

# The Interaction Between Repo And Interest Rate Swaps

ICMA Professional Repo Market and Collateral Management Workshop 2021

# Outline

- Repo and Interest Rate Swap basics
- Link and relationship between Repos and Swaps
- Back to basics: Monetary Policy
- Interest Rate Swaps
  - Reference Rate transition away from Libor
  - Collateral Adjusted Valuation for Swaps and Derivatives
  - Swap curve and repo curve
- Asset Swaps
- Total Return Swaps

# Repos and Interest Rate Swaps basics - Repos

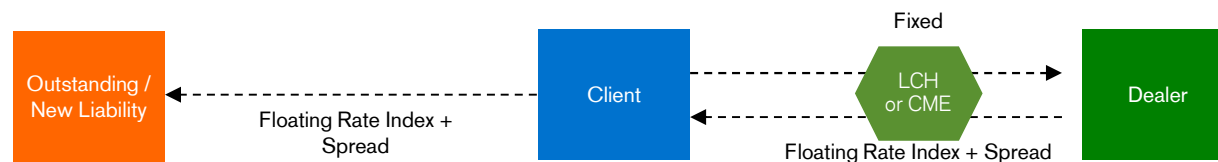
- Repo: secured funding transaction, where one counterparty borrows cash and pays repo interest and another counterparty borrows securities as collateral and has the right to liquidate such collateral in case of counterparty default.
- Big part of the market volume is concentrated in short dates (Overnight, Tom/Next, Spot/Next) and duration of 1 day. When the repo trade ends, either it gets rolled into a new trade or securities and cash return back to their respective original lenders.
- Repo funding market is a cornerstone for the smooth functioning of the cash Bond market. Buyers of bonds can borrow cash against their holdings, while sellers of bonds can borrow specific securities in repo in order to sell them in the cash market.



Source: ICMA website

# Repos and Interest Rate Swaps basics – Interest Rate Swaps

- Interest Rate Swap: derivative instrument designed to replicate the interest rate risk of bonds.
  - The key difference is that there is no exchange of principal.
  - The payer replicates a short bond position, paying a fixed rate throughout the life of the swap, while the receiver receives fixed in exchange for a floating rate.
- The fixed rate is determined at initiation of a trade, while the floating rate is reset throughout the life of the trade
  - The payer makes money when yields on interest rates rise, or when prices on the replicating bonds fall
  - The receiver makes money when yields on interest rates fall, or when prices on the replicating bonds rise
- Most of the volume in interest rate swaps is centrally cleared for new trades, while legacy trades are either bilateral or centrally cleared
- Different floating rate indices on the floating leg give different fixed rate



# Repos and Interest Rate Swaps basics – Interest Rate Swaps Market Structure

## Natural Payers of Fixed

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- Spread product dealers hedging inventory
  - Mortgages, Agencies, Corporates
  - Swaps provide both a duration hedge and spread protection
- Hedgers of future issuance
  - Rate locking through spot and forward starting swaps
- Asset swappers
  - Take views on credit spread but hedge out rate risk
- Gap Managers
  - Match long assets to short liabilities (deposits)
- Speculators, relative value hedge funds

## Forces Moving Swap Spreads Out

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- Decrease in Treasury supply
- Convexity paying in a sell-off
- Tightening repo market
- Flight to quality trade
- LIBOR/OIS widening

## Natural Receivers of Fixed

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- New issuance swapping by Corporate/Agency issuers
  - Issue long fixed-rate notes and simultaneously receive on swap to synthesize floating rate liability
- Convexity Hedgers
  - Receive fixed on swaps to buy back duration when market rallies and duration of asset portfolio decreases
- Gap Managers
  - Match short assets to long liabilities
  - I.E. Insurance companies, pension funds
- Speculators, relative value hedge funds

## Forces Moving Swap Spreads In

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- Increase in Treasury supply
- Convexity receiving in a rally
- Leveraged investor carry trades
- Easing repo market
- Swapped corporate issuance
- LIBOR/OIS tightening
- Corporate issuance

