iBoxx USD Liquid Investment Grade Inflation Hedged Index Guide

June 2018

T180515

1 iBoxx USD Liquid Investment Grade Inflation Hedged Index

The iBoxx USD Liquid Investment Grade Inflation Hedged index aims to provide an inflation hedge to Markit iBoxx USD Liquid Investment Grade Index (“Underlying Index”) which reflects the performance of USD denominated investment grade corporate debt. The index hedges the long position in the Underlying Index with positions in USD zero coupon inflation swaps.

The Underlying Index 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 S&P Global Ratings. The eligible contracts for the swap position include: 3-Year, 5-Year, 10-Year and 30-Year zero coupon inflation swaps.

The iBoxx USD Liquid Investment Grade Inflation Hedged index is rebalanced once a month at the month-end (the “rebalancing date”).

This document covers the index selection rules and calculation methodology.

1.1 Index governance

In order to ensure the independence and the objectivity of the iBoxx USD Liquid Investment Grade Inflation Hedged Index, the index rules and their enforcement will be governed by two distinct Index Advisory Committees, in line with the governance structure for the main iBoxx index families.

1.1.1 Technical Committee

The Technical Committee is composed of representatives from market makers/banks. The main purpose of this group is to provide assistance in the identification of eligible constituents, especially in the instance where the eligibility or the classification of a bond is unclear or contentious. Additionally, the Technical Committee discusses any market developments which may warrant index rule changes, and provide recommendations on changes to the rules or additional indices. It also reviews the impact of financial sanctions on the eligibility of countries or specific index constituents.

1.1.2 Oversight committee

The Oversight Committee is comprised of representatives from a broad range of asset managers, consultants and industry bodies. The purpose of this committee is to review the recommendations made by the Technical Committee and also to provide consultation on any market developments which may warrant rule changes.

1.2 Publication of the iBoxx USD Liquid Investment Grade Inflation Hedged Index

All indices are calculated as end-of-day and distributed once daily. The indices are calculated every day on which the Markit iBoxx USD Liquid Investment Grade Index is published. In addition, the indices are calculated with the previous trading day's close on the last calendar day of each month if that day is not a trading day. IHS Markit publishes an index calculation calendar which is available in the indices Documentation section on *www.markit.com/product/iBoxx* under iBoxx Calendar. Index data and bond price information is also available from the main information vendors.

Bond and index analytical values are calculated each trading day using the daily bond closing prices and inflation swap valuations. Closing index values and key statistics are published at the end of each business day in the indices section on *www.markit.com/indices* for registered users.

2 Selection Criteria for the iBoxx USD Liquid Investment Grade Inflation Hedged Index

The index has long positions in the Markit iBoxx USD Liquid Investment Grade index and positions in USD zero coupon inflation rate swaps.

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 S&P Global Ratings. Detailed methodology for the Markit iBoxx USD Liquid Investment Grade index is available on *www.markit.com*.

2.2 Inflation swap position

The eligible contracts for the swap position include: 3-Year, 5-Year, 10-Year, 30-Year zero coupon inflation swaps with a notional value of USD 1,000,000 each.

T180515

3 Index calculation

3.1 Bond and inflation swap prices

Inflation swap prices are provided by Markit Portfolio Valuation team.

For more details please refer to the “Markit iBoxx Pricing Rules” document, available on the Markit iBoxx Rules page of *www.markit.com* (*http://www.markit.com/Documentation/Product/iBoxx*) in the Methodology section.

3.2 Rebalancing process

The iBoxx USD Liquid Investment Grade Inflation Hedged index is rebalanced monthly on the last business day of the month.

The iBoxx USD Liquid Investment Grade Inflation Hedged index uses USD zero coupon swaps to hedge inflation. The hedge positions are reset at each monthly rebalancing day.

Ten business days before the end of each month, a preliminary membership list is 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 the rebalancing day each bond in the underlying index is paired to a certain number of specific inflation swap contracts. These bond/swap pairs are then aggregated into the inflation hedged index.

The rebalancing process follows the following steps:

- Determine the term for each *j* swap contract, with *j* = {3,5,10,30}
- Each bond is assigned to the two neighboring swap contracts, where available, based on the distance between the bond´s annual modified duration and the term of the inflation swap. If only one neighbouring swap is available, the bond is assigned to the swap solely.
- The *delta distribution ratio* $\delta_{i,j,t-s}$ is determined for each bond/swap pair. The distribution weight can be between 0 and 1.
- Determine the notional for each swap contract.
- Calculate the index.

3.3 Determining the distribution weight

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

1. For all bonds with an annual modified duration below the term of the 3-Year inflation swap contract or greater than the term of the 30-Year inflation swap contract, the "*delta distribution ratio*" is 1. The "*delta distribution ratio*" ratio is 1 also for bonds with an annual modified duration of exactly 3,5,10 or 30 years.
2. For all bonds where the annual modified duration is in between the terms of two neighbouring swap contracts the "*delta distribution ratio*" is calculated as:

$$\delta_{i,j,t-s} = 1 - \frac{abs(AMD_{i,t-s} - SwapTerm^{S}_{j,t-s})}{SwapTerm^{S}_{j+1,t-s} - SwapTerm^{S}_{j,t-s}}$$

and

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

Where

$$SwapTerm^{S}_{j,t-s} \leq AMD_{i,t-s} \leq SwapTerm^{S}_{j+1,t-s}$$

3.4 Index calculation

Step 1: Calculate the hedge ratio for each of the two swaps used to hedge each bond

$$HR_{i,j,t-s} = \frac{(AMD_{i,t-s} * \delta_{i,j,t-s})}{SwapTerm^{S}_{j,t-s}}$$

Step 2: Calculate the number of contracts for each swap needed to hedge the bond

$$S_{i,j,t-s} = \frac{(HR_{i,j,t-s} * BMV_{i,t-s})}{N^{S}_{j,t-s}}$$

Step 3: Aggregate the number of swap contracts needed each month

$$\#contracts^{S}_{j,t-s} = round(\sum_{i=1}^{n} S_{i,j,t-s}, 0)$$

Step 4: Calculate the ratio of each swap contract

$$W^{S}_{j,t-s} = \frac{\#contracts^{S}_{j,t-s} * N^{S}_{j,t-s}}{\sum_{i=1}^{n} BMV_{i,t-s}}$$

