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Markit M10CDITX
Total Return Index
Guide

March 2019

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1 Introduction

This document explains the technical calculation of the M10CDITX Total Return Index:

- Markit 10y CDX and iTraxx GBP Hedged Tri Index

The Index measures the performance of a leveraged equally weighted credit position in the respective on-the-run 10 year CDX & iTraxx index contracts hedged in to GBP held against a GBP funding component. The index reflects a long credit position i.e. selling protection on the CDX / iTraxx default swap indices. It therefore replicates the behavior of a fictitious portfolio that buys equal amounts of CDX / iTraxx index contracts. The portfolio is always invested in the on-the-run CDX / iTraxx series that it tracks - each time a new CDX / iTraxx series is issued, due to the regular index roll (every March and September) or due to a credit event in the current series, the CDS position in the reference portfolio is rolled into the on-the-run/reduced index position.

The base index level is set to 100 at the base date 20-March-2015 an index back history has been calculated back to 21 March 2011 for observational purpose.

2   Index Calculation

2.1   Methodology

The Index measures the performance of holding a leveraged position in the respective on-the-run CDX / iTraxx CDS contracts with a monthly resetting GBP currency hedge, credit exposure is funded by a GBP cash component. The index replicates selling protection on the CDX / iTraxx credit default swap indices with an initial overall leverage of 4x GBP cash holding, GBP cash held is invested in money market instruments all resulting transactions from EUR and USD denominated credit positions are settled and Marked-to-Market at GBP spot - the index return therefore reflects a monthly GBP hedged long credit position. On the first trading day of the new on-the-run indices, in March and September for CDX.NA.IG and iTraxx Europe indices, if these days are business days[1], if not the next business day - the position in the off-the-run index is unwound and a position in the new series is entered into. The contracts are sold and purchased at the official Markit 17:00 London mid-spread on the relevant trading day.

The index reflects a protection seller position and therefore receives a coupon on a quarterly basis. Any coupons[2] paid are added to GBP cash holding converted at using the WM4PM FX rate on the coupon payment date.

2.2   Leverage

At the outset the initial index leverage is set so that protection is sold to the equivalent of 4x times the GBP cash component within the index. Protection is sold on equal GBP notional amounts of iTraxx Europe and CDX North America to achieve the desired leverage. Leverage is then only reset if it breaches leverage thresholds of above 5.6x or below 3.2x, in the event that either of the leverage thresholds are breached GBP cash holdings will be increased or decreased to return the index to a leverage level of 4x.Any increase/decrease of cash following a breach of leverage will be done on the index business day preceding the next Index Dealing Day[3] that is a minimum of 8 index business days after the day on which the breach of leverage limits occurs.

2.3   GBP Currency Hedge

On the last Index Business day of each month the MTM on each of the credit indices CDX North America and iTraxx Europe are hedged for their currency exposure to USD and EUR, by entering into 1 Month GBP forwards to hedge out the currency risk.

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[1] Relevant holiday calendar for all iTraxx Indices: www.markit.com/Documentation/Product/ITraxx
CDX indices follows the SIFMA recommended a holiday schedule
[2] Coupon payment dates are on Mar/Jun/Sep/Dec 20th, business day adjusted following, all Coupons and recovery rates are available in the index documentation on www.markit.com
[3] The Index Dealing Calendar can be found in the Document Annex and is updated on an annual basis.

2.4 Semi-annual index roll process

The regular roll process from the off-the-run into the new on-the-run indices is a straight forward process. At any one point only the most recently available index CDS return is included in the index return calculation. The return of the index therefore reflects the value of exiting the long risk position in the old CDX North America and iTraxx Europe contracts and simultaneously entering the new contracts at mid 17:00 London time on the first day of trading of the new contracts. The relative proportions of CDX and iTraxx contracts are also rebalanced at this time and further detail is in 4.2. Note that transacting at mid means that transaction costs are not included. Therefore, the following roll transaction costs will be implemented[4]:

- The roll transaction costs for the CDX.NA.IG 10-year roll will be 0.25% of the respective "old" series coupon plus 0.25% of the respective "new" series coupon applied to the spread
- The roll transaction costs for the iTraxx Europe 10-year roll will be 0.25% of the respective "old" series coupon plus 0.25% of the respective "new" series coupon applied to the spread

2.5 Index data and disruption

For Markit to be able to publish the daily M10CDITX Total Return index level the relevant iTraxx / CDX spreads must be published. In periods of market stress or disruption as well as in illiquid or fragmented markets preventing the publication of a daily Markit iTraxx/CDX spread, Markit will publish a statement outlining the course of action due to the disruption on the Markit website www.markit.com/Product/Indices under the News page.

