S&P Dow Jones Indices

A Division of S&P Global

iBoxx USD 10-Year Breakeven Inflation (Futures) Index Guide

May 2023

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1) iBoxx USD 10-Year Breakeven Inflation (Futures) Index

The iBoxx USD 10-Year Breakeven Inflation (Futures) Index aims to provide exposure to U.S. 10-year breakeven inflation by entering into long positions in U.S. Treasury Inflation-Protected securities (TIPS) and a short position in the Ultra 10-Year Treasury Note futures contract.

The iBoxx USD 10-Year Breakeven Inflation (Futures) Index is rebalanced once a month at the month-end (the "rebalancing date"). Exposure to any Treasury Inflation-Protected security within the long position is capped at 30% at each rebalancing date. In addition, the iBoxx USD 10-Year Breakeven Inflation (Futures) Index must contain at least six TIPS at any point in time.

This document covers the index selection rules and calculation methodology.

2) Selection criteria

The index has long positions in U.S. Treasury Inflation-Protected securities with an average life close to 10 years and short position in the Ultra 10-Year Treasury Note front month quarterly futures contract.

2.1) Long position

The long position consists of Treasury Inflation-Protected securities (TIPS) with an average life close to 10 years. The base inflation index for the TIPS is US CPI.

2.1.1) Outstanding amount

The bonds require a minimum amount outstanding of USD 5 billion in order to be eligible for the index.

2.1.2) Age

Only bonds with an age lower or equal to 20 years at each rebalancing date are eligible for the index.

2.1.3) Bond selection procedure

The eligible universe for the TIPS position of the iBoxx USD 10-Year Breakeven Inflation (Futures) Index is determined at each rebalancing date by considering the following six scenarios in order of preference from 1 to 6:

- Scenario 1:
  - > Filter the bonds having average life between 8 and 10 years.
  - > Rank the eligible TIPS by distance to 10-year by average life in ascending order and by bond notional in descending order.
  - > Select top 8 of the eligible bonds. If less than 8 bonds are eligible, proceed to Scenario 2.
- Scenario 2:
  - > Filter the bonds having average life between 7 and 13 years.
  - > Rank the eligible TIPS by distance to 10-year by average life in ascending order and by bond notional in descending order.
  - > Select top 8 of the eligible bonds. If less than 8 bonds are eligible, proceed to Scenario 3.
- Scenario 3:
  - > Filter the bonds having average life between 6 and 14 years.
  - > Rank the eligible TIPS by distance to 10-year by average life in ascending order and by bond notional in descending order.
  - > Select top 8 of the eligible bonds. If less than 8 bonds are eligible, proceed to Scenario 4.
- Scenario 4:
  - > Filter the bonds having average life between 8 and 10 years.
  - > Rank the eligible TIPS by distance to 10-year by average life in ascending order and by bond notional in descending order.
  - > Select top 6 of the eligible bonds. If less than 6 bonds are eligible, proceed to Scenario 5.
- Scenario 5:
  - > Filter the bonds having average life between 7 and 13 years.
  - > Rank the eligible TIPS by distance to 10-year by average life in ascending order and by bond notional in descending order.
  - > Select top 6 of the eligible bonds. If less than 6 bonds are eligible, proceed to Scenario 6.
- Scenario 6:
  - > Filter the bonds having average life between 6 and 14 years.
  - > Rank the eligible TIPS by distance to 10-year by average life in ascending order and by bond notional in descending order.
  - > Select top 6 of the eligible bonds.

If there is a tie after the above ranking criteria are applied, the bond with the lower age is selected.

2.1.4) Bond weight capping

Exposure to any TIPS is capped at 30% at each rebalancing date. In addition, the iBoxx USD 10-Year Breakeven Inflation (Futures) Index must contain at least six TIPS at any point in time.

2.2) Short position

The short position consists of front month Ultra 10-Year Treasury Note futures contracts. The contracts follow a March quarterly cycle and expire in March, June, September and December.

The "cheapest-to-deliver" bond ("CTD") for the futures contract is determined at every rebalancing.

3) Index Calculation

3.1) Bond and future prices

The calculation of the underlying bond index is based on mid prices. New bonds are included in the underlying index at ask price. The underlying bond index is transaction cost adjusted. For more details please refer to the *Markit iBoxx Bond Calculus* and *Markit iBoxx Pricing Rules*, available in the Methodology section of the Markit iBoxx Documentation page on www.ihsmarkit.com.

