



# **Markit Credit Indices A Primer**

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## Scope of the document

This document aims to outline the different credit indices owned and managed by Markit, their characteristics and differences, and how they trade. The focus is on synthetic indices backed by single name bonds CDS (senior unsecured) and single name loans CDS (senior secured): the Markit CDX, the Markit iTraxx and the Markit iTraxx SovX for bonds, and the Markit iTraxx LevX and Markit LCDX for loans. Synthetic structured indices, such as the ABX and the CMBX, are not covered in this document as their functioning is quite different.

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## Section 1 – Credit Default Swaps

### Definition

A Credit Default Swap (CDS) is a contract between two parties, a protection buyer who makes fixed periodic payments, and a protection seller, who collects the premium in exchange for making the protection buyer whole in case of default. In general trades are between institutional investors and dealers.

CDS are over-the-counter (OTC) transactions. They are similar to buying/selling insurance contracts on a corporation or sovereign entity's debt, without being regulated by insurance regulators (unlike insurance, it is not necessary to own the underlying debt to buy protection using CDS). Before trading, institutional investors and dealers enter into an ISDA Master Agreement, setting up the legal framework for trading.

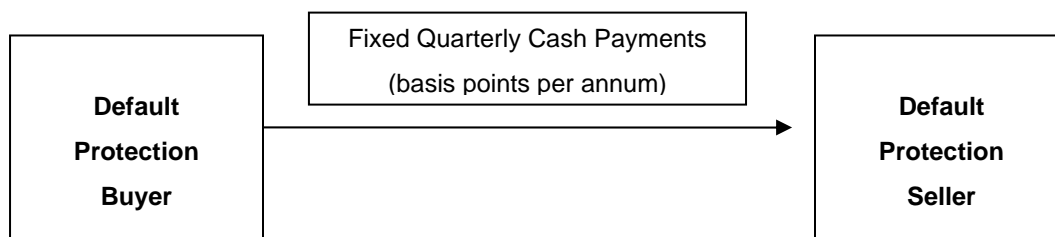
Each contract is defined by

- A Reference Entity (the underlying entity on which one is buying/selling protection on);
- A Reference Obligation (the bond or loan that is being “insured” - although it doesn't have to be the deliverable instrument in a default situation and doesn't have to have the same maturity as the CDS, it designates the lowest seniority of bonds that can be delivered in case of default);
- A Term/Tenor (5 years are the most liquid contracts);
- A Notional Principal;
- Credit Events (the specific events triggering the protection seller to pay the protection buyer – The defined events are bankruptcy, failure to pay, debt restructuring, and the rare obligation default, obligation acceleration, and repudiation/moratorium).

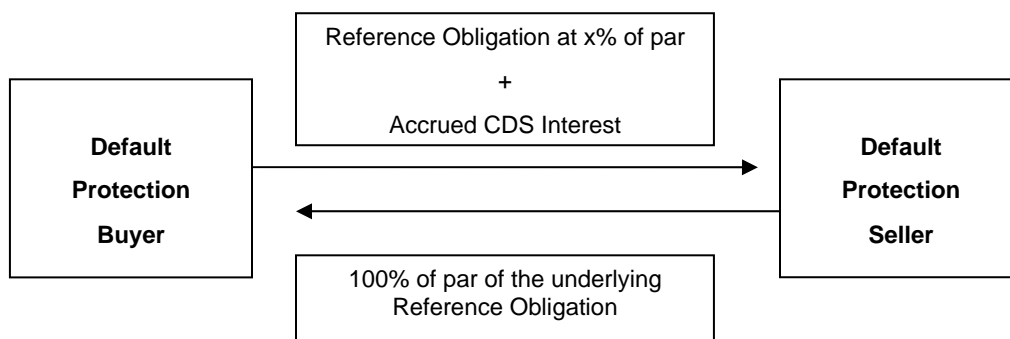
Markit Reference Entity Database (RED) is the market standard that confirms the legal relationship between reference entities that trade in the credit default swap market and their associated reference obligations, known as “pairs”. Each entity is identified with a unique 6-digit alphanumeric code, and a 9-digit code identifies the pair. RED codes are widely and successfully used by CDS market participants to electronically match and confirm CDS transactions. The RED “preferred reference obligation” is the default reference obligation for CDS trades based on liquidity criteria.

In case of a credit event, under physical settlement the protection buyer has to deliver a bond of seniority at least equal to that of the reference obligation – if there are multiple bonds deliverable, the protection buyer will most likely deliver the cheapest bond to the protection seller. We can represent the life of a CDS with the following cash flows:

From initiation of trade to maturity if there is no credit event:



In case of Credit Event



The standard settlement mechanism for Loan CDS and Corporate CDS is cash settlement via a Credit Event Auction. The difference with the example above is that instead of exchanging a cash instrument for par, the exchange is a cash amount equal to par minus the recovery set in the auction. Further details will be covered under Credit Events section later.

## Types

The different types of CDS contracts traded:

- CDS: indicates that the underlying reference entities and obligations are senior unsecured bonds, issued by corporate or sovereign issuers
- LCDS: Loan-only CDS refers to contracts where protection is bought and sold on syndicated secured leveraged loans. These are higher in the capital structure (and with higher recovery rates) than CDS.
- MCDS: The reference entity is a municipality, and the reference obligation a municipal bond.
- ABCDS: CDS on structured securities (Asset Backed Securities typically)
- Preferred CDS: CDS on Preferreds

## Uses

### Hedging

- CDS allow capital or credit exposure constrained businesses (banks for example) to free up capacity to facilitate doing more business.
- CDS can be a short credit positioning vehicle. It is easier to buy credit protection than short bonds.
- For LCDS, counterparties can assign credit risk of bank loans without requiring consent of lender (assigning bank loans often requires borrower consent/notification), therefore LCDS reduce bank exposure to credit risk without disturbing client relationships.
- CDS may allow users to avoid triggering tax/accounting implications that arise from sale of assets

### Investing

- Investors take a view on deterioration or improvement of credit quality of a reference credit
- CDS offer the opportunity to take a view purely on credit
- CDS offer access to hard to find credit (limited supply of bonds, small syndicate)
- CDS allows investors to invest in foreign credits without bearing unwanted currency risk

- Investors can tailor their credit exposure to maturity requirements, as well as desired seniority in the capital structure
- CDS require little cash outlay and therefore creates leverage

The standardized documentation, liquidity, ability to customize terms, and pure credit focus has made the CDS market a de facto standard for expressing a view on the credit market (either single credits, or baskets such as indices).

## Pricing

CDS contracts in general trade based on a spread, which represents the cost a protection buyer has to pay the protection seller (the premium paid for protection). The protection buyer is said to be short the credit as the value of the contract rises the more the credit deteriorates.

The value of the CDS contract increases for the protection buyer if the spread increases. For example, a protection buyer paying a spread of 60bps when the current spread is 90bps would be able to unwind the position at a higher spread level.

Distressed names are trading with an upfront payment and a standard running spread. Instead of trading a name with a spread of 1000, the protection buyer will generally pay running coupon of 500, and an upfront amount to compensate the seller for the difference between 1000 and 500 for the life of the trade. In a 5 year trade maturing on 20 September 2014 entered on 13 July 2009, the upfront amount will be approximately 16.75 points, or \$167,500 for \$1 million of protection.

Estimated recovery is a key part of valuing a CDS contract, as it represents the value post-default, and therefore impacts expected cash flows. For investment grade names, recovery is generally assumed to be 40% (as the probability of default is low, the recovery rate is at best an estimate). For distressed names however, where the probability of default is higher, recovery tends to be more precisely defined.

It is important to note that with the introduction of fixed coupon for North American Corporate credits on April 8<sup>th</sup>, and for European Corporates and Sovereigns on June 20<sup>th</sup>, single name contracts are trading using a fixed coupon, similar to indices and distressed names. The fixed coupons for North America are 100 and 500, and 25/100/300/500/750/1000 in Europe. There are continuing commitments for LCDS, EM CDS, and MCDS to move to trading with a fixed coupon.

Markit offers comprehensive data service including daily credit curves for over 3,500 entity-tiers including recovery rates, and valuation services to value trades.

## Notional

It is important here to note that CDS trades refer to a notional, the quantity of the underlying asset or benchmark to which the derivative contract applies. It doesn't refer to any cash exchange at time of trade, the mark-to-market size of the trade. It is akin to the amount of insurance bought, not the premium paid.

## Section 2 - Credit Indices

### A Brief History

Synthetic credit indices originated in 2001 when JPMorgan launched the JECI and Hydi indices, and Morgan Stanley launched Synthetic TRACERS. Both firms merged their indices under the Trac-x name in 2003. During the same period iBoxx launched credit derivatives indices. In 2004 Trac-x and iBoxx merged to form the CDX in North America and the iTraxx in Europe and Asia. After being the administrator for the CDX and calculation agent for iTraxx, Markit acquired both families of indices in November 2007, and owns the iTraxx, CDX, SovX, LevX, and LCDX Indices for derivatives, and the iBoxx indices for cash bonds.

### Benefits

Credit indices have expanded dramatically in recent years, with volumes rising, trading costs decreasing, and a growing visibility across financial markets. Benefits of using CDS indices include:

- **Tradability:** Credit indices can be traded and priced more easily than a basket of cash bond indices or single name CDS
- **Liquidity:** Significant liquidity is available in indices and has also driven more liquidity in the single name market
- **Operational Efficiency:** Standardized terms, legal documentation, electronic straight-through processing
- **Transaction Costs:** Cost efficient means to trade portions of the market
- **Industry Support:** Credit indices are supported by all major dealer banks, buy-side investment firms, and third parties (for example, Markit offers transaction processing and valuations services)
- **Transparency:** Rules, constituents, fixed coupon, daily prices are all available publicly

### Participants

There are five main parties involved in credit indices:

- **Markit** – Markit owns and operates the indices: including licensing, marketing, administration, and calculation. Markit publishes prices daily on its website
- **Banks** – Banks trade indices on their own behalf and provide liquidity for their clients. They are intimately involved in the indices, actively participating in rolls, and playing a key part in product development
- **Institutional Investors** – Investors can hedge their positions, or express views on a specific market segments via credit indices
- **ISDA** – Markit and banks have worked with ISDA to create globally approved legal documentation for CDX, LCDX, iTraxx, SovX and LevX indices
- **Third parties** – Third parties have made trading credit indices easier by integrating them into their platform. For example, Markit Trade Processing allows buy-side and sell-side firms to communicate and confirm trade details with counterparties, including industry matching utilities like DTCC's Deriv/SERV.

## Key characteristics

Appendix 1 presents a roadmap of the major credit indices, number of entities included in each index, roll dates, maturities available to trade, and other details for each index. This section outlines the similarities and differences between the various types of credit derivative indices.

### *Differences between Bond and Loan-only CDS Indices*

	Bonds	Loans
<b>Deliverable</b>	Bonds or Loans	Loans only
<b>Cancellability</b>	CDS trade is not cancellable in cases where all the underlying debt is called or matures	CDS trade is not cancellable if an issuer repays all its secured debt without issuing new relevant debt
<b>Valuation</b>	Duration is not adjusted for cancellability	Duration is not adjusted for cancellability
<b>Credit Event</b>	The three most commonly used credit events are failure to pay, bankruptcy and restructuring. Also defined but rarely seen are Obligation, Acceleration, Repudiation / Moratorium	Bankruptcy, Failure to Pay, and - for LevX only - Restructuring

### *Differences between LevX and LCDX*

	LevX	LCDX
<b>Roll Date</b>	March and September 20 <sup>th</sup>	April and October 3 <sup>rd</sup>
<b>Region</b>	Europe	North America
<b>Reference</b>	Reference Obligation	Reference Entity
<b>Currency</b>	EUR	USD or EUR
<b>Credit Event</b>	Bankruptcy, Failure to Pay, Restructuring	Bankruptcy, Failure to Pay
<b>Deliverables</b>	LevX only includes Senior (1 <sup>st</sup> Lien) loans – the Sub index (2 <sup>nd</sup> / 3 <sup>rd</sup> Lien) is not rolled anymore	LCDX only includes 1 <sup>st</sup> Lien loans
<b>Loan Criteria Eligibility</b>	Senior – min EUR500 million deal	Loans must be on the Markit Syndicated Secured List *
<b>Entities</b>	Senior – 40 names	100 names
<b>Business Days</b>	London and TARGET Settlement Day	USD – New York and London EUR – London and TARGET Settlement Day

\* Markit's Syndicated Secured List (SSL) is a database of syndicated secured loans traded in the primary and secondary markets including information about the priority of such loans gathered from market participants and other information. Markit RED maintains the SSL.

