

NPTEL ONLINE CERTIFICATION COURSES

MANAGEMENT OF COMMERCIAL BANKING

PROF. JITENDRA MAHAKUD
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Module 03: Asset-Liability Management (ALM): Management of Interest Rate Risk

Lecture 26: Use of Derivatives in ALM-I

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CONCEPTS COVERED

- Forwards
- Futures
- Options
- Swaps

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Derivatives

- Derivative is a financial instrument or security whose payoffs depend on a more primitive or fundamental good.
- Financial derivative is a financial instrument whose payoffs depend on the financial instruments or security
- Types of derivative instruments: Futures, Forwards, Options and Swaps

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Forward Vs. Future

- **Forwards: A forward contract is a customized contract between two entities, where settlement takes place on a specific date in the future at today's pre-agreed price.**
- **Futures: A futures contract is an agreement between two parties to buy or sell an asset at a certain time in the future at a certain price. Futures contracts are special types of forward contracts in the sense that the former are standardized exchange-traded contracts**
- **Financial future contract is an Agreement Between a Buyer and a Seller Which Calls for the Delivery of a Particular Financial Asset at a Set Price at Some Future Date**

Futures Vs. Forwards Cont…

FORWARDS	FUTURES
Private contract between 2 parties	Exchange traded
Not standardized	Standard contract
Usually 1 specified delivery date	Range of delivery dates
Settled at maturity	Settled daily
Delivery or final cash settlement usually occurs	Contract usually closed out prior to maturity
Some credit risk	Virtually no credit risk

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Buyers of Future Contract

- A buyer of a futures contract is said to be ***long futures***
- Agrees to pay the underlying futures price or take delivery of the underlying asset
- Buyers gain when futures prices rise and lose when futures prices fall

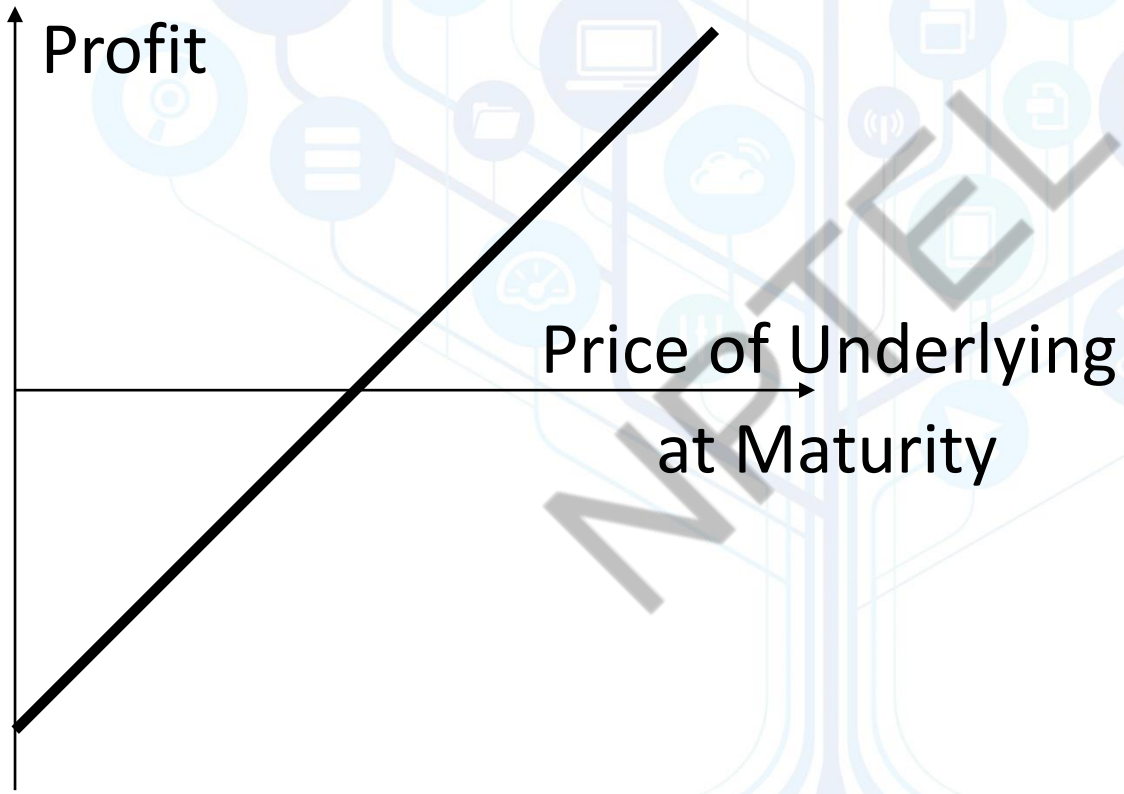
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Seller of the Future Contract

