

Guide to the eb.rexx[®] Bond Indices

Formerly known as Guide to the
eb.rexx[®] Index Family

Version 5.5

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General Information

With effect to August 2019 Deutsche Börse AG has transferred the administration of the Indices formerly known as the eb.rexx[®] Index Family of Deutsche Börse AG to its affiliate STOXX Ltd.

STOXX Ltd. develops, creates and publishes Indices for certain uses, e.g., the issuance of Financial Instruments. In general, an Index is any figure published or made available to the public that is regularly determined by the application of a formula (or any other method of calculation, or by an assessment) on the basis of the value of one or more underlying assets or prices, including estimated prices, actual or estimated interest rates, quotes and committed quotes, or other values or survey.

All eb.rexx[®] Bond Indices are governed by the respective index methodology applicable to the respective index or index family. Purpose of this Guide "Guide" is to provide for a comprehensible index methodology in continuity of the former eb.rexx[®] Index Family of Deutsche Börse AG as last amended with effect from 21 December 2018 (version 4.1).

In order to ensure the highest quality of each of its indices, STOXX Ltd. exercises the greatest care when compiling and calculating fixed income indices on the basis of the rules set out in this Guide.

However, STOXX Ltd. cannot guarantee that the various indices, or the various ratios that are required for index compilation and computation purposes, as set out in this Guide, are always calculated free of errors. STOXX Ltd. accepts no liability for any direct or indirect losses arising from any incorrect calculation of such indices or ratios.

The eb.rexx[®] Bond Indices in no way represent a recommendation for investment. In particular, the compilation and calculation of the various indices shall not be construed as a recommendation of STOXX Ltd. to buy or sell individual securities, or the basket of securities underlying a given index.

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Changes to the Rules and Additions to the Index Family:

All amendments listed with effect prior to August 2019 are amendments to the Rules and Regulations of the former Deutsche Börse AG Guide to the eb.rexx Index Family.

Amendments listed as of August 2019 are amendments to the Rules and Regulations of the Guide to the eb.rexx Bond Indices, administered by STOXX Ltd, in continuation of the Rules and Regulations of the former Deutsche Börse AG Guide to the eb.rexx Index Family.

21.10.2022	Version 5.5	Decommissioning of the eb.rexx® Jumbo Pfandbriefe. Clarifications relating to calculation time and publication procedure
28.01.2022	Version 5.4	Suspension Rule removal
22.06.2020	Version 5.3	Governance update
08.10.2019	Version 5.2	Clarification relating to EU Benchmark Regulation.
16.08.2019	Version 5.1	Clarification relating to EU Benchmark Regulation and changes relating to the transfer of index administration to STOXX Ltd.
21.12.2018	Version 4.1	Alignment on the naming convention for eb.rexx® Government Germany maturity indices
18.12.2017	Version 4.0	Changes to the rules reflecting the termination of Eurex Bonds business operations
10.10.2017	Version 3.15	Change of yield difference threshold for the alternative pricing source
10.10.2017	Version 3.14	Include liquidity requirements
05.02.2015	Version 3.13	Removal of the liquidity criteria
23.12.2014	Version 3.12	Clarification relating to IOSCO principles
30.04.2014	Version 3.11	Change of reference price source from Xetra Bonds to Boerse Frankfurt
17.12.2013	Version 3.10	Introduction of close prices adjustment for eb.rexx® Government indices and publication delay in index closing values
16.08.2013	Version 3.9	Update of contact details (Appendix)
19.01.2009	Version 3.8	Suspension of the liquidity criteria
01.01.2008	Version 3.7	Adjustment of rating consideration
02.05.2007	Version 3.6	Launch of eb.rexx® Jumbo Pfandbriefe and eb.rexx® Government maturity indices
02.04.2007	Version 3.5	Changes to the rules for Jumbo Pfandbriefe
03.07.2006	Version 3.4	Launch eb.rexx® Money Market
01.04.2006	Version 3.3	New liquidity criteria for selection indices
01.02.2006	Version 3.2	Consideration of issuer ratings
01.05.2005	Version 3.1	Amendment of monthly re-balancing procedure and formulae

01.12.2004	Version 3.0	Introduction of eb.rexx® Jumbo Pfandbriefe and eb.rexx® Government overall indices
21.07.2003	Version 2.3	Inclusion of additional index analytics
26.03.2003	Version 2.2	Inclusion of trademark rights
21.03.2003	Version 2.1	Inclusion of bond analytics
18.12.2002	Version 2.0	Launch of eb.rexx® Government indices
24.10.2002	Version 1.0	

1 eb.rexx® Indices – Overview

The eb.rexx® Bond Indices reflect the market for fixed-income securities denominated in Euro. All indices use Börse Frankfurt as pricing source. STOXX Ltd. is responsible for the calculation and distribution of the various indices.

The eb.rexx® Bond Indices, as described below in Figure 1, consist of several segments and subsegments can be extended by additional indices whenever appropriate, without changing the composition of existing indices.

Figure 1: Structure of the eb.rexx® Bond Indices (overall and maturity indices)

eb.rexx® Bond Indices overall and maturity indices		
eb.rexx® Overall overall and maturity indices		
eb.rexx® Government overall and maturity indices	eb.rexx® Non-Government overall and maturity indices	
eb.rexx® Government Germany selection, overall and maturity indices	eb.rexx® Collateralized overall and maturity indices	eb.rexx® Sub-Sovereigns overall and maturity indices
eb.rexx® Other Government each with overall indices	eb.rexx® Other Collateralized each with overall indices	

Only the indices of the eb.rexx® Bond Indices, which are indicated by white fields in Figure 1 above, are currently calculated and disseminated. The rules applicable to these indices are provided for below. The eb.rexx® Bond Indices includes the most liquid securities from the government bonds ("Government") segment, the asset-covered issues ("Collateralized") segment, as well as the government-guaranteed bonds ("Sub-Sovereigns") segment, traded on Börse Frankfurt. These fixed-income securities are aggregated in the eb.rexx® Overall index. The indices are further subdivided into the segments Government and Non-Government.

