

INDEX METHODOLOGY

HSBC Vantage+ Index (USD) Excess return

Version 1.1

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INTRODUCTION

This document (the “Index Methodology”) describes the methodology with regard to the composition, calculation and maintenance of the HSBC Vantage+ Index (USD) Excess return (the “Index”). Any amendment to the Index rules is subject to the approval of an oversight committee, as specified in section 5.5. The Index is calculated, administered and published by Solactive AG (“Solactive”) assuming the role as administrator (the “INDEX ADMINISTRATOR”) under the Regulation (EU) 2016/1011 (the “BENCHMARK REGULATION” or “BMR”). The name “Solactive” is trademarked. The Index is owned by HSBC Bank plc (“HSBC”).

This document and the policies and guidelines referenced herein contain the underlying principles and rules regarding the construction and operation of the Index. The Index is proprietary to HSBC. No use or publication may be made of the Index, or any of its provisions or values, without the prior written consent of HSBC.

Neither HSBC nor Solactive assumes any obligation or duty to any party and under no circumstances does HSBC or Solactive assume any relationship of agency or trust or of a fiduciary nature for or with any party. Any calculations or determinations in respect of the Index or any part thereof shall, unless otherwise specified, be made by Solactive, acting in good faith and in a commercially reasonable manner and shall (except in the case of manifest error) be final, conclusive and binding. The term “manifest error” as used herein shall mean an error that is plain and obvious and can be identified from the results of the calculation or determination itself without: (i) recourse to any underlying data; or (ii) any application or re-application of any formulae.

Neither HSBC nor Solactive makes any express or implied representations or warranties as to (a) the advisability of purchasing or assuming any risk in connection with any transaction or investment linked to the Index, (b) the levels at which the Index stands at any particular time on any particular date, (c) the results to be obtained by any party from the use of the Index or any data included in it for the purposes of issuing securities or carrying out any financial transaction linked to the Index or (d) any other matter. Calculations may be based on information obtained from various publicly available sources. Solactive has relied on these sources and has not independently verified the information extracted from these sources and accepts no responsibility or liability in respect thereof.

Without prejudice to the foregoing, in no event shall HSBC or Solactive have any liability for any indirect, special, punitive or consequential damages (provided that any such damage is not reasonably foreseeable) even if notified of the possibility of such damages. The publication of the Index by Solactive does not constitute a recommendation for capital investment and does not contain any assurance or opinion of Solactive regarding a possible investment in a financial instrument based on this Index.



1. INDEX SPECIFICATIONS

1.1. SCOPE OF THE INDEX

The Index is denominated in USD (the “Index Currency”) and follows a rules-based, quantitative, long-only asset allocation strategy.

The Index dynamically allocates across a diversified portfolio of 14 assets (each, an “Asset”) consisting of 13 exchange-traded funds (each, an “ETF Asset”) and a cash index. The Assets are classified in 6 different groups (each, a “Group”): Developed Equities, Developed Bonds, Emerging Markets, Real Assets, Inflation and Cash. The weight of each Asset and each Group are subject to caps.

The Index uses modern portfolio theory principles and the related concept of efficient frontier to allocate between the Assets: the Index seeks to allocate to the portfolio of Assets with the highest past return for a given level of risk, in this case equivalent to a volatility of 5%. Such allocation is adjusted on a monthly basis over three Index Business Days.

The exposure of the Index to this portfolio of Assets varies between 0% and 150% and may be adjusted on each Index Business Day to aim to achieve a volatility of 6% for the Index.

The Index is excess return, which reflects the weighted performance of the portfolio of Assets in excess of the performance of the Cash Asset and incorporates a fee of 0.85% per annum, deducted daily.

1.2. IDENTIFIERS AND PUBLICATION

The Index is published under the following identifiers:

Name	ISIN	RIC	Bloomberg code
HSBC Vantage Plus Index	DE000SLA7P58	HSIEVPLS	HSIEVPLS Index

The Index is published via the price marketing services of Boerse Stuttgart GmbH and may be distributed to all of its affiliated vendors. Each vendor decides on an individual basis as to whether it will distribute or display the Index via its information systems. In the event that the level of the Index cannot be provided to the price marketing services of Boerse Stuttgart GmbH, the Index cannot be published.

1.3. CALCULATION FREQUENCY

The level of the Index is calculated in respect of each Index Business Day from, and including, 17 July 2003 (the “Index Start Date”).

The level of the Index has been calculated on a live basis from, and including, 29 April 2019 (the “Index Live Date”).



2. CALCULATION OF THE INDEX

2.1. INDEX CONSTITUENTS

The Index dynamically allocates across a diversified portfolio of 14 Assets set forth in the Table of Assets below.

The weight of each Asset is subject to a cap (the “Asset Cap”) and the weight of each Group is also subject to a cap (the “Group Cap”) (the Asset Caps and Group Caps are collectively the “Caps”), as set forth in the Table of Assets below.