- A seller of a futures contract is said to be ***short futures***
- Agrees to receive the underlying futures price or to deliver the underlying asset
- Sellers gain when futures prices fall and lose when futures prices rise

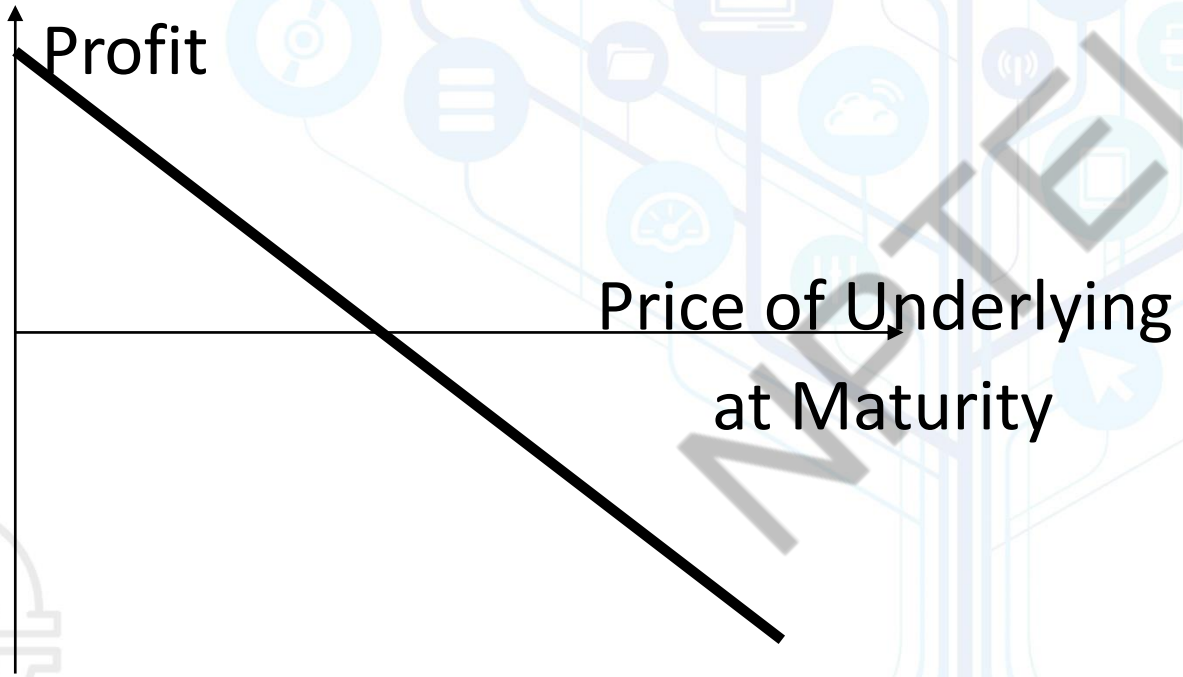
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Profit from a Long Forward or Futures Position



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Profit from a Short Forward or Futures Position



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Relationship between Future Price and Spot Price