The eb.rexx® Non-Government segment basically comprises state government bonds, as well as bonds from other issuers. It is further subdivided into the segments Collateralized and Sub-Sovereigns.

All eb.rexx® indices are based on selection criteria that ensure high liquidity for the underlying bonds, thus facilitating the tracking of the indices.

There is one segment for which selection indices are additionally calculated: The eb.rexx® Government Germany index measures the investment performance in the overall market for highly-liquid German government bonds.

2 eb.rexx® Index Rules

2.1. Classification of Bonds

The eligible bonds for the eb.rexx indices are selected based upon the availability of bond reference data and their admission for trading on Börse Frankfurt. Bond price information derive from Börse Frankfurt, where specialists manage the trading and guarantee the price quality of the securities.

Each bond's eligibility for a certain sub-index is always determined by the top-down segmentation into "Government Bonds", "Collateralized" and "Sub-Sovereigns". Bonds from the "Government Bonds" segment are assigned to the index group of *Governments*, and those from the "Collateralized" and "Sub-Sovereigns" segments to the index group of *Non-Governments*.

2.1.1. Liquidity requirements

For the bond indices, no explicit liquidity filter is applied. The applied selection criteria of the index constituents facilitate the selection of liquid constituents due to filtering by issuer, country as well as minimum nominal amount outstanding for a bond. Consequently, stricter constraints on the selection criteria favor the selection of the most liquid constituents for the index.

2.2. Selection of Bonds

2.2.1. Selection Criteria

Eligible for the eb.rexx® indices are fixed coupon bonds with a minimum remaining term of 1,5 years (measured as the difference between the end of the relevant rebalancing month and a bond's maturity date).

The eb.rexx® Government Germany 0-1- index includes fixed coupon bonds with a maturity between one month and one year measured at each monthly rebalancing date.

Eligible bonds must have a certain minimum amount outstanding of €4 bn. for governments and €1.5 bn. for non-governments. Zero-coupon bonds are not used for the composition of indices.

2.2.2. Bond Rating

All bonds must be rated at least investment grade¹.

¹ Investment grade is defined as "BBB-/Baa3" or higher

2.3. Overall and Maturity Indices

Overall indices as well as the following maturity buckets are calculated and distributed for any index involved: 1 month – 1 year², 1.5 - 2.5 years, 2.5 -5.5 years, 5.5 – 7.5 years, 7.5 – 10.5 years, 5.5 - 10.5 years and more than 10.5 years.

2.4. Basis

The base level of eb.rexx® indices is 100. The base date is 30 July 2003 for the eb.rexx® Government Germany 0-1 index, 31 December 2000 for the rest of the eb.rexx® Government Germany indices..

2.5. Selection Indices

2.5.1. eb.rexx® Government Germany

The eb.rexx® Government Germany index comprises the 25 most liquid German government bonds with a remaining term of 1.5 to 10.5 years.

The weight of any individual bond in the eb.rexx® Government Germany index is limited to 30 percent.

² One month – one year maturity bucket refers to eb.rexx® Government Germany 0-1index and includes bonds with a maturity between one month and 0.999 years, measured at rebalancing. This applies similarly for the other maturity buckets.

2.6. eb.rexx® Government Germany 0-1

eb.rexx® Government Germany 0-1 reflects the development of the German shortdated government bonds with a residual maturity between one month and one year, measured at rebalancing. All bonds must have a minimum amount outstanding of €4 bn.

Any bond in the eb.rexx® Government Germany 0-1 index is weighted by market capitalization. The weight of any single bond in the index is limited to 30 percent.

The adjustment of eb.rexx® Government Germany 0-1 composition and its weightings are carried out monthly.

Monthly Adjustment

The eb.rexx® selection indices are rebalanced according to the following rules on a monthly basis:

1. Bond selection within the eb.rexx® universe

At the reporting date all bonds that meet the criteria above are selected by STOXX Ltd. and are assigned to the respective segments (see 2.1).

2. Adjustment of the index composition

Each bond is assigned to the corresponding indices according to the classification criteria. Eligibility for a selection index is determined on the basis of a ranking list. For each index, all eligible bonds are ranked according to nominal amount outstanding. In case of equal amount outstanding priority is given to the newer bond. This is measured by the time difference between first settlement date and current end of month. The eb.rexx® Government Germany indices contain the first 25 bonds on the respective ranking list.

3. Monthly adjustment of bonds' weightings

Bonds are weighted based on its market capitalization. Changes in the market capitalization, which occur between two index adjustment dates, are reflected in the index by updating its composition at the respective due dates and become effective at subsequent month begin.

4. Cap limit

Capping is a procedure which ensures that the weighting of index constituents is suitable and prevents single bonds from dominating the index. Capping will only be applied to selection indices.

a) eb.rexx® Government Germany

For indices, where the market capitalization of a single bond exceeds 30 percent, the weight of the bond will be reduced so that the market capitalization is equivalent to 30 percent of the reduced index market capitalization ("capping"). Should yet another bond exceed the cap limit, the market capitalization will then be determined so that the weight of each bond to be equal to 30 percent of the revised index capitalization. This procedure is repeated as long as there is no bond exceeding the cap limit.