### ***Differences between iTraxx and CDX***

	<b>iTraxx</b>	<b>CDX</b>
<b>Region</b>	Europe and Asia	North America and Emerging Markets
<b>Credit Event</b>	Bankruptcy, Failure to Pay, Modified Restructuring	Bankruptcy, Failure to Pay
<b>Currency</b>	Europe – EUR Japan – JPY Asia ex-Japan – USD Australia – USD	USD, EUR
<b>Reference Entities</b>	Liquidity – A liquidity poll decides inclusions and exclusions	Dealer Poll – Dealers select reference entities to be added and removed (ratings, liquidity, corporate actions)
<b>Business Days</b>	London and TARGET Settlement Day	USD – New York and London EUR – London and TARGET Settlement Day

### ***Coupon Payments***

Payments from the protection buyer to protection seller are made on a quarterly basis (March 20, June 20, September 20, December 20) and accrue on a Actual/360, except for CDX.EM, where, if the master transaction relates to an index with an effective date prior to September 20, 2009, the payments are semi-annual on June 20 and December 20 of the year; otherwise, coupon payments are on March 20, June 20, September 20 and December 20 of the year, similar to other credit indices.

### **Rules**

Indices roll every six month - a new series of the index is created with updated constituents. The previous series continues trading although liquidity is concentrated on the on-the-run series.

The roll consists of a series of steps which are administered by Markit:

- For the Markit iTraxx Europe / Asia Pacific indices, liquidity lists are submitted by dealers to Markit. Markit aggregates the liquidity lists and applies the index rules (outlined in Appendix 5) for the respective indices to determine the index constituents.
- For the Markit CDX/LCDX/MCDX indices, the following steps are applicable:
  - Exclusion: a number of entities are excluded from the index. Names no longer qualify because of a corporate action, ratings changes (for the indices where ratings are a criteria), lack of liquidity, or by dealer poll results
  - Inclusion: New names are added to the each index to keep the number of constituents the same. Inclusion is decided by a dealer poll for the CDX/LCDX/MCDX

- Reference obligation assignment: For each entity in the new index, a suitable reference obligation is identified by Markit RED, with input from the dealers
- Fixed Rate determination: Licensed Dealers determine the spread for each index and maturity. This is done via a dealer call in Europe and Asia. The fixed coupons are generally set equal to the closest standard single name coupons (for the respective region) to the weighted average spreads of constituents of the respective index. In addition to the fixed rate, CDX and iTraxx dealers also agree on a recovery rate used for upfront calculations (not for the determination of cash flows in case of a credit event)
- Annex: The final annex, stating the composition of each index, and fixed rate is published by Markit. The annex is attached to each index trade confirmation
- New Series starts trading

Timelines for the rolls of Markit CDX, Markit LCDX, Markit MCDX, Markit iTraxx, and Markit iTraxx LevX are given as examples in Appendix 2.

The complete rules can be found on Markit's website:

**Markit CDX and LCDX**

<http://www.markit.com/assets/en/docs/products/data/indices/credit-and-loan-indices/rules/Markit-CDX-LCDX-Rules.pdf>

**Markit iTraxx Europe and Asia**

<http://www.markit.com/en/products/data/indices/credit-and-loan-indices/itraxx/documentation.page?>

**Markit iTraxx LevX**

<http://www.markit.com/en/products/data/indices/credit-and-loan-indices/levx/documentation.page?>

**Markit iTraxx SovX**

<http://www.markit.com/en/products/data/indices/credit-and-loan-indices/sovx/sovx-documentation.page?>

Additional details on Markit iTraxx index rules can be found in Appendix 5.

## Section 3 – Trading Credit Indices

### Trading Overview

#### *Trading Conventions*

Indices trade either on spread or on price. This convention mimics the cash instrument where some bonds trade on yields, and others on price. The CDS indices convention matches that of the underlying cash instruments.

<b>Spread</b>	CDX (IG, XO, HVOL), iTraxx (Europe, Japan, Asia ex-Japan, Australia), SovX, MCDX
<b>Price</b>	CDX (HY, EM, EM.Div), LCDX, LevX

Intuitively, if an index has a fixed coupon of 60 and the current coupon is 90, it is positive for the protection buyer (they are paying 60 for something that is currently worth 90). The price is inversely related to spread so the price of the index at 90 is lower than the price at 60, and as the protection buyer is short the credit a drop in price is positive.

#### *Where can I trade?*

Credit Indices are over-the-counter (OTC) products and can be traded with licensed dealers providing liquidity.

A list of banks providing liquidity for the US indices is available on:

<http://www.markit.com/en/products/data/indices/credit-and-loan-indices/cdx/contributing-banks.page?>  
<http://www.markit.com/en/products/data/indices/credit-and-loan-indices/lcdx/dealers.page?>

A list of banks providing liquidity for the European and Asian indices is available on:

<http://www.markit.com/en/products/data/indices/credit-and-loan-indices/itraxx/contributing-banks.page?>  
<http://www.markit.com/en/products/data/indices/credit-and-loan-indices/levx/contributing-banks.page?>

A list of banks providing liquidity for the Sovereign CDS indices is available on:

<http://www.markit.com/en/products/data/indices/credit-and-loan-indices/sovx/sovx-market-makers.page?>

#### *How do I trade?*

Buying and selling the indices can be compared to buying and selling portfolios of loans or bonds. A buyer takes on the credit exposure to the loans or bonds, and is exposed to defaults, similar to buying a cash portfolio (buying the index is equivalent to selling protection). By selling the index, the exposure is passed on to another party. Exposure is similar in both cases.

The indices trade at a fixed coupon, which is paid quarterly (except for EM which is semi-annual) by the buyer of protection on the index, i.e. a short index position, and upfront payments are made at initiation and close of the trade to reflect the change in price. Correspondingly, the protection seller, or buyer of the index, receives the coupon. The indices are quoted on a clean basis.

#### *Example:*

The index launches with a price of 100 on September 20<sup>th</sup>, and a fixed coupon of 60. Investor A buys \$10,000,000 notional protection on the index on November 30<sup>th</sup>, when the spread has moved to 90 and corresponding price is 98.67 (the price is par minus the present value of the spread differences). Investor A makes an upfront payment to account for the movement in the spreads.

$$\text{Payment} = 10,000,000 * (100-98.67)/100 = \$133,000$$

In addition, he will receive the accrued interest up to trade date (as he will have to make the full coupon on coupon payment date – this simplifies operations as all protection buyers make the same payment on the same date):  $71/360 * 10,000,000 * 0.006 = \$11,833.3$

$$\text{Net outflow} = \$121,166.67$$

December 20<sup>th</sup> – Investor A pays the fixed coupon.

$$\text{Cash outflow} = 0.006 * 10,000,000 * 91/360 = \$15,166.67$$

March 13<sup>th</sup> – Investor A closes the trade on March 13 when the spread is 120 and the equivalent price is 97.44. Investor A pays the accrued interest up to trade date and receives payment.

$$\text{Inflow} = 10,000,000 * (100-97.44)/100 - 0.006 * 10,000,000 * 84/360 = 256000 - 14000 = \$242,000$$

Markit offers a variety of services around trading of single name CDSs and indices. Markit Quotes and Intraday offer intra-day CDS and indices levels, and Markit Portfolio Valuations provide buyside firms daily valuations using Markit's extensive dataset.

## Valuation

Markit calculates the official levels for the Markit iTraxx and CDX suite of indices, based on their regional market close times. These levels are published on the Markit website ([www.markit.com](http://www.markit.com)) and are freely accessible to the public.

Markit collects mid, or bid/offer spreads (or prices, as applicable) for the Markit iTraxx and CDX indices from licensed iTraxx and CDX market makers respectively. The collected spreads (or prices) need to be dated on the calculation date. If bid and offer spreads are submitted, Markit calculates mid-spreads as being the mid-point between bid and offer.

In order to derive calculated index levels, contributions need to be available from at least three approved data sources for a particular index. The calculated level is the simple arithmetical average of collected spreads. In addition to other quality control mechanisms the highest and lowest spreads (usually top and bottom quartile) are excluded from the calculation as shown in the table below.

Number of Contributions	Upper Quartile Discards	Lower Quartile Discards	Number Used in Composite
1	0	0	No Composite Calculated
3	1	1	1
4	1	1	2
5	1	1	3
7	1	1	5
8	2	2	4
11	2	2	7
12	3	3	6
16	4	4	8

Markit also calculates theoretical index spreads based on the contributions received for the underlying index components. Following is the methodology used for calculation:

- Using the Markit Composite credit curve and recovery rate for each of the index constituents, the survival probability of each constituent at each coupon payment date are calculated

- The Present Value (PV) of each index constituent is calculated using the trade details of the index (as described below)
- The PV of the index (Weighted Average of the PVs of the constituents) and the accrued interest on the index (Weighted Average of the accrued of the index constituents) are calculated.
- Theoretical Price of the index is calculated as  $1 + PV - \text{Accrued}$
- The Index Theoretical Spread is solved as the flat curve that gives the index PV using the index recovery rate assumption

The Present Value (PV) of each index constituent can be calculated using one of the two following methods:

- A simplified model using risky duration only for each credit in the index generates a decent approximation. This is covered in more detail below.
- The more accurate and complex way is to use the hazard rate model for each underlying components of the index. It is not a trivial exercise and is outside the scope of this document, but will generate a more accurate value, as it allows for curvature in the credit spread curve. Details of this method is available on [www.cdsmodel.com](http://www.cdsmodel.com)

For small differences in fixed and current coupon the two valuation methods will have similar results. The hazard rate model will give better results for large movements in the spread.

In the simple valuation methodology, the risky duration of the credit is multiplied by the difference between the current spread of the credit and the coupon of the index. This gives the PV on each component.

For example, if a credit is trading at 200 bps, with a risky duration of 3.75 years, and the index coupon is 150 bps, then the PV of the constituent is  $3.75 * 50 / 10,000 = 0.01875$ .

The index will trade away from the intrinsic / theoretical value calculated above, as it is a tradable index, and market supply and demand ultimately dictates where the index trades. However the intrinsic value provides a benchmark. The traded and intrinsic values are both available in Markit's end-of-day data services.

## Credit Events

Credit Events result in the triggering of the CDS / LCDS single name and index contracts. As a consequence a payout occurs from the seller of protection on the index to the buyer of protection. The list of possible Credit Events are highlighted in the tables above and defined in Appendix 4 (Dictionary).

Following the implementation of the Big Bang and Small Bang in April and July 2009 respectively for the CDS markets, the ISDA Determinations Committee (DC) for the respective region decides whether a Credit Event has occurred and whether an auction will be held. More details on the process are available in Markit's "The CDS Big Bang Research Report" and "The CDS Small Bang Research Report" published on [www.markit.com/cds](http://www.markit.com/cds).

LCDS and LCDS index trades are not covered by the Big or the Small Bang.

Following a Credit Event in a constituent of the CDS / LCDS index, a new version of the index is published which assigns a zero percent weight on the relevant entity. The notional amount on the index trade is reduced by the weight of the name in the index. Assuming 100 names in the index and one

default, the new version of the index will contain 99 names and have a revised notional of \$9.9 million rather than \$10 million.

CDS / LCDS trades can either be cash settled or physically settled following a Credit Event. Cash Settlement is the default settlement mechanism for all CDS trades following the implementation of the Big Bang and Small Bang. Cash Settlement is conducted by setting the recovery price in an auction, and the compensation received by the protection buyer is based on the final agreed auction price.

