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STOXX[®] BOND INDEX GUIDE



1. INTRODUCTION TO THE STOXX INDEX GUIDES	3	4.3.4. EXCEPTIONAL RULES	22
2. CHANGES TO THE STOXX BOND INDEX GUIDE	4	4.3.4.1. Handling of unforeseeable events	22
2.1. HISTORY OF CHANGES TO THE STOXX BOND INDEX GUIDE	4	4.3.4.2. Consideration of extreme economic situations and market disruptions	22
3. GENERAL PRINCIPLES	5	4.3.5. HISTORICAL DATA	22
3.1. INDEX RATIONALE	5		
3.2. METHODOLOGY REVIEW POLICIES	5		
3.3. INDEX TERMINATION POLICY	5		
4. EURO STOXX 50® CORPORATE BOND INDICES	6		
4.1. OVERVIEW	6		
4.2. STRUCTURE	6		
4.3. INDEX METHODOLOGY	8		
4.3.1. SELECTION CRITERIA	8		
4.3.1.1. Issuer Type	8		
4.3.1.2. Bond Type	8		
4.3.1.3. Currency	9		
4.3.1.4. Credit Rating	9		
4.3.1.5. Time to Maturity	10		
4.3.1.6. Nominal amount outstanding	10		
4.3.1.7. Seniority of Debt	10		
4.3.2. INDEX CALCULATION	10		
4.3.2.1. Reference Data	10		
4.3.2.2. Bond prices	10		
4.3.2.3. Periodical adjustment	11		
4.3.2.4. Calculation formulas	12		
4.3.2.5. Settlement conventions	20		
4.3.2.6. Calculation periods and calendar	21		
4.3.2.7. Reporting	21		
4.3.3. INDEX CORRECTION POLICIES	21		
4.3.3.1. Internal errors	21		
4.3.3.2. External errors	21		
4.3.3.3. Correction of index parameter values	21		

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 USD, JPY, CHF and GBP currency hedged and unhedged index versions

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 advises 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 Index is a corporate bond index tracking the performance of bonds issued by the companies of the EURO STOXX 50[®] equity index, which represent the highly liquid, top-flight blue-chip companies of the Eurozone.

Exclusive selection criteria is applied in order to determine the most liquid and representative underlyings. The EURO STOXX 50[®] Corporate Bond Index with its concept establishes a bridge, combining the selection criteria for Eurozone equity indices with the international accepted “European Federation of Financial Analysts Societies” (EFFAS) principles of fixed income indices.

4.2. STRUCTURE

The indices are calculated as a so-called basket index, implying that the index is based on real bonds. This makes it easy to track index performance. Only bonds issued by EURO STOXX 50[®] equity companies 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 [®] Equity Index Issuer	EURO STOXX 50 [®] Bond Index Issuer
✓ 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

Following index versions are currently available:

Currency ¹	ISIN	Index	Version	Bloomberg Ticker	Reuters RIC
EUR	DE000A0QZJL9	EURO STOXX 50 Corporate Bond Price Index EUR	Price	SX5BPI	.SX5BPI
EUR	DE000A0QZJM7	EURO STOXX 50 Corporate Bond Total Return Index EUR	Total Return	SX5BTR	.SX5BTR
USD	DE000A0QZJS4	EURO STOXX 50 Corporate Bond Price Index USD	Price	-	.SX5BPIU
USD	DE000A0QZJT2	EURO STOXX 50 Corporate Bond Total Return Index USD	Total Return	-	.SX5BTRU
CHF	DE000A0QZJ06	EURO STOXX 50 Corporate Bond Price Index CHF	Price	-	.SX5BPIC
CHF	DE000A0QZJ14	EURO STOXX 50 Corporate Bond Total Return Index CHF	Total Return	-	.SX5BTRC
GBP	DE000A0QZJN5	EURO STOXX 50 Corporate Bond Price GBP	Price	-	.SX5BPIG
GBP	DE000A0QZJP0	EURO STOXX 50 Corporate Bond Total Return GBP	Total Return	-	.SX5BTRG
JPY	DE000A0QZJQ8	EURO STOXX 50 Corporate Bond Price JPY	Price	-	.SX5BPIJ
JPY	DE000A0QZJR6	EURO STOXX 50 Corporate Bond Total Return JPY	Total Return	-	.SX5BTRJ
GBP	DE000A0Z3M66	EURO STOXX 50 Corporate Bond Monthly Hedged Price GBP	Price	-	.SX5BPIGH
GBP	DE000A0Z3M74	EURO STOXX 50 Corporate Bond Monthly Hedged Total Return GBP	Total Return	-	.SX5BTRGH
JPY	DE000A0Z3M82	EURO STOXX 50 Corporate Bond Monthly Hedged Price JPY	Price	-	.SX5BPIJH
JPY	DE000A0Z3M90	EURO STOXX 50 Corporate Bond Monthly Hedged Total Return JPY	Total Return	-	.SX5BTRJH
USD	DE000A0Z3M25	EURO STOXX 50 Corporate Bond Monthly Hedged Price USD	Price	SX5BPIUH	.SX5BPIUH
USD	DE000A0Z3M33	EURO STOXX 50 Corporate Bond Monthly Hedged Total Return USD	Total Return	SX5BTRUH	.SX5BTRUH
CHF	DE000A0Z3M41	EURO STOXX 50 Corporate Bond Monthly Hedged Price CHF	Price	SX5BPICH	.SX5BPICH
CHF	DE000A0Z3M58	EURO STOXX 50 Corporate Bond Monthly Hedged Total Return CHF	Total Return	SX5BTRCH	.SX5BTRCH

