Discounting and Price Alignment (PA) Transition

Emerging Markets IRS and OTC FX Products

January 2021
Discounting Transition Overview

**Scope:** All existing Cleared MXN IRS, NDIRS, and OTC FX products at CME referencing either USD or EUR discounting, comprised of:

<table>
<thead>
<tr>
<th>LatAm IRS Products:</th>
<th>MXN, BRL, CLP, COP</th>
</tr>
</thead>
<tbody>
<tr>
<td>APAC IRS Products:</td>
<td>KRW, INR, CNY</td>
</tr>
<tr>
<td>OTC FX Products:</td>
<td>NDFs (11 Pairs), CSFs (20 Pairs), FX Options (3 Pairs)</td>
</tr>
</tbody>
</table>

**Timing:** Close of Business March 26, 2021, pending regulatory approval

**Transition Process:** Following the standard EOD clearing cycle using Fed Funds/EONIA discounting and PA on Friday, CME will generate a discounting transition report that provides the NPV of all trades under SOFR/€STR discounting and corresponding cash adjustment amounts needed to account for the change in discounting rate.

**Cash Adjustment:** To neutralize the value transfer from the change to SOFR/€STR discounting, CME will process a cash adjustment that is equal and opposite to the NPV change on each trade in all accounts.

- In line with prior discounting transitions, the Cash Adjustment is settled as part of the Variation Margin calculated on the following Monday and settled Tuesday morning.
- CME will *not be conducting* a re-hedging and corresponding auction process given the relatively small size of the discounting risk carried in the products and weighting towards the short end of the curve.

**Methodology:** Mark-to-Market (MTM) in local currency for each of the swaps is computed by discounting the future cashflows in local currency. MTM for NDIRS is then converted to USD equivalent using a CME-calculated FX rate.

- When pricing under SOFR discounting for EM IRS and OTC FX products in scope, CME will keep the forward projected cashflows (i.e., forecast curves) unchanged.
Overview - Variation Margin and Cash Adjustment

Discounting Transition Cash Flow Example

<table>
<thead>
<tr>
<th>Date</th>
<th>Current NPV</th>
<th>Prior NPV</th>
<th>VM</th>
<th>Adjustment</th>
<th>Total Cash</th>
</tr>
</thead>
<tbody>
<tr>
<td>T – 1</td>
<td>$100 (EFFR)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Thursday)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>$125 (EFFR)</td>
<td>$100 (EFFR)</td>
<td>$25</td>
<td></td>
<td>$25</td>
</tr>
<tr>
<td>(Friday)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T + 1</td>
<td>$140 (SOFR)</td>
<td>$125 (EFFR Friday)</td>
<td>$15</td>
<td>-$1</td>
<td>$14</td>
</tr>
<tr>
<td>(Monday)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The purpose of generating the IRS Discounting Transition Report is to:

- Isolate the impacts of the discounting transition for each USD IRS trade cleared at CME. In the above example, the Friday SOFR NPV is $126, generating the -$1 cash adjustment.
- Provide participants ability to reconcile settlement variation on Monday by referencing the cash adjustment amount and prior-day EFFR NPV.
### IRS Discounting Transition Report: Available in Production Beginning March 8th

