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CDS Indices

The backbone of the credit derivatives market

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Agenda

- **What are CDS Indices?**
- **Mechanics and cash flows**
- **Index series: On- and Off-the-run**
- **What trades? How much? How is the market positioned?**
- **Index “skew” and “arb” trades**
- **Data and Daily Analytics @ CitiVelocity**

What is a CDS index?

- **CDS contract by which an investor takes credit exposure to a portfolio of firms**
    - The performance of the index contract will reflect the performance of the underlying basket of credits.

- **A CDS Index is a basket of single name CDS**
    - It provides the same default exposure as a combination of single name CDS (with the proper weighting).
        - CDS indices are **generally equally weighted** – i.e. provide the same exposure to each underlying CDS.
        - E.g. if you sell 125m protection on an index with 125 equally weighted underlying CDS – you gain 1m exposure to each underlying credit. I.e. it is equivalent to selling 1m protection on each single name CDS.
    - It trades in the market as a **stand alone contract**.
    - Its price/spread fluctuations will be related to price fluctuations of the underlying companies.
        - Although there can be divergences due to different supply/demand dynamics in indices vs. single names.

- **Like in any other CDS-based product, investors can take long risk (sell protection) and short risk (buy protection) positions**

What is a CDS index?

- **If it provides the same default exposure than a basket of CDS, why bother?**
  - **Bid-asks**
    - Index bid-asks can be ~10x lower than the average bid-ask of the underlying single name CDS.
  - **Ability to trade in size**
    - CDS Index volumes are many times higher than the sum of the volumes in their underlying single name CDS. In fact, for many single name CDS, a large fraction of their trading volume comes from index related trades (“arb” trades).
  - Quick way to gain exposure to the default risk of a particular region/rating/sector – i.e. they are a **macro tool**

Example: iTraxx Europe Main

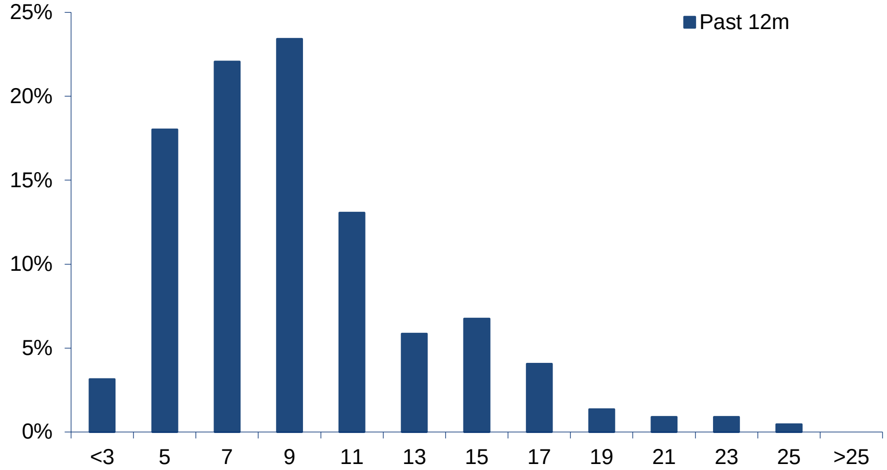
- **125 Investment Grade European Companies**
- **Equally weighted portfolio** (i.e. 0.8% = 1 / 125 exposure to each company)
- **Index composition:**
  - Reviewed every six months (20 March & 20 September)
  - Liquid names (using DTCC trading volume data)
  - European
  - Investment grade rated
  - Sector balanced: 30 Autos & Industrials, 30 Consumers, 20 Energy, 20 TMT, 25 Financials
- **Quoting and trading conventions**
  - Quoting convention: full running spreads
  - Trading convention: upfront plus fixed coupon (1%)
- **Traded maturities: 3, 5, 7, 10y**

- **Benchmark for liquid, diversified, investment grade European credit risk**

Example: iTraxx Europe Main

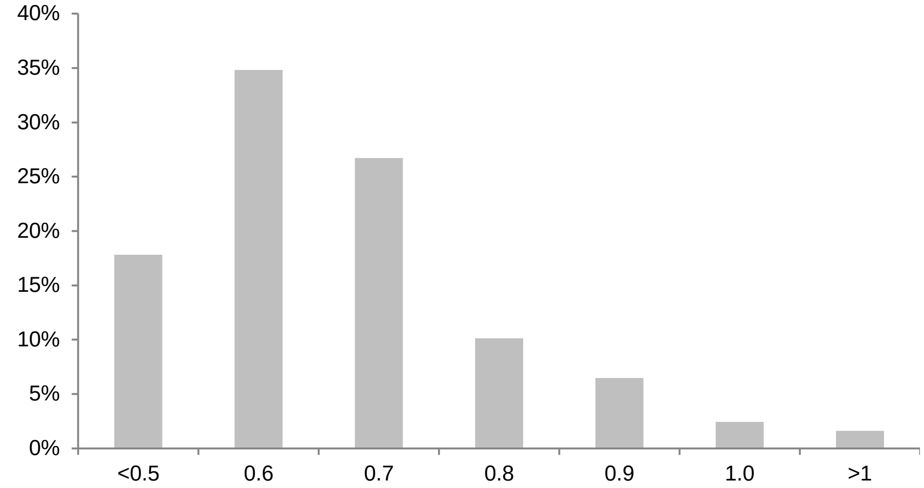
Distribution of average daily trading volumes, €bn

From Sep-13 to Aug-14. On-the-run 5y iTraxx Europe Main.



Distribution of average daily bid-offer, bp

From Sep-13 to Aug-14. On-the-run 5y iTraxx Europe Main.