5. Rebalancing timeframe

Three Börse Frankfurt business days before the end of each month the nominal amount outstanding for each bond is determined, based on the data provided by financial market information vendors. Two business days before the end of each month, the list considers rating changes and is adjusted and published accordingly. The resulting list is the final membership list for the following month.

On the last Börse Frankfurt business day of each month, STOXX Ltd. publishes this new list with closing prices of all bonds on its website after close of trading.

2.7. Calculation Methodology

2.7.1. Index Calculation

By updating the index composition, new bonds are included in the respective index using the last available traded price. In the absence of a traded price, new bonds are included on the basis of the last available ask quote.

The indices are calculated on the basis of trades and bid quotes provided by specialists as defined in Exchanges Rules (“Börsenordnung”). Best bid quotes providing high quality information about the current price level are used for index calculation purposes.

From a portfolio perspective, this calculation methodology incorporates transaction costs incurred by investors who want to track the indices and have to buy additional bonds at the respective ask quote.

In case trades and quotes are not available or the market maker stops quoting before close of trading, the bond prices are recalculated using the yields from the preceding Börse Frankfurt business day (see 3.3 Special closing price adjustment).

2.7.2. Settlement Convention

All eb.rexx® indices are calculated assuming t+0 settlement.

2.7.3. Calculation Periods

The indices are calculated and distributed every minute in real-time, between 9.00 a.m. and 5.30 p.m. CET. Index calculation is based on the Börse Frankfurt trading calendar.

2.7.4. Publication

Index closing values and analytics are published daily by STOXX Ltd. at www.dax-indices.com, after the close of trading with a delay of forty-five minutes at 6.15 p.m. CET. Index values will be based on the latest available trades or quotes as of 5.30 p.m. CET. If trades and quotes are not available or the market maker stops quoting before close of trading, bond prices are recalculated using the yields from the preceding Börse Frankfurt business day (see 3.3 Special closing price adjustment).

In cases where the last Börse Frankfurt business day of any given month does not coincide with the last calendar day, separate index levels (including accrued interest) will be published for that day.

A snapshot of all eb.rexx[®] indices taken at 1.00 p.m. CET is published on each Börse Frankfurt business day. Apart from index values, the corresponding bond prices - as well as the composition of all indices involved - are published on the website.

All data concerning the up-to-date index composition is published on the website, in the evening of index adjustment.

Price information on the various bonds is distributed by STOXX Ltd., but can also be obtained from the major information vendors.

2.7.5. Calculation Correction

This section outlines the rules and procedures applicable in case of a calculation error, meaning the provision of index values, usage of index constituents or other elements or the application of weightings, capping, or other aspects of the index methodology in a manner that is not in line with this index methodology, e.g. due to a mistake, incorrect input data, etc.

2.7.5.1. Rule-based Correction

STOXX Ltd. corrects a Calculation Error without delay on the dissemination day it occurred, provided that STOXX Ltd. becomes aware of such Calculation Error before 15:30 CET of that dissemination day and insofar as technically and operationally feasible. STOXX Ltd. does not change intraday index composition of an index.

If STOXX Ltd. became aware of a Calculation Error at or after 15:30 CET, STOXX Ltd. aims at correcting the Calculation Errors as of the end of the next dissemination day, including corrections to index constituents.

STOXX Ltd. amends without undue delay previous incorrect index values or input data only if they are required for the subsequent index values calculation. Incorrect real-time index values disseminated before the effective time of the correction are not restated.

2.7.5.2. Non-rule based Correction

If the above-outlined rule-based error correction cannot be applied, the relevant STOXX Committee assesses without undue delay:

- if and how the Calculation Error should be corrected, including if the index shall be restated, and/or
- if the dissemination of index values shall be suspended (Discretionary Rule, see Section [7.6](#)).

An index should be restated, when the performance of the index (other than Selection Indices) can no longer be replicated. A suspension of index dissemination is triggered when relevant STOXX Committee decides that the correction will take significant time during which misleading index values could lead to financial, legal and reputational risks (Discretionary Rule, see Section [7.6](#)).

STOXX Ltd. suspends the dissemination of an index at the latest at the end of the dissemination day after it became aware of a Calculation Error, if the Calculation Error has not been corrected by then.

STOXX Ltd. will resume the dissemination of the index as soon as the correct index calculation is feasible and the correct historical values are available.

2.7.5.3. Notifications

In general, notifications take the form of an announcement on the DAX website (<http://www.dax-indices.com>). Announcements can (but need not, depending on the decision of STOXX Ltd.) be published via financial relevant media.

With regard to Calculation Errors, STOXX Ltd. issues notifications in accordance with the following rules:

- STOXX Ltd. will publish a notification before correcting a Calculation Error. Notifications are effective immediately following their issuance, unless otherwise specified in the notification.
- The notification will specify if a Calculation Error will be corrected retrospectively. In case of retrospective correction, STOXX Ltd. will publish the notification using the new end of day closing price.
- If STOXX Ltd. decides under Section 2.7.5.2 that index dissemination is suspended until the Calculation Error is corrected, a resume notification is published specifying the point in time when index dissemination is resumed and the correction will take place.

STOXX Ltd. will refrain from the issuance of a notification if it reaches the view that the issuance of a notification is not in line with the applicable laws and may decide to issue such Notification at a later point in time when such reasons have lapsed (Discretionary Rule, see Section [7.6](#)). By reason of force majeure or other events beyond the control of STOXX Ltd. it might become impossible for STOXX Ltd. to issue a notification in due time or by the means set out herein. In such cases STOXX Ltd. may exceptionally issue the notification either subsequently immediately following such event or in any case by other means (Discretionary Rule, see Section [7.6](#)).