# So what's the link between Repos and Interest Rate Swaps?

- Back to basics: monetary policy and Central Banking tools
- Transition away from Libor and the new Reference Rates for Interest Rate Swaps
- Discounting of future cashflows and Collateral Adjusted Valuation
- Term Repo curve construction in practice
- Asset swaps and the role of Repo in market pricing
- Total Return Swaps and pricing

# Back to basics: Monetary Policy

- A Central Bank's mandate: price stability, maximum employment, minimum output gap or a combination of these
- The mandate is achieved with the use of monetary policy tools, with the most powerful being managing of short term interest rates
- Taking the FED as example, they set a 25bps range for their target effective Federal Funds rate. To establish the range, they rely on the following administered rates:
  - Interest on Reserves
  - Overnight Reverse Repo Facility
  - Overnight Repo Facility
  - Discount Window Facility

Repo Rate and Repo Market a cornerstone of  
Monetary Policy Transmission

Monetary Policy expectations about where  
policy Repo Rate will be in the future drives  
Interest Rate Swap markets



Source: Bloomberg





# Libor Transition: Reforming Major Interest Rate Benchmarks and the rise of SOFR

- The G-20 asked the FSB to undertake a fundamental review of major interest rate benchmarks and of plans for reform.
- The Financial Stability Board (FSB) recognized that the decline in wholesale unsecured short-term funding by banks posed structural risks for unsecured benchmark rates (e.g. LIBOR, Euribor, and TIBOR – the IBORs).
- In July 2014, the FSB recommended developing alternative, nearly risk-free reference rates.
- On June 22, 2017, the **US ARRC (Alternative Reference Rate Committee)** selected the **secured overnight financing rate (SOFR)** as the preferred alternative reference rate given robust volume when compared to OBFR. Parallel initiatives proceeding in other main jurisdictions.
- On July 27, 2017, the FCA, which oversees the LIBOR submission process for all currencies, announced that it would no longer persuade or compel London banks to make these submissions after the end of 2021. This accelerated expected transition timelines.
- On March 5, 2021, the FCA announced the end of 35 LIBOR benchmark settings, most of which will cease after year-end 2021 though several key settings like (1m, 3m, and 6m USD LIBOR) will cease after June 30, 2023.

Source: Credit Suisse Interest Rates Strategy



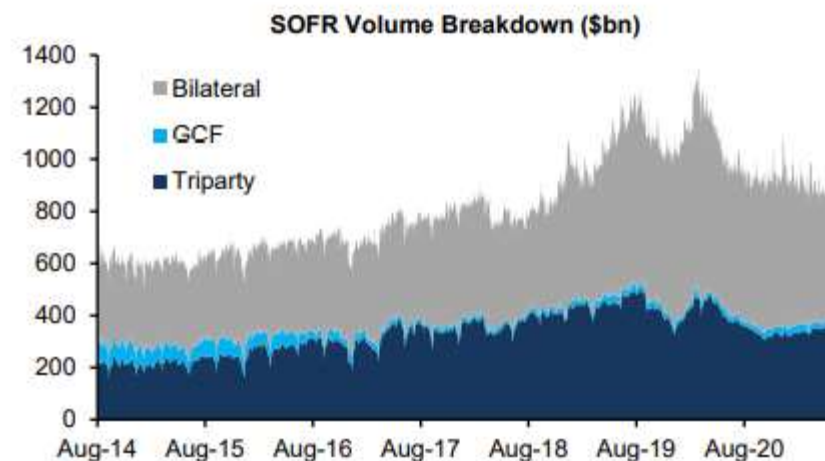
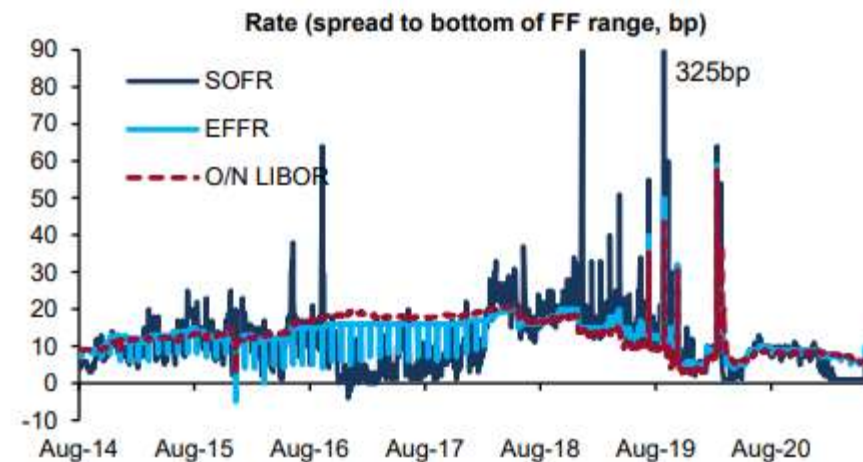
# Global IBOR Replacement Landscape