Table of Assets

Group	Asset	Bloomberg Code	Primary Exchange	Asset Cap	Group Cap	Currency
Developed Equities	SPDR® S&P 500® ETF	SPY	NYSE Arca	40%	60%	USD
	iShares® Russell 2000 ETF	IWM	NYSE Arca	20%		USD
	Invesco S&P 500® Low Volatility ETF	SPLV	NYSE Arca	20%		USD
	Invesco QQQ Trust SM , Series 1	QQQ	Nasdaq GM	20%		USD
	iShares® MSCI EAFE ETF	EFA	NYSE Arca	20%		USD
Developed Bonds	iShares® 20+ Year Treasury Bond ETF	TLT	Nasdaq	40%	80%	USD
	iShares® iBoxx \$ Investment Grade Corporate Bond ETF	LQD	NYSE Arca	40%		USD
	iShares® iBoxx \$ High Yield Corporate Bond ETF	HYG	NYSE Arca	15%		USD
Emerging Markets	iShares® MSCI Emerging Markets ETF	EEM	NYSE Arca	20%	30%	USD
	iShares® J.P. Morgan USD Emerging Markets Bond ETF	EMB	Nasdaq GM	10%		USD
Real Assets	iShares® U.S. Real Estate ETF	IYR	NYSE Arca	20%	30%	USD
	SPDR® Gold Shares	GLD	NYSE Arca	20%		USD
Inflation	iShares® TIPS Bond ETF	TIP	NYSE Arca	5%	5%	USD
Cash	Cash Asset – Reinvested ICE LIBOR USD 3 Month	Not Applicable	Not Applicable	0%*	Not Applicable	USD

* Subject as provided in section 3.2.



2.2. INDEX LEVEL CALCULATION

The level of the Index (the “Index Level”) in respect of the Index Start Date shall be equal to 100.

The Index Level in respect of each Index Business Day after the Index Start Date (“Index Business Day t”) shall be calculated in accordance with the following formula:

$$IL_t = IL_{t-1} \times \left[1 + E_{t-1} \left(\frac{ERPL_t}{ERPL_{t-1}} - 1 \right) - Fee \times \frac{Days_{t-1,t}}{360} \right]$$

Where:

- IL_t Means the Index Level in respect of Index Business Day t;
- IL_{t-1} Means the Index Level in respect of the Index Business Day immediately preceding Index Business Day t;
- E_{t-1} Means the exposure in respect of the Index Business Day immediately preceding Index Business Day t, calculated in accordance with the following formula:

$$E_{t-1} = \min \left(\text{Max Exposure}, \frac{\text{Target Volatility}}{RV_{t-2}} \right)$$

Where:

Max Exposure means 150%;

Target Volatility means 6%;

RV_{t-2} means the Realized Volatility (as defined in section 2.3) in respect of the day falling two Index Business Days prior to Index Business Day t;

- $ERPL_t$ Means the ER Portfolio Level (as defined in section 2.4) in respect of Index Business Day t;
- $ERPL_{t-1}$ Means the ER Portfolio Level in respect of the Index Business Day immediately preceding Index Business Day t;
- Fee Means 0.85% (per annum);
- $Days_{t-1,t}$ Means the number of calendar days from, but excluding, the Index Business Day immediately preceding Index Business Day t to, and including, Index Business Day t.

2.3. REALIZED VOLATILITY CALCULATION

The realized volatility (the “Realized Volatility”) in respect of the 17 July 2003 shall be equal to 6.41979%.



The Realized Volatility in respect of each Index Business Day after 17 July 2003 (“Index Business Day t”) shall be calculated in accordance with the following formula:

$$RV_t = \max (RV_{s,t}, RV_{l,t})$$

Where:

RV_t Means the Realized Volatility in respect of Index Business Day t;

$RV_{s,t}$ Means the short term realized volatility in respect of Index Business Day t, calculated in accordance with the following formula:

$$RV_{s,t} = \sqrt{252 \times \text{Var}_{s,t}}$$

Where:

$\text{Var}_{s,t}$ Means the short term realized variance in respect of Index Business Day t, determined in accordance with the following formula:

$$\text{Var}_{s,t} = \lambda_s \times \text{Var}_{s,t-1} + (1 - \lambda_s) \times \left[\ln \left(\frac{\text{ERPL}_t}{\text{ERPL}_{t-1}} \right) \right]^2$$

$\text{Var}_{s,t-1}$ Means the short term realized variance in respect of the Index Business Day immediately preceding Index Business Day t, provided that the short term realized variance in respect of 17 July 2003 shall be equal to 0.0016355%;

λ_s Means 0.94;

$RV_{l,t}$ Means the long term realized volatility in respect of Index Business Day t, calculated in accordance with the following formula:

$$RV_{l,t} = \sqrt{252 \times \text{Var}_{l,t}}$$

Where:

$\text{Var}_{l,t}$ Means the long term realized variance in respect of Index Business Day t, determined in accordance with the following formula:

$$\text{Var}_{l,t} = \lambda_l \times \text{Var}_{l,t-1} + (1 - \lambda_l) \times \left[\ln \left(\frac{\text{ERPL}_t}{\text{ERPL}_{t-1}} \right) \right]^2$$

$\text{Var}_{l,t-1}$ Means the long term realized variance in respect of the Index Business Day immediately preceding Index Business Day t, provided that the long term realized variance in respect of 17 July 2003 shall be equal to 0.00136656%;



λ_1 Means 0.97;

$ERPL_t$ Means the ER Portfolio Level (as defined in section 2.4) in respect of Index Business Day t ;

$ERPL_{t-1}$ Means the ER Portfolio Level in respect of the Index Business Day immediately preceding Index Business Day t .

2.4. ER PORTFOLIO LEVEL CALCULATION

The excess return level of the portfolio (the “ER Portfolio Level”) in respect of 24 February 2003 (the “ER Portfolio Start Date”) shall be equal to 100.

The ER Portfolio Level in respect of each Index Business Day after the ER Portfolio Start Date (“Index Business Day t ”) shall be calculated in accordance with the following formula:

$$ERPL_t = ERPL_{t-1} \times \left[1 + \left(\frac{RP_t}{RP_{t-1}} - 1 \right) - \left(\frac{C_t}{C_{t-1}} - 1 \right) \right]$$

$ERPL_t$ Means the ER Portfolio Level in respect of Index Business Day t ;

$ERPL_{t-1}$ Means the ER Portfolio Level in respect of the Index Business Day immediately preceding Index Business Day t ;

RP_t Means the Reference Portfolio Level (as defined in section 2.5) in respect of Index Business Day t ;

RP_{t-1} Means the Reference Portfolio Level in respect of the Index Business Day immediately preceding Index Business Day t ;

C_t Means the Total Return Level (as defined in section 2.6) of the Cash Asset in respect of Index Business Day t ;

C_{t-1} Means the Total Return Level of the Cash Asset in respect of the Index Business Day immediately preceding Index Business Day t ;

2.5. REFERENCE PORTFOLIO LEVEL CALCULATION

The reference level of the portfolio (the “Reference Portfolio Level”) in respect of the ER Portfolio Start Date shall be equal to 100.

The Reference Portfolio Level in respect of each Index Business Day after the ER Portfolio Start Date (“Index Business Day t ”) shall be calculated in accordance with the following formulas:



- a) If Index Business Day t falls in the period starting on, but excluding, the ER Portfolio Start Date and ending on, and including, the first Index Business Day of the Rebalancing Period immediately following the ER Portfolio Start Date:

$$RP_t = RP_0 \times \sum_{i=1}^n W_{i,0} \times \frac{TR_{i,t}}{TR_{i,0}}$$

Where:

RP_t	Means the Reference Portfolio Level in respect of Index Business Day t ;
RP_0	Means the Reference Portfolio Level in respect of the ER Portfolio Start Date;
$W_{i,0}$	Means the Asset Weight (as defined in section 3.3) of Asset i in respect of the Selection Date falling on the ER Portfolio Start Date;
$TR_{i,t}$	Means the Total Return Level (as defined in section 2.6) of Asset i in respect of Index Business Day t ;
$TR_{i,0}$	Means the Total Return Level of Asset i in respect of the ER Portfolio Start Date;
n	Means the number of Assets;

- b) If Index Business Day t falls in the period starting on, but excluding, the first Index Business Day of a Rebalancing Period and ending on, and including, the last Index Business Day of such Rebalancing Period:

$$RP_t = RP_{t-1} * \left[\left(1 - \frac{k}{3} \right) \times \left(\sum_{i=1}^n EW_{i,t} \times \frac{TR_{i,t}}{TR_{i,t-1}} \right) + \frac{k}{3} \times \left(\sum_{i=1}^n W_{i,s} \times \frac{TR_{i,t}}{TR_{i,t-1}} \right) \right]$$

Where:

RP_t	Means the Reference Portfolio Level in respect of Index Business Day t ;
RP_{t-1}	Means the Reference Portfolio Level in respect of the Index Business Day immediately preceding Index Business Day t ;
$TR_{i,t}$	Means the Total Return Level of Asset i in respect of Index Business Day t ;
$TR_{i,t-1}$	Means the Total Return Level of Asset i in respect of the Index Business Day immediately preceding Index Business Day t ;



$W_{i,s}$	Means the Asset Weight of Asset i in respect of the Selection Date immediately preceding such Rebalancing Period;
k	Means, if Index Business Day t falls on (i) the second day of such Rebalancing Period, 1; or (ii) the third day of such Rebalancing Period, 2;
$EW_{i,t}$	Means the effective weight of Asset i in respect of Index Business Day t, calculated in accordance with the following formula:

$$EW_{i,t} = \frac{W_{i,s-1} \times \frac{TR_{i,t-1}}{TR_{i,r-1}}}{\sum_{i=1}^n W_{i,s-1} \times \frac{TR_{i,t-1}}{TR_{i,r-1}}}$$