2.7.6. Index Termination Policy

For termination of an index or an index family that underlie financial products issued on the market, to the knowledge of STOXX Ltd., a market consultation will be conducted by STOXX Ltd. in advance of the termination in line with STOXX Transition Policy and STOXX Consultation Policy (publicly available on STOXX website). The length of the consultation period will be defined in advance based on the specific issues of each proposed termination subject to STOXX Benchmark Transition Policy (Discretionary Rule, see Section [7.6](#)). During the consultation period, clients and third parties will have the chance to share their concerns regarding the termination of the index or index family. Based on the collected feedback, STOXX Ltd. may rethink its decision to terminate an index or an index family (Discretionary Rule, see Section [7.6](#)). At the end of the consultation period, STOXX Ltd. will publicly announce its final decision about the termination. A transition period will be granted in the event of termination (Discretionary Rule, see Section [7.6](#)).

For termination of an index or an index family that do not underlie financial products issued on the market, no market consultation will be conducted.

3 Index Formulae

The eb.rexx® indices are calculated as so-called basket indices, implying that each index is based on real bonds. This makes it easy to track index performance³.

The indices are based on a volume-weighted summation concept that analyzes relative changes in value compared to a reference date. The composition and volume of the index portfolio are adjusted at this date. Therefore, corresponding adjustments to index-tracking portfolios are only required once, i.e. at the respective cut-off date. The amount outstanding of each bond is used for the purpose of index weighting. Both price and total return indices are market capitalization-weighted.

3.1. Price Index

Price indices are calculated as follows:

$$(1) \quad P_t = P_{t-s} \frac{\sum_{i=1}^n P_{i,t} \cdot N_{i,t-s}}{\sum_{i=1}^n P_{i,t-s} \cdot N_{i,t-s}}$$

Where:

P_t	=	Price index value at time t
P_{t-s}	=	Price index value on the last calendar day of the previous month
$P_{i,t}$	=	Trade or quote price of bond i at time t
$P_{i,t-s}$	=	Closing trade or quote price of bond i on the last business day of the previous month
$N_{i,t-s}$	=	Amount outstanding of bond i on the third last business day of the previous month
n	=	Number of bonds in the index
s	=	Calendar days since the last adjustment
t	=	Calculation date

³ The calculation methodology applied for eb.rexx® indices is in line with the standards laid down by the "European Federation of Financial Analysts Societies" (EFFAS). For a detailed overview, cf. Patrick J. Brown (2002): "Constructing and Calculating Bond Indices – A Guide to the EFFAS European Bond Commission Standardized Rules", 2nd Edition, Cambridge, England, 2002.

3.2. Total Return Index

For total return indices, the monthly adjustment involves the reinvestment of coupon payments in the overall portfolio. This occurs once per period at each index composition cut-off date. Consequently, total return indices are calculated as follows:

$$(2) \quad TR_t = TR_{t-s} \frac{\sum_{i=1}^n (P_{i,t} + A_{i,t} + XD_{i,t-s} \cdot (CP_{i,t} + G_{i,t})) \cdot N_{i,t-s}}{\sum_{i=1}^n (P_{i,t-s} + A_{i,t-s} + XD_{i,t-s} \cdot CP_{i,t-s}) \cdot N_{i,t-s}}$$

Where (in addition to (1)):

- $A_{i,t}$ = Accrued interest of bond i at time t
- $A_{i,t-s}$ = Accrued interest of bond i at the last calendar day of the previous month
- $CP_{i,t}$ = Value adjustment (coupon payment) at the settlement date if the next coupon payment of bond i is not included in the quote price at date t because of the ex-dividend period. If none the value is set to zero
- $CP_{i,t-s}$ = Coupon payment received from bond i between the day of the payment and end of month
- $G_{i,t}$ = Value of a coupon payment on bond i at time t, made at the coupon date or within the period s. If there has been no payment within the respective month, the value equals zero
- TR_t = Total return index value at time t
- TR_{t-s} = Total return index value on the last calendar day of the previous month
- $XD_{i,t-s}$ = Flag that ensures the correct treatment of bond i with ex-dividend features at the last rebalancing. During the ex-dividend period the buyer of a security will not receive the next coupon payment. Setting XD to 0 ensures that the next coupon payment is not counted in the total return if the bond enters the index family during its ex-dividend period. In all other cases and for bonds without ex-dividend features, XD has a value of 1

3.3. Special closing price adjustment

If during a Börse Frankfurt business day no trades occur or no bid quotes are posted, the bonds' closing prices will be recalculated by using the yields from the preceding business day. Below the relevant formulae:

	Method	Legend
Constant yield approach	If ($P_T=NA \ \&\& \ P_Q=NA \ \&\& \ y_t \neq y_{t-1}$) { $\Delta_i = (y_t - y_{t-1}) * 100$ $P_i^{EB} = P_i^{EB} + (\Delta_i * PVBP_i)$	P_T = Trade price for bond i P_Q = Bid quote price for bond i y_t = Last yield current business day for bond i y_{t-1} = Last yield preceding business day for bond i Δ_i = the yield change between the current and the preceding business day

4 Index Analytics

There are several analytics that are calculated in addition to the index values. The following analytics are calculated and distributed for each index separately:

4.1. Average Yield

The average yield is calculated, weighting the yield of each bond by the corresponding market capitalization and duration of the respective bond.

$$(3) \quad RY_t = \frac{\sum_{i=1}^n Y_{i,t} \cdot (P_{i,t} + A_{i,t}) \cdot N_{i,t-s} \cdot D_{i,t}}{\sum_{i=1}^n (P_{i,t} + A_{i,t}) \cdot N_{i,t-s} \cdot D_{i,t}}$$