**Overview - Variation Margin and Cash Adjustment**

**Column Header**

<table>
<thead>
<tr>
<th>Description</th>
<th>Sample Value</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value Date</td>
<td>10/16/2020</td>
<td>Date</td>
</tr>
<tr>
<td>Position Account ID</td>
<td>3TTNN7</td>
<td>VARCHAR(8)</td>
</tr>
<tr>
<td>Cleared Trade ID</td>
<td>6355844</td>
<td>Integer</td>
</tr>
<tr>
<td>Platform ID</td>
<td>7897868G9H</td>
<td>VARCHAR(255)</td>
</tr>
<tr>
<td>Client ID</td>
<td>1423523IS</td>
<td>VARCHAR(255)</td>
</tr>
<tr>
<td>REG_TRADE_ID</td>
<td>CCCIRS6355844</td>
<td>VARCHAR(255)</td>
</tr>
<tr>
<td>Firm ID</td>
<td>998</td>
<td>VARCHAR(3)</td>
</tr>
<tr>
<td>ORIGIN</td>
<td>CUST</td>
<td>VARCHAR(4)</td>
</tr>
<tr>
<td>PRODUCT_TYPE</td>
<td>ZCS</td>
<td>VARCHAR(5)</td>
</tr>
<tr>
<td>Currency</td>
<td>BRL</td>
<td>VARCHAR(3)</td>
</tr>
<tr>
<td>NPV_NEW_DISC</td>
<td>2,266.34</td>
<td>Float</td>
</tr>
<tr>
<td>NPV_PRIOR_DISC</td>
<td>2,244.28</td>
<td>Float</td>
</tr>
<tr>
<td>NPV_ADJ_NEW_DISC</td>
<td>2,266.34</td>
<td>Float</td>
</tr>
<tr>
<td>NPV_ADJ_PRIOR_DISC</td>
<td>2,244.28</td>
<td>Float</td>
</tr>
<tr>
<td>NPV_ADJ_DIFF</td>
<td>22.06</td>
<td>Float</td>
</tr>
<tr>
<td>FX_RATE</td>
<td>5.342940</td>
<td>Float</td>
</tr>
<tr>
<td>OFFSET_ADJ_AMT</td>
<td>-22.06</td>
<td>Float</td>
</tr>
<tr>
<td>SETTLE_CCY</td>
<td>USD</td>
<td>VARCHAR(3)</td>
</tr>
</tbody>
</table>

- Shows revised NPVs under the new discounting methodology and the cash adjustment at the trade level for each position account
- Produced as part of transition processing after close-of-business
  - Publication targeted for 8 pm ET on the Transition Date
- CSV report delivered to firm and client FTP folders
  - All parties receiving IRS Trade Registers today will receive this report
- FCMs can find sample reports on CME’s Intra-Links site
- Clients can reach out to CME client services for sample reports

**Column Header**

- **Value Date**: Business Date
- **Position Account ID**: Position Account
- **Cleared Trade ID**: CME Trade ID
- **Platform ID**: SEF/Platform ID
- **Client ID**: Client ID
- **REG_TRADE_ID**: USI
- **Firm ID**: 3 digit clearing firm ID
- **ORIGIN**: HOUS or CUST
- **PRODUCT_TYPE**: Type of swap
- **Currency**: Local currency
- **NPV_NEW_DISC**: NPV under SOFR discounting (USDE for NDIRS)
- **NPV_PRIOR_DISC**: NPV under EFFR discounting (USDE for NDIRS)
- **NPV_ADJ_NEW_DISC**: ADJ NPV under SOFR discounting (USDE for NDIRS)
- **NPV_ADJ_PRIOR_DISC**: ADJ NPV under EFFR discounting (USDE for NDIRS)
- **NPV_ADJ_DIFF**: New ADJ NPV minus Prior ADJ NPV
- **FX_RATE**: Can be used to convert NPVs/Adj NPVs to local currency for NDIRS
- **OFFSET_ADJ_AMT**: Cash adjustment amount
- **SETTLE_CCY**: Currency of settlement
Overview - Timelines and Testing Summary

Test Phase 1: February 10 – March 5
- NR environment performs a daily simulation of the processing that occurs on transition date:
  - First, CME runs a normal end-of-day clearing cycle. NPVs and cash flows in this cycle are based on Fed Funds/EONIA.
  - Next, CME revalues trades with SOFR/ESTR and produces the Discounting Transition Reports and SOFR-based pricing curves

Mock Transition Weekend: March 5 – March 8
- **Mock Transition Date (Friday, Mar 5):** CME publishes the official Discounting Transition Reports with SOFR/ESTR based NPVs and cash adjustments
- **Mock Transition Date + 1 (Monday, Mar 8):** CME includes the cash adjustment as part of end-of-day VM calculation

Test Phase 2: March 8 – March 26
- Simulates the post-transition environment
- CME publishes Trade Registers reflecting SOFR/ESTR inputs:
  - IRS Trade Register (VM, PAA, and NPVs) are based on SOFR
  - FX Trade Register (VM, PAA, and MTMs) are based on SOFR/ESTR
- Discounting Transition Reports are no longer published in NR

