Project Delta

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Fixed Income Basics

LIBOR

- An interest rate at which banks can borrow funds, in marketable size, from other banks in the London interbank market.
- Average of the world's most creditworthy banks' interbank deposit rates
- LIBOR is a benchmark for other bonds and loans.

Treasury Bonds

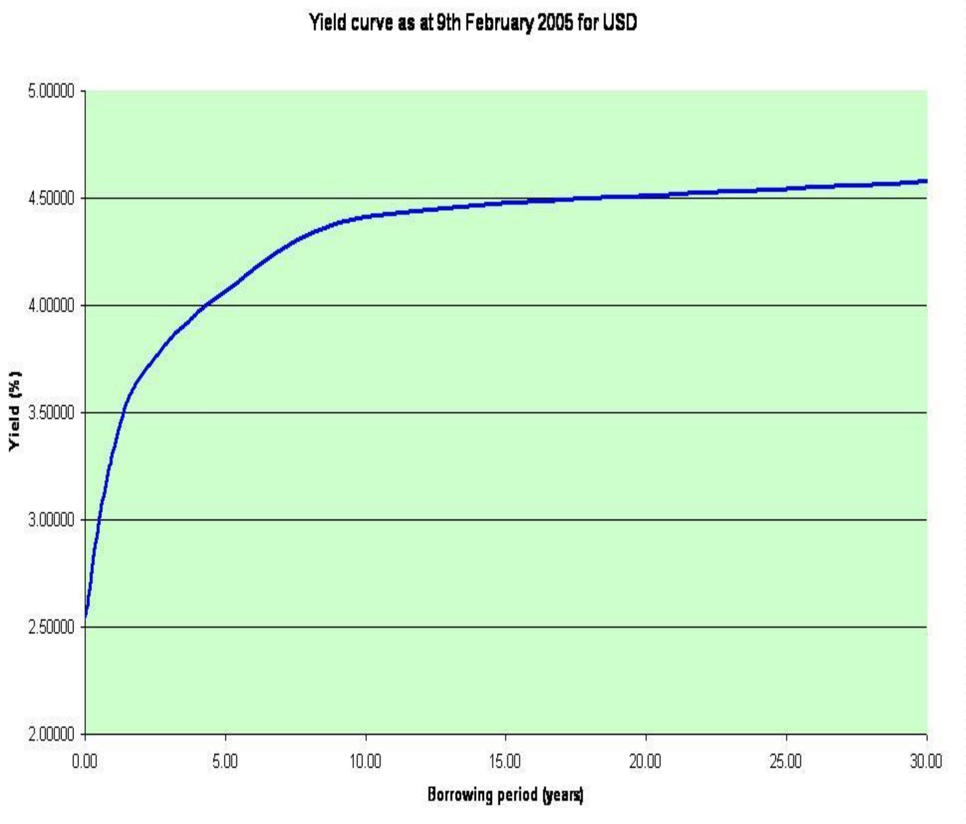
- There are three types of treasury bonds:
  - T-bills
    - Short term (< 1 year)
    - Receive as a lump sum (No regular payments)
  - T-notes
    - Mid (1 to 10 years)
    - Interest payments every 6 months
  - T-bonds
    - Long term (< 10 years)
    - Interest payments semi-annually
- All only taxed federally
- T-notes are most popular (secondary market)

Competitive vs. Non-competitive Bid

- When buying Treasury notes and bonds from the government, you can either put in a competitive or noncompetitive bid.
  - With a competitive bid, you specify the yield you want; however, this does not mean that your bid will be approved.
  - With a noncompetitive bid, you accept whatever yield is determined at auction.