Whereby: RY_t = Average yield at time t
 $Y_{i,t}$ = Yield of bond i at time t
 $D_{i,t}$ = Duration of bond i at time t

4.2. Average Duration

The average duration is calculated, weighting the duration of each bond by the corresponding market capitalization of the respective bond.

$$(4) \quad DU_t = \frac{\sum_{i=1}^n D_{i,t} \cdot (P_{i,t} + A_{i,t}) \cdot N_{i,t-s}}{\sum_{i=1}^n (P_{i,t} + A_{i,t}) \cdot N_{i,t-s}}$$

Whereby: DU_t = Average duration at time t

4.3. Average Modified Duration

Calculation of the average modified duration is in line with the previously-described calculation process for the average duration.

$$(5) \quad MDU_t = \frac{\sum_{i=1}^n MD_{i,t} \cdot (P_{i,t} + A_{i,t}) \cdot N_{i,t-s}}{\sum_{i=1}^n (P_{i,t} + A_{i,t}) \cdot N_{i,t-s}}$$

Whereby: MDU_t = Average modified duration at time t
 $MD_{i,t}$ = Modified duration of bond i at time t

4.4. Average Convexity

Calculation of the average convexity is in line with the previously described calculation process for the average duration and average modified duration.

$$(6) \quad CX_t = \frac{\sum_{i=1}^n X_{i,t} \cdot (P_{i,t} + A_{i,t}) \cdot N_{i,t-s}}{\sum_{i=1}^n (P_{i,t} + A_{i,t}) \cdot N_{i,t-s}}$$

Whereby: CX_t = Average convexity at time t

$X_{i,t}$ = Convexity of bond i at time t

4.5. Average Coupon

The average coupon is calculated, weighting the coupon of each bond by its amount outstanding.

$$(7) \quad CO_t = \frac{\sum_{i=1}^n C_{i,t} \cdot N_{i,t-s}}{\sum_{i=1}^n N_{i,t-s}}$$

Whereby: CO_t = Average coupon at time t

$C_{i,t}$ = Coupon of bond i at time t

4.6. Average Remaining Years to Maturity

Calculation of the average remaining years to maturity is in line with the previously-described calculation process for the average coupon (i.e. weighting on the basis of amount outstanding).

$$(8) \quad LF_t = \frac{\sum_{i=1}^n L_{i,t} \cdot N_{i,t-s}}{\sum_{i=1}^n N_{i,t-s}}$$

Whereby: LF_t = Average remaining years to maturity at time t

$L_{i,t}$ = Remaining years to maturity of bond i at time t

4.7. Nominal Value

The nominal value of a bond is calculated as follows:

$$(9) \quad NV = \sum_{i=1}^n N_{i,t-s}$$

4.8. Market Value

The market value of a bond at time t is calculated as follows:

$$(10) \quad MV_t = \sum_{i=1}^n (P_{i,t} + A_{i,t} + XD_{i,t-s} \cdot CP_{i,t}) \cdot N_{i,t-s}$$

4.9. Base Market Value

The base market value (i.e. market value as at the base date) of a bond is calculated as follows:

$$(11) \quad MV_0 = \sum_{i=1}^n (P_{i,t-s} + A_{i,t-s} + XD_{i,t-s} \cdot CP_{i,t-s}) \cdot N_{i,t-s}$$

5 Bond Analytics

There are several bond analytics that are calculated in addition to the index values and index analytics. In this chapter, the following annotations are used throughout the bond analytics formulae:

$A_{i,t}$	=	Accrued interest of bond i at time t
$CF_{i,j}$	=	Cash flow of bond i within period j
$D_{i,t}$	=	Duration of bond i at time t
$L_{i,t,j}$	=	Time (in years) between time t and the cash flow of bond i within period j
$MD_{i,t}$	=	Modified duration of bond i at time t
$P_{i,t}$	=	Trade or quote price of bond i at time t
$X_{i,t}$	=	Convexity of bond i at time t
$Y_{i,t}$	=	Yield of bond i at time t
n	=	Number of future cash flows
s	=	Time since the last adjustment
t	=	Calculation date

5.1. Yield

The yield of a bond at time t is calculated as follows:

$$(12) \quad P_{i,t} + A_{i,t} = \sum_{j=1}^n CF_{i,j} \cdot (1 + Y_{i,t})^{-L_{i,t,j}}$$

The Newton iteration method is used to solve the equation for $Y_{i,t}$.

5.2. Duration

The duration of a bond at time t is calculated as follows:

$$(13) \quad D_{i,t} = \frac{\sum_{j=1}^n CF_{i,j} \cdot L_{i,t,j} \cdot (1 + Y_{i,t})^{-L_{i,t,j}}}{\sum_{j=1}^n CF_{i,j} \cdot (1 + Y_{i,t})^{-L_{i,t,j}}} = \frac{1}{P_{i,t} + A_{i,t}} \cdot \sum_{j=1}^n CF_{i,j} \cdot L_{i,t,j} \cdot (1 + Y_{i,t})^{-L_{i,t,j}}$$

5.3. Modified Duration

The modified duration of a bond at time t is calculated as follows:

$$(14) \quad MD_{i,t} = D_{i,t} \cdot \frac{1}{1 + Y_{i,t}}$$

5.4. Convexity

The convexity of a bond at time t is calculated as follows:

$$(15) \quad X_{i,t} = \frac{1}{R_{i,t} + A_{i,t}} \cdot \sum_{j=1}^n L_{i,t,j} \cdot (L_{i,t,j} + 1) \cdot CF_{i,j} \cdot (1 + Y_{i,t})^{-(L_{i,t,j} + 2)}$$

