# SMART Enhancements
5.8.0

07th Feb 2017

# Table of Contents

# 1 SMART Changes

## 1.1 Overview

**Important Notice**

**This 5.8.0 release of SMART is a mandatory upgrade which has the following enhancements:**

- Provide ability to import FPML trades into desktop
- Fix to support the new name for MXN regulatory body in REP0003
- Liquidity Add-on column removed from estimated IM table
- Fixed Curve assignment to include the NOK index OIBOR (curvemap.csv)
- VNS eligibility extended to include CHF,CZK,DKK,HKD,HUF,MXN,NZD,SGD,ZAR (eligibility.csv)

## 1.2 API changes

There are no changes to  API introduced as part of this release.

## 1.3 Configuration File Changes

The following configuration files have changed in the current release (however it is recommended that the entire release is replaced):

- indexConventions.csv
- curvemap.csv
- system.csv

It is therefore recommended that you replace both lib and config/etc directories when you upgrade.

## 1.4 Report Changes

There are no changes to the layout of the reports that are used in SMART.

Below is a summary of those reports which drive each service: SwapClear (OTC), Portfolio Balancing (PB) and Listed:

| ID | Name | OTC | PB | LISTED | Changed? |
|---|---|---|---|---|---|
| 3 | Historic Index Rates | Y | Y | Y | N |
| 6 | Calendar | Y | Y | Y | N |
| 18 | FX Rates | Y | Y | Y | N |
| 79 | IM Yield Curve – Zero Yield Day 0 | Y | Y | Y | Y |
| 79.spread | IM Yield Curve – Zero Yield Day 0 | Y | Y | N | Y |

| | | | | | |
|---|---|---|---|---|---|
| 79.tenor | IM Yield Curve – Zero Yield Day 0 | Y | Y | N | Y |
| 90 | SwapClear Scenario Report | Y | Y | N | Y |
| 90.spread | SwapClear Scenario Report | Y | Y | N | Y |
| 90.tenor | SwapClear Scenario Report | Y | Y | N | Y |
| 100 | Risk Yield Curve – Zero Rates Day 0 | Y | Y | Y | Y |
| 101 | VM Yield Curves – Zero Rates Day 0 | Y | Y | N | Y |
| 133 | Inflation Seasonality | Y | Y | N | N |
| 134 | IM Inflation Curves | Y | Y | N | N |
| 135 | VM Inflation Curves | Y | Y | N | N |
| | SMART0001.DAT | Y | Y | Y | Y |

Please refer to section 4 for a detailed explanation of all these reports

## 1.5 SMART Desktop changes

Provide ability to import FPML trades into desktop

# 2 FAQs

## 2.1 Release Contents

### 2.1.1 Is this release of SMART a mandatory upgrade?

Yes. The new version is a mandatory upgrade.

### 2.1.2 Is this release backward compatible?

Yes this version of SMART is backward compatible and works with earlier sets of data.

### 2.1.3 SMART Spider FAQ

#### 1. Can I reduce my total IM liabilities by perfectly hedging my OTC portfolio with listed products?

Although a prefect hedge is not achievable between OTC and Listed, a great level of IM reduction can be achieved.

For example a single OTC swap resetting on STIRS futures dates can be hedged with an equivalent strip of STIR futures providing a large total IM reduction.

In reality OTC portfolios are usually very diversified with a lower level of direct offset achievable. The resulting total final IM is also affected by additional add-ons that can further decrease the offset effect.

#### 2. I have my largest OTC risk on the mid-long end of the swap curves ie.10Y+, can I still benefit by cross margin using STIRS futures up to 3Y or 5Y?

Yes, there should be some cross margining benefit, because the IM optimization works on IM scenario rather than deltas, it takes in account the portfolio margining characteristics across all products, risk factors and currencies.

#### 3. I have added some simulated positions to my OTC and/or Listed portfolio and my resulting transferred listed portfolio is now very different from before, is that normal?

