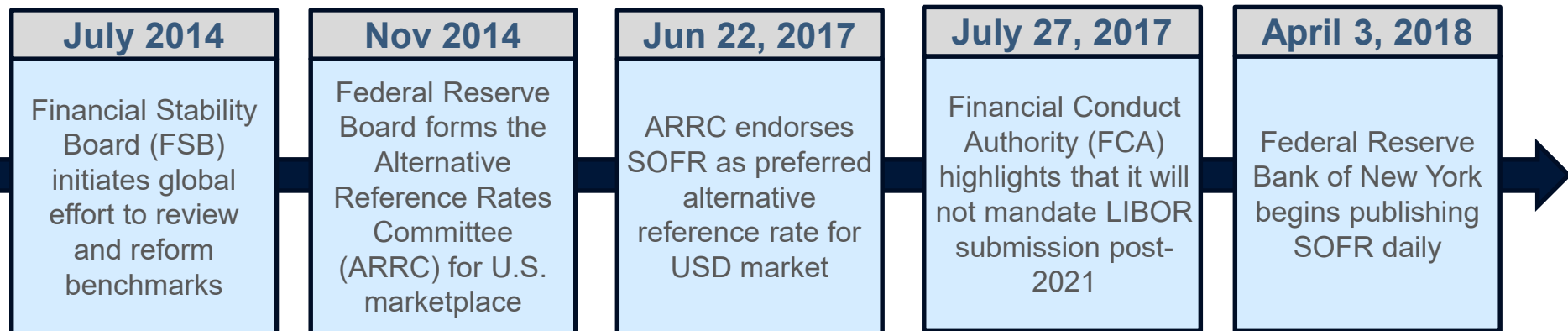


# CME SOFR Futures

[www.cmegroup.com/sofr](http://www.cmegroup.com/sofr)

# Background on SOFR and the ARRC

In 2014, the Federal Reserve commissioned the Alternative Reference Rates Committee (ARRC), tasked with identifying an alternative USD interest rate benchmark based firmly in market transaction data. After extensive research, in June 2017 the ARRC selected the **Secured Overnight Financing Rate (SOFR)**, a broad treasury financing rate, as the preferred alternative reference rate for the USD Marketplace



## CME Group has been deeply involved in this initiative for several years

Member of LIBOR Oversight Committee since April 2013

Member of ARRC since September 2015

Participant in ISDA Working Group on Benchmark Fallbacks

Published White Paper: What's Next for LIBOR and Eurodollar Futures?