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>

4. EURO STOXX 50® CORPORATE BOND INDICES

4.3. INDEX METHODOLOGY

The index is based on a volume-weighted summation concept that analyzes relative changes in value compared to a reference date (i.e. review 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 reference date. The outstanding amount of each bond is used for the purpose of index weighting. Both price and total return indices are weighted by market capitalization.

The calculation methodology 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.

4.3.1. SELECTION CRITERIA

In order to determine the index constituents, following selection criteria will be applied:

- Issuer Type
- Bond Type
- Currency
- Credit Rating
- Time to Maturity
- Nominal amount outstanding

Illiquid securities without available data are excluded from the index, thus precondition for index eligibility is that a bond has reference data and pricing data (for details see 4.3.2 Index calculation). Bonds with prices being 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

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. As eligible bonds are considered those issued by the parent and subsidiary corporations of the corporate group. Intra-review composition change, fast exit, fast entry changes of the EURO STOXX 50® Equity index (e.g. due to acquisition or delisting) do not trigger extraordinary composition change of the EURO STOXX 50® Corporate Bond index.

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-steps and multi-step callable bonds
- Multi coupon bonds
- Sinking funds and amortizing bonds
- Fix to float bonds
- Extendible bonds
- Private placements

4. EURO STOXX 50® CORPORATE BOND INDICES

- Perpetuals
- 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

A minimum rating of Investment Grade (BBB and higher) is required. STOXX composite rating will be applied. The STOXX composite rating for the EURO STOXX 50® Corporate Bond index is derived by using 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 there is one rating available from a source for a bond then that rating will be applied. If there are two ratings 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	Investment Grade
Aa1	AA+	AA	
Aa2	AA		
Aa3	AA-		
A1	A+	A	
A2	A		
A3	A-		
Baa1	BBB+	BBB	
Baa2	BBB		
Baa3	BBB-		
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	

4. EURO STOXX 50® CORPORATE BOND INDICES

4.3.1.5. TIME TO MATURITY

All eligible bonds must have a remaining time to maturity of at least 15 months measured from the respective rebalancing date to the maturity date. 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 holding the condition). The remaining time to maturity consider the following day count conventions - ACT/360, ACT/365, ACT/ACT, ISMA 30/360.

4.3.1.6. NOMINAL AMOUNT OUTSTANDING

The minimum nominal amount outstanding 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. Thus Subordinated bonds are not eligible and excluded from the index.

4.3.2. INDEX CALCULATION

4.3.2.1. REFERENCE DATA

Bond reference data used for the selection and in the index calculation is sourced from third data providers and if needed is checked against offering circulars.

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 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 indices are calculated on the basis of continuously evaluated prices, sourced from Interactive Data. Evaluated prices provide high quality 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. They are sourced from an independent data provider, who is not affiliated with or owned by a securities broker, dealer or underwriter, nor is it actively involved in the business of investment management or securities trading. The quality of the evaluated prices is continually verified from a broad client base,

4. EURO STOXX 50® CORPORATE BOND INDICES

ranging from asset managers, investment banks, custodians, insurance companies to central banks. The evaluated prices can be challenged if there is a reason to believe certain price does not correspond to the appropriate current price level.