Discounting Transition Report live in PROD: March 8 – March 26
- During Test Phase 2, the Discounting Transition reports will be available in Production on FTP sites for further testing.
- This report will show the indicative NPV changes and Cash Adj. leading up to and on the Transition Date.
Valuation and Curve Methodology

MXN and Non-Deliverable IRS Transition
### Transition for MXN and NDIRS

#### Valuation Methodology

CME will transition swaps to SOFR discounting and PA on March 26, 2021 as highlighted below:

| Products | MXN (31Y)  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>ND IRS:</strong> BRL (10Y), CLP (20Y), CNY (10Y), COP (20Y), INR (10Y), KRW (21Y)</td>
</tr>
</tbody>
</table>

| Current Method | Discount curves implied using Spot FX, FX forwards, cross-currency swaps and EFFR curve  
|----------------|-----------------------------------------------------------------|
|                | **PA NDIRS:** EFFR  
|                | **PA MXN:** EFFR-based |

| Post Transition Method | Discount curves implied using Spot FX, FX forwards, cross-currency swaps and SOFR curve  
|------------------------|-----------------------------------------------------------------|
|                        | **PA NDIRS:** SOFR  
|                        | **PA MXN:** SOFR-based |

| Curve Snap Times | Consistent with the current pricing methodology, curves will be snapped at different times based on market closes. As such, FF-SOFR basis marks used for cash compensation will align as per current snap times for individual currencies. |

| Cash Compensation | MXN: Local currency  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>NDIRS:</strong> USD</td>
</tr>
</tbody>
</table>
Transition for MXN and NDIRS

Overview: Mark to Market (MTM)

MXN
✓ MXN Swaps variation margin (VM) and cashflows (CF) are settled in MXN. CME generates a discount curve and a forecast curve for MXN.

✓ MTM of the MXN swaps is determined in local currency by discounting the future cashflows:

\[ MTM_{MXN} = \sum_i \text{Projected Cashflow}_{local}^i \times DF_{local}^{T_i} \]

Non-deliverable IRS
✓ NDIRS referenced in BRL, CLP, COP, CNY, KRW and INR swaps VM and CF are settled in USD. CME generates a discount curve and a forecast curve for each of the currencies.

✓ MTM of the NDIRS swaps is determined first in local currency by discounting the futures cashflows, and then converted to USD equivalents using FX rate:

\[ MTM_{USD} = FX_{s_{local}} \times \sum_i \text{Projected Cashflow}_{local}^i \times DF_{local}^{T_i} \]
Overview: Current Curve Construction Mechanism

MXN and NDIRS Curve construction

✓ The discount curve for each of the currencies is generated using FX spot, FX forwards and cross-currency swaps instruments along the term-structure. Forecast curve is generated using Fix/Float swaps referencing the cleared rate index. Note that BRL forecast curve is generated using DI Futures

✓ FX forward instruments utilizes Effective Federal Fund Rate (EFFR) curve in the interest rate parity equation as shown below:

\[ DF_{T_i}^{local} = \frac{Spot \; FX_{local}^\$ * DF_{T_i}^{EFFR}}{Forward \; FX_{local}^\$_{T_i}} \]

✓ For cross currency swaps, the USD leg utilizes EFFR rate for discounting of the USD cashflow referencing USD LIBOR 1M/3M/6M index; MXN/NDIRS leg of XCCY swap references the forecasting rate of MXN/NDIRS* currencies. MXN/NDIRS swap cashflows is discounted using the implied discount curve

✓ Due to the cross dependency between the discount curves and forecast curves, the discount curve and forecast curve are generated simultaneously

* BRL uses FX Forward instruments along the term structure and INR, KRW, CNY cross currency swap are fixed-float swaps with fixed rate defined for the non-USD leg.
Transition for MXN and NDIRS

Overview: Current Curve Construction Mechanism

The below shows the current curve construction process for NDIRS & MXN interest rate curves.