Hosted market-wide webinar on ARRC and SOFR, attended by 900 market participants

Collected feedback from 100+ participants on SOFR futures design

**Launched SOFR futures on May 7, 2018 and cleared OTC SOFR swaps on October 22, 2018**

**Launching options on SOFR futures on January 6, 2020**

# What is the Secured Overnight Financing Rate (SOFR)?

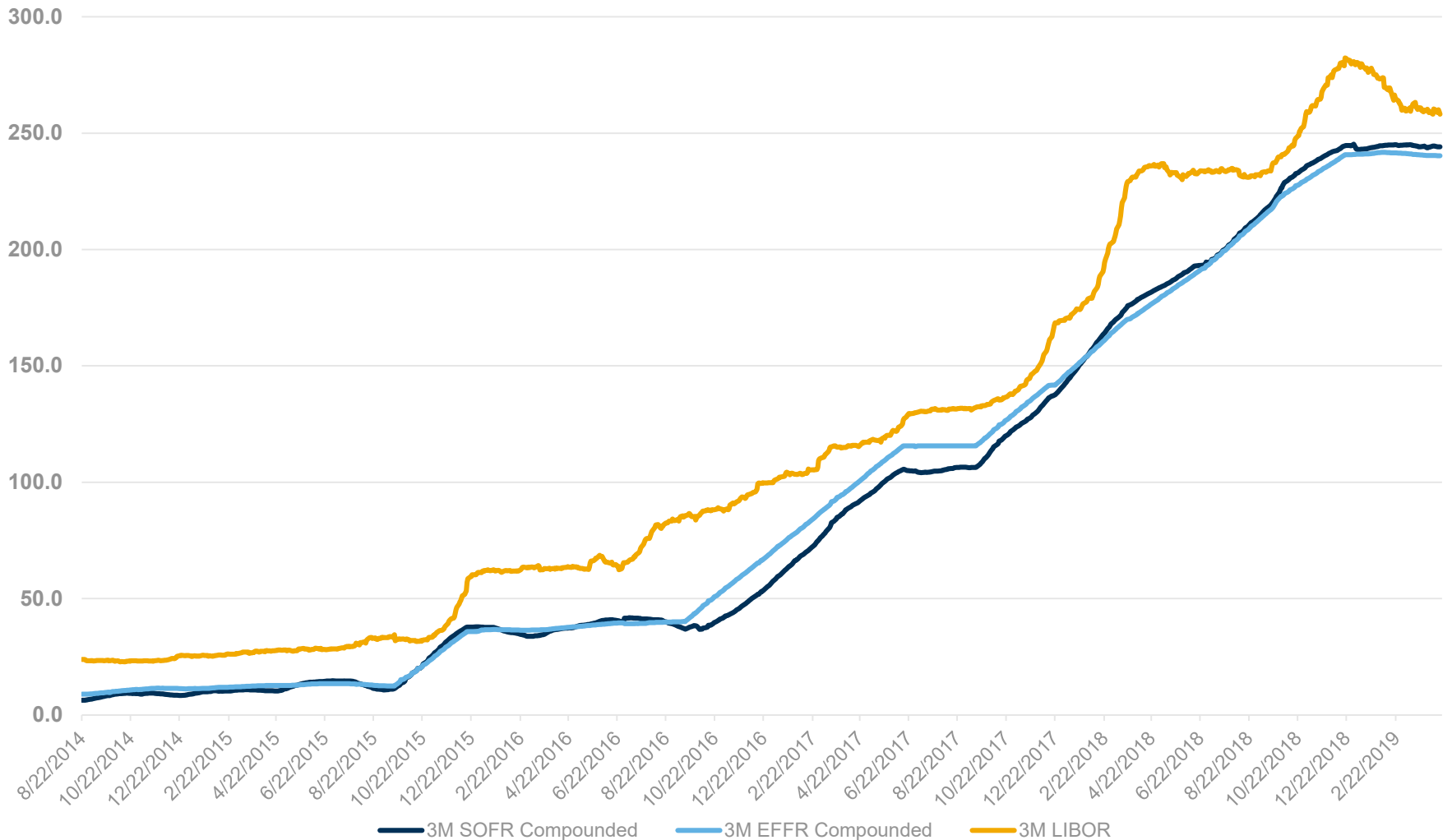
- SOFR is endorsed by the Fed-sponsored Alternative Reference Rate Committee (ARRC) as a robust alternative reference rate for the USD Marketplace
- ARRC's criteria included liquidity of the underlying market, usefulness to all market participants, feasibility of calculating the rate, and consistency with IOSCO principles for benchmarks (such as Benchmark Quality and Governance)\*
- Underpinned by the U.S. Treasury overnight repurchase (repo) market, for which the pool of eligible transactions exceeds \$700 billion per day, and is growing\*\*
  - Data sourced from tri-party repo data from Bank of New York Mellon (BNYM), and cleared bilateral and GCF Repo data from the Depository Trust & Clearing Corporation (DTCC)
  - Calculated as a transaction-volume-weighted median rate
  - Various filters and trims are applied to cleared bilateral and GCF transactions from DTCC to clean idiosyncrasies such as inter-company transactions and repo specials. Also, the Fed's RRP transactions are excluded to help determine the representative cost of overnight secured funding.
- SOFR is financially distinct but highly correlated with benchmark Eurodollar and Fed Fund rates. Therefore, we believe that Eurodollars, Fed Funds, and SOFR futures may co-exist for a long time providing valuable choice in investing, risk management, and hedging tools.