- Basis is the relationship between the spot price and future price of the asset.
- Basis =Current Spot Price – Future Price
- Normal Market: Prices for more distant futures are higher than for nearby futures. Future Price > Spot Price
- Inverted Market: Distant Futures prices are lower than the prices for contracts nearer to the expiration. Future price < Spot Price
- When the future contract is at expiration, the future price and the spot price of asset must be same. Basis is zero. This behaviour of basis over time is known as convergence

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Options

- An option is a security that gives the holder the right to buy or sell, but not obligation a particular asset at a specified price, on or before, a specific date.
- Options are of two types - calls and puts. Calls give the buyer the right but not the obligation to buy a given quantity of the underlying asset, at a given price on or before a given future date. Puts give the buyer the right, but not the obligation to sell a given quantity of the underlying asset at a given price on or before a given date.
- A European option is one that can be exercised only at the exercise date, while an American option can be exercised at any time on or before the exercise date.

Options Cont…

Option Type	Buyers of Option (Long Position)	Writer of Option (Short Position)
Call	Right to Buy Asset	Obligation to Sell Asset
Put	Right to Sell Asset	Obligation to Buy Asset

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Options Cont…

- Every option has an option price, an exercise price, and an exercise date.
- The price paid by the buyer to the writer is referred to as the option premium
  - The exercise price or strike price is the price specified in the option contract at which the underlying asset can be purchased or sold.
  - The exercise date is the last day the holder can exercise.

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Concept of Moneyness

Condition	Call Option	Put Option
$S_0 > E$	In-the-Money	Out-of-the Money
$S_0 < E$	Out-of-the Money	In-the-Money
$S_0 = E$	At-the-Money	At-the-Money

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Intrinsic Value and Time Value

- Option Premium = Intrinsic Value (Parity Value) + Time value (Premium over parity)
- Intrinsic value refers to the amount by which it is in-the-money
- Option which is out-of-the money has a zero intrinsic values
- For a call option which is in the money, the intrinsic value is the excess of stock price over the exercise price
- For a put option which is in the money, the intrinsic value is the excess of exercise price over the stock price

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Example

Option	Exercise price	Stock price	Call Option price	Classification	Intrinsic value	Time Value
1	80	83.5	6.75	In-the-money	3.5	6.75-3.5
2	85	83.5	2.5	Out-of the money	0	2.5

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Swap

- Swaps are private agreements between two parties to exchange cash flows in the future according to a prearranged formula. They can be regarded as portfolios of forward contracts. The two commonly used swaps are :
- *Interest rate swaps*: These entail swapping only the interest related cash flows between the parties in the same currency.
- *Currency swaps*: These entail swapping both principal and interest between the parties, with the cash flows in one direction being in a different currency than those in the opposite direction.

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Use of Derivatives

- To hedge risks
- To speculate (take a view on the future direction of the market)
- To lock in an arbitrage profit
- To change the nature of a liability
- To change the nature of an investment without incurring the costs of selling one portfolio and buying another

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CONCLUSION

- Financial derivative is a financial instrument whose payoffs depend on the financial instruments or security
- Futures, options and swaps are major derivative instruments used to hedge the risk
- Options can be categorized as call option and put option and American option and European option
- Basis is defined as the difference between spot price and future price
- Intrinsic value of option refers to the amount by which it is in-the-money
- Swaps are private agreements between two parties to exchange cash flows in the future according to a prearranged formula

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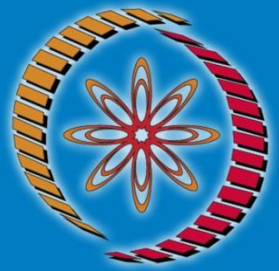
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Module 03: Asset-Liability Management (ALM): Management of Interest Rate Risk

Lecture 27: Use of Derivatives in ALM-II

CONCEPTS COVERED

- Hedging
- Long Hedge
- Short Hedge

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What is Hedging?