Source: Citi Research, Markit, Bloomberg.

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  - **Quoting and trading standards**
  - Cash flows assuming no credit events (defaults)
  - What happens in a single name credit event?
  - Cash flows when there are credit events

Quoting and trading standards

- **Quoting standard:**
  - **Spreads** (for all indices except CDX HY), in bp.
  - E.g. iTraxx Main 5y traded @ 60bp on 21-Aug-14 – Series 21, 20-Jun-19 maturity.
- **Trading standard:**
  - **Upfront + Annual fixed running coupon**
  - E.g. the 60bp quote for iTraxx Main above corresponds to -1.9% upfront + 100bp running fixed coupon per year.
  - Market participants use a pre-agreed model (CDSW in BBG) to move from spread to upfront + coupon and vice-versa. This requires an assumed recovery. The model essentially does this: *Upfront = (Spread – Coupon) x Risky Duration*.
  - The **standard coupon** and **assumed recovery** are set by Markit, the index administrator, and used by all market participants.

Region	Type	Index	Quoted Spread (bp)	Fixed Coupon (bp)	Assumed Recovery (%)	Duration	Upfront (%)
Europe	IG	**iTraxx Main**	60	100	40	4.75	-1.9%
Europe	HY	**iTraxx Crossover**	250	500	40	4.41	-11.0%
Europe	IG Senior Fins	**iTraxx Senior Financials**	64	100	40	4.74	-1.7%
Europe	IG Sub (T2) Fins	**iTraxx Sub Financials**	87	100	20	4.74	-0.6%
US	IG	**CDX IG**	58	200	40	4.65	-6.6%

			Quoted price	Fixed Coupon (bp)	Assumed Recovery (%)	Duration	Upfront (%)	Equiv. Spread (bp)
US	HY	**CDX HY**	107.8	500	30	4.20	-7.8%	314

Source: Citi Research, Markit, Bloomberg. As of COB 20-Aug-14.

Coupon

- **Paid quarterly**
  - 20-Mar, 20-Jun, 20-Sep, 20-Dec

- **Act/360**

- **Accrued coupon at inception and first full coupon**
  - Imagine you sell 100m iTraxx Main protection today 21-Aug-14.
  - On 20-Sep-14 you will receive a coupon of 100m x 100bp / 4 = 250k.
  - However, you are getting paid for a full quarter when you only have risk for a month (21-Aug / 20-Sep).
  - To compensate for that, you'll have to pay an accrued coupon at inception of the trade – i.e. the accrued from the last coupon date (20-Jun) to the trade date = (62 days / 360) x 100m x (100bp) = 172k.

Quoting and trading standards: CDX HY

- **Unlike other CDS indices, CDX HY is quoted in terms of "price", not spread**
  - All CDS indices trade on an "upfront + fixed coupon" basis (although most of them are "quoted" on a spread basis):
    - Assume the quoted index spread is S and it trades with a coupon of C. If you sell protection:
      - You receive an upfront of (S – C) x D ………………………………… this can be negative (D = duration)
      - You receive an annual coupon of C.
  - It's just that all indices, except CDX HY, are quoted in spread S terms.
  - CDX HY index is quoted in "price" terms, where **Price = 100 – Upfront**

  Example: CDX HY trades with a **105.75 price** … Equivalent …
    - Upfront = -5.75% = 100 – Price
    - Thus, an investor selling CDX HY protection would: Pay 5.75% upfront & Receive a 5% running coupon
    - If the index duration is 4.5, the -5.75% upfront (107.5 price) is equivalent to a **370bp spread**

    (= upfront / Duration + Coupon)

Remember:

$$Upfront + Coupon \cdot Duration = Spread \cdot Duration$$

$$\text{"Price"} = 100 - Upfront$$

Source: Citi Research.

Agenda

Mechanics and cash flows

Quoting and trading standards

Cash flows assuming no credit events (defaults)

What happens in a single name credit event?

Cash flows when there are credit events

Cash flows assuming no credit events

- **Trade**
  - Sell 100m protection on iTraxx Main Series 21 5y (20-Jun-19 maturity).
  - Trade date: 21-Aug-14.
  - Spread: 60bp – which, with a 100bp coupon, generates a -1.9% upfront.

- **Cash flows**
  - Trade date: 21-Aug-14
    - Upfront = 100m x -1.9% = -1.9m
      - **The protection seller receives the upfront if it's positive (spread > coupon) and pays if it's negative**.
    - Accrued coupon from 20-Jun to the trade date = - (62 days / 360) x 100m x (100bp) = - 172k
      - **The protection seller always pays the accrued coupon**.
  - Every coupon date until maturity (20-Sep-14, 20-Dec-14 …. 20-Jun-19)
    - Receive a coupon of 100m x 100bp / 4 = 250k

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- Mechanics and cash flows
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What happens in a single name credit event?

