ForexClear

Settlement Management Margin: SMM

(FX Spots, Forwards and Options)

Methodology Document

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Contents

1. Purpose

This document is a technical information specification for ForexClear's *Settlement Management Margin* ("*SMM*") add-on. This document provides full details of the *SMM* methodology, specifically focused on G10 FX option contracts, spot, and forward.

2. Overview

ForexClear provides an inter-bank foreign exchange clearing service for FX options ("FXOs") and associated FX spot and forward hedges (collectively referred to as the "FXO service").

ForexClear collects Initial Margin ("IM") from each member to cover the potential losses arising from a member's portfolio over a specified close-out period under prevailing market conditions. It represents the potential market risk on any open position. It is called regularly throughout the day and is used to cover an estimate of the worst probable potential future losses in the event of default of a clearing house member, given normal market conditions.

Given the deliverable nature of the products within the FXO service which does not exist within the current NDF service the SMM add-on is used to cover the potential settlement replacement cost associated with these instruments. This add-on therefore will only be applicable to the FXO Service.

3. Settlement Management Context

In the event of settlement failure, ForexClear will need to fulfil their settlement pay in obligations and pay in to CLS on behalf of the member with a settlement failure so that the cycle can complete and all other members receive the required pay outs.

SMM covers the potential cost of ForexClear having to pay-in to the CLS cycle and then replenish the ForexClear settlement provisions given the subsequent pay outs received.

To allow for clearing to final settlement, ForexClear will maintain settlement provisions in each currency. In the event of a member settlement failure, ForexClear may be required to use its settlement provisions to complete the settlement process in a timely manner. In such a case, ForexClear will receive a contra currency as part of the settlement process and will need to rebalance/replenish the settlement provisions used by either executing next-day outrights (or swap trades); the potential cost of rebalancing/replenishing settlement provisions over a 5 day horizon is captured by the Settlement Replacement Cost ("SRC") which forms part of the SMM.

The second component of the SMM will be the settlement variation margin ("SVM") to cover changes in a trade MTM between EOD SD-2 and SD. This is required because ForexClear will cease issuing a liability in PPS for the VM on trades at EOD SD-2 so that a final Pay In Pay Out ("PIPO") obligation can be issued 24 hours prior to the CLS settlement cycle.

4. Product Scope

In addition to its existing NDF clearing service, ForexClear will clear FX Spots, Forwards and FX Options OTC contracts for the following currency pairs:

- AUD/USD (Australian Dollar vs US Dollar)
- EUR/CHF (Euro vs Swiss Franc)
- EUR/GBP (Euro vs British Pound)
- EUR/JPY (Euro vs Japanese Yen)
- EUR/USD (Euro vs US Dollar)
- GBP/USD (British Pound vs US Dollar)
- USD/CHF (US Dollar vs Swiss Franc)
- USD/JPY (US Dollar vs Japanese Yen).

The tables below outline the product scope for the cleared contracts.

Table 1 - Eligibility Criteria for FX Options

Category	Definition
Product	LCH Deliverable FX Options (single leg or package)
Option Style	European Vanilla
Underlying Asset	Eligible LCH Spot
Expiry Range	Minimum: 1 business day Maximum: 2 years
Cut Times	New York: 10:00 (local time) Tokyo: 15:00 (local time)

Table 2 - Eligibility Criteria for FX Spots/Forwards

Category	Definition
Product	LCH Spot or Forward (single leg or package)
Tenor Range	Minimum: Spot Maximum: 2 years
Settlement	Physical delivery via CLS

Table 3 - FX Options and Spot/Forward Product Conventions

Category	EUR /USD	EUR /CHF	EUR /GBP	EUR /JPY	GBP /USD	AUD /USD	USD /CHF	USD /JPY
Base currency	EUR	EUR	EUR	EUR	GBP	AUD	USD	USD
Term currency	USD	CHF	GBP	JPY	USD	USD	CHF	JPY
Quote basis	Term per Base							
Pip size	0.0001	0.0001	0.0001	0.01	0.0001	0.0001	0.0001	0.01
Spot	T+2	T+2	T+2	T+2	T+2	T+2	T+2	T+2
Bus day calendars	TE, FD	TE, SZ	TE, GB	TE, JN	GB, FD	AU, FD	FD, SZ	FD, JN
Prem-included delta	No	Yes	Yes	Yes	No	No	Yes	Yes
Option premium ccy	Base or Term currency (or USD)							
Option premium date	Spot							
ATM vol convention	*Expiry less than 10 years*: Delta-neutral straddle							
Delta convention	*Expiry less than 2 years*: Spot delta *Expiry 2 years or more*: Forward delta							

5. Methodology Description

5.1 Overview

The *Settlement Management Margin ("SMM")* is an additional margin add-on. This settlement margin is considered as the potential cost incurred should ForexClear need to fulfil a members settlement obligations on their behalf.