Credit Event Auctions have been developed over recent years for the unsecured market and have more recently been used in the senior secured market too. The recovery price is used across the whole market to settle trades, ensuring all contracts are settled at the same price. A complete Credit Event Auction Guide is available at

<http://www.creditfixings.com/information/affiliations/fixings/contentParagraphs/00/document/Credit%20Event%20Auction%20Primer.pdf>

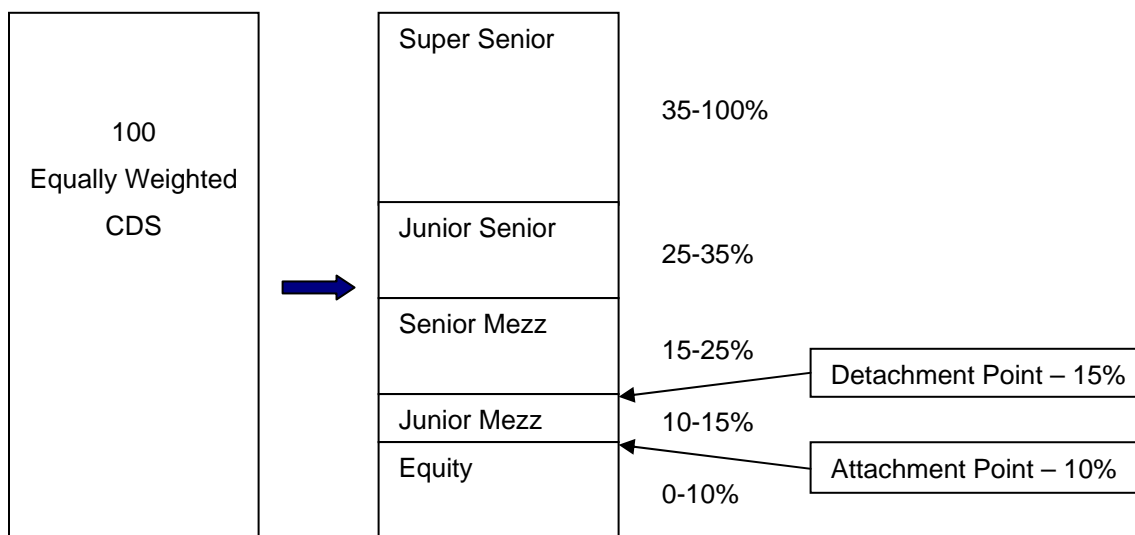
Assuming a recovery of 70 cents on the dollar, all protection buyers are compensated 30 cents in the dollar on the defaulted name. Assuming that each entity has a 1% weighting in the index, they are compensated  $1\% * 0.3$  multiplied by the notional of the trade. For a \$10m trade, this equals \$30,000. Markit and Creditex administer the auction and publish the results of each step of the process on [www.creditfixings.com](http://www.creditfixings.com).

An alternative to Cash Settlement is Physical Settlement. In a Physical Settlement the protection buyer delivers the defaulted debt and receives par for it. The protection seller who takes delivery of the debt is left holding the defaulted asset. For a constituent of the index, the settlement is with respect to the portion of the index made up of the defaulted reference entity.

Physical Settlement has been the traditional method of settlement, but runs into problems when the notional of the outstanding debt is less than the CDS/LCDS outstanding. In addition, all counterparties are not able to take receipt of the debt. For an index, where the notional exposure in many trades for an actual credit will be small, and investors typically do not own the loan or bond on the credit event date, Cash Settlement is a better choice. The mechanics of Cash Settlement are simpler, faster, and more operationally efficient than Physical Settlement, where an actual loan/bond trade takes place.

## Section 4 – Tranches

Some of the credit indices are also available in a tranching format, which allows investors to gain exposure on a particular portion of the index loss distribution. Tranches are defined by attachment and detachment points. Defaults affect the tranches according to the seniority of the tranche in the capital structure. Example of the CDX.NA.HY tranches:



**Tranche Mechanics:** The protection buyer of a tranche makes quarterly coupon payments to the protection seller and receives a payment in case there is a credit event in the underlying portfolio. Upfront payments are made at initiation and close of the trade to reflect the change in price. Coupon payments (500bps or 100bps per annum) are made until the notional amount of the tranche gets fully written down due to a series of credit events or until maturity whichever is earlier. Payments are made by the protection seller as long as the losses are greater than the attachment point and less than the detachment point for that tranche. Once the total loss reaches the detachment point, that tranche notional is fully written down. The premium payments are made on the reduced notional after each credit event.

Example:

An index has 100 equal weighted names, and has the following tranches: 0-5, 5-8, 8-12, 12-15, 15-100 (in this case the 5-8 tranche has an attachment point of 5 and detachment point of 8). Investor B bought protection on the 0-5% tranche with a notional of \$10 million.

One name defaults – Recovery is set at 65% (35% Loss Given Default – LGD). The payout from the protection seller is:

$(\text{Notional} * \text{LGD} * \text{Weighting}) / \text{Tranche Size}$

Or \$700,000 to Investor B.

The 0-5% tranche is adjusted for the reduced notional (0.35 based on LGD) and 4.65% of the notional remains. The new detachment point has to be adjusted for the number of remaining names in the index, using a factor of 0.99 (the 0-5 tranche for new trades now becomes a 0-4.69 tranche). The original principal of the other tranches is unaffected but now has a smaller cushion protecting them against further losses, except that of the super senior tranche which notional is adjusted for the recovery. The

detachment point doesn't change, but the notional is adjusted for the recovery rate. The loss goes to the equity tranche, the recovery to the super senior.

**Tranche Accruals:** After June 22<sup>nd</sup> 09, tranches mimic indices with an upfront at the trade date, the seller paying the buyer the accrued up to trade date, and the buyer paying full coupon at next payment date. So no matter when a trade is entered, the coupon legs always accrue from the same date and make unwinds, transfers and collapses very easy.

**Tranche following a Credit Event:**

Like Indices, the new version (ex-defaulted entity) starts trading after the credit event auction.

Example: Credit Event of Quebecor

-Consider a 100 name HY index (version 1).

-After the credit event, tranches for version 2 (ex-Quebecor) continue to be quoted in standard AP and DP. i.e. 0-10,10-15,15-25, 25-35 and 35-100. However the actual AP and DP will be different.

- Auction Recovery rate of Quebecor is 41.25%. The new underlying index is the 99 name index (version2 - ex Quebecor).

- This implies a loss of  $[1/100 * (1-41.25\%)] = 0.5875\%$  on the 100 name index. This loss is fully absorbed by the equity tranche and so the new detachment point for equity tranche will be  $[10\% - (1/100 * 58.75\%)] = 9.4125\%$ . Since the underlying index now has 99 names, the actual detachment point will be  $(9.4125 * 100/99 = 9.507576\%)$ .

- Tranche widths will change for remaining tranches. For example, the tranche width of 10-15% will be  $(5 * 100/99 = 5.050505\%)$ , width for 15-25% and 25%-35% tranches will be  $(10 * 100/99 = 10.101010\%)$ . So DP for 10-15% tranche would be  $(9.507576\% + 5.050505\% = 14.55808\%)$ .

- A \$10 mn notional on the 0-10 tranche corresponds to an actual notional of  $10mn - [(1/100) * 10mn * 58.75\% * (100/10)] = \$9.4125 mn$  on the 0-9.507576 tranche. So the underlying index notional is  $(9.4125mn / 9.507576\% = 99 mn)$

- For the super senior tranche, both the AP and the notional is reduced. The notional is reduced, because the recovered amount on the defaulted entity can no longer be lost. Notional for senior tranches are reduced by the recovery rate. The equity tranche is reduced by 100-recovery.

Hence, the new attachment, detachment points and actual notional will be as follows:

Quoted AP	Quoted DP	Actual AP	Actual DP	Quoted Notional	Actual Notional
0	10	0	9.507575758	\$10.00	\$9.41
10	15	9.507575758	14.55808081	\$5.00	\$5.00
15	25	14.55808081	24.65909091	\$10.00	\$10.00
25	35	24.65909091	34.76010101	\$10.00	\$10.00
35	100	34.76010101	100	\$65.00	\$64.59
				Total =100	Total = 99

Markit offers the most comprehensive pricing service for on-the-run and off-the-run tranches, providing bid, ask, and mid upfronts and spreads, as well as base correlations.

Additional information is available in Appendix 3.

## Conclusion

Credit indices are widely used around the world. It is therefore key to understand the basic mechanics and characteristics of each index and their differences. We have attempted to highlight each index, but if you need more in-depth information, please contact the following people:

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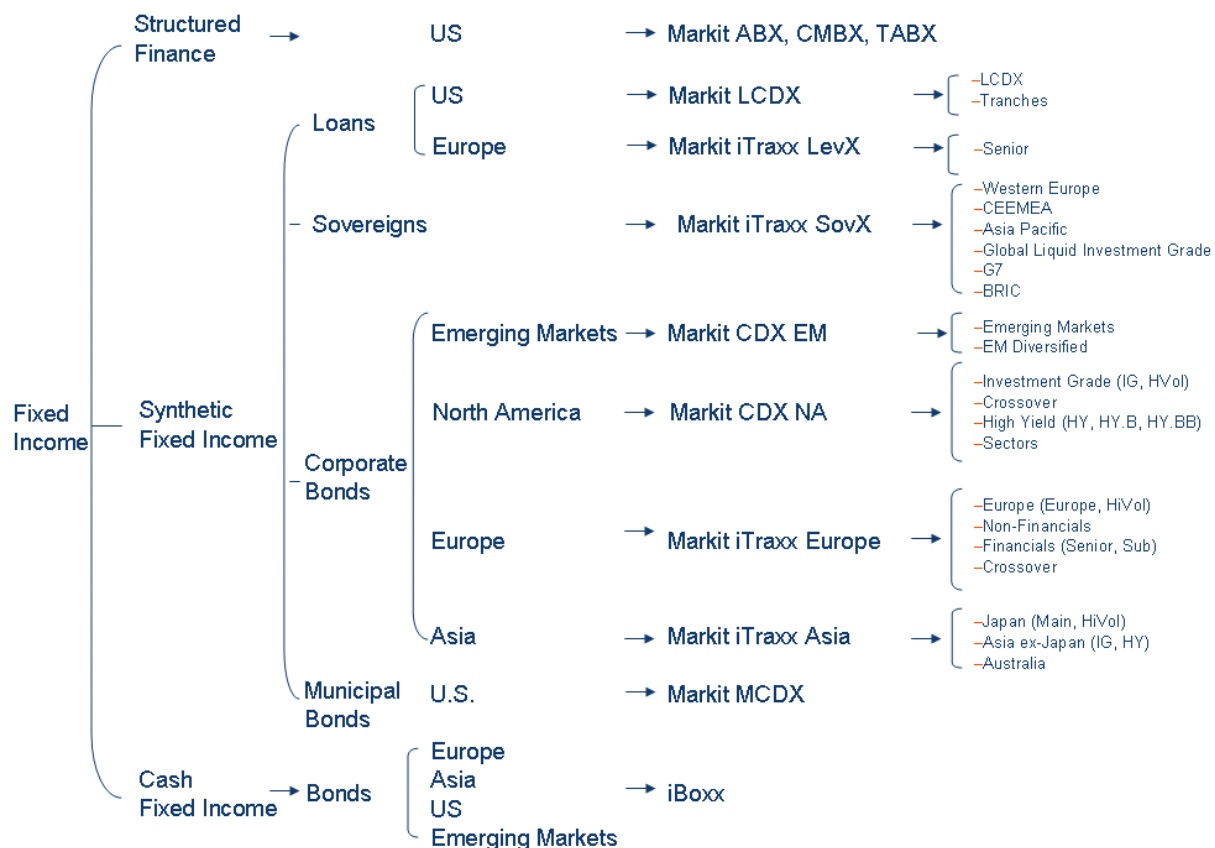
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or go to [www.markit.com](http://www.markit.com).

## Appendix 1: Roadmap to Credit Indices

Credit and Loan Indices - Markit CDX, iTraxx, SovX, LCDX, LevX, and MCDX - provide the market standards for investing, trading and hedging in the credit markets.

Chart: Markit Credit and Loan Indices overview



### Product Descriptions

#### Markit iTraxx

Markit iTraxx are the standard European and Asian tradable credit default swap family of indices. The rules-based Markit iTraxx indices are comprised of the most liquid names in the European and Asian markets. The selection methodology ensures that the indices are replicable and represent the most liquid, traded part of the market. Markit iTraxx indices are easy and efficient to trade - investors can express their bullish or bearish sentiments on credit as an asset class, and portfolio managers can manage their credit exposures actively.

The benchmark Markit iTraxx Europe index comprises 125 equally-weighted European names. A HiVol index consisting of the 30 widest spread non-financial names and three sector indices are also published. The Markit iTraxx Crossover index comprises the 45 most liquid sub-investment grade entities.

The Markit iTraxx Europe indices trade 3, 5, 7 and 10-year maturities and a new series is determined by dealer liquidity poll every 6 months. Markit calculates the official mid-day (11am GMT) and end-of-day (4pm GMT) levels for the Markit iTraxx Europe suite of Indices on a daily basis.

The Markit iTraxx Asia Pacific indices comprise two Markit Asia ex-Japan indices (a 50 equally-weighted investment grade and a 20 equally-weighted high yield CDS index of Asian entities), a Markit iTraxx Australia index (25 equally-weighted Australian entities), and the iTraxx Japan index (50 equally-weighted CDS of Japanese entities).

The Markit iTraxx Asia Pacific indices typically trade on a 5-year maturity and a new series is determined by dealer liquidity poll every 6 months. Markit calculates the official end-of-day levels for the Markit iTraxx Asia Pacific suite of Indices on a daily basis.