- **The protection seller "pays" for the credit event** – in a simplified way:
  - How much? Index notional x weight of that credit x (1 – recovery rate)
    - E.g. in a 100m iTraxx Main = 100m x (1 / 125) x (1 – 40%) = 800k
  - When?
    - When the credit event for that name happens

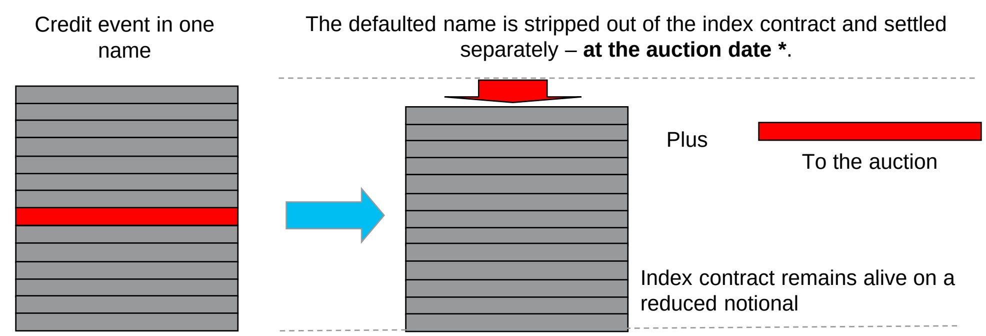
- **The index "outstanding" notional goes down and future coupons are paid on this new (lower) notional**
  - Notional outstanding is reduced after each default
  - Notional reduction: weight of the defaulted name
    - E.g. in a 100m iTraxx Main = 100m x (1 / 125) = 1m
    - After the first default, the coupons will be paid in 99m (from the credit event determination date).
  - Outstanding notional at any time = Initial notional x Sum of the weights on the defaulted names
    - E.g. in a 100m iTraxx Main = 100m x (1 – # defaults / 125)

What happens in a single name credit event?

- Index contract splits into two (at the auction date):
  - A new index contract referencing the non-defaulted names – with a reduced notional.
  - A single name CDS contract on the defaulted name – with the corresponding notional.
    - The usual “settlement” process applies on this single name CDS.

Defaults in an index position

- A CDS index contract can be considered as a series of single name credit default swaps on each of the names composing the index.
- Example
  - X buys €125 million of iTraxx Europe protection (125 names); equivalent to €1 million protection on each of the names composing the index.
  - If there is a Credit Event on one of the names composing the index, the contract will be triggered on that name.
  - Assuming a recovery rate of 40%, the protection buyer will receive (1-R) x 1 million, or 600k.
  - Coupons will be paid on the full notional until the credit event date, and on the reduced (i.e. outstanding) notional afterwards.



* For failure to pay and bankruptcy credit events, assuming cash settlement. For restructuring events the defaulted name is stripped out of the index at the credit event determination date (i.e. before the auction) and it trades separately from that date onwards.

A bit more detail

- **Different outcomes for different credit events:**

  - For **failure to pay and bankruptcy credit events** the index “splits” (i.e. notional goes down) at the auction time (which is later than the credit event determination date).

    - The investor goes to the single name CDS auction with the corresponding notional for the single name.

    - Like in any credit event auction, cash and physical settlement are available.

  - For **restructuring events** the defaulted name is stripped out of the index at the credit event determination date (i.e. before the auction) and it trades separately from that date onwards.

    - Unlike bankruptcy & failure to pay credit events, restructuring credit events do not trigger automatically. The investor has the option to trigger or not (before the auction).

    - The idea is that the restructured single name is stripped out of the index and the investor then decides whether to trigger or to keep the un-triggered single name. But no matter what he does, the index contract has split already.

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  - Quoting and trading standards
  - Cash flows assuming no credit events (defaults)
  - What happens in a single name credit event?
  - **Cash flows when there are credit events**

Cash flows

- **Trade**
  - Sell 100m protection on iTraxx Main Series 21 5y (20-Jun-19 maturity).
  - Trade date: 21-Aug-14.
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- **Cash flows**
  - Trade date: 21-Aug-14
    - Upfront = 100m x -1.9% = -1.9m
      - **The protection seller receives the upfront if it's positive (spread > coupon) and pays if it's negative**.
    - Accrued coupon from 20-Jun to the trade date = - (62 days / 360) x 100m x (100bp) = - 172k
      - **The protection seller always pays the accrued coupon**.
  - Every coupon date until maturity (20-Sep-14, 20-Dec-14 …. 20-Jun-19)
    - Receive a coupon of **Outstanding notional** x 100bp / 4 = 100m x (1 – # defaults / 125) x 100bp / 4
  - **Whenever a default happens***
    - **Pay Initial notional x weight of that credit x (1 – recovery rate)**
    - Assuming 40% recovery = 100m x (1 / 125) x (1 – 40%) = 800k

* For failure to pay and bankruptcy credit events, assuming cash settlement.

Cash flows

- **Imagine, using the previous example, that there is one bankruptcy credit event as follows:**
  - Event determination date: 20-Nov-14.
  - Auction: 1-Dec-14; 40% recovery.

- **Cash flows**
  - <u>Auction (1-Dec-14)</u>
    - Pay 100m x (1 / 125) x (1 – 40%) = 800k
  - <u>Next coupon date (20-Dec-14)</u>: coupon consists on two components
    - Coupon on the initial notional (100m) from last coupon date (20-Sep) to event determination date (20-Nov).
    - Coupon on the new outstanding notional (99m) from event determination date (20-Nov) to next coupon date (20-Dec).
    - I.e. receive 100m x 100bp x (61 days / 360) + 99m x 100bp x (30 days / 360) = 169.4k + 82.5k
  - <u>Subsequent coupon dates</u> (20-Mar-15 …) until the next credit event
    - Receive coupon on the new outstanding notional (99m).

* For failure to pay and bankruptcy credit events, assuming cash settlement.

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Index series: On- and Off-the-run

- **Indices "roll" every 6 months: 20-Mar & 20-Sep**
  - **"Roll" means that a new Series of that index is launched … but the rest don't disappear!**
  - Each 20-Mar & 20-Sep a new index "Series" is launched.
  - E.g. iTraxx Europe Main Series 1 was launched in Mar-2004, Series 2 in Sep-2004 … Series 22 in Sep-2014.

