



IHS Markit™

# iTraxx-CDX IG Global Credit Steepener & Flattener Indices Guide

May 2020

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# 1. iTraxx-CDX IG Global Credit Steepener & Flattener Indices

This document describes the methodology for the iTraxx-CDX IG Global Credit Steepener & Flattener Indices (the "Indices"). The Steepener Index is rebalanced monthly to hold 3x leveraged 10Y protection buyer positions, with leverage equally allocated to iTraxx Europe (1.5x) and CDX.NA.IG (1.5x) CDS indices. The Steepener index has 5Y protection seller positions on iTraxx Europe and CDX.NA.IG that are rebalanced to maintain credit spread DV01 neutrality to their respective 10Y positions. The Flattener Index is rebalanced to hold CDS positions with opposite directions to those of the Steepener Index. The base currency of the Steepener and Flattener indices is EUR. No FX hedging is included. A cash return of EONIA minus a spread is included.

The CDS index positions held are rolled to the latest issued series over three days starting on the second business day the new series becomes available semi-annually in March and September. The methodology includes transaction costs. The indices are calculated on all business days "t".

## 1.1. Index Summary Table

Index	Ticker	Underlying Contracts	Base Currency	Target Leverage	Calendars
iTraxx-CDX IG Global Credit Steepener	ITXCDXST	Protection seller: <i>iTraxx Europe 5Y, CDX.NA.IG 5Y</i>  Protection buyer: <i>iTraxx Europe 10Y, CDXIG 10Y</i>	EUR	3x leverage on 10Y; 5Y leverage determined to balance credit spread DV01	London, TARGET, New York
iTraxx-CDX IG Global Credit Flattener	ITXCDXFL	Protection buyer: <i>iTraxx Europe 5Y, CDX.NA.IG 5Y</i>  Protection seller: <i>iTraxx Europe 10Y, CDXIG 10Y</i>	EUR	3x leverage on 10Y; 5Y leverage determined to balance credit spread DV01	London, TARGET, New York

## 2. Index Calculation

The following sections describe the calculation of the index.

### 2.1. Inputs

The index levels are calculated each business day using the IHS Markit CDS Index prices which in turn are used to derive the PV. IHS Markit CDS Index prices as published by the IHS Markit Pricing Service are used. The following Pricing Snaps are used to calculate the respective index levels:

Index	Pricing Snap
CDX North America	New York 17:00 hrs
iTraxx Europe	London 17:00 hrs

The exchange rates used for currency conversions will be done using the 16:00 London rate from WM Reuters for the relevant currency.

### 2.2. CDS Target weights

The CDS indices index target weights are given below:

- (1)  $w_{j,m,t}^{CDS} = 1.5 \cdot DV01_{j,n,t} / DV01_{j,m,t}$
- (2)  $w_{j,n,t}^{CDS} = 1.5$
- (3)  $w_{k,m,t}^{CDS} = 1.5 \cdot DV01_{k,n,t} / DV01_{k,m,t}$
- (4)  $w_{k,n,t}^{CDS} = 1.5$

where,

$m = 5Y$  CDS index

$n = 10Y$  CDS index

$j = iTraxx$  Europe CDS index

$k = CDX.NA.IG$  CDS index

$DV01_{n,t}$  is the value change in basis points per unit notional for a 1bp parallel upward shift in the underlying credit spread curve

### 2.3. Index value

The index has an initial value of 100.

- (6)  $I_{t_0} = 100$

The index is rebalanced monthly but its value is calculated daily on each business day. Its value each day is calculated using the overall return ( $R_t$ ).

$$(7) \quad I_t = I_{t-1} \cdot (1 + R_t)$$

The overall return is the sum of the return components for the CDS indices weighted by the CDS notional to index values and the cash return:

$$(8) \quad R_t = x_t^{cash} R_t^{cash} + \sum_{i \in G} x_{i,t}^{CDS} \cdot R_{i,t}^{CDS}$$

where,

$$G = \{iTraxx Europe 5Y, iTraxx Europe 10Y, CDX.NA.IG 5Y, CDX.NA.IG 10Y\}$$

In the rest of the document the subscript  $i$  is used to denote the different CDS indices held (*iTraxx Europe 5Y*, *iTraxx Europe 10Y*, *CDX.NA.IG 5Y*, *CDX.NA.IG 10Y*). During the three days that the CDS are rolled there will be different variables (returns, notionals, etc.) for both old and new series.