- Managing risks by using one financial instrument ('hedging instrument') purposely to offset the variability in future value or cash flows of a recognized asset or liability, firm commitment, or future cash flows ('hedged item')
- Hedging is viewed as the purchasing insurance
- For hedging all the factors should match
  - Time span covered
  - Amount of the assets
  - Particular characteristics of the good

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Long & Short Hedges (Hedging the dollar gap position)

- A long futures hedge is appropriate when you know you will purchase an asset in the future and want to lock in the price
- A short futures hedge is appropriate when you know you will sell an asset in the future & want to lock in the price
- A bank with a positive dollar gap would benefit on-balance-sheet from rising interest rates but would lose from falling interest rates. It would hedge this risk by taking a long or buy position in the financial futures market.
- If, conversely, the bank has a negative dollar gap it would take a short position in the futures market.

Long-Hedge in future

- A long hedge can be used to protect the bank against falling interest rates
- Long hedge applicable when interest rate falls; usually when a cash inflow is expected in the near future
- Positive dollar gap: RSA> RSL
- If interest rate falls then net interest margin will fall
- Strategy to be adopted: (i) Reduction of RSA, (ii) Long hedge by purchasing one or more T-Bill contracts for future delivery
- If interest rate falls then reduction in NIM would offset by the gain on the long-hedge in the future market
- If interest rate rises the gain in NIM would be offset by the loss on the futures transactions

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Long Futures Hedge Process

- Today – Contract is Purchased Through an Exchange
- Sometime in the Future – Contract is sold Through the Same Exchange
- Results – The Two Contracts are Cancelled by the Clearinghouse
- Gain or Loss is the Difference in the Price Purchase For (At the Beginning) and the Price Sold For (At the End)

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Short hedge in future

- Negative dollar gap: RSA< RSL
- If interest rate increases then net interest margin will fall
- There will be gain in the short-hedge position, which will offset the loss in the spot market
- If interest falls then increased NIM would be offset by the loss on the future contracts

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Short Hedge in Futures : Example

- Consider securities portfolio of bank contains $10 million in 6%, 15 yr bonds
- Market yield increase from 6% to 6.5% →market value of bonds decreases from $10 million to $9,525,452.07
- Loss of $474,547.73 in cash market
- Loss offset by futures contract
- If the bank makes an offsetting sale and purchase of the same futures contract on a futures exchange, it has no obligation either to deliver or to take delivery of securities named in contracts

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Short Futures Hedge Process

- Today – Contract is Sold Through an Exchange
- Sometime in the Future – Contract is Purchased Through the Same Exchange
- Results – The Two Contracts Are Cancelled Out by the Futures Clearinghouse
- Gain or Loss is the Difference in the Price Purchased for (At the End) and Price Sold For (At the Beginning)

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Hedging with Futures Contracts

- **Typical interest rate hedging problems most banks face:**
  i. **Protecting the value of securities and fixed-rate loans from losses due to rising interest rates**
  ii. **Avoiding a rise in borrowing costs**
  iii. **Avoiding a fall in the interest returns expected from loans and securities holding**

Avoiding Higher Borrowing Costs and Declining Asset Values → **Use a Short Hedge: Sell Futures Contracts and then Purchase Similar Contracts Later**

Avoiding Lower Than Expected Yields from Loans and Securities → **Use a long Hedge: Buy Futures Contracts and then Sell Similar Contracts Later**

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Futures to hedge Duration Gap

- With a positive duration gap, a bank would experience a decline in the market value of equity if interest rates increased (because the market value of assets would fall more than the market value of liabilities). It could help this exposure by taking a short position in financial futures. With such a position, increases in interest rates would produce gains in the futures market position that could be used to offset the losses in the cash market position.

- In contrast, a bank with a negative duration gap would hedge with a long position in the futures market.

- **Number of contracts to be bought or sold :**

  $[(V/F) \times (M_C / M_F)]\, b$

  V = value of cash flow to be hedged

  F = face value of futures contract

  M_C = maturity of anticipated cash assets

  M_F = maturity of futures contacts

  b = variability of cash market to futures market.