Instruments used for Boot-strapping of USD curves

- USD SOFR
- USD LIBOR BBA 6M
- USD LIBOR BBA 3M
- USD LIBOR BBA 1M
- USD EFFR

Instruments used for Boot-strapping of MXN & NDIRS curves

- Forecast curves: MXN & NDIRS
  Forecast Curve under EFFR
- Discount curves: MXN & NDIRS
  Discount Curve under EFFR

Boot-strapping Algorithm for USD using SOFR discounting

Boot-strapping Algorithm for MXN & NDIRS using EFFR discounting

EffR Discounting
Transition for MXN and NDIRS

Overview: Current Price Alignment Calculation

MXN PA Calculation
In order to account for the USD funding used by most market participants, the MXN PA rate is currently calculated based on the Fed Funds rate. The rate is adjusted by the USD/MXN exchange rate as the actual cash flow moves in MXN.

\[
MXN \text{ PA Rate} = FF \text{ Effective Rate} \times \frac{FX_1}{FX_0} + \frac{FX_1 - FX_0}{n} \times \frac{1}{360}
\]

\[
FX_1: FX \text{ overnight rate}
\]

\[
FX_0: TOM \text{ next rate}
\]

The above MXN PA rate is then applied to the standard PA calculation:

\[
PA = -Adjusted \ NPV_{(previous\ Bus.\ day)} \times MXN \text{ PA Rate} \times (Days / 360)
\]

Non-deliverable Currency PA Calculation
All Non-deliverable currencies are settled in USD. The previous business day Adjusted NPV is calculated in local currency and converted into USD using CME’s overnight FX rate. The calculation then uses the overnight Fed Funds effective rate and the day count to derive the final PA amount:

\[
PA = -Adjusted \ NPV^{S}_{previous\ Bus.\ day} \times FF \text{ Effective Rate} \times (Days / 360)
\]
Transition for MXN and NDIRS

Cash Compensation Mechanism
The below highlights the process for cash compensation which is computed as:

\[ \text{Adjusted NPV}_{\text{EFFR Discounting}} - \text{Adjusted NPV}_{\text{SOFR Discounting}} \]

Cash compensation for MXN and NDIRS will be local currency and USD equivalents, respectively.

To ensure forward rates for the forecast curve are unchanged under SOFR discounting, CME will imply the FX Forward rate along the maximum term-structure using the current generated curves.

\[ \text{Implied Forward } FX_{\text{local}}^{\$} = \frac{\text{Spot } FX_{\text{local}}^{\$} \times DF_{\text{EFFR}}^{T_i}}{DF_{\text{SOFR}}^{T_i}} \]

CME will imply discount curve under SOFR discounting pricing using the implied FX forward rates and SOFR curves as illustrated below.

\[ DF_{\text{local}}^{T_i} = \frac{\text{Spot } FX_{\text{local}}^{\$} \times DF_{\text{SOFR}}^{T_i}}{\text{Implied Forward } FX_{\text{local}}^{\$} \times DF_{\text{EFFR}}^{T_i}} \]

**Generated curves under current process**

- **USD EFFR curves**: Generated under SOFR discounting
- **Discount curves**: MXN & NDIRS Discounting Curve using EFFR
- **Generated curves under current process**
  - Imply FX forward Rates going along the term-structure using Interest Rate parity
  - Boot-strapping Algorithm for USD using SOFR discounting
- **Discount curves**: MXN & NDIRS Discounting Curve using SOFR
- **USD SOFR curves**: Generated under SOFR discounting

Pending Regulatory Approval
Transition for MXN and NDIRS

Cash Compensation Mechanism – Curve Generation Process

Current Process

USD LIBOR 1M/3M curves

USD EffR

Instruments used for MXN & NDIRS Bootstrapping

Boot-strapping Algorithm for EM using EffR discounting

MXN & NDIRS Forecast Curve under EffR

Pricer = Adjusted NPV$_{FedFund Discounting}$

Forecast curves: MXN and NDIRS

Forecast Curve

Discount curves: MXN and NDIRS

Discount Curve under EffR

EffR Discounting

SOFR Discounting

Pricer = Adjusted NPV$_{SOFR Discounting}$

Forecast curves: MXN and NDIRS

Forecast Curve

Discount curves: MXN and NDIRS

Discount Curve under SOFR

Usd EffR

Fx Spot

Implied Quotes for FX Forward Instruments all the way to maximum maturity

Forward FX$^{local}_{T_1} = \frac{Spot FX^{local}_{T_1} + DF^{EffR}_{T_1}}{DF^{local}_{T_1}}$