### ***Markit iTraxx SovX***

The Markit iTraxx SovX indices are a family of sovereign CDS indices covering countries across the globe. These indices provide investors with an efficient, standardized risk barometer and tools to gain or hedge exposure to this asset class on a diversified basis.

The indices in the Markit iTraxx SovX family are the Markit iTraxx SovX Western Europe Index (comprising 15 names from the Eurozone region plus Denmark, Norway, Sweden and United Kingdom that trade on Western European documentation), the Markit iTraxx SovX CEEMEA Index (comprising 15 names in the Central & Eastern Europe, Middle East and African countries that trade on Emerging Markets documentation), the Markit iTraxx SovX Asia Pacific Index (comprising 10 names from the Asia and Oceania regions), the Markit iTraxx SovX Global Liquid Investment Grade Index (comprising the most liquid high grade sovereign entities), the Markit iTraxx SovX G7 Index (comprising entities from the G7 universe) and the Markit iTraxx BRIC Index (comprising the most liquid BRIC entities). All constituents are equally weighted in all the indices except the Markit iTraxx SovX CEEMEA index.

### ***Markit iTraxx LevX***

The Markit iTraxx LevX indices are the first European indices on Leveraged Loans CDS. They are constructed from the universe of European corporates with leveraged loan exposures. The Markit iTraxx LevX Senior Index comprises the most liquid first lien credit agreements traded in the European Leveraged Loan CDS market.

	Index	Entities (1)	Coupon (bps)	Recovery Rates (%)	Roll Dates	Maturity in years (2)	Underlying
iTraxx Europe	Europe	125	100	40	3/20 – 9/20	3, 5, 7, 10	Top 125 single name CDS contract by volume
	Non Financials	100	100	40	3/20 – 9/20	5, 10	
	Senior Financials	25	100	40	3/20 – 9/20	5, 10	
	Sub Financials	25	100	20	3/20 – 9/20	5, 10	
	Crossover	50	500	40	3/20 – 9/20	3, 5, 7, 10	Sub-investment grade reference entities
	High Volatility	30	100	40	3/20 – 9/20	3, 5, 7, 10	Top 30 highest spread names from iTraxx Europe
iTraxx Asia	Japan	50	100	35	3/20 – 9/20	5	
	Asia ex-Japan IG	50	100	40	3/20 – 9/20	5	
	Australia	25	100	40	3/20 – 9/20	5	
	Asia ex-Japan HY	20	500	25	3/20 – 9/20	5	
iTraxx SovX	Western Europe	15	100	40	3/20 – 9/20	5, 10	Top 15 sovereign entities by liquidity that trade on Western European documentation
	CEEMEA	15	100	25	3/20 – 9/20	5, 10	Top 15 sovereign entities by liquidity that trade on Emerging Market documentation
	Asia Pacific	10	100	40	3/20 – 9/20	5, 10	Top 10 sovereign entities by liquidity in the Asia and Oceania regions
	Global Liquid IG	11-27	100	40	3/20 – 9/20	5, 10	Most liquid high grade global sovereign entities
	G7	Upto 7	100	40	3/20 – 9/20	5, 10	Most liquid industrialized countries
	BRIC	Upto 4	100	40	3/20 – 9/20	5, 10	Most liquid BRIC countries
iTraxx LevX	LevX Senior	40	500	40	3/20 – 9/20	5	European First Lien Syndicated Loans

(1) All indices are equally weighted except the Markit iTraxx SovX CEEMEA index

(2) Exact maturity is 3 months past the years after anniversary (coinciding with coupon payment dates and IMM roll dates of 20 Mar, 20 Jun, 20 Sep, 20 Dec)

## Markit CDX

The Markit CDX indices are a family of indices covering multiple sectors. The main indices are: Markit CDX North American Investment Grade (125 names), Markit CDX North American Investment Grade High Volatility (30 names from CDX IG), Markit CDX North American High Yield (100 names), Markit CDX North American High Yield High Beta (30 names), North American Emerging Markets (14 names), and North American Emerging Markets Diversified (40 names). The Markit CDX indices roll semi-annually in March and September.

## Markit LCDX

Markit LCDX is a tradable index with 100 equally-weighted underlying single-name loan-only credit default swaps (LCDS). The default swaps each reference an entity whose 1st lien loans that trade in the secondary leveraged loan market and listed on the Markit Syndicated Secured List.

## Markit MCDX

Markit MCDX index comprises of 50 CDS contracts referencing municipal issuers as the Reference Entity.

	Index	# Entities (1)	Coupon (bps)	Recovery Rates (%)	Roll Dates	Maturity in years (2)	Underlying	Sub-Indices
LCDX	LCDX	100	250	70	4/3 – 10/3	3, 5	North American First Lien Senior Secured Loans	
CDX	IG	125	100	40	3/20 – 9/20	1, 2, 3, 5, 7, 10	Investment Grade	HVol – 30 names in IG with High Volatility Sectors
	HY	100	500	30	3/27 – 9/27	5	High Yield	HY.B, HY.BB, HB
	XO	35	340	40	3/20 – 9/20	3, 5, 7, 10	Cross-Over (7B or 6B) (3)	
	EM	14 - can vary	500	25	3/20 – 9/20	5	Emerging Markets (Sovereign)	
	EM Div	40	100	25	3/20 – 9/20	5	Emerging Markets Diversified (Sovereign and Corporate)	
MCDX	MCDX	50 credits	100	80	4/3 – 10/3	3, 5, 10	U.S. Municipal Bonds	

(1) All indices are equally weighted – Except for EM, which is decided by poll

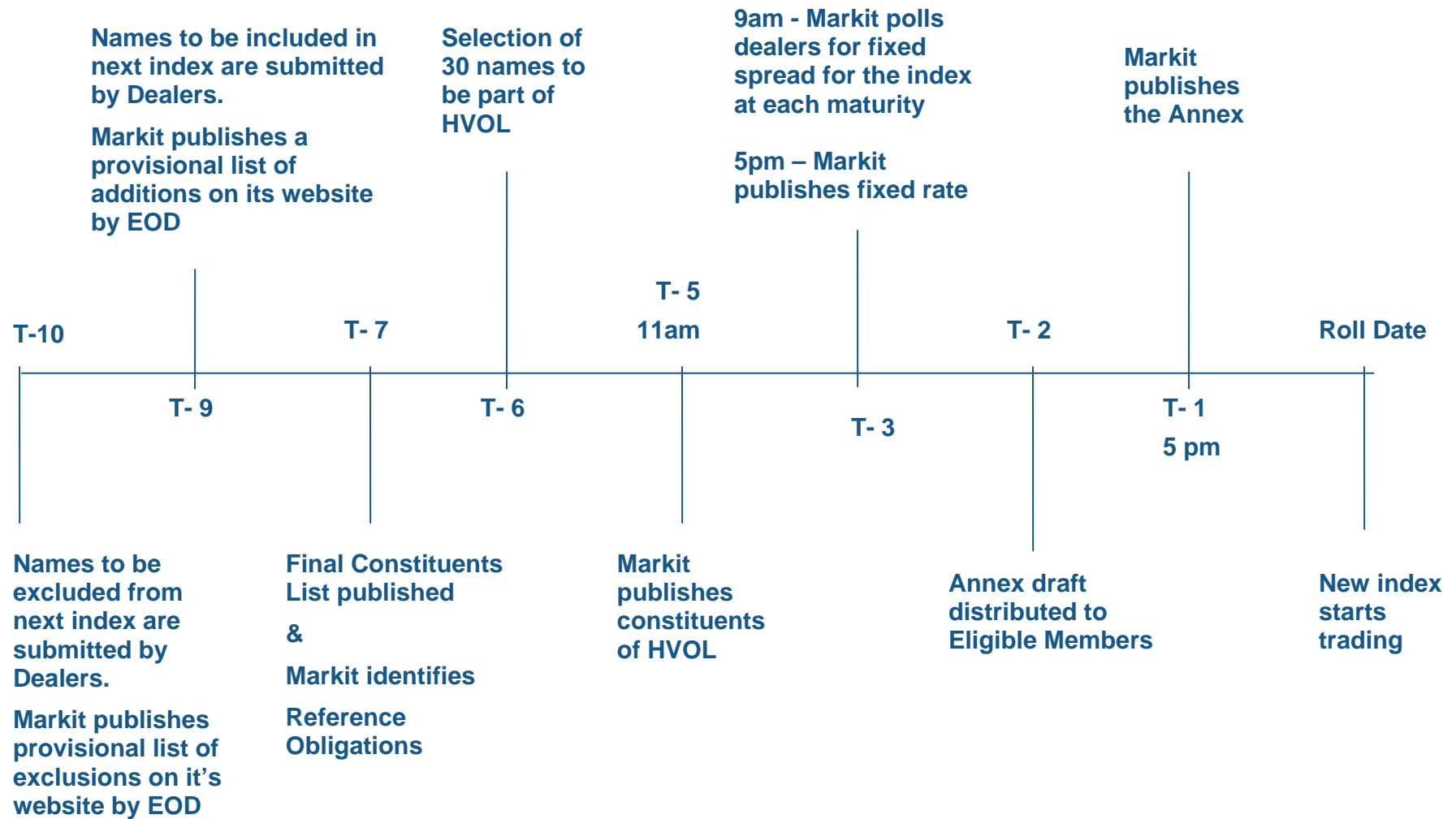
(2) Exact maturity is 3 months past the years after anniversary (coinciding with coupon payment dates and IMM roll dates of 20 Mar, 20 Jun, 20 Sep, 20 Dec)

(3) 7B - a rating in the BBB/Baa rating category by one of S&P, Moody's or Fitch and in the BB/Ba rating category by the other two

