

SOFR Discounting Transition Process For Cleared Swaps

August 2020

SOFR Price Alignment & Discounting Transition



CME Group has worked with market participants and industry groups to develop a plan for transitioning price alignment and discounting for USD OTC cleared swaps from the daily Effective Federal Funds Rate (EFFR) to SOFR

Scope: Cleared US Dollar interest rate swap products at CME (IRS, OIS, FRAs, Basis, ZCS, Swaptions)

- CME SOFR index swaps are excluded from the transition as they are already using SOFR discounting and price alignment
- CME believes market practitioners should continue to evaluate a future date for transitioning additional IRS currencies that contain a US Dollar-funding component, taking into consideration potential impacts on adjacent FX forward and cross-currency swap markets

Transition Date: Close of Business October 16, 2020

Transition Process: Following the standard EOD cycle using EFFR discounting/PA on Friday, CME will generate a discounting transition report that provides the NPV of all trades under SOFR 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 discounting, CME will process a cash adjustment that is equal and opposite to the NPV change on each trade in all accounts

Re-Hedging Process:

- By changing the discounting curve, CME effectively moves the discounting risk of all participants from EFFR to SOFR
- To mitigate re-hedging costs CME will book a mandatory series of EFFR/SOFR basis swaps to participants' accounts
- These basis swaps will approximately restore participants back to their original discounting risk profile at the portfolio level, and will be booked at closing curve levels (\$0 NPV)

Auction: On Monday October 19th, CME will facilitate an auction for participants looking for an efficient way to unwind their basis swaps

Client Readiness Checklist

Develop a Strategy for Handling the Operational Process of the Discounting Transition

- Approach for capturing and booking the cash adjustment amounts
- Determine plan for capturing and booking the SOFR/EFFR basis swaps
- Make Client Elections:** basis swaps vs fixed/float swap pairs, auction participation
- If applicable, determine plan for booking basis swaps offsets from the auction process

Preparing for the discounting transition

- Reach out to CME to run analysis for understanding discounting transition impacts (per slide 25)
- Setup to trade and clear SOFR discounted instruments as well as SOFR-indexed instruments
- Engage with FCMs ahead of the discounting transition to ensure all elections and operational setups are in place

Variation Margin & Cash Adjustment

Variation Margin and Cash Adjustment

Discounting Transition Cash Flow Example

	Date	Current NPV	Prior NPV	VM	Adjustment	Total Cash
1	T - 1 (Thursday)	\$100 (EFFR)				
2	T (Friday)	\$125 (EFFR)	\$100 (EFFR)	\$25		\$25
Discounting Transition						
	T + 1 (Monday)	\$140 (SOFR)	\$125 (EFFR)	\$15	-\$1	\$14

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

Variation Margin and Cash Adjustment

IRS Discounting Transition Report - Available in Production Beginning September 21st

- Shows revised NPVs under the new discounting methodology and the cash adjustment at the trade level for each position account
- Produced as part of the Special EOD Cycle
 - Publication targeted for 8 pm ET on the Transition Date
- CSV report delivered to firm and client sFTP folders
 - All parties receiving Trade Registers today will receive this report
- FCMs and Customers can find sample reports on CME's Intra-Links site

Column Header	Description	Sample Value	Type
Value Date	Business Date	10/16/2020	Date
Position Account ID	Position Account	3TTNN7	VARCHAR(8)
Cleared Trade ID	CME Trade ID	6355844	Integer
Platform ID	SEF/Platform ID	7897868G9H	VARCHAR(255)
Client ID	Client ID	1423523IS	VARCHAR(255)
REG_TRADE_ID	USI	CCCIRS6355844	VARCHAR(255)
Firm ID	3 digit clearing firm ID	998	VARCHAR(3)
ORIGIN	HOUS or CUST	CUST	VARCHAR(4)
PRODUCT_TYPE	type of swap	OIS	VARCHAR(5)
Currency	3 digit currency code	USD	VARCHAR(3)
NPV_NEW_DISC	NPV under SOFR discounting	2,266.34	Float
NPV_PRIOR_DISC	NPV under EFFR discounting	2,244.28	Float
NPV_ADJ_NEW_DISC	ADJ NPV under SOFR discounting	2,266.34	Float
NPV_ADJ_PRIOR_DISC	ADJ NPV under EFFR discounting	2,244.28	Float
NPV_ADJ_DIFF	New ADJ NPV minus Prior ADJ NPV	22.06	Float
FX_RATE	FX Rate use to convert non-deliverable currencies' NPV differences to the adjustment amount. Equal to 1 for USD	1.000000	Float
OFFSET_ADJ_AMT	Cash adjustment amount Prior ADJ NPV minus new ADJ NPV	-22.06	Float

