4-1-2013

Markit Credit Indices A Primer

IHS Markit Ltd.

Recommended Citation

IHS Markit Ltd., "Markit Credit Indices A Primer" (2013). *YPFS Documents*. 505.
https://elischolar.library.yale.edu/ypfs-documents/505

Markit Credit Indices
A Primer

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.

Contents

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:

```
┌────────────────┐   Fixed Quarterly Cash Payments   ┌────────────────┐
│    Default     │   (basis points per annum)        │    Default     │
│   Protection   │ ────────────────────────────────► │   Protection   │
│     Buyer      │                                    │     Seller     │
└────────────────┘                                    └────────────────┘
```

4

In case of Credit Event

	Reference Obligation at x% of par + Accrued CDS Interest	
Default Protection Buyer	→ ←	**Default Protection Seller**
	100% of par of the underlying Reference Obligation	
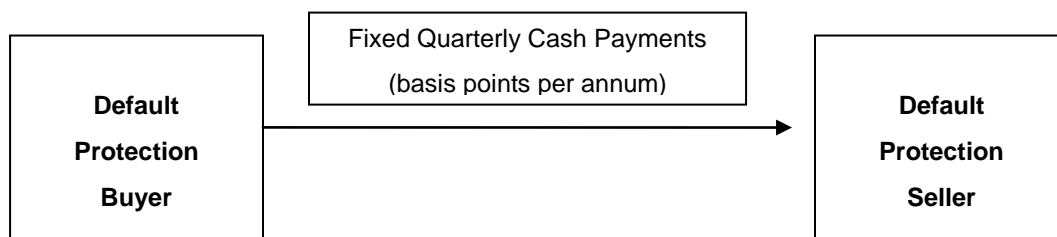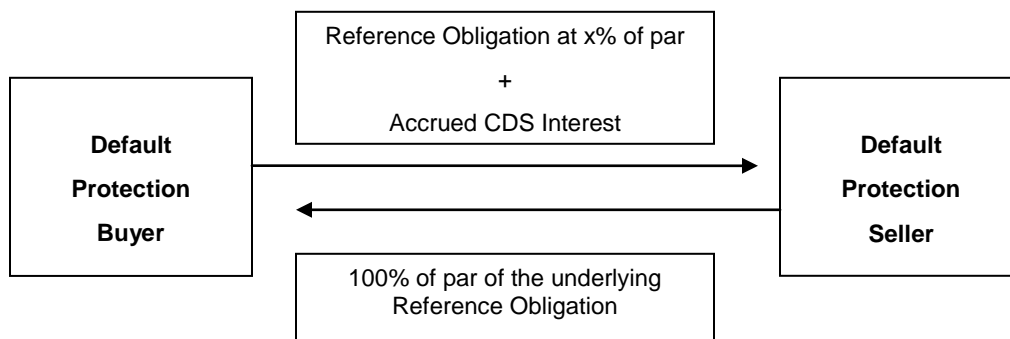
The standard settlement mechanism for Loan CDS and Corporate CDS is cash settlement via a Credit Event Auction. The difference with the example above is that instead of exchanging a cash instrument for par, the exchange is a cash amount equal to par minus the recovery set in the auction. Further details 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 usually 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[th]2009, and for European Corporates and Sovereigns on June 20[th]2009, 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. The North American LCDS contract trades with a fixed coupon of 0/100/250/500 as of April 5th 2010. There are continuing commitments for 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, MarkitSERV, a joint venture between Markit and DTCC, allows buyside and sellside firms to communicate and confirm trade details with counterparties..

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 if credit derivative indices.

Differences between Bond and Loan-only CDS Indices

	Bonds	**Loans**
Deliverable	Bonds or Loans	Loans only
Cancellability	CDS trade is not cancellable in cases where all the underlying debt is called or matures	Legacy LCDS can be terminated early if an issuer repays all its secured debt without issuing new relevant debt. Bullet LCDS cannot be early terminated due to repayment.
Valuation	Duration is not adjusted for cancellability	Duration is not adjusted for cancellability
Credit Event	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**
Roll Date	March and September 20th	April and October 3rd
Region	Europe	North America
Reference	Reference Obligation	Reference Entity
Currency	EUR	USD or EUR
Credit Event	Bankruptcy, Failure to Pay, Restructuring	Bankruptcy, Failure to Pay
Deliverables	LevX only includes Senior (1st Lien) loans – the Sub index (2nd/ 3rd Lien) is not rolled anymore	LCDX only includes 1st Lien loans
Loan Criteria Eligibility	Senior – min EUR500 million deal	Loans must be on the Markit Syndicated Secured List *
Entities	Senior – 40 names	100 names
Business Days	London and TARGET Settlement Day	USD – New York and London EUR – London and TARGET Settlement Day

8

* 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

	iTraxx	CDX
Region	Europe, Asia and Emerging Markets	North America and Emerging Markets
Credit Event	Bankruptcy, Failure to Pay, Modified Restructuring	Bankruptcy, Failure to Pay
Currency	Europe – EUR Japan – JPY Asia ex-Japan – USD Australia – USD	USD, EUR
Reference Entities	A liquidity poll decides inclusions and exclusions	A rules-based approach, that takes into account liquidity (as well as sectors and ratings for high yield names), determines inclusions and exclusions
Business Days	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 CDX 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 indices, liquidity lists are formed from the trading volumes from the DTCC TIW . Markit applies the index rules for the respective indices to determine the index constituents. Following is a summary of the process:

– iTraxx Europe main: Final Index comprises 30 Autos & Industrials, 30 Consumers, 20 Energy, 20 TMT, 25 Financials

– iTraxx Europe Crossover index: The highest ranked non investment grade entities from the liquidity lists which satisfy the minimum and maximum spread criteria and also have sufficient amount of outstanding debt.