6B - a rating in the BB/Ba rating category by S&P, Moody's and Fitch

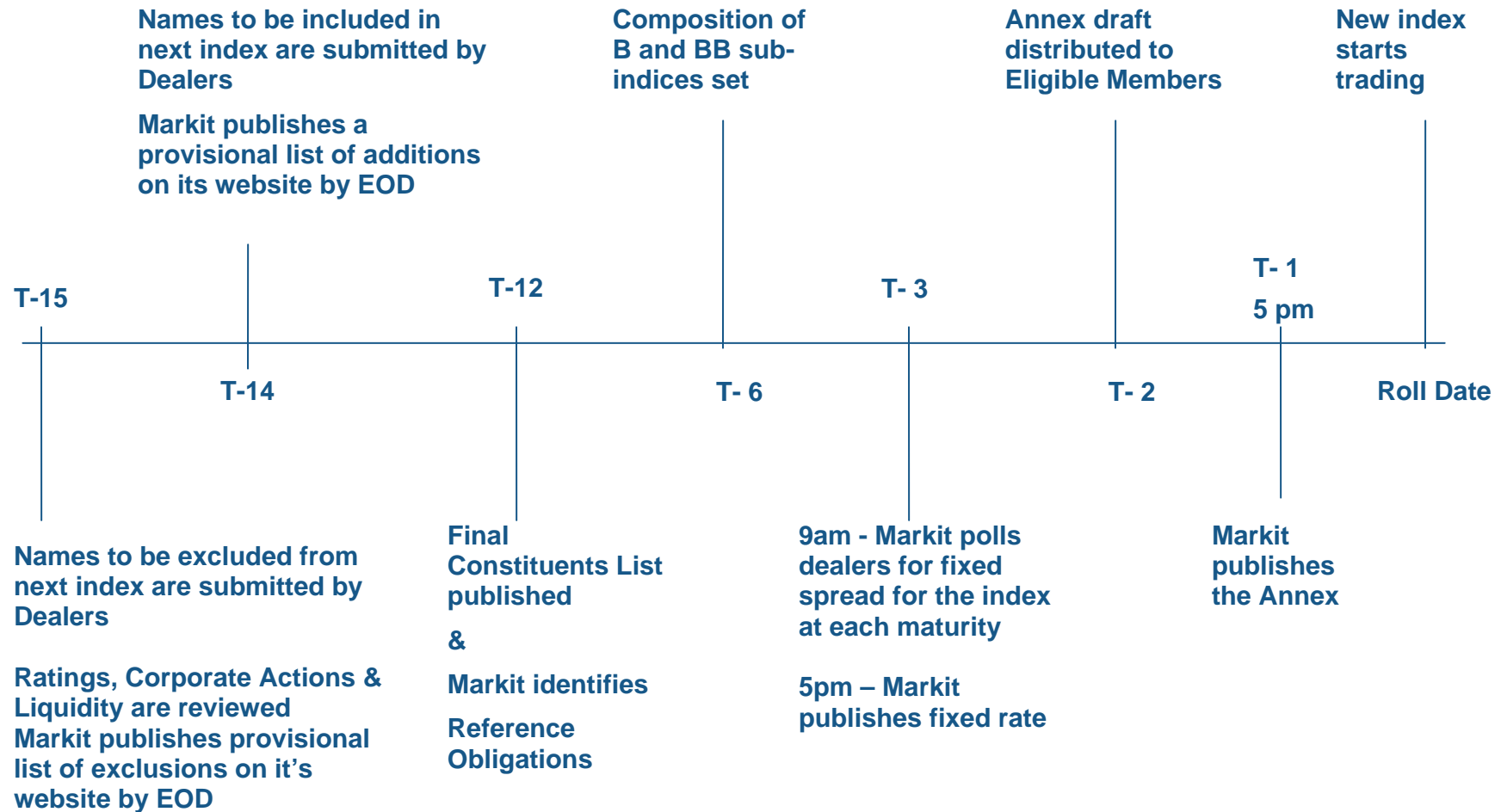
## Appendix 2: Index Roll Timeline

### Markit CDX.NA.IG



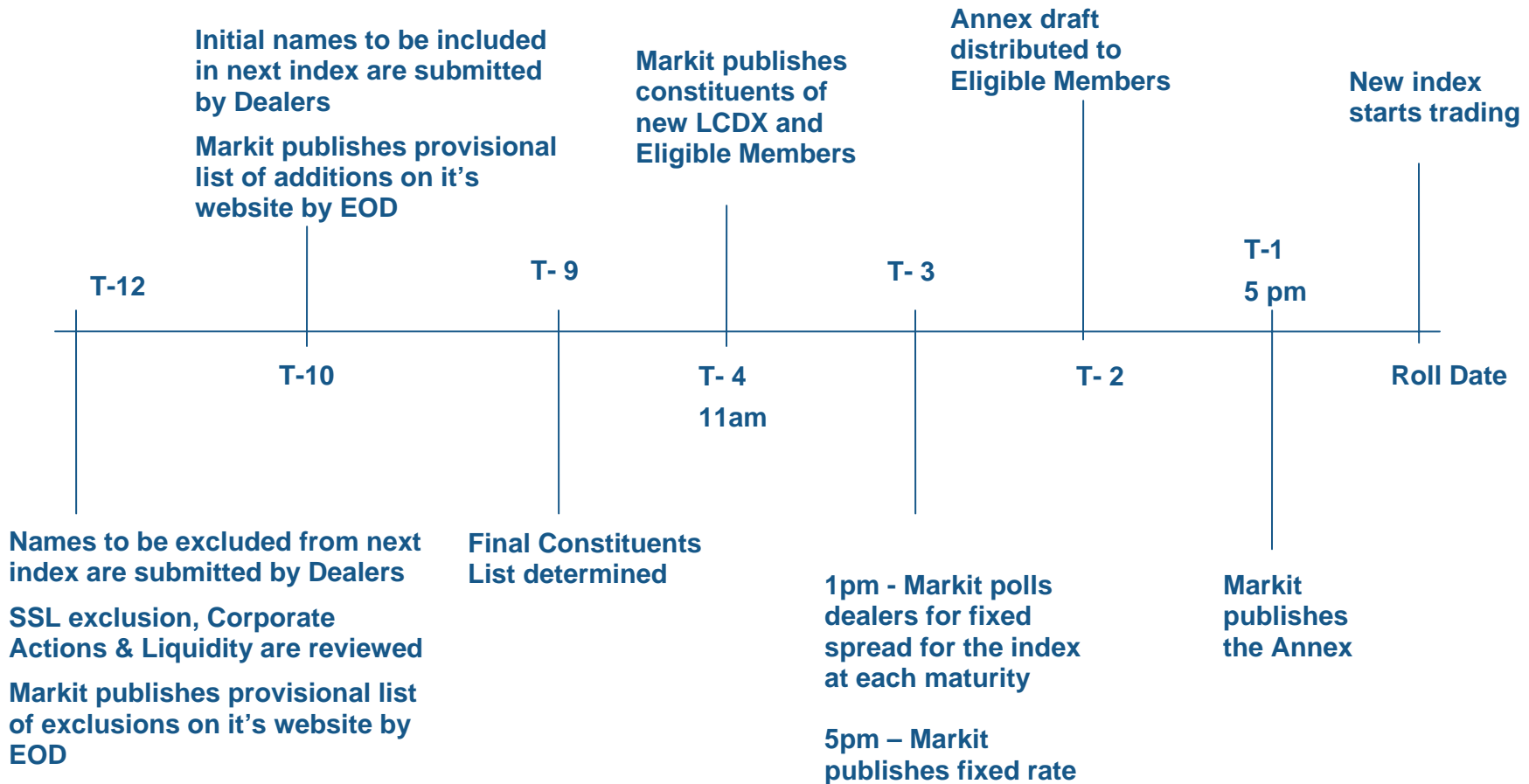
## Appendix 2: Index Roll Timeline

### Markit CDX.NA.HY

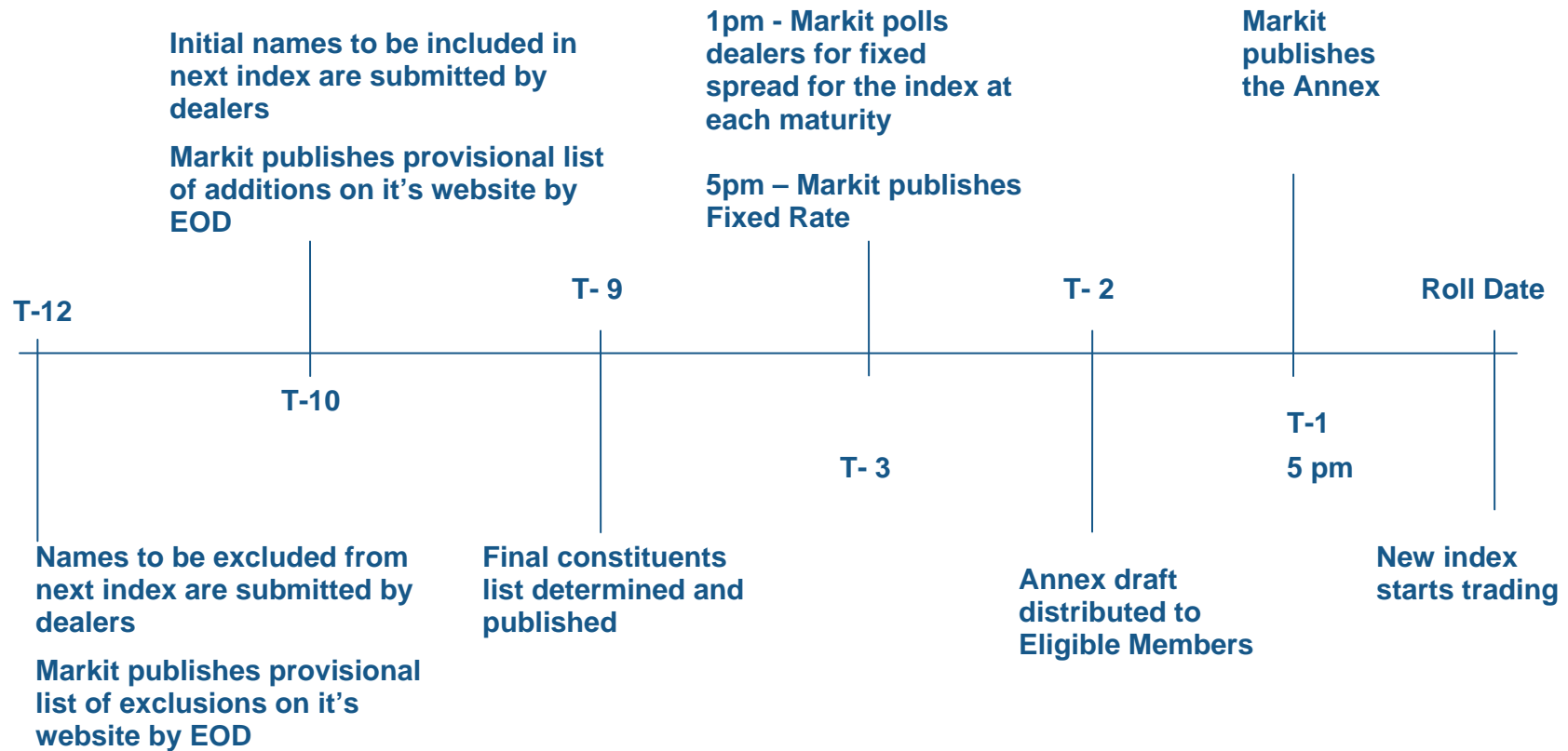


## Appendix 2: Index Roll Timeline

### Markit LCDX

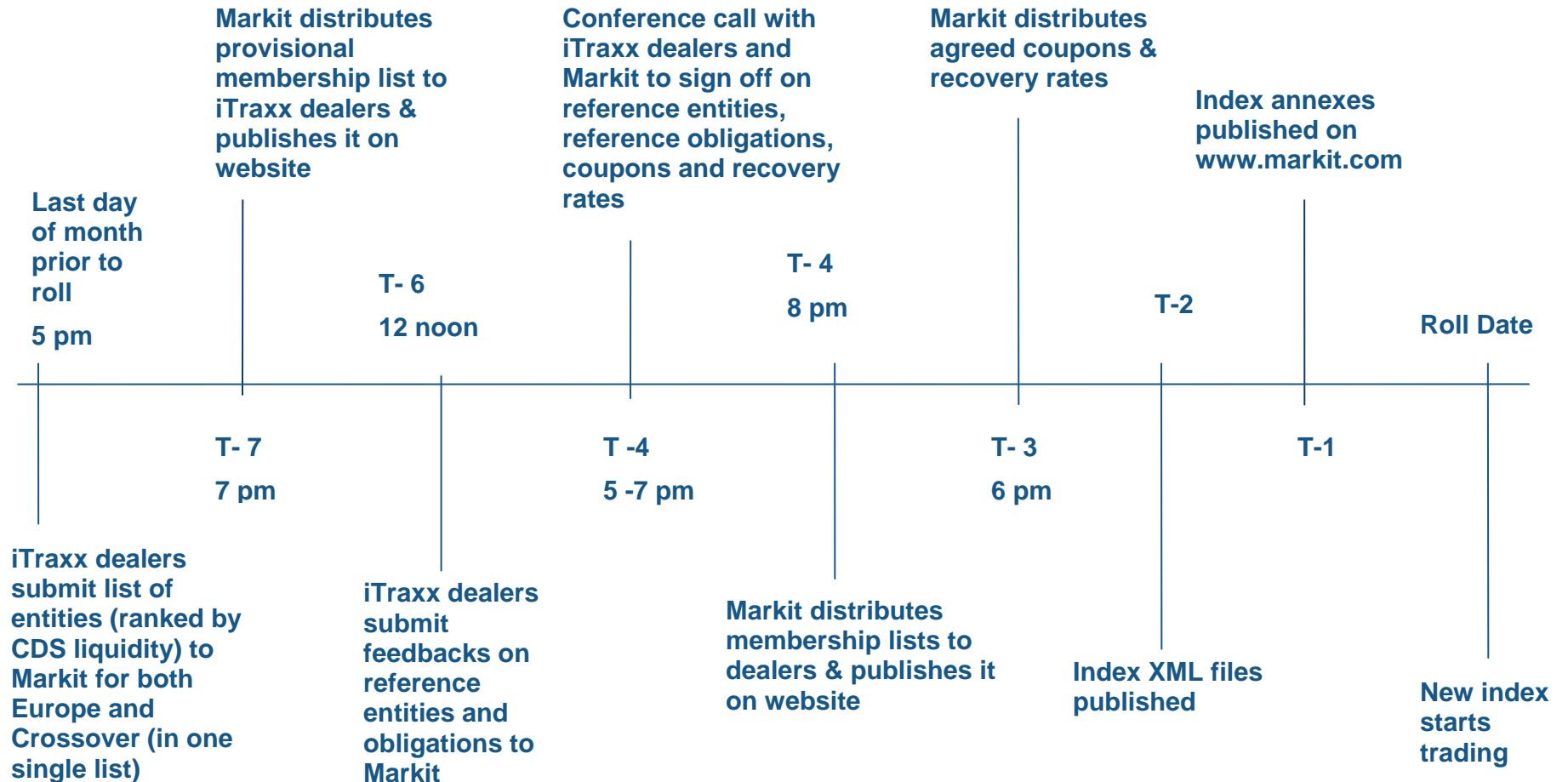


## Appendix 2: Index Roll Timeline Markit MCDX



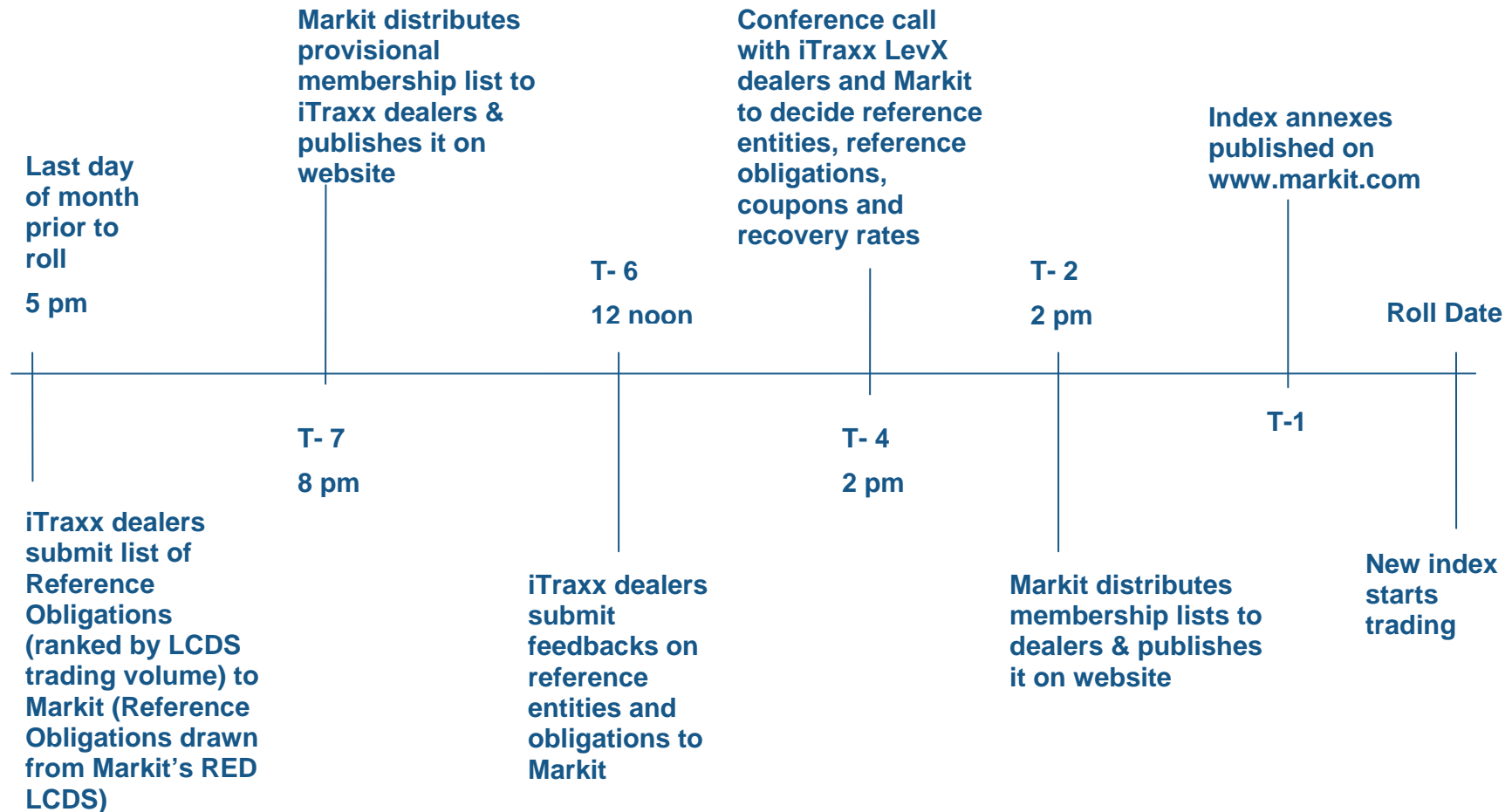
## Appendix 2: Index Roll Timeline

### Markit iTraxx Europe and Crossover



## Appendix 2: Index Roll Timeline

### Markit iTraxx LevX



## Appendix 3: Roadmap to Tranches

### Index Tranches Availability

Tranches are available for the following indices:

Index Name	Tranches
CDX.NA.HY	0-10, 10-15, 15-25, 25-35, 35-100
CDX.NA.IG	0-3, 3-7, 7-15, 15-100
iTraxx Europe	0-3, 3-6, 6-9, 9-12, 12-22, 22-100
iTraxx Europe XO	0-10, 10-15, 15-25, 25-35, 35-100
iTraxx Japan	0-3, 3-6, 6-9, 9-12, 12-22
iTraxx Asia ex-Japan	0-3, 3-6, 6-9, 9-12, 12-22
iTraxx Australia	0-3, 3-6, 6-9, 9-12, 12-22
LCDX	0-5, 5-8, 8-12, 12-15, 15-100

A detailed description of tranches for LCDX can be found on

[http://www.markit.com/assets/en/docs/products/data/indices/credit-index-annexes/LCDX\\_Tranche\\_Presentation.pdf](http://www.markit.com/assets/en/docs/products/data/indices/credit-index-annexes/LCDX_Tranche_Presentation.pdf)

### Standard Tranche Coupons

Markit CDX.HY – Starting with Series 12 all tranches trade with upfront + 500 bps running coupon. Prior to Series 12, the bottom two tranches trade upfront with no running coupons (0-10, 10-15), the next two tranches trade with upfront and a 500 coupon (15-25 25-35), and the super senior tranche trades in running spreads.

Markit CDX.IG – Starting with Series 12 all tranches trade with an upfront + 100 running coupon. Prior to Series 12, the bottom three tranches traded upfront + 500 running coupon, the next three in upfront + 100 bps running coupon.

Markit iTraxx Europe – The bottom two tranches (0-3, 3-6) trade upfront + 500 bps running coupon, the next tranche (6-9) trades upfront + 300 bps running coupon, the next two tranches (9-12, 12-22) trades upfront + 100 bps running coupon while the 22-100 tranche trades with upfront + 25 bps running coupon, for all except Series 12. For Series 12 all tranches trade with an upfront + 100 running coupon.

Markit LCDX – Starting with series 12 all tranches are traded in price + 500 bps running coupon. For previous series the bottom two tranches are quoted in price and no running spreads, and the other tranches are quoted in price and a 500 coupon.

## Appendix 4: Credit Derivatives Glossary

**ABCDS** – A CDS where the underlying is an Asset Backed security.

**Asset Swap Spread** – An asset swap involves a swap of a fixed rate in return for a floating rate. The fixed rate is derived from an asset. The floating rate is composed of a spread over LIBOR (or another floating benchmark). The asset swap spread (gross spread) is derived by valuing a bond's cash flows via the swap curve's implied zero rates. This gross spread is the basis point amount added to the swap curve, which causes a bond's computed value to equal the market price of the bond. It is comparable to a CDS spread in that it is interest rate insensitive.

**Basis Point** –  $1/100^{\text{th}}$  of 1%. 100 basis points = 1%. A common term in fixed income and credit derivatives markets.

**Basket CDS** – A CDS where a group of reference entities are specified in one contract. There are several types of basket CDS including first or  $N^{\text{th}}$ -to-default swaps (where settlement is triggered when the first or  $N^{\text{th}}$  entity defaults) and add-up default swaps where settlement is contingent on all of the entities in the basket.

**Binary CDS** – (Also called a digital default swap) A CDS where the recovery is fixed.