Many different solutions can be close to the optimal solution, the addition of few trades or moving into a new business day can cause the transfer positions to be very different, however this should not be of concern as the Total final IM is not expected to change substantially unless the risk added is substantial.

#### 4. Is there a way to identify the listed positions that reduces my total IM the most?

A starting listed positions set is always required. Users can simulate listed trade positions, use original position or a mix of simulated and original ones.

To exclude an original position just book an opposite sign simulated position.

Once the desired starting positions have been defined, run the balancer, the transferred positions will provide a good indication of the most efficient position, the process can be repeated by using transferred starting position as original position.

#### 5. What are the Add On affecting my final total IM numbers?

The IM optimization process works with OTC base IM and Listed base IM only (no Add on).

The following add on values are then added to calculate the total final IM:

IM add-ons include:

- Diversification Add On - Diversification benefit between futures and minor currency swaps will be limited via an add-on.
- PM Add On - applied to margin savings as result of the Portfolio margining. The charge is a percentage of the savings in basic Initial Margin. This Add On is applied only if listed positions are balanced to Swapclear accounts.
- Liquidity Add On – this Add On is charged for concentrated risk positions. This is calculated based on 2 quantities:
    - IMM1 : Captures the total IM breaching the liquidity thresholds. When members are margining listed accounts, the IMM1 will be calculated on total IM of listed and OTC accounts.
    - IMM2 : Captures the concentration risk for listed and OTC trades

        - Outright interest rate risk: The existing SwapClear IMM FP methodology will be used to capture concentrated outright directional risks across the combined listed/OTC rates service.
        - Swap vs futures basis risk: An additional component of IMM FP will be introduced to cater for futures vs swap basis risk.
        - LCRM: Captures the concentration risk for all ineligible products for margining (Bond futures).

    Where a member has the possibility to incur both types of IMM it is typically the larger of the two that will be charged.
    Further details of the individual curve concentration charge can be found on the “Liquidity Summary” tab. For a complete description of SwapClear Liquidity Add On methodology please see the document “Liquidity Margin!” that can be found on the LCH secure website.
- Basis Risk Add On –this Add On is computed based on tenor basis exposures. Further details are available on the “Basis Risk Detail” tab and in the related document, “Basis Risk Addon_TIP_v2.2.pdf.”
    - Unscaled Add On – this Add On is required when a VaR figure run with unscaled scenarios is more negative than the traditional PAIRS base initial margin calculation. The 5.6.0 version will load STIRS scenarios for margined STIRS trades in the SwapClear account. Please also see “AddendumToPAIRS_V1.0.pdf.”

# 3 Appendix I - Historical Release Changes

## 3.1 Overview

### 3.1.1 Version 5.7.6

**Important Notice**

This 5.7.6 release of SMART is an upgrade which has the following enhancements:

- Introduction of NOK-NIBOR-OIBOR index (to initially run in tandem, with the NOK-NIBOR-NIBR equivalent)
- VNS support extended for NOK, PLN, SEK
- Eligibilty changes for DKK, NOK,PLN

### 3.1.2 Version 5.7.5

**Important Notice**

This 5.7.5 release of SMART is an upgrade which has the following enhancements:

- Support for the new Listed Rates Exchange LDM for Listed Rates and Spider
- The ability to calculate unscaled VAR add-on for Listed Rates and included this in Portfolio Balancing for Spider
- VNS support extended for JPY, CAD and AUD

### 3.1.3 Version 5.6.0

**Important Notice**

This 5.6.0 release of SMART is an upgrade which has the following enhancements:

- The ability to calculate margin and add-ons (liquidity margin) for Listed Rates
- Revised add-ons for SwapClear
- The ability to run portfolio margining using EOD reports and:
  View resulting margin and add-ons post portfolio balancing
  View transferred futures
- Manually simulate a portfolio of swaps and futures for the purposes of portfolio margining
- SMART001.dat file, REP00090, REP00X90Spread, and REP00X90Tenor has been enhanced with additional information

