MARCH 2021

STOXX® BOND INDEX GUIDE

Creating an Investment Intelligence Advantage

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CONTENTS

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1. INTRODUCTION TO THE STOXX INDEX GUIDES

The STOXX index guides are separated into the following sub-sets:

- » The **STOXX Calculation guide** provides a general overview of the calculation of the STOXX equity indices, the dissemination, the index formulas and adjustments due to corporate actions
- » The **STOXX Index Methodology guide** contains the equity index specific rules regarding the construction and derivation of the portfolio based indices, the individual component selection process and weighting schemes
- » The **STOXX Strategy guide** contains the formulas and description of all strategy indices
- » The **STOXX Dividend Points Calculation guide** describes the dividend points products
- » The **STOXX Distribution Points Calculation guide** describes the distribution points products
- » The **STOXX ESG guide** contains the index specific rules regarding the construction and derivation of the ESG indices, the individual component selection process and weighting schemes
- » The **iSTOXX guide** contains the index specific rules regarding the construction and derivation of the iSTOXX indices, the individual component selection process and weighting schemes
- » The **STOXX Reference Rates guide** contains the rules and methodologies of the reference rate indices
- » The **STOXX Statistical Calculations** guide provides a detailed view of definitions and formulas of the statistical calculations as utilized in the reports, factsheets, indices and presentations produced by STOXX
- » The **STOXX Bond Index guide** contains the bond index specific rules regarding the construction of the indices, the individual component selection process, weighting schemes and overview of the index and bond analytics formulas

All rule books are available for download on http://www.stoxx.com/indices/rulebooks.html

2. CHANGES TO THE STOXX BOND INDEX GUIDE

2.1. HISTORY OF CHANGES TO THE STOXX BOND INDEX GUIDE

» Apr. 07, 2016: Launch of EURO STOXX 50® Corporate Bond indices
» May 10, 2016: Launch of EURO STOXX 50® Corporate Bond in USD, JPY, CHF and GBP and EURO STOXX 50® Corporate Bond Hedged in USD, JPY, CHF and GBP indices
» Feb. 21, 2017: Launch of EURO STOXX 50® Corporate Bond maturity, industry and rating sub-indices
» Aug. 30, 2017: Clarification of section 4.3.1 Selection Criteria
» March 16, 2021: Clarification of section 4.3.2.2 Bond Prices

3. GENERAL PRINCIPLES

3.1. INDEX RATIONALE

STOXX defines the index rationale as the basis for applying a certain methodology in order to achieve the index objective. STOXX performs intensive research and may conduct conversations with market participants and third parties for this purpose. STOXX discloses the index objective in every case.

3.2. METHODOLOGY REVIEW POLICIES

STOXX constantly monitors the execution of the index calculation rules in order to ensure the validity of the index methodology. STOXX also conducts general methodology reviews in a periodic and ad-hoc basis, to reflect economic and political changes and developments in the investment industry. As result of these activities, STOXX introduces changes to the methodology books. Material changes are notified to subscribers and the media through the usual communication channels. Clarifications of the methodology are updated in the rulebook. All changes are tracked in the section 2.1 History of changes to the STOXX bond index Guide.

3.3. INDEX TERMINATION POLICY

For the termination of an index or index family for which outstanding products are present in the market to the knowledge of STOXX, a market consultation with the involved clients will be initiated by STOXX to take into account their views and concerns related to the termination or transition. A consultation period will be opened. Its duration depends on the specific issue. After the consultation period and in case of further action needed, a notification will be issued and the process defined above will be followed. In the case of a transition, STOXX will launch the alternative index and will notify of its character as a suitable replacement for an existing index whose calculation should be discontinued in the future. This notification advices clients on the alternative recommended by STOXX as replacement. The timeframe in which both indices will be calculated in parallel will be disclosed in the notification's text and will be no shorter than three months.

For the termination of an index or index family for which, to the knowledge of STOXX, no listed financial products are issued in the market, a press release notification or e-mail notification to subscribers will be communicated at least three months before coming into force. Clients or third parties with interest in the index or index family are urged to communicate as soon as possible their concerns to STOXX. Based on the feedback collected, STOXX may alter the index termination decision. For the termination of an index without financial product issued on there will be no market consultation. Changes to the original notification will be communicated in the same manner.

3.4 COMMUNICATION

Notifications are sent out for short-term changes, the periodic review announcements, index calculation and production issues and errors, new index launches and general information from STOXX.

4. EURO STOXX 50® CORPORATE BOND INDICES

4.1. OVERVIEW

The EURO STOXX 50® Corporate Bond Indices are corporate bond indices tracking the performance of bonds issued by the companies of the EURO STOXX 50® index, which represent highly liquid, blue-chip companies of the Eurozone.
Exclusive selection criteria are applied in order to determine the most liquid and representative components. The EURO STOXX 50® Corporate Bond Indices combine the selection criteria for Eurozone equity indices with the internationally accepted European Federation of Financial Analysts Societies (EFFAS) principles of fixed income indices.