Where:

$W_{i,s-1}$	Means the Asset Weight of Asset i in respect of the Selection Date immediately preceding the Selection Date immediately preceding such Rebalancing Period;
$TR_{i,r-1}$	Means the Total Return Level of Asset i in respect of the last Index Business Day of the Rebalancing Period immediately preceding such Rebalancing Period (or, if none, in respect of the ER Portfolio Start Date);
n	Means the number of Assets;

c) Otherwise:

$$RP_t = RP_r \times \sum_{i=1}^n W_{i,s} \times \frac{TR_{i,t}}{TR_{i,r}}$$

Where:

RP_t	Means the Reference Portfolio Level in respect of Index Business Day t;
RP_r	Means the Reference Portfolio Level in respect of the last Index Business day of the Rebalancing Period immediately preceding Index Business Day t;
$W_{i,s}$	Means the Asset Weight of Asset i in respect of the Selection Date immediately preceding the Rebalancing Period immediately preceding Index Business Day t;
$TR_{i,t}$	Means the Total Return Level of Asset i in respect of Index Business Day t;



$TR_{i,r}$ Means the Total Return Level of Asset i in respect of the last Index Business day of the Rebalancing Period immediately preceding Index Business Day t.

2.6. TOTAL RETURN LEVEL OF AN ASSET

The total return level (the “Total Return Level”) of each Asset in respect of 26 July 2002 (“Asset Total Return Level Start Date”) shall be equal to 100.

The Total Return Level of each Asset (“Asset i”) in respect of each Index Business Day after the Asset Total Return Level Start Date (“Index Business Day t”) shall be calculated in accordance with the following formula:

a) If Asset i is the Cash Asset:

$$TR_{Cash,t} = TR_{Cash,t-1} \times \left(1 + r_{t-1} \times \frac{Act_{t-1,t}}{360} \right)$$

Where:

$TR_{Cash,t}$ Means the Total Return Level of the Cash Asset in respect of Index Business Day t;

$TR_{Cash,t-1}$ Means the Total Return Level of the Cash Asset in respect of the Index Business Day immediately preceding Index Business Day t;

r_{t-1} Means the LIBOR Rate in respect of the first Index Business Day preceding Index Business Day t until July 14th 2022, due to LIBOR cessation, after which the SOFR Rate is used. The latter is applied before index calculation in the morning CET time, resulting in a 2-day lag.

$Act_{t-1,t}$ Means the number of calendar days from, but excluding, the Index Business Day immediately preceding Index Business Day t to, and including, Index Business Day t;

b) Otherwise, subject as provided in section 4:

$$TR_{i,t} = TR_{i,t-1} \times \frac{P_{i,t} + Div_{i,t}}{P_{i,t-1}}$$

Where:

$TR_{i,t}$ Means the Total Return Level of Asset i in respect of Index Business Day t;

$TR_{i,t-1}$ Means the Total Return Level of Asset i in respect of the Index Business Day immediately preceding Index Business Day t (as determined in accordance with section 4, if applicable);

$P_{i,t}$ Means the Price of Asset i in respect of Index Business Day t;

$P_{i,t-1}$ Means the Price of Asset i in respect of the Index Business Day immediately preceding Index Business Day t;



$Div_{i,t}$ Means the aggregate amount of dividends for Asset i with an ex-dividend date falling in the period from, but excluding, the Index Business Day immediately preceding Index Business Day t to, and including, Index Business Day t ;

2.7. PUBLICATION AND ACCURACY

The Index Level is published around 16:50 New York time on Bloomberg and Reuters with levels rounded to two decimal places.

2.8. CORPORATE ACTIONS

Corporate actions on the Assets that are exchange-traded funds (other than dividends) will be treated in accordance with the methodology described in the Solactive [Equity Index Methodology](#), which is incorporated by reference herein and available on the Solactive website: www.solactive.com.

2.9. RECALCULATION

Solactive makes the greatest possible efforts to accurately calculate and maintain its indices. However, errors in the index determination process may occur from time to time for a variety of reasons (internal or external) and therefore, cannot be completely ruled out. Solactive endeavors to correct all errors that have been identified within a reasonable timeframe. Such timeframe, as well as the general measures to be taken generally depend on the underlying and are specified in the Solactive [Correction Policy](#), which is incorporated by reference herein and available on the Solactive website: www.solactive.com.

2.10. MARKET DISRUPTION

Subject to section 2.11 hereof, following certain market disruption events, Solactive calculates its indices following predefined and exhaustive arrangements, as described in the Solactive [Disruption Policy](#), which is incorporated by reference herein and available on the Solactive website: www.solactive.com. Such market disruption events can arise due to a variety of reasons, and generally result in inaccurate or delayed prices for one or more components of the Index. The determination of the Index may be limited or impaired at times of illiquid or fragmented markets and market stress.