\*ARRC Second Report, page 4

\*\*ARRC Second Report, page 7

<https://www.newyorkfed.org/medialibrary/Microsites/arrc/files/2018/ARRC-Second-report>

# 3-Month Compounded SOFR, 3-Month Compounded EFFR, and 3-Month LIBOR<sup>®</sup>

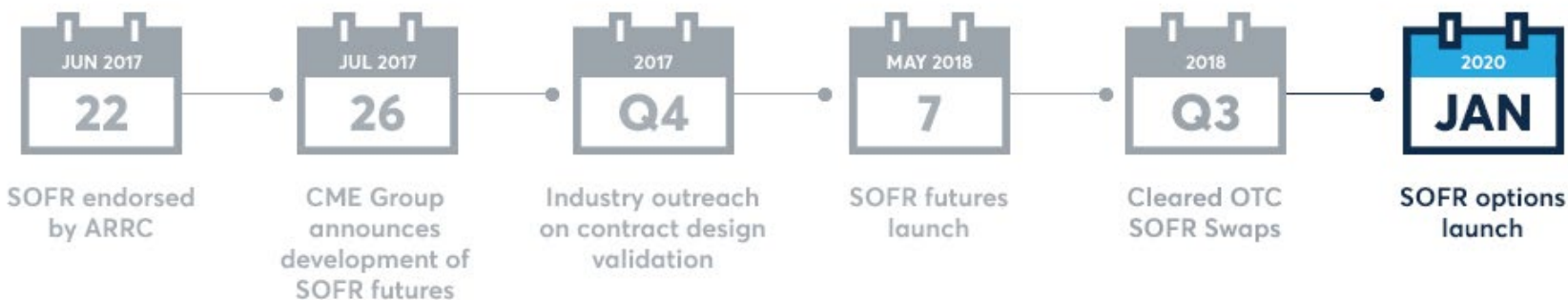


# CME 3-Month and 1-Month SOFR futures

Based on extensive customer feedback, CME Group launched 3-Month and 1-Month SOFR futures contracts on May 7, 2018

- 3-Month SOFR futures (SR3) offer a strip of 39 quarterly contracts which settle to the compounded SOFR in a given reference period between two IMM dates
- 1-Month SOFR futures (SR1) offer a strip of 13 monthly contracts which settle to the arithmetic average of SOFR in a given calendar month
- Complementarity between SR3 and SR1:
  - The 1-Month SOFR futures strip offers finer granularity for framing market expectations of future SOFR values over the nearby 1-month to 7-month interval during which the front 3-Month contract becomes more set each day from daily SOFR fixings
  - After the nearby contract enters its Reference Quarter, the contract rate becomes a mix of (i) known SOFR values, ie, published values for all days from start of the Reference Quarter to the present, and (ii) market expectations of SOFR values for all remaining days in the Reference Quarter that lie ahead
- CME Group will launch options on 3-Month SOFR futures on Jan 6, 2020, pending regulatory review