Note that SMART will not replicate the portfolio balancing results obtained because SMART works on EOD SwapClear reports, whereas the Portfolio Balancer uses a snapshot of the SwapClear portfolio at approximately 5pm EST

### 3.1.4 Version 5.4.1

**Important Notice**

**This 5.4.1 release of SMART is an upgrade which has the following enhancements:**

- SMART has now been extended to support the product/curve extensions
- Supports the new Delta based IMMFP implementation
- Provides ability to load the new client trade report SMART0003C/CL
- Changes to the eligibility as per changes in Swap Clear.
- Valuation fixes for FRA, Basis Swaps and Compounding Swaps
- Basis Risk threshold reduced from 10M to 3M GBP
- MXN is now included for Basis Risk calculations
- Ability to explicitly specify EOM convention of 28th and 29th in GUI and API
- Ability to specify known amount as an alternative to fixed rate in the API and trade csv.
- SMART GUI displays the 50Y ultra long addon in IMMFP Breakdown as per the new IMMFP methodology

### 3.1.5 Version 5.4.0

**Important Notice**

**This 5.4.0 release of SMART is a mandatory upgrade which has the following enhancements:**

- SMART has now been extended to support the product/curve extensions
- Support for MXN Swaps
- Fix to support the Inflation French Curve change from Linear to Piecewise

### 3.1.6 Version 5.3.1

**Important Notice**

**This 5.3.1 release of SMART is an upgrade which has the following enhancements:**

- SMART has now been extended to handle zero coupon inflation swaps (ZCIIS)
- Additional reports have been included for inflation curves and seasonality
- Fixed the issue with incorrect sensitivity ladders for forward starting swaps
- Support for package FPML transactions

### 3.1.7 Version 5.3.0

**Important Notice**

**This 5.3.0 release of mandatory SMART is an upgrade which has the following enhancements:**

- SMART now supports LIBOR OIS basis swaps (GBP LIBOR OIS Basis Swaps and USD FEDFUND LIBOR Basis Swaps) and JPY TONA OIS Swaps
- Basis Risk sensitivity reports 102 Ois/Spread/Tenor are no longer available and SMART uses the sensitivity report 103 instead to calculate Basis Risk
- Performance improvements
- Support for CAD 1M curve (when the curve gets added the VM space).

### 3.1.8 Version 5.2.1

**Important Notice**

**This 5.2.1 release of SMART is an upgrade which has the following enhancements:**

- SMART calculates the new Unscaled Add-on to initial margin
- More details are available from the Liquidity Add-on and Basis Risk Add-on calculations
- Various usability improvements

### 3.1.9 Version 5.1.0

**Important Notice**

**The 5.1.0 release of SMART is a mandatory upgrade which has the following enhancements :**

- SMART allows for the use of the Account column in various reports to contain segregated account information.
- The SMART API now supports FRA additional payments in trade FpML.
- Correction to boot strapper to incorporate compounding swaps.
- SMART now matches Murex as in it discards CAD ois discounting risk included in the CAD hedge trade ladders.
- Correction to IMMFP bucketing to match hedge trade maturities and not the nearest from the par curve.
- Introduction of JPY 1M curve into the VM space for forward estimation.
- Introduction of HKD 3M and 6M curves into the VM space for forward estimation.
- Introduction of SGD 3M and 6M curves into the VM space for forward estimation.
- The number of futures in the GBP and EUR STD and 3M VM curves has increased to align the curves more to the market.

## 3.2 API changes

All API changes for this release are intended to be backward compatible. API changes for the current release include the following:

- New methods to retrieve the un-scaled add-on and the total initial margin including all add-ons, with the deprecation of some earlier methods
- New methods exposing the details of the liquidity add-on and basis risk add-on calculations

The bundled version of the Protocol Buffers library has been updated from version 2.4.1 to 2.5.0.