- For the Markit iTraxx Asia Pacific indices, liquidity lists are submitted by dealers to Markit. Markit aggregates the liquidity lists and applies the index rules for the respective indices to determine the index constituents.

- For the Markit CDX Investment Grade and High Yield indices, a rules-based approach is used for determining new constituents during a roll.

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/en/products/data/indices/credit-and-loan-indices/cdx/cdx.page?

Markit iTraxx Europe, Asia and CEEMEA

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?

Markit MCDX

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

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.

Spread	CDX (IG, HVOL), iTraxx (Europe, Japan, Asia ex-Japan, Australia), SovX, MCDX
Price	CDX (HY, EM), 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 with a fixed coupon that is paid quarterly (except for series of Markit CDX EM with an effective date prior to September 2009, which pay the coupon semi-annually). The coupon is paid by the buyer of protection on the index, who is in effect the seller of the index and is taking a short position. The protection seller, or buyer of the index, receives this quarterly coupon. Upfront payments are made at initiation and close of the trade to reflect the change in price of the index. The indices are quoted on a clean basis, meaning that accruals are not taken into account for pricing purposes.

Example:
The index launches with a price of 100 on September 20th, and a fixed coupon of 60. Investor A buys $10,000,000 notional protection on the index on November 30th, 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.

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

Net outflow = $121,166.67

December 20th – Investor A pays the fixed coupon.

Cash outflow = 0.006 * 10,000,000 * 91/360 = $15,166.67

March 13th – 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.

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) 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-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

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 https://source.markit.com.

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

13

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.markit.com/en/products/data/indices/credit-and-loan-indices/index-annexes/primers.page?

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.

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 tranched 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:
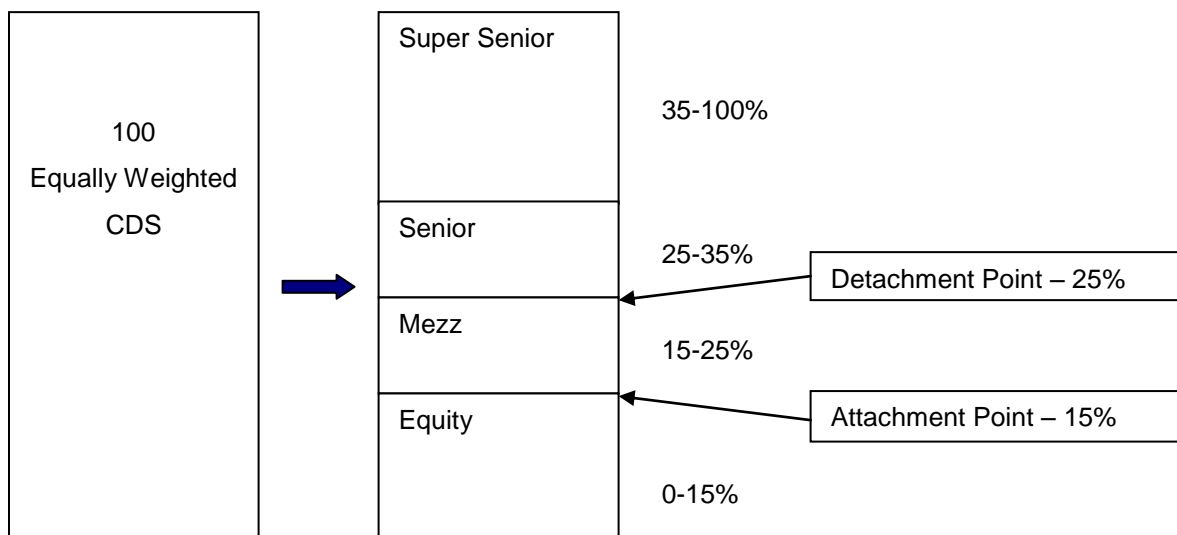
Tranche Mechanics: The protection buyer of a tranche makes quarterly coupon payments to the protection seller and receives a payment in case there is a credit event in the underlying portfolio. Upfront payments are made at initiation and close of the trade to reflect the change in price. Coupon payments (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: 0-15, 15-25, 25-35, 35-100 (in this case the 15-25 tranche has an attachment point of 15 and detachment point of 25). Investor B bought protection on the 0-15% 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:

(Notional * LGD * Weighting) / Tranche Size

Or $233,333 to Investor B.