Jurisdiction	Prior benchmark	Replacement rate	Description	Current status
	USD LIBOR	<b>SOFR</b> Secured Overnight Financing Rate	<ul style="list-style-type: none"> <li>▪ <b>Secured</b></li> <li>▪ Fully transaction-based</li> <li>▪ Covers multiple repo market segments, allowing for future market evolution</li> </ul>	<ul style="list-style-type: none"> <li>▪ Largely completed paced transition plan</li> <li>▪ Publication of rate began April 3, 2018</li> </ul>
	EURIBOR, EONIA	<b>€STR</b> Euro Short Term Rate	<ul style="list-style-type: none"> <li>▪ <b>Unsecured</b></li> <li>▪ Fully transaction-based</li> <li>▪ Volume weighted-trimmed mean of transactions</li> <li>▪ Gathered from the 50 biggest EA banks</li> <li>▪ Trades structurally lower than EONIA</li> </ul>	<ul style="list-style-type: none"> <li>▪ ECB began publishing €STR in October 2019, EONIA to discontinue in early 2022.</li> <li>▪ Reformed Euribor considered BMR compliant</li> </ul>
	CHF LIBOR	<b>SARON</b> Swiss Average Rate Overnight	<ul style="list-style-type: none"> <li>▪ <b>Secured</b></li> <li>▪ Became the reference interbank overnight repo in 2009</li> <li>▪ Reflects interest paid on overnight repo</li> </ul>	<ul style="list-style-type: none"> <li>▪ TOIS now discontinued</li> <li>▪ SARON swaps began trading in April 2017</li> </ul>
	GBP LIBOR	<b>Reformed SONIA</b> Sterling Overnight Index Average	<ul style="list-style-type: none"> <li>▪ <b>Unsecured</b></li> <li>▪ Fully transaction-based</li> <li>▪ Encompasses a robust underlying market</li> <li>▪ Includes volume-weighted trimmed mean</li> </ul>	<ul style="list-style-type: none"> <li>▪ BoE rolled out reformed SONIA, based on actual transactions, on April 24, 2018</li> </ul>
	JPY LIBOR	<b>TONAR</b> Tokyo Overnight Average Rate	<ul style="list-style-type: none"> <li>▪ <b>Unsecured</b></li> <li>▪ Transaction-based (call rate market)</li> <li>▪ Calculated and published on a daily basis based on money market broker information</li> <li>▪ Weighted by volume of transactions</li> </ul>	<ul style="list-style-type: none"> <li>▪ Roadmap indicates new quoting conventions for IRS based on TONA should be adopted by end of July</li> </ul>

