

**S&P Dow Jones
Indices**

A Division of **S&P Global**

iBoxx EUR Covered Interest Rate Hedged Index

May 2023

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1) iBoxx EUR Covered Interest Rate Hedged Index

The iBoxx EUR Covered Interest Rate Hedged Index is designed to provide a duration hedge to the Market iBoxx Liquid Covered Index ("Underlying Index"), which reflects the performance of the investment grade market for Euro-denominated covered bonds. The index aims to achieve a duration of 1 by taking a long position in the Underlying Index and short positions in German government bond futures contracts.

The Underlying Index consists of investment-grade Euro-denominated covered bonds that have been rated by at least one of the following three rating agencies: Fitch Ratings, Moody's Investors Service or S&P Global Ratings. The eligible contracts for the short position include 2-year, 5-year and 10-year German government bond futures.

The iBoxx EUR Covered Interest Rate Hedged Index is rebalanced on the last business day of each month ("the Rebalancing Date").

This document covers the index selection rules and calculation methodology.

2) Selection criteria for the iBoxx EUR Covered Interest Rate Hedged Index

The index has long positions in the Markit iBoxx Liquid Covered Index and short positions in German government bond front-month quarterly futures contracts.

2.1) Long position

The Underlying Index in the long position consists of investment-grade Euro-denominated covered bonds and rated by at least one of the following three rating services: Fitch Ratings, Moody's Investors Service, or S&P Global Ratings. Detailed methodology for the Markit iBoxx Liquid Covered Index is available on www.ihsmarkit.com under *Methodology*.

2.2) Short position

The eligible front-month contracts for the short position include the 2-year, 5-year and 10-year German government bond futures. The contracts follow a March quarterly cycle and expire in March, June, September and December.

The "cheapest-to-deliver" bonds (CTDs) for each futures contract are determined at every rebalancing.

3) Index calculation

3.1) Bond and future prices

The Eurex closing prices from 5:15 p.m., CET are used for the futures.

For more details on the bond prices, please refer to the “Markit iBoxx Pricing Rules” document, available on the Markit iBoxx Rules page at www.ihsmarkit.com under *Methodology*.

3.2) Rebalancing process

The iBoxx EUR Covered Interest Rate Hedged Index is rebalanced monthly on the last business day of the month after the close of business. Changes to outstanding amounts are only taken into account if they are publicly known three business days before the end of the month. Changes in ratings are only taken into account if they are publicly known two business days before the end of the month. New bonds issued are taken into account if they are publicly known to settle until the last calendar day of the month, inclusive, and if their rating has become known at least three trading days before the end of the month.

A preliminary membership list is published on the 6th calendar day of the month (moved to the next business day in case of holiday/weekend).

Three business days before the end of each month, a membership list with final amount outstanding for each bond is published.

Two business days before the end of each month, the rating information for the constituents is updated and the list is adjusted for all rating changes which are known to have taken place two trading days before the end of the month. Bonds which are known to have been upgraded to investment grade two trading days before the end of the month are not included in the membership, but bonds which are known to have been downgraded to sub-investment grade two trading days before the end of the month do get excluded from the membership. However, if any bonds which are part of the broader EUR universe become eligible two business days prior to rebalancing because of rating or amount changes, they will be included in the Index.

On the last business day of each month, IHS Markit publishes the final membership with closing prices for the bonds, and various bonds analytics based on the index prices of the bonds.

3.2.1) Rebalancing Procedure

On each rebalancing day each long position of the underlying index is paired to a certain number of specific futures contracts in a short position. These long/short pairs are then aggregated into the index.

The rebalancing process follows five steps as follows:

- Determining the Cheapest-To-Deliver bond (“CTD”) of each futures contract
- Determine the duration for each j-years futures contract
- Each bond is assigned to the two neighboring futures contracts
- The delta distribution ratio $\delta_{i,j,t-s}$ is determined for each bond/future pair. The distribution weight is between 0 and 1
- Calculate the index

3.3) Determining the cheapest-to-deliver bond

The cheapest-to-deliver bond (CTD) is the least expensive bond that can be delivered upon expiry to satisfy the requirements of a futures contract.

The CTD is used as the proxy of a futures contract in determining the number of contracts required to fully hedge the index.