4.2. STRUCTURE

The indices are calculated based on real bonds, which facilitates easier tracking of the index. Only bonds issued by companies part of the EURO STOXX 50® index are eligible for the index. As not all companies issue bonds and the selection criteria is applied purely on a bond level (for details see 4.3.1 SELECTION CRITERIA), some equity issuer will not be represented in the bond index, for example as of December 2015 two EURO STOXX 50® companies do not issue bonds:

EURO STOXX 50® Index companies	EURO STOXX 50® Corporate Bond Index bond issuing companies
✓ L'OREAL	✗ L'OREAL
✓ INDITEX	✗ INDITEX
✓ BANCO SANTANDER	✓ BANCO SANTANDER
✓ BNP PARIBAS	✓ BNP PARIBAS
✓ ENI	✓ ENI
✓ BMW	✓ BMW
✓ VOLKSWAGEN	✓ VOLKSWAGEN
✓ TELEFONICA	✓ TELEFONICA
✓ ENEL	✓ ENEL
✓ ING	✓ ING
…	…

4. EURO STOXX 50® CORPORATE BOND INDICES

The following index variants are currently available:
- EURO STOXX 50 Corporate Bond
- EURO STOXX 50 Corporate Bond 1-3
- EURO STOXX 50 Corporate Bond 3-5
- EURO STOXX 50 Corporate Bond 5-7
- EURO STOXX 50 Corporate Bond 7+
- EURO STOXX 50 Corporate Bond Financials
- EURO STOXX 50 Corporate Bond Ex-Financials
- EURO STOXX 50 Corporate Bond Ex-Financials 1-3
- EURO STOXX 50 Corporate Bond Ex-Financials 3-5
- EURO STOXX 50 Corporate Bond Ex-Financials 5-7
- EURO STOXX 50 Corporate Bond Ex-Financials 7+
- EURO STOXX 50 Corporate Bond AAA-A
- EURO STOXX 50 Corporate Bond Monthly Hedged

The full list of indices can be found below:

ISIN	Index	Currency[1]	Version	Bloomberg Ticker	Reuters RIC
DE000A0QZJL9	EURO STOXX 50 Corporate Bond	EUR	Price	SX5BPI	.SX5BPI
DE000A0QZJM7	EURO STOXX 50 Corporate Bond	EUR	Total Return	SX5BTR	.SX5BTR
DE000A0QZJS4	EURO STOXX 50 Corporate Bond	USD	Price	-	.SX5BPIU
DE000A0QZJT2	EURO STOXX 50 Corporate Bond	USD	Total Return	-	.SX5BTRU
DE000A0QZJ06	EURO STOXX 50 Corporate Bond	CHF	Price	-	.SX5BPIC
DE000A0QZJ14	EURO STOXX 50 Corporate Bond	CHF	Total Return	-	.SX5BTRC
DE000A0QZJN5	EURO STOXX 50 Corporate Bond	GBP	Price	-	.SX5BPIG
DE000A0QZJP0	EURO STOXX 50 Corporate Bond	GBP	Total Return	-	.SX5BTRG
DE000A0QZJQ8	EURO STOXX 50 Corporate Bond	JPY	Price	-	.SX5BPIJ
DE000A0QZJR6	EURO STOXX 50 Corporate Bond	JPY	Total Return	-	.SX5BTRJ
DE000A2DBNQ5	EURO STOXX 50 Corporate Bond 1-3	EUR	Price	-	.SX5B13PI
DE000A2DBNR3	EURO STOXX 50 Corporate Bond 1-3	EUR	Total Return	-	.SX5B13TR
DE000A2DBNS1	EURO STOXX 50 Corporate Bond 3-5	EUR	Price	-	.SX5B35PI
DE000A2DBNT9	EURO STOXX 50 Corporate Bond 3-5	EUR	Total Return	-	.SX5B35TR
DE000A2DBNU7	EURO STOXX 50 Corporate Bond 5-7	EUR	Price	-	.SX5B57PI
DE000A2DBNV5	EURO STOXX 50 Corporate Bond 5-7	EUR	Total Return	-	.SX5B57TR
DE000A2DBNW3	EURO STOXX 50 Corporate Bond 7+	EUR	Price	-	.SX5B7PI
DE000A2DBNX1	EURO STOXX 50 Corporate Bond 7+	EUR	Total Return	-	.SX5B7TR
DE000A2DBNY9	EURO STOXX 50 Corporate Bond Financials	EUR	Price	-	.SX5BFPI
DE000A2DBNZ6	EURO STOXX 50 Corporate Bond Financials	EUR	Total Return	-	.SX5BFTR

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[1] Index currency versions other than EUR are calculated intraday using spot rates provided by Thomson Reuters. The WM/Reuters currency fixing rates from 5:00 pm CET are used to calculate the indices' closing values. For details, see https://www.stoxx.com/end-of-the-day-data?eodd=2

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4.EURO STOXX 50® CORPORATE BOND INDICES

