S&P Dow Jones Indices

A Division of S&P Global

# Markit iBoxx USD Liquid Investment Grade Interest Rate Hedged Index Guide

## *May 2023*

# Table of Contents

# 1) Markit iBoxx USD Liquid Investment Grade Interest Rate Hedged Index

The Markit iBoxx USD Liquid Investment Grade Interest Rate Hedged Index is a strategy targeting to provide a duration hedge to Markit iBoxx USD Liquid Investment Grade Index ("Underlying Index") which reflects the performance of US Dollar denominated investment grade corporate debt. The index aims to achieve a neutral duration (i.e. duration equal to zero) by taking a long position in the Underlying Index and short positions in U.S. Treasury futures contracts.

The Underlying Index consists of investment grade US Dollar denominated bonds issued by corporate issuers from developed countries and rated by at least one of three rating services: Fitch Ratings, Moody's Investors Service or S&P Global Ratings.

The eligible contracts for the short position include: 2-Year T-Note, 5-Year T-Note, 10-Year T-Note, T-Bond and Ultra T-Bond futures.

The Markit iBoxx USD Liquid Investment Grade Interest Rate Hedged Index is rebalanced once a month at the month-end (the "rebalancing date").

This document covers the index selection rules and calculation methodology.

# 2) Selection criteria

The index has long positions in the Markit iBoxx USD Liquid Investment Grade Index and short positions in the U.S. Treasury front month quarterly futures contracts.

### 2.1) Long position

The Underlying Index in the long position consists of investment grade USD denominated bonds issued by corporate issuers from developed countries and rated by at least one of three rating services: Fitch Ratings, Moody's Investors Service, or or S&P Global Ratings. Detailed methodology for the Markit iBoxx USD Liquid Investment Grade Index is available on www.ihsmarkit.com.

### 2.2) Short position

The eligible front month contracts for the short position include the 2-Year T-Note, 5-Year T-Note, 10-Year T-Note, T Bond and Ultra T-Bond Futures (for the period prior to February 28th 2010 the T-Bond futures is used instead of the Ultra T. The Ultra T-Bond futures contract was launched January 11th 2010). The contracts follow a March quarterly cycle and expire in March, June, September and December.

The "Cheapest-To-Deliver" bond ("CTD") for each futures contract is determined at every rebalancing.

# 3) Index Calculation

### 3.1) Bond and Future prices

The close prices from the open auction from CME Group are used for the futures.

For more details on bond prices used in the index calculation please refer to the *Markit iBoxx Pricing Rules* document, available in the *Methodology* section of the Markit iBoxx Documentation page on www.ihsmarkit.com.

### 3.2) Rebalancing process

The Markit iBoxx USD Liquid Investment Grade Interest Rate Hedged indices are rebalanced monthly on the last business day of the month after the close of business.

The Markit iBoxx USD Liquid Investment Grade Interest Rate Hedged index strategy uses futures contracts to fully hedge the duration of the Underlying Index. The hedge positions are reset to achieve neutral duration (i.e. duration equal to zero) at each monthly rebalancing day.

Daily from the 10th calendar day of the month (or the next index publication day if the 10th calendar day falls on a non-business day) a preliminary membership is being published.

Three business days before the end of each month an updated membership list is published.

On the last business day of each month, IHS Markit publishes the final membership.

### 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 duration neutral index.

The rebalancing process follows five steps as follows:

1. Determining the Cheapest-To-Deliver bond ("CTD") of each futures contract
2. Determine the duration for each j-years futures contract
3. Each bond is assigned to the two neighboring futures contracts
4. The delta distribution ratio ($\delta_{i,j,t-s}$) is determined for each bond/future pair. The distribution weight is between 0 and 1
5. 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:

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

### 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-years futures contract or a duration greater than the duration of the Ultra T-Bond Futures, 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:

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

and

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

where

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

### 3.6) Index calculation

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

The notional of each futures contract is determined as:

$$N^{F}_{j,t-s} = \frac{CF^{CTD}_{j,t-s} \sum_{i=1}^{n} (\delta_{i,j,t-s} BMV_{i,t-s} MD_{i,t-s})}{P^{CTD}_{j,t-s} MD^{CTD}_{j,t-s}}$$

