

# A KEY METRICS RUNDOWN FOR SECURITIZED PRODUCT INVESTORS

## KEY TAKEAWAYS

- Key factors such as Libor, interest rate swaps and SOFR interact to affect MBS and ABS.
- The piece aims to provide readers with a better understanding of interest rate derivatives.

In this piece, we discuss the major building blocks in securitized products pricing. By understanding some key metrics, investors in securitized products can better assess performance in mortgage-backed securities (MBS) and asset-backed securities (ABS).

## AERIAL VIEW

### The Key Factors and Why They Matter:

**Libor:** The interbank lending rate for U.S. dollars outside the U.S.

**SOFR:** The secured overnight financing rate based on U.S. Treasury repo transactions.

**Eurodollar Futures:** The futures market for dollar-denominated time deposits.

**Interest Rate Swaps:** Interest rate swaps are transactions in which cash flow streams are “swapped.” For example, an investor may swap a fixed cash flow for a floating cash flow.

**Swap Spreads:** The swap spread is the difference between the swap rate and the U.S. Treasury rate of the same maturity.

**Swaptions:** Options that allow the investor to enter (or not to enter) a swap.

- **Interest Rate Swaps Make Up the Swap Curve...** In one simple form, interest rate swaps occur when two parties exchange fixed and floating rate payment streams. The “swap rate” is the fixed interest rate that is demanded in that exchange. It is typically just an average of the expected floating rates over the period of the swap, and usually, the floating rate is Libor.

The swap curve is a plot of swap rates across various periods. Therefore, it shows the market’s expectations for where future short-term floating Libor rates will set in one year, two years, three years and so on.

**...and MBS and ABS Typically Trade Benchmarked to the Swap Curve.** That means that MBS and ABS usually trade at some spread, or yield, above or below the swap rate of the same maturity. It’s similar to how corporate bonds are usually quoted, at some spread above or below the Treasury curve.



To quote a securitized bond, a trader may say “Swaps + 20” basis points (bps). However, Libor, eurodollars and swaps are used interchangeably and synonymously by traders. The trader may say “Libor + 20” to describe the same bond.

- **When Libor Goes Up, Swap Spreads Typically Widen...** Swap spreads are swap rates expressed as a spread above or below the Treasury rate of the same maturity. All else equal, when Libor goes up, the fixed rate required in exchange for a stream of higher future floating payments goes up. That is, swap spreads widen.

**...and When Swap Spreads Widen, MBS and ABS Spreads Typically Tighten.** Holding the securitized bond “all-in” yield<sup>1</sup> constant, MBS and ABS spreads to the swap curve will usually *tighten* when swap spreads widen. Tighter MBS or ABS spreads could imply that securitized bond pricing has become less attractive on a relative value basis.

- **SOFR will most likely replace Libor in the future.** For short-term interest rates, SOFR is expected to replace Libor as the “benchmark rate,” or the rate that is typically used as a reference rate for floating rate instruments. Once an observable SOFR-based benchmark rate is established, a SOFR swap curve can be extrapolated. This curve can be used for pricing and discovering relative value between fixed income instruments across asset classes.
- **Implied volatility is derived from the swaptions market and is used in the valuation of MBS.** Higher implied volatility means more uncertainty in the future path of interest rates. In turn, this means more potential opportunities for homeowners to prepay their mortgages (increased call risk), or more potential chances for homeowners to become “locked in” and not prepay (extension risk). For an MBS investor this manifests itself in wider spreads, all else equal.