Pending Regulatory Approval

Variation Margin and Cash Adjustment

Curve Construction

The below demonstrates the SOFR curves construction used for computing the cash compensation:

- The short end of the SOFR curve is constructed using monthly and quarterly listed SOFR futures contracts. These products are the most liquid futures in the marketplace
- Convexity adjustments are applied to SOFR futures to better reflect the differential of interest rate risk between OTC and exchange traded instruments
- Fed Funds-SOFR Basis swaps are used for the remainder of the curve as they are the most liquid OTC products
- Quotes taken at 3:00 p.m. ET.

Forward rates will be held constant for the transition process

	Tenor	Instruments
Forecasting and Discounting Curve Inputs	1M	CME Monthly SOFR Futures (SR1)
	3M-2Y	CME Monthly SOFR Futures (SR3)
	3Y,4Y,5Y,7Y,10Y,12Y,15Y,20Y,25Y,30Y, 40Y, 50Y	Fed Funds-SOFR Basis Swap

Draft proposal intended for soliciting further participant feedback

Mandatory Re-Hedging Process

Mandatory Discounting Re-Hedging Process

Maintaining Original Discounting Risk Exposures with Basis Swaps

The Goal of the ARRC's Discounting Transition is to Gradually Expose Participants to SOFR

(\$MM DV01)	Pre-Transition	Transitioning w/o Re-hedging	Basis Swaps	Transitioning w/ Re-hedging
Outright ICE LIBOR Risk	\$20MM	\$20MM	-	\$20MM
EFFR Discounting Risk	\$1MM	\$0	\$1MM	\$1MM
SOFR Discounting Risk	\$0	\$1MM	(\$1MM)	\$0

*For illustration purposes only
Delta ladder computed based on zero-rate bump*

Transitioning to SOFR discounting will effectively move the discounting risk of all CME-cleared participant portfolios from EFFR to SOFR at closing curve levels on October 16, 2020

To mitigate both the re-hedging costs associated with this transition and the sensitivity of valuations to closing curve marks on that day, CME will book a series of EFFR/SOFR basis swaps to participants' accounts

Through these basis swaps, CME's Re-hedging mechanism restores participants back to their approximate EFFR discounting exposures

- If the basis swaps are held, participants gain incremental exposure to SOFR as new risk is cleared and as the dynamics of the legacy portfolio change after the transition
- Alternatively, by unwinding the resulting basis swaps via auction or directly sourcing liquidity, participants immediately transition their discounting risk from EFFR to SOFR

Mandatory Discounting Re-Hedging Process

Basis Swap & Client Election

- Swap Tenors: 2Y, 5Y, 10Y, 15Y, 20Y, 30Y
- Participants can choose to have these swaps booked as either CME cleared:
 - Float-versus-float basis swaps, or
 - Pairs of fixed-versus-float swaps
- Basis Swaps will be processed after the close on October 16th with a cleared date of October 19th
 - Swaps booked at a \$0 NPV
 - No variation or initial margin will be calculated for these swaps on transition date
 - Float-versus-float basis swaps: Breakeven spread is included on the SOFR leg
 - Pairs of fixed-versus-float swaps: Difference in par rates will reflect the breakeven spread

Client Election Process

Election:	1. Choose how re-hedging swaps are booked	2. Whether to liquidate swaps in the auction
Default:	Float v. Float Basis Swap	Not to participate in the auction
Alternative:	Pairs of Fixed v. Float Synthetic Basis Swaps	Participate in the auction
Process	<i>FCMs facilitate clients' selection</i>	<i>FCMs facilitate clients' selection & Clients sign CME agreement</i>

Mandatory Discounting Re-Hedging Process

Basis Swap Details

The steps below describe the mechanism used by CME to calculate the basis swaps' notional amounts