ISIN	Index	Currency[1]	Version	Bloomberg Ticker	Reuters RIC
DE000A2DBN01	EURO STOXX 50 Corporate Bond Ex-Financials	EUR	Price	-	.SX5BEFPI
DE000A2DBN19	EURO STOXX 50 Corporate Bond Ex-Financials	EUR	Total Return	-	.SX5BEFTR
DE000A2DBN27	EURO STOXX 50 Corporate Bond Ex-Financials 1-3	EUR	Price	-	.SX5BEF13PI
DE000A2DBN35	EURO STOXX 50 Corporate Bond Ex-Financials 1-3	EUR	Total Return	-	.SX5BEF13TR
DE000A2DBN43	EURO STOXX 50 Corporate Bond Ex-Financials 3-5	EUR	Price	-	.SX5BEF35PI
DE000A2DBN50	EURO STOXX 50 Corporate Bond Ex-Financials 3-5	EUR	Total Return	-	.SX5BEF35TR
DE000A2DBN68	EURO STOXX 50 Corporate Bond Ex-Financials 5-7	EUR	Price	-	.SX5BEF57PI
DE000A2DBN76	EURO STOXX 50 Corporate Bond Ex-Financials 5-7	EUR	Total Return	-	.SX5BEF57TR
DE000A2DBN84	EURO STOXX 50 Corporate Bond Ex-Financials 7+	EUR	Price	-	.SX5BEF7PI
DE000A2DBN92	EURO STOXX 50 Corporate Bond Ex-Financials 7+	EUR	Total Return	-	.SX5BEF7TR
DE000A2DBPA4	EURO STOXX 50 Corporate Bond AAA-A	EUR	Price	-	.SX5BAPI
DE000A2DBPB2	EURO STOXX 50 Corporate Bond AAA-A	EUR	Total Return	-	.SX5BATR
DE000A0Z3M66	EURO STOXX 50 Corporate Bond Monthly Hedged	GBP	Price	-	.SX5BPIGH
DE000A0Z3M74	EURO STOXX 50 Corporate Bond Monthly Hedged	GBP	Total Return	-	.SX5BTRGH
DE000A0Z3M82	EURO STOXX 50 Corporate Bond Monthly Hedged	JPY	Price	-	.SX5BPIJH
DE000A0Z3M90	EURO STOXX 50 Corporate Bond Monthly Hedged	JPY	Total Return	-	.SX5BTRJH
DE000A0Z3M25	EURO STOXX 50 Corporate Bond Monthly Hedged	USD	Price	SX5BPIUH	.SX5BPIUH
DE000A0Z3M33	EURO STOXX 50 Corporate Bond Monthly Hedged	USD	Total Return	SX5BTRUH	.SX5BTRUH
DE000A0Z3M41	EURO STOXX 50 Corporate Bond Monthly Hedged	CHF	Price	SX5BPICH	.SX5BPICH
DE000A0Z3M58	EURO STOXX 50 Corporate Bond Monthly Hedged	CHF	Total Return	SX5BTRCH	.SX5BTRCH

4. EURO STOXX 50® CORPORATE BOND INDICES

4.3. INDEX METHODOLOGY

The indices are based on a volume-weighted summation concept that analyzes relative changes in value compared to a reference date (i.e. the index review date): the composition and volume of the index portfolios are adjusted at this date. Therefore, corresponding adjustments to index-tracking portfolios are only required once, i.e. at the respective reference date. The constituent bonds are weighted by their amount outstanding. The calculation methodology is in line with the standards set by EFFAS[2].

4.3.1. SELECTION CRITERIA

The precondition for index eligibility is that a bond has reference data and pricing data (for details see 4.3.2 Index calculation). For the avoidance of doubt, securities without available data are not included in the index.

In order to determine the index constituents, the following selection criteria will be applied:
  ➢ Issuer type
  ➢ Bond type
  ➢ Currency
  ➢ Credit rating
  ➢ Time to maturity
  ➢ Nominal amount outstanding
  ➢ Seniority of debt
  ➢ Industry

For the bond indices, no explicit liquidity filter is applied, as bonds are largely traded over-the-counter (OTC) or off-exchange and thus the data availability is restricted. The applied selection criteria of the index constituents facilitate the selection of liquid constituents due to the filtering by issue size, credit rating, seniority of debt 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.

Bonds with prices received in amount instead of percentage or with dirty price instead of clean price are not eligible for the index.

4.3.1.1. ISSUER TYPE

The EURO STOXX 50® Corporate Bond Index is comprised solely of corporate bonds from companies that are constituents of the EURO STOXX 50® index at the time of the rebalancing. Only bonds issued by the parent or a subsidiary entity of a corporate group are considered eligible. Intra-review changes in the EURO STOXX 50® index due to extraordinary composition changes or the application of fast exit and fast entry rules do not trigger extraordinary composition changes of the EURO STOXX 50® Corporate Bond index.

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[2] 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.