6 Limitations

This section applies in the event of Limitations that occur due to:

- insufficient rules, meaning the absence of a methodology rule, provision or procedure which leads to a failure when determining the respective index value or which leads to an index value that does not properly reflect the concept / nature of the index, e.g.:
 - performance of the index can no longer be physically replicated;
- insufficiently available index constituents to fulfil the requirements of the Index Methodology; unclear rules, meaning a situation in which the rules leave multiple possible interpretations on how a certain rule shall be applied to a specific situation
- data insufficiency, meaning a scenario in which the calculation of an index is no longer possible due to insufficient data quantity or quality;
- failure to produce index values as intended;
- market disruption which results in the performance of the index being unable to be tracked;
- events with a market impact that by their nature could reasonably not be foreseen, or events whose impact on an index or the economic reality the index intends to represent, cannot be determined in advance. Events covered in this section include, but are not limited to, events of natural, social, political, economic nature that may negatively impact regional or global societies or economies. Examples may be, but are not limited to, the following: (i) change to currency convertibility or restriction on capital flows announced by a country; (ii) market disruption, e.g. an event that materially negatively influences the aggregated liquidity, capitalization or tradability of an entire market; (iii) exchange closure, (iv) government intervention, (v) pandemic, (vi) natural catastrophe.

If a Limitation has occurred, the IGC shall decide if and how the Limitation shall be rectified (Discretionary Rule, see Section [7.6](#)). Any such rectification may comprise deviations from the index methodology which may apply as long as the Limitation persists (Discretionary Rule, see Section [7.6](#)).

In this context, STOXX may also decide to cancel an index review.

If a Limitation that could justify the cancellation of an index review occurs two or fewer dissemination days before the scheduled review implementation day, the review will be performed as planned, if reasonably possible. This aims to avoid last minute changes and not undermine the trading activity that may have already been performed.

If a review is cancelled, STOXX aims to perform it at the next scheduled review of the index, whichever comes first and subject to the then prevailing market conditions.

If a decision to deviate from the index methodology is taken, it will be communicated as soon as possible soon as possible in form of an Announcement or Press Release. STOXX Ltd. will refrain from the issuance of a notification if it reaches the view that the issuance of a notification is not in line with applicable laws and may decide to issue such notification at a later point in time when such reasons have lapsed (Discretionary Rule, see Section [7.6](#)). By reason of force majeure or other events beyond the control of STOXX Ltd. it might become impossible for STOXX Ltd. to

issue a notification in due time or by the means set out herein. In such cases STOXX Ltd. may exceptionally issue the notification either subsequently immediately following such event or in any case by other means.

Any measures will be implemented two dissemination days later and will enter into effect the next dissemination day after implementation, unless a different effective date is specified in the notification.

7 Methodology Review

The purpose of the methodology review is to maintain integrity of the index, i.e. that the index methodology remains executable and results in an accurate and reliable representation of the market / economic realities the index seeks to measure.

7.1. Frequency of Review

In order to ensure the index integrity is maintained, the methodology is reviewed annually and ad hoc if a Limitation has occurred. If a Limitation cannot be addressed with by a methodology review, this may give rise to an index cessation or index transition. STOXX Ltd. shall not be liable for any losses arising from any decisions taken as part of a methodology review.

7.2. Review Procedure

7.2.1. Initiation of Methodology Review

The IMC proposes an annual methodology review schedule for approval by the IGC (Discretionary Rule, see Section [7.6](#)).

The IMC is in charge of initiating ad hoc methodology reviews in case of a Limitation or based on recommendations to initiate a Methodology Review by other STOXX Committee (Discretionary Rule, see Section [7.6](#)).

7.2.2. Decision and Escalation

The following STOXX Committees are responsible for making the decisions on amendments to an index methodology:

The IMC decides on changes to the index methodology, unless

- a. a material change to the index methodology is proposed (see Section 7.3 below),
- b. the change is triggered by an Unclear Rule or Insufficient Rule (as part of a Limitation, Section 6), or
- c. it relates to a request for a market consultation,
- d. financial products relating to the index have a notional value/notional amount of more than EUR 100 mn.
- e.

If any of the conditions a) to d) above is met, the decision is taken by IGC.

7.3. Material Changes with Consultation

As described in the STOXX Changes to Methodology Policy and in STOXX Consultation Policy (publicly available on STOXX website), prior to proposed material changes to the index methodology, a consultation will be performed.

A change to an index methodology shall be considered material in the event of:

- a) a substantial change in the index objective or market/economic reality the index aims to represent (e.g. market leader components vs. mid cap companies), or
- b) a substantial change of the index methodology in aspects such as, but not limited to, the ones listed below and that would result in altering the overall concept or the nature of the index:
- i) calculation methods or formulas with a substantial impact on the index performance, or
 - ii) rules regarding the determination of index constituents by application of the index methodology, or
 - iii) rules regarding the determination of the weights of index constituents by application of the index methodology,
 - iv) rules regarding the treatment of corporate actions.

On the contrary, index methodology updates resulting from the application of existing methodology principles or minor clarifications of existing rules or corrections without altering the overall concept or the nature of the index are generally considered non-material.

The IMC determines whether an amendment is material as defined above. In case such determination is not possible, the proposed amendment shall be treated as material.

In case of Changes to Methodology as described in STOXX Changes to Methodology Policy a STOXX consults with reasonably affected stakeholders (“Stakeholders”) prior to take decision.