- Imply SOFR-based par quotes for instruments used in the bootstrapping process
- Compute the delta sensitivity to the instruments used for generating the SOFR curve by sequentially bumping the implied quotes up and down for each instrument under SOFR discounting. This delta ladder vector will be computed for the production portfolio and the instruments identified in the re-hedging exercise
- Bucket the delta ladder vector using linear interpolation to each of the instruments identified in the re-hedging exercise
- To avoid booking swaps with de-minimis notional which may be difficult for clients to liquidate in the market, CME has introduced a minimum notional threshold of receiving re-hedging swaps of \$10,000
 - All notional amounts for re-hedging swaps will be rounded to the nearest integer
- Additional details can be found in [CME's Transition Methodologies White Paper](#)

Mandatory Discounting Re-Hedging Process

Basis Swap Characteristics

- **Index:** USD-SOFR-COMPOUND vs USD-Federal Funds-H.15-OIS-COMPOUND
 - **Start Date:** 10/21/2020
 - **Roll convention:** 21 (both legs)
 - **Cal period Adj Frequency:** 3M (both legs)
 - **Cal period Adj Calendar:** USNY (both legs)
 - **Payment Frequency:** 3M (both legs)
 - **Payment Offset:** 2D (both legs)
 - **Payment Related to:** End period (both legs)
 - **Payment Calendar:** USNY (both legs)
 - **Spread:** On SOFR leg
 - **Comp Method:** Spread Exclusive (both legs)
 - **Day Count:** ACT/360 (both legs)
 - **Fixing Date Cal:** SOFR – USGS; EFFR - USNY
 - **Floating Index Tenor:** 1D
 - **Fixing Date Offset:** 0D
 - **Fixing Date type:** Business
 - **Fixing Date Business date convention:** Preceding (both legs)
- Maturity Date:** + {2yr, 5yr, 10yr, 15yr, 20yr, 30yr}
- Minimum Notional Amount:** \$10,000

Mandatory Discounting Re-Hedging Process

Position Account-Level Discounting Delta Report

- Available on firms' SFTP October 16th
- Allows firms to review the impact of the SOFR re-hedging process, and compute their relevant charge from the auction (as outlined on slide 17)
- Produced as part of the Friday transition process, published as CSV report delivered to firm and client sFTP folders
 - All parties receiving Trade Registers will receive this report

Sample Report*

Value Date	Position Acct Number	Curve Name	2 Year	5 Year	10 Year	15 Year	Gross Discounting DV01
10/16/2020	ABCD1234	USD_SOFR_1D	-1	442	3	-6	

Individual Trade-Level Discounting Delta Report

- Available on firms' SFTP October 16th
- Attributes SOFR discounting risk impacts back to individual trades, helping participants allocate risk between entities sharing the same position account
- Produced as part of the Friday transition process similar to the position account level report

Sample Report*

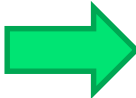
Value Date	Trade ID	Curve Name	2 Year	5 Year	10 Year	15 Year
10/16/2020	1446246	USD_SOFR_1D	-157	442	3	-6
10/16/2020	1447678	USD_SOFR_1D	-358	-188	100	806
10/16/2020	1442453	USD_SOFR_1D	60	65	225	165

Voluntary Auction

Basis Swap Auction Process

Potential Auction Benefits

- Position netting across all participating clients is expected to result in lower cost of execution, as demonstrated below:

Gross DV01: \$5M
Market Bid/Ask: 1.0bp

Net DV01: \$2M
Realized Bid/Ask: 0.4bp
Realized Savings: 60%

Customer	DV01	Cost Based on Individual Liquidation	Cost Using The Auction	\$ Saving
Customer A	(\$500,000)	(\$500,000)	(\$200,000)	\$300,000
Customer B	(\$1,000,000)	(\$1,000,000)	(\$400,000)	\$600,000
Customer C	\$1,500,000	(\$1,500,000)	(\$600,000)	\$900,000
Customer D	\$2,000,000	(\$2,000,000)	(\$800,000)	\$1,200,000
Total	\$2,000,000	(\$5,000,000)	(\$2,000,000)	\$3,000,000

- A sizeable pool of large and active SOFR/Fed Funds basis dealers combined with an optimal auction setup

SOFR Discounting Transition – Client Elections

CME Will Seek the Following Information From Participants by October 2nd 2020:

Election:	1. Choose how re-hedging swaps are booked	2. Whether to liquidate swaps in the auction
Default:	Float v. Float Basis Swap	Not to participate in the auction
Alternative:	Pairs of Fixed v. Float Synthetic Basis Swaps	Participate in the auction
Process	<i>FCMs facilitate clients' selection</i>	<i>FCMs facilitate clients' selection & Clients sign SOFR Auction Participation Agreement</i>

CME SOFR Basis Swap Auction Participation Agreement

In order to participate in the auction, CME must receive a signed agreement from the client, stating:

- Client consents that results of the auction are binding and indemnifies CME as the operator
- All re-hedging swaps received for the position account are submitted to the auction (no partials)
- Specifies the Maximum Loss Limit based on a percentage of gross discounting exposure in DV01
- Includes auction protocol, detailing how the auction will operate

Along with this, CME must also receive a completed election file specifying which of the client's position accounts will participate in the auction

Maximum Loss Limit

CME Auction Process

- Defined as the maximum dollar amount that each client could incur as a result of the auction
- The limit will be set based on prevailing liquidity prior to the auction legal agreement being made available, and universally applied to all clients
- If the cost of auctioning the net risk, when allocated back to participants' portfolios, exceeds the loss limit, the auction will not be executed

The maximum auction charge for each Position Account in \$ terms can be derived as:

$$\text{Maximum auction charge}_{P_{Acct}} = \text{Gross Discounting DV01}_{P_{Acct}} * \text{CME defined maximum loss limit}$$

Gross Discounting DV01 across the 6 tenor points, as stated on the position account-level report on slide 13

Maximum Loss Limit: Hypothetical Worked Example

Maximum Loss Limit = 2bps [*Hypothetical Loss Limit. Actual can be found in the Participation Agreement.*]

Gross Discounting DV01 for the position account are below:

Key Tenors	2Y	5Y	10Y	15Y	20Y	30Y	Gross DV01
Portfolio Delta Ladder	\$ (70,000)	\$ 210,000	\$ 31,000	\$ 660,000	\$ (1,190,000)	\$ (639,000)	\$2,800,000

$$\text{Maximum Auction Charge} = \text{Gross Discounting DV01} * 2\text{bps} = \mathbf{\$2,800,000 * 2 = \$5,600,000}$$

Basis Swap Auction Process

Approach Overview

Timing: Monday, October 19th, CME will open the auction window between 9-10am ET

Eligible Bidders: CME will invite CME IRS Clearing Members and/or other active market participants in the SOFR/Fed Funds market to bid in the auction. Other parties interested in participating in the auction should contact CME.

- Bidding in the auction is voluntary
- All invited bidders will be required to accept the Auction Bidder Terms and participate in a dry run on September 21st

Design: Single voluntary auction, inclusive of all 6 tenor points

- Allows dealers to consider offsetting risk when providing prices
- CME will be asking for a 2-way price to protect participating clients if the auction is not executed

Auction Type: Determined by CME based on the size of the portfolio being auctioned

- Winner-takes-all: The best price wins the portfolio (smaller portfolio)
- Dutch-style: Execution price is determined based on the bid filling the last clearing size of the portfolio (larger portfolio)

Auction Bidder Logistics

Pre-Auction: CME plans to communicate the auction style to bidders during the week of October 12th

Auction Venue: Bidding, related reporting, communication will be facilitated on [CME Auction Platform](#). The Platform will open shortly before 9am EST on Monday

Auction Portfolio: To mask the direction of the portfolio, CME will provide bidders with both the auction portfolio and a mirror portfolio in the opposite direction including:

- [IRS Trade Register](#) (2) - One for each portfolio
- [IRS Cash Flow Report](#) (2) - Projected cash flows for each basis swap within the two portfolios
- [Clearing Confirmed Messages](#) (12) - Full basis swap economics in FpML for bidding firm's risk systems
- [Market Data](#) files as of COB 10/16 settlement run

Bidding Convention: Bidders will be asked to provide NPV-based submissions in USD terms

- Bids reflect MTM gains or losses of the portfolio from COB October 16th plus any hedging and other costs
- A negative bid indicates that CME pays the bidder, a positive bid indicates CME receives payment from the bidder

Auction Dry Run: CME will hold a mandatory dry-run for all Auction Bidders on September 21st. If CME elects to hold a second dry-run for additional testing, this will be held on September 28th.