Source: Credit Suisse Interest Rates Strategy

# SOFR at a high level

- SOFR reflects overnight secured borrowing costs derived from:
  - Triparty GC repo
  - GCF Repo
  - Bilateral cleared repo
- Calculated as a volume -weighted median
- Excludes rates below the 25th volume - weighted percentile rate in order to remove specials trades from the bilateral data
- Volume has grown over the last several years from \$600 -700bn per day to \$900bn - \$1.0tn
  - Compare this to \$60 -100bn per day in Fed funds and around \$500mil per day underlying 3m LIBOR



Source: Credit Suisse Interest Rates Strategy

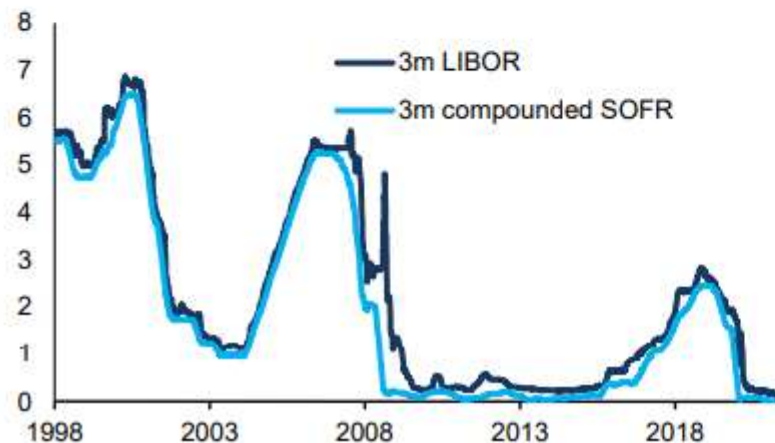
# Libor vs SOFR

## LIBOR

- Unsecured
- Term rate
- Forward looking
- Transaction- and market- based
- Dwindling underlying volumes
- Reflects panel bank funding
- Trimmed mean
- Waterfall-based methodology

## SOFR

- Secured
- Overnight rate (compounded)
- Backward looking
- Transaction-based
- Robust volumes (~\$1tn/day)
- Diverse set of market participants
- Volume-weighted median, excludes lowest 25% of transactions

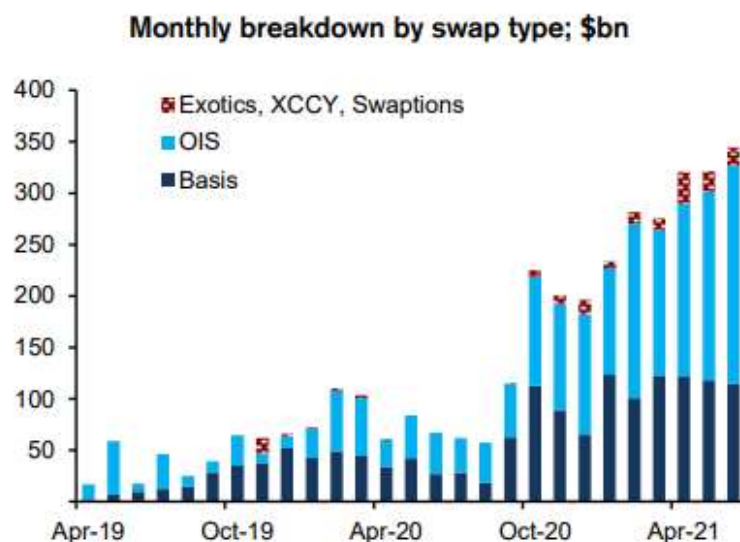
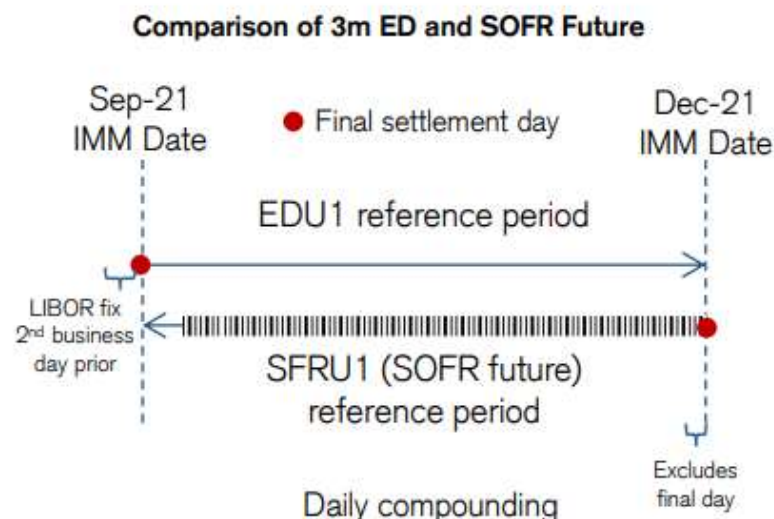