Stakeholders mean (a) persons or entities who have an index license with STOXX regarding a benchmark administered by STOXX (Subscriber) and/or as far as STOXX is reasonable aware (b) persons or entities and/or third parties who own contracts or financial instruments that reference a benchmark administered by STOXX (Investors)

Taking into account the Principle of Proportionality, STOXX informs affected Stakeholders as follows:

- either via public consultation open to the entire market and performed via STOXX website;
- or, when the relevant Stakeholders are known, on a restricted basis directly on the Stakeholders e-mail address.

STOXX shall inform in writing the Stakeholders on:

- the key elements of the proposed relevant changes
- the rationale for any proposed relevant changes
- the specific questions to be answered
- the deadline for receiving feedback

- the timeline of implementation of the Relevant Changes
- contact details where to provide feedback
- relevant definitions

The consultation shall enable Stakeholders to submit comments.

The standard consultation period shall be 1 month with the option to shorten or extend this period.

The IGC may decide to shorten the 1-month period in the following cases:

- in extreme or exceptional market conditions or analogous extraordinary situations
- in urgent cases, such as a situation in which the Index cannot be replicated anymore;
- in situations where there is no known Stakeholders impact or only a limited number of Stakeholders;
- in order to align the effective date of a proposed change with Index Maintenance; e.g. an Equity/Bond Index Rebalancing, Index Review, and Corporate Action Adjustment, or
- any other similar cases applying the principle of proportionality.

The IGC will consider the feedback received and decide whether the relevant changes shall become effective.

The IGC is not bound by any feedback received. Moreover, if the received feedback is ambiguous, or if no Stakeholders participated, the IGC may decide to conduct another consultation, which again will not be binding.

If the IGC decides that relevant changes shall become effective, STOXX will communicate a timeline on the implementation of the relevant changes, if not already communicated in the consultation material.

STOXX will after the consultation make available the Stakeholders feedback received in the consultation and STOXX's summary response to those comments, except where confidentiality has been requested by the respective Stakeholders.

The decision will be communicated as soon as possible in the form of an Announcement or Press Release.

STOXX Ltd. will refrain from issuance of a notification if it reaches the view that the issuance of a notification is not in line with applicable laws and may decide to issue such notification at a later point in time when such reasons have lapsed.

By reason of force majeure or other events beyond the control of STOXX Ltd. it might become impossible for STOXX Ltd. to issue a notification in due time or by the means set out herein. In

such cases STOXX Ltd. may exceptionally issue the notification either subsequently immediately following such event or in any case by other means.

At the end of each consultation STOXX Ltd. will make available the feedback received from Stakeholders in the consultation together with a summary of its response to that feedback, except where confidentiality has been requested by the respective Stakeholders. (Discretionary Rule, see Section [7.6](#)).

7.4. Non-Material Changes without Consultation

Non-material changes of the index methodology, including a description of the impact and the rationale, will be announced via Announcement or Press Release, effective immediately following publication, unless otherwise specified in the notification (Discretionary Rule, see Section [7.6](#)). STOXX Ltd. will refrain from the issuance of a notification if it reaches the view that the issuance of a notification is not in line with applicable laws and may decide to issue such Notification at a later point in time when such reasons have lapsed (Discretionary Rule, see Section [7.6](#)). By reason of force majeure or other events beyond the control of STOXX Ltd. it might become impossible for STOXX Ltd. to issue a notification in due time or by the means set out herein. In such cases STOXX Ltd. may exceptionally issue the notification either subsequently immediately following such event or in any case by other means.

7.5. Publication of the methodology change

The effective date for benchmark methodology changes is aligned, where feasible, with the periodic benchmark reviews dates when the benchmark composition is changed, and a rebalancing is triggered to avoid extra ordinary impact for clients. Material methodology changes should generally be publicly announced 3 months prior to implementation. IGC may decide to shorten the notice period:

- a) In exceptional or urgent cases such as extreme or exceptional market conditions or analogous extraordinary situations
- b) in situations where there is no Stakeholder impact and where it has been agreed that the notice period has to be shortened but immediate communication is not possible. A case that requires urgent action is for example a situation in which the investor's ability to replicate the index benchmark performance with his or her portfolio is no longer ensured. In such cases, changes or amendments to the published index methodology must be made on the same day the new rule or change is implemented.
- c) to align with the period benchmark review dates and the rebalancing of the benchmarks.

In case of any proposed material change in its methodology, STOXX shall share its view on the key elements of the methodology that will be impacted by a proposed material change. Furthermore, STOXX Ltd. shall include an assessment as to whether the representativeness of the benchmark and its appropriateness for its intended use are put at risk in case the proposed material change is not put in place. In case of any changes or amendments to the present Index Guide, Operations and Product will work together to ensure both the public and subscribers are provided with

detailed information about the nature and rationale of the change as well as the implications and terms for the new methodology to enter into force.

7.6. Discretion

Save for the cases expressly described in this Guide, the index methodology is entirely rule-based and automatic. Discretion only applies if expressly stated and must be exercised as provided for in this Guide.

7.6.1. Exercise of Discretion

Discretion may only be exercised by STOXX Committee(s) (as defined hereafter) with a view to resolve issues arising in maintaining the prevailing index methodology in response to events, with an overarching aim to accurately and reliably measure the market or economic realities as defined in this Guide.