## 2.4. Returns

### CDS Returns

The return on each of the CDS indices considers the change in PV of the index held as well as coupons, credit events and transaction costs. The PV, coupon terms and credit event terms in the formula below are for protection seller positions regardless of whether the underlying CDS is a protection seller or protection buyer since the  $\varphi_i^{CDS}$  variable is used to make the sign of the  $x_{i,t}^{CDS}$  notional ratio to negative for protection buyer positions. Excluding the credit event and transaction cost terms, the units of these are in terms of percentage of the product of the notional and the index factor ( $f_{i,t}$ ) so these can be multiplied by  $f_{i,t}$ , the notional to index value fraction ( $x_{i,t}^{CDS}$ ) and the index value to give the change in index value. Over rolls, two sets of variables are used to account for the old and new series. The transaction cost term is defined in the appendix.

$$(9) \quad R_{i,t}^{CDS} = FX_{i,t}^{LCY|BCY} \cdot f_{i,t} \cdot PV_{i,t}^{\%,dirty} - FX_{i,t-1}^{LCY|BCY} \cdot f_{i,t-1} \cdot PV_{i,t-1}^{\%,dirty} + FX_{i,t}^{LCY|BCY} \cdot \left( \Delta_{t_{prev},tc} \cdot f_{i,t-1} \cdot Coupon_{i,t-1}^{\%,ifCouponDate} - CEC_{i,t}^{\%} - \varphi_i^{CDS} \cdot TransactionCosts_{i,t}^{\%} \right)$$

The coupon term has a value of zero if it is not a coupon payment date. The credit event costs ( $CEC_{i,t}^{\%}$ ) are zero on all days except the switching date ( $t_{swt}$ ) that the index calculation methodology switches from the previous index version data for the underlying CDS index  $i$  to the "reduced" index version data where the impacted entity is zero weighted as described in the 'Credit Events' section. Its value is defined in appendix 5.2.

$FX_{i,t}^{LCY|BCY}$  is the foreign exchange rate that specifies how many units of BCY can be bought with one unit of LCY. BCY is the base currency of the Steepener or Flattener Index and LCY is the currency of the underlying CDS. If BCY and LCY are the same currency then  $FX_{i,t}^{LCY|BCY}$  is equal to one.

## Cash Return

The cash return  $R_t^{cash}$  is the product of the interest rate for the cash component and the year fraction between  $t-1$  and  $t$  using the Actual/360 convention. The cash component earns interest at EONIA minus a spread ( $s_1$  or  $s_2$ ).

$$R_t^{cash} = (r_{t-1}^{EONIA} - s) \cdot \Delta_{t-1,t}$$

Where,  $s$  is the applicable spread, either  $s_1$  or  $s_2$  for the Steepener or Flattener index respectively.

**Table A – Spread removed from EONIA**

Start Date	End Date	$s_1$	$s_2$
20/03/2007	-	0%	0%

## 2.5. Ratios

### CDS Notional to Index Value Ratio

The notional must be determined as described in the next section in order to calculate the CDS notional to index value ratio,  $x_{i,t}^{CDS}$ .

$$(14) \quad x_{i,t}^{CDS} = \frac{\varphi_i^{CDS} \cdot \text{Notional}_{i,t-1}}{I_{t-1}}$$

### Cash Notional to Index Value Ratio

The cash notional to index value ratio,  $x_{i,t}^{cash}$  is set to be equal to 1.

$$(14) \quad x_{i,t}^{cash} = 1$$

## 2.6. CDS Notional

The portfolio is rebalanced monthly to align notional to index value ratios with the target weights. Notional is always considered positive although  $x_{i,t}^{CDS}$  can be positive or negative depending on long/short direction.