  Example: A bank wishes to use 3-month futures to hedge a $48 million positive dollar gap over the next 6 months. (Assume the correlation coefficient of cash and futures positions as interest rates change is 1.0).

  N = [(48/1) x (6/3)] 1 = 96 contracts.

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Change in the Market Value of the Futures Contract

$$\frac{\text{Change in futures price}}{\text{Initial futures price}} = -\left[\begin{array}{c}\text{Duration of the}\\ \text{underlying security}\\ \text{named in the}\\ \text{futures contract}\end{array}\right] \times \left[\frac{\begin{array}{c}\text{Change expected in}\\ \text{interest rates}\end{array}}{1 + \begin{array}{c}\text{Original}\\ \text{interest rate}\end{array}}\right]$$

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Change in the Market Value of the Futures Contract

$$\text{Positive or negative change in futures position value} = -\left[\begin{array}{c}\text{Duration of the underlying security named in the futures contract(s)}\end{array}\right] \times \left[\begin{array}{c}\text{Initial futures price}\end{array}\right] \times \left[\begin{array}{c}\text{Number of futures contracts}\end{array}\right] \times \left[\frac{\text{Change expected in interest rates}}{1 + \text{Original interest rate}}\right]$$

$$F_t - F_0 = -D \times F_0 \times N \times \frac{\Delta i}{(1+i)}$$

Number of Futures Contracts Needed

$$= \frac{(D_A - D_L * \frac{TL}{TA}) * TA}{D_F * \text{Price of the Futures Contract}}$$

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Steps Involved in Hedging

Steps involved in hedging the interest-sensitivity position of a bank with respect to its dollar gap or duration gap:

1. **Determine the total interest rate risk either on or off the balance sheet**
2. **Select a futures contract: select contract most highly correlated with cash market instrument being hedged**
3. **Determine the number of contracts needed**
4. **Determine the maturity of the hedge**
5. **Place the hedge**
6. **Monitor the hedge**
7. **Lift the hedge**

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Basis with a Short Hedge

- Banks fear increasing interest rate → change in cash market price $(C_t - C_0)$ will be negative
- Take short position in futures market to hedge the long position in cash market → gain of $(F_0 - F_t)$

$ Returns from a combined cash and futures position :

$$= (C_t - C_0) + (F_0 - F_t)$$

$$= (C_t - F_t) - (C_0 - F_0)$$

Dollar Return = Basis at termination of hedge – Basis at initiation of hedge

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Basis with a Long Hedge

- Banks fear decreasing interest rate: create long hedge
- Take long position in futures market
- Loss (gain) in cash market = $(C_0 - C_t)$; gain (loss) in the futures market = $(F_t - F_0)$

$ Returns from a combined cash and futures position :

$$= (C_0 - C_t) + (F_t - F_0)$$

$$= (C_0 - F_0) - (C_t - F_t)$$

Dollar Return = Basis at initiation of hedge – Basis at termination of hedge

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Realized Return from Combining Cash and Futures Market Trading

Return Earned in the Cash Market

+/- Profit or Loss from Futures Trading

- **Closing Basis Between Cash and Futures Market**

- **Opening Basis Between Cash and Futures Market**

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CONCLUSION

A bank with a positive dollar gap would benefit on-balance-sheet from rising interest rates but would lose from falling interest rates. It would hedge this risk by taking a long or buy position in the financial futures market.

If, conversely, the bank has a negative dollar gap it would take a short position in the futures market.

With a positive duration gap, a bank would experience a decline in the market value of equity if interest rates increased (because the market value of assets would fall more than the market value of liabilities). It could help this exposure by taking a short position in financial futures. With such a position, increases in interest rates would produce gains in the futures market position that could be used to offset the losses in the cash market position. In contrast, a bank with a negative duration gap would hedge with a long position in the futures market.