2.11. EXTRAORDINARY EVENTS

Extraordinary and unforeseeable events not addressed by this section 2.11 will be treated as described in section 4.9 of the Solactive [Disruption Policy](#).



- a) Extraordinary Events Definition. “Extraordinary Event” in respect of an ETF Asset means an event deemed as extraordinary by Solactive, which may include, by way of example and without limitation:
 - i) an ETF Asset is de-listed from the relevant exchange for such ETF Asset, liquidated, or otherwise terminated; or
 - ii) the Price of any ETF Asset is not published by the Primary Exchange where it is listed for 8 consecutive Index Business Days.
- b) Consequences of Extraordinary Events. For any ETF Asset, (i) if its Price is not published by its Primary Exchange, but is published by a successor Primary Exchange acceptable to Solactive or (ii) if it is replaced by a successor ETF whose underlying commodities are the same as those of the replaced ETF Asset or whose ETF Underlying Index is either the same as that of the replaced ETF Asset or is an index using, in Solactive’s determination, the same or a substantially similar formula for and method of calculation as used in the calculation of the replaced ETF Asset’s ETF Underlying Index and, in any case, whose sponsor is acceptable to Solactive, then in the case of (i) or (ii) above that ETF Asset will thereafter be deemed to be the successor ETF so calculated and announced by that successor sponsor described in (i) above or that successor ETF described in (ii) above, as the case may be, with effect from a date determined by Solactive, who may make such adjustments to these Index rules as it determines are appropriate to account for such change. Upon the acceptance of a successor ETF by Solactive, such successor shall take the place of the relevant ETF Asset. For the avoidance of doubt, the prior daily prices of such successor shall be used in future calculations of the Reference Portfolio Level in future.
- c) The consequences of Extraordinary Events in section 2.11(b) will supersede anything to the contrary in the Solactive Equity Index Methodology or the Solactive Disruption Policy.

2.12. LIBOR UNAVAILABILITY AND CESSATION

- (a) In the event that the USD 3 Month LIBOR Rate does not appear on the Price Source at approximately 11:00 a.m., London time, on the Interest Determination Date, then Solactive will use for the calculation of the Index the most recent available USD 3 Month LIBOR Rate published on the Price Source.
- (b) If Solactive determines that USD 3 Month LIBOR (1) is no longer representative as a measure of the average rate at which banks are willing to borrow wholesale unsecured funds in the London interbank market or (2) has been discontinued at any time, it will substitute for USD 3 Month LIBOR an industry-accepted substitute or successor rate (the “LIBOR Successor Rate”), including any adjustment to or related spread on such LIBOR Successor Rate, in each case in its sole discretion and in accordance with Section 5.5. In the event that Solactive determines, in its sole discretion, that there is no industry-accepted substitute or successor rate and that there are no quotations provided as described in Section 2.12(a), then, after consulting such sources as it deems reasonable, it will estimate the USD 3 Month LIBOR rate in its sole discretion from time to time to use as the LIBOR Successor Rate. Further, if Solactive subsequently determines, in its sole discretion, that an industry-accepted substitute or successor rate has emerged or otherwise become available, it will cease to estimate the LIBOR Successor Rate and instead substitute such industry-accepted substitute or successor rate as provided in the first sentence of this Section 2.12(b).



If Solactive has determined a LIBOR Successor Rate (including any such adjustment and/or spread) in accordance with the foregoing, Solactive in its sole discretion may also implement changes to the Index rules as it determines are appropriate to account for such change to the LIBOR Successor Rate, including, but not limited to, the definition of any business day (including a London Business Day), interest determination dates and any method for obtaining the LIBOR Successor Rate if such rate is unavailable on the relevant date of determination, and any changes to any such adjustment and/or spread, in a manner that is consistent with industry-accepted practices for the LIBOR Successor Rate. Once Solactive chooses a LIBOR Successor Rate, such LIBOR Successor Rate will be used in place of USD 3 Month LIBOR for all calculations, and the term “USD 3 Month LIBOR,” as used in this methodology, shall be then deemed to refer to the LIBOR Successor Rate.

3. REBALANCING OF THE INDEX

3.1. INDEX REBALANCING

In respect of each Selection Date, a mean-variance optimisation process as described below (the “Portfolio Optimisation Process”) is performed and the Index Administrator will revise the composition of the Index. The determination of the composition of the Index is fully rule-based: the Index Administrator has no discretion. The rebalancing of the Index is then performed during the Rebalancing Period.

3.2. PORTFOLIO OPTIMISATION PROCESS

In respect of each Selection Date and for each Observation Period, an optimal portfolio of Assets shall be determined.

The optimal portfolio of assets in respect of a Selection Date and an Observation Period ending on such Selection Date shall be the Eligible Portfolio with the highest Return (as defined below) over such Observation Period, with a Variance (as defined below) no greater than 0.05^2 (the “Target Variance”) (such constraint, the “Variance Constraint”).