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

The number of futures contracts is determined as:

$$contracts_{j,t-s} = round(\frac{N^{F}_{j,t-s}}{FCS_{j,t-s}}, 0)$$

and the notional based on this number is calculated as:

$$N^{F,rounded}_{j,t-s} = contracts_{j,t-s}\, FCS_{j,t-s}$$

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

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

**Step 4: Calculate the index level**

$$IL_t = IL_{t-s} \cdot \left(1 + \left(\frac{IL_t^{long,Nominal}}{IL_{t-s}^{long,Nominal}} - 1\right) - W_{t-s}^{S}[P_t^F - P_{t-s}^F]\right)$$

For specific index formulas please refer to *Markit iBoxx Bond Calculus* document, available on the Markit iBoxx Rules page of www.ihsmarkit.com in the *Methodology* section.

### 3.7) Roll process

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

### 3.8) Monthly reinvestment

P/L from the index is reinvested in the Underlying Index.

### 3.9) Index history

The Index history starts on 30 September 2009. 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 Markit iBoxx USD Liquid Investment Grade Interest Rate Hedged Index is calculated as end-of-day index and distributed once daily after close of US markets.

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.ihsmarkit.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.ihsmarkit.com for registered users.

### 3.13) Data publication and access

The table below summarizes the publication of the Markit iBoxx USD Liquid Investment Grade Interest Rate Hedged Index in the *Indices* section of the IHS Markit website www.ihsmarkit.com for registered users and on the FTP server.

*Table 1: Publication types and access*

| Frequency | File Type | Access |
|---|---|---|
| Daily | Underlying files – Bond level | IHS Markit FTP Server |
| | Indices files – 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) | Forward Files | IHS Markit FTP Server |
| Monthly | End of Month Components | IHS Markit FTP Server / IHS Markit website |
| | XREF files | IHS Markit FTP Server |

Below is a summary of the identifiers for each publication channel:

| Index Name | Markit iBoxx USD Liquid Investment Grade Interest Rate Hedged Index |
|---|---|
| **Return type** | TRI |
| **ISIN** | GB00BC5ZDX70 |
| **SEDOL** | BC5ZDX7 |
| **Ticker** | IBXXH1US |
| **RIC** | .IBXXH1US |

### 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.ihsmarkit.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

| | |
|---|---|
| $A^{CTD}_{j,t-s}$ | 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 |
| $CF^{CTD}_{j,t-s}$ | 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 [1] |
| $IL_t$ | denotes the index level on day t |
| $IL^{long}_t$ | 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 |
| $MD^{CTD}_{j,t-s}$ | 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 |
| $N^{F}_{j,t-s}$ | denotes notional of the  j-years futures contract at the rebalancing day t-s |
| $P^{CTD}_{j,t-s}$ | denotes the price of the CTD of the j-th futures contract at the rebalancing day t-s |
| $P^{F}_{j,t-s}$ | 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 T-Note, 5-Year T-Note, 10-Year T-Note, T-Bond and Ultra T-Bond Futures) |
| $W^{S}_{j,t-s}$ | denotes the ratio of the j-years futures contract in the short position on the rebalancing day t-s |

[1] The contract size is $100,000 for the 5-Year T-Note, 10-Year T-Note, T-Bond and Ultra T-Bond futures and $200,000 for the 2-year T-Note futures contracts.

# 6) Changes to the Markit iBoxx USD Liquid Investment Grade Interest Rate Hedged Index

| | |
|---|---|
| **Jun 2022** | Monthly forward start date updated from 10th calendar day to 6th calendar day |
| **Sep 2021** | Update of monthly forward start date from 12th calendar day to 10th calendar day |
| **Mar 2021** | Governance and Regulatory Compliance section added |
| **Mar 2014** | Modification of hedging methodology (Chapter 3.5-3.6) |
| **Jul 2013** | Launch of Markit iBoxx USD Liquid Investment Grade Interest Rate Hedged 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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### Technical issues and client support

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| | | | |
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| | **USA** | General: | +1 877 762 7548 |

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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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