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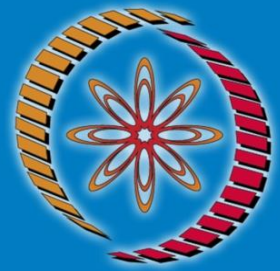
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Module 03: Asset-Liability Management (ALM): Management of Interest Rate Risk

Lecture 28: Use of Derivatives in ALM-III

CONCEPTS COVERED

- Options
- Futures vs. Options
- Hedging dollar gap using options
- Caps and floors

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Interest Rate Options

- Interest rate option grants a holder of securities the right to either :

  a. Sell (put) those instruments with another investor at a pre-specified exercise price before the option expires

  b. Buy securities (call) from another investor at a pre-specified price before the option's expiration date

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Interest Rate Options

- Put option writer must stand ready to accept delivery of securities from the option buyer if the option is exercised
- Call option writer must stand ready to sell the securities to the option buyer upon request
- The fee than an option buyer should pay to the option writer for this facility is known as *option premium*

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Futures Versus Options

- Unlike futures, options do not obligate any party to deliver securities and require a smaller initial outlay
- The option buyer can
  1. Exercise the option
  2. Sell the option to another buyer
  3. Allow the option to expire
- Interest rate options are traded mostly over the counter markets where the exercise date and price can be tailored to the needs of the option buyer

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Futures Options Market

- A futures options contract is an option contract in which the deliverable is a futures contract, such as the Treasury bill futures contract. For standardized exchange traded interest rate option most activities happen using the *futures option market*
- Buyer of call futures option has the right, but not the obligation, to take a long position in the futures market at the exercise (strike) price any time prior to expiration of the options contract
- Buyer of put futures option has the right, but not the obligation to take a short position in the future market at the exercise (strike) price anytime prior to expiration of option

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Principal Uses of Option Contracts

1. Protecting a security portfolio through the use of put options to insulate against falling security prices (rising interest rates)
2. Hedging against positive or negative gaps between interest-sensitive assets and interest- sensitive liabilities

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Hedging Interest Rate and Futures Options Contract

- Future price is highly correlated with the underlying cash price → futures on option can be used to hedge interest rate risk
- Example: Buyer of a T-bond future option at exchange is granted the right call or short position in a T-bond futures contract at the exercise price until option expires
  i. If interest rate rise, put(sell) options are most likely to be exercised
  ii. If interest rate falls, holders of call options will be more inclined to exercise their option

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Example:

- Suppose that your bank has a commitment to make a fixed rate loan in three months at the existing rate. In order to hedge against the prospect of rising interest rates, the bank takes a position in the futures options markets. What position should it take? The relevant information is as follows: T-bill futures prices:89; Put option:90; Premium Rs.2500. What will be the net gain to the bank if T-bill futures prices fall to 85? Increase to 93?

- If T-bill futures prices fall to 85, the put option could be exercised at 90 for a gain of 5, or Rs. 50,000. After paying the premium, the net gain would be Rs. 47,500.

- If T-bill futures prices rise to 93, the put option would not be exercised. The loss would equal the premium paid for the option, or Rs. 2,500.

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Hedging Dollar Gap with Options

- Suppose interest sensitive liabilities > interest sensitive assets ; bank has a negative dollar gap
- Without hedging: if interest rate increases, net interest income declines
- Long interest rate put option reduces the interest rate risk

  ✓If interest rate increases, bank earns profit on put option and could use it to reduce or eliminate the net interest income loss from negative dollar gap

  ✓If interest rates decrease, the bank would not exercise its put option, and benefit from an increasing net interest income (minus the put premium)

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Hedging Dollar Gap with Options Cont…

- Conversely interest sensitive assets > interest sensitive liabilities ; bank has a positive dollar gap
- Banks buy interest rate call option hedge the interest rate risk

✓If interest rate fall, bank would lose on its cash or spot market portfolio, but gain from its options position would partially or completely offset that loss

✓If interest rate rise, the gain from net interest income would only be partially offset by option cost (premium)