4.EURO STOXX 50® CORPORATE BOND INDICES

4.3.1.2.   BOND TYPE

The eligible bond types are:
 - ➢ Bullet fixed-coupon bonds
 - ➢ Zero-coupon bonds (exception: stripped bonds are not included)

The following bond types are excluded:
 - ➢ Bonds with call or put option
 - ➢ Step-up bonds
 - ➢ Multi-step and multi-step callable bonds
 - ➢ Multi-coupon bonds
 - ➢ Sinking funds and amortizing bonds
 - ➢ Fix-to-float bonds
 - ➢ Extendible bonds
 - ➢ Private placements
 - ➢ Perpetual bonds
 - ➢ Floating rate notes
 - ➢ Inflation-linked bonds
 - ➢ Purchase fund bonds
 - ➢ Convertible bonds
 - ➢ Securitized (ABS/MBS/CDO)
 - ➢ Dual-currency bonds
 - ➢ Pay-in-kind bonds
 - ➢ Schuldscheine
 - ➢ Money-market instruments (deposit notes, banker`s acceptance).

4.3.1.3.   CURRENCY

Only EUR denominated bonds are eligible for the index.

4.3.1.4.   CREDIT RATING

STOXX composite rating is applied in order to determine a bond's rating. The STOXX composite rating for the EURO STOXX 50® Corporate Bond index is derived by using the issue´s long term ratings from S&P and Moody`s. The following rating values are used within the composition logic: AAA, AA, A, BBB, BB, B, CCC, CC, C. If only one rating is available from a source for a bond, then that rating will be applied. If two ratings are available from the sources for a bond, then the lower of the two will be applied. Bonds which are in default or not rated are not eligible for the indices:

MOODY'S	S&P	STOXX Bond Composite Rating	
Aaa	AAA	AAA	
Aa1	AA+		
Aa2	AA	AA	Investment Grade
Aa3	AA-		
A1	A+		
A2	A	A	
A3	A-		
Baa1	BBB+		
Baa2	BBB	BBB	
Baa3	BBB-		

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4. EURO STOXX 50® CORPORATE BOND INDICES

MOODY'S	S&P	STOXX Bond Composite Rating	
Ba1	BB+	BB	Non-Investment Grade
Ba2	BB		
Ba3	BB-		
B1	B+	B	
B2	B		
B3	B-		
Caa1	CCC+	CCC	
Caa2	CCC		
Caa3	CCC-		
Ca	CC	CC	
C	C	C	

EURO STOXX 50® Corporate Bond AAA-A Index:
For the higher quality sub-index a minimum composite rating of A is required (i.e. only bonds with composite rating A and higher).

EURO STOXX 50® Corporate Bond Index and all other sub-indices:
A minimum rating of Investment Grade (BBB and higher) is required.

4.3.1.5. TIME TO MATURITY
The time to maturity is measured from the respective rebalancing date to the maturity date. All eligible bonds must have a remaining time to maturity of at least 1.25 years. This condition is not only valid for bonds to be included into the index, but also for bonds already part of the index (which will be excluded at next rebalancing date, in case of not fulfilling the condition). The following day count conventions are supported: ACT/360, ACT/365, ACT/ACT, ISMA 30/360.

For the purpose of calculating the maturity-bucket sub-indices, the following ranges are considered:
- 1-3 (exclude bonds with years to maturity < 1.25 and >= 3)
- 3-5 (exclude bonds with years to maturity < 3 and >= 5)
- 5-7 (exclude bonds with years to maturity < 5 and >= 7)
- 7+ (exclude bonds with years to maturity < 7).

4.3.1.6. NOMINAL AMOUNT OUTSTANDING
The minimum nominal amount outstanding for a bond to be eligible is EUR 750 million. The amount outstanding of each bond is used to calculate its index weight. The index is capitalization-weighted.

4.3.1.7. SENIORITY OF DEBT
Subordinated bonds carry additional risk as higher ranked bonds, hence subordinated bonds are not eligible and excluded from the index.

4.3.1.8. INDUSTRY
The industry of the corresponding equity company used for the EURO STOXX 50® index is used for selection of the Financials and Ex-Financials corporate bond sub-indices.

4. EURO STOXX 50® CORPORATE BOND INDICES

4.3.2. INDEX CALCULATION

4.3.2.1. REFERENCE DATA

Bond reference data used for the selection and in the index calculation are sourced from third data providers and verified against offering circulars as appropriate

4.3.2.2. BOND PRICES

On-going calculation:

The indices are calculated in real time on the basis of bid prices. If no new prices for a particular bond are received, the index will continue to be calculated based on the last available prices. Prices are always clean prices in percentage.

Insertions:

New bonds are factored into the respective index when its composition is updated, using the ask price. 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.

Cost factor:

Bonds which are already in the index and their weight increases as a result of rebalancing are valued at the bid price. In fact if a portfolio manager tracks the index, those bonds will be purchased at the ask price as well, which implies tracking cost. In order to offset this effect and accordingly to reflect the costs a cost factor is applied to the price and total return indices (for details see 4.3.2.4 Calculation Formulas).

Evaluated prices:

The bond indices use evaluated bond prices in the form of bid and ask prices provided by ICE Data Services for index calculation.