The 0-15% tranche is adjusted for the reduced notional (0.35 based on LGD) and 14.65% 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 0-15 tranche for new trades now becomes a 0-14.80 tranche). The original principal of the other tranches is unaffected but now has a smaller cushion protecting them against further

15

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 22nd 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:

U.S. Credit Indices	Deepak Agnani
	Head of US Credit Indices
	+1 212 205 1248
	deepak.agnani@markit.com
	Shahzeb Rao
	Director
	+1 646 257 2719
	shahzeb.rao@markit.com
European/ Asian Credit Indices	Frans Scheepers, CFA
	Vice President
	+44 (0)20 7260 2429
	frans.scheepers@markit.com
	Paul Carter
	Director
	+44 (0)20 7260 2229
	paul.carter@markit.com
Global Cash Bond Indices	Tobias Sproehnle, CFA
	Director
	+44 (0)20 7260 2320
	tobias.sproehnle@markit.com

or go to 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
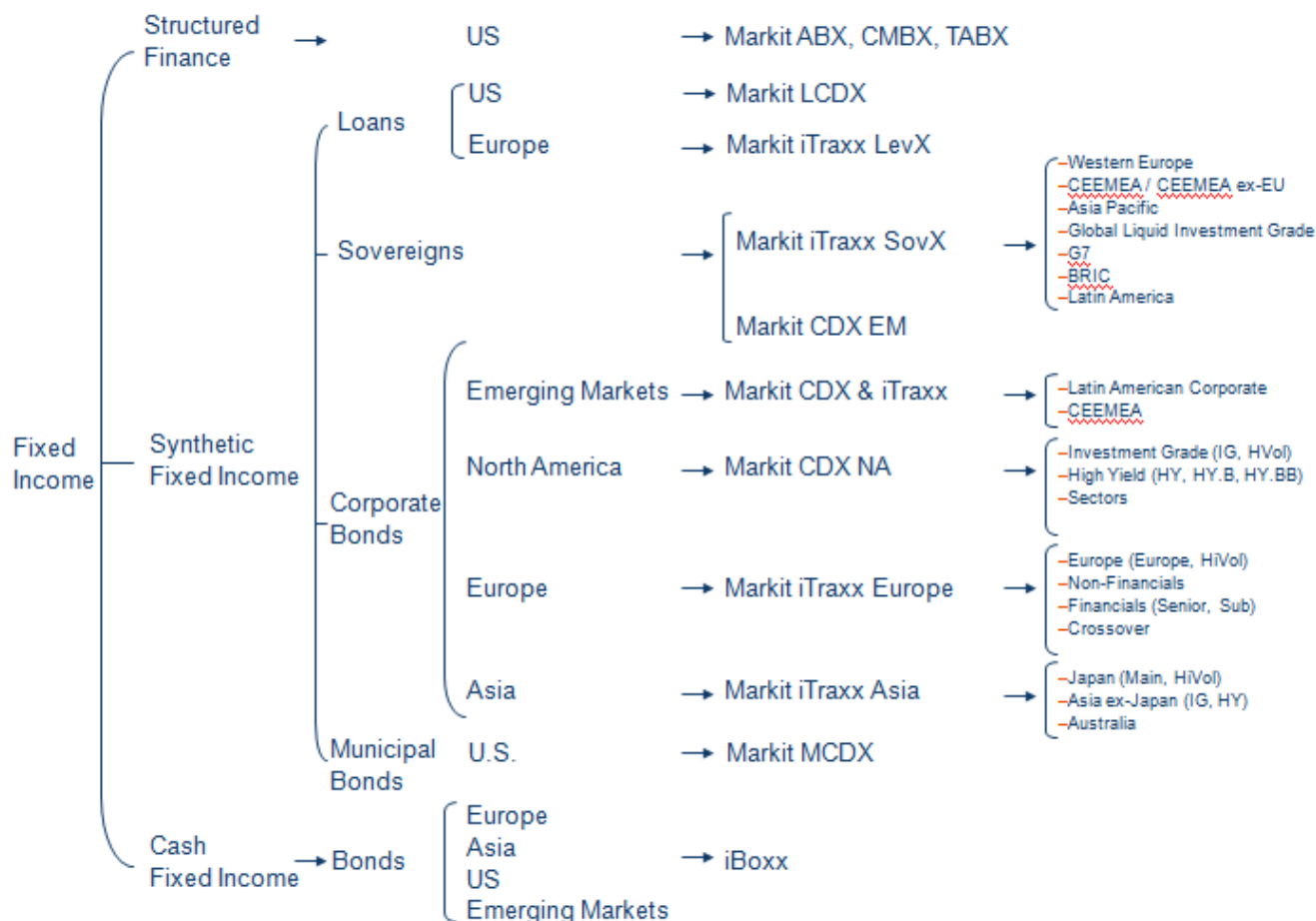
Product Descriptions

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 40 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 CEEMEA index is a tradable index composed of 25 corporate and quasi-sovereign entities from Central & Eastern European, Middle Eastern and African countries.

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 SovX Latin America Index (comprising 8 entities from the Latin American universe), 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
	CEEMEA	25	100	25	3/20 – 9/20	5	25 corporate and quasi-sovereign entities from CEEMEA countries
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 (ex-EU)	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	Up to 7	100	40	3/20 – 9/20	5, 10	Most liquid industrialized countries
	BRIC	Up to 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 and Markit iTraxx SovX CEEMEA ex-EU indices
(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), Markit CDX Emerging Markets (14 names), Markit Emerging Markets Diversified (40 names), and Markit CDX Latin American Corporate (20 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. The Markit LCDX index rolls semi-annually in April and October.

Markit MCDX

Markit MCDX index comprises of 50 CDS contracts referencing municipal issuers as the Reference Entity. The Markit MCDX index rolls semi-annually in April and October.

