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GFMA Global FX Division
OTC FX Options Clearing & Settlement Analysis Results

REFERENCE GUIDE TO REVIEWING PROJECT RESULTS

The purpose of this reference guide is to assist interested stakeholders in reviewing the project's results by briefly defining key terms used, explaining the underlying rationale for key assumptions made, and providing background and context for how data was analyzed and some general commentary and observations.

Slide 8 Approach For Sizing Same Day Liquidity Shortfall for OTC FX Options

Five key assumptions

1. *A single CCP (in order to achieve greatest netting efficiencies, but not intended to suggest or promote a single CCP).*

   General commentary

   A single CCP is generally viewed as the model that would, or would most likely, yield the greatest liquidity efficiencies, in comparison to multiple CCPs, due to multilateral netting. From this perspective, the results provide an indication of minimum, baseline same day liquidity requirements which CCPs can work towards managing in the first instance and, subsequently, test the strength of their potential models/solutions against other scenarios – such as a multiple CCP environment, as well as stress cases (*e.g.*, change in market trading behavior, significant FX market movements, etc).

   The liquidity figures were also calculated on the basis of *multiple* CCPs, in particular clearing via three or five CCPs. These multiple CCP scenarios were selected for illustrative purposes only, namely to provide an indication of how the size of the same day liquidity shortfall may vary based on the number of CCPs. While the results of the single, three and five CCP scenarios do not reflect an upper bound to, or maximum size of the same day liquidity problem for clearing in this market, the results suggest that the size of this shortfall increases as the number of CCPs increases (*see, e.g.*, each figure in the single CCP scenario is the same as or greater than its equivalent figure in the three CCP scenario; and, similarly, each figure in the three CCP scenario is the same as or greater than its equivalent figure in the five CCP scenario).

2. *An option determined to be in-the-money (based on prevailing market rates) on its "exercise date" was settled on the "settlement date" specified in the trade data.*

   General commentary

   The results of the project's calculations are based on a single CCP clearing OTC FX options traded by one of the 22 GFMA Global FX Division ("GFXD") member firms (each, a "GFXD firm" or "G22 firm") and their affiliates with another G22 firm or with a non-G22 firm (excluding corporate clients), with an expiry date between January 1, 2007 and December 31, 2011. An FX option was treated as exercised, and therefore generating a

payment to be delivered in one currency in exchange for receipt of another currency on the "settlement date" specified in the trade data, if the option was determined to be "in-the-money" based on FX market rates prevailing on the "exercise date" specified in the trade data.

While the results identify the two clearing firms generating the largest combined settlement obligations on any given settlement date for exercised FX options, the results do **not** take into consideration stress cases, or "worst case" scenarios, such as changes in market behavior (which could have led to an increase or decrease in the values/volumes of FX options traded) or FX market movements (which could have led to the exercise of more or less FX options). This is commonly referred to as the "cover 2" liquidity requirement set forth in the *Principles for Financial Market Infrastructures* ("FMI Principles") which was jointly published in April 2012 by the BIS Committee on Payment and Settlement Systems ("CPSS") and International Organization of Securities Commissions ("IOSCO").[1] The results therefore provide an indication of minimum, baseline same day liquidity requirements which a CCP clearing such transactions should have been capable of managing based on historical trading activity and FX market rates. CCPs seeking to clear deliverable FX options would therefore also need to consider appropriate stress cases, including but not limited to these two examples, in light of global regulatory expectations set forth in the FMI Principles.

3. *The CCP calculated settlement obligations due to it from its clearing firms on the basis of multilateral netting under an integrated solution between clearing and settlement.*

   General commentary. There are natural efficiencies resulting from transactions processed by a CCP, namely, a central counterparty that is capable of calculating settlement obligations on a multilateral netted basis. This is analogous to the multilateral net funding efficiencies achieved by the CLS settlement service, which yields an average payment netting benefit of nearly 96%.[2] The project's analysis therefore also assumes an integrated solution between clearing and settlement, *e.g.*, one or more CCPs and CLS, in order to take maximum advantage of these efficiencies to the greatest extent practicable.