ICE Data Services utilises evaluated pricing models varying by asset class, incorporating available: trades, bid and ask quotes, and other market information, including cash flow and loan performance data for structured securities. Because many fixed income securities do not trade daily, STOXX applies ICE Data Services' evaluated pricing applications through processes including: benchmark curves, benchmarking of like securities, sector groupings and matrix pricing, to prepare evaluations. In addition, ICE Data Services uses model processes to assess interest rate impact and develop prepayment scenarios such as the option adjusted spread model, taking into account market convention. For each asset class, an ICE Data Services team of evaluators gathers information from market sources and integrates relevant credit information, perceived market movements and sector news into the evaluated pricing applications and models.

For certain security types, additional inputs may be used, or some of the standard inputs may not be applicable. ICE Data Services' evaluated prices provide information about the current price level. These evaluations represent the third data provider good faith opinion about the fair price for a security in a current sale, typically in an institutional round lot position.

The quality of the evaluated prices of ICE Data Services is continuously verified by ICE Data Services against a broad client base, ranging from asset managers, investment banks, custodians, insurance companies to central banks. The evaluated prices can be challenged by

4.EURO STOXX 50® CORPORATE BOND INDICES

STOXX if there is a reason to believe that a certain price does not correspond to the appropriate current price level.
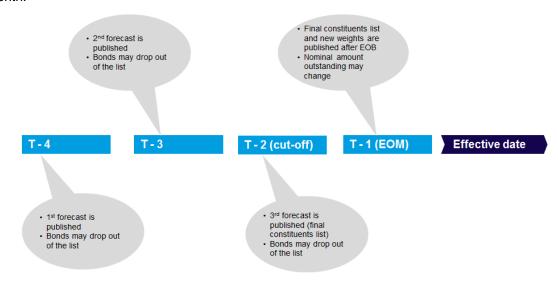
The hierarchy of data inputs used by ICE Data Services for the evaluated prices is the following: benchmark yields, reported trades, broker/dealer quotes, issuer spreads, two-sided markets, benchmark securities, bids, offers, and reference data including market research publications. ICE Data Services may prioritize inputs differently, and not all inputs listed above may be available for use in the evaluation process.

4.3.2.3.   PERIODICAL ADJUSTMENT

4.3.2.3.1.   Rebalancing timeframe

The EURO STOXX 50® Corporate Bond Index is rebalanced on a quarterly basis, at the end of March, June, September and December using as a basis the latest EURO STOXX 50® index composition from the same month. The equity index composition is effective one trading day after every third Friday in March, June, September and December.

Four trading days before the end of the last month of the quarter the nominal amount outstanding for each bond is determined and the index constituents list is published (a forecast file is published). Three and two trading days before end of the last month of the period, bonds may drop out of this list due to rating or other relevant reference data changes (a second and third forecast file is published). The cut-off date for the final membership list for the following period is the list published two trading days before end of the last month of the period.

On the last business day of each period, the new membership list with closing prices resp. weights of all bonds after close of business is published. The prices are bid prices for index constituents or ask prices for insertions. The list is effective from the first trading day of next month.

4.3.2.3.2.   Weighting adjustments

Within an index, each bond is weighted according to its market capitalization. Intra-month changes of the amount outstanding for each bond are reflected in the index through the rebalancing procedure.

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4.3.2.3.3.   Coupon adjustments

In case coupon changes, those changes are taken into account in the calculation of the indices from the exact date on which the coupon was altered.

4.3.2.3.4.   Monthly bond exclusions between scheduled rebalancing

Bonds can become intra-month not eligible for the index. In this case they will be kept in the index until end of month and the proceeds from the sale will be invested in cash. Following scenarios are applicable:
- Bond or issuer default
- Rating downgrade of the bond to non-investment grade (i.e. below threshold)
- Reduction of the amount outstanding
- other changes in bond reference data, which would make the bond not eligible applying again the selection criteria

4.3.2.3.5.   Monthly cash reinvestment between scheduled rebalancing

Cash from coupon payments or from bonds which exit the index will be invested at the end of each month in the money market for one month at the STOXX GC Pooling EUR Deferred Funding Rate, or a rate of zero in case of negative interest levels (i.e. floor at 0%). At rebalancing the cash is set to zero, because invested in the index.

4.3.2.3.6.   Index size

Indices have no limitation in regards to size.

4.3.2.3.7.   Cap Limit

The capping procedure is performed at issuer level first and subsequently at issuer industry level in order to prevent those dominating the index. In case capping at both levels is not possible, preference is given to capping at issuer level and the capping at issuer industry level is disregarded. The issuer industry capping procedure does not apply to single industry sector sub-indices (e.g. for EURO STOXX 50 Corporate Bond Financials Index).

4.3.2.3.7.1.   Bond Issuer Capping

The weight of a bond issuer is capped at 20%. If the combined weight of all bonds from any individual issuer within the index exceeds 20%, the market capitalization of these bonds will be proportionally reduced to 20% of the reduced index capitalization. If this is not possible, bond issuer will be equal-weighted (e.g. in case of 5 or less issuer). The capping procedure is applied at each quarterly review, when on the last business day of each period the final capped weights are published and effective from the first trading day of next month.