## CME SOFR Product Development Timeline



# SOFR Futures Contract Design

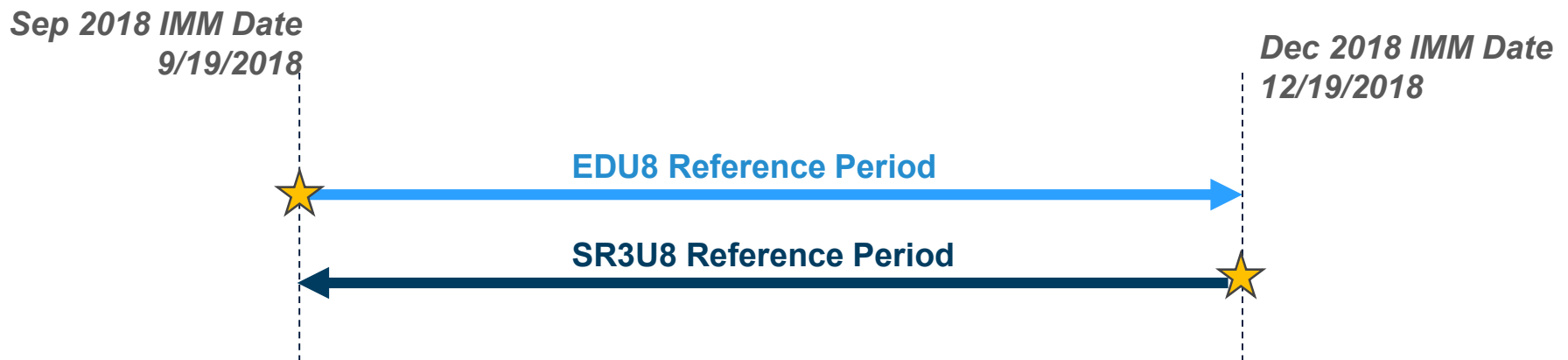
	3-Month SOFR futures	1-Month SOFR futures
Contract Unit	Compounded daily Secured Overnight Financing Rate (“SOFR”) interest during contract Reference Quarter, such that each basis point per annum of interest = \$25 per contract.	Average daily Secured Overnight Financing Rate (“SOFR”) interest during futures contract delivery month, such that each basis point per annum of interest is worth \$41.67 per futures contract.
Price Basis	Contract-grade IMM Index: 100 minus R	Contract-grade IMM Index: 100 minus R
Contract Size	\$25 per basis point per annum	\$41.67 per basis point per annum
Minimum Price Fluctuation	<i>Nearby Delivery Month:</i> 0.0025 IMM Index points (¼ basis point per annum) equal to \$6.25 per contract <i>All Other Delivery Months:</i> 0.005 IMM Index points (½ basis point per annum) equal to \$12.50 per contract	<i>Nearby Delivery Month:</i> 0.0025 IMM Index points (¼ basis point per annum) equal to \$10.4175 per contract <i>All Other Delivery Months:</i> 0.005 IMM Index points (½ basis point per annum) equal to \$20.835 per contract
Delivery Months	Nearest 39 March Quarterly months (Mar, Jun, Sep, Dec)	Nearest 13 calendar months
Globex Product Code	SR3	SR1

For full SOFR contract specifications, please refer to appendix slides 12 and 13

# 3-Month SOFR vs. Eurodollar Futures: Contract Months and Reference Periods

- Due to the nature of their underlying rates, Eurodollar futures are forward looking (using 3-month rates) while SOFR futures are backward looking (using an overnight rate)
- SOFR futures are named so that each contract month's 3-month reference period begins at the same time of as the most relevant Eurodollar future
- While the reference period is the same for both products, the final settlement date and last trade date differs

★ *Indicates final settlement day*



# Inter-Commodity Spreads facilitate liquidity formation in SOFR futures

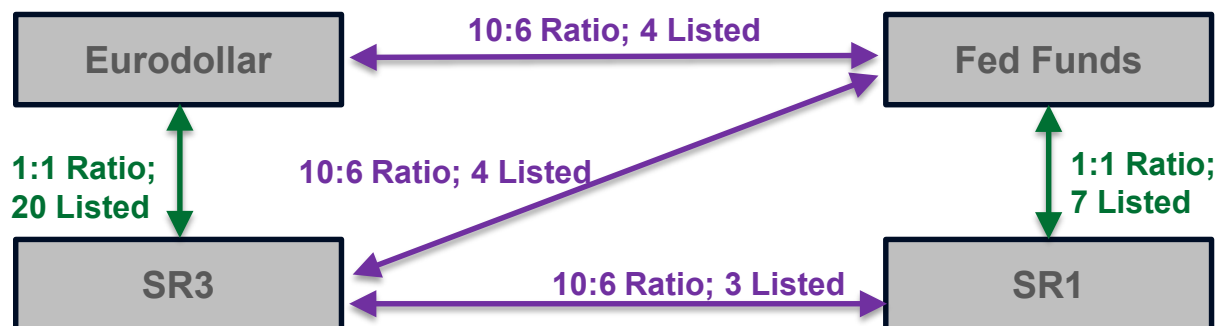
- CME Globex offers spread instruments that reduce leg risk and improve liquidity formation by matching orders from related markets
- We offer inter-commodity spreads between short-term interest rate futures
  - *Eurodollars vs. Fed Fund futures*
  - *1-Month SOFR vs. Fed Fund futures (with implied)*
  - *3-Month SOFR Futures vs. Eurodollar futures (with implied)*
  - *3-Month SOFR Futures vs. 1-Month SOFR futures*
  - *3-Month SOFR Futures vs. Fed Fund futures*
- Implied functionality creates orders using related spread markets
  - *For example, if there are market makers providing liquidity in 1-Month SOFR vs. Fed Fund Futures, the CME Globex match engine will use this in combination with the Fed Fund markets to create orders in the SOFR outrights*