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Hedging Dollar Gap with Futures Options Contract

- **When bank has negative dollar gap and is concerned about rising interest rates : buy a put option in T-bill future contracts**

  ✓**If interest rate increases and T-bill prices will fall, the gain in futures position could be exercised**

  ✓**If interest rate decreases, T-bill prices rise and T-bill futures contract is not exercised**

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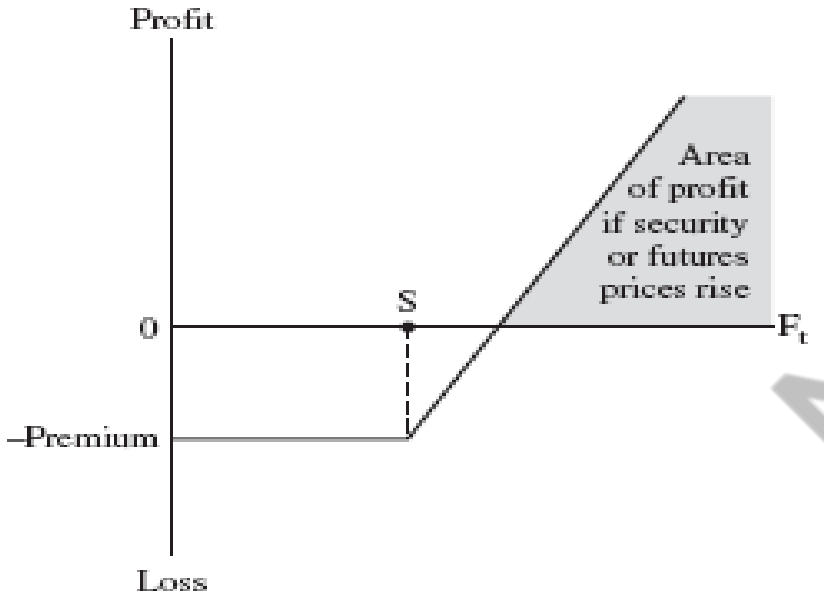
Hedging Dollar Gap with Futures Options Contract

- When bank has positive dollar gap and concerned about falling interest rates : buy a call option in T-bill future contracts
  - ✓As interest rates fall, the call option would earn profits to offset declining net interest income
  - ✓If interest rate rises, the call option would not be exercised

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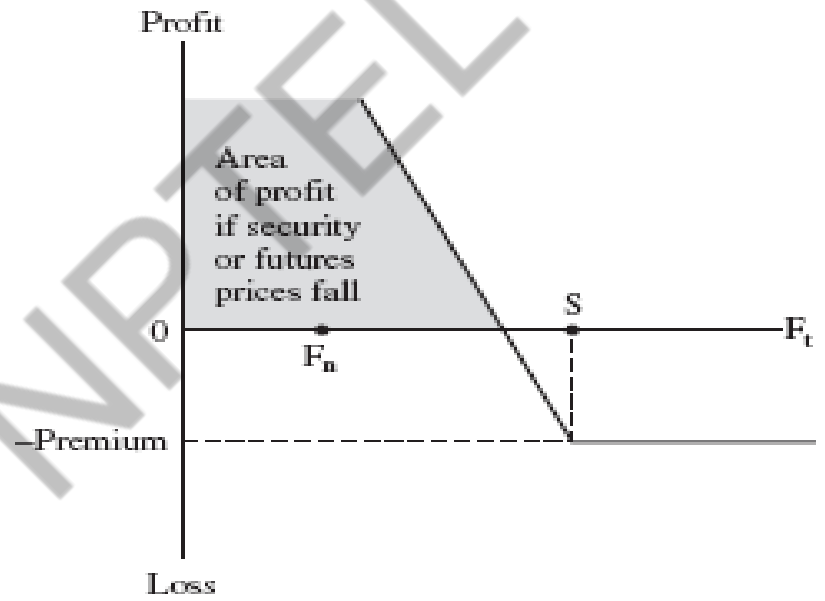
Payoff for Put and Call Options Purchased by Bank

Purchase of a Call Option (right to call away from option writer securities or futures contracts at a specific price (S) if interest rates fall)



Purpose: Protect against falling yields on assets (such as current and future loans and investments in securities).