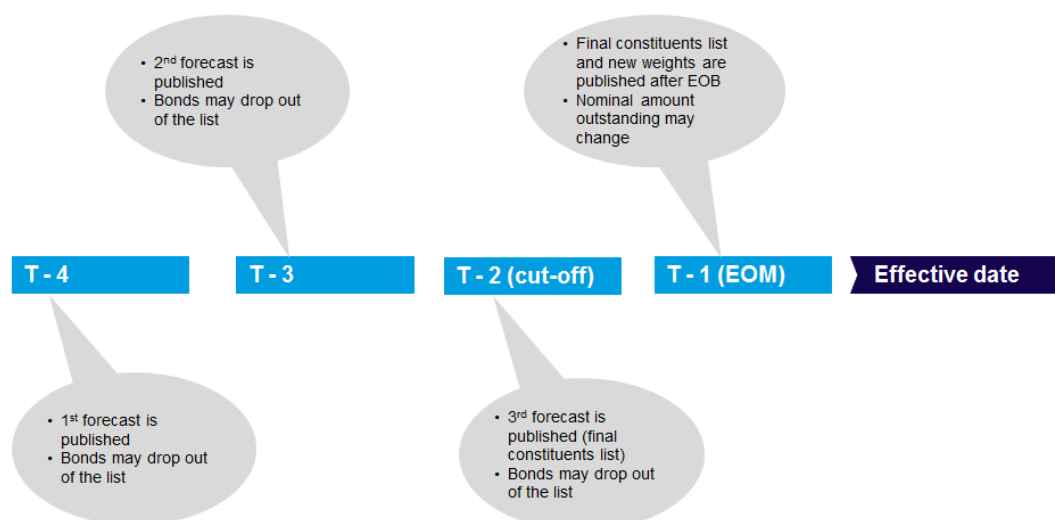
4.3.2.3. PERIODICAL ADJUSTMENT

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® equity 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 on.



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.

4.3.2.3.3. Coupon adjustments

4. EURO STOXX 50® CORPORATE BOND INDICES

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 and from bonds which exit the index will be invested at the end of each month in the money market for one month. The rate to be used is STOXX GC Pooling EUR Deferred Funding Rate or 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 the size.

4.3.2.3.7. Cap Limit

Capping is a procedure which satisfies the weighting of index constituents and prevents single bonds resp. issuer or issuer industry sector (e.g. Financials) from dominating the index. Capping is performed on issuer and issuer industry level, first starting with the issuer capping and afterwards proceed with the issuer industry. In case capping for both levels is not possible, more priority is given to issuer capping and industry capping will not be applied.

4.3.2.3.7.1. Bond Issuer Capping

The weight of a bond issuer in the index 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 equally reduced to 20% of the reduced index capitalization. If this is not anymore possible, bond issuer will be equally weighted (e.g. in case of 5 or less issuer). Capping process is applied at each quarterly review, where on the last business day of each period the final capped weights are published and are effective from the first trading day of next month on.

4.3.2.3.7.2. Issuer Industry Capping

Based on the industry classification used for the Euro Stoxx 50® equity index, the weight of a single industry sector in the index is capped at 40% at each quarterly review. If the combined weight of all bonds which belong to the industry sector exceeds 40%, the market capitalization of these bonds will be equally reduced to 40% of the reduced index capitalization. If this is not anymore 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:

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

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

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

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 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 adjustment
t	Calculation date
CF_{PI}	Cost factor price index, valid since last rebalancing date
N_i^+	Nominal amount outstanding issue size of bond i after rebalancing
N_i^-	Nominal amount outstanding issue size of bond i

4. EURO STOXX 50® CORPORATE BOND INDICES

Parameter	Legend
	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
$cash_{t-s}$	Cash at the end of last month

4.3.2.4.2. Total Return Index

For total return indices, the monthly adjustment 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:

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

Where, in case of non-rebalancing month:

$$CF_{TR} = 1$$

Else, in case of rebalancing month:

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

4. EURO STOXX 50® CORPORATE BOND INDICES

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

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

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 index during a previous ex-dividend period, flag is set to 1
CF_{TR}	Cost factor total return index, valid since last

4. EURO STOXX 50® CORPORATE BOND INDICES

Parameter	Legend
	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 Unhedged 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
$UH_IDX_{c,t}$	Unhedged 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 standard STOXX index 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

4.3.2.4.3. Index Analytics

4. EURO STOXX 50® CORPORATE BOND INDICES

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, weighting the yield of each bond by the corresponding market capitalization and duration of the respective bond.

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

Whereby:

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, weighting the duration of each bond by the corresponding market capitalization of the respective bond.

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

Whereby:

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

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

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

4. EURO STOXX 50® CORPORATE BOND INDICES

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

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

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

Whereby:

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

4. EURO STOXX 50® CORPORATE BOND INDICES

4.3.2.4.3.6. 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 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 a bond is calculated as follows:

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

4.3.2.4.3.8. Market Value

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

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

4.3.2.4.3.9. Base Market Value

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

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

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. EURO STOXX 50® CORPORATE BOND INDICES

4.3.2.4.4.1. Yield

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

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

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

Whereby:

Parameter	Legend
$\text{CashFlow}_{i,j}$	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:

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

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:

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

4.3.2.5. SETTLEMENT CONVENTIONS

The indices are calculated assuming t+0 settlement.

4. EURO STOXX 50® CORPORATE BOND INDICES

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 adjustment. 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 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. EURO STOXX 50® CORPORATE BOND INDICES

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 stock market. An example of an inappropriate situation is if the strict application of the rules heavily influences the liquidity of a company's stock in the stock 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.