- **When a new Series in launched …**
  - **Its portfolio composition is reviewed to guarantee that the constituents satisfy the index rules**.
    - E.g. iTraxx Europe Main is made up of investment grade companies.
    - Each new Series contains only IG companies at inception, but some of them can go to HY afterwards.
    - The "old" (a.k.a. "off-the-run") iTraxx Europe Main Series may have some non-IG companies, but the "new" (a.k.a. "on-the-run") Series will always start with only IG companies.

  - **Its maturity is set to be the corresponding 5y at the time of launch (20-Jun or 20-Dec)**.
    - E.g. iTraxx Europe Main S21 – launched 20-Mar-14 with 5y 20-Jun-19 maturity.
    - E.g. iTraxx Europe Main S22 – launched 20-Sep-14 with 5y 20-Dec-19 maturity.

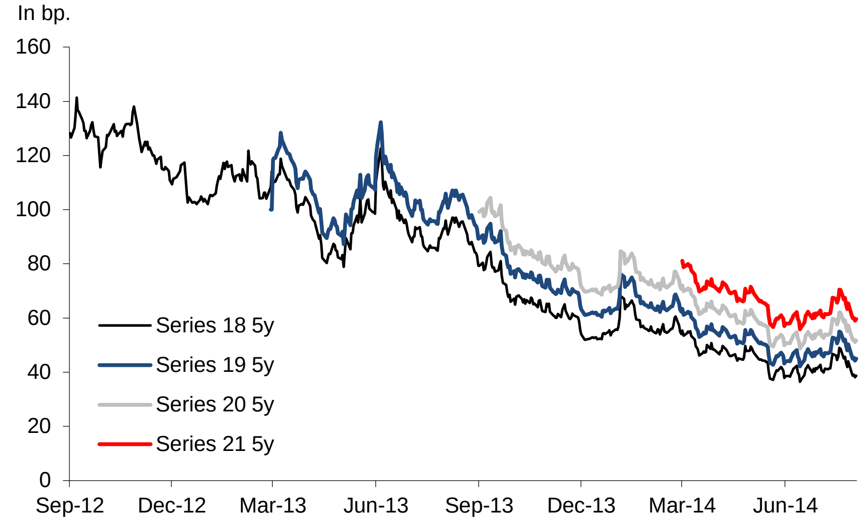
Index series: On- and Off-the-run

iTraxx Main Series

Series	Launch	5y Maturity
1	20-Mar-04	20-Jun-09
2	20-Sep-04	20-Dec-09
3	20-Mar-05	20-Jun-10
4	20-Sep-05	20-Dec-10
5	20-Mar-06	20-Jun-11
6	20-Sep-06	20-Dec-11
7	20-Mar-07	20-Jun-12
8	20-Sep-07	20-Dec-12
9	20-Mar-08	20-Jun-13
10	20-Sep-08	20-Dec-13
11	20-Mar-09	20-Jun-14
12	20-Sep-09	20-Dec-14
13	20-Mar-10	20-Jun-15
14	20-Sep-10	20-Dec-15
15	20-Mar-11	20-Jun-16
16	20-Sep-11	20-Dec-16
17	20-Mar-12	20-Jun-17
18	20-Sep-12	20-Dec-17
19	20-Mar-13	20-Jun-18
20	20-Sep-13	20-Dec-18
21	20-Mar-14	20-Jun-19
22	20-Sep-14	20-Dec-19

And so on …

iTraxx Main 5y Spreads across Series



iTraxx Main 5y On-the-run spreads

Source: Citi Research, Markit.

Index series: On- and Off-the-run

- **An index series is "on-the-run" during the 6m period after it has been launched, i.e. when it is the last Series to have been launched**
  - Example:
    - 20-Mar-14 – iTraxx Europe Main S21 is launched and became the "on-the-run" series (replacing S20, which at that date became an "off-the-run" series, like all other previous series).
    - 20-Sep-14 – iTraxx Europe Main S22 is launched and became the "on-the-run" series (replacing S21, which at that date became an "off-the-run" series, like all other previous series).

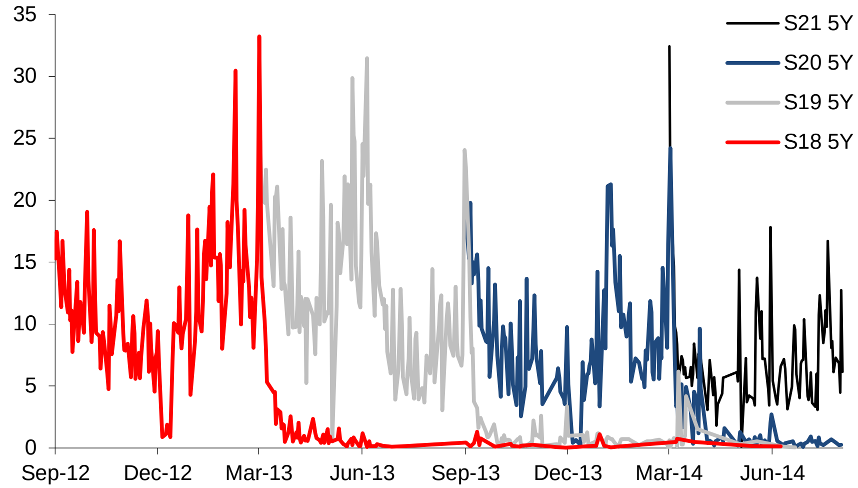
- **The portfolio on each Series is static**
- **When you take a position in a given Series, your trade will continue referring to that Series** (unless you roll it).