Boot-strapping Algorithm for MXN and NDIRS using SOFR curves

MXN & NDIRS Discount Curve using SOFR

Usd SOFR

Imply Forward FX Rate

Pending Regulatory Approval
Transition for MXN and NDIRS

Post Transition Curve Construction Mechanism

The below shows the curve construction process for EM interest rate curves after the discounting transition switch.

- **SOFR Discounting**
  - **Forecast curves**: MXN and NDIRS Forecast Curve
  - **Discount curves**: MXN and NDIRS Discount Curve under SOFR

**Boot-strapping Algorithm for USD using SOFR discounting**
- USD EFFR
- USD LIBOR BBA 6M
- USD LIBOR BBA 3M
- USD LIBOR BBA 1M
- USD SOFR

**Instruments used for Boot-strapping of USD curves**

**Boot-strapping Algorithm for EM using SOFR discounting**

**Instruments used for Boot-strapping of EM curves**
Transition for MXN and NDIRS

Post Transition Price Alignment Calculation

MXN PA Calculation
In order to account for the USD funding used by most market participants, the MXN PA rate will be calculated based on the SOFR rate. The rate will be adjusted by the USD/MXN exchange rate as the actual cash flow moves in MXN.

\[
MXN \text{ PA Rate} = SOFR \times \frac{FX_1}{FX_0} + \frac{FX_1 - 1}{n} \times FX_0
\]

- \(FX_1\): FX overnight rate
- \(FX_0\): TOM next rate

The above MXN PA rate will then be applied to the standard PA calculation:

\[
PA = -\text{Adjusted NPV}_{\text{previous Bus. day}} \times MXN \text{ PA Rate} \times \frac{\text{Days}}{360}
\]

Non-deliverable Currency PA Calculation
All Non-deliverable currencies are settled in USD. The previous business day Adjusted NPV is calculated in local currency and converted into USD using CME’s overnight FX rate. The calculation will then use SOFR and the day count to derive the final PA amount:

\[
PA = -\text{Adjusted NPV}^S_{\text{previous Bus. day}} \times SOFR \times \frac{\text{Days}}{360}
\]
IRS Pricing Curve Reports

CME will make SOFR-based pricing curves available on the Transition Date for reconciling to the SOFR-discounted NPV

Curve Input Files
- Each discounting curve will have additional inputs for computing the SOFR-discounted MTM during transition processing
- These curve inputs will be added to the existing curve input files on the transition date only; the curve input file will revert to the standard inputs/format following the transition date
- Please reach out to CME client services for further details

Daily Discount Factor Files
- An additional Daily Discount Factor file will be published for each SOFR-based discounting curve (BRL, CLP, COP, CNY, INR, KRW, MXN)
- The file layout will be identical to the standard file
- SOFR-based file names will include “_SOFR”
  • Example of MXN Discount Factor File Names:
    – Standard File: IRSDFR_TIIE_20210326.csv
    – SOFR-based File: IRSDFR_TIIE_SOFR_20210326.csv
Valuation and Curve Methodology

OTC FX Products
**Transition for OTC FX**

CME will transition OTC FX products to SOFR/€STR discounting and PA on March 26, 2021 alongside our emerging market IRS currencies.