	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	First Lien Senior Secured Loans	
CDX	IG	125	100	40	3/20 – 9/20	1, 2, 3, 5, 7, 10	Investment Grade	Sectors
	HY	100	500	30	3/27 – 9/27	3, 5, 7, 10	High Yield	HY.B, HY.BB
	EM	14 - can vary	500	25	3/20 – 9/20	5	Emerging Markets (Sovereign)	
	LatAm Corp	20	500	25	3/20 – 9/20	5	Emerging Markets	
MCDX	MCDX	50 credits	100	80	4/3 – 10/3	3, 5, 10	U.S. Municipal Bonds	

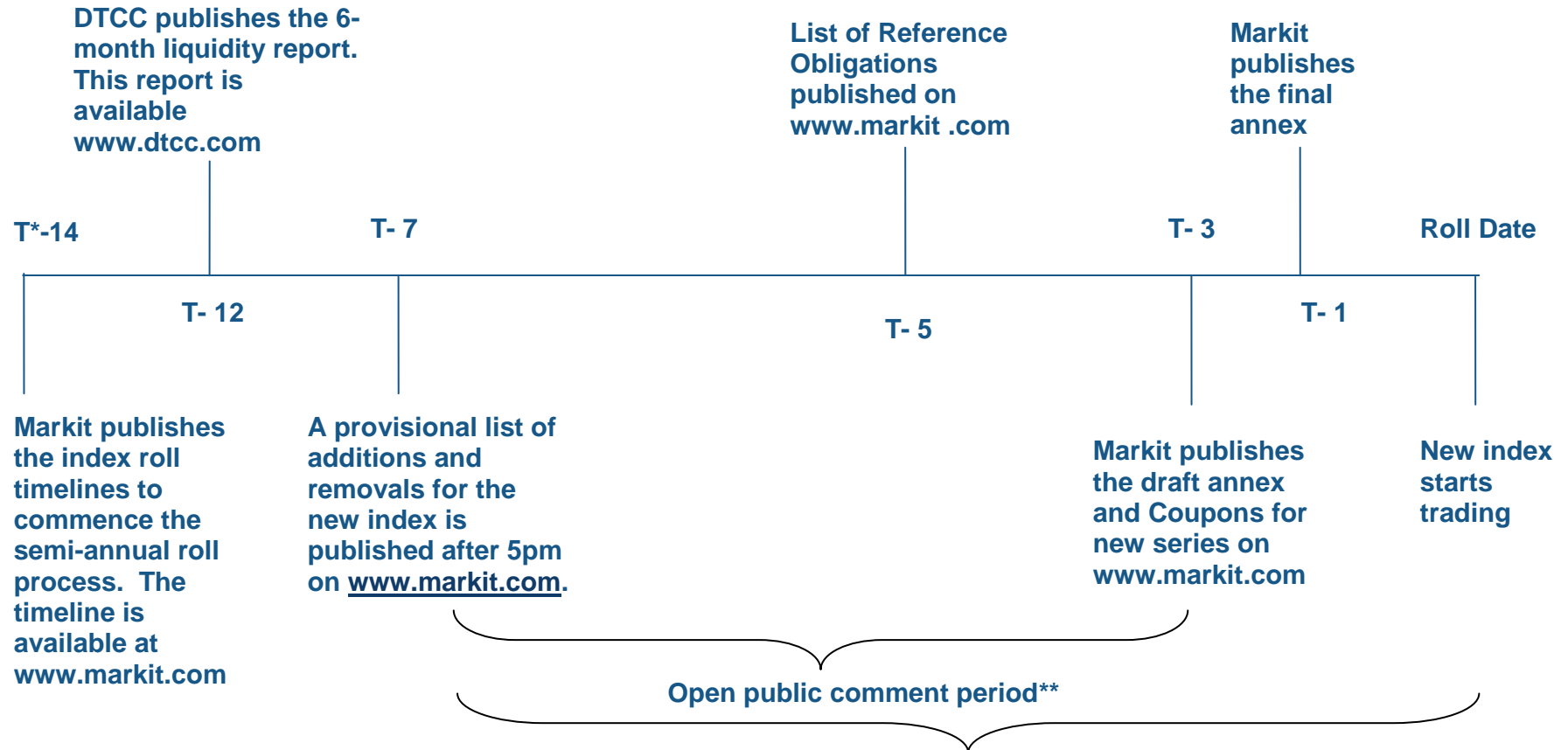(1) All indices are equally weighted – Except for CDX EM and CDX LatAm Corp, which are decided by poll
(2) Exact maturity is 3 months past the years after anniversary (coinciding with coupon payment dates and IMM roll dates of 20 Mar, 20 Jun, 20 Sep, 20 Dec)
*Note that new series of Markit CDX Crossover, Markit CDX EM Diversified and Markit CDX High Yield High Beta (HY.HB) indices are no longer issued

markit

Appendix 2: Index Roll Timeline

Markit CDX.NA.IG , CDX.NA.HY, iTraxx Europe & iTraxx Crossover

DTCC publishes the 6-month liquidity report. This report is available www.dtcc.com

List of Reference Obligations published on www.markit .com

Markit publishes the final annex

T*-14   T- 7   T- 3   Roll Date

T- 12   T- 5   T- 1

Markit publishes the index roll timelines to commence the semi-annual roll process. The timeline is available at www.markit.com

A provisional list of additions and removals for the new index is published after 5pm on www.markit.com.

Markit publishes the draft annex and Coupons for new series on www.markit.com

New index starts trading

Open public comment period**

Market events (Corp events, Credit Events, Rating Change) – changes posted on markit.com

*The timeline specifies the 'no-later-than' date on which the information is made available. However, the Administrator has the discretion to publish the information earlier if possible.