The following relation holds for each underlying CDS index when it is rebalanced monthly, excluding over rolls described in the next section:

$$(16) \quad \frac{FX_{i,t-1}^{LCY|BCY} \cdot \text{Notional}_{i,tr}}{I_{t-1}} = W_{i,t-1}^{CDS}$$

The CDS notional values for each underlying CDS index that satisfy the ratios above when rebalancing can then be determined by the formula below obtained from rearranging the preceding equations. The formula below gives the notional after rebalancing on rebalancing date  $tr$ . Note  $\text{Notional}_{i,tr}$  is in the currency of the CDS which may be different from the Index currency, hence the FX conversion.

$$(17) \quad \text{Notional}_{i,tr} = \frac{w_{i,t-1}^{CDS} \cdot I_{t-1}}{FX_{i,t-1}^{LCY|BCY}}$$

On days that are not rebalancing or roll dates the Notional remains constant and equal to the previous day's notional.

$$(18) \quad \text{Notional}_{i,t \neq tr} = \text{Notional}_{i,t-1}$$

## 2.7. CDS Rolls

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The CDS index positions held are rolled to the latest issued series over three days starting on the second business day the new series becomes available semi-annually in March and September. One third of the target weight allocation is shifted from the old series to the new series each day over the roll and the notionals are rebalanced each day over the roll.

## 2.8. CDS Notional Rebalancing Schedule

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The CDS index notionals are rebalanced monthly on the first business day of the month in the months of Jan, Feb, Mar, May, June, July, Aug, Sep, Nov, Dec. CDS index notionals are also rebalanced over the three days in the roll month when old CDS index series is rebalanced to the new CDS index series. The CDS notionals are not rebalanced on the first business day in April and October (since they will have recently been rebalanced during the roll) unless the roll is delayed and no rebalance related to the roll has taken place by the first business day of April or October, respectively.

## 3. Credit Events

In the case of credit events, the Credit Derivatives Determinations Committee votes to determine if a credit event has occurred for an entity and if an auction will be held. If the vote is positive for an entity in either of the underlying CDS indices, IHS Markit publishes a new index version (the "reduced" index) giving the impacted entity a weight of zero. Note the new "reduced" index version will still be the same CDS index series as the previous version.

The index methodology handles restructuring and non-restructuring credit events in the underlying CDS indices differently as described below.

In the case of credit events, the index calculation methodology switches from using the previous index version data for the underlying CDS index  $i$  to the "reduced" index version data on the switching date ( $t_{swt}$ ) when it becomes available. If the switch to the "reduced" index data occurs on day  $t = t_{swt}$ , the  $f_{i,t} \cdot PV_{i,t}^{\%,dirty}$  variables use the "reduced" CDS index  $i$  version data and  $f_{i,t-1} \cdot PV_{i,t-1}^{\%,dirty}$  variables uses the previous index  $i$  version data.



## 4. Index Data

### 4.1. Credit Prices

All market data used is end of day data at mid-price. Markit CDS index prices as published by the Markit Pricing Service are used. The following pricing snaps are used to calculate the index levels:

Index	Pricing Snap
iTraxx Europe 5Y	London 17:00 hrs
iTraxx Europe 10Y	London 17:00 hrs
CDX.NA.IG 5Y	New York 17:00 hrs
CDX.NA.IG 10Y	New York 17:00 hrs

### 4.2. Index History

Index	Base Date	Base Level
iTraxx-CDX IG Global Credit Steepener	20 March 2007	100
iTraxx-CDX IG Global Credit Flattener	20 March 2007	100

### 4.3. Data Publication and Access

The table below summarises the publication of the Index data:

Frequency	File Type	Access	Publication Time
Daily	Index levels	Markit FTP Server / Markit website / Bloomberg / Reuters	New York Close

In the event that Markit Pricing Service does not publish the relevant CDS index price/spread or in periods of market stress or disruption as well as in illiquid or fragmented markets preventing the publication of a daily Markit CDS index price, Markit will publish a statement outlining the course of action due to the disruption on the Markit website [www.markit.com/Product/Indices](http://www.markit.com/Product/Indices) under the iTraxx News page.

In the event of a major structural change within the CDS market impacting the IECC calculation, Markit will confer with all relevant stakeholders and publish the outcome of any material change as well as any decisions taken at Markit's discretion that has led to the resulting methodology change.

## 4.4. Calendar

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Markit publishes an index calculation calendar which is available in the indices section on [www.markit.com/Documentation/Product/IBoxx](http://www.markit.com/Documentation/Product/IBoxx) under Calendar for registered users.