Purchase of a Put Option (right to deliver to option writer securities or futures contracts at a specific price (S) if interest rates rise)

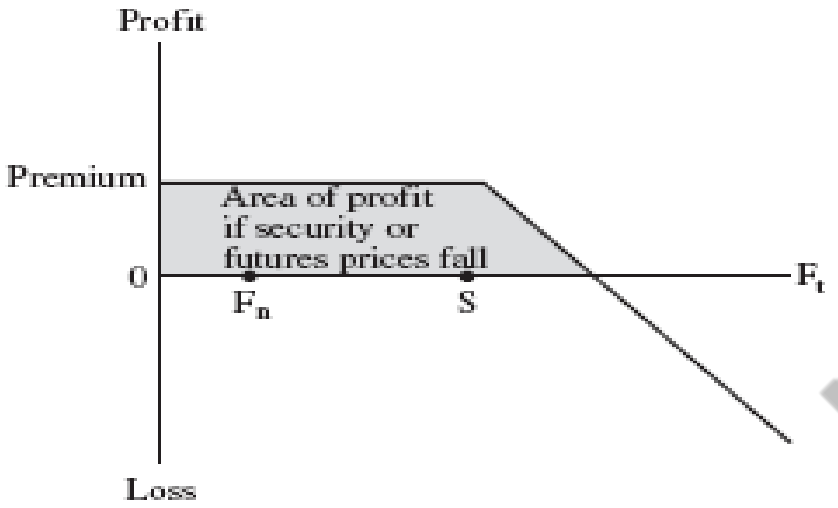


Purpose: Protect against rising deposit and other borrowing costs and falling market values of assets (such as security investments and loans).

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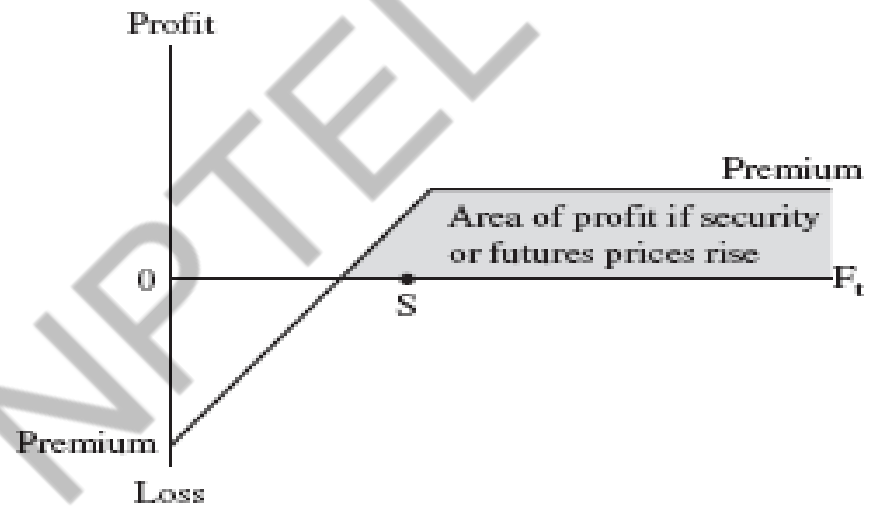
Payoff for Put and Call Options Written by Bank

Financial Firm Sells Call Option to a Buyer (giving the buyer the right to call away securities or futures contracts at price (S) if interest rates rise)



Purpose: Protect against rising deposit and other borrowing costs and falling market values of assets (such as security investments and loans).

Financial Firm Sells Put Option to a Buyer (giving the buyer the right to deliver securities or futures contracts at the price (S) if interest rates fall)

