

INDEX GUIDELINE

Solactive US Treasury Bond Index Family

Version 1.2

28 September 2018



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Introduction

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INTRODUCTION

This document (the "Guideline") is to be used as a guideline with regard to the composition, calculation and maintenance of the Solactive US Treasury Bond Index Family. Any changes made to the Guideline are initiated by the Committee specified in Section 1.6. The Index is calculated and published by Solactive AG. The name "Solactive" is trademarked.

It contains the underlying principles and rules regarding the structure and operation of the Solactive US Treasury Bond Index Family (the "Index"). Solactive AG shall make every effort to implement the applicable regulations. Solactive AG does not offer any explicit or tacit guarantee or assurance, neither pertaining to the results from the use of the Index nor the Index value at any certain point in time nor in any other respect. The Index is merely calculated and published by Solactive AG and it strives to the best of its ability to ensure the correctness of the calculation. There is no obligation for Solactive AG – irrespective of possible obligations to issuers – to advise third parties, including investors and/or financial intermediaries, of any errors in the Index. The publication of the Index by Solactive AG does not constitute a recommendation for capital investment and does not contain any assurance or opinion of Solactive AG regarding a possible investment in a financial instrument based on this Index.



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Index Specifications

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1 INDEX SPECIFICATIONS

- > Solactive US Treasury Bond Index Family is a rules-based, market value weighted index designed to track the performance of USD-denominated bonds issued by the US Treasury.
- > The index family consists of the broad Solactive US Treasury Index and four further sub-indices broken down by maturity:
 - ✓ Solactive US Treasury Bond Index
 - ✓ Solactive US 1-3 Year Treasury Bond Index
 - ✓ Solactive US 3-10 Year Treasury Bond Index
 - ✓ Solactive US 10-20 Year Treasury Bond Index
 - ✓ Solactive US 20+ Year Treasury Bond Index
- > The series is rebalanced monthly and any income is re-invested daily.

1.1 SHORT NAME AND ISIN

The Index series is distributed under the following identifiers:

Index	ISIN	RIC	Bloomberg Ticker
Solactive US Treasury Bond Index	DE000SLA4CA1	.SOLUT	SOLUTC
Solactive US 1-3 Year Treasury Bond Index	DE000SLA4B65	.SOLUT13	-
Solactive US 3-10 Year Treasury Bond Index	DE000SLA4B73	.SOLUT310	-
Solactive US 10-20 Year Treasury Bond Index	DE000SLA4B81	.SOLUT120	-
Solactive US 20+ Year Treasury Bond Index	DE000SLA4B99	.SOLUT20	-



1.2 INITIAL VALUE

The initial value of the indices is 1000 as of 29th December 2006. The live date of the indices is 11th October 2017, before this date, the index values are backfilled until 29th December 2006.

1.3 DISTRIBUTION

The Index is published via the price dissemination services of Boerse Stuttgart AG and is distributed to all affiliated vendors. Each vendor decides on an individual basis as to whether it will distribute/display the Index via its information systems.

1.4 PRICES AND CALCULATION FREQUENCY

The Index Levels are calculated on each Business Day based on the Evaluated Bid Prices of the Index Components. Newly added bonds are added at the Evaluated Ask Price. Index analytical values are calculated each Business Day using the Last Evaluated Price.

In the event that data cannot be provided to the pricing services of Boerse Stuttgart AG, the Index cannot be distributed.

1.5 WEIGHTING

The Index Components are weighted according to their respective Market Value in proportion to the aggregated Market Value of all Index Components and no additional weight constraints are applied.

1.6 OVERSIGHT

A Committee composed of staff from Solactive AG (the "Committee" or the "Index Committee") is responsible for decisions regarding the composition of the Index as well as any amendments to the rules.

Members of the Committee can recommend changes to the Guideline and submit them to the Committee for approval.

1.7 PUBLICATION

All specifications and information relevant for calculating the Index are made available on the <http://www.solactive.com> web page and sub-pages.