4.3.2.3.7.2.   Issuer Industry Capping

Based on the industry classification used for the EURO STOXX 50® index, the weight of a single industry in the index is capped at 40% at each quarterly review. If the combined weight of all bonds associated with a certain the industry exceeds 40%, the market capitalization of these bonds will be proportionally reduced to 40% of the reduced index capitalization. If this is not possible, issuer industry capping will not be performed, but only bond issuer capping.

4.3.2.4.   CALCULATION FORMULAS

4. EURO STOXX 50® CORPORATE BOND INDICES

4.3.2.4.1. Price Index

Price indices are calculated as follows:

$$PI_t = PI_{t-s} \cdot \frac{\sum_{i=1}^{n} P_{i,t} \cdot N_{i,t-s} + cash_{t-s}}{\sum_{i=1}^{n} P_{i,t-s} \cdot N_{i,t-s} + cash_{t-s}} \cdot CF_{PI}$$

Where, in case of non-rebalancing month:

$$CF_{PI} = 1$$

Else, in case of rebalancing month:

$$CF_{PI} = \frac{\sum_{i=1}^{n} N_i^+ \cdot P_i^{PI}}{\sum_{i=1}^{n} N_i^- \cdot P_i^{PI} + cash_{t-s}} \cdot \frac{\sum_{i=1}^{n} N_i^- \cdot P_i^{B/A} + cash_{t-s}}{\sum_{i=1}^{n} N_i^+ \cdot P_i^{B/A}}$$

$$P_i^{A/B} \begin{cases} = P_i^A, & \frac{N_i^+ \cdot P_i^{PI}}{\sum_{i=1}^{n} N_i^+ \cdot P_i^{PI}} > \frac{N_i^- \cdot P_i^{PI}}{\sum_{i=1}^{n} N_i^- \cdot P_i^{PI} + cash_{t-s}} \Leftrightarrow w_i^+ > w_i^- \\ = P_i^B, & \text{else} \end{cases}$$

$$P_i^{PI} \begin{cases} = P_i^A, & for\ insertions \\ = P_i^B, & else \end{cases}$$

Whereby:

Parameter	Legend
PI$_t$	Price index value at time t
PI$_{t-s}$	Price index value on the last calendar day of the previous month
P$_{i,t}$	Price of bond i at time t
P$_{i,t-s}$	Closing price of bond i on the last trading day of the previous month
N$_{i,t-s}$	Capped nominal amount outstanding issue size of bond i on the last trading day of the previous month
n	Number of bonds in the index
t-s	Time of the last rebalancing
t	Calculation date
CF$_{PI}$	Cost factor for price index, valid from last rebalancing date

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Parameter	Legend
N_i^+	Nominal amount outstanding issue size of bond i after rebalancing
N_i^-	Nominal amount outstanding issue size of bond i before rebalancing
w_i^+	Weight of bond i after rebalancing
w_i^-	Weight of bond i before rebalancing
$P_i^{A/B}$	Either closing ask or bid price of bond i depending on the change in the weight resulting from the rebalancing
P_i^A	Closing ask price of bond i on the rebalancing day
P_i^B	Closing bid price of bond i on the rebalancing day
$cash_{t-s}$	Cash at the end of last month

4.3.2.4.2. Total Return Index

For total return indices, the monthly rebalancing involves the reinvestment of coupon payments in the overall portfolio at the rebalancing date fixed for any adjustment of the index composition. Consequently, total return indices are calculated as follows:

$$TR_t = TR_{t-s} \frac{\sum_{i=1}^{n} \left(P_{i,t} + A_{i,t} + XD_{i,t-s} \cdot (CP_{i,t} + G_{i,t})\right) \cdot N_{i,t-s} + cash_{t-s}\left(1 + r_{t-s}^{1d} \cdot \frac{days_{t-s,t}}{360}\right)}{\sum_{i=1}^{n} (P_{i,t-s} + A_{i,t-s} + XD_{i,t-s} \cdot CP_{i,t-s}) \cdot N_{i,t-s} + cash_{t-s}} \cdot CF_{TR}$$

Where, in case of non-rebalancing month:

$$CF_{TR} = 1$$

Else, in case of rebalancing month:

$$CF_{TR} = \frac{\sum_{i=1}^{n} N_i^+ \cdot \left(P_i^{TR} + A_i\right)}{\sum_{i=1}^{n} N_i^- \cdot \left(P_i^{TR} + A_i\right) + cash_{t-s}\left(1 + r_{t-s}^{1d} \cdot \frac{days_{reb}}{360}\right) + \sum_i N_i^- . G_{i,t}} \cdot$$

$$\frac{\sum_{i=1}^{n} N_i^- \cdot \left(P_i^{B/A} + A_i\right) + cash_{t-s}\left(1 + r_{t-s}^{1d} \cdot \frac{days_{reb}}{360}\right) + \sum_i N_i^- . G_{i,t}}{\sum_{i=1}^{n} N_i^+ \cdot \left(P_i^{B/A} + A_i\right)}$$