**The Administrator will review comments received and determine whether amendments are necessary. The Administrator welcomes comments from the public, but is not required to follow or otherwise address all comments received.

markit™

Appendix 2: Index Roll Timeline
Markit LCDX

Initial names to be included in next index are submitted by Dealers

Markit publishes provisional list of additions on it's website by EOD

Markit publishes constituents of new LCDX and Eligible Members

Annex draft distributed to Eligible Members

New index starts trading

T-12

T- 9

T- 3

T-1
5 pm

T-10

T- 4
11am

T- 2

Roll Date

Names to be excluded from next index are submitted by Dealers

SSL exclusion, Corporate Actions & Liquidity are reviewed

Markit publishes provisional list of exclusions on it's website by EOD

Final Constituents List determined

1pm - Markit polls dealers for fixed spread for the index at each maturity

5pm – Markit publishes fixed rate

Markit publishes the Annex

23

markit™

Appendix 2: Index Roll Timeline
Markit MCDX

Initial names to be included in next index are submitted by dealers

Markit publishes provisional list of additions on it's website by EOD

1pm - Markit polls dealers for fixed spread for the index at each maturity

5pm – Markit publishes Fixed Rate

Markit publishes the Annex

T- 9

T- 2

Roll Date

T-12

T-10

**T- 1
5 pm**

T- 3

Names to be excluded from next index are submitted by dealers

Markit publishes provisional list of exclusions on it's website by EOD

Final constituents list determined and published

Annex draft distributed to Eligible Members

New index starts trading

24

Appendix 2: Index Roll Timeline

Markit iTraxx LevX

Markit distributes provisional membership list to iTraxx dealers & publishes it on website

Conference call with iTraxx LevX dealers and Markit to decide reference entities, reference obligations, coupons and recovery rates

Index annexes published on www.markit.com

Last day of month prior to roll

5 pm

T- 6

12 noon

T- 2

2 pm

Roll Date

T-1

T- 7

8 pm

T- 4

2 pm

iTraxx dealers submit list of Reference Obligations (ranked by LCDS trading volume) to Markit (Reference Obligations drawn from Markit's RED LCDS)

iTraxx dealers submit feedbacks on reference entities and obligations to Markit

Markit distributes membership lists to dealers & publishes it on website

New index starts trading

25

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

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 15, 4 tranches will be trading instead of 5 with the maturities of 3, 5, and 7 years, The coupon for 0-3 tranche will be upfront + 500bps, 3-7 and 7-10 tranche will trade on a running coupon of 100bps + upfront payment and 15-100 + upfront tranche will trade on a running coupon of 25bps. 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.

Basel III – The third and latest installment of global regulatory standards on bank capital adequacy and liquidity agreed by the members of the Basel Committee on Banking Supervision developed in response to the deficiencies in financial regulation revealed by the financial crisis. Basel III strengthens bank capital requirements and introduces new regulatory requirements on bank liquidity and bank leverage.

Basis – In finance, the *basis* represents the difference between two instruments. In the world of credit derivatives, the basis may refer to the difference between the CDS and the reference obligation (calculated as the Par Spread minus the bond's Asset Swap Spread or Z-spread). Other potential basis metrics are:

- *Restructuring basis*: the difference in the cost of protection between a contract trading with or without restructuring (mostly prevalent in North America).
- *Quanto basis*: the difference in the cost of protection for the same entity trading in different currencies (applies principally to sovereign credits).
- *Tier basis*: the difference between the cost of protection for different tiers of debt for the same entity.

Basis Point – 1/100th of 1%. 100 basis points = 1%. A common term in fixed income and credit derivative 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 Nth-to-default swaps (where settlement is triggered when the first or Nth entity defaults).

Big Bang Protocol – On April 8 2009, the Big Bang Protocol went into effect, hardwiring the auction mechanism and creating Determinations Committees (DC) with the responsibility to declare whether a credit or succession event has occurred. The Protocol also introduced the concept of rolling effective dates with "lookback" periods defining credit event and succession event protection (T-60 days for credit events, and T- 90 days for succession events). Simultaneously, with the global contract changes, North American corporate single names started trading with fixed coupons (50 or 100 bp) and a full first accrual period.

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

CDS Spread – Also called a *premium*. The amount paid by the Protection Buyer to the Protection Seller, typically denominated in basis points and paid quarterly. For example, if the spread for Acme Inc. is 200 basis points, the Protection Buyer will pay the Protection Seller 200 basis points multiplied by the notional of the trade annually (typically paid quarterly, on an 'actual number of days per period/360' basis).

Composite Spread – Refers to the spread of a single name or an index derived by aggregating all the spreads individually submitted by Markit's contributors after deleting the outliers.

Composite Price – Refers to the price for price-based indices (CDX.NA.HY, CDX EM, LCDX, LevX) derived by aggregating all the prices individually submitted by Markit's contributors after deleting the outliers.

Conventional Spreads – These spreads represent the translation of fixed coupon and upfront payment into a single number. Investment grade names are expected to be quoted using this convention as they may have either the 100 or the 500 bps coupon associated with them, depending on the dealer's preference.

Credit Default Swap (CDS) – A credit derivative transaction in which two parties enter into an agreement, whereby one party (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.

Credit Event Auction – Industry standard mechanism designed to ease the settlement of credit derivative trades following a credit event. The auction process determines the cash settlement price of a CDS, with the compensation received by the protection buyer based on the final agreed-upon auction price. Markit and Creditex have jointly acted as administrators of credit auctions since their inception in June 2005.