Yield Curve

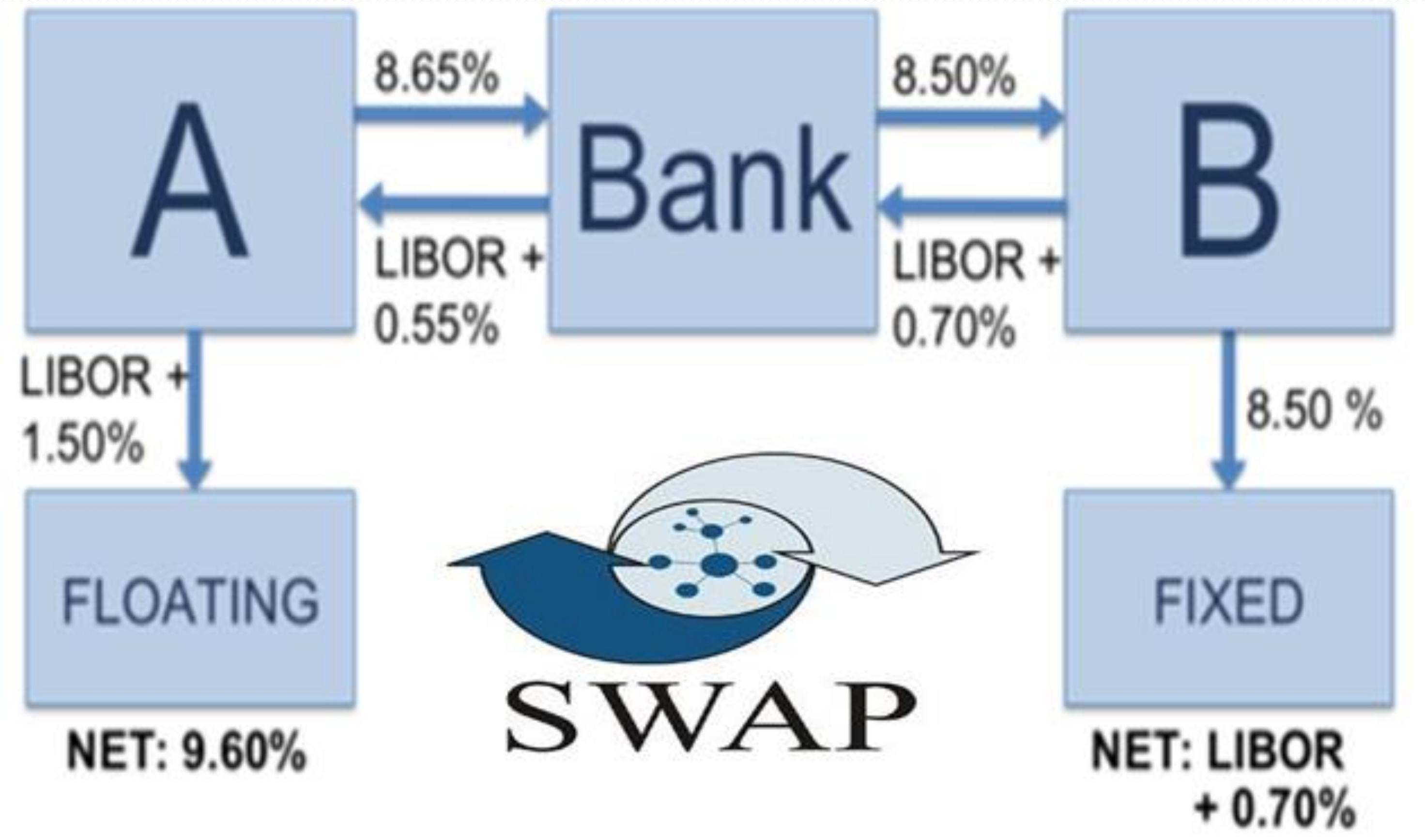
- What is a yield curve?
- Shape of a yield curve