4. *Each GFXD firm is a clearing firm.*

5. *For client clearing scenarios (3), assumptions regarding concentration in firms providing this client services have been made: client clearing through (i) a single existing GFXD firm (e.g., a dominant FX PB firm); (ii) five existing GFXD firms (e.g., major FX PB firms); or (iii) a single non-GFXD firm.*

   General commentary. Each of the three "interdealer market with client clearing" scenarios includes (A) the interdealer market, *i.e.,* trades between two GFXD firms (or their affiliates), plus (B) the client market, *i.e.*, trades between a GFXD firm and its clients (excluding corporates).

   It is important to note that the three scenarios were **not** selected as stress cases. Rather, the scenarios were selected for illustrative purposes – to provide an indication of how the size of the same day liquidity shortfall may vary based on who is providing client clearing services and the number of providers. In particular, the results illustrate the impact on settlement obligations/liquidity shortfalls and payment reduction benefits, by currency and across all currencies, of the concentration in clearing services, as well as of clearing services

[1] http://www.bis.org/publ/cpss101a.pdf.

[2] *CLS Assessment of Compliance with Core Principles for Systemically Important Payment Systems (December 2011*). http://www.cls-group.com/About/Documents/CLS%20Bank%20-%20Core%20Principles%20Assessment.pdf.

being provided by firms which are not the GFXD firms who represent more than 90% of the FX dealer flow. While the results of these three scenarios do not reflect an upper bound to, or maximum size of the same day liquidity problem for clearing in this market, the results suggest that the size of this problem may or may not increase as the number of providers increases. This is because, *e.g.*, if the two GFXD firms driving the FMI Principles cover 2 liquidity requirement for a given day do not provide client clearing services, in any of the client clearing scenarios, their liquidity requirements (pay-ins) would not change in the client clearing scenarios because the population of trades clearing through such two firms would not change. While the inclusion of client activity in the population of trades clearing through a GFXD firm could increase that firm's liquidity requirements on a given day, such clearing firm may or may not be driving the largest FMI Principles cover 2 liquidity requirement for that day (in other words, one or more non-clearing firms could still drive the largest FMI Principles cover 2 liquidity requirement for that day in either of the client clearing scenarios). For these reasons, the peak liquidity requirement for a currency may be the same under each of the three client clearing scenarios.

Client clearing via a single GFXD firm. This scenario addresses the situation where client clearing services are concentrated in a single, existing GFXD firm. In this scenario, the GFXD firm is the clearing firm for (i) its trading activity with other GFXD firms (or their affiliates); (ii) its trading activity with its clients; and (iii) the trading activity of other GFXD firms' clients. The key assumption for this scenario is that a single GFXD firm emerges as a dominant clearing firm for this market, meaning the other GFXD firm's clients do not utilize the clearing services of the GFXD firms with whom they are trading. The other GFXD firms do, however, function as their own clearing firms for their own side of the trading activity, whether trading with another GFXD firm or a client.

Client clearing via five GFXD firms. This scenario addresses the situation where client clearing services are concentrated in a few – in this case, five – existing GFXD firms. The key assumption for this scenario is that not all GFXD firms will be offering clearing services to their clients and/or that a few (in this case five) GFXD firms emerge as dominant clearing firms for this market. For purposes of this scenario, the clients were distributed evenly among the five GFXD clearing firms.

Client clearing via a single non-GFXD firm. This scenario addresses the situation where client clearing services are concentrated in one or more firms which are **not** the existing GFXD firms. The key assumption for this scenario is that one or more non-GFXD firms emerge as dominant clearing firms for this market. In this scenario, institutions that trade with GFXD firms only use such firms for trading purposes and not for client clearing services. The GFXD firms do, however, function as their own clearing firms for their side of the trading activity. It is worth noting that this scenario does not explicitly analyze how the number of non-GFXD clearing firms could impact settlement obligations/liquidity shortfalls, payment reduction benefits. As explained above, however, while the results of these three scenarios do not reflect an upper bound to, or maximum size of the same day liquidity shortfall for clearing in this market, the results suggest that the size of this problem may or may not increase as the number of providers increases.

