



Ready for the End of Libor

Enterprise-ready technology and analytics that empower firms to stay ahead of the risks, challenges and uncertainty introduced by the Libor phaseout

Industry Challenges

In 2021, Libor, the benchmark rate that underpins \$350 trillion of financial contracts, will be discontinued. This momentous change will require global markets to adapt to a new crop of benchmark interest rates that will replace Libor globally. Preparations will involve tackling a number of challenges, including needs to:

- define the new curve valuation environment,
- price and risk manage against the new instruments and curves, and
- understand fallback definitions and overhaul technology to cope with new benchmarks.

The new benchmark rates in the US and Eurozone need new curves, which rely on new derivatives markets for SOFR Futures and ESTER swaps. Many of the new benchmarks are based on overnight rates, and thus do not have the multi-tenor issues of Libor. But incorporating these new curves into existing multi-curve models will lead to increased complexity in managing interest-rate basis risk. Individual pricing and risk algorithms will each need to be overhauled to cope with new instruments, new curves, and fallbacks for Libor when it is discontinued.

Adding to the complexity, the new benchmarks that have been proposed to replace Libor are calculated in the opposite direction in that they are backward-looking rates instead of forward-looking Libor. This means there will be less certainty on how to manage liabilities as they will not be fixed until the last minute before they are paid. What all this uncertainty has created is an imminent need to start planning for the end of Libor now. When assessing preparedness, firms should ensure they have future-proof, flexible analytics and technology in place.

The Solution

FINCAD F3 is ready for the end of Libor. FINCAD F3 has enterprise-ready analytics developed by the industry's top experts. Using F3 enables firms to stay well ahead of the risks, challenges and uncertainty introduced by the Libor phaseout. F3 can replace Libor seamlessly in multi-asset portfolios, providing the ability to control alternative benchmarks and spread adjustments to fully explore all fallback options.

Current Instrument and Curve Coverage for the End of Libor

New Alternative Benchmark Trades

- a. Cash Instruments and Derivatives
 - i. SOFR and SONIA futures
 - ii. FedFunds/SOFR basis swaps
 - iii. Libor/SOFR basis swaps
- b. New RFR-linked instruments are easy to define using F3's building blocks

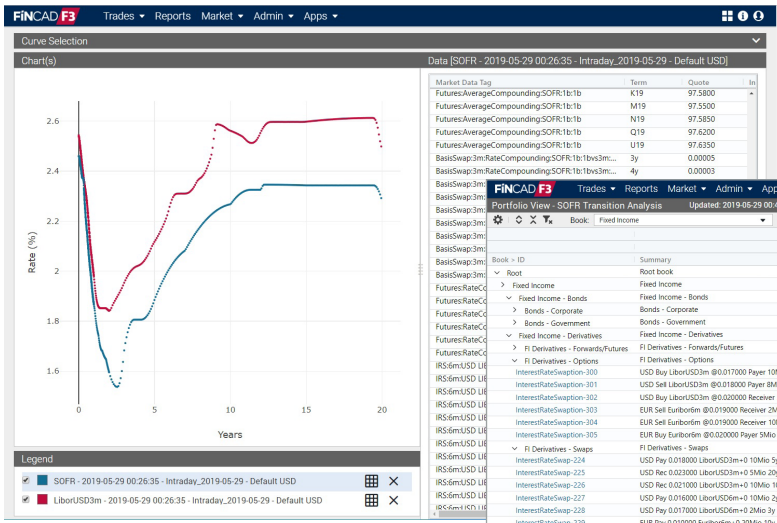
New Alternative Benchmark Curves

- a. F3 Coverage Includes:
 - i. SONIA
 - ii. SARON
 - iii. TONAR
 - iv. SOFR
 - v. ESTER (EONIA)
 - vi. RBA Cash

Make Better Business Decisions

As a user, you will be empowered to make the best decisions on how to amend contracts and mitigate potential losses due to the end of Libor. F3's future-proof instrument and model flexibility means that you can easily respond to future Libor challenges ahead, in real-time. F3 enables you to:

- **Incorporate new instruments without having to write code** using F3's building block approach. F3 helps you create the latest market instruments in real-time for trading and curve calibration, so you can easily stay on top of the latest developments in derivatives markets.
- **Add the latest curves without having to write code.** Users can easily add new curves and change their existing choice of instruments and other settings using F3's generic calibration. Additionally, F3's global calibration can be used to incorporate full basis markets, meeting dates, and turn pressure spikes. The F3 model can be easily customized to build the right curve for your needs.
- **Get ultra-fast risk reporting for multi-asset portfolios** with F3's patented algorithmic differentiation (AD), which allows complete analysis of exposure to Libor and alternative benchmarks.
- **F3 facilitates novation and compression of legacy Libor positions onto alternative benchmarks.** It also assists with managing liquidity risk and hedging exposure to remaining overnight fixings, which in turn reduces the challenges in liability management from the move to backward-looking rates.
- **Benefit from centralized valuation and risk.** Libor is currently used in a number of different ways, such as forward-rates, discounting, or embedded in the volatility surface. Traditional libraries must be updated to replace all these dependencies with alternative benchmarks and spread adjustments. This requires more inputs for each pricing function, and additional new trades on alternative benchmarks may require new pricers. The benefit of F3's centralized valuation and risk architecture is that it eliminates this challenge by supporting Libor replacement for every use of Libor in the modeling of all asset classes.
- **Gain insight into complex problems.** Regulatory capital requirement calculations and counterparty margin requirements are just a few examples of complex algorithms that can rely on Libor. The process of discovering how the end of Libor will impact other key areas, such as market risk measures, valuation adjustments, and other regulatory- and/or capital-driven activities can be arduous. This task is made easier when aided by the coherent modeling and flexible multi-asset analytics library available with FINCAD F3.