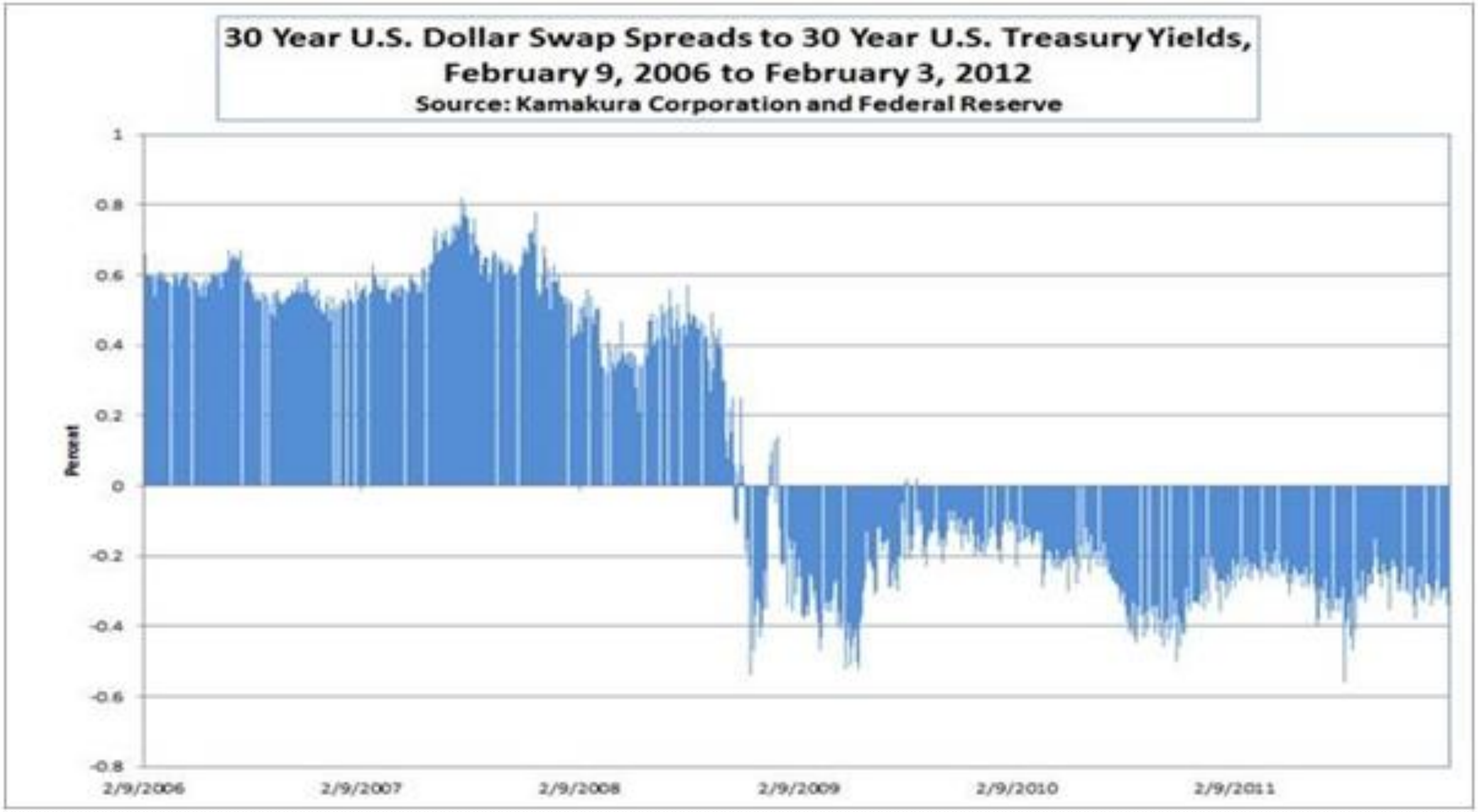
Repo

- What is a repo?
- Difference between repo and Libor?

Swap


A
8.65%
Bank
8.50%
B
LIBOR + 0.55%
LIBOR + 0.70%
LIBOR + 1.50%
8.50 %
FLOATING
SWAP
FIXED
NET: 9.60%
NET: LIBOR + 0.70%

Negative Swap Spread



Arbitrage Strategy on Negative Swap Spreads

Arbitrage- Libor

Set-up

- Borrow money at 3 month Libor to finance treasury purchase
- Buy 30 year treasury at par with coupon equal to the 30 year yield
- Enter a 30-year swap (with notional equal to the face value of the purchased treasuries) to pay fix and receive floating

Arbitrage- Libor

Results

- Cash flow from the floating leg can be used to pay back the initial financing at 3 month Libor
- Profit is the difference between 30-year treasury coupon and the 30-year swap rate.
- Since the 30-year swap spread is negative, i.e. swap rate – treasury yield < 0, we have a profit

Arbitrage- Libor

Assumptions

- We can borrow at LIBOR
- Treasury trades at par
- There was a 30-year auction or a longer tenor treasury rolled down the curve.
- We do not have to post collateral for the swap
- No counterparty risk for the swap, treasury is risk-free but the bank account is not.

Arbitrage - Repo

Setup

- Borrow money at the repo markets to finance 30-year treasury purchase.
- Use the treasury for collateral
- Enter into a swap transaction paying fix and receiving Libor.

Arbitrage - Repo

Result

- Every 3 months, use the Libor payments from the swap to pay the repo interest.
- Refinance for another 3 months using repo markets, using the same treasury as collateral.
- Every 6 months, receive the spread of the swap rate over the treasury coupon.
- On expiration, use the principal from the treasury to return the repo loan.

Arbitrage - Repo

Assumptions

- No bid-ask spreads
- We are able to roll over the repo agreement every 3 months
- 30-year treasury bond trades at par.
- No collateral is required for the swap,
- The repo transaction does not require a haircut on the collateral,
- No counterparty risk

Arbitrage Assumptions and Realistic Limitations

Illiquidity of 30-year Treasury

- Principle notation of 30-year treasury is the largest of all treasury bonds.
- Longer the tenor, less liquid
- On-the-run vs. Off-the-run
  - Off-the-run less liquid, and thus traded below par
  - On-the-run auctioned quarterly

30-year Swap Contracts

- Likewise, as tenor increases, liquidity drops notably
- Swap contracts are OTC, thus we should customized to match the dates we receive floating interest payments and pay back our interbank loan or repo rates.

Notable Financing Costs

- Only entities with credit rating tantamount to large banks can borrow at LIBOR
  - ASSUMPTION: we are a large bank (if not, we pay commissions to bank for borrowing through them)
  - Otherwise, our arbitrage profit might narrow and even vanish
- Repo haircut (margin call) is paid when entering the contract, and also when the value of collateral posted falls.
  - Otherwise, repo rate might be adjusted upward.
  - Typical haircut for Treasury is about 2%

Thank you