1.8 HISTORICAL DATA

Historical data will be maintained from 29 December 2006.

1.9 LICENSING

Licenses to use the Index as the underlying value for derivative instruments are issued to stock exchanges, banks, financial services providers and investment houses by Solactive AG.



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Composition of the Index

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2 COMPOSITION OF THE INDEX

2.1 SELECTION OF THE INDEX COMPONENTS

At the launch of the index, all financial instruments which meet the requirements of the Selection Pool are eligible for inclusion in the index. Instruments issued prior to the Selection Day and which meet the criteria of the Selection Pool as defined below will be added on the Adjustment Day to the Selection Pool.

Any Index Components that do not pass this screen will be removed from the Index on the next Adjustment day.

The "Selection Pool" comprises bonds that fulfill the following conditions:

1. US Government Treasury Notes and Bonds
2. Denominated in USD
3. Current SOMA adjusted amount outstanding of at least USD 250 million
4. Inflation linked bonds, callable bonds, floating rate, fungible strips, principal only strips, interest only strips and local government bonds are specifically excluded from the available universe
5. The following maturity ranges apply to the sub-indices:
6. Solactive US Treasury Bond Index
7. All eligible securities must have at least 1 year until maturity from the selection date.
8. Solactive US Treasury 1-3 Year Bond Index
9. All eligible securities must have at least 1 year until maturity but less than 3 years from the selection date.
10. Solactive US Treasury 3-10 Year Bond Index
11. All eligible securities must have at least 3 years until maturity but less than 10 years from the selection date.
12. Solactive US Treasury 10-20 Year Bond Index
13. All eligible securities must have at least 10 years until maturity but less than 20 years from the selection date.
14. Solactive US Treasury 20+ Year Bond Index
15. All eligible securities must have at least 20 years until maturity from the selection date.

For the avoidance of doubt, besides the Selection Pool criteria and reweighting mentioned above, the types of changes which are implemented on a monthly basis on the respective Adjustment Day will include:



- Adjustments to amount outstanding due to re-opening, repurchases, stripping increases etc.
- Removal of Bonds that no longer meet the amount outstanding requirements due to partial or early redemptions.

2.2 ORDINARY ADJUSTMENT

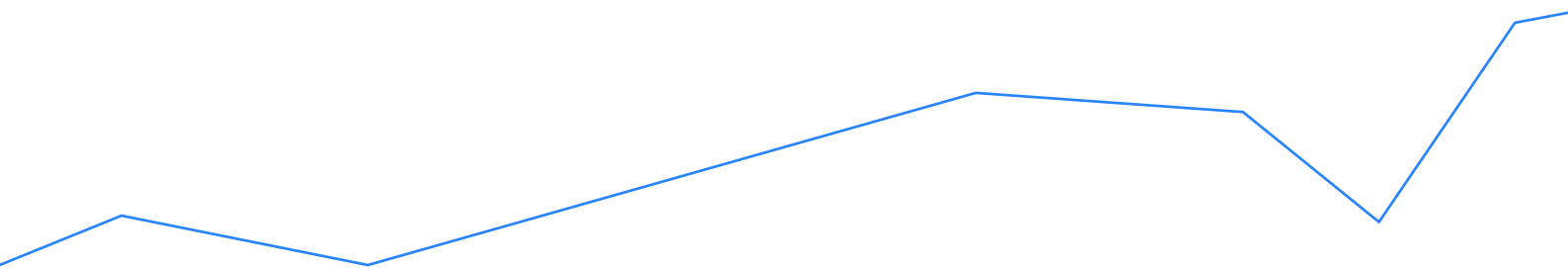
The composition of the Index is ordinarily adjusted on the Adjustment Day, which falls on the last Business Day of each month. Additionally, any income (e.g. resulting from coupon payments or corporate actions) is reinvested proportionately across all constituents at the end of each index calculation date.

The composition of the Index is ordinarily reviewed on the Selection Day. The Selection Day is 7 Business Days prior to the Adjustment Day.