Credit Swaptions – **aka Credit Options** – Allow the investor to either buy protection (for payer swaptions) or sell protection (for receiver swaptions) at a pre-agreed strike for a single credit or an index. Payer Swaptions can be further classified as Knock-Outs or Non-Knock Outs depending on whether the option ceases to exist following a credit event ahead of the option maturity.

Coupons – **aka 'deal spread'** – Since the release of ISDA's protocols for the standardization of the credit markets, the most common coupon strikes have been 100bps and 500bps, though exceptions may apply (see inset below for details).

	Implementation Date	Coupon Strikes			
		25	100	500	1000
Asian Corporate & Sovereign CDS	December, 2009		☑	☑	
Australian Corporate & Sovereign CDS	September, 2009		☑	☑	
Eastern & Central European Corporate & Sovereign CDS	September, 2009		☑	☑	
European Corporate CDS	June, 2009	☑	☑	☑	☑
Japanese Corporate & Sovereign CDS	December, 2009	☑	☑	☑	
Latin American Corporate & Sovereign CDS	September, 2009		☑	☑	
Middle Eastern Corporate & Sovereign CDS	September, 2009		☑	☑	
New Zealand Corporate & Sovereign CDS	September, 2009		☑	☑	
North American Corporate & Sovereign CDS	April, 2009		☑	☑	
Western European Sovereign CDS	June, 2009	☑	☑		

Credit Event – This is the event-triggering settlement under the CDS contract. The DCs determine whether a credit event has occurred, and whether an auction should take place to settle trades. Since the original ISDA Agreement in 1999, six 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). For more details, see the definition for *Restructuring Credit Event* further below.
- *Obligation default, obligation acceleration, and repudiation/moratorium* – The 2003 ISDA definitions define these three credit events, but they are very rare.

Credit Spread Curve – The curve display of the credit spread for a unique reference entity/tier/currency/doc-clause combination over different nodes or tenors. Find below a picture of the Allied Waste credit spread curve from Markit's CDS pricing service.

29

AW SNRFOR USD XR, 11Feb09
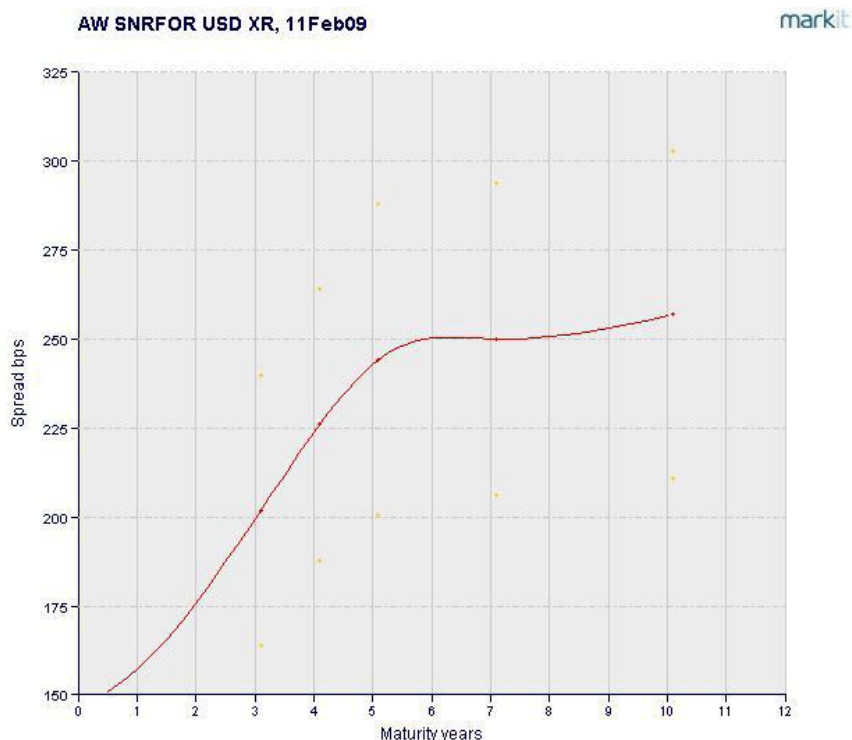
Derivative – A broad term describing financial instruments that "derive" their value from an underlying asset or benchmark. Many derivatives are designed to transfer some form of risk from one party to another. Included in this broad definition would be: Futures, Options (including caps and floors), Swaps (including CDS and interest rate swaps), Forwards and hybrids of the above.

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 derivatives. The CDS matching and confirmation service provides automated, real-time matching and confirmation for standard single reference entity CDS (including North American, European, Asian corporate credits, and sovereign credits), as well as CDS indices.

DV01 – **aka Risky Duration** – The change in the mark-to-market value of a CDS trade for a 1bp parallel shift in CDS spreads. Though Risky Duration and Risky Annuity are often used interchangeably, the two measures yield changes that are very close only for CDS spreads trading at par. For larger spread movements away from par, this assumption becomes increasingly inaccurate.

FAS 157 – Financial accounting standards which define and establish a framework for measuring *fair value.* Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at a specified date.

Fair value is measured using market-based inputs categorized in 3 levels of 'quality':

- *Level 1*: quoted prices in active markets.
- *Level 2*: quoted prices for similar assets or liabilities or corroborated by observable market data by correlation or other means.
- *Level 3*: unobservable inputs.

Gross Notional – Gross notional values are the sum of CDS contracts bought (or equivalently sold) for all Warehouse contracts in aggregate, by sector or for single reference entities displayed. Aggregate gross notional value and contract data provided are calculated on a per-trade basis.