- **Liquidity is highest in the on-the-run series**: highest trading volumes and lowest bid-ask spreads.
- **Most people "roll" their index positions to the new "on-the-run" series as soon as it's launched**
  - Dealers provide "roll" markets: e.g. what is the market to roll a short from S20 to S21.
  - Effectively, "rolling" a 5y index trade whenever a new index is launched means investing in a portfolio of credits with a constant 5y maturity and satisfying the index composition rules

Index series: On- and Off-the-run

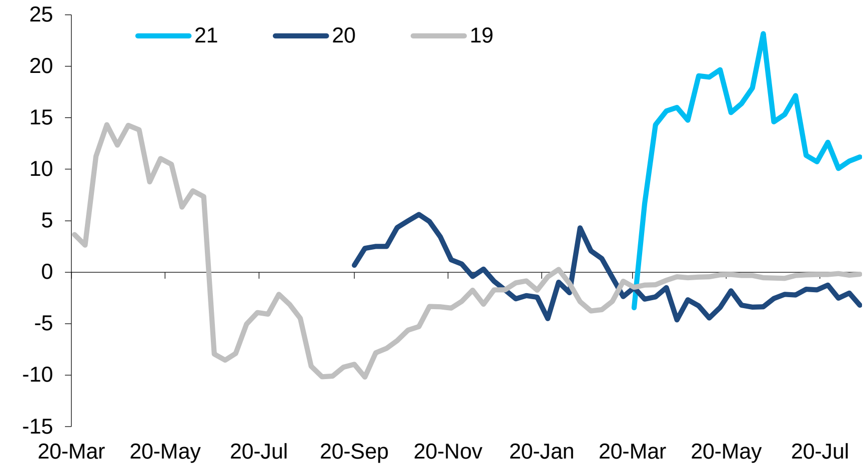
Trading volumes by Series

In €bn. 5y iTraxx Main



Non-dealer net positioning by Series

In $bn. iTraxx Main. +ve/-ve: Non-dealers long/short risk.



Example of a "Roll" run

In bp. As of 21-Aug-14.

Source: Citi Research, Markit.

Index series: On- and Off-the-run

- **When people refer to an index, they generally refer to the "on-the-run"**
  - When plotting historical spreads, the "on-the-run" index is used
    - E.g. plotting the 5y iTraxx Europe Main on-the-run guarantees that you are looking at an IG portfolio with 5y maturity at all times.
  - In BBG the "on-the-run" is called the "generic" index.

iTraxx Main 5y on-the-run spreads

Source: Citi Research, Markit.

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What trades?

- **A wide selection of CDS indices trade – for different regions as well as asset classes**
  - Regions: Europe, North America, EM, Asia
  - Asset classes: IG, Financials, HY, Loans, Sovereigns
- **All indices trade the same way**
  - Apart from the underlying constituents, index will differ in the number of constituents and the fixed coupons they trade with.

	Europe	North America	EM & Asia
IG	iTraxx Europe Main iTraxx Senior Financials iTraxx Sub Financials	CDX IG	iTraxx Asia ex-Japan IG iTraxx Japan iTraxx Australia
HY	iTraxx Crossover	CDX HY	iTraxx Asia ex-Japan HY
Loans	iTraxx LevX	LCDX	
Sovereigns	iTraxx SovX Western Europe		iTraxx SovX CEEMEA iTraxx SovxX Asia Pacific CDX EM

Source: Citi Research, Markit.

What trades?

Index	Region	No. Entities	Selection	Coupon (bp)	CCY	Traded tenors	Recovery rate*
iTraxx Europe Main	Europe	125	Most liquid IG CDS; sector diversified	100	EUR	3, 5, 7, 10y	40%
iTraxx Crossover	Europe	75	Most liquid HY CDS	500	EUR	3, 5, 7, 10y	40%
iTraxx Senior Financials	Europe	25	Most liquid banks & insurers	100	EUR	5, 10y	40%
iTraxx Sub Financials	Europe	25	Most liquid banks & insurers	100	EUR	5, 10y	20%
CDX IG	US	125	Most liquid IG	100	USD	3, 5, 7, 10y	40%
CDX HY	US	100	Most liquid HY	500	USD	3, 5, 7, 10y	30%

- **Indices trade on an "upfront + fixed coupon" format** – all of them.
- **Most indices are quoted on a "spread" format, except CDX HY which is quoted on a "Price" format**.
- For details on each index composition rules – please see Markit's website.

Remember:

$$Upfront + Coupon \cdot Duration = Spread \cdot Duration$$

$$\text{"Price"} = 100 - Upfront$$

- Our daily **iTraxx Main and Crossover analytic reports (@ CitiVelocity)** provide plenty of historical information on:

  Spreads, Market positioning, Volatility, Correlation and dispersion, off-the-run spreads, index trading volumes, curves …

Source: Citi Research, Markit. * To be used when transforming a spread into an upfront via CDSW in Bloomberg.

How much?

- Our monthly **CDS Index Trading Volume Report** provides detailed data on index trading volumes.

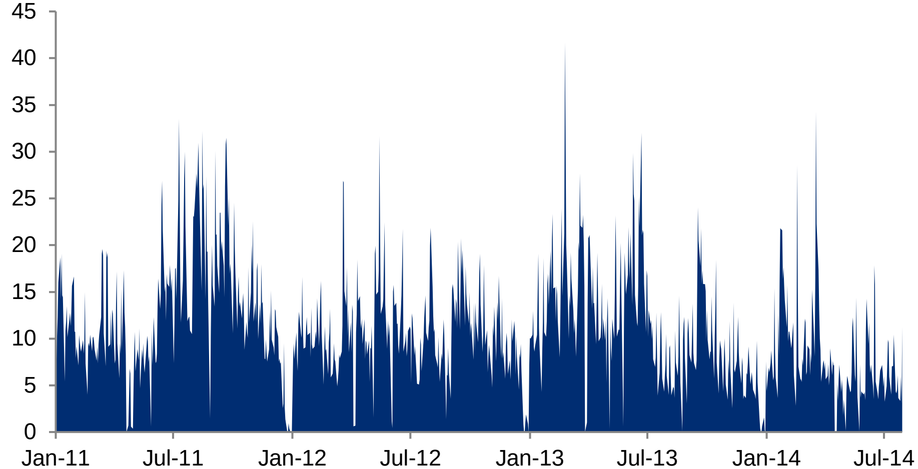
Average daily trading volumes - bn

Local currency, on-the-run indices. 2014 YtD: Up to July.