***CME Clearing provides margin offsets of up to 75% between related STIR Futures***



# Inter-commodity spreads for Short-Term Interest Rates

Spreading against established liquidity pools of FF and ED futures assist in developing liquidity in SOFR futures



## Spread Weightings

- Fed Funds and 1-Month SOFR futures are \$41.67 DV01 contracts
- Eurodollars and 3-Month SOFR futures are \$25 DV01 contracts
- To keep positions and risk balanced, spreads between instruments with different DV01s are weighted with 10:6 leg ratios. DV01s which are \$41.67 for 1-Month contracts (FF and SR1) and \$25.00 for 3-Month contracts (ED and SR3)
- For weighted spreads, legs are arranged to match exposures between IMM dates: 1 quarterly Eurodollar or 3-Month SOFR future spread against the next 2 Fed Fund or 1-Month SOFR Futures contract months (e.g. 3 April FF + 3 May FF vs. 10 March ED)

Globex Symbol Example	Spread Code	Implied Y/N	Front Leg	Back Leg	Leg Ratio
ZQJ8K8-GEH8	EF	No	Fed Funds	Eurodollars	(3+3) : 10
SR3H8-GEH8	IS	Yes	SOFR 3-Month	Eurodollars	1:1
SR1H8-ZQH8	IS	Yes	SOFR 1-Month	Fed Funds	1:1
SR1J8K8-SR3H8	EF	No	SOFR 1-Month	SOFR 3-Month	(3+3) : 10
ZQJ8K8-SR3H8	EF	No	Fed Funds	SOFR 3-Month	(3+3) : 10

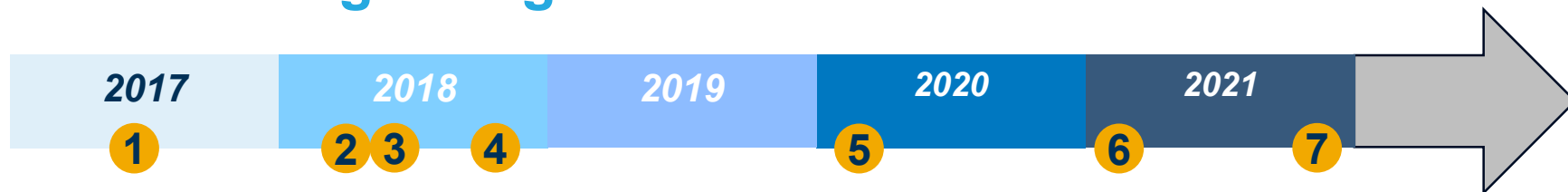
# OTC Clearing for SOFR OIS

- Clearing OTC SOFR Swaps further extends CME Group’s leadership as the only clearing house to offer clearing for IRS, Swaptions and Interest Rate futures within a single netting pool.
- The deep liquidity and potential offsets found in our Interest Rate franchise makes CME the natural home for SOFR clearing.