Hazard Rate – the conditional probability of default in Period n for a particular entity given this entity has survived until the beginning of Period n. Hazard rates are 'backed out' of a CDS spread curve and 'bootstrapped' to create a term structure of Hazard rates. This term structure of Hazard rates is then translated into a term structure of Survival Probabilities and a term structure of Non-conditional Default Probabilities. The former is used to weigh the premium (or 'fee') leg of the CDS, while the latter is used to weigh the protection (or 'contingent') payment leg. The PV of each leg is discounted to find the MTM value of a CDS contract.

Implied Rating – A field used by Markit and calculated on a weekly basis by comparing the issuer's 5Y senior standard trading convention spread to the 5Y spreads of our sector curves and applying the rating of the logarithmically nearest rating curve specific to that sector**.**

Index Price – In standard quotation, CDX HY,CDX EM, LCDX, and Lev-X indices are quoted on a price basis.

Index Roll – Process which, for the Markit iTraxx and Markit CDX suite of indices, takes place twice a year in March and September to create a new index series. The previous index becomes off-the-run, and the new index is the new on-the- run series.

Index Spread – In standard quotation, CDX IG, iTraxx Main and Crossover, SovX and MCDX indices are quoted on a spread basis. Converting the price to spread and vice versa can be achieved via the 'Converter' (https://source.markit.com) or can be approximated using the dollar value of 1 basis point (DV01) and multiplying that by the difference between the deal spread and the quoted spread.

Index Skew – Market participants refer, by convention, to the index skew as the difference between the price (or spread) of the Credit index traded in the market and its 'fair value' derived from the index constituents. It is also called the index basis.

There are several reasons why actual spreads may differ from fair value, e.g lower liquidity in single name spreads, differences in maturity between on-the-run single names and index contracts, and general credit market demand for protection selling and buying, among others.

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.

Jump-to-Default risk – The risk that a credit defaults suddenly before the market has had time to factor its increased default risk into current spreads.

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

LIBOR – London Interbank Offered Rate – An interest rate fixing in the interbank market, representing the rate at which highly-rated banks will lend to one another. Also widely used as a floating rate reference on interest rate and currency swaps, and floating rate notes. LIBOR is calculated daily for a variety of currencies including USD and GBP. The EUR equivalent is EURIBOR and the JPY equivalent is TIBOR.

Long Basis – aka 'buying the basis' – A trade that seeks to profit from a widening of the basis (becoming more positive), and can be executed by selling the bond and selling the CDS.

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 indices focused on the Americas. Investment Grade, High Yield, and Emerging Markets are the three major sub-indices.

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

Markit iTraxx LevX – The Markit iTraxx LevX indices are based on European Loan credit derivatives - they are constructed from the universe of European corporates.

Markit iTraxx SovX – Markit iTraxx SovX Indices are a family of sovereign CDS indices covering countries across the globe. The indices have 5-year and 10-year maturities and the underlying currency is USD.

Markit LCDX – Markit LCDX is the North American benchmark for first lien leverage loans CDS

Markit MCDX – Markit MCDX index references U.S. municipal credits covering revenue and general obligations.

Markit RED™ – Markit's Reference Entity Database. Markit RED is the industry standard identifier for reference entities and reference obligations in the credit derivative market.

Markit VolX – The Markit VolX indices are the benchmark family of indices that track the realized volatility in the European and North American credit derivatives markets.

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.

Negative Basis – Occurs when the ASW or Z-Spread of a bond is wider than the CDS spread.

Negative index skew – A bullish credit indicator, suggesting that there are more sellers of index protection, than buyers of single name protection.

Net Notional – The sum net protection bought by buyers (or equivalently net protection sold by net sellers). Assuming a recovery of 0, net notional positions generally represent the maximum possible net funds transfers between net sellers of protection and net buyers of protection that could be required upon the occurrence of a credit event relating to particular reference entities. Actual net fund transfers are dependent on the recovery rate for the underlying bonds or other debt instruments.

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

Off-the-run / On-the-run – Markit iTraxx and CDX indices 'roll' every six months when a new series of the index is created with updated constituents. The previous series continues trading although liquidity is concentrated on the new series. The new series is referred to as being on-the-run, with previous series referred to as being off-the-run.

OTC – Over-The-Counter – Refers to trades negotiated and conducted directly between two parties. This contrasts with trades conducted on exchanges, where the trades are defined by the rules of the particular exchange. CDS are examples of an OTC-traded instrument.

Par Spread – The spread of a CDS contract that ensures the PV of the expected premium payments (fee leg) equal the PV of the expected default payment payments (contingent leg).

Positive Basis – Occurs when the CDS spread is trading wider than the ASW or Z-spread of the bond.

Positive index skew – A bearish credit indicator suggesting index protection buyers outweigh sellers of single name protection.

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.

Quanto CDS – FX swaps embedded in CDS contracts - quoted on all the major sovereigns in addition to some single name corporate swaps and CDS indices. The buyers and sellers of the quanto swap take opposite views on the correlation between currency and credit risk

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

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 which trigger settlement under the CDS contract. Restructuring is a "soft" event, whereby 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. The following are the different types of Restructuring clauses:

- *Full Restructuring* (CR): This allows the Protection Buyer to deliver bonds of *any* maturity after restructuring of debt in *any* form occurs. This type of clause is more prevalent in Asia.
- *Modified Restructuring* (MR): limits deliverable obligations to bonds with maturities of less than 30 months after a credit event.
- *Modified Modified Restructuring (MM):* This is a "modified" version of the Modified Restructuring clause whereby deliverable obligations can mature up to 60 months (5 years) following the credit event. This type of clause if more prevalent in Europe.
- *No Restructuring* (XR): This option excludes restructuring altogether from the CDS contract, eliminating the possibility that the Protection Seller suffers a "soft" Credit Event that does not necessarily result in losses to the Protection Buyer. No-R protection typically trades cheaper than Mod-R protection. Following the implementation of SNAC, this clause is mainly traded in North America.