	2012	2013	2014 YtD
Main	10.8	11.9	8.2
Crossover	3.0	2.8	2.4
Senior Fin	2.6	2.3	1.7
Sub Fin	0.4	0.3	0.2
CDX IG	16.8	11.9	6.6
CDX HY	3.2	2.7	1.9

iTraxx Main daily trading volumes – bn

Local currency, on-the-run indices.



Daily volume by Series – iTraxx Main

Local currency, 5y on-the-run indices. As of 22-Aug-14.

	S21	S20	S19	S18
21-Aug-14	6.13	0.00	0.00	0.00
1w average	7.49	0.29	0.00	0.00
1m average	8.14	0.42	0.00	0.00
6m average	7.11	0.55	0.22	0.13

Source: Citi Research, Markit.

How is the market positioned?

- DTCC provides data on **Dealer vs. Non-dealer aggregate net positioning in CDS indices**.
- See our weekly **CDS Index Positioning Report** provides detailed data on index trading volumes.

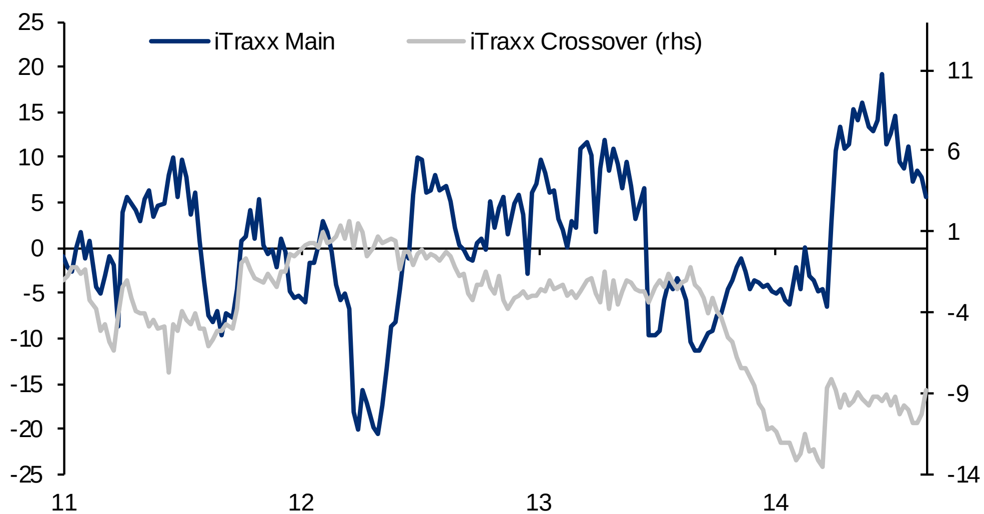
Non-Dealer Positioning in CDS Indices

	Current	1w chg	1m chg	Series	Current by Series		
					21	20	19
iTraxx Main	5.6	-2.1	-1.8	21, 20, 19	9.8	-3.7	-0.5
iTraxx Crossover	-8.8	1.5	2.0	21, 20, 19	-3.1	-4.2	-1.5
iTraxx Senior Fin	-2.2	1.0	0.5	21, 20, 19	-3.2	1.6	-0.7
iTraxx Sub Fin	-2.2	0.0	-0.2	21, 20, 19	-0.1	-1.3	-0.8
					22	21	20
CDX IG	35.6	4.2	2.7	22, 21, 20	36.9	-0.9	-0.5
CDX HY	4.6	1.4	-1.9	22, 21, 20	5.6	-1.2	0.1

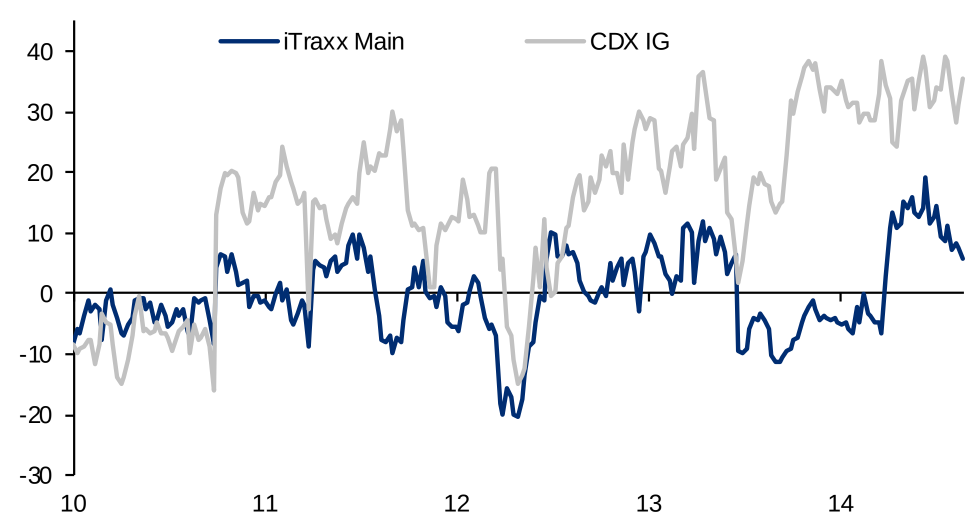
What do the volume signs represent?
Positive: Non-dealers long risk
Negative: Non-dealers short risk

Data as of the week ending on:	22 Aug 14
Index series included:	On-the-run + previous 2
Volume data measured in:	$bn

iTraxx Main vs. iTraxx Crossover
In $bn, +ve/-ve: Non-dealers long/short risk.



iTraxx Main vs. CDX IG
In $bn, +ve/-ve: Non-dealers long/short risk.