Curve selection in F3

Portfolio view of SOFR transition analysis in F3

Book - ID	Summary	Valuation (SOFR 2019)	Valuation (SOFR 2022)	Valuation (SOFR 2025)	Scenario analysis	Base	USD rates 10bps up
		MTM	MTM	MTM	Value	Difference	% Change
Root	Root book	USD (7,902,179.18)	USD (7,903,061.30)	USD (7,970,373.98)	USD (8,075,749.07)	-135,678.25	-1.68007 %
Fixed Income	Fixed Income	USD (8,261,097.45)	USD (8,269,292.26)	USD (8,329,282.26)	USD (8,434,667.35)	-111,266.96	-1.31916 %
Bonds - Corporate	Bonds - Corporate	USD (4,255,103.20)	USD (4,259,957.49)	USD (4,263,306.15)	USD (4,263,006.15)	40.76	0.00596 %
Bonds - Government	Bonds - Government	USD (2,253,595.21)	USD (2,253,595.21)	USD (2,253,595.21)	USD (2,253,595.21)	37.26	0.00138 %
Fixed Income - Derivatives	Fixed Income - Derivatives	USD (1,748,398.84)	USD (1,748,651.68)	USD (1,779,125.69)	USD (1,884,500.78)	-112,167.72	-5.94411 %
FI Derivatives - Forwards/Futures	FI Derivatives - Forwards/Futures	USD (14,746.65)	USD (15,337.32)	USD (15,337.32)	USD (15,337.32)	5,460.08	35.3474 %
FI Derivatives - Options	FI Derivatives - Options	USD (846,655.75)	USD (846,655.75)	USD (853,116.60)	USD (845,782.20)	-1,071.24	-0.10977 %
IRS5mUSD LIB	USD Buy LiborUSD3m @0.017000 Payer 10Mio 2022-02-05 1y	USD (85,556.66)	USD (85,556.66)	USD (85,556.66)	USD (86,737.55)	5,713.53	5.79101 %
IRS5mUSD LIB	USD Sell LiborUSD3m @0.018000 Receiver 5Mio 2022-08-05 1y	USD (9,080.61)	USD (9,080.61)	USD (9,454.74)	USD (9,454.74)	-5,033.78	-50.2511 %
IRS5mUSD LIB	USD Buy LiborUSD3m @0.020000 Receiver 5Mio 2022-02-05 2y	USD (4,481.66)	USD (4,481.66)	USD (4,481.66)	USD (4,481.66)	-2,296.18	-5.82721 %
IRS5mUSD LIB	EUR Sell Euribor3m @0.019000 Receiver 2Mio 2024-08-05 10y	USD (23,674.08)	USD (23,674.08)	USD (23,674.08)	USD (23,674.08)	1.24	0.0056 %
IRS5mUSD LIB	EUR Sell Euribor3m @0.020000 Receiver 10Mio 2024-02-05 5y	USD (794,495.67)	USD (794,495.67)	USD (794,495.67)	USD (794,495.67)	4.41	0.0056 %
IRS5mUSD LIB	EUR Buy Euribor3m @0.020000 Payer 5Mio 2023-02-05 10y	USD (8,356.29)	USD (8,356.29)	USD (8,356.29)	USD (8,356.29)	-0.46	-0.0056 %
IRS5mUSD LIB	EUR Buy Euribor3m @0.020000 Payer 5Mio 2023-02-05 10y	USD (8,356.29)	USD (8,356.29)	USD (8,356.29)	USD (8,356.29)	-0.46	-0.0056 %
IRS5mUSD LIB	FI Derivatives - Swaps	USD (857,231.45)	USD (852,668.61)	USD (910,269.77)	USD (1,025,382.27)	-115,965.56	-11.30448 %
IRS5mUSD LIB	USD Pay 0.018000 LiborUSD3m @ 10Mio 5y	USD (4,466.62)	USD (4,466.62)	USD (4,466.62)	USD (4,466.62)	31,111.01	34.27225 %
IRS5mUSD LIB	USD Rec 0.020000 LiborUSD3m @ 5Mio 20y	USD (4,292.87)	USD (4,292.87)	USD (4,292.87)	USD (4,292.87)	-73,444.15	-17.10847 %
IRS5mUSD LIB	USD Rec 0.021000 LiborUSD3m @ 10Mio 10y	USD (6,362.35)	USD (6,362.35)	USD (6,362.35)	USD (6,362.35)	-75,509.87	-249.39129 %
IRS5mUSD LIB	USD Pay 0.016000 LiborUSD6m @ 10Mio 2y	USD (3,520.13)	USD (3,520.13)	USD (3,520.13)	USD (3,520.13)	8.26	0.03280 %
IRS5mUSD LIB	USD Pay 0.017000 LiborUSD6m @ 2Mio 3y	USD (1,338.56)	USD (1,338.56)	USD (1,338.56)	USD (1,338.56)	1,963.52	39.18011 %
IRS5mUSD LIB	EUR Pay 0.018000 Euribor3m @ 20Mio 10y	USD (1,683,967.15)	USD (1,683,967.15)	USD (1,683,967.15)	USD (1,683,967.15)	935	0.0056 %
IRS5mUSD LIB	EUR Pay 0.019000 Euribor3m @ 3Mio 5y	USD (1,608,815.01)	USD (1,608,815.01)	USD (1,608,815.01)	USD (1,608,815.01)	0.89	0.0056 %
IRS5mUSD LIB	EUR Rec 0.019000 Euribor3m @ 5Mio 5y	USD (474,199.65)	USD (474,199.65)	USD (474,199.65)	USD (474,199.65)	-2.63	-0.0056 %
IRS5mUSD LIB	EUR Rec 0.018000 Euribor12m @ 2Mio 5y	USD (174,268.73)	USD (174,268.73)	USD (174,268.73)	USD (174,268.73)	-0.97	-0.0056 %
IRS5mUSD LIB	GBP Pay 0.019000 LiborGBP6m @ 10Mio 2y	USD (60,525.22)	USD (60,525.22)	USD (60,525.22)	USD (60,525.22)	0.34	0.0056 %
IRS5mUSD LIB	GBP Rec 0.020000 LiborGBP6m @ 10Mio 10y	USD (95,104.56)	USD (95,104.56)	USD (95,104.56)	USD (95,104.56)	-0.53	-0.0056 %
IRS5mUSD LIB	GBP Rec 0.016000 LiborGBP6m @ 2Mio 2y	USD (18,762.82)	USD (18,762.82)	USD (18,762.82)	USD (18,762.82)	-0.77	-0.0056 %
Fixed Income - Inflation	Fixed Income - Inflation	USD (2,287,160.42)	USD (2,287,160.42)	USD (2,287,160.42)	USD (2,287,160.42)	809.01	0.03537 %
Inflation - Bonds	Inflation - Bonds	USD (2,287,160.42)	USD (2,287,160.42)	USD (2,287,160.42)	USD (2,287,160.42)	809.01	0.03537 %
Inflation - Derivatives	Inflation - Derivatives	USD (2,287,160.42)	USD (2,287,160.42)	USD (2,287,160.42)	USD (2,287,160.42)	809.01	0.03537 %