<table>
<thead>
<tr>
<th>Currency Pair</th>
<th>CME Cleared Instrument Type</th>
<th>Settlement Currency</th>
<th>Current Discounting and PAA</th>
<th>New Discounting and PAA</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUDUSD, EURUSD, GBPUSD, NZDUSD, USDCZK, USDDKK, USDHKD, USDHUF, USDLR, USDMXN, USDMYR, USDNOK, USDPLN, USDSEK, USDTHB, USDTRY, USDZAR</td>
<td>Cash-Settled Forward</td>
<td>USD</td>
<td>EFFR</td>
<td>SOFR</td>
</tr>
<tr>
<td>USDBRL, USDCNY, USDKRW, USDRUB, USDCLP, USDRNR, USDPHP, USDIDR, USDTWD, USDCOP, USDPEN</td>
<td>Non-Deliverable Forward</td>
<td>USD</td>
<td>EFFR</td>
<td>SOFR</td>
</tr>
<tr>
<td>AUDUSD, EURUSD, GBPUSD</td>
<td>FX Option</td>
<td>USD</td>
<td>EFFR</td>
<td>SOFR</td>
</tr>
<tr>
<td>EURAUD, EURCHF</td>
<td>Cash-Settled Forward</td>
<td>EUR</td>
<td>EONIA</td>
<td>€STR</td>
</tr>
</tbody>
</table>
### Overview - Variation Margin and Cash Adjustment

**OTC FX Discounting Transition Report: Available in Production Beginning March 8th**

- Shows revised MTMs under the new discounting methodology and the cash adjustment at the trade level for each position account
- Produced as part of transition processing after close-of-business - Publication targeted for 8 pm ET on the Transition Date
- CSV report delivered to firm and client FTP folders - All parties receiving FX Trade Registers today will receive this report
- FCMs can find sample reports on CME’s Intra-Links site
- Clients can reach out to CME client services for sample reports

<table>
<thead>
<tr>
<th>Column Header</th>
<th>Description</th>
<th>Sample Value</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus_Date</td>
<td>Business Date</td>
<td>3/15/2021</td>
<td>Date</td>
</tr>
<tr>
<td>PA</td>
<td>Position Account</td>
<td>9FXONF1</td>
<td>VARCHAR(10)</td>
</tr>
<tr>
<td>Trade_ID</td>
<td>CME Trade ID</td>
<td>6355777</td>
<td>Integer</td>
</tr>
<tr>
<td>EXEC_ID2</td>
<td>SEF/Platform ID</td>
<td>1423523IS</td>
<td>VARCHAR(255)</td>
</tr>
<tr>
<td>Order_ID</td>
<td>Client Order ID</td>
<td>D91240-1</td>
<td>VARCHAR(255)</td>
</tr>
<tr>
<td>Reg_Trtd_ID</td>
<td>USI</td>
<td>CCCIRS6355777</td>
<td>VARCHAR(255)</td>
</tr>
<tr>
<td>CMF</td>
<td>3 digit clearing firm ID</td>
<td>998</td>
<td>VARCHAR(3)</td>
</tr>
<tr>
<td>Origin</td>
<td>HOUS or CUST</td>
<td>CUST</td>
<td>VARCHAR(4)</td>
</tr>
<tr>
<td>Product_Type</td>
<td>Type of FX forward or option</td>
<td>CSF</td>
<td>VARCHAR(5)</td>
</tr>
<tr>
<td>Product_Code</td>
<td>Currency Pair</td>
<td>USDBRL</td>
<td>VARCHAR(6)</td>
</tr>
<tr>
<td>Setl_Cur</td>
<td>Currency of settlement</td>
<td>USD</td>
<td>Float</td>
</tr>
<tr>
<td>New_MTM_Amt</td>
<td>MTM under SOFR/ESTR discounting</td>
<td>1,100.00</td>
<td>Float</td>
</tr>
<tr>
<td>Prior_MTM_Amt</td>
<td>MTM under EFFR/EONIA discounting</td>
<td>2,000.00</td>
<td>Float</td>
</tr>
<tr>
<td>MTM_Amt_DIFF</td>
<td>New_MTM_Amt minus Prior_MTM_Amt</td>
<td>-900.00</td>
<td>Float</td>
</tr>
<tr>
<td>OFFSET_ADJ_AMT</td>
<td>Prior_MTM_Amt minus New_MTM_Amt</td>
<td>900.00</td>
<td>Float</td>
</tr>
</tbody>
</table>
Transition for OTC FX

Mechanism for products settled in USD

The below highlights the process for cash compensation which is computed as:

\[
\text{Adjusted NPV}_{\text{EFFR Discounting}} - \text{Adjusted NPV}_{\text{SOFR Discounting}}
\]