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Calculation of the Index



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3 CALCULATION OF THE INDEX

3.1 INDEX FORMULA

The indices in the Solactive US Treasury Bond Index Family are calculated using a standard total return format with market value weights and recognizes price movements, accrued interest, coupon income and other cash payments. Coupon and other cash payments being re-invested back into the index on a daily basis proportionately across all index constituents.

As a formula:

$$TotalReturn_{i,t} = \frac{Price_{i,t} + AI_{i,t} + Cash_{i,t} + CPadj_{i,t} + Cap_{i,t}}{Price_{i,t-1} + AI_{i,t-1} + CPadj_{i,t-1} + Cap_{i,t-1}} \cdot \frac{IR_{i,t}}{IR_{i,t-1}} \cdot \frac{FX_{i,t}}{FX_{i,t-1}} - 1$$

$$Weight_{i,t-1} = \frac{(Price_{i,t-1} + AI_{i,t-1} + Cap_{i,t-1}) \cdot SinkFactor_{i,t-1} \cdot Amt_{i,SD} \cdot CF_{i,SD} \cdot FX_{i,t-1} \cdot IR_{i,t-1}}{\sum_{i=1}^a (Price_{i,t-1} + AI_{i,t-1} + Cap_{i,t-1}) \cdot SinkFactor_{i,t-1} \cdot Amt_{i,SD} \cdot CF_{i,SD} \cdot FX_{i,t-1} \cdot IR_{i,t-1}}$$

$$Index_t = Index_{t-1} \cdot (1 + \sum_{i=1}^a TotalReturn_{i,t} \cdot Weight_{i,t-1})$$

Whereas:

$AI_{i,t}$	Accrued Interest of the bond i on day t
$Amt_{i,t}$	Amount Outstanding of bond i on day t
$Cap_{i,t}$	Capitalization rate of bond i on day t (only relevant for capitalizing bonds, otherwise the default value is 0)
$Cash_{i,t}$	Aggregated cash consisting of all payments made by index members up to and including day t, which is between two regular Adjustment Days. In Price Return indices, the Cash term includes cash derived from Corporate Actions and sink cash, while Total Return indices reflect coupon payments in addition to that. On the next Selection Day, Cash is reinvested into the index and is set to 0
$CF_{i,SD}$	Capping factor of bond i on the last Selection Day. It is used to scale the weight of bond i defined on the last Selection Day
$CPAdj_{i,t}$	Variable coupon adjustment factor of bond i on day t. If the bond enters the index during the ex-dividend period, the factor is 0. If the bond is already in the index during the ex-dividend period, the variable coupon adjustment factor equals the coupon amount
$FX_{i,t}$	Foreign exchange rate of bond i on day t
$Index_t$	Value of the Index on day t
$IR_{i,t}$	Inflation ratio of bond i on day t



$Price_{i,t}$	Clean price of bond i on day t
SD	Last Selection Day
$SinkFactor_{i,t}$	Sinking fund factor of bond i on day t (only relevant for sinkable bonds, otherwise default value is 1)
t	Business Day t
$Total\ Return_{i,t}$	Total return of the bond i on day t
$Weight_{i,t}$	Weight of the bond i on day t

3.2 ACCURACY

The displayed value of the Index will be rounded to 2 decimal places.

3.3 ADJUSTMENTS

Indices may need to be adjusted to reflect any market structure changes. The Committee will regularly review the Index to determine if they need to be adjusted to take into account any market changes.