## Product Scope

Field	Description
Swap Types	<p><u>OIS:</u></p> <p>Fixed versus SOFR</p> <p><u>Basis:</u></p> <p>USD LIBOR versus SOFR</p> <p>EFFR versus SOFR</p>
Floating Rate Index	USD-SOFR-COMPOUND
Maximum Maturity	30 Years
Settlement Convention	T+1
Forecasting and Discounting Curve	USD SOFR Curve
Price Alignment Rate	USD SOFR
Reset Calendar	US Gov Securities
Payment Calendar	USNY

# CME Offerings in light of ARRC's Paced Transition Plan

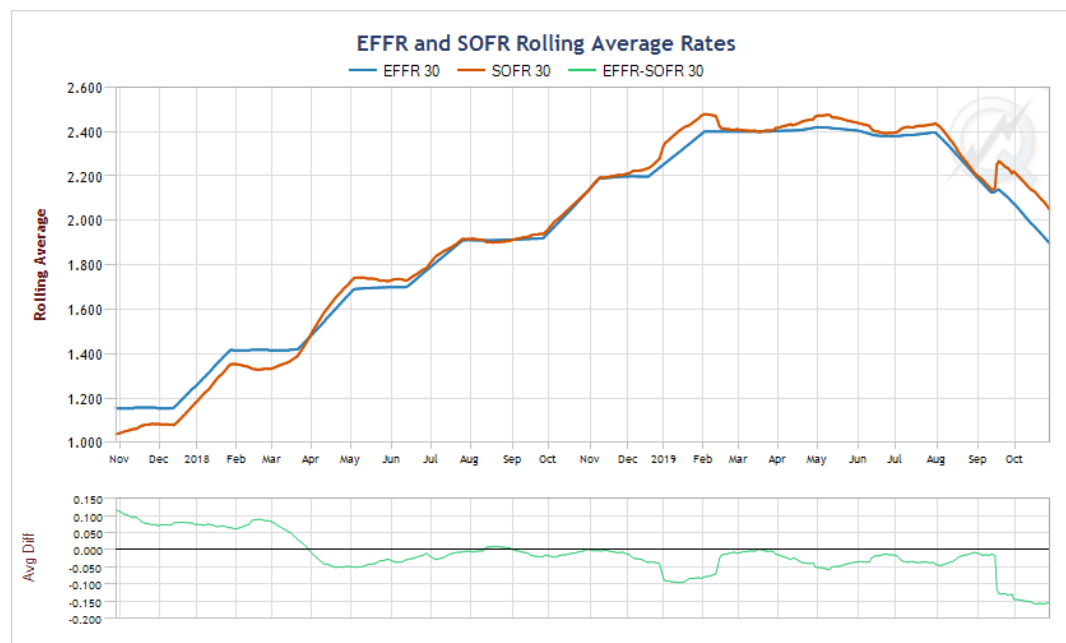


	Step	Timing
1	ARRC Nominates SOFR as preferred rate for U.S. Dollar marketplace	June 22, 2017 (Complete)
2	SOFR daily publication begins	April 3, 2018 (Complete)
3	CME futures contracts launch	May 7, 2018 (Complete)
4	CME provides OTC Clearing for SOFR OIS (SOFR also used for discounting and price alignment)	October 1, 2018 (Complete)
5	CCPs begin offering optionality in the rate used for discounting and price alignment, for all OTC-Cleared derivatives	Q1-2020
6	CCPs no longer accept new swap contracts for clearing that use Effective Fed Funds Rate for price alignment and discounting, except for the purpose of reducing risk in legacy contracts	Q1-2021
7	Creation of term reference rate, potentially based on SOFR-derivatives markets once liquidity has developed sufficiently to produce a robust rate	Before end of 2021

Source: ARRC Roundtable November 2<sup>nd</sup>  
<https://www.newyorkfed.org/arrc/meetings>

# Why Trade SOFR Futures?

- Futures are a reliable indicator of market expectations of SOFR along the curve
- Seamless spread trading vs. Eurodollars and Fed Funds futures via inter-commodity spreads, providing relative value opportunities and a transparent basis market
- Margin offsets of up to 80% vs. Treasuries, Eurodollars and Fed Funds futures ([SR1 offsets](#) | [SR3 offsets](#))
- Slated to become eligible for portfolio margining against CME-cleared swaps in 2020
- Supported by a robust global network of FCMS and [market makers](#) (electronic and blocks)
- Unique investing and risk management applications for overnight repo and relative value traders
- Differences in SOFR and EFFR are affected by supply and demand dynamics in each market, and create relative value trading opportunity for futures market participants