Preparing You for the Unexpected

F3 can help you handle long-lived Libor-linked assets, as well as equip you with the necessary tools and technology needed to adapt to alternative benchmarks yet to come.

- **In USD** – Ameribor, Bank Yield Index, and other possibly unforeseen benchmark rates can all be quickly built once market data is available. Using F3, this can be done with simple configuration, eliminating the need to write new code.
- **In EUR and JPY** – ESTER will sprout from EONIA in October 2019, but EURIBOR may live on past 2021 separately from other lbors. Additionally, there is speculation that TIBOR may be robust enough to outlast other lbors. F3's powerful multi-curve technology supports all these curves living side-by-side in any of these scenarios.
- **Using the power and flexibility of F3**, you can also guarantee native handling of any custom curves that become defined, along with their instrument types and modelling instructions.

Rate Summary	DV01	Direct Rate Risk	Quote	Delta	Basis Risk	Quote	Delta	Discounting	Quote
USD	11,910	USD	(11,374)	> USD	23,277	USD	23,277	USD	
Futures: 1m SOFR	11,483	> Futures: 1m SOFR	11,483	> 3v6	98	> OIS: FF		1m	2.383%
Futures: 3m SOFR	457	M19	97,550	14,713	> Fv3	11,295	2m	2.382%	
Futures: Euro\$	(12,118)	N19	97,585	(3,275)	2y	0.209%	(33)	3m	2.372%
IRS: LIBOR3m	(11,195)	Q19	97,620	36	3y	0.210%	(45,996)	4m	2.367%
BasisSwap 3v6	98	U19	97,635	9	4y	0.210%	796	5m	2.339%
BasisSwap FF3	11,295	> Futures: 3m SOFR	97,745	84	7y	0.211%	(4,777)	6m	2.314%
BasisSwap SOFRvF	11,885	Z19	97,935	84	10y	0.212%	3,804	7m	2.286%
OIS: FF	6	H20	98,090	84	15y	0.230%	1,389	8m	2.259%
		M20	98,210	84	20y	0.238%	4,988	9m	2.232%
		Z20	98,295	83	30y	0.246%	1	10m	2.208%
		Z22	98,335	37	> SOFRvFF	11,885	11m	2.182%	
		> Futures: Euro\$	(12,118)	3y	0.005%	(4,583)	12m	2.161%	
		M19	97,477	(13,186)	4y	0.005%	1,415		
		U19	97,615	2,239	5y	0.007%	(462)		
		Z19	97,725	(1,556)	7y	0.007%	5,450		
		H20	97,910	(880)	10y	0.007%	5,381		
		M21	98,135	(133)	12y	-0.002%	(7,025)		
		> IRS: LIBOR3m	(11,195)	15y	-0.005%	10,324			
				20y	-0.005%	1,386			
				25y	-0.005%	1			
				30y	-0.006%	0			

Shown above is current rate sensitivity, assuming that LIBOR is replaced by SOFR in 2022. The risk summary report demonstrates the combined advantages of F3's universal support for Libor replacement, together with its industry-leading algorithmic differentiation for fast and accurate risk views with alternative reference rates.

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