The following Extraordinary Events will result in changes or adjustments to an index as indicated below between Adjustment Days:

- 1) Early Redemption or Full Call: Any cash proceeds are re-invested into the index on the day that they are received. For the avoidance of doubt a Tender must be mandatory, an offer to tender a bond will not be considered for adjustment until the results have been announced.
- 2) Flat Trading: A bond is flat trading if the bond issuer is not expected to meet its coupon payment obligation which means that the buyer of a bond is not responsible for paying the interest that has accrued since the last payment. If a bond is defined to be "flat trading" between two Adjustment Days the respective accrued interests and coupons will be set to 0. The bond will be removed on the next Adjustment Day, if it is identified as Flat Trading on selection date.
- 3) Defaulted Bonds: If the status of a bond changes to "In Default", the bond will remain as part of the index or portfolio at the last available evaluated price provided by the pricing source until the next regular index Adjustment Day.
- 4) Exchange Offers:
 - a) Optional Exchange Offers: Optional Exchange Offers will not result in an adjustment of the index*
 - b) Mandatory Exchanges Offers:



- i. In the case when less than 90% of the Amount Outstanding is exchanged the exchange will not be considered to be an event that affects the relevant bond's position in the index.
 - ii. In case more than 90% of the Amount Outstanding is exchanged the exchange will be considered in the index calculation by exchanging the relevant bonds, so that the new bond will receive the weight of the old exchanged bond.
- 5) The treatment of events for Fungible Bonds depends on whether:
 - a) The parent bond and the sub-tranche are both index constituents: Both bonds are kept in the index until the next Adjustment Day. On the next Adjustment Day, the new bond will be removed and the Amount Outstanding of the parent bond will be increased by the amount of the new bond issue.
 - b) The parent bond is an index constituent and the sub-tranche is not: on the next Adjustment Day the Amount Outstanding of the parent bond will be increased by the amount of the sub-tranche.
 - c) The parent bond is not an index constituent but the sub-tranche is. The fund will be treated as an exchange into the parent bond, if it meets the index eligibility criteria with an amount equal to that of the sub-tranche. On the next adjustment day, the amount of the parent bond will be updated to include its full amount as of the index selection day. If the parent bond does not fulfil the selection criteria, the fund will be treated as a deletion and the sub-tranche will be removed from the index at the latest available price.
- 6) Payment-in-Kind Bonds: These bonds pay interest in additional bonds rather than in cash. Assuming the additional bonds will be sold immediately and the proceeds will be reinvested in the index, payments-in-kind are therefore considered as cash in all Total Return calculations.
- 7) Ex-dividend Bonds: "Ex-dividend" means that the next coupon is detached from the bond several days in advance of the coupon payment date. Between ex-date and pay-date a buyer of the bond does not get the right to receive the next coupon. Therefore, accrued interest is negative during that period. However, the coupon will be paid to the original bondholder, i.e. if a bond is already in the index the next coupon payment is held separate in the Variable Coupon Adjustment Factor $CPAdj_{i,t}$. If the bond enters the index during the ex-dividend period $CPAdj_{i,t}$ is zero as the next coupon payment will not accrue to the index.

*For the avoidance of doubt, an optional tender or exchange offer may lead to an index adjustment after the end of the submission period. In case the tender or exchange has been successful for at least 90% of the amount outstanding, the bond will be removed from the index/exchanged into the relevant bond.



In case of an Extraordinary Event that is not covered by the standard treatments mentioned above the Committee will meet and decide on how to treat the Extraordinary Event in the index based on the information available. An extraordinary adjustment will only be implemented if the majority of the Committee supports the suggested treatment. As soon as a decision has been taken all parties related to the index are informed about the Extraordinary Event as well as the decided treatment and date of implementation.

3.6 MISCELLANEOUS

3.6.1 Recalculation

Solactive AG makes the greatest possible efforts to accurately calculate and maintain its indices. However, the occurrence of errors in the index determination process cannot be ruled out. In such cases Solactive AG adheres to its publicly available [Correction Policy](#).

3.6.2 Market Disruption

In periods of market stress Solactive AG calculates its indices following predefined and exhaustive arrangements set out in its publicly available [Disruption Policy](#).



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Definitions

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4 DEFINITIONS

"Adjustment Day" is the last Business Day of each month.

"Amount Outstanding" is the face value of the respective bond.