3.4) Determining the Duration of Each Futures Contract

The duration of the futures contract is determined as follows:

$$MD_{j,t-s}^F = MD_{j,t-s}^{CTD}$$

3.5) Determining the Distribution Weight

The “delta distribution ratio” is determined for each bond and futures combination:

1. For all bonds with a duration less than the duration of the 2-year futures contract or a duration greater than the duration of the 10-Year futures contract, the “delta distribution ratio” is 1
2. For all bonds where the duration is in between the duration of two neighboring futures contracts the “delta distribution ratio” is calculated as

$$\delta_{i,j,t-s} = 1 - \frac{\text{abs}(MD_{i,t-s} - MD_{j,t-s}^F)}{MD_{j+1,t-s}^F - MD_{j,t-s}^F}$$

and

$$\delta_{i,j+1,t-s} = 1 - \delta_{i,j,t-s}$$

Where

$$MD_{j,t-s}^F \leq MD_{i,t-s} \leq MD_{j+1,t-s}^F$$

3.6) Index Calculation

- **Step 1: Calculate the number of futures contracts used**

The notional of each futures contract is determined as:

$$N_{j,t-s}^F = \frac{CF_{j,t-s}^{CTD} \times \sum_{i=1}^n (\delta_{i,j,t-s} \times BMV_{i,t-s} \times MD_{i,t-s})}{P_{j,t-s}^{CTD} \times MD_{j,t-s}^{CTD}}$$

- **Step 2: Calculate the number of futures contracts**

The number of futures contracts is determined as:

$$\#contracts_{j,t-s} = \text{round}\left(\frac{N_{j,t-s}^F}{FCS_{j,t-s}}, 0\right)$$

and the notional based on this number is calculated as:

$$N_{j,t-s}^{F,rounded} = \#contracts_{j,t-s} \times FCS_{j,t-s}$$

- **Step 3: Calculate the ratio of each futures contract**

$$w_{j,t-s}^S = \frac{N_{j,t-s}^{F,rounded}}{\sum_{i=1}^n BMV_{i,t-s}}$$

- **Step 4: Calculate the index level**

$$IL_t = IL_{t-s} \times \left(1 + \frac{IL_t^{long}}{IL_{t-s}^{long}} - \sum_{j \in S_F} w_{j,t-s}^S [P_{j,t}^F - P_{j,t-s}^F] \right)$$

For specific index formulae please refer to Markit iBoxx Bond Calculus document, available on the Markit iBoxx Rules page of www.ihsmarkit.com in the Methodology Documentation section on the right-hand side of the page.

3.7) Roll process

On the rebalancing day prior to the delivery month, the futures contract is rolled into the new front-month quarterly futures contract.

3.8) Monthly re-investment

Cash from the long position and net profits from the short futures positions are reinvested in the Underlying Index.

Net losses from the short futures positions are deducted from the long position.

3.9) Index history

The Index history starts on 31 December 2016. The index has a base value of 100 on that date.

3.10) Settlement conventions

All iBoxx indices are calculated using the assumption of T+0 settlement days.

3.11) Calendar

IHS Markit publishes an index calculation calendar in the *iBoxx Calendars* section of the iBoxx Documentation page on www.ihsmarkit.com. This calendar provides an overview of the index calculation holidays of the iBoxx bond index families in a given year.

3.12) Publication of the Index

The iBoxx EUR Covered Interest Rate Hedged Index is calculated as end-of-day index and distributed once daily after market close.

Bond and index analytical values are calculated end of day Monday to Friday using that day's closing prices. In addition, bond and index analytical values are calculated using the previous trading day's closing prices on the last calendar day of each month if that day is not a regular trading day as well as on common bank holidays as published in the iBoxx index calculation calendar. This index calculation calendar is available on www.ihsmarket.com under *iBoxx Calendars*. Index data is also available from the main information vendors.

Closing index values and key statistics are published at the end of each calculation day in the *Indices* section on www.ihsmarket.com for registered users.

3.13) Data publication and access

The table below summarizes the publication of iBoxx EUR Covered Interest Rate Hedged Index in the *Indices* section of the IHS Markit website www.ihsmarket.com for registered users and on the FTP server.

Table 1: Publication frequency, file types and access

Frequency	File Type	Access
Daily	Underlying file – Bond level	IHS Markit FTP Server
	Indices file – Index level	IHS Markit FTP Server / IHS Markit website / Bloomberg for index levels only
Daily from the 6th calendar day of the month (or the next index publication day if the 6th calendar day falls on a non-business day)	Forwards	IHS Markit FTP Server
Monthly	End of Month Components	IHS Markit FTP Server / IHS Markit website

Markit iBoxx indices are also published through a number of information service providers including Bloomberg and Thomson Reuters. Below is a summary of the IDs for each publication channel:

Index Name	Return Type	SEDOL	ISIN	Ticker	RIC
iBoxx EUR Covered Interest Rate Hedged Index	TRI	BF9Q2T6	GB00BF9Q2T67	--	--

3.14) Annual index review

The rules for the index are reviewed at least once per year during the public annual index review consultation process to ensure that the index provides a balanced representation of the EUR denominated debt market. Decisions made following feedback from market participants, the annual index review and External Advisory Committees (EAC) will be published on www.ihsmarket.com shortly after the EAC meetings have been held. The publication will contain a detailed overview and timelines for implementation of any rules changes.