In the event of a major structural change within the CDS market impacting the M10CDITX Total Return indices calculation, Markit will confer with all relevant stakeholders and publish the outcome of any material change as well as any decisions taken at Markit's discretion that has led to the resulting methodology change.

Should the relevant FX rates or overnight funding rate as per the index calculus not be available at the time of Index publication and no further notice having been posted by the relevant central bank or administrative agent: the Administrator, acting in a commercially reasonable manner, may determine that it is appropriate to depart from the methodology by either keeping the last available rate or in the event of longer disruption seeking an alternative rate.

2.6 Index restatement

Index restatement follows the policy described in the Index restatement policy document, available on the Markit website www.markit.com

2.7 Index review

Index methodology reviews for the Total Return indices outlined within this guide are performed on a periodic basis. Any material changes to the methodology governing the Total Return indices are published on the Markit website www.markit.com under the relevant News page.

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[4] The methodology of determining the roll transaction cost is subject to change by Markit if warranted by market conditions. This methodology will be checked on every first calendar day of the iTraxx index roll month and will only be changed if market conditions change dramatically.

3   Management of defaults in the underlying indices

When credit events occur, Markit announces that a new "reduced" contract will replace the current "full" contract as the official one. Markit does not determine credit events, but following a credit event the index will effectively move into the new reduced contract.

3.1   Trigger event

Following a credit event in a constituent of the on-the-run CDX or iTraxx index, the ISDA Determinations Committee votes to decide if a credit event has occurred for the entity and if an auction for the defaulted entity is to be held. If the outcome of this vote is positive, Markit publishes a new version of the index annex zero weighting the relevant entity i.e. the "reduced" index.

3.2   Procedure

For the Total Return Indices, the date on which the indices are rolled from the "full" index (with the defaulted name) to the "reduced" index (without the defaulted name) is usually done on the business day following the auction date. However for "restructuring" credit events the contract will be rolled on the business day following the Event Determination Date (EDD).

The CDX and iTraxx index prices at which the position of the "reduced" index is valued are determined by Markit at 17:00 London time, the reduced contract will be used to value the index as of the business day following the Auction date or EDD whichever is applicable .To reflect the default the index factor will be reduced by the weight of the defaulted constituent which in turn will reduce the notional exposure to the reduced index by the equivalent percentage by which the index factor is reduced. Furthermore a default payment amount will be calculated based on the recovery rate determined by the credit auction, the weight of the constituent and the notional exposure to the index containing the name at the time of default. The GBP cash amount within the index will be reduced to reflect the payment determined.

4 M10CDITX Total Return Index Calculus

4.1 Index calculation

The base index level of M10CDITX is set to be 100 at the launch day of 20th March 2015 coinciding with the launch of Series 24 of the CDX.NA.IG index and Series 23 of the iTraxx Europe index. At the index base date the cash level of the index is initially set at GBP 25 million to achieve the initial leverage of 4 times protection is sold to the equivalent of GBP 100 million which is equally split between the two underlying indices, trades are executed in the index currencies USD and EUR all currency conversions are done at the 1600 WMR fix of the transaction day. Index terminology can be found in the index guide appendix.

The total return index level I_t on day t is calculated as

$$I_t = (Cash_t + CDXMTM_t^{GBP} + iTRXMTM_t^{GBP} + FXMTM_t) / Divisor_t$$

Where

$$CDXMTM_t^{GBP} = CDXNotional_t * -(1 - P_t - AC_t) * FX_t^{LCY/CCY}$$

$$iTRXMTM_t^{GBP} = iTRXNotional_t * -(1 - P_t - AC_t) * FX_t^{LCY/CCY}$$

$$FXMTM_t = FXMTM_t^{CDX} + FXMTM_t^{iTRX}$$

$$Cash_t = Cash_{t-1} + Cash_{t-1} * t_{O/N} f_t + Coupon_t + Tradefee_t + DP_t + FXMTM_{t-s} + CI_t$$

$$Divisor_t = Cash_b + \sum_{i=1}^{n} CI_i$$

Where

$$FXMTM_t^{CDX} = CDXMTM_{t-s}^{USD} * ((FX_{t-s}^{LCY/CCY} + (FX_{t-s,t}^{LCY/CCY} - FX_{t-s}^{LCY/CCY}) * (-(HDay_{t-s} - CalcDay_t)/HP_{t-s}) - FX_t^{LCY/CCY})$$

$$FXMTM_t^{iTRX} = iTRXMTM_{t-s}^{EUR} * ((FX_{t-s}^{LCY/CCY} + (FX_{t-s,t}^{LCY/CCY} - FX_{t-s}^{LCY/CCY}) * (-(HDay_{t-s} - CalcDay_t)/HP_{t-s}) - FX_t^{LCY/CCY})$$