The close prices for futures are from CME.

3.2) Rebalancing process

The iBoxx USD 10-Year Breakeven Inflation (Futures) 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.

Ten business days before the end of each month, a preliminary membership list is published.

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 USD 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 TIPS bond is paired to a certain number of Ultra 10-Year Treasury Note futures contract in the short position. These long/short pairs are then aggregated into the iBoxx USD 10-Year Breakeven Inflation (Futures) index.

The rebalancing process follows five steps:

1. Determining the cheapest-to-deliver bond ("CTD") of the futures contract
2. Determining the duration of the futures contract
3. Determining the number of futures contracts assigned to each bond
4. Determining the ratio of the futures contract
5. Calculating 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:

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

3.5) Index calculation

Step 1: Calculate the number of futures contracts used

The notional of futures contract is determined as:

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

Step 2: Calculate the number of futures contracts

The number of futures contracts is determined as:

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

and the notional based on this number is calculated as:

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

Step 3: Calculate the ratio of the 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 formulae please refer to *Markit iBoxx Bond Calculus* document, available in the Methodology section of the Markit iBoxx Documentation page on www.ihsmarkit.com.

3.6) Roll process

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

3.7) Index history

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

3.8) Settlement conventions

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

3.9) 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.

3.10) Publication of the index

The iBoxx USD 10-Year Breakeven Inflation (Futures) 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.

3.11) Data publication and access

The table below summarizes the publication of the iBoxx USD 10-Year Breakeven Inflation (Futures) Index in the *Indices* section of the IHS Markit website www.ihsmarkit.com for registered users and on the FTP server.

Table 1: Data publication frequency, file 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)	Forwards files	IHS Markit FTP Server
Monthly	End of Month Components	IHS Markit FTP Server / Markit website

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

Index Name	Return Type	ISIN	SEDOL	Ticker	RIC
iBoxx USD 10-Year Breakeven Inflation (Futures) Index	TRI	GB00BHFSRH32	BHFSRH3	IBXXUTBI	.IBXXUTBI
iBoxx USD 10-Year TIPS Custom TCA	TRI (Nominal)	GB00BHFSXF36			
iBoxx USD 10-Year TIPS Custom TCA	TRI (Real)	GB00BHFSXH59			

3.12) 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 USD 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_{t-s}^{CTD}	denotes the accrued of the CTD of the eligible futures contract at the rebalancing day t-s
$BMV_{i,t-s}^{Nominal}$	denotes the nominal base market value of the *i-th* bond constituent in the inflation linked long index 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_{t-s}^{CTD}	denotes the conversion factor of the CTD bond for the eligible futures contract
FCS_{t-s}	denotes the contract size ($ face value) of the eligible futures contract [1]
IL_t	denotes the index level on day *t*
$IL_t^{long,Nominal}$	denotes the index level nominal of the inflation linked 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_{t-s}^{CTD}	denotes the annual modified duration of the CTD bond associated to the eligible 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_{t-s}^{F}	denotes notional of the eligible futures contract at the rebalancing day t-s
P_{t-s}^{CTD}	denotes the dirty price of the CTD of the eligible futures contract at the rebalancing day t-s
P_{t-s}^{F}	denotes the price of the eligible futures contract at the rebalancing day t-s
$contracts_{t-s}$	denotes the number of the eligible futurescontract at the rebalancing day t-s
W_{t-s}^{S}	denotes the ratio of the eligiblefutures contract in the short position on the rebalancing day t-s

[1] The contract size is $100,000 for the Ultra 10-Year Treasury Note futures contract.

6) Changes to the iBoxx USD 10-Year Breakeven Inflation (Futures) Index

31 May 2019	Launch of iBoxx USD 10-Year Breakeven Inflation (Futures) 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.

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For contractual or content issues please contact:

Markit Indices GmbH
Friedrich-Ebert-Anlage 35-37
60327 Frankfurt am Main
Germany
email: indices@ihsmarkit.com
web: www.ihsmarkit.com

Technical issues and client support

For technical issues and client support please contact:

E-mail:	indices@ihsmarkit.com		
Phone:	**Asia Pacific**	Japan: Singapore:	+81 3 6402 0127 +65 6922 4210
	Europe	General: UK:	+800 6275 4800 +44 20 7260 2111
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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
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[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.

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