Provided that, in respect of a Selection Date, if no Eligible Portfolio meets the Variance Constraint:

- the Target Variance in respect of such Selection Date will be increased in increments of 0.0025^2 until an Eligible Portfolio meets the revised Variance Constraint, subject to a maximum value for the Target Variance of 0.075^2 .
- if, in respect of such Selection Date, no Eligible Portfolio has a Variance no greater than 0.075^2 , then the Asset Cap for the Cash Asset in respect of such Selection Date will be increased in increments of 10% until an Eligible Portfolio with a Variance no greater than 0.075^2 is found.

3.3. DETERMINATION OF ASSET WEIGHTS

The weight (“Asset Weight”) of each Asset (“Asset i”) in respect of each Selection Date (“Selection Date s”) shall be calculated in accordance with the following formula:



$$W_{i,s} = \frac{W_{i,s}^l + W_{i,s}^s}{2}$$

Where:

$W_{i,s}$	Means the Asset Weight of Asset i in respect of Selection Date s;
$W_{i,s}^l$	Means the weight of Asset i in the optimal portfolio in respect of Selection Date s for the Long Term Observation Period ending on Selection Date s, as determined in accordance with section 3.2;
$W_{i,s}^s$	Means the weight of Asset i in the optimal portfolio in respect of Selection Date s for the Short Term Observation Period ending on Selection Date s, as determined in accordance with section 3.2.

3.4. RETURN OF AN ELIGIBLE PORTFOLIO

The return (“Return”) of an Eligible Portfolio in respect of a Selection Date (“Selection Date s”) and an Observation Period ending on such Selection Date shall be calculated in accordance with the following formula:

$$R_{s,p} = \sum_{i=1}^n W_i' \times \frac{TR_{i,s}}{TR_{i,s,p}}$$

Where:

$R_{s,p}$	Means the Return of such Eligible Portfolio in respect of Selection Date s and such Observation Period;
W_i'	Means the weight attributed to Asset i in such Eligible Portfolio;
$TR_{i,s}$	Means the Total Return Level of Asset i in respect of Selection Date s;
$TR_{i,s,p}$	Means the Total Return Level of Asset i in respect of the first Index Business Day of such Observation Period;
n	Means the number of Assets.

3.5. VARIANCE OF AN ELIGIBLE PORTFOLIO

The variance (“Variance”) of an Eligible Portfolio in respect of a Selection Date (“Selection Date s”) shall be calculated in accordance with the following formula:



$$\text{Var}_s = \sum_{i,j=1}^n W_i' \times W_j' \times \text{Cov}_{i,j}$$

Where:

Var_s	Means the Variance of such Eligible Portfolio in respect of Selection Date s;
W_i'	Means the weight attributed to Asset i in such Eligible Portfolio;
W_j'	Means the weight attributed to Asset j in such Eligible Portfolio;
n	Means the number of Assets;
$\text{cov}_{i,j}$	Means the covariance between Asset i and Asset j, calculated in accordance with the following formula:

$$\text{cov}_{i,j} = \frac{252}{5 \times (N - 1)} \sum_{k=0}^{N-1} \left(\left(\frac{\text{TR}_{i,s-k}}{\text{TR}_{i,s-k-5}} - 1 \right) - \bar{R}_i \right) \times \left(\left(\frac{\text{TR}_{j,s-k}}{\text{TR}_{j,s-k-5}} - 1 \right) - \bar{R}_j \right)$$

Where:

N	Means 126;
$\text{TR}_{i,s-k}$	Means the Total Return Level of Asset i in respect of the Index Business Day falling k Index Business Days before Selection Date s;
$\text{TR}_{i,s-k-5}$	Means the Total Return Level of Asset i in respect of the Index Business Day falling k+5 Index Business Days before Selection Date s;
$\text{TR}_{j,s-k}$	Means the Total Return Level of Asset j in respect of the Index Business Day falling k Index Business Days before Selection Date s;
$\text{TR}_{j,s-k-5}$	Means the Total Return Level of Asset j in respect of the Index Business Day falling k+5 Index Business Days before Selection Date s;
\bar{R}_i	Means an amount calculated in accordance with the following formula:

$$\bar{R}_i = \frac{1}{N} \times \sum_{k=0}^{N-1} \left(\frac{\text{TR}_{i,s-k}}{\text{TR}_{i,s-k-5}} - 1 \right);$$

\bar{R}_j	Means an amount calculated in accordance with the following formula:
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$$\bar{R}_j = \frac{1}{N} \times \sum_{k=0}^{N-1} \left(\frac{\text{TR}_{j,s-k}}{\text{TR}_{j,s-k-5}} - 1 \right).$$



4. BACKTESTING AND DATA

4.1. BACKTEST EXTENSION

In order to extend the backtest of the Index, the time series for the Assets set forth in the Table of Extended Assets below have been extended prior to their existence using the levels of their respective underlying indices. An adjustment has been applied to account for the expense ratio of an exchange-traded fund, that is not reflected in the level of the underlying index.