See the latest version of this chart (and more) at [www.cmegroup.com/stiranalytics](http://www.cmegroup.com/stiranalytics)

## For more information...

Visit our website at [www.cmegroup.com/sofr](http://www.cmegroup.com/sofr) to find information on volume and open interest, educational materials, analytical tools and more.

Or contact our interest rates product team at [InterestRates@cmegroup.com](mailto:InterestRates@cmegroup.com)

# Appendix

# SOFR Futures – Vendor Codes for Outrights and Spreads

Product	3-Month SOFR	1-Month SOFR	3-Month SOFR vs. Eurodollar	1-Month SOFR vs. Fed Funds	1-Month SOFR vs. 3-Month SOFR	Fed Funds vs. 3-Month SOFR
	<i>Outright</i>	<i>Outright</i>	<i>1:1 Spread</i>	<i>1:1 Spread</i>	<i>6:10 Spread</i>	<i>6:10 Spread</i>
CME Globex	SR3	SR1	SR3	SR1	SR1	ZQ
Bloomberg	SFR Comdty	SER Comdty	SFRED	SERFF Comdty	SERSFR Comdty	FFSFR Comdty
Thomson Reuters Globex Chain RICs	0#1SRA:	0#1S1R:	0#1SRA-ED:	0#1S1R-FF:	0#1S1R-S1R-SRA:	0#1FF-FF-SRA:
Thomson Reuters Composite Chain RICs	0#SRA:	0#S1R:	0#SRA-ED:	0#S1R-FF:	0#S1R-S1R-SRA:	0#FF-FF-SRA:
TT	SR3	SR1	SR3	SR1	SR1	ZQ
CQG	SR3	SR1	SGI0	SZI0	SRWI1	ZSWI1
FIS/SunGard	SR3	SR1	SR3	SR1	SR1	ZQ
Fidessa	SR3	SR1	SR3	SR1	SR1	ZQ
Stellar	SR3	SR1	SR3-GE	SR1-ZQ	SR1-SR3	ZQ-SR3
ION (Pats & FFastFill)	SR3	SR1	Pending	Pending	Pending	Pending
Broadway Technology	SR3	SR1	Pending	Pending	Pending	Pending
DTN	@SR3	@SR1	Pending	Pending	Pending	Pending
Itiviti	SR3	SR1	Pending	Pending	Pending	Pending