The SMM comprised of two components as follow:

$$SMM = SRC + SVM$$

where,

SRC = Settlement Replacement Cost

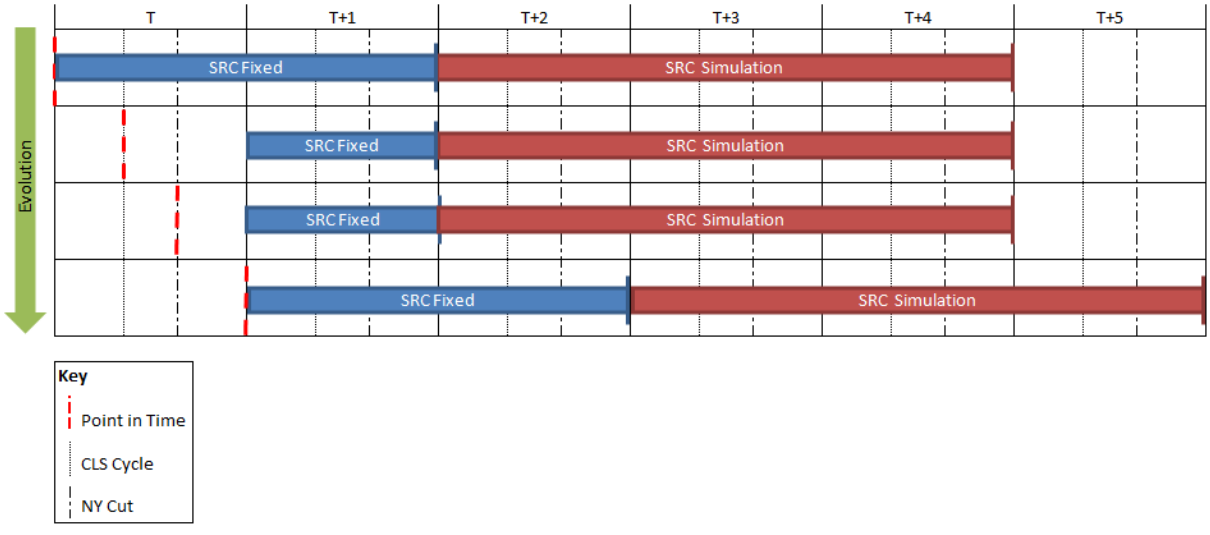
SVM = Settlement Variation Margin

5.2 Settlement Replacement Cost ("SRC")

The SRC represents the potential cost of executing next-day FX transactions in order to rebalance/replenish the settlement provisions used in the event of a member settlement failure.

Once a trade is exercised at either the New York or Tokyo cut, the settlement obligation becomes certain so ForexClear will be able to determine the net notional in each currency due for settlement on T and T+1. Prior to the New York or Tokyo cut the settlement obligations are not certain so ForexClear will use the *Foreign Exchange Settlement Exposure Tolerance ("FxSET")* model to calculate the worst expected settlement exposure for each currency over T+2 to T+4.

$$SRC = SRC_{Fix} + SRC_{sim}$$



For this calculation the margin will roll at the EOD margin run.