Basis Swap Auction Process

Dutch Auction Example

Process:

1. Portfolio divided into equally proportioned “vertical slices” across all six tenor points, these “slices” represent the minimum portfolio bidding size
2. Each bidder submits bid (stated in terms of \$ bid/ask) at either the minimum bidding size, or its multiples
3. The auction price is determined based on the last clearing size of the portfolio, all winning bidders get filled at that price

Example: Auction portfolio with net \$2M DV01, shown on slide 15, divided into four equal slices (25% of portfolio):

Bidder	Submission	Allocation	Premium Received
1	\$375,000	\$500k DV01 “Slice”	\$500,000
2	\$450,000	\$500k DV01 “Slice”	\$500,000
3	\$475,000	\$500k DV01 “Slice”	\$500,000
4	\$500,000	\$500k DV01 “Slice”	\$500,000
5	\$550,000	N/A	-
6	\$625,000	N/A	-

Final auction cost will be:
 $\$500,000 \times 4 \text{ Slices} = \$2,000,000$

Included Bid	Excluded Bid	Auction Clearing Price
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Basis Swap Auction Process

Auction Results and Communication

Immediately after the auction bidding window closes, CME will determine if the auction will be executed based on whether the auction cost, allocated to customers' portfolios, breaches the maximum loss limit

- Auction participants will be notified within as soon as reasonably possible whether the auction is executed
- CME will also publish a Clearing Advisory to communicate whether the auction was executed, and if executed, the fill level of the auction in basis points of the gross discounting DV01

If auction is executed, CME will allocate the auction cost to individual clients and book offsetting trades.

Cost Participation % Share is calculated as a ratio of a client's gross DV01 to the entire auction portfolio gross DV01.

Customer	Gross DV01	Cost Participation % Share		\$ Cost
Customer A	(\$500,000)	10%	▶	(\$200,000)
Customer B	(\$1,000,000)	20%		(\$400,000)
Customer C	\$1,500,000	30%		(\$600,000)
Customer D	\$2,000,000	40%		(\$800,000)
Total	\$5,000,000	100%		(\$2,000,000)

Net DV01: \$2M
Bid/Ask: 1.0bp
Cost: (\$2,000,000)

- In this example, CME would communicate that the Participant fill level is equal to 0.4 bps of gross discounting DV01

If auction is not executed, clients may seek an alternate means of risk mitigation

Basis Swap Auction Process

Auction Risks and Considerations

- If there is no, or limited, position netting, i.e. all participating clients are in the same direction, this may materially diminish the auction benefits and increase the cost of the auction due to the large concentrated risk being auctioned off at the same time vs bilateral trading which may be spread over longer period of time
- A large move in the SOFR/Fed funds basis price from Friday night, October 16th to Monday morning, October 19th may jeopardize CME's ability to execute an auction as the resultant mark-to-market may exceed the previously communicated maximum loss threshold
- By participating in the auction, you agree to sell your SOFR/Fed Funds basis swaps according to following:
 - **If the auctioned portfolio generates a loss (expected case):** The cost would be no greater than the maximum loss limit, as communicated by CME
 - **If the auctioned portfolio generates a gain:** The gain would be allocated consistent with the earlier participation share methodology
- Clients with very small exposures may get a better price transacting on a bilateral basis

Client Elections, Analysis, & Testing

SOFR Discounting Transition – Client Elections

August 4, 2020

- **CME sent the ‘SOFR Basis Swap Auction Participation Agreement’ to each IRS Clearing Member**
 - This agreement **includes** the pre-defined Maximum Loss Limit for the SOFR Basis Swap Auction
 - This agreement also includes an auction protocol (see separate attached Annex to the Participation Agreement, titled **SOFR Basis Swap Auction Protocol**. CME will maintain the latest version on the CME [website](#).
 - Clearing Members are responsible for distributing this agreement to all customers that receive the ‘CME SOFR Discounting Transition Election File’. Clearing Members will **not** be responsible for signing this agreement.
 - If a client would like to participate in the auction, CME must receive a signed legal agreement and corresponding election file.
 - Clients may send the signed legal agreement to their FCM or to CME directly at Onboarding_Clearing@cmegroup.com.
 - **Note:** Clients may leverage DocuSign for the purposes of signing this agreement.