Source: Credit Suisse Interest Rates Strategy

Though SOFR is more volatile on a daily basis, it is considerably less volatile than 3m LIBOR on a compounded basis.

# SOFR futures: building block for SOFR Swaps

- 1m and 3m SOFR futures began trading in May 2018 and are designed to largely parallel existing FF and ED futures
- However, there is a crucial difference. 3m SOFR futures are backward looking as opposed to 3m ED futures, which are forward looking. The settlement value for SOFR futures is only known at the end of the reference period
- 1m SOFR futures extend out 13 months, though only trade about 10 months out. 3m futures extend out 5 years. Liquidity is growing beyond 2y out, but is still relatively light
- SOFR swaps began trading in Q3 2018
- Trading volume continued to climb in H1 2021, albeit gradually, amid rising OIS activity
- Most of the traded notional remains cleared



Source: Credit Suisse Interest Rates Strategy



# Discounting of future cashflows: which curve to use?

## Time Value of Money

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- Future cash flows are worth less than cash flows today
- The rates market is focused on the question “How much less?”
- The ratio between the present value of a cash flow and the future value of that same amount is the “Discount Factor”
  - With some simplification: Discount Factor =  $1/(1 + \text{interest rate})^{\text{(time until cash flow)}}$
  - **But what do we use for “Interest Rate”? The answer has changed over time.**

## How do we value a swap?

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- A swap is a contract to exchange a floating rate for a fixed rate
- Generally we solve for a fixed rate such that the PV of the floating leg equals the PV of the fixed leg (so the net PV is zero)
- The value of a swap leg is equal to the present value of future cash flows

$$PV = \frac{\frac{c}{f}}{1+\frac{y1}{f}} + \frac{\frac{c}{f}}{\left(1+\frac{y2}{f}\right)^2} + \dots + \frac{\frac{c}{f}}{\left(1+\frac{yn-1}{f}\right)^{n-1}} + \frac{\frac{c}{f}}{\left(1+\frac{yn}{f}\right)^n} + \frac{v}{\left(1+\frac{yn}{f}\right)^n}$$

c is the annual coupon rate

v is the redemption value (which is zero for swaps)