The following business calendars are used for the respective indices:

Index	Business Calendars
iTraxx-CDX IG Global Credit Steepener	London, TARGET, New York
iTraxx-CDX IG Global Credit Flattener	London, TARGET, New York

## 4.5. Index Restatement

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Index restatement follows the policy described in the [Markit Benchmark Administration Restatement Policy](#) document, available on the Markit website [www.markit.com](http://www.markit.com)

## 4.6. Index Review

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Index methodology reviews for the iTraxx-CDX IG Global Credit Steepener Index and iTraxx-CDX IG Global Credit Flattener Index outlined within this guide are performed on a periodic basis. In order to ensure the independence and the objectivity of the Indices, the index rules, their enforcement will be governed by the **Index Advisory Committee**. The purpose of this committee is to conduct a timely review of the index methodology and any changes thereto. As part of the review process, the committee will address any suggested changes brought to it by index stakeholders, such as a potential change to any of the Index Parameters. In the event that following an index review an amendment is to be made to the Index Parameters, a notice of the proposed change will be published on the Markit iTraxx news page. Following the publication of the impending index rule change, a consultation period is put in place up until the second Wednesday following the notice having been made public or the business day thereafter if the Wednesday is not an index business day. Provided that during the consultation period no concerns raised by index stakeholders are seen to be material by the Index Advisory Committee, the rule change will be implemented for the index close on the index business day following the final day of the consultation period.

## 5. Appendix

### 5.1. Transaction Costs

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The transaction cost is zero if not a rebalancing  $tr$  or roll date  $t_{roll}$ . It is the sum of the transaction cost components when rebalancing the CDS index notional and the bid-offer cost component when buying/selling CDS indices to roll to the new series on roll dates. In general, the bid offer costs are calculated by assuming the bid-offer spread can be estimated as a percentage of the CDS index spread.

$$(19) \quad \text{TransactionCosts}_{i,t}^{\%} = \text{RebaltransactionCosts}_{i,t}^{\%,\text{rebal}} + \text{BidOffer}_{i,t}^{\%,\text{roll}}$$

The  $\text{BidOffer}_{i,t}^{\%,\text{roll}}$  is zero if not a roll date. On roll dates, it is calculated as follows:

$$(20) \quad \text{BidOffer}_{i,t_{roll}}^{\%,\text{roll}} = \frac{1}{3} \cdot \frac{1}{2} \cdot b_i \cdot d_i \cdot (f_{i,t,\text{oldseries}} \cdot S_{i,t_{roll},\text{oldseries}} \cdot DV01_{i,t_{roll},\text{oldseries}} + f_{i,t,\text{newseries}} \cdot S_{i,t_{roll},\text{newseries}} \cdot CS01_{i,t_{roll},\text{newseries}})$$

$\text{RebalTransactionCosts}_{i,t}^{\%}$  are zero if it is not a rebalancing date.  $\text{RebalTransactionCosts}_{i,t}^{\%}$  are also zero on the rebalance date coinciding with the series rolls. On other monthly rebalance dates it's calculated as:

$$(21) \quad \text{RebalTransactionCosts}_{i,tr}^{\%} = \text{BidOffer}_{i,tr}^{\%,\text{rebal}}$$

The bid-offer rebalancing transaction cost is calculated using an approximation  $\eta_{i,tr}$  for the absolute value of the amount of notional to be bought or sold in the rebalancing to avoid circular dependencies in the formulas:

$$(23) \quad \text{BidOffer}_{i,tr}^{\%,\text{rebal}} = f_{i,tr} \cdot \frac{\eta_{i,tr}}{\text{Notional}_{i,tr-1}} \cdot \frac{1}{2} \cdot b_i \cdot S_{i,tr} \cdot DV01_{i,tr}$$

$$(24) \quad \eta_{i,tr} = \left| \frac{w_{i,t-1}^{CDS}}{FX_{i,t-1}^{LCY|BCY}} \cdot I_{t-1} - \text{Notional}_{i,tr-1} \right|$$

#### Transaction costs at inception

The index value at  $t_0$  ( $I_{t_0}$ ) is 100. No transaction costs are applied for the CDS indices that are included at inception.