All FX products settled in USD are in scope for the SOFR discounting transition. For NPV calculation, future cashflows are calculated in quote currency first and converted to settlement currency (USD) using FX forward rate, before discounting back to value date using USD discounting.

\[
\text{Adjusted NPV} = \text{Future Cashflow}^{\text{quote}} \times \text{FX Forward Rate}^{\text{quote}} \times DF^S
\]

### FX Forward Curve Construction

- **Instruments used for Bootstrapping FX Forward Curve**
- **Boot-strapping Algorithm for FX Forward Curve**
- **FX Forward Curve**

### USD Discounting Curve Construction

- **Instruments used for Bootstrapping of USD curves**
- **Boot-strapping Algorithm for USD using SOFR discounting**
- **USD EFFR Curve**
- **USD SOFR Curve**

**Pricer** = Adjusted NPV

- **FX curves**: FX Forward Curve
- **Discount curves**: USD EFFR Curve

**Pricer** = Adjusted NPV

- **FX curves**: FX Forward Curve
- **Discount curves**: USD SOFR Curve

Pending Regulatory Approval
Transition for OTC FX

Mechanism for products settled in EUR

The below highlights the process for cash compensation which is computed as:

\[ \text{Adjusted NPV}_{EONIA\text{Discounting}} - \text{Adjusted NPV}_{\varepsilon STR\text{Discounting}} \]

All FX products settled in EUR are in scope for the \( \varepsilon \text{STR} \) discounting transition. For NPV calculation, future cashflows are calculated in quote currency first and converted to settlement currency (EUR) using FX forward rate, before discounting back to value date using EUR discounting.

\[ \text{Adjusted NPV} = \text{Future Cashflow}_{\text{quote}} \times \text{FX Forward Rate}_{\varepsilon \text{quote}} \times DF_{\varepsilon} \]

FX Forward Curve Construction

- Instruments used for Bootstrapping FX Forward Curve
- Boot-strapping Algorithm for FX Forward Curve
- FX Forward Curve

EONIA Discounting

- Pricer = Adjusted NPV\text{EONIA Discounting}
- FX curves: FX Forward Curve
- Discount curves: EUR EONIA Curve

EUR Discounting Curve Construction

- Instruments used for Bootstrapping of EUR curves
- Boot-strapping Algorithm for EUR using \( \varepsilon \text{STR} \) discounting
- EUR EONIA Curve
- EUR \( \varepsilon \text{STR} \) Curve

\( \varepsilon \text{STR} \) Discounting

- Pricer = Adjusted NPV\text{\( \varepsilon \text{STR} \) Discounting}
- FX curves: FX Forward Curve
- Discount curves: EUR \( \varepsilon \text{STR} \) Curve
Disclaimer

Neither futures trading nor swaps trading are suitable for all investors, and each involves the risk of loss. Swaps trading should only be undertaken by investors who are Eligible Contract Participants (ECPs) within the meaning of Section 1a(18) of the Commodity Exchange Act. Futures and swaps each are leveraged investments and, because only a percentage of a contract’s value is required to trade, it is possible to lose more than the amount of money deposited for either a futures or swaps position. Therefore, traders should only use funds that they can afford to lose without affecting their lifestyles and only a portion of those funds should be devoted to any one trade because traders cannot expect to profit on every trade.

CME Group, the Globe Logo, CME, Globex, E-Mini, CME Direct, CME DataMine and Chicago Mercantile Exchange are trademarks of Chicago Mercantile Exchange Inc. CBOT is a trademark of the Board of Trade of the City of Chicago, Inc. NYMEX is a trademark of New York Mercantile Exchange, Inc. COMEX is a trademark of Commodity Exchange, Inc. All other trademarks are the property of their respective owners.

The information within this communication has been compiled by CME Group for general purposes only. CME Group assumes no responsibility for any errors or omissions. Additionally, all examples in this communication are hypothetical situations, used for explanation purposes only, and should not be considered investment advice or the results of actual market experience. All matters pertaining to rules and specifications herein are made subject to and superseded by official CME, CBOT, NYMEX and COMEX rules. Current rules should be consulted in all cases concerning contract specifications.

Copyright © 2020 CME Group Inc. All rights reserved.
CME Group