### VIEW FROM THE GROUND

#### More In-Depth Descriptions of the Key Factors Are as Follows:

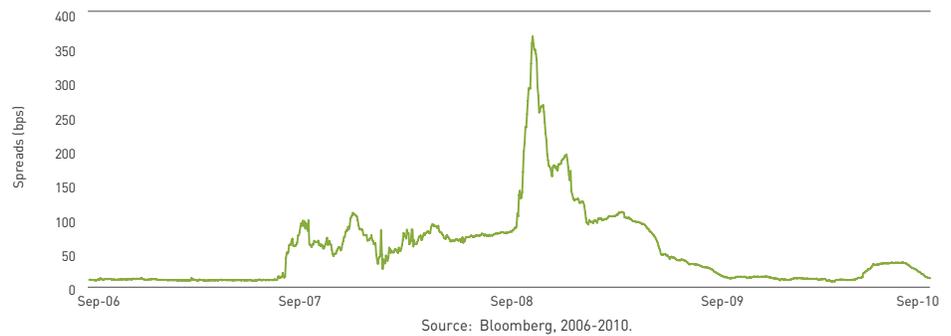
##### Libor

The London Interbank Offered Rate (Libor) is the benchmark rate for about \$6.5 trillion of business loans, consumer loans and securitized loans in the U.S.,<sup>2</sup> including the vast majority of adjustable-rate mortgages, student loans and auto loans. Libor is an indicative short-term interest rate administered by the Intercontinental Exchange (ICE). A panel of large international banks is polled to find the rate at which each bank could borrow U.S. dollars in the interbank market outside the U.S. The Libor rate is a trimmed mean<sup>3</sup> derived from the quotations provided by the panel banks. ICE calculates, or “fixes,” Libor each day at 11 a.m. London time, and releases the rate at 11:45 a.m. London time.



Every business day, the Libor rate is set for 1-month, 3-month, 6-month and 1-year maturities, and the market focuses most on the 1-month and 3-month tenors. Libor is an important barometer of the health of short-term funding markets. The 1-month tenor largely tracks the Fed Funds Effective Rate (plus a credit premium), but that relationship can diverge in periods of market stress. For example, during the global financial crisis, the Fed Funds Effective Rate fell but Libor rose as banks became less willing to lend to each other. Figure 1 illustrates this by charting the spread between Libor and the overnight indexed swap (OIS) rate, which is an overnight swap linked to the Fed Funds Rate.

**FIGURE 1: U.S. LIBOR OIS SPREADS SPIKED DURING THE FINANCIAL CRISIS**



Libor is often used to set lending rates in securitized products. That is, most floating-rate ABS or MBS provide a coupon of Libor plus some spread, such as L+ 50 (1-month Libor plus 50bps). Banks, which issue ABS, often issue floating-rate bonds to manage their asset-liability mix. Banks prefer to pay floating-rate coupons on their liabilities, because the loans they've made (their assets) usually have some portion that are floating-rate.

### Secured Overnight Financing Rate

Partly due to recent Libor-fixing scandals,<sup>4</sup> Libor is expected to be phased out over the next few years and replaced by the Secured Overnight Financing Rate, or SOFR. The New York Federal Reserve began publishing SOFR in April 2018, and the rate is based on transactions in the massive U.S. repo market. See our blog post [What to Know About the Libor Phaseout](#) for more information on this transition and what it means for investment grade fixed income.

### Eurodollar Futures

Eurodollar futures tell us the market's expectations for lending rates—or Libor—in the future. Eurodollars are U.S. dollar time deposits at foreign banks. It is one of the largest funding markets in the world, as these deposits act as a lending mechanism for banks and a way for banks to manage their balance sheets.<sup>5</sup> The bulk of eurodollars are interbank transfers that pay some rate of return (typically Libor) to the holder. Therefore, to avoid arbitrage, the interest rate on eurodollar futures contracts must line up with the market's future



expectations for Libor. Overnight Libor and the overnight Fed Funds Rate tend to track closely, making domestic overnight lending comparable to the same lending overseas.

Eurodollar futures contracts are traded on the Chicago Mercantile Exchange (CME) and are highly liquid out to maturities of about 5 years. The contract prices are based on where the market is expecting 3-month Libor to be set two days before the third Wednesday of every March, June, September and December.

The eurodollar futures are quoted in dollar price rather than yield or spread, and the quoting convention is 100 minus the expected rate. Figure 2 shows forward rates for 3-month Libor at various future dates. The dates are clustered together by color. For example, the green “pack” starts with a 2-year forward, 3-month contract, and follows it over the course of one year.

The dollar value of a 1bp rate move, also known as the DV01, is fixed at \$25 per million of contract notional; that is, if the rate for the 9/16/2020 contract rose 1bp to 2.94, the price would fall to \$97.06, and the loss would be \$25 per million.