The Total Return Level of each such Asset in respect of the Asset Total Return Level Start Date shall be equal to 100.

The Total Return Level of each such Asset ("Asset i") in respect of each Index Business Day ("Index Business Day t") from, but excluding, the Asset Total Return Level Start Date to, and including, the ETF Start Date in respect of such Asset, as set forth in the Table of Extended Assets below, shall be calculated in accordance with the following formula:

$$TR_{i,t} = TR_{i,t-1} \times \left(\frac{P_{i,t}}{P_{i,t-1}} - TER_i \times \frac{Act_{t-1,t}}{365} \right)$$

Where:

- $TR_{i,t}$ Means the Total Return Level of Asset i in respect of Index Business Day t;
- $TR_{i,t-1}$ Means the Total Return Level of Asset i in respect of the Index Business Day immediately preceding Index Business Day t;
- $P_{i,t}$ Means the ETF Underlying Index Level of Asset i in respect of Index Business Day t;
- $P_{i,t-1}$ Means the ETF Underlying Index Level of Asset i in respect of the Index Business Day immediately preceding Index Business Day t;
- TER_i Means the Total Expense Ratio of Asset i, as set forth in the Table of Extended Assets below;
- $Act_{t-1,t}$ Means the number of calendar days from, but excluding, the Index Business Day immediately preceding Index Business Day t to, and including, Index Business Day t;

Table of Extended Assets

Asset	ETF Start Date	ETF Underlying Index	ETF Underlying Index Bloomberg Code	Total Expense Ratio
Invesco S&P 500® Low Volatility ETF	05 May 2011	S&P 500 Low Volatility Total Return Index	SP5LVIT Index	0.25%
iShares® iBoxx \$ High Yield Corporate Bond ETF	11 April 2007	iBoxx USD Liquid High Yield Index	IBOXHY Index	0.49%
iShares® MSCI Emerging Markets ETF	11 April 2003	MSCI Daily Total Return Net Emerging Markets USD	NDUEEGF Index	0.69%
iShares® J.P. Morgan USD Emerging Markets Bond ETF	19 December 2007	J.P. Morgan EMBI Global Core	JPEICORE Index	0.40%



SPDR® Gold Shares	18 November 2004	LBMA Gold Price	GOLDLNPM Index	0.40%
iShares® TIPS Bond ETF	05 December 2003	Bloomberg Barclays US Treasury Inflation-Linked Bond Index	LBUTTRUU Index	0.20%

4.2. MISSING DATA FOR EXCHANGE TRADED FUNDS

For certain Assets that are exchange-traded funds, the relevant volume weighted average price was not published by the Price Source for a certain period of time from, and including, the ETF Start Date in respect of such Asset. In such situation, the official composite closing price of such Asset, as published by the Price Source, has been used instead.

5. MISCELLANEOUS

5.1. DISCRETION

Any discretion which may need to be exercised in relation to the determination of the Index shall be limited to (i) exercising routine judgment (in the expert view of the Index Administrator) in the administration of the Index rules, provided, however, that such routine judgment does not include deviations or alterations to the Index rules that are designed to improve the financial performance of the Index, (ii) correcting errors in the implementation of the rules or calculations made pursuant to the rules, or (iii) making an adjustment to respond to an unanticipated event outside of Solactive's control, such as a stock split, merger, listing or delisting, nationalization, or insolvency, a disruption in the financial markets for specific assets or in a particular jurisdiction, regulatory compliance requirement, force majeure, or any other unanticipated event of similar magnitude and significance, subject to sections 2.8 through 2.12 hereof.

5.2. METHODOLOGY REVIEW

The Index Methodology is reviewed annually to ensure that it remains representative of the relevant market or economic reality the Index is intended to reflect.

5.3. CHANGES IN CALCULATION METHOD

The application by the Index Calculation Agent of the method described in this document is final and binding. The Index Calculation Agent shall apply the method described above for the composition and calculation of the Index. However, it cannot be excluded that the market environment, supervisory, legal, financial or tax reasons may require changes to be made to this method. In such cases, the Index Administrator may make changes to the terms and conditions of the Index and the method applied to calculate the Index that it deems to be necessary and desirable in order to prevent obvious or demonstrable error or to remedy, correct or supplement incorrect terms and conditions.



5.4. TERMINATION

Solactive makes the greatest possible efforts to ensure the resilience and continued integrity of its indices over time. Nevertheless, if no other options are available, the orderly cessation of an index may be necessary. This is usually the case when the underlying market or economic reality, which an index is set to measure or to reflect, changes substantially and in a way not foreseeable at the time of inception of the Index, the index rules, and particularly the selection criteria, can no longer be applied coherently or the Index is no longer used as the underlying value for financial instruments, investment funds and financial contracts.

Solactive has established and maintains clear guidelines on how to identify situations in which the cessation of an index is unavoidable, how stakeholders are to be informed and consulted and the procedures to be followed for a termination or the transition to an alternative index. Details are specified in the Termination Policy, which is incorporated by reference and available on the Solactive website: www.solactive.com.