Slide 9 Significance of FX Options in OTC FX Market

Key terms

- *"interdealer market" (or dealer – dealer)* – refers to trading activity between two dealers; for purposes of this project, refers to trading activity between two GFXD firms (or their affiliates).

- *"client market" (or "dealer – client")* – refers to trading activity between a GFXD firm and its clients (excluding corporates).
- *"sides" compared to "trades"* – there are two sides to each trade, with each side representing the payment of one currency from one party to another party in exchange for the receipt of another currency.
- *"average daily gross notional value"* – refers to the average daily sum of the notional value of the relevant FX option contracts.

Slides 11-13 Illustration of Calculation Used to Size Same Day Liquidity Shortfall

Key terms

- *"without offset"* – analysis "without offset" involves the aggregation of pay-ins due from the relevant clearing firms to the CCP.
- *"with offset"* – same as analysis "without offset" with the following additional steps: (i) netting/offsetting the pay-ins (commonly referred to as short positions) in each currency due from each of the two clearing firms to the CCP against any pay-outs (commonly referred to as long positions) in the relevant currency due from the other clearing firm to the CCP; and (ii) aggregating these netted positions for the relevant clearing firm(s). This assumes no pay-outs to any clearing firm until all funding is received from all clearing firms.

- *"gross settlement obligations"* – requirements calculated by aggregating pay-ins due from a clearing firm to the CCP for a given currency (or across all currencies, in USD equivalents), without regard to any pay-outs due from the CCP to such clearing firm in the same currency (or in all currencies) in order to discharge obligations under its transactions.
- *"net settlement obligations"* – same as gross settlement obligations with the following additional steps: (i) netting/offsetting such aggregate amount with pay-outs due from the CCP to such clearing firm in the same currency (or in all currencies); and (ii) if applicable, aggregating these netted positions for the relevant clearing firm(s).

Slide 15 Summary Results – Size of Liquidity Shortfall for OTC FX Options – Single CCP

Key terms

- *"interdealer market"* – as described under slide 9 above, refers to trading activity between a GFXD firm and its clients (excluding corporates).
- *"interdealer market with client clearing"* – refers to trading activity in the interdealer market plus the client market (*i.e.*, between a GFXD firm and its clients, excluding corporates).

- *"overall peak"* – refers to the largest same day liquidity shortfall across all currencies, due to the failure of the two clearing firms representing the largest combined settlement obligations on any given settlement date with respect to exercised FX options due for settlement on such date.

    - *"without offset"* – see description under slides 11-13 above.
    - *"with offset"* – see description under slide 11-13 above.

- *"gross settlement obligations"* – see description under slides 11-13 above.
- *"net settlement obligations"* – see description under slides 11-13 above.

- *"single day"* – refers to the single settlement date which generated the largest overall peak or currency specific peak, as the case may be, in a failure situation on such date.

- *"three day" or "three day scenario"* – refers to the single settlement date which generated the largest overall peak or currency specific peak, as the case may be, in a failure situation, plus the next two consecutive settlement dates. The three day figure provides an indication of the liquidity challenges faced by a CCP and market participants immediately (same day) and near term (next two days) in a failure situation. The two consecutive settlement dates following the original settlement/failure date are also referred to as "settlement date + 1" and "settlement date + 2" in the detailed slides that follow and capture the settlement obligations of the relevant failing clearing firms to the CCP related to FX options exercised prior to the failure date but scheduled to settle on settlement date + 1 or settlement date + 2 (since FX options are generally settled within two days after their exercise).

- *"currency specific peak"* – refers to the largest liquidity shortfall in the relevant currency, due to the failure of the two clearing firms representing the largest combined settlement obligations in such currency on any given settlement date with respect to exercised FX options due for settlement on such date.

    - *"total"* – the sum of the currency specific peaks, which represents the aggregate size of the same day liquidity shortfall across all currencies.