5.2.1 SRC Fixed

Once the settlement limits enforcement process has been executed the settlement obligations are fixed and the "Fixed" SRC ("SRC_{Fix}") is calculated as:

$$SRC_{Fix} = \sum_{Ccy} SRC_{Ccy}$$

$$= \sum_{Ccy} \frac{SrcSpread_{Ccy}}{10{,}000} \times \min\left(0, SettObligation_{Ccy,T} + SettObligation_{Ccy,T+1} + Prefunding_{Ccy}\right) \times FxRate_{Ccy-USD}$$

where,

$SrcSpread_{Ccy}$	= spread from the SRC Spread Matrix in Table 4 for currency *Ccy* (in basis points)
$SettObligation_{Ccy,t}$	= settlement requirement for currency *Ccy* (where a pay-in obligation is a negative value) on day *t*
$FxRate_{Ccy-USD}$	= FX spot rate expressed as amount of USD per 1 unit of *Ccy*
$Prefunding_{Ccy}$	= Prefunding is amount of collateral lodged at central banks

Post the CLS cycle on day T no settlement obligations will exist for that day so in subsequent calculations of the SRC_{Fix} that day the $SettObligation_{Ccy,T}$ will equal to 0.

The SRC Spread Matrix will be defined by currency, relating to the bid-to-mid spread for a next-day trade for the amount of settlement provision in that currency. Table 4 below provides an example of a SRC Spread Matrix.

Table 4 - SRC Spread Matrix (for example purposes only):

Currency	AUD	CHF	EUR	GBP	JPY	USD
SPA (local Ccy million)	80	80	160	120	0	360
Spread (bps)	10	20	15	20	20	20

Spread parameters will be obtained from a quarterly survey of the DMG, where the following question will be asked:

- *Please provide your views on the bid-to-mid spread (in basis points) that would be incurred in executing next-day trades for the notional amounts indicated over a 12 hour period under stress market conditions.*

5.2.2 SRC Simulated

In order to simulate what the settlement obligations may be prior to them becoming known the Simulated SRC ("SRC_{Sim}") will use the *Foreign Exchange Settlement Exposure Tolerance ("FxSET")* model[1] to calculate the worst expected settlement exposure between T+2 and T+4. The expected settlement exposure over the 3 days will be capped at the 3 times the Settlement Provision Amounts ("*SPA*") given a forced trade down will occur once obligations are known to ensure members are below the SPA in all currencies.

The first stage to calculate the SRC_{Sim} is to use the *FxSET* model to calculate a settlement exposure for each day and currency under each scenario and use this to calculate a SRC in local currency for each scenario used in the FxSET model:

$$SRC_{Ccy,j} = max\left(min\left(\sum_{i=2}^{4} Settlement\ Exp_{Ccy,j,T+i}, 0\right), -3SPA_{Ccy}\right) \times \frac{SrcSpread_{Ccy}}{10{,}000}$$

Where:

$Settlement\ Exp_{Ccy,j,t}$	= Settlement exposure calculated using the FxSet model for currency *Ccy*, day *t* and under scenario *j*
$SrcSpread_{Ccy}$	= spread from the SRC Spread Matrix in Table 4 for currency *Ccy* (in basis points)
SPA_{Ccy}	= SPA from the SRC Spread Matrix in Table 4 for currency *Ccy*

The above calculation will create 5 (Ccys) x 2500+ (FxSET scenarios incl. stresses) vectors and the next stage is to convert the $SRC_{Ccy,j}$ into a USD equivalent and aggregate to create a single SRC_{USD} vector:

$$SRC_{USD,j} = \sum_{Ccy} SRC_{Ccy,j} \times FxRate_{Ccy-USD,j}$$

Where:

$FxRate_{Ccy-USD}$	= FX spot rate expressed as amount of USD per 1 unit of *Ccy* under scenario *j*
$SRC_{Ccy,j}$	= SRC for currency *Ccy* under scenario *j*

The *SRC* charge is then the worst SRC_{USD} under all scenarios *j*.

5.3 Settlement Variation Margin ("SVM")

Settlement obligations are calculated on EOD SD-2 at SD-2 closing prices. To account for the price changes on these positions between EOD SD-2 and their settlement in CLS, ForexClear hold a SVM liability which corresponds to the difference in mark-to-market on these transactions since their settlement price has been determined.

$$SVM = \sum_{i=1}^{n} ((MTM_{t,i} - MTM_{SD-2,i}) \times FxRate_{Ccy-USD,t})$$

Where:

$MTM_{t,i}$	= Current mark to market of trade i
$MTM_{SD-2,EOD}$	= Mark to market value of trade i at end of day 2 days before settlement date
$FxRate_{Ccy-USD,t}$	= FX spot rate expressed as amount of USD per 1 unit of *Ccy*