### 5.2. Credit Event Costs

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The credit event costs as a percentage of notional are calculated as described below. It reflects the net protection payment cost in the case of a credit event. The credit event costs are zero on all days except the switching date ( $t_{swt}$ ) that the index calculation methodology switches from using the previous index version data for the underlying CDS index  $i$  to the new "reduced" index version data where the impacted entity is zero weighted, when it becomes available. The calculation of credit event

costs is different for restructuring and non-restructuring credit events in the underlying CDS indices.

The formula below gives the credit event costs for the non-restructuring case:

$$(26) \quad \text{CEC}_{i,t_{\text{swt}}}^{\%,\text{non-res}} = \frac{1}{E_i} \cdot \left( (1 - \text{Recovery Rate}_{e,(t_{\text{swt}}-1)}) - (\Delta_{t_{\text{Cprev}},t_{\text{EDD}}} \cdot \text{Coupon}_{i,t_{\text{EDD}}}^{\%}) \right)$$

The formula below gives the credit event costs for the restructuring case (if it is applicable for the underlying CDS). A cost for a restructuring case is only included if applicable for the underlying CDS. It is applicable for iTraxx indices, but not CDX indices.

$$(27) \quad \text{CEC}_{i,t_{\text{swt}}}^{\%,\text{res}} = \frac{-1}{E_i} \cdot \left( \text{PV}_{e,t_{\text{swt}}}^{\%,\text{dirty},\text{single}} - \frac{1}{2} \cdot b_{e,(t_{\text{swt}})} \cdot S_{e,(t_{\text{swt}})} \cdot \text{DV01}_{e,(t_{\text{swt}})} \right)$$

In the unlikely event that multiple entities are removed from the underlying CDS index series on the same day, the credit event costs of each of these would be added. However, if an entity had been removed previously at an earlier date and its credit event cost already included previously, it is not included again.

### 5.3. Index Parameters

Symbol	Value	Description
$b_{e,(t_{\text{swt}})}$	.10	fraction of the CDS single name spread assumed to be the estimate of the bid/offer spread.
$b_{j,m}$	.007	fraction of iTraxx Europe 5Y index spread assumed to be the estimate of the bid-offer spread
$b_{j,n}$	.008	fraction of iTraxx Europe 10Y index spread assumed to be the estimate of the bid-offer spread
$b_{k,m}$	.007	fraction of CDX IG 5Y index spread assumed to be the estimate of the bid-offer spread
$b_{k,n}$	.008	fraction of CDX IG 10Y index spread assumed to be the estimate of the bid-offer spread
$d_{j,m}$	.25	roll trade discount parameter for iTraxx Europe 5y reflecting reduced transaction costs for trades rolling CDS indices around roll dates
$d_{j,n}$	.33	roll trade discount parameter for iTraxx Europe 10y reflecting reduced transaction costs for trades rolling CDS indices around roll dates
$d_{k,m}$	.25	roll trade discount parameter for iTraxx Europe 5y reflecting reduced transaction costs for trades rolling CDS indices around roll dates
$d_{k,n}$	.33	roll trade discount parameter for iTraxx Europe 10y reflecting reduced transaction costs for trades rolling CDS indices around roll dates