Both the API and the desktop application have been compiled with Java 7 and the desktop now ships with a v7 JRE.

## 3.3 Configuration File Changes

system.csv, TradeTemplate.csv, indexConventions.csv but it is recommended that you replace both the lib and the config/etc folder when you upgrade

## 3.4 Library changes

No change to the interface.

## 3.5 Report Changes

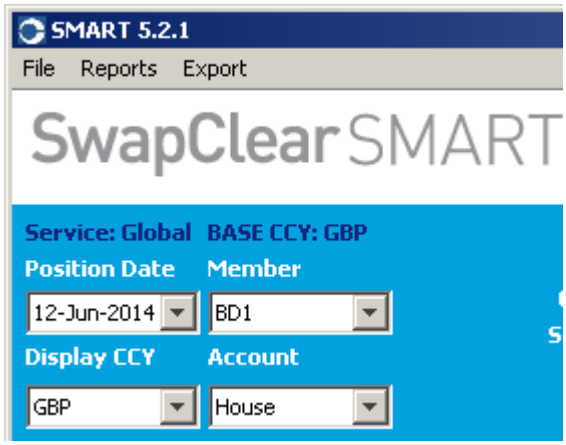
The binary file, SMART0001.DAT has now been extended to include the data used in producing the un-scaled add-on. For backward compatibility, SMART will continue to read the older versions of the SMART0001.DAT file, but the un-scaled add-on field will not be set. Likewise, older versions of SMART will be able to use the new file for use in calculating the liquidity add-on, but will not compute the un-scaled add-on.

## 3.6 SMART Desktop changes

### 3.6.1 Buttons moved to Menu items

The function to initialize SMART with reports loaded from a local directory or download reports from the LCH secure website has been moved from large blue buttons in the upper panel to menu items under the new “Reports” menu on the top bar of the application (with hotkey accelerators).

Likewise, the button to export the contents of the current tab to Excel has moved to the “Export” menu (or by double right clicking in the lower pane).




### 3.6.2 IM Summary Table

The IM summary table in the top panel now reflects all margin add-ons as well as the base IM value and a grand total:

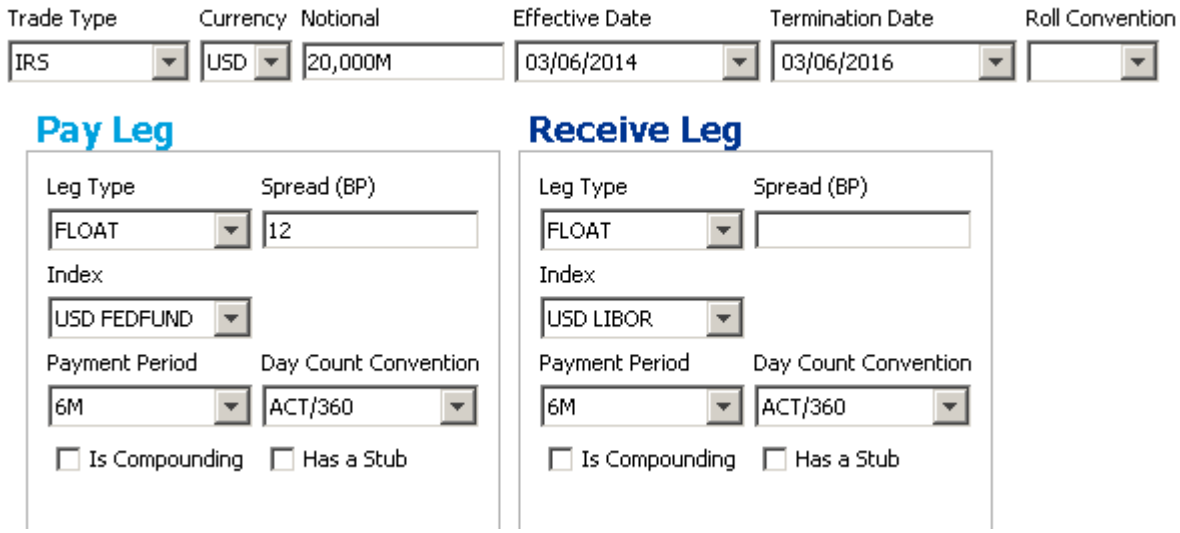
| | BASE INITIAL MARGIN | LIQUIDITY ADDON | BASIS RISK ADDON | UNSCALED ADDON | TOTAL IM |
|---|---|---|---|---|---|
| Original Portfolio | -1,513,113,620 | -1,513,113,620 | -47,346,511 | 0 | -3,073,573,753 |
| Simulated Trades | -93,520,133 | -7,752,278 | -14,417,156 | -4,907,061 | -120,596,629 |
| Combined | -1,472,269,603 | -1,472,269,603 | -47,402,532 | 0 | -2,991,941,739 |
| Impact on IM | 40,844,017 | 40,844,017 | -56,020 | 0 | 81,632,013 |