With $N^{S}_{j,t-s}$ = USD 1,000,000

Step 5: Calculate the index level

$$IL_t = IL_{t-s} * (\frac{IL_t^{long}}{IL_{t-s}^{long}} + \sum_{j \in Swap} W_{j,t-s}^S [P_{j,t}^S - P_{j,t-s}^S])$$

For specific index formulae please refer to *Markit iBoxx Bond Calculus* document, available on the Markit iBoxx Rules page of *www.markit.com* (*http://www.markit.com/Documentation/Product/IBoxx*) in the Methodology section.

3.5 Monthly re-investment

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

3.6 Index history

The index history starts on 31 January 2012. All indices have a base value of 100 on that date.

3.7 Settlement conventions

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

3.8 Calendar

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

3.9 Data publication and access

The table below summarizes the publication of the iBoxx USD Liquid Investment Grade Inflation Hedged Index in the *Indices* section of the IHS Markit website *www.markit.com/indices* 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 T-10 Onwards	Forwards files	IHS Markit FTP Server
Monthly	End of Month Components	IHS Markit FTP Server / Markit website
	XREF files	IHS Markit FTP Server

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

Index Name	Return Type	ISIN	Bloomberg	RIC
iBoxx USD Liquid Investment Grade Inflation Hedged Index	TRI	GB00BF9QCM90	IBXXIILS	.IBXXIILS

3.10 Index restatement

Index restatement follows the policy described in the *Markit iBoxx Index Restatement Policy* document, available in the *Methodology* section of the Markit iBoxx Documentation page on *www.markit.com/Documentation/Product/IBoxx*.

3.11 Annual index review

The rules for the index are reviewed once per year during the annual index review process to ensure that the index provides a balanced representation of the USD denominated debt market. Decisions made following the Annual Index Review will be published on *www.markit.com/NewsInformation/GetNews/IBoxx* under *Indices News* shortly after both committees have been held. The publication will contain a detailed overview and timelines for implementation of the rules changes.

4 Appendix

4.1 Annotations

$BMW_{i,t-s}$	Base market value of the *i-th* bond constituent at the rebalancing day *t-s*
$\delta_{i,j,t-s}$	"*delta distribution ratio*" for bond *i* and *j-th* swap contract at the rebalancing day *t-s*
IL_t	Index level on day *t*
IL_t^{long}	Index level of the long index on day *t*
$AMD_{i,t-s}$	Annual modified duration of the *i-th* bond constituent at the rebalancing day *t-s*
$SwapTerm_{j,t-s}^{S}$	Term of the *j-th* swap contract at the rebalancing day *t-s*
$N_{j,t-s}^{S}$	Notional of the *j-th* swap contract at the rebalancing day *t-s* [1]
$N_{i,t-s}$	Notional of the *i-th* bond constituent at the rebalancing day *t-s*
$P_{j,t-s}^{S}$	Price of the *j-th* swap contract at the rebalancing day *t-s*
$\#contracts_{j,t-s}^{S}$	Number of the *j-th* swap contract at the rebalancing day *t-s*
Swap	Set of eligible swap contracts (3-Year, 5-Year, 10-Year and 30-Year)
$W_{j,t-s}^{S}$	Ratio of the *j-th* swap contract on the rebalancing day *t-s*

[1] The notional is $1,000,000 for the 3Y, 5Y, 10Y, 30Y USD zero coupon inflation swaps.

5 Changes to the iBoxx USD Liquid Investment Grade Inflation Hedged Index

6 Jun 2018	Launch of the iBoxx USD Liquid Investment Grade Inflation Hedged Index

6 Further information

Glossary of key terms

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

Contractual and content issues

For contractual or content issues please contact:

Markit Indices Limited
Friedrich-Ebert-Anlage 35-37
60327 Frankfurt am Main
Germany
E-mail: *indices@ihsmarkit.com*
Web: *https://ihsmarkit.com/products/iboxx.html*

Technical issues and client support

For technical issues and client support please contact:

E-mail:	*indices@ihsmarkit.com*		
Phone:	**Asia Pacific**	Japan:	+81 3 6402 0127
		Singapore:	+65 6922 4210
	Europe	General:	+800 6275 4800
		UK:	+44 20 7260 2111
	USA	General:	+1 877 762 7548

Formal complaints

Formal complaints can be sent electronically to our dedicated e-mail address *complaints_indices@markit.com.*

For any general index enquiries, please contact iBoxx indices support group at *indices@ihsmarkit.com*.

Licences and Data

iBoxx is a registered trademark of Markit Indices Limited. Markit Indices Limited owns all iBoxx data, database rights, indices and all intellectual property rights therein. A licence is required from Markit Indices Limited to create and/or distribute any product that uses, is based upon or refers to any iBoxx index or iBoxx data.

T180515

Ownership

Markit Indices Limited is a wholly-owned subsidiary of IHS Markit Limited.

Other index products

Markit Indices Limited owns, manages, compiles and publishes the iTraxx credit derivative indices and the iBoxxFX Trade Weighted Indices.