# Contract Specifications: Three-Month SOFR futures

	Three-Month SOFR futures
<b>Trading Unit</b>	Compounded daily Secured Overnight Financing Rate (“SOFR”) interest during contract Reference Quarter, such that each basis point per annum of interest = \$25 per contract. <b>Reference Quarter:</b> For a given contract, interval from (and including) 3rd Wed of 3rd month preceding Delivery Month, to (and not including) 3rd Wed of Delivery Month.
<b>Price Basis</b>	Contract-grade IMM Index: 100 minus R. R = compounded daily SOFR interest during contract Reference Quarter.
<b>Contract Size</b>	\$25 per basis point per annum
<b>Minimum Price Increment</b>	<b>Contracts with Four Months or Less Until Termination of Trading:</b> 0.0025 IMM Index points (¼ basis point per annum) equal to \$6.25 per contract <b>All Other Contracts:</b> 0.005 IMM Index points (½ basis point per annum) equal to \$12.50 per contract
<b>Last Trading Day</b>	Exchange Business Day first preceding 3rd Wed of Delivery Month. <b>Termination of Trading:</b> Close of CME Globex trading on Last Day of Trading.
<b>Delivery</b>	Cash settlement, by reference to Final Settlement Price, on first US government securities market business day following Last Day of Trading. <b>Final Settlement Price:</b> Contract-grade IMM Index evaluated on the basis of realized SOFR values during contract Reference Quarter $R = [ \prod_i \{1+(d_i/360)*(r_i/100)\} - 1 ] \times (360/D) \times 100$ n = Number of US government securities market business days in the Reference Quarter i ~ Running variable indexing US government securities market business days during Reference Quarter $\prod_i$ denotes the product of values indexed by the running variable, i = 1,2,...,n. r <sub>i</sub> = SOFR value for i <sup>th</sup> US government securities market business day d <sub>i</sub> = Number of calendar days to which r <sub>i</sub> applies D = $\sum d_i$ (ie, number of calendar days in Reference Quarter)
<b>Contract Months</b>	Nearest 39 March Quarterly months (Mar, Jun, Sep, Dec).  For each contract, Contract Month is the month in which Reference Quarter begins. Example: For a “Sep” contract, Reference Quarter starts on IMM Wed of Sep and ends with Termination of Trading on the first US government securities market business day before IMM Wed of Dec, the contract Delivery Month.
<b>CME Globex Algorithm</b>	Allocation (A Algorithm, with Top Order Allocation = 100% and Pro Rata Allocation = 100%)
<b>Block Minimum</b>	4pm–12am CT, Mon-Fri on regular business days and at all weekend times: <b>250 contracts</b> 12am– 7am CT, Mon-Fri on regular business days: <b>500</b> 7am–4pm CT, Mon-Fri on regular business days: <b>1000</b>
<b>Product Code</b>	SR3
<b>Bloomberg Code</b>	SFR Comdty <GO>



# Contract Specifications: One-Month SOFR futures

	One-Month SOFR futures
<b>Trading Unit</b>	Average daily Secured Overnight Financing Rate (“SOFR”) interest during futures contract Delivery Month, such that each basis point per annum of interest is worth \$41.67 per futures contract.
<b>Price Basis</b>	Contract-grade IMM Index: 100 minus R. R = average daily SOFR interest during contract Delivery Month.
<b>Contract Size</b>	\$41.67 per basis point per annum
<b>Minimum Price Increment</b>	0.005 IMM Index points (½ basis point per annum) equal to \$20.835 per contract, provided that: <ul style="list-style-type: none"> <li>• If first day of contract Delivery Month is Sat, Sun, or Mon, then MPI is 0.0025 Index points, equal to \$10.4175 per contract, as of first trading day of contract Delivery Month.</li> <li>• If first day of contract Delivery Month is Tue, Wed, Thurs, or Fri, then MPI is 0.0025 Index points, equal to \$10.4175 per contract, as of last Sunday of month preceding contract Delivery Month.</li> </ul>
<b>Last Trading Day</b>	Last Exchange Business Day of contract Delivery Month.
<b>Delivery</b>	Cash settlement, by reference to Final Settlement Price, on first US government securities market business day following Last Day of Trading. <b>Final Settlement Price:</b> Contract-grade IMM Index evaluated at R = arithmetic average of daily SOFR during Delivery Month.
<b>Contract Months</b>	Nearest 13 calendar months
<b>CME Globex Algorithm</b>	Split FIFO and Pro-Rata (K Algorithm, with Top Order Allocation = 100% and Pro Rata Allocation = 100%)
<b>Block Minimum</b>	4pm–12am CT, Mon-Fri on regular business days and at all weekend times: <b>125 contracts</b> 12am– 7am CT, Mon-Fri on regular business days: <b>250</b> 7am–4pm CT, Mon-Fri on regular business days: <b>500</b>
<b>Product Code</b>	SR1
<b>Bloomberg Code</b>	SER Comdty <GO>

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CME (“the Exchange”) has entered into an agreement with ICE Benchmark Administration Limited which permits the Exchange to use ICE LIBOR as the basis for settling Three–Month Eurodollar futures contracts and to refer to ICE LIBOR in connection with creating, marketing, trading, clearing, settling and promoting Three–Month Eurodollar futures contracts.

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