October 2, 2020 (Client Deadline)

- **Clearing Firms (or clients) to provide the completed election file and signed legal agreement to CME**
 - CME will begin consolidating the client elections and reconcile auction elections vs. signed agreement.
 - CME will reach out to clearing members and clients directly if breaks are found.

October 9, 2020 (Clearing Member Deadline)

- **Clearing Firms to provide final approval on the client elections.**
 - CME will finalize the consolidated list of client elections to use as an input to ‘Risk Exchange’ on Transition Date and the SOFR Auction on October 19th.
 - CME will provide clearing members with a snapshot of their current client elections and ask that they provide approval.

SOFR Discounting Transition – Available Analysis

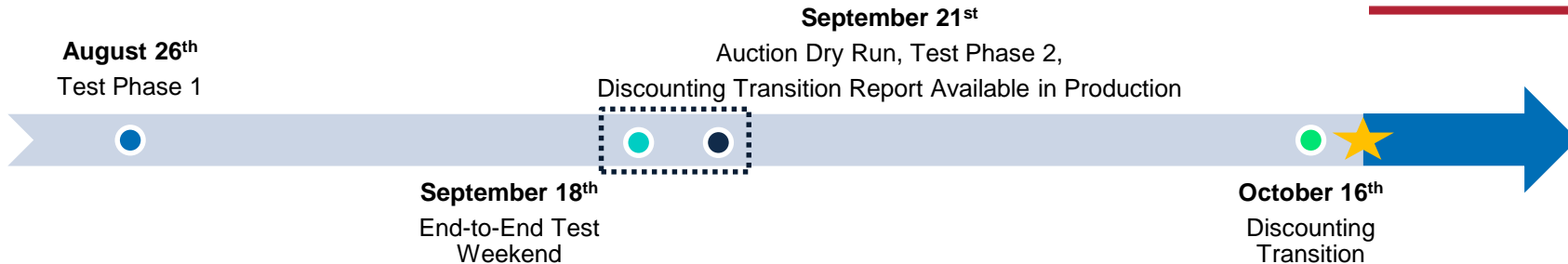
CME can provide indicative impacts from the SOFR discounting transition for existing cleared portfolios based on data for a pre-selected date. CME plans to refresh data used to conduct the analysis: **Aug 28, Sep 25, Oct 2, and Oct 9**

1. Indicative Cash Adjustment at trade level
2. Indicative Re-Hedging Swaps from the re-hedging process
3. Indicative SOFR Discounting Sensitivity bucketed at six tenor points for each Position Account (available trade level upon request)
4. Indicative EFFR-SOFR History and Breakeven Spreads at the six tenor points

To receive this information, please email CME with your position account IDs: CMEOTCAnalysis@cmegroup.com

Note: CME may need to obtain the requesting firm's Verification Officer approval in order to provide this information.

SOFR Testing and Readiness Timelines



Test Phase 1: August 26th – September 18th

- Simulates the transition-date processing (Oct 16th)
- CME produces the 'IRS Discounting Transition Report' daily in NR
- IRS Trade Register (VM, PAA, and NPVs) are based on EFRF discounting
- IM requirements are calculated using EFRF-based NPVs/risk

End-to-End Test: *Weekend of September 18th*

- CME simulates the Re-Hedging Process at end-of-day in NR
- Create basis swaps for all accounts w/ USD Swaps
- Send corresponding clearing confirmed messaging
- The IRSTR will show the basis swaps with a cleared date of Sept 21st

Test Phase 2: September 21st – October 16th

- Simulates the post-transition environment (Oct 19th onward)
- CME hosts a mock SOFR Auction the morning of Sept 21st
- CME begins publishing the IRSTR reflecting SOFR discounting
 - IRS Trade Register (VM, PAA, and NPVs) are based on SOFR
- IM requirements are calculated using SOFR-based NPVs/risk
- IRS Discounting Transition Report no longer published in NR

Discounting Transition Report in Production: *September 21st*

- Shows NPV change leading up to Transition Date
- All reports contain the date as part of file name and a Value Date within the report: IRSDIS_[FIRM ID]_YYYYMMDD_EOD.csv

CME Group SOFR Resources

[Three-Part Discounting Transition Webinar Series](#)

[Discounting Transition Methodologies White Paper](#)

[SOFR Basis Swap Auction Protocol](#)

[OTC SOFR Swap Clearing](#)

[CME SOFR Futures and Options](#)



CME Group

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