**Calculation agent** – The party responsible for determining when a credit event has occurred, and calculating the amount of payment required by the Protection Seller.

**CDS Spread** – Also called a premium. The amount paid by the Protection Buyer, typically denominated in basis points and paid quarterly.

**Contingent CDS** – A CDS in which settlement requires both a credit event and another trigger (e.g. credit event in another reference entity or specified movement in some market variable). These are rare.

**Credit Default Swap (CDS)** – A credit derivative transaction in which two parties enter into an agreement, whereby one party (known as the Protection Buyer) pays the other party (the Protection Seller) periodic payments for the specified life of the agreement. The Protection Seller makes no payment unless a credit event relating to a predetermined reference asset occurs. If such an event occurs, it triggers the protection seller's settlement obligation, which can be either cash or physical, as more particularly described below.

**Derivative** – A broad term describing financial instruments that “derive” their value from an underlying asset or benchmark. Many derivatives are designed to transfer some form of risk from one party to another and can involve varying amounts of leverage. Included in this broad definition would be: Futures, Options (including caps and floors), Swaps (including CDS and interest rate swaps), Forwards, Floaters and hybrids of the above.

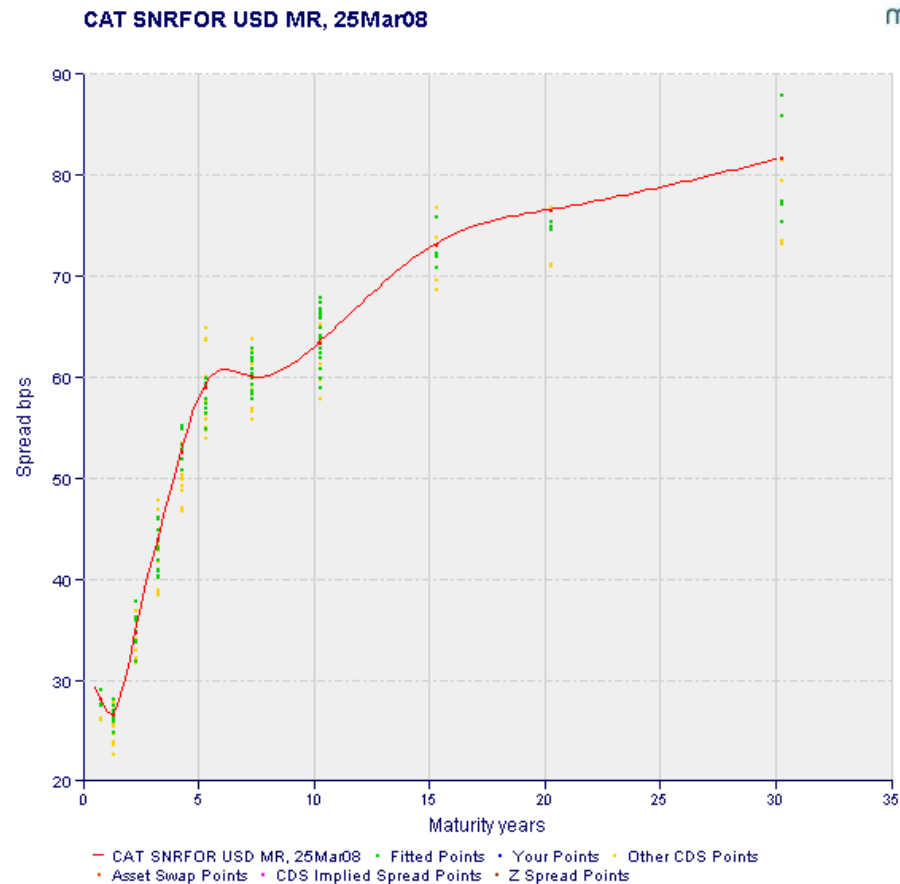
**CFTC** – Commodities and Futures Trading Commission – U.S. regulator charged with oversight of commodities and financial futures and options contracts.

**Credit Event** – This is the event triggering settlement under the CDS contract. Since the original ISDA Agreement in 1999, 6 categories of credit events have been defined:

- **Bankruptcy** – Although the ISDA 2003 Definitions refer to different ways a bankruptcy can occur, the experience has been that the reference entity has filed for relief under bankruptcy law (or equivalent law).
- **Failure to pay** - the reference entity fails to make interest or principal payments when due, after the grace period expires (if grace period is applicable in the trading documentation).
- **Debt restructuring** - the configuration of debt obligations is changed in such a way that the credit holder is unfavorably affected (maturity extended and/or coupon reduced).
- **Obligation default, obligation acceleration, and repudiation/moratorium** – the 2003 ISDA definitions define these three credit events, but they are very rare.

**Credit Spread (Cash)** – It is the spread to be added to a benchmark rate to compensate an investor for taking credit risk on a particular instrument. In general the benchmark rate is LIBOR.

**Credit Spread Curve** – The curve display of the credit spread for a unique reference entity/tier/currency/docclause combination over different tenors. Find below a picture of a Caterpillar credit spread curve from Markit's CDS pricing service:



**Restructuring Clause** - Defines the credit events that trigger settlement. This is a key element as CDS spreads are higher for contracts with a broader range of credit events (i.e. more events can trigger the payment to the Protection Buyer, therefore the CDS protection is more valuable), and/or fewer restrictions on the Protection Buyer's settlement obligations (i.e. the more flexibility a Protection Buyer has to deliver a bond, the more valuable the CDS contract). Variations include:

**CR** – Complete Restructuring (a.k.a. full restructuring, **FR**): Any restructuring event qualifies as a credit event and any bond of maturity up to 30 years is deliverable. This is standard for EM and MCDX trades. It was the standard for IG and HY trades but was replaced by MR in 2001.