4) Governance and regulatory compliance

IHS Markit Benchmark Administration Limited (IMBA UK) is the Index Administrator of iBoxx indices. Information on IMBA UK's governance and compliance approach can be found [here](#). This document covers:

- Governance arrangements, including external committees
- Input data integrity
- Conflicts of interest management
- Market disruption and Force Majeure
- Methodology changes and cessations
- Complaints
- Errors and restatements
- Reporting of infringements and misconduct
- Methodology reviews
- Business continuity

More details about IMBA UK can be found on the [Administrator's website](#).

5) Appendix

5.1) Annotations

$A_{j,t-s}^{CTD}$	denotes the accrued of the CTD of the j -years futures contract at the rebalancing day $t-s$
$BMV_{i,t-s}$	denotes the base market value of the i -th bond constituent at the rebalancing day $t-s$
$Cash_{i,t-s,t}$	denotes the cash accumulated of the i -th constituent in the period that starts from the rebalancing day $t-s$ and ends on (including) day t
$CF_{j,t-s}^{CTD}$	denotes the conversion factor of the CTD bond for the j -years futures contract
$\delta_{i,j,t-s}$	denotes the "delta distribution ratio" for bond i and j -years futures contract at the rebalancing day $t-s$
$FCS_{j,t-s}$	denotes the contract size (\$ face value) of the j -years futures contract
IL_t	denotes the index level on day t
IL_t^{long}	denotes the index level of the long index on day t
$MD_{i,t-s}$	denotes the annual modified duration of the i -th bond constituent at the rebalancing day $t-s$
$MD_{j,t-s}^{CTD}$	denotes the annual modified duration of the CTD bond associated to the j -years futures contract at the rebalancing day $t-s$
$MV_{i,t}$	denotes the market value of the i -th bond constituent at day t
$N_{j,t-s}^F$	denotes notional of the j -years futures contract at the rebalancing day $t-s$
$P_{j,t-s}^{CTD}$	denotes the price of the CTD of the j -th futures contract at the rebalancing day $t-s$
$P_{j,t-s}^F$	denotes the price of the j -th futures contract at the rebalancing day $t-s$
S_F	denotes the set of eligible futures contracts (2-Year, 5-Year, 10-Year German government bond futures)
$W_{j,t-s}^S$	denotes the ratio of the j -years futures contract in the short position on the rebalancing day $t-s$

6) Changes to the iBoxx EUR Covered Interest Rate Hedged Index

30 Jun 2022	<ul style="list-style-type: none">• Monthly forward start date updated from 10th calendar day to 6th calendar day
01 Sep 2021	<ul style="list-style-type: none">• Monthly forward start date updated from 12th calendar day to 10th calendar day• Changes to the Index section added
31 Mar 2021	<ul style="list-style-type: none">• Governance and Regulatory Compliance section added
31 Dec 2016	<ul style="list-style-type: none">• Launch of the index

7) Further information

Glossary of key terms

The Markit iBoxx Glossary document of key terms is available in the *Methodology* section of the iBoxx *Documentation* page on www.ihsmarkit.com.

Contractual and content issues

For contractual or content issues please contact:

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A) ESG Disclosures

EXPLANATION OF HOW ENVIRONMENTAL, SOCIAL & GOVERNANCE (ESG) FACTORS ARE REFLECTED IN THE KEY ELEMENTS OF THE BENCHMARK METHODOLOGY [1]		
1	Name of the benchmark administrator.	IHS Markit Benchmark Administration Limited (IMBA)
2	Underlying asset class of the ESG benchmark. [2]	N/A
3	Name of the S&P Dow Jones Indices benchmark or family of benchmarks.	iBoxx Benchmark Statement
4	Do any of the indices maintained by this methodology take into account ESG factors?	No
Appendix latest update:		May 2023
Appendix first publication		May 2023

[1] The information contained in this Appendix is intended to meet the requirements of the European Union Commission Delegated Regulation (EU) 2020/1817 supplementing Regulation (EU) 2016/1011 of the European Parliament and of the Council as regards the minimum content of the explanation of how environmental, social and governance factors are reflected in the benchmark methodology and the retained EU law in the UK (The Benchmarks (amendment and Transitional Provision) (EU Exit) Regulations 2019).

[2] The 'underlying assets' are defined in European Union Commission Delegated Regulation (EU) 2020/1816 supplementing Regulation (EU) 2016/1011 of the European Parliament and of the Council as regards the explanation in the benchmark statement of how environmental, social and governance factors are reflected in each benchmark provided and published.

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Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Information presented prior to an index’s launch date is hypothetical back-tested performance, not actual performance, and is based on the index methodology in effect on the launch date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. In addition, forks have not been factored into the back-test data with respect to the S&P Cryptocurrency Indices. For the S&P Cryptocurrency Top 5 & 10 Equal Weight Indices, the custody element of the methodology was not considered; the back-test history is based on the index constituents that meet the custody element as of the Launch Date. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor/look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results.

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