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

Diagram showing the swap process between entities A, Bank, and B. Entity A offers floating interest (LIBOR + 1.50%) and receives fixed interest (LIBOR + 0.55%). Bank acts as the intermediary, providing fixed interest (LIBOR + 8.50%) in return for floating interest (LIBOR + 8.65%). Entity B offers fixed interest (LIBOR + 0.70%) and receives floating interest (LIBOR + 8.50%). The net interest in the swap is 9.60% for A and LIBOR + 0.70% for B.
Negative Swap Spread

30 Year U.S. Dollar Swap Spreads to 30 Year U.S. Treasury Yields,
February 9, 2006 to February 3, 2012
Source: Kamakura Corporation and Federal Reserve
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 customize them 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