- Base Initial Margin – the IM computed using the LCH PAIRS methodology

- Liquidity Add-on – the more negative of IMM1 or IMM First Principles (IMMFP)
- Basis Risk Add-on – the basis risk adjustment figure
- Unscaled Add-on – the additional margin required if the unscaled VaR calculation figure is higher than the base IM (see the "AddendumToPAIRS_V1.0.pdf" document on the member secure area for more details).
- Total IM – the total initial margin figure including all available add-ons

### 3.6.3 New Trade

Both the pay leg and the receive leg of the new trade entry tab now have a field for the index of a floating leg. Generally these will default to the correct value, but it is necessary to specify the appropriate indices for IRS basis swaps to distinguish between tenor basis (eg 3M LIBOR vs 6M LIBOR) and LIBOR OIS basis (3M LIBOR vs FEDFUNDS).

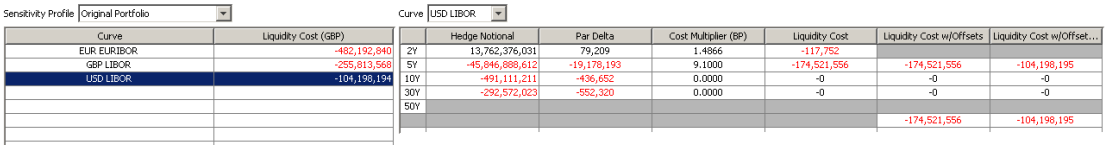



The new index field in the lower simulated trades table is optional, except in the case of LIBOR OIS basis trades, where the expected values are the ISDA index names.

| Type | Notional | CCY | Effective | Termination | Pay Leg | | | | | | Receive Leg | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Type | Rate | Index | Pay Period | Day Count | Com… | Type | Rate | Index | Pay Period | Day Count |
| IRS | 200,000,000 | USD | 03-Jun-14 | 03-Jun-16 | FLOAT | 12 | USD-Federal Funds-H.15 | 6M | ACT/360 | | FLOAT | 0 | USD-LIBOR-BBA | 6M | ACT/360 |

### 3.6.4 Liquidity Detail

The new Liquidity Detail tab shows the details for the IMMFP calculation. Each IM curve for which there is an IMMFP charge is displayed in the left table. Clicking on any one of these shows the details for that curve in the right table, including par delta, cost multiplier and liquidity cost per pillar point with and without offsets. Please see the "Liquidity Margin.pdf" document on the member secure area for more details of this calculation.