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$$P_i^{A/B} \begin{cases} = P_i^A, & \dfrac{N_i^+ \cdot (P_i^{TR} + A_i)}{\sum_{i=1}^{n} N_i^+ \cdot (P_i^{TR} + A_i)} > \dfrac{N_i^- \cdot (P_i^{TR} + A_i)}{\sum_{i=1}^{n} N_i^- \cdot (P_i^{TR} + A_i) + cash_{t-s} \cdot \left(1 + r_{t-s}^{1d} \cdot \dfrac{days_{reb}}{360}\right) + \sum_i N_i^- \cdot G_{i,t}} \Leftrightarrow w_i^+ > w_i^- \\ \\ = P_i^B, & \text{else} \end{cases}$$

$$P_i^{TR} \begin{cases} = P_i^A, & for\ insertions \\ = P_i^B, & else \end{cases}$$

Whereby (in addition to the denotations used in 3.3.4.1):

Parameter	Legend
$A_{i,t}$	Accrued interest of bond i at time t
$A_{i,t-s}$	Accrued interest of bond i on the last calendar day of the previous month
$G_{i,t}$	Value of a coupon payment of 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
$CP_{i,t}$	Value of the next coupon payment of bond i at date t during an ex-dividend period (as the next coupon payment of bond i is not included in the dirty price calculation at date t because of the ex-dividend period). Outside the ex-dividend period, the value is 0
$CP_{i,t-s}$	Value of the next coupon payment of bond i at rebalancing date during an ex-dividend period (as the next coupon payment of bond i is not included in the dirty price calculation at date t because of the ex-dividend period). Outside the ex-dividend period, the value is 0
$XD_{i,t-s}$	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): If the bond enters the index within the ex-dividend period, flag is set to 0 If bond is not ex-dividend, or has not entered the index during an ex-dividend period, or entered the

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Parameter	Legend
	index during a previous ex-dividend period, flag is set to 1
CF_{TR}	Cost factor total return index, valid since last rebalancing date
N_i^+	Nominal outstanding issue size of bond i after rebalancing
N_i^-	Nominal outstanding issue size of bond i before rebalancing
w_i^+	Weight of bond i after rebalancing
w_i^-	Weight of bond i before rebalancing
$P_i^{A/B}$	Either closing ask or bid price of bond i depending on the change in the weight resulting of the re-composition
P_i^A	Closing ask price of bond i on the rebalancing day
P_i^B	Closing bid price of bond i on the rebalancing day
A_i	Accrued interest of bond i on the rebalancing day
r_{t-s}^{1d}	STOXX GC Pooling EUR Deferred Funding Rate on the rebalancing day or 0 in case of negative rates (i.e. <0)
$days_{t-s,t}$	Days between dates t-s and t

4.3.2.4.1. Currency Index

The EURO STOXX 50® Corporate Bond Index is also converted from EUR in CHF, GBP, JPY and USD, like follows:

$$UH\_IDX_{c,t} = IDX_t \cdot FX_{c,t} \cdot CRF_c$$

Parameter	Legend
$UH\_IDX_{c,t}$	Currency index in currency c at time t
IDX_t	EUR Price or Total Return index at time t
$FX_{c,t}$	Spot currency rate for currency c at time t
$CRF_{c,t}$	Currency rebase factor for currency c at base date /31.12.2010/: EUR/CHF = 0.799712103642689 EUR/GBP = 1.167065414016460 EUR/JPY = 0.009190635844950 EUR/USD = 0.745406432857516

4.3.2.4.2. Currency Hedged Index

The monthly hedged index versions follow the standard STOXX methodology and therefore are not described in this guide, for more details refer to the STOXX Strategy Guide:
https://www.stoxx.com/document/Indices/Common/Indexguide/stoxx_strategy_guide.pdf

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4.3.2.4.3.   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:

4.3.2.4.3.1.   Average Yield

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

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

Whereby:

Parameter	Legend
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

4.3.2.4.3.2.   Average Duration

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

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

Whereby:

Parameter	Legend
DU_t	Average duration at time t
$D_{i,t}$	Duration of bond i at time t

4.3.2.4.3.3.   Average Modified Duration

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

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

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Whereby:

Parameter	Legend
MDU_t	Average modified duration at time t
$MD_{i,t}$	Modified duration of bond i at time t

4.3.2.4.3.4.   Average Convexity

The average convexity is calculated by weighting the convexity of each bond by the market capitalization of the respective bond.

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

Whereby:

Parameter	Legend
CX_t	Average convexity at time t
$X_{i,t}$	Convexity of bond i at time t

4.3.2.4.3.5.   Average Coupon

The average coupon is calculated by weighting the coupon of each bond by its nominal outstanding issue size.

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

Whereby:

Parameter	Legend
CO_t	Average coupon at time t

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

4.3.2.4.3.6. Average Remaining Years to Maturity

The average remaining years to maturity is calculated by weighting the remaining years to maturity of each bond by its nominal outstanding issue size.