yi is the discount rate, quoted on a compounded basis

f is the payment and compounding frequency

n is the number of whole coupon periods between settlement and maturity

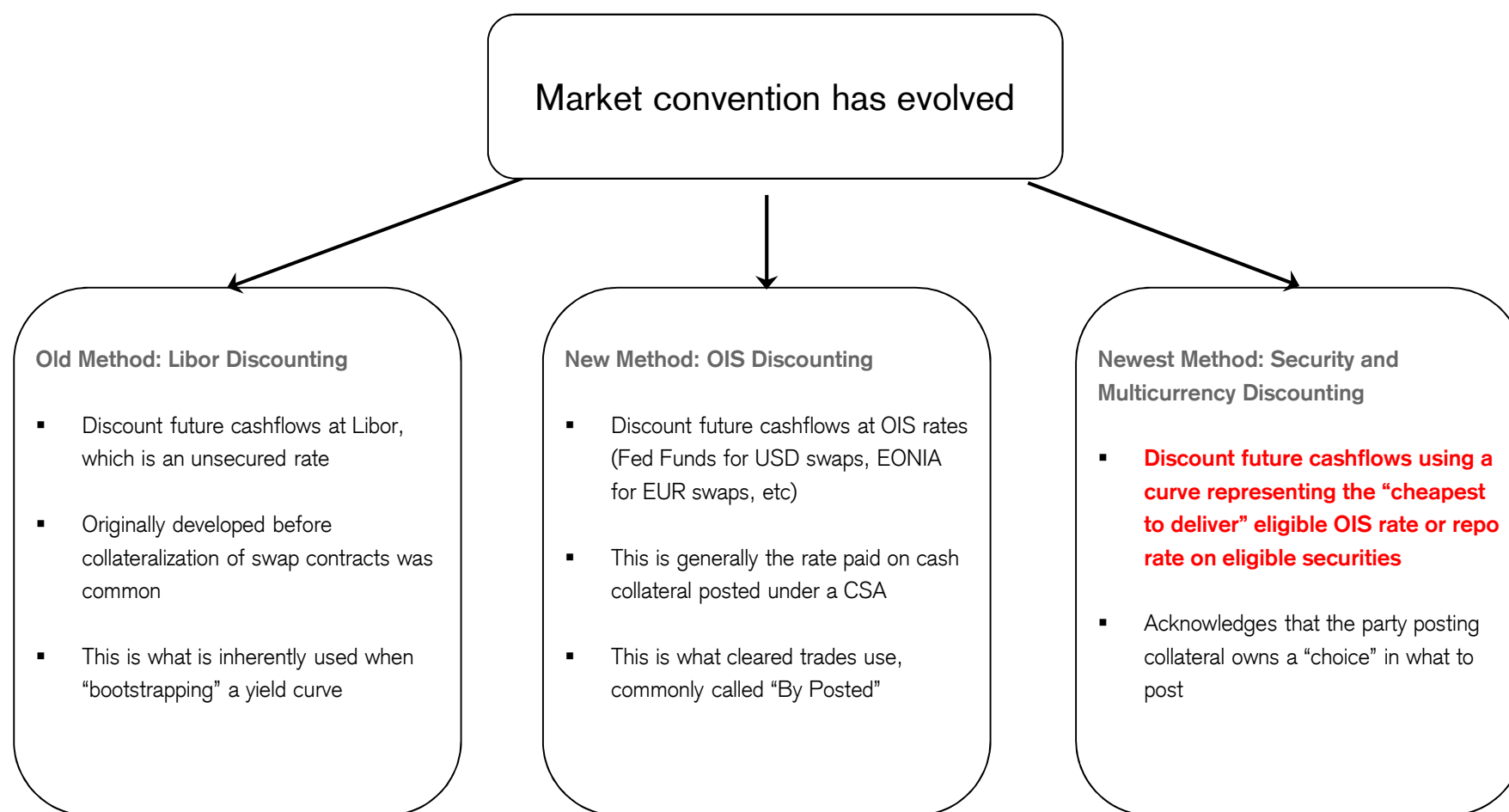
n/f is the number of years remaining until maturity

Even if we have perfect knowledge of all future Floating Index levels, we still need to pick a discount rate.

Fundamentally, a fixed rate payer today is giving up current cash flow for future cash flow.