## 6. Annotations

$b_{j,m}$	fraction of iTraxx Europe 5Y index spread assumed to be the estimate of the bid-offer spread
$b_{j,n}$	fraction of iTraxx Europe 10Y index spread assumed to be the estimate of the bid-offer spread
$b_{k,m}$	fraction of CDX IG 5Y index spread assumed to be the estimate of the bid-offer spread
$b_{k,n}$	fraction of CDX IG 10Y index spread assumed to be the estimate of the bid-offer spread
$b_{e,(t_{swt})}$	Percentage of the CDS single name spread assumed to be the estimate of the bid/offer spread
$BidOffer_{i,t}^{\%,roll}$	Bid/offer cost when buying/selling CDS indices to roll to the new series on roll dates
$BidOffer_{i,tr}^{\%,rebal}$	Bid/offer rebalancing transaction cost
$ClearingCosts_{i,tr}^{\%}$	Clearing cost representing other transaction costs for trading cleared CDS indices that are not bid-offer related
$Coupon_{i,t-1}^{\%,ifCouponDate}$	Coupon as a percent of the product of the notional and the index factor (has a value of 0 if not a coupon payment date)
$CEC_{i,t}^{\%}$	Credit event cost as a percent of the notional
$d_{j,m}$	Roll trade discount parameter for iTraxx Europe 5y reflecting reduced transaction costs for trades rolling CDS indices around roll dates
$d_{j,n}$	roll trade discount parameter for iTraxx Europe 10y reflecting reduced transaction costs for trades rolling CDS indices around roll dates
$d_{k,m}$	roll trade discount parameter for iTraxx Europe 5y reflecting reduced transaction costs for trades rolling CDS indices around roll dates
$d_{k,n}$	roll trade discount parameter for iTraxx Europe 10y reflecting reduced transaction costs for trades rolling CDS indices around roll dates
$DV01_{i,t}$	Value change in underlying CDS index in basis points per unit notional for a 1bp parallel upward shift in the underlying credit spread curve
$e$	Entity impacted by credit event
$E_i$	Original total number of entities presents in the CDS index series $i$ on the day it was created
$f_{i,t}$	Index factor representing the fraction of entities remaining in the CDS index out of the total number of entities at the CDS index series inception

$g$	Clearing cost parameter
$I_t$	Index value at day $t$
$i$	Denotes the underlying CDS Index
$L$	Target CDS notional market exposure ratio
$\eta_{i,tr}$	Approximation of absolute value of the amount notional to be bought or sold at rebalancing
Notional $_{i,tr}$	CDS notional
$PV_{i,t}^{\%,clean}$	CDS index clean PV as a percent of the product of the notional and the index factor
$PV_{i,t}^{\%,dirty}$	CDS index dirty PV as a percent of the product of the notional and the index factor
$PV_{e,t_{swt}}^{\%,dirty,single}$	Single name CDS dirty PV for the entity $e$ impacted by credit event as a percent of the notional
$r_{t-1}^{EONIA}$	EONIA interest rate
$R_t$	Overall index return at time $t$
$R_t^{cash}$	Cash return
$RebalTransactionCosts_{i,t}^{\%}$	Transaction cost for rebalancing
Recovery Rate $_{e,(t_{swt}-1)}$	Recovery rate for the entity $e$
$s$	Spread subtracted from benchmark interest rate for overall interest on cash component
$S_{i,t_{roll},series}$	CDS index spread of the old or new series on the roll date. It should be entered as a decimal number, so for example a 250bp spread should be entered as 0.0250.
$S_{e,(t_{swt})}$	Single name CDS spread for the entity $e$ impacted by credit event. It should be entered as a decimal number, so for example a 250bp spread should be entered as 0.0250.
$t_0$	Inception date (also considered as a rebalancing date)
$t$	Business day $t$
$t - 1$	Previous business day
$tr$	Refers to rebalancing date
$TransactionCosts_{i,t}^{\%}$	Transaction cost as a percent of the notional
$w_{j,m}^{CDS}$	iTraxx Europe 5Y target weight
$w_{k,m}^{CDS}$	iTraxx Europe 10Y target weight
$w_{j,n}^{CDS}$	CDX.NA.IG 5Y target weight
$w_{k,n}^{CDS}$	CDX.NA.IG 10Y target weight
$x_t^{cash}$	Ratio of cash to index value at time $t$
$x_{i,t}^{CDS}$	Ratio of CDS notional to index value

$\Delta_{t_{c_{prev}, t_c}}$	Year fraction between the previous and the current coupon payment date using the actual/360 convention
$\Delta_{t_{c_{prev}, t_{EDD}}}$	Year fraction from the previous coupon date to the Event Determination Date using the Actual/360 convention
$\varphi_i^{CDS}$	A long/short variable that is equal to 1 if CDS index $i$ are protection seller positions or -1 if they are protection buyer positions

## 7. Further Information

### GLOSSARY OF KEY TERMS

Further information regarding use of the Markit Credit Indices and glossary of key terms are available in the Markit Credit Index Primer located in the indices documentation section under Primers on [www.markit.com/indices](http://www.markit.com/indices).

### FOR CONTRACTUAL OR CONTENT ISSUES

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