General commentary. As noted above, the results provide an indication of minimum, baseline same day liquidity requirements which a CCP clearing such transactions should have been capable of managing based on historical trading activity and FX market rates. The differential between the net and gross figures provide an indication of the extent to which the mechanism used for settlement could directly impact the size of the same day liquidity shortfall the largest two failing clearing firms may present to, and must be managed by, CCPs under the FMI Principles cover 2 liquidity requirement. Because the size of the settlement obligation is a function of the settlement mechanism used, the way in which the settlement mechanism is structured and designed can affect and, in some cases, limit the size of this liquidity shortfall. With respect to the client clearing, the three interdealer with client clearing scenarios were not selected as stress cases, but rather to provide an indication of how who is providing client clearing services and the number of such providers might impact the size of the same day liquidity shortfall.

It is important to note that currency specific peak figures (individual and total) *and* overall peak figures are both relevant to the design of a clearing and settlement solution. While a CCP must be prepared for these potential same-day liquidity needs in *each* currency, a CCP would not draw fully (i.e., 100%) on its capabilities in each currency if a settlement failure were to occur.

CCPs seeking to clear deliverable FX options should also consider appropriate stress cases to satisfy global regulatory expectations set forth in the FMI Principles. For example, the *FMI* Principles note that the multiple roles that an institution may play within the FMI – as a participating clearing firm, a settlement bank, a custodian bank or a liquidity provider – should be considered by the CCP in determining its liquidity needs. With respect to liquidity risk (Principle 7), CCPs should consider the potential failure of its liquidity providers when assessing its liquidity capabilities against its liquidity needs. This means ensuring that the CCP has sufficient liquidity facilities even if the largest liquidity provider (which may also be a participating clearing firm) fails to perform its obligations.

Slides 16-17 Summary Results – Size of Liquidity Shortfall for OTC FX Options – Three and Five CCPs

As noted above, liquidity figures were also calculated on the basis of multiple CCPs for illustrative purposes – to provide an indication of how the size of the same day liquidity shortfall

may vary based on the number of CCPs. While the results of the single, three and five CCP scenarios do not reflect an upper bound to, or maximum size of the same day liquidity shortfall for clearing in this market, the results suggest that the size of this problem increases as the number of CCPs increases (*see, e.g.*, each figure in the single CCP scenario is the same as or greater than its equivalent figure in the three CCP scenario; and, similarly, each figure in the three CCP scenario is the same as or greater than its equivalent figure in the five CCP scenario). For each of the multiple CCP scenarios, the trades were distributed evenly among the three or five CCPs, as the case may be.

Slide 18 Summary Results – Multilateral Netting Efficiencies

Key terms

- *"total gross notional value"* – the sum of the notional value of the relevant contracts sold, *i.e.*, the sum of "sold" currency amounts in the FX option contracts (specifically, one side of each trade), then aggregated across all GFXD firms for the interdealer market and client market.

- *"total net settlement obligation"* – the sum of the net settlement obligations (see description under slides 11-13 above, aggregated across all GFXD firms for the interdealer market and client market.

- *"net % of gross"* – calculated by dividing total net settlement obligation by total gross notional value. This reflects the percentage of currency which must be paid by the clearing firms to the CCP, relative to the gross notional value of the exercised FX options being settled, on the relevant settlement date if settlement were based on a net settlement obligations.
- *"payment reduction benefit"* – calculated by subtracting "net % of gross" from 100%. This reflects the percentage reduction in the amount of currency that would otherwise have been paid by the clearing firms to the CCP to settle the gross notional values of the exercised FX options on the relevant settlement date if settlement were based on gross settlement obligations instead of net settlement obligations.

Slide 19+ Detailed Results of Analysis (Single CCP: Calculations Based on Net Settlement Obligations)

Other key terms

- *"remaining open position"* – with respect to the failing clearing firms which generated the peak FMI Principles cover 2 settlement obligations (on settlement date, settlement date + 1 and settlement date + 2), this figure reflects the sum of the gross notional values of FX option contracts sold by such clearing firms, and cleared by the CCP but not yet exercised prior to their respective events of default on the failure date. As such, these trades do not present immediate liquidity challenges, *i.e.*, same day or over the next two days, which is unique to deliverable, physically-settled products in the FX market.