FIGURE 2: SAMPLE EURODOLLAR FUTURES CURVE

Start Date	Days	Ticker	Price	Rate
09/10/2018	9	Front	98.0323	1.9677
09/19/2018	91	EDU8	97.6525	2.3475
12/19/2018	91	EDZ8	97.39	2.61
03/20/2019	91	EDH9	97.245	2.755
06/19/2019	91	EDM9	97.14	2.86
09/18/2019	91	EDU9	97.085	2.915
12/18/2019	91	EDZ9	97.05	2.95
03/18/2020	91	EDH0	97.05	2.95
06/17/2020	91	EDM0	97.06	2.94
09/16/2020	91	EDU0	97.07	2.93
12/16/2020	91	EDZ0	97.065	2.935
03/17/2021	91	EDH1	97.085	2.915
06/16/2021	91	EDM1	97.09	2.91
09/15/2021	91	EDU1	97.09	2.91
12/15/2021	91	EDZ1	97.085	2.915
03/16/2022	91	EDH2	97.085	2.915
06/15/2022	98	EDM2	97.08	2.92

- A** “EDXX” = An identification code for pit trading. “Z” represents the month (December), and “8” represents the year (2018).
- B** The Eurodollar quoting convention is “100-the price,” or 2.3475.
- C** The market is pricing 3 month Libor to set at 2.61 on 12/19/18.

Bloomberg and Breckinridge Capital Advisors, as of September 2018.

Buying (going long) or selling (going short) eurodollar futures contracts allows investors to lock in a set rate. If, for example, a company is planning to issue debt in the future and is concerned about rising rates, the issuer could sell eurodollar futures contracts. If rates do in fact rise, the gain on the contract sale would be used to offset the increased cost of newly issued debt.

### Interest Rate Swaps

The swaps market is one of the largest, most-liquid markets in the world, and MBS and ABS are typically benchmarked to swap rates.<sup>6</sup> In a simple form, an interest rate swap is an exchange of fixed cash flows for floating cash flows.



Figure 3 shows a sample interest rate swap for an investor who is swapping from “floating” to “fixed.” The investor is taking his existing floating cash flow stream and “paying” it to his swap counterparty (Leg 2). In return, the investor is “receiving” a fixed stream from his swap counterparty (Leg 1).

In this case, as for terminology, the investor is the “fixed rate receiver,” as he is receiving the fixed rate. His swap counterparty is the “fixed rate payer.” The “payer/receiver” terms are always in reference to the fixed rate.

As we explained, the eurodollar futures curve shows the expected value of Libor for various periods in the future. At the time of an interest rate swap, the swap rate is approximately equal to the average of the floating rates in the forward Libor curve over the term of the swap. For example, in Figure 3, the “swap rate,” or the fixed rate received by the investor for the period September 2018 through September 2020, is roughly an average of the eurodollar contracts of the same tenor (the “white and red packs” in the Rate column of Figure 2).<sup>7</sup>

FIGURE 3: SAMPLE INTEREST RATE SWAP PRICING SCREEN

Leg 1	Receive	Pay	Leg 2
Notional	10MM	10MM	Notional
Effective	9/10/2018	9/10/2018	Effective
Maturity	9/10/2020	9/10/2020	Maturity
Coupon	A 2.82	3M	Index
Pay Freq	Semi	0	C Spread
Day Count	30/360	2.32	Last
		Qtrly	Index
		Qtrly	Reset
			Freq
Upfront	0.00		Pay Freq
NPV	B 0.00		
DV01	2,184.00		

- A The swap rate, 2.82%, is roughly an average of Libor expectations from Sept 2018 to Sept 2020, as priced through the Eurodollar curve.
- B Most swaps are traded at 0 net NPV.
- C If the swap is not a “par swap,” the spread will be greater than 0.

Bloomberg and Breckinridge Capital Advisors, as of September 2018.

Most of the time, interest rate swaps are traded at zero net present value (NPV). In our example, the PV of the floating rates paid out by our investor equals the PV of the fixed rates our investor receives. This is known as a “par swap.” If the swap is not a par swap at inception, either the floating rate or the fixed rate will have to be adjusted and the “spread” between the floating and fixed cash flows will be greater than or less than 0.

Interest rate swaps have many uses. If investor demand for fixed rate debt is high, bond issuers will often issue fixed rate debt, but use an interest rate swap behind the scenes to swap the liability from fixed to floating. However, these swaps create challenges, as they require capital from the issuers and create exposure to counterparty risk.