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

Whereby:

Parameter	Legend
LF_t	Average remaining years to maturity at time t
$L_{i,t}$	Remaining years to maturity of bond i at time t

4.3.2.4.3.7. Nominal Value

The nominal value of the index is calculated by adding nominal outstanding issue size of each bond together:

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

4.3.2.4.3.8. Market Value

The market value of the index at time t is calculated as follows:

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

4.3.2.4.3.9. Base Market Value

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

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

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4.3.2.4.4.   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 formulas:

4.3.2.4.4.1.   Yield

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

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

The Newton iteration method is used to solve the equation for Yi,t.

Whereby:

Parameter	Legend
CashFlow$_{i,j}$	Cash flow of bond i within period j
L$_{i,t,j}$	Time in coupon periods for bond i between date t and the jth cash flow
n	Number of future cash flows

4.3.2.4.4.2.   Duration

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

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

4.3.2.4.4.3.   Modified Duration

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

$$MD_{i,t} = D_{i,t} \cdot \frac{1}{1 + Y_{i,t}}$$

4.3.2.4.4.4.   Convexity

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

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$$X_{i,t} = \frac{1}{P_{i,t} + A_{i,t}} \cdot \sum_{j=1}^{n} L_{i,t,j} \cdot \left(L_{i,t,j} + 1\right) \cdot CashFlow_{i,j} \cdot \left(1 + Y_{i,t}\right)^{-\left(L_{i,t,j}+2\right)}$$

4.3.2.5.   SETTLEMENT CONVENTIONS
The indices are calculated assuming t+0 settlement.

4.3.2.6.   CALCULATION PERIODS AND CALENDAR
The indices are calculated and distributed every minute in real-time, between 9:00 a.m. and 17:15 p.m. Frankfurt time. Index calculation is based on the STOXX trading calendar - closed on Saturdays and Sundays and on the following Bank holidays:
• New Year's Day
• Good Friday
• Easter Monday
• Christmas Day
• St. Stephen's Day / Boxing day

4.3.2.7.   REPORTING
A snapshot of the indices taken at 1:00 p.m. Frankfurt time is published on each STOXX calendar trading day. Index closing values, corresponding bond prices and analytics are published daily on STOXX website, after the close of business. In cases where the last trading day of any given month does not coincide with the last calendar day, separate index levels, will be published for that day.
All data concerning the up-to-date index final composition is published at the evening of index rebalancing. Forecast composition files are available every day starting four trading days before the end of the last month of the rebalancing period. In case of early close days, which depends on the pricing data availability the reports will be produced close of business, as usual.

4.3.3.   INDEX CORRECTION POLICIES
In the event of index value changes more than 2% against the previous index value, the corresponding index is labelled with "U" (unchecked). The calculated index value is subsequently checked for errors. In the case of a deviation in excess of 2% where no error occurred, the index is revalidated (i.e. labelled in line with its corresponding status).

4.3.3.1.   INTERNAL ERRORS
If STOXX becomes aware of internal index calculation errors within a trading day, intraday values of the respective index are corrected for that specific day, if technically feasible and economically reasonable. Intraday values, which are not detected within the same trading day are not corrected but will retroactively be flagged as invalid.
If there are deviations that are considered significant by STOXX, index close values also will be corrected retroactively, if technically feasible and economically reasonable.

4.3.3.2.   EXTERNAL ERRORS
Calculation errors that are based on incorrect external data are corrected as soon as possible, if technically feasible and economically reasonable. If there are deviations that are considered significant by STOXX, index close values will also be corrected retroactively, if technically feasible

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and economically reasonable. Intraday values that are not corrected will retroactively be flagged as invalid.

4.3.3.3. CORRECTION OF INDEX PARAMETER VALUES

All index parameters that are published by STOXX in the context of the index review are only corrected or adjusted at the subsequent rebalancing date. This rule applies regardless of when STOXX became aware of facts that would change the index parameter values during the index review process.

4.3.4. EXCEPTIONAL RULES

4.3.4.1. HANDLING OF UNFORSEEABLE EVENTS

In the case of an exceptional unforeseeable event that is not considered in this rulebook, STOXX may under consideration of the respective facts, apply procedures that differ from the aforementioned rules in this rulebook. This holds true especially in cases where i) there are no applicable rules, ii) the application of present rules does not lead to a clear result, iii) the rules contradict each other, and/or iv) the application of these rules lead to an inappropriate situation in the bond market. An example of an inappropriate situation is if the strict application of the rules heavily influences the liquidity of a company's emissions in the bond market. In the case that STOXX makes a decision that is outside the parameters of the rulebook, the decision will be published within an appropriate notice period.

4.3.4.2. CONSIDERATION OF EXTREME ECONOMIC SITUATIONS AND MARKET DISRUPTIONS

In times of extreme economic situations and market disruptions, especially in cases where the price source is unavailable (e.g. market suspension or restriction), STOXX will generally use the last available price data.

Also in times of extreme economic cases, additional exceptions from this rulebook can be made, e.g. postponement of an ordinary review date.

All changes will be published within an appropriate notice period.

4.3.5. HISTORICAL DATA

Historical data is available since December, 31st 2010. The base value for all indices is 100 on that date.