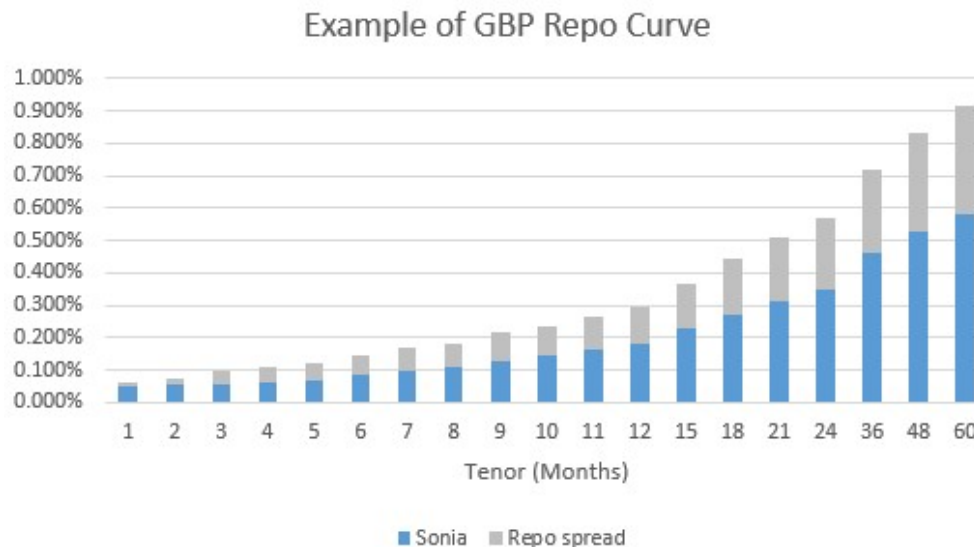
Different assumptions give different values. This is called Collateral Adjusted Valuation (CAV)

# Discounting of future cashflows: which curve to use?



# Term Repo curve construction in practice

- SOFR swaps market is the best place to observe expectations and pricing about long dated repo trades. In practice >1yr SOFR swaps market more liquid and active than term repo market.
  - Swap market provides useful information for term repo curve construction and marking
- In regions or currencies where the ARR index is an unsecured rate (e.g. ESTR, SONIA), term repo curve construction less straightforward.
  - Longer term repo tenors not market observable
  - Repo trading desks need to take into account various factors (excess liquidity, collateral availability, balance sheet availability) to estimate a repo spread curve over the OIS curve



# Asset Swaps and repo

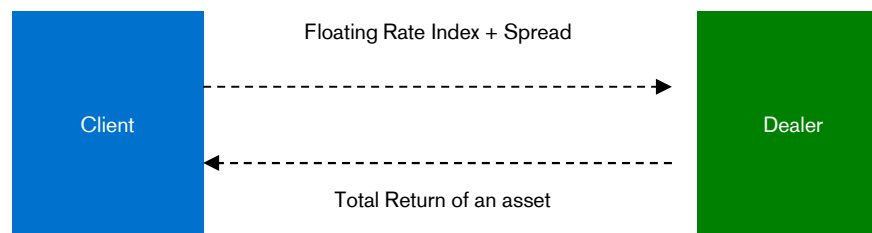
- An asset swap converts a fixed rate bond, that may be trading at either a premium or discount, into a floating rate bond.
- Imagine an investor:
  - buying 10-year US Treasury
  - funding the long bond position in the repo market overnight and
  - entering into a 10-year swap paying fixed and receiving floating
- If the floating index of the swap is not linked to repo (e.g. Libor, Fed Funds etc), the relative move between the repo rate on the funding leg and the floating rate fixing changes the economics and the attractiveness of the trade.
- When repo funding becomes more expensive, bonds tend to underperform swaps (swap spread tightening) and when repo funding becomes cheaper bonds tend to outperform swap (swap spread widening).

BUT: if the floating rate index is a secured rate (SOFR) the investor is only left with the spread between the Bond coupon and the swap fixed rate!



# Total Return Swaps

- Total Return Swap allows a market participant to receive/pay the change in market value of a security (total return including any distributions like coupons). In return, they pay/receive a funding rate, which can be fixed or floating. It's a way to synthetically replicate a long or short position in an asset having secured term funding until the maturity of the swap.
- The dealer on the other side of this transaction has most likely bought/sold the underlying security to offset market risk.
- For a dealer, the risk profile between a Total Return Swap and a repo is identical.
- HOWEVER, the two instruments are not fungible from a Leverage point of view!
- Total Return Swaps are usually bilateral transactions, not cleared
- Traditionally, the Total Return Swap market has focused on longer funding trades, while the repo market on shorter



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