4.2 Index Rolls

In the case of the regular semi-annual index rolls, the portfolio is rolled over and the return on the roll date is calculated in the usual way, as specified above, and a "Tradefee" is added to account for Bid/Ask trading cost. The new notional to be traded on the roll date is determined 10 index business days ahead of the roll date (Notional Reset Date) according to the below formula:

$$IndexNotional_{t-RS} = iTRXNotional_t^{GBP} + iTRXMTM_t^{GBP} + CDXNotiond_t^{GBP} + CDXMTM_t^{GBP}$$

$$CDXNotiond_t^{GBP} = CDXNotiond_{t-rs} * CDXIF_t * FX_t^{LCY/CCY}$$

$$iTRXNotional_t^{GBP} = iTRXNotional_{t-rs} * iTRXIF_t * FX_t^{LCY/CCY}$$

Where:

$$CDXNotiond_{t-rs} = IndexNotional_{t-rs} / 2 * FX_{t-rs}^{LCY/CCY}$$

$$iTRXNotional_{t-rs} = IndexNotional_{t-rs} / 2 * FX_{t-rs}^{LCY/CCY}$$

Trade costs are determined according to the following formula:

$$Tradefee_t = CDXTradeFee_t^{GBP} + iTRXTradeFee_t^{GBP}$$

$$CDXTradeFee_t^{GBP} =$$
$$\left(CDXNotional_{t-1}^{USD} * -(CDS_t^{oldseries}\left(S_t^{oldseries} + TC^{oldseries}\right) \right.$$
$$\left. - CDXNotional_t^{USD} * -(CDS_t^{newseries}\left(S_t^{newseries} + TC^{newseries}\right) \right) * FX_t^{LCY/CCY}$$

$$iTRXTradeFee_t^{GBP} =$$
$$\left(iTRXNotional_{t-1}^{EUR} * -(CDS_t^{oldseries}\left(S_t^{oldseries} + TC^{oldseries}\right) \right.$$
$$\left. - iTRXNotional_t^{EUR} * -(CDS_t^{newseries}\left(S_t^{newseries} + TC^{newseries}\right) \right) * FX_t^{LCY/CCY}$$

Where:

$S_t^{oldseries}$: the market spread of the old CDX.NA.IG series at day t

$TC^{oldseries}$: the transaction cost of rolling out of the old series, as specified in Section 2.4

$S_t^{newseries}$: the market spread of the new CDX.NA.IG series at the roll day t

$TC^{newseries}$: the transaction cost of rolling into the new series, as specified in Section 2.4

$CDS_t^{newseries}\left(S_t^{newseries} - TC^{newseries}\right)$: the mark-to-market value of the new series with adjusted spread of

$S_t^{newseries} - TC^{newseries}$, survival probabilities calculated using adjusted spread

$CDS_t^{oldseries}\left(S_t^{oldseries} + TC^{oldseries}\right)$: the mark-to-market value of the old series with adjusted spread of

$S_t^{oldseries} + TC^{oldseries}$, survival probabilities calculated using adjusted spread

4.3   Leverage resetting

Leverage is set initially at 4x GBP cash and only reset if thresholds of 3.2 or 5.6 are hit, the index leverage is reset by increasing/decreasing GBP cash holdings.

$$IndexLeverage_t = \frac{iTRXNotional_t^{GBP} + iTRXMTM_t^{GBP} + CDXNotional_t^{GBP} + CDXMTM_t^{GBP}}{cash_t + iTRXMTM_t^{GBP} + CDXMTM_t^{GBP} + FXMTM_t}$$

In the event that $3.2 < IndexLeverage_t > 5.6$

$$CI_i = \left[1 - \left(\frac{IndexLeverage_t}{4}\right)\right] * Cash_t$$

Any increase/decrease of cash following a breach of leverage is set on the day of the breach as per the above formula .However only on the index business day preceding the next index dealing day that is a minimum of 7 index business days after the day on which the breach of leverage limits occurs is change in cash implemented.