Discretion shall be exercised in line with the following principles:

- The body or person(s) exercising discretion must not be affected by a conflict of interest;
- The body or person(s) exercising discretion must have the requisite skills, knowledge and experience to exercise such discretion;
- All facts and circumstances relevant for the exercise of discretion must have been established and properly documented prior to the exercise of discretion;
- The exercise of discretion must comply with all applicable laws and regulations;
- The body or person(s) exercising discretion must act on the basis of the relevant facts and circumstances only, must give proper weight to the various considerations and ignore irrelevant facts and circumstances;
- The body or person(s) exercising discretion must act with a view to maintain the integrity of the market or economic reality by aiming to ensure that indices remain representative and can be replicated, taking into account, inter alia, some, or all of the following:
 - Relevance of the event to the eb.rexx Bond Indices
 - Trading accessibility of the affected market
 - Availability of alternative markets
 - Ability of market participants to replicate the index or, where applicable, the results of the index review
 - Public information related to the events and their development in the foreseeable future
-
- The body or person(s) exercising discretion must act honestly, reasonably, impartially and in good faith.
-

As part of the decision-making process, STOXX may consult with external stakeholders.

Discretionary Rule: *Any exercise of discretion must take into account the rationale of the index, the purpose of the rules with regard to which discretion is exercised, the objective to preserve market integrity and reliability of the index calculation to avoid undue market impact, the technical feasibility and economic reasonability, and the interest of licensees or investors. Bodies and functions responsible for decision-marking*

The cases in which STOXX Ltd. may exercise discretion regarding the index methodology and its application are noted in the respective rules of this Guide.

The following bodies (hereafter each of them separately also referred to as “STOXX Committee”) are involved in the decision-making process relevant for the indices governed by this Guide:

- Product Initiation Committee (PIC),
- Product Approval Committee (PAC),
- Index Operations Committee (IOC),
- Index Management Committee (IMC),
- Index Governance Committee (IGC),
- Oversight Committee (OC),
- Management Board (MB).

The following table summarizes the cases in which STOXX Committee(s) may exercise discretion regarding the index methodology and its application:

Case	Responsible STOXX Committee
Index Termination and Transition	IMC, IGC
Sector Affiliation	IGC
Exclusion from Rankings	IGC
Deviation from Fast Exit/Fast Entry rules and Regular Exit/Regular Entry rules in exceptional cases	IGC
Procedure in case if a breach of the Basic Criteria	IGC
Determination of expected price to new shares in case of Subscription Rights on Other Share Classes	IGC
Procedure for Subscription Rights on Instruments with Embedded Options	IGC
Limitations	IGC
Review and approve treatment of Calculation Errors. Non-rule-based Correction.	IOC, IGC
Annual methodology review schedule	IMC, IGC
Initiation of ad hoc methodology reviews	IMC
Determination regarding materiality of changes to the index methodology	IMC
Deviation from standard consultation period in case of material changes of the index methodology	IGC
Deviation from notification procedure in case of material changes of the index methodology	IGC
Deviations from notification procedure in case of non-material changes of the index methodology	IMC

Extreme or exceptional market conditions or analogous extraordinary situations to be addressed in a fast track way (e.g. Pandemic)	IGC
Periodic review of current index methodologies (e.g. matching of underlying interest) including initiation of ad-hoc reviews of benchmarks or benchmark families and clarification of methodologies (if required).	IGC
(Annual) Review of the control framework (including identification of operational risks and definition of measures that address operational risks).	IOC, IMC
Review and approve reports on monitoring of outsourced service providers, contributors, risks and incidents reporting (Art. 10 BMR relevant)	IGC
Consideration and follow-up on the implementation of remedial actions based on results of internal and external audits.	IGC
Monitoring of input data (including input data from contributors).	IOC, IGC, OC
Review and approval of special cases identified during index review	IOC, IMC, IGC
Review and approval of complex corporate actions (disagreement on treatment of corp. action or application of rules)	IOC, IMC, IGC
Decisions with respect to complaints.	IGC
Review and approve periodic reporting requirements under the Periodic Review Policy.	IGC
Review and approve changes in case thresholds of significant or critical benchmarks exceeded and notify competent authority	IGC
Approval of introduction of new internal or strategic projects for new product ideas.	PIC
Responsibilities for clients requests: Decision to proceed or not or further analysis required.	PIC
Approval of launch of new products, including checks on suitability based on Positioning Paper .(including Regulatory Checklist, financial products that will be used and confirmation that any maintenance tool will be delivered by the launch date).	PAC, IGC
Responsibilities for clients, strategic or internal requests: -Final estimation of costs and revenues and final launch date -Final Positioning Paper (including Regulatory Checklist, financial products that will be used and confirmation that any maintenance tool will be delivered by the launch date).	PAC, IGC

8 Appendix

8.1. Index Overview

Figure 2: Overview of the current eb.rexx® Bond Indices

Sub-index	Maturity	Type	ISIN	Code
Germany	Overall	Price	DE000A0BRC00	R1GK
		Total Return	DE000A0BRC18	R1GP
	0-1	Price	DE000A0JZF66	I2ID
		Total Return	DE000A0JZF58	I2IC
	1.5-2.5	Price	DE0007201915	RXP1
		Total Return	DE0007201923	RXR1
	2.5-5.5	Price	DE0007201931	RXP2
		Total Return	DE0007201949	RXR2
	5.5-7.5	Price	DE000A0MEWM4	R8JR
		Total Return	DE000A0MEWL6	R8JQ
	7.5-10.5	Price	DE000A0MEWP7	R8JT
		Total Return	DE000A0MEWN2	R8JS
	5.5-10.5	Price	DE0007201956	RXP5
		Total Return	DE0007201964	RXR5
	10.5+	Price	DE0007201972	RXPX
		Total Return	DE0007201980	RXRX
Germany	Selection	Price	DE0007201881	RXPG
		Total Return	DE0007201899	RXRG

8.2. Contact

➤ **Information on prices, index concepts and licenses**

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