Risky PV01 – **aka Risky Annuity –** The sum of the discount factors used in CDS valuation weighed by their corresponding survival probabilities. The Risky PV01 or Annuity measures the present value of 1bp risky annuity received or paid until the occurrence of a credit event or the expiration of the contract.

Series – Term which identifies the series of a specific index, and its main characteristics. In September 2008, Markit rolled the Markit CDX IG index to series 11. Series 11 has a maturity of December 20, 2013, and fixed coupon of 150basis points. In March 2009, Markit will roll the Markit CDX IG index to series 12.

Settlement – What occurs in the case of a credit event. Settlement can be cash or physical delivery, depending on the terms of the contract. Traditionally, CDS specified physical delivery but in the last three years numerous auctions have been held to allow for cash settlement.

Short Basis – **aka 'selling the basis'** – a trade that seeks to profit from a tightening of the basis (becoming more negative), which can be executed by buying the bond and buying a CDS.

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

Small Bang Protocol – While the CDS Big Bang authorized the Determinations Committees (DC) to decide whether or not a Restructuring Event took place, the DC rules under the CDS Big Bang specifically prohibited them from authorizing auctions to settle trades for Restructuring Events – consequently, the CDS Small Bang (issued June 20, 2009) addressed the need to incorporate the auction settlement mechanism for Restructuring Events, whereby DCs are able to decide whether or not to hold auctions for specific Maturity Buckets and implement a "Use It or Lose It" date.

Simultaneously, since June 20th, 2009, standard European corporate entities started trading with fixed coupons of 25, 100, 500 and 1000, similar to North American corporate entities albeit with additional coupons.

SNAC (Standard North American Corporate Contract) – Defines trades based on the new CDS conventions, with full coupon, subject to the Big Bang Protocol (determination committee, auction hardwiring, lookback period).

STEC (Standard European Corporate Contract) – Defines trades based on the new CDS conventions, with full coupons, subject to the Small Bang Protocol which focuses on restructuring clauses.

Theoretical Spread (Price) – **aka 'Intrinsic Value' or 'Fair Spread'** – the spread of an index implied by the underlying index constituents with currency, doc clause, day counts, coupon, coupon frequency, and maturity identical to that of the index.

Tranches – Allow 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. For example, the 5Y 3-6% tranche on a portfolio of 125 single names with a 40% recovery would protect the investor up to the sixth default – 1/125* (1-0.4)= 0.48% loss on one name. By the seventh default (0.48%*7= 3.36%), the investor is no longer protected and will incur principal loss. After the thirteenth default (0. 48% * 13 = 6.24%), the entire principal is lost and no further losses are incurred on this tranche.

Succession Event – An event such as a merger, consolidation, amalgamation, transfer of assets or liabilities, demerger, spin-off or other similar events where one entity succeeds to the obligations of another entity. Rules for succession events are defined in the 2003 ISDA definitions and the Determinations Committees review and determine such events and debt movement and respective impact on the CDS.

Probability of Survival – The probability of an entity not defaulting in period *n* and subsequent periods. These probabilities are modeled as a function of Hazard Rates and a term structure of survival probabilities is used to weigh the premium (or fee) leg when valuing a CDS transaction quantitatively.

Probability of Default – The probability that an entity defaults in a particular period.

Swap – An agreement between two parties to exchange future cash flows or credit risk.

Tenor – Refers to the duration of a CDS contract. Most CDS are written with 5 year terms, and this remains the most liquid and frequently quoted part of the credit curve; however other tenors, such as the 10 year, 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.

- *JRSUBUT2* – Junior Subordinated or Upper Tier 2 Debt (Banks)
- *PREFT1* – Preference Shares, or Tier 1 Capital (Banks)
- *SECDOM* – Secured Debt (Corporate/Financial) or Domestic Currency Sovereign Debt (Government)
- *SNRFOR* – Senior Unsecured Debt (Corporate/Financial), Foreign Currency Sovereign Debt (Government)
- *SUBLT2* – Subordinated or Lower Tier 2 Debt (Banks)

Upfront – Refers to the initial (i.e. upfront) lump sum payment made when entering a CDS transaction. Upfront payments tend to apply to transactions where the credit quality of the entity referenced is poor – in other words, where the perceived risk of the entity defaulting is high. It ensures the Protection Seller receives a payment upon trade execution that reflects the riskiness of the contract.

Version – Each index series is identified by a version number. After an index rolls, the initial version will be one. To represent removal of constituents because of credit events and early termination (for LCDX), a new version of the index is published. For example Markit CDX HY 11 v1 was the version of the Markit CDX HY index launched at the roll of September 2008. After the removal of Tribune Company because of bankruptcy, a new version Markit CDX HY 11 v2 was published. After the removal of Nortel Networks Corporation, a new version was published, Markit CDX HY 11 v3.

Z-spread – The basis point value that must be added to the zero coupon curve, such that the security's discounted cashflows equal the security's market price. At its simplest, the zero-volatility spread measures the spread to Treasury spot (zero) rates all along the curve.