Source: Citi Research, DTCC.

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"**Skew**" = Traded index spread *minus* theoretical spread

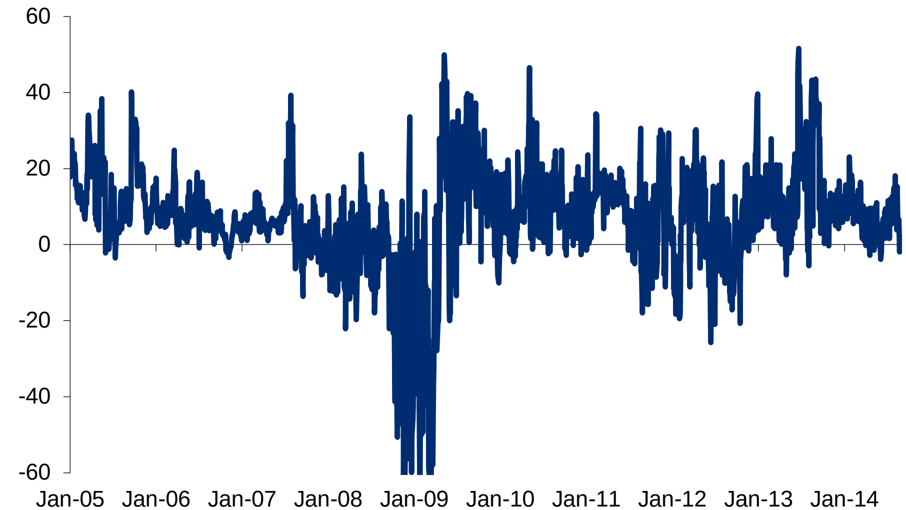
- **CDS indices have a "theoretical" value (spread)**
  - Since indices are baskets of single name CDS, they can be perfectly replicated.
  - The cost of this perfect replication – which depends on the spreads of each of the index constituents – determines the index theoretical spread (a.k.a. "intrinsic" spread or "NAV").
- **The theoretical index spread can deviate from its traded spread** – their difference is call "skew" or "basis-to-theoretical"
  - Why? Different supply-demand technicals between the index (macro & liquid) market and the single name CDS (idiosyncratic & less liquid) market.
  - Clearest example: sudden negative news make investors rush for quick index hedges; single names lag and the skew gets +ve.

iTraxx Main Skew

In bp. 5y on-the-run indices. Traded minus theoretical spread.

iTraxx Crossover Skew

In bp. 5y on-the-run indices. Traded minus theoretical spread.



Source: Citi Research, Markit.

How is the theoretical spread computed?

- **Let's replicate the index with the underlying single names**. Take iTraxx Crossover for example, with 75 equally weighted names.
  - To replicate a long risk 75m index position, we would have to sell 1m protection on each underlying single name CDS.
- At first glance, taking a simple average of the spreads of all the single name CDS constituents would seem to work.
  - And it takes you close to the proper result, but not quite.
  - A duration-weighted average of the single name CDS spreads would take you closer; but again, not quite.
- **To create a perfect replicating strategy, you need the basket of single names to have the same spread as the index**
  - Imagine that the Crossover index is currently trading with a <u>275bp</u> spread, which generates a -9.75% upfront (using a 500bp coupon and a 40% recovery rate).
    - We know how to go from spread to upfront given a coupon and a recovery rate: CDSW.
  - Imagine you sell 1m protection on each of the 75 Crossover constituents, with 500bp coupon (i.e. the same as the coupon in the Crossover index) and with the same maturity as the index one, and that generates an initial upfront of -11.5%.
    - That -11.5% is the simple average of the upfronts of all the Crossover constituents, using their corresponding spreads and the same coupon (500bp) and recovery (40%) than the index.
    - We now take the resulting upfront, -11.5% and compute the corresponding spread: <u>238bp</u>. That's the theoretical index spread, resulting from our replicating strategy.
    - In our example, the "skew" would be 37bp (= 275 – 238bp).
  - **What trade would you do if the spreads above were real? How much would you make? Any risks there?**

Why is there a “skew”?

- **Negative skew**
  - There is more selling protection pressure on the index than on single names
  - Why?
- **Positive skew**
  - There is more buying protection pressure on the index than on single names
  - Why?

What is an “arb” trade?

- **Imagine the previous example:**
  - iTraxx Crossover trading at 275bp – equivalent to a -9.75% upfront (with a 500bp coupon).
  - The theoretical spread is 238bp – equivalent to a -11.5% upfront (with the same coupon and maturity).
- **Trade?**
  - Sell 75m Crossover protection @ 275bp
    - Cash flows: pay 7.3125m upfront today and receive 3.75m annual coupon going forward.
  - Buy 1m protection of each of the underlying single names
    - Cash flows: receive 8.625m upfront today and pay 3.75m annual coupon going forward.
    - The 8.625m upfront is the sum of all the upfronts received in each single name trade, if done with a 500bp coupon and the same index maturity. The 3.75m coupon is, again, the sum of all the coupons received in each single name trade.
- **Positive skew: traded > theoretical spread => Sell index protection and buy single name protection**
  - Impact: make the index tighter, the single names wider => reduce the skew.
- **What are the “problems” of “arb” trades?**
  - Execution: 76 trades in the example above.
  - Bid-ask: can one really capture the basis after paying all the bid-asks?
  - MtM: the trade is “risk-free” if you can hold it to maturity, but it has MtM as the skew moves.