5.5. OVERSIGHT

The Index Administrator is responsible for decisions regarding any amendments to the Index rules. Any such amendment, which may result in an amendment of the Index Methodology, must be submitted to an oversight committee for prior approval, in accordance with Solactive's "Methodology Policy", which is available at www.solactive.com.

6. DEFINITIONS

"Asset" has the meaning given to it in section 1.1.

"Asset Cap" has the meaning given to it in section 2.1.

"Asset Total Return Level Start Date" has the meaning given to it in section 2.6.

"Asset Weight" has the meaning given to it in section 3.3.

"Caps" has the meaning given to it in section 2.1.

"Eligible Portfolio" means any hypothetical portfolio composed of the Assets that satisfies the following constraints: (i) the weights attributed to the Assets do not breach the Asset Caps and Group Caps (as detailed in the Table of Assets in section 2.1); (ii) the weight attributed to each Asset must not be negative and (iii) the aggregate of the weights attributed to the Assets must be equal to 1.

"ER Portfolio Level" has the meaning given to it in section 2.4.

"ER Portfolio Start Date" has the meaning given to it in section 2.4.

"ETF Asset" has the meaning given to it in section 1.1.

"ETF Underlying Index" means, in respect of an ETF Asset, the index underlying such ETF Asset.



“ETF Underlying Index Level” means, in respect of an Index Business Day, the official closing level of the ETF Underlying Index in respect of such Asset (as set forth in the Table of Extended Assets in section 4.1) on such Index Business Day, as published by the Price Source.

“Group” has the meaning given to it in section 1.1.

“Group Cap” has the meaning given to it in section 2.1.

“Index” has the meaning given to it in the Introduction.

“Index Administrator” means Solactive.

“Index Business Day” means each day on which the Primary Exchanges in respect of all the Assets are scheduled to be open for trading for their regular trading session.

“Index Calculation Agent” means Solactive.

“Index Currency” has the meaning given to it in section 1.1.

“Index Level” has the meaning given to it in section 2.2.

“Index Live Date” has the meaning given to it in section 1.3.

“Index Methodology” has the meaning given to it in the Introduction.

“Index Start Date” has the meaning given to it in section 1.3.

“Interest Determination Date” means the second London Business Day prior to the relevant Index Business Day.

“LIBOR Successor Rate” has the meaning given to it in Section 2.12.

“London Business Day” means any day on which commercial banks are open for business, including dealings in U.S. dollars, in London.

“Long Term Observation Period” means, in respect of a Selection Date, the period starting from, and including, the sixth Observation Period Start Date preceding such Selection Date and ending on, and including, such Selection Date.

“Observation Period” means each Short Term Observation Period and each Long Term Observation Period.

“Observation Period Start Date” means the fourth Index Business Day immediately preceding the last Index Business Day of each month.

“Portfolio Optimisation Process” has the meaning given to it in section 3.1.

“Price” means, in respect of an Index Business Day and each ETF Asset, the volume weighted average price from the open to the close of trading of such Asset on such Index Business Day on the Primary Exchange in respect of such Asset as published by the Price Source, except as provided in section 4.

“Price Source” means the Thomson Reuters Corporation (including any successor publisher).

“Primary Exchange” means, in respect of an Asset, the exchange on which such Asset is primarily listed. The Primary Exchange of each Asset as of the Index Live Date is set forth in the column “Primary Exchange” in the Table of Assets in section 2.1.

“Realized Volatility” has the meaning given to it in section 2.3.



“Rebalancing Period” means the period of three consecutive Index Business Days commencing on, but excluding, each Selection Date after the ER Portfolio Start Date.

“Reference Portfolio Level” has the meaning given to it in section 2.5.

“Return” has the meaning given to it in section 3.4.

“Selection Date” means (i) the ER Portfolio Start Date and (ii) the fourth Index Business Day immediately preceding the last Index Business Day of each month falling after the ER Portfolio Start Date.

“Short Term Observation Period” means, in respect of a Selection Date, the period starting from, and including, the third Observation Period Start Date preceding such Selection Date and ending on, and including, such Selection Date.

“Solactive” has the meaning given to it in the Introduction.

“SOFR Rate” means, in respect of an Index Business Day, the New York Federal Reserve SOFR Rate at approximately 8:00 a.m. New York Time.

“Target Variance” has the meaning given to it in section 3.2.

“Total Return Level” has the meaning given to it in section 2.6.

“USD 3-Month LIBOR Rate” means, in respect of an Index Business Day, the ICE LIBOR USD 3 Month rate at approximately 11:00 a.m., London time, on the Interest Determination Date, for 3-month U.S. dollar deposits commencing on that Index Business Day, as published by the Price Source, except as provided in Section 2.12.

“Variance” has the meaning given to it in section 3.5.

“Variance Constraint” has the meaning given to it in section 3.2.

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