A "Business Day" is in relation to the index, any day other than a Saturday or Sunday and which is not a holiday according to SIFMA and the NYSE.

"Call" means that a bond with a callable feature will be redeemed before the actual maturity date of the bond. The callable feature allows the issuer of the bond to retain the privilege of redeeming the bond before the actual maturity date.

"Covered Bonds" are bonds backed by cash flows or mortgages or public sector loans.

A "Credit Event" is the suspension of debt service, insolvency or failure to pay on time.

"Early Redemption" includes every event that leads to a redemption of a bond before the actual maturity date.

"Ex-dividend" means that the next coupon is detached from the bond several days in advance of the coupon payment date.

"Exchange Offer" means that the holder of a bond is invited to exchange the existing bond to another debt security.

In particular an "Extraordinary Event" is

- > an early redemption of the bond
- > a credit event

"Emerging Market Country" is any country that is not classified as Developed Market by Solactive and is not a part of a Eurozone



"Evaluated Ask Price" is the last available Ask Price evaluated by the designated Pricing Provider.

"Fixed Coupon Bonds" are bonds with a fixed coupon rate, as opposed to floating rate coupons.

A bond is marked as "Flat Trading" if the bond issuer will not meet its coupon payment obligation. This means that the buyer of a bond is not responsible for paying the interest that has accrued since the last payment.

"Floating Rate Bonds" are bonds with a variable or floating interest rate, i.e. coupons fluctuate in line with the underlying level of interest rates, as opposed to fixed-rate coupons.

A "Fungible Bond" is a new issue that has all the same specifications as an existing issue (bonds with the same parameters can be issued in different tranches). At a specific date, the tranches will be combined into one bond. After this date, the parent tranche will include the Amount Outstanding of all new tranches.

A bond is "In Default" when the issuer is not able to fulfil its bond payment obligations anymore after the 30 days grace period.

"Index Components" are all bonds in the Selection Pool.

The "Index Currency" is USD.

"Inflation-linked Bonds" are bonds whose principal is indexed to inflation.

"Issuer" is the issuing entity of the respective bond.

"Last Evaluated Price" generally is (aside from the rules referred to in "Extraordinary Events") the last available Evaluated Bid Price.

"Paid Cash" is either the value of the coupon payments between Adjustment Days or the resulting payment when a bond is removed from the index between Adjustment Days. On the next Adjustment Day "Paid Cash" will be reinvested in the index.



"Payment-In-Kind Bonds" are a type of bonds that pay interest in additional bonds rather than in cash.

"Preferred Securities" combine both debt and equity characteristics.

"Securitized Bonds" are bonds secured against specific assets or receivables (ABS), mortgages (MBS) or cash flows.

"Selection Day" is a Business Day 7 Business Days prior to the Adjustment Day. If the Selection Day happens to be Christmas Eve the new composition is fixed 1 Business Day in advance.

"Sinking Fund Bonds" are bonds that are backed by a fund that sets aside money on a regular basis. A sinkable bond issuer is required to buy a certain amount of the bond back from the purchaser at various points throughout the life of the bond.

"Step-Up Coupon Bonds" are bonds whose coupons increase while the bond is outstanding. The coupon amounts are determined at issuance.

"Tender Offer" means that a holder of a bond is invited to tender the bond for a specific price at a specific time before the actual maturity date.

A "Total Return Index" measures the performance of the index components by assuming that all distributions are reinvested into the index, i.e. the index does not only reflect pure price movements.

"Zero Coupon Bonds" do not pay interest but are issued at a discount.



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Appendix

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5 APPENDIX

5.1 CONTACT DATA

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5.2 CHANGES IN CALCULATION METHOD

The application by the Index Calculator of the method described in this document is final and binding. The Index Calculator 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. The Index Calculator may also 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. The Index Calculator is not obliged to provide information on any such modifications or changes. Despite the modifications and changes, the Index Calculator will take the appropriate steps to ensure a calculation method is applied that is consistent with the method described above.