Agenda

- What are CDS Indices?
- Mechanics and cash flows
- Index series: On- and Off-the-run
- What trades? How much? How is the market positioned?
- Index “skew” and “arb” trades
- **Data and Daily Analytics @ CitiVelocity**

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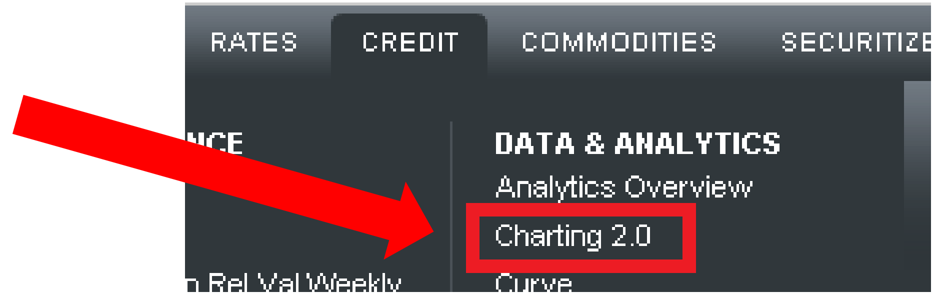
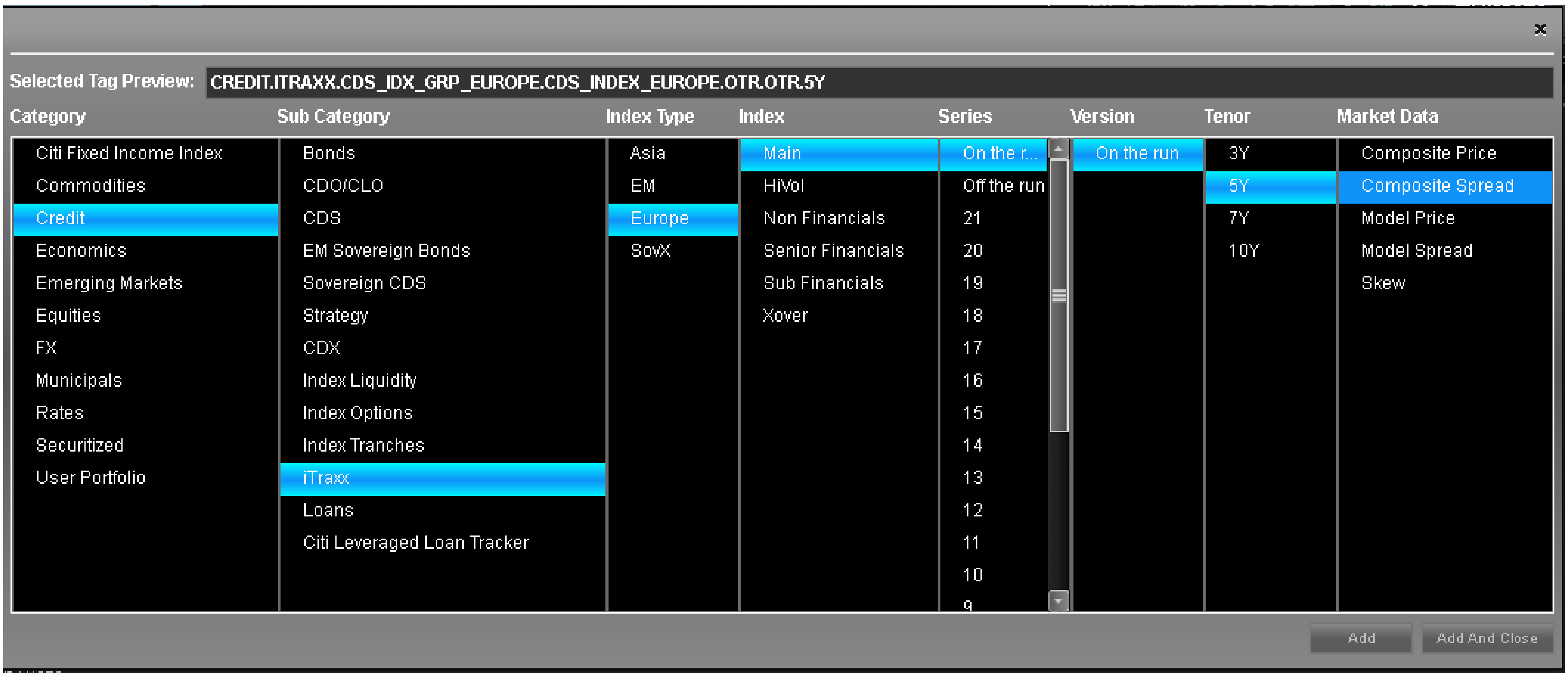
- **Historical data** on the charting tool.





Source: Citi Research.

Data and Daily Analytics @ CitiVelocity

- Analytic reports:
  - **iTraxx Main** and **Crossover** index reports
  - CDS Index **Trading Volume** report
  - CDS Index **Positioning** report
  - **Derivatives Indices** Report
  - World of **Intrinsics**
  - CDS **Ratios** Report
  - **Cross-Market** Report

Source: Citi Research.

Appendix A-1

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