19BAE710-FINANCIAL DERIVATIVES

Valuation of Interest Rate Swaps (IRS):

1. **Discounted Cash Flow (DCF) Approach:**

- **Future Cash Flows:** Project future cash flows for both fixed and floating rate payments.

- **Discounting:** Discount each future cash flow using the appropriate discount factor, typically derived from the market yield curve.

- **Net Present Value (NPV):** Sum the present values of all cash flows to determine the net present value.

2. **Yield Curve Bootstrapping:**

- **Yield Curve:** Bootstrap the yield curve to obtain zero-coupon rates.

- **Forward Rates:** Derive forward rates from the yield curve.

- **Discounting:** Discount future cash flows at the corresponding forward rates.

3. **Market Quotes:**

- **Benchmark Rates:** Use market quotes for benchmark interest rates, like LIBOR, for floating leg valuation.

- **Credit Spread Adjustment:** Adjust for credit spreads if applicable.

4. **Pricing Models:**

- **Black Model:** Adapt the Black-Scholes model for options to value the embedded options in the swap.

- **Binomial Model:** Use a binomial tree model to capture discrete interest rate movements.

5. **Par Swap Rate:**

- **Definition:** The fixed rate that makes the swap's initial value equal to zero.

- **Calibration:** Determine the par swap rate based on market conditions.

6. **Mark-to-Market:**

- **Continuous Valuation:** Regularly mark the swap's value to market, adjusting for changes in interest rates.

Valuation of Currency Swaps:

1. Discounted Cash Flow (DCF) Approach:

- Future Cash Flows: Project future cash flows for both principal and interest payments in each currency.

- Discounting: Discount each future cash flow using the appropriate discount factor for the respective currency.

- Net Present Value (NPV): Sum the present values of all cash flows to determine the net present value.

2. Currency Forward Rates:

- Forward Rates: Use currency forward rates to discount future cash flows.

- Interest Rate Differentials: Consider interest rate differentials between the two currencies.

3. Market Quotes:

- FX Rates: Incorporate market quotes for exchange rates.

- Benchmark Rates: Use market interest rates for each currency.

4. Cross-Currency Basis Swap:

- Basis Swap: If applicable, consider the cross-currency basis swap, which adjusts for differences in funding costs between currencies.

5. Pricing Models:

- Currency Option Models: For swaps with embedded options, use currency option models to value these components.

6. Par Swap Rate:

- Definition: The fixed exchange rate that makes the swap's initial value equal to zero.

- Calibration: Determine the par swap rate based on market conditions.

7. Mark-to-Market:

- Continuous Valuation: Regularly mark the swap's value to market, adjusting for changes in exchange rates and interest rates.

Considerations for Both:

1. Counterparty Credit Risk:

- Credit Spreads: Consider the credit spreads of the counterparties.

- Credit Value Adjustment (CVA): Adjust the valuation for counterparty credit risk.

2. Model Risk:

- Assumptions: Be aware of assumptions in the chosen valuation model.

- Model Selection: Choose a model that aligns with market conventions and the specific features of the swap.

3. Market Liquidity:

- Market Conditions: Assess market liquidity, as less liquid markets may affect valuations.

- Bid-Ask Spreads: Consider bid-ask spreads when valuing swaps in less liquid markets.

4. Documentation:

- Contractual Terms: Ensure that the valuation reflects the contractual terms specified in the swap agreement.

- Market Conventions: Adhere to market conventions for the specific type of swap.

Valuation of interest rate swaps and currency swaps involves a combination of market data, mathematical models, and financial expertise. It is essential to stay updated on market conditions, utilize appropriate models, and consider the specific features of the swaps being valued. Additionally, counterparty credit risk and market liquidity should be carefully assessed in the valuation process.