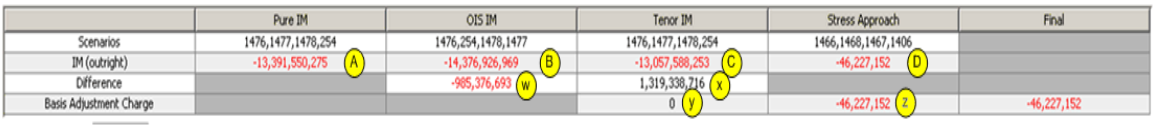

| Curve | Liquidity Cost (GBP) |
|---|---|
| EUR EURIBOR | -482,192,840 |
| GBP LIBOR | -255,813,568 |
| USD LIBOR | -104,198,194 |

| | Hedge Notional | Par Delta | Cost Multiplier (BP) | Liquidity Cost | Liquidity Cost w/Offsets | Liquidity Cost w/Offset… |
|---|---|---|---|---|---|---|
| 2Y | 13,762,376,031 | 79,209 | 1.4866 | -117,752 | | |
| 5Y | -45,846,888,612 | -19,178,193 | 9.1000 | -174,521,556 | -174,521,556 | -104,198,195 |
| 10Y | -491,111,211 | -436,652 | 0.0000 | -0 | -0 | -0 |
| 30Y | -292,572,023 | -552,320 | 0.0000 | -0 | -0 | -0 |
| 50Y | | | | | | |
| | | | | | -174,521,556 | -104,198,195 |

## 3.7 Basis Risk Detail

The Basis Risk Details tab shows the details underlying the basis risk add-on calculation. The top table displays summary results for the four different approaches used in calculating the basis add-on: Pure IM, OIS IM, Tenor IM, and Stress. For each of these, the total incremental add-on, including thresholds, is

shown on the bottom line. Further details on the Basis Risk calculation are available in the related document, Basis Risk Addon_TIP_v2.2.pdf.



| | Pure IM | OIS IM | Tenor IM | Stress Approach | Final |
|---|---|---|---|---|---|
| Scenarios | 1476,1477,1478,254 | 1476,254,1478,1477 | 1476,1477,1478,254 | 1466,1468,1467,1406 | |
| IM (outright) | -13,391,550,275 A | -14,376,926,969 B | -13,057,588,253 C | -46,227,152 D | |
| Difference | | -985,376,693 w | 1,319,338,716 x | | |
| Basis Adjustment Charge | | | 0 y | -46,227,152 z | -46,227,152 |

A. Pure IM - Expected shortfall calculated using the standard PAIRS methodology and the standard IM curve assignments, but with a reduced set of scenarios (from Dec 2008) and averaging the worst 4 (rather than the worst 6) outcomes.
B. OIS IM - Similar to the Pure IM, but using OIS curve assignments for discounting.
C. Tenor IM - Similar to Pure IM, but using the full VM curve mapping, including OIS discounting and tenor forward curves.
D. Stress Approach - Applies observed historical changes in tenor basis spreads to portfolios' net basis risk position considered in isolation to calculate future potential losses due to widening or narrowing of the basis.

The table on the lower left is controlled by the Basis Risk Approach select box. Under the IM approach, it shows a table of the three IM approaches, broken down by curve. Selecting any one of these cells will further show the detailed scenario results for that curve and approach on the lower right table. Alternatively, choosing Stress will show the stress approach breakdown, with individual scenario results again shown on the lower right.

## 3.8 Known Issues

None

# 4 SwapClear End of Day Reports

The SMART API relies upon a number of SwapClear End of Day Reports.

Download of Reports from MemberLive is to be handled as a separate task outside of SMART tool. Members should have a process in place to download the reports required by SMART from the MemberLive website to a specific location in their organization's network. The files used in the calculation must be downloaded daily from LCH. Member Reporting and all saved on the same folder. The necessary files and their respective links are:

**YYYYMMDD_REP00003 - Historic Index Rates_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Trade

**YYYYMMDD_REP00006 - Calendar_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Trade

**YYYYMMDD_REP00016a - OTC Portfolio Cash Settlement (SCM)_ 1.txt**

https://memberlive.lch.com/Reporting/nnn/SwapClear/YYYYMMDD

OR

**YYYYMMDD_REP00016c - OTC Portfolio Cash Settlement (Client)_ 1.txt**

https://memberlive.lch.com/Reporting/nnn/SwapClear/YYYYMMDD

NOTE: Anyone of the two reports is needed to retrieve the FX rate. The reports contain information on house respective clients' positions

Alternatively

**REP00018 – Daily Exchange Rates_1.TXT**

https://memberlive.lch.com/Reporting/Public/Banking

NOTE: The report contains exchange rates from banking; please observe that the rates are slightly different from the rates in report 16.

**YYYYMMDD_REP00079 - IM Yield Curve - Zero Yield Day 0_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/Yield Curves

**YYYYMMDD_REP00079Spread - IM Yield Curve - Zero Yield Day 0_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/Yield Curves

**YYYYMMDD_REP00079Tenor - IM Yield Curve - Zero Yield Day 0_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/Yield Curves

**YYYYMMDD_REP00090 - SwapClear Scenario Report_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/Yield Curves

**YYYYMMDD_REP00090Spread - SwapClear Scenario Report_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/Yield Curves

**YYYYMMDD_REP00090Tenor - SwapClear Scenario Report_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/Yield Curves

**YYYYMMDD_REP00100 - Risk Yield Curve - Zero Rates Day 0_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/Yield Curves

**YYYYMMDD_REP00101 - VM Yield Curve - Zero Rates Day 0_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/Yield Curves

**YYYYMMDD_REP00133 - Inflation Seasonality_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/Yield Curves

**YYYYMMDD_ REP00134 - IM Inflation Curve - Par Rates Day 0_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/Yield Curves

**YYYYMMDD _REP00135 - VM Inflation Curve - Par Rates Day 0_ 1.TXT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/Yield Curves

**YYYYMMDD_REP00102 - IM Sensitivity Report (SCM)_ 1.TXT**

https://memberlive.lch.com/Reporting/nnn/SwapClear/YYYYMMDD

**YYYYMMDD_REP00102c - IM Sensitivity Report (Client)_ 1.TXT**

https://memberlive.lch.com/Reporting/nnn/SwapClear/YYYYMMDD

The equivalent report for clients would be called 102cl and for fund managers 102cf

**YYYYMMDD_REP00103 - Tenor Sensitivity Report (SCM)_ 1.TXT**

https://memberlive.lch.com/Reporting/nnn/SwapClear/YYYYMMDD

**YYYYMMDD_REP00103c - Tenor Sensitivity Report (Client)_ 1.TXT**

https://memberlive.lch.com/Reporting/nnn/SwapClear/YYYYMMDD

The equivalent report for clients would be called 103cl and for fund managers 103cf

**YYYYMMDD_ REP00138 - IM Cross Gamma Sensitivity Report_ 1.TXT**

https://memberlive.lch.com/Reporting/nnn/SwapClear/YYYYMMDD

**YYYYMMDD_ REP00138c - IM Cross Gamma Sensitivity Report_ 1.TXT**

https://memberlive.lch.com/Reporting/nnn/SwapClear/YYYYMMDD

The equivalent report for clients would be called 138cl and for fund managers 138cf

**YYYYMMDD_SMART0001.DAT**

https://memberlive.lch.com/Reporting/Public/SwapClear/Risk/SMART

**YYYYMMDD_SMART0002.TXT**

https://memberlive.lch.com/Reporting/nnn/SwapClear/YYYYMMDD

“nnn” is the generic for the Mnemonic Code for the member.

An equivalent report for clients would be call 2c and 2f

**YYYYMMDD_SMART0003c/cf.TXT**

https://memberlive.lch.com/Reporting/nnn/SwapClear/YYYYMMDD

Only for direct clients

**Listed Position Statement Report**

https://memberlive.lch.com/Reporting/nnn/NLX//YYYYMMDD