The swaps market is also used extensively for interest-rate risk hedging, and the liquidity is instantly created from the existing cash flows of the transactions.

### Swap Spreads

The “swap spread” is the difference between a swap rate and the U.S. Treasury rate of the same maturity. In its most basic form, the swap spread can be thought of as the premium over Treasuries that banks must pay to receive unsecured funding, given that banks are the primary counterparties to swaps. However, other fundamental drivers can have a significant impact on swap spreads as well.

For example, in the front end of the curve (1- to 3-year maturities), general funding pressures can affect swap spreads. In addition, many market participants monitor Libor versus the OIS, which is an overnight swap linked to the Fed Funds Rate and a proxy for repo rates. The spread between Libor, which is unsecured, and the OIS rate, which is collateralized borrowing, can drive swap spread levels.

In the belly of the curve (5- to 10-year maturities), corporate hedging of bond issuance cash flows and asset manager asset swaps are drivers. Finally, in the long end (30-year maturities), MBS and variable rate annuity (insurance company) hedging dominate the flows.

In recent years, however, swap spreads have become a bit of a random walk and do not necessarily fit past pricing norms. Swap spreads have declined post-crisis (Figure 4) for several reasons:

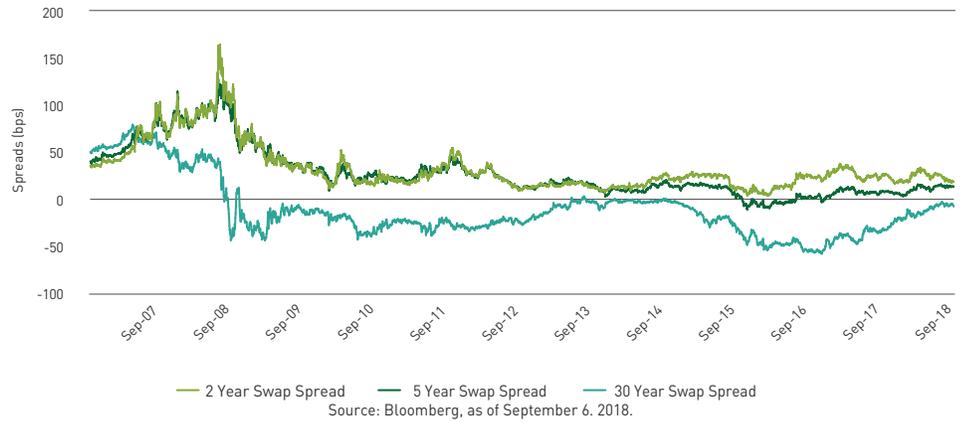
- The *Dodd-Frank* mandate requires swaps to be cleared through a central clearinghouse (CME/LCH) in an effort to reduce systematic risk (see *Revisiting Bank Credit After The Dodd-Frank Rollback*). This is a big change from the pre-crisis days, when a swap with a dealer would mean exposure to that dealer for the life of the trade. With the new clearing rules, the risk shifts from counterparty exposure to clearinghouse exposure.
- The old textbook definition of the swap rate as the rate at which highly rated banks lend unsecured funds to each other has been challenged. This could be why swap spreads have in recent years traded *lower* than Treasury rates in intermediate maturities.
- Furthermore, 30-year swap spreads have been highly negative since the financial crisis. This is largely attributable to the meltdown of exotic-dealer hedging books, and the reduction by government-sponsored enterprises (GSEs) of their retained MBS portfolios and subsequent hedges.<sup>8</sup> Given that rates have rallied sharply post-crisis, the few natural players in the long end have stepped back almost entirely.

We note that negative swap spreads are counterintuitive; swap rates typically



trade above U.S. Treasury rates. The lower swap rates have caused hedging losses to market participants who hedged interest rate risk with swaps.