**MR** – Modified Restructuring: Restructuring agreements count as a credit event, but the deliverable obligation against the contract has to be limited to those with a maturity of 30 months or less after the termination date of the CDS contract or the reference obligation that is restructured (regardless of maturity). Generally used for IG trades in the US. This doc-clause started in 2001.

**MM** – “Modified-Modified” restructuring: In 2003, market participants in Europe found the 30 months limit on deliverable bonds to be too restrictive, so MM was introduced with a maturity limit of 60 months for restructured obligations and 30 months for all other obligations. This is used mostly in Europe.

**XR** – No Restructuring (a.k.a. **NR**): All restructuring events are excluded as trigger events. This is prevalent in the high yield market.

**DTCC** – Depository Trust & Clearing Corporation provides clearance, settlement and information services for equities, corporate and municipal bonds, government and mortgage-backed securities and over-the-counter credit derivatives. The credit default swaps matching and confirmation service provides automated, real-time matching and confirmation for standard single reference entity credit default swaps (including North American, European, Asian corporate credits, and sovereign credits), as well as credit default swap indices. The automated system currently supports new trades, full terminations, partial terminations and assignments (i.e., the assignment of the contract from one party to another, also called novation) through a fully automated environment.

**Entity Pair** – Refers to the combinations of reference entities and reference obligations, which are described by the full 9 digit Markit RED™ code. One reference obligation may have more than one Entity Pair. Entity Pairs also identify the Tier (see below). For each Tier, there is a ‘Preferred’ Entity Pair, defined as the most liquid. Here is an example:

Pair CLIP	Entity Name	Ticker	Entity CLIP	Preferred	Tier	Jurisdiction	Role	Record	Maturity	ISIN	CUSIP
15DA35AD9	Caterpillar Inc.	CAT	15DA35		SNRFOR	Delaware (US)	Issuer	19Jun07	01May31	US149123BJ96	149123BJ9
15DA35AC1	Caterpillar Inc.	CAT	15DA35	Y	SNRFOR	Delaware (US)	Issuer	19Jun07	15Aug16	US149123BM26	149123BM2
15DA35AA5	Caterpillar Inc.	CAT	15DA35		SNRFOR	Delaware (US)	Issuer	19Jun07	01May11	US149123BH31	149123BH3
15DA35AB3	Caterpillar Inc.	CAT	15DA35		SNRFOR	Delaware (US)	Issuer	19Jun07	15Sep09	US149123BG57	149123BG5

**ISDA** – The International Swaps and Derivatives Association is the global trade association representing participants in the privately negotiated derivatives industry, a business covering swaps and options across all asset classes (interest rate, currency, commodity and energy, credit and equity). ISDA was chartered in 1985, and today numbers over 670 member institutions from 50 countries on six continents. The membership includes associated service providers and consultants.

**LCDS** – A CDS contract where the underlying is a syndicated loan, senior secured in the capital structure.

**LIBOR** – London Interbank Offered Rate – An interest rate paid by high-rated borrowers, such as international banks. Somewhat of an international equivalent to the US Fed Funds rate, it is used as a reference rate for many transactions, including credit derivatives.

**Long Credit** – Refers to the position of the CDS Protection Seller who is exposed to the credit risk and who receives periodic payments from the Protection Buyer.

**Markit CDX** – Markit credit indexes focused on North America. High Grade, High Yield, and Emerging Markets are the three major sub-indexes.

**Markit iTraxx** – European and Asian CDS indices owned by Markit. iTraxx represents the most liquid part of the CDS market for Asia and Europe.

**Markit RED™** – Markit's Reference Entity Database of approximately 3000 reference entities forming the basis of the RED code identifiers for CDS.

**Markit iTraxx SovX** – Global family of sovereign CDS indices owned by Markit.

**MCDS** – A CDS contract where the underlying is a municipality, and the reference obligation is either a Revenue Liability, a General Obligation Liability, a Moral Obligation Liability or a Full Faith and Credit Liability.

**Notional Principal** – The quantity of the underlying asset or benchmark to which the derivative contract applies.

**Present Value** – An asset valuation method, which maps future cash flows from an asset and discounts the future cash flows by an appropriate discount rate.

**Protection Buyer** – This is the party to a CDS contract which pays a premium for protection in case a credit event occurs. The Protection Buyer can also speculate that the cost of protection will rise and profit from selling the CDS contract at a higher price than was paid.

**Protection Seller** – This is the party to a CDS contract receiving the premium payments, and who is exposed to the credit risk of the reference entity.

**Quorum** – Quorum represents a 75% majority of members when making decisions in regards to a Markit credit index.

**Recovery rate** – Estimate of percentage of par value bondholders will receive after a credit event. CDS for investment grade bonds generally assume a 40% recovery rate. However, CDS for lower rated bonds are more dynamic and often reflect lower estimated recovery rates.

**RED Code** - Industry standard identifier for CDS contracts. They are 9 character CUSIP-like codes where the first 6 characters refer to the reference entity, and the last 3 refer to the reference obligation. RED codes are used by DTCC to confirm CDS trades on the DTCC Deriv/SERV platform.

**Reference Entity** – Refers to the legal entity that is the subject of a CDS contract. The reference entity can be the issuer or the guarantor of the debt.

**Reference Obligation** – The specific bond (debt obligation) that is referenced in the CDS contract

**Restructuring Credit Event** – One of the types of credit events (defined above). It is a “soft” event, in which the loss to the owner of the reference obligation is not obvious. In addition, restructuring often retains a complex maturity structure, so that debt of different maturities may remain outstanding with significant differences in value.

**Settlement** – What occurs in the case of a credit event. Settlement can be cash or physical delivery, depending on the terms of the contract. CDS have most often specified physical delivery, but in the last three years, auctions have been held and cash settlement is becoming the standard.

**Short Credit** – This is the credit risk position of the Protection Buyer, who sold the credit risk of a bond to the Protection Seller.

**Spread** – A generic term describing the difference, generally in basis points, between the levels of two reference values. For example, it can be a dealer's bid-ask spread or a yield spread (the difference between yields on different debt instruments).

**Swap** – An agreement between two parties to exchange future cash flows.

**Tenor** – Refers to the duration of a Credit Default Swap contract. Most CDS have been written with 5 years terms, and this remains the most liquid and frequently quoted part of the credit curve; however other tenors, such as 10 years, are becoming more common.

**Tier** – Refers to one of four levels of debt in the capital structure of the reference entities. Each tier represents a different level of seniority or preference in liquidation or bankruptcy. There will generally be different levels for CDS protection for each of the tiers.

- Senior
- Subordinated
- Junior
- Preferred

## Appendix 5: Index Rules

### Markit iTraxx Rules

#### Markit iTraxx Europe

The Markit iTraxx® Europe index comprises 125 investment grade rated European entities.

#### *Liquidity Poll*

- Each market maker submits to Markit a list of entities based on the following criteria:
  - Incorporated in Europe, where 'Europe' means EU and EFTA member countries.
  - Those entities with the highest single name CDS trading volumes (the "most liquid" entities), as measured over the previous 6 months. The list is ranked according to trading volumes, i.e. the entity with the highest trading volume is ranked #1.
  - Volumes for financial entities are based on Subordinated (Lower Tier 2) transactions only.
  - Internal transactions (e.g. those with an internal proprietary trading desk) are excluded from the volume statistics.
  - Volumes for entities that fall under the same ticker, but trade separately in the CDS market, are summed to arrive at an overall volume for each ticker. The most liquid entity under the ticker qualifies for index membership.

#### *Membership determination*

- All entities must be rated investment grade by Fitch, Moody's or S&P. Entities with an Entity Rating of BBB-/Baa3/BBB- (Fitch/Moody's/S&P) with negative outlook or below are excluded.
- If it is confirmed that one entity has more than 50% of the voting rights of another entity and both trade under different tickers, then the most liquid entity qualifies for index membership.
- Affiliates of an entity included in the index, already guaranteed by that entity, are eliminated. Non-guaranteed wholly-owned subsidiaries of an entity are eligible.
- Each entity is assigned to its appropriate iTraxx® sector and is ranked within its sector by averaging the liquidity ranking of the market makers, i.e. the entity with the highest liquidity is ranked #1.
- Index composition is initially set to be the same as the previous series. Ineligible entities (downgraded, defaulted, changed sector or merged) are excluded. Any entities in the top 50% of the number of entities in that sector not already in the index are added. Entities ranked lower than 125% of the number of entities in the sector are removed and replaced by the next most liquid entity not yet in the index. Entities ranked below 150 in the overall master list that includes all sectors, are removed and replaced by the most liquid entity in that sector that is not yet in the index. If the replacement is less liquid than the entity to be dropped, no change is made.
- The final index comprises 125 entities, and is constructed by selecting the highest ranking entities in each sector below, subject to the restrictions described below:
  - 30 Autos & Industrials
  - 30 Consumers
  - 20 Energy
  - 20 TMT
  - 25 Financials (separate Senior & Subordinated indices)

## Markit iTraxx HiVol

The Markit iTraxx<sup>®</sup> HiVol index comprises 30 entities with the widest 5-year credit default swap spreads from the Markit iTraxx<sup>®</sup> Europe Non-Financials index. The average of 5-year mid-spreads, published by Markit, calculated over last 10 London Business Days of the month prior to roll date determine eligibility.

## Markit iTraxx Crossover

The Markit iTraxx<sup>®</sup> Crossover index comprises 50 European entities; this number may be increased from time to time at an index roll upon reasonable notice if warranted by market conditions.

### *Liquidity Poll*

- Each market maker submits to Markit a list of entities based on the following criteria:
  - Incorporated in Europe, where 'Europe' means EU and EFTA member countries.
  - Both financial and non-financial entities are eligible.
  - Those entities with the highest CDS trading volume, as measured over the previous 6 months. The list is ranked according to trading volumes, i.e. the entity with the highest trading volume is ranked #1.
  - Internal transactions (e.g. those with an internal proprietary trading desk) are excluded from the volume statistics.
  - Volumes for entities that fall under the same ticker, but trade separately in the CDS market, are summed to arrive at an overall volume for each ticker. The most liquid entity under the ticker qualifies for index membership.

### *Membership determination*

- Entities with an Entity Rating of BBB-/Baa3/BBB- (Fitch/Moody's/S&P) with stable outlook or higher are excluded. Entities not rated by any of Fitch, Moody's or S&P are eligible.
- Only entities that have issued or guaranteed more than €100 million publicly traded debt securities (which shall be taken to exclude loans and equities) at close of business in London on the fifth London Business Day preceding the roll date in a currency that is deliverable into a European CDS contract will be included. For new issues of the relevant entities, the settlement date of the issue will be considered. Private placements will not be considered.
- If it is confirmed that one entity has more than 50% of the voting rights of another entity (and both trade under different tickers), then the more liquid entity qualifies for index membership.
- Affiliates of an entity included in the index, already guaranteed by that entity, are eliminated. Non-guaranteed wholly-owned subsidiaries of an entity are eligible.
- An entity is eligible if it has an average spread at least twice the average spread of the constituents of the iTraxx<sup>®</sup> Non-Financial Index, as determined for the next index roll, with a maximum of 50% upfront plus 500 bps running spread. Average 5-year mid-spreads published by Markit for the last 10 London Business Days of the month prior to roll date determine eligibility (e.g. if the average spread of the entities in the iTraxx<sup>®</sup> Non-Financial Index effective 20 March was 40 bps over the last 10 London Business Days in February, then only those entities whose average spread over the last 10 London Business Days in February was 80 bps or higher qualify).
- The final portfolio comprises the 45 highest ranking entities.

## Markit iTraxx Japan

The Markit iTraxx® Japan index comprises 50 investment grade Japanese entities.

### *Liquidity Poll*

- Each market maker submits to Markit a list of the most liquid traded entities:
  - Trading volumes of each entity are aggregated by market makers
  - Trading volumes of the past six months are used
  - For bank names, both subordinated and senior volumes are combined
  - All internal transactions are excluded from the volume statistics, e.g. those with an internal prop desk
  - Markit aggregates the volume ranked lists from market makers to compute final liquidity ranking for each entity.