4.4   Index Default

In the event of the ISDA determinations committee voting on a credit event having occurred in one of the underlying constituents on the index business day following the credit auction a default payment as well as an adjustment to the notional exposure to the underlying index will be implemented. The below example is for a credit event in the on the run iTraxx Europe index.

$$DP_t = \left[1 - \left(\frac{1 - Auction\,Re\,cevory}{100}\right)\right] * Constituen\,tweight_t * iTRXNotional_{t-1} * FX_t^{LCY/CCY}$$

5 Marking CDS to Market

The mark-to-market value of an iTraxx CDS contract is the difference between the present value of contingent payments on defaults minus the present value of all future fixed rate payment.

For this mark-to-market calculation the ISDA CDS Standard Model is used. More information regarding the model input factors used as well as the ISDA CDS Standard Model source code can be downloaded freely from: www.cdsmodel.com

An Upfront fee calculator based on the ISDA CDS Standard model is available on www.markit.com.

6 Further information

- Further information regarding use of the Markit credit indices and glossary of key terms are available in the Markit Credit Index Primer located in the indices documentation section under Primers on www.markit.com/indices

- For contractual or content issues please refer to

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7 Appendix

I_t = index level at time t

$Cash_t$ = index cash at time t

$Cash_b$ = Cash at inception

$CDXMTM_t^{GBP}$ = CDX North America(CDX NA) Mark to Market at time t denominated in GBP

$iTRXMTM_t^{GBP}$ = iTraxx Europe Mark to Market at time t denominated in GBP

$CDXMTM_{t-s}^{USD}$ = CDX NA Mark to Market on hedge day denominated in USD

$iTRXMTM_{t-s}^{EUR}$ = iTraxx Mark to Market on hedge day denominated in EUR

$Divisor_t$ = index divisor on day t

$CDXNotional_t$ =Notional amount of protection sold on CDX NA in USD at time t $iTRXNotional_t$

=Notional amount of protection sold on iTraxx Europe in EUR at   time t

$iTRXNotional_t^{GBP}$ = Notional amount of protection sold on iTraxx Europe converted in   to GBP at time t

$CDXNotional_t^{GBP}$ = Notional amount of protection sold on iTraxx Europe converted in   to GBP at time t

$FXMTM_t$ = FX Mark to Market of aggregate Forwards

$FXMTM_t^{CDX}$ = FX Mark to Market of USD Forwards

$FXMTM_t^{iTRX}$ = FX Mark to Market of EUR Forwards

$FXMTM_{t-s}$ = Realised FX hedge on last day of hedge period

P_t = CDS contract price at time t

AC_t = is the Accrued Coupon till day t from the last coupon day

$FX_t^{LCY/CCY}$ = Spot exchange rate at t

$FX_{t-s,t}^{LCY/CCY}$ = Forward exchange rate at last hedge date for hedge period

$FX_{t-s}^{LCY/CCY}$ = Spot exchange rate at last hedge date

$FX_{t-rs}^{LCY/CCY}$ = Spot exchange rate on the notional reset day

$Cash_{t-1}$ = Index cash on preceding index business day

$t_{O/N}f$ = is the Federal Funds Rate at day t-1, day count convention Act/360

$Coupon_t$ = underlying index Coupon payments at time t

$Tradefee_t$ = proceeds received/paid on index roll

DP_t = Default payment in the event of underlying constituent defaulting

CI_i = Cash injection at time t to amend leverage

$HDay_{t-s}$ = Hedge date at time t

$CalcDay_t$ =Index calculation date at time t

HP_{t-s} =Days in hedge period at time t

$IndexNotional_{t-RS}$= Index Notional credit exposure in GBP on reset day

$CDXNotional_{t-rs}$= CDX NA Notional credit exposure in USD on reset day

$iTRXNotional_{t-rs}$= iTraxx Europe Notional credit exposure in EUR on reset day

8 Annex

8.1 Dealing Calendar

Dealing Days 2019		
09 January 2019	08 May 2019	09 September 2019
16 January 2019	15 May 2019	16 September 2019
23 January 2019	22 May 2019	23 September 2019
31 January 2019	31 May 2019	30 September 2019
07 February 2019	07 June 2019	09 October 2019
14 February 2019	14 June 2019	16 October 2019
21 February 2019	21 June 2019	23 October 2019
28 February 2019	28 June 2019	31 October 2019
07 March 2019	09 July 2019	07 November 2019
14 March 2019	17 July 2019	14 November 2019
21 March 2019	24 July 2019	21 November 2019
29 March 2019	31 July 2019	29 November 2019
05 April 2019	07 August 2019	10 December 2019
12 April 2019	14 August 2019	17 December 2019
23 April 2019	22 August 2019	
30 April 2019	30 August 2019	