**FIGURE 4: SWAP SPREADS HAVE FALLEN, ESPECIALLY IN THE LONG END**



### Swaptions

Volatility is an important factor in valuing mortgage-backed securities. The primary volatility input is swaptions, which are “rights” to enter a swap. Figure 5 shows a sample swaption. This swaption is a “Euro”-style swaption, meaning that it can be exercised only one time. By contrast, a “Bermuda” swaption can be exercised over a series of discrete dates, while an “American” option can be exercised at any time after an initial lockout period. While there are different types of swaptions, mortgage-backed securities most closely resemble American-style swaptions, as the homeowner owns right to prepay their mortgage at any time. In buying the swaption in Figure 5, the investor is buying the right to receive a fixed cash flow stream of 2.93 percent for 5 years, while paying Libor. The option can be exercised in one year, making the swaption “1y x 5y.”

**FIGURE 5: SAMPLE SWAPTION PRICING SCREEN**

Style	Euro	10MM	Notional
Position	Long Rec	2.93	Strike
Type	1y x 5y		
Expiration	9/6/2019	68.27	Implied Vol
Swap Start	9/10/2019	\$122,462	NPV
Swap End	9/10/2024		
Underlying			
Leg 1	Receive	Pay	Leg 2
Coupon	2.93	3M	Index
Pay Freq	Semi	0	Spread
Day Count	30/360	Qtrly	Reset Freq
		Qtrly	Pay Freq

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The swaption is priced based on implied volatility. Figure 6 shows an implied volatility surface. The circled number, 68.27, can be thought of as how much the 5-year swap rate is expected to move in 1 year (in bps) in either direction.<sup>9</sup> This implied volatility is a direct input to price the swaption in Figure 5. The premium, which is \$122,462 in our example, is the upfront payment the buyer makes to own the right to exercise this swap.

**FIGURE 6: SAMPLE IMPLIED VOLATILITY SURFACE**

Expiry	1Yr	2Yr	3Yr	4Yr	5Yr
1Mo	34.65	41.44	50.32	50.97	54.74
3Mo	39.43	50.37	56.39	57.16	58.11
6Mo	44.39	56.22	58.92	62.03	62.23
9Mo	56.09	62.84	64.25	65.06	63.86
1Yr	58.32	64.58	66.98	68.04	68.27
2Yr	67.08	74.7	74.45	72.71	71.99
3Yr	74.09	76.18	74.88	74.67	74.45
4Yr	77.34	77.12	76.54	76.22	77.09
5Yr	79.15	79.23	77.74	78.25	76.42

Bloomberg and Breckinridge Capital Advisors, as of September 2018.

If swap rates rally after one year, it may make sense for the investor to exercise the option and receive an above-market fixed cash flow stream. In this case, the swaption is known as being “in the money.” On the other hand, if swap rates sell off and the investor is “out of the money,” he could do nothing—but he loses the premium on the swap.

To be profitable for the investor, rates cannot just stay at the same levels: Rates need to move, which makes swaptions “long volatility.” The swaptions market is the largest, most-liquid volatility market in the world and is used interchangeably with the MBS market to make volatility bets, as MBS is “short volatility.” Swaptions are also used to hedge MBS.

## FOOTNOTES

1. All-in yields are total yields on bonds, including the benchmark rate (for example, Libor) plus the applicable spread.
2. “Estimated USD LIBOR Market Footprint by Asset Class. New York Federal Reserve, Second Report, The Alternative Reference Rates Committee (ARRC), March 2018, the latest report available. Per the ARRC, data is from year-end 2016.”
3. The top and bottom quartile of quotations are eliminated, and an average of the remaining quotations are calculated to arrive at fixing.
4. Chad Bray, “Two Former Barclays Traders Acquitted in Libor Retrial,” *The New York Times*, April 6, 2017.
5. Based on data from the 3Q18 CME Group Leading Products Snapshot, available at <https://www.cmegroup.com/education/files/leading-products-snapshot-2018-q3.pdf>.
6. Bank for International Settlements, as of September 2018.
7. It is “approximate” because the fixed \$25 DV01 per million of notional in the contracts needs to be adjusted for the positive convexity (or nonlinearity) of swaps, or of bulleted cash flow bonds in general.
8. GSEs often hedge extension risk caused by interest rate sell-offs by paying the “fixed leg” in swaps (shedding duration).
9. We can then calculate how much the swap rate is expected to move in one day  $\{68.27/\text{square root of the number of trading days in a year } \{252\} = 4.3\text{bps per day}\}$ .

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