### *Membership determination*

- The iTraxx® Japan main index comprises 50 investment grade rated Japanese entities. Fitch, Moody's, R&I, and S&P ratings are considered. If an entity is rated by two or more agencies, the highest rating is used.
- The top 50 entities with a Nikkei industry cap of 10 are selected from the volume ranked list to form iTraxx Japan.
- At the time of an index roll, index composition is initially set to be the same as the previous series. Existing constituents will be excluded from the new index if they now rank #76 or lower. They are replaced by the most liquid new entities. New entities ranked #25 or higher are included automatically, replacing the least liquid entities of the updated overall 50-name list.

## Markit iTraxx Asia ex-Japan

The Markit iTraxx® Asia ex-Japan IG index comprises 50 investment grade entities, the iTraxx® Asia ex-Japan HY index comprises 20 non-investment grade entities.

### Liquidity Poll

- Each market maker submits to Markit two lists for each of the Markit iTraxx Asia ex-Japan IG and HY indices -----Exclusion List and Inclusion List
- In the first stage, Markit requests Exclusion Lists corresponding to the IG and HY indices.
- Exclusion Lists comprise of the entities market makers would like to remove from the existing indices on the basis of trading volumes over the past 12 months.
- Markit aggregates all votes from the Exclusion Lists. All entities securing more than 50% of the votes from the market makers (among all market makers sending their lists to Markit), are excluded from the respective index.
- In addition, entities for which a rating change has occurred and no longer qualify for the respective index are removed.<sup>1</sup>
- In the second stage depending on the number of exclusions from the IG and HY indices, Markit requests dealers to submit Inclusion Lists for each of the indices.
- Inclusion Lists comprise of the entities market makers would like to include in the new series of the respective indices on the basis of trading volumes over the past 12 months.
- Markit aggregates all votes from the Inclusion Lists. All entities in this list are ranked according to the number of votes in descending order.
- Entities are selected from the sorted Inclusion Lists for membership in the new series of the index till the total number of names in the IG index and HY index are 50 and 20 respectively.

### Membership determination

#### Markit iTraxx Asia ex-Japan IG index

- Markit aggregates the votes from Exclusion and Inclusion Lists of the market makers to compute a provisional membership list to be confirmed on the dealer roll call.
- All entities must be rated investment grade. Entities rated below BBB-/ Baa3 are excluded. Fitch, Moody's and S&P ratings are considered. If an entity is rated by two or more agencies, the lowest rating is considered.

#### Markit iTraxx Asia ex-Japan HY index

- Markit aggregates the votes from Exclusion and Inclusion Lists of the market makers to compute a provisional membership list to be confirmed on the dealer roll call.
- Entities rated BBB-/ Baa3 or higher are excluded. Fitch, Moody's and S&P ratings are considered. If an entity is rated by two or more agencies, the lowest rating is considered.

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<sup>1</sup> Please note that removal of an entity from one index due to rating change does not imply that it would enter another index unless market makers vote for it in the Inclusion Lists. For example, excluding an entity from the IG index due to rating downgrade does not automatically make it a member of the HY index. This entity needs to be in the Inclusion List for the HY index and ranked appropriately for inclusion in the HY index.

## Markit iTraxx Australia

The Markit iTraxx® Australia index comprises 25 investment grade rated entities.

### *Liquidity Poll*

- Each market maker submits to Markit a list of the most liquid traded entities based on the following criteria:
  - Trading volumes of each entity are aggregated by market makers
  - Trading volumes of the past 12 months are used
  - For bank names, both subordinated and senior volumes are combined
  - All internal transactions are excluded from the volume statistics, e.g. those with an internal prop desk

### *Membership determination*

- The entity, the parent company of the entity or a subsidiary of the entity has to be listed on the Australian Stock Exchange.
- All entities must be rated investment grade by Fitch, Moody's or S&P. This translates into a minimum rating of Baa3 from Moody's and BBB- from Fitch or S&P. If an entity is rated by two or more agencies, the lowest rating is used.
- Markit aggregates the volume ranked lists from market makers to compute final liquidity ranking for each entity. The top 25 most liquid entities are selected from the volume ranked list to comprise iTraxx Australia
- No more than 5 bank entities may be included in the index.

## Markit iTraxx SovX Rules

### Markit iTraxx SovX Western Europe Index

The Markit iTraxx SovX Western Europe is a tradable index composed of 15 equally weighted sovereign constituents from an 18 name universe of European countries that are traded on Western European documentation.

The constituents are the 15 countries with the largest sum of weekly trading activity (as measured in the DTCC Trade Information Warehouse) over the last six months preceding the last Friday of the month prior to the roll date. If there are names that have the same sum of net weekly trading activity, a dealer poll will be held to determine which entity will be included in the index. The 18 name universe comprises Eurozone countries that are traded on Western European documentation (Austria, Belgium, Cyprus, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Malta, Netherlands, Portugal and Spain) plus Denmark, Norway, Sweden and United Kingdom.

The list will be published on [www.markit.com](http://www.markit.com) after selection. A new series will roll every 6 months. The index will be quoted in spread terms.

### Markit iTraxx SovX CEEMEA Index

The Markit iTraxx SovX CEEMEA Index is a tradable index composed of the top 15 most liquid sovereign entities from Central & Eastern European, Middle Eastern and African countries that trade on Emerging Markets Documentation.

The constituents are 15 countries from the full universe of 26 CEEMEA countries comprising Abu Dhabi, Bahrain, Bulgaria, Croatia, Czech Republic, Dubai, Estonia, Hungary, Israel, Kazakhstan, Latvia, Lebanon, Lithuania, Morocco, Poland, Qatar, Romania, Russian Federation, Saudi Arabia, Serbia and Montenegro, Slovakia, Slovenia, South Africa, Tunisia, Turkey and Ukraine. The number of constituents is set at 15 but may be changed from time to time at an index roll upon reasonable notice.

The constituents of the index are decided using the following methodology:

- Markit sends to all Markit iTraxx SovX CEEMEA market makers the list of entities from the 26 name universe for which weekly trading activity data is available as measured in the DTCC Trade Information Warehouse over the last six months preceding the last Friday of the month prior to the roll date. The sum of weekly trading activity levels over the last six months preceding the last Friday of the month prior to the roll date is also sent.
- All dealers submit the 15 entities from this list which they would prefer to be in the index. Liquidity will be the main driving factor for the choices.
- The list of 15 entities that receive the maximum number of votes will be included in the index.
- In case of ties, further polling rounds will be conducted

The weights for the entities in the index are fixed using the following methodology:

- All Markit iTraxx SovX CEEMEA market makers submits to Markit a list of weights for the entities in the index
- For each entity, the initial weight is calculated as the median of the weight contributions from the dealers, rounded off to the closest whole numbers.
- If the Initial Weights sum to 100%, then these are the Final Weights of the constituents.
- If the Initial Weights for all the entities do not add up to 100%

- Markit suggests few possible weighting schemes for the entities so that the weights add up to 100%.
- Dealers vote on their most preferred weights allocation.
- The weighting scheme which receives the maximum number of votes is the Final Weights.

The list will be published on [www.markit.com](http://www.markit.com) after selection. A new series will roll every 6 months. Each series will have a fixed coupon of 100 and a recovery rate of 25%.

### Markit iTraxx SovX Asia Pacific Index

The Markit iTraxx SovX Asia Pacific Index is a tradable index composed of the top 10 most liquid sovereign entities from the Asia Pacific region.

The constituents are the 10 countries with the largest sum of weekly trading activity (as measured in the DTCC Trade Information Warehouse) over the last six months preceding the last Friday of the month prior to the roll date. If there are names that have the same sum of net weekly trading activity, a dealer poll will be held to determine which entity will be included in the index. The 11 name universe of Asia Pacific countries comprises Australia, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Thailand, and Vietnam. The number of constituents is set at 10 but may be changed from time to time at an index roll upon reasonable notice.

The list will be published on [www.markit.com](http://www.markit.com) after selection. A new series will roll every 6 months. The index will be quoted in spread terms.

### Markit iTraxx SovX Global Liquid Investment Grade Index

The Markit iTraxx SovX Global Liquid Investment Grade Index is composed of a variable number of constituents based on the most liquid high-grade global sovereign entities.

The regional breakdown of the Markit SovX Global Liquid Investment Grade Index is:

Region	Min. # of constituents	Max. # of constituents
Asia Pacific	2	5
Eastern Europe	2	5
Latin America	2	5
Middle East & Africa	2	5
North America	1	2
Western Europe	2	5

- Selection Criteria
  - All entities must be rated investment grade. Entities rated below BBB-/ Baa3 are excluded. Fitch, Moody's and S&P ratings are considered. If an entity is rated by two or more agencies, the lowest rating is considered.
  - Rating changes that could affect the index membership are taken into account if Markit is notified prior to 5:00 pm London time on the last London Business Day of the month prior to the roll date.
  - The sum of the weekly trading activity -- as measured in the DTCC Trade Information Warehouse over the last six months preceding the last Friday of the month prior to the roll date -- is used for selection.

- If there are more than the maximum required constituents in a region, Markit will select the entities with the largest net weekly trading activity in the Trade Information Warehouse.
- If there are fewer than the minimum required constituents in a region, Markit will select the entities with the higher number of contributors.

### Markit iTraxx SovX G7 Index

The Markit iTraxx SovX G7 Index is composed of the top industrialized countries in the world. The constituents are equally weighted. Although the index is starting as a theoretical benchmark index, it will be portable to a tradable index.

The constituents are selected from the universe of the G7 states (Canada, France, Germany, Italy, Japan, the United Kingdom and the United States).

- Selection Criteria
  - An entity must be part of the top 500 entities in terms of the sum of the net weekly trading activity as measured in the DTCC Trade Information Warehouse over the last six months preceding the last Friday of the month prior to the roll date, to be included.

### Markit iTraxx SovX BRIC Index

The Markit iTraxx SovX BRIC Index is composed of the BRIC countries. The constituents are equally weighted. Although the index is starting as a theoretical benchmark index, it will be portable to a tradable index.

The constituents are selected from the universe of the BRIC countries (Brazil, Russia, India, and China).

- Selection Criteria
  - An entity must be part of the Top 100 entities in terms of the sum of the net weekly trading activity as measured in the DTCC Trade Information Warehouse over the last six months preceding the last Friday of the month prior to the roll date, to be included.

## Markit iTraxx LevX Rules

### Markit iTraxx LevX

- The Markit iTraxx LevX Senior Index comprises the 40 most liquid “1st lien” Reference Obligations traded on the European Leveraged Loan CDS (LCDS) market.
- For the purposes of determining whether a Reference Obligation qualifies for inclusion in the relevant Markit iTraxx LevX Index, structural subordination shall be taken into account.
- The number of Reference Obligations in the Markit iTraxx LevX Index may be adjusted from time to time at an index roll upon reasonable notice if warranted by market conditions, subject to vote by Eligible LevX Market Makers in accordance with the procedures below.

### *Liquidity Poll*

The initial two series of the Markit iTraxx LevX Index were selected by a Market Maker poll and were not necessarily linked to LCDS trading volumes. In relation to each subsequent Markit iTraxx LevX Index series each Market Maker will submit to Markit a separate list of single-name LCDS trading volumes (denominated in the currency traded) for use in the selection of the following series of the Markit iTraxx LevX Index. If the LCDS volumes are submitted by Market Makers in a currency other than Euro, the end-of-day currency rates on the last Business Day of the month prior to roll date published by WM Company will be used to determine its equivalent amount in Euro. Markit will select the index constituents based on the following criteria:

- The Reference Obligations and other relevant information are obtained from the Markit RED LCDS Database in conjunction with input from the Market Makers.
- Reference Obligations with the highest LCDS trading volumes, as measured over the previous 6 months.
- Internal transactions (e.g., those with an internal proprietary desk) are excluded from the volume statistics. The Reference Obligations on the list will be identified by the relevant unique identifier.

### *Membership determination*

- The minimum qualifying size of a Reference Obligation for index membership is €500 million (or equivalent) for the Markit iTraxx LevX Senior Index (constituting 1st lien tranches only). Such qualifying size will be measured on a lien-by-lien basis at close of business five Business Days before the roll date. If the Reference Obligation is not denominated in Euro, the end-of-day currency rates on the last Business Day of the month prior to roll date published by WM Company will be used to determine its equivalent amount in Euro.
- Each constituent must be a Secured Reference Obligation (as defined in the LevX Standard Terms).
- If it is confirmed that two or more Reference Obligations are related to the same or a related obligor, then the most liquid Reference Obligation qualifies for index membership. A related obligor in this context is an obligor that has more than 50% of the voting rights of another obligor. Affiliates of an obligor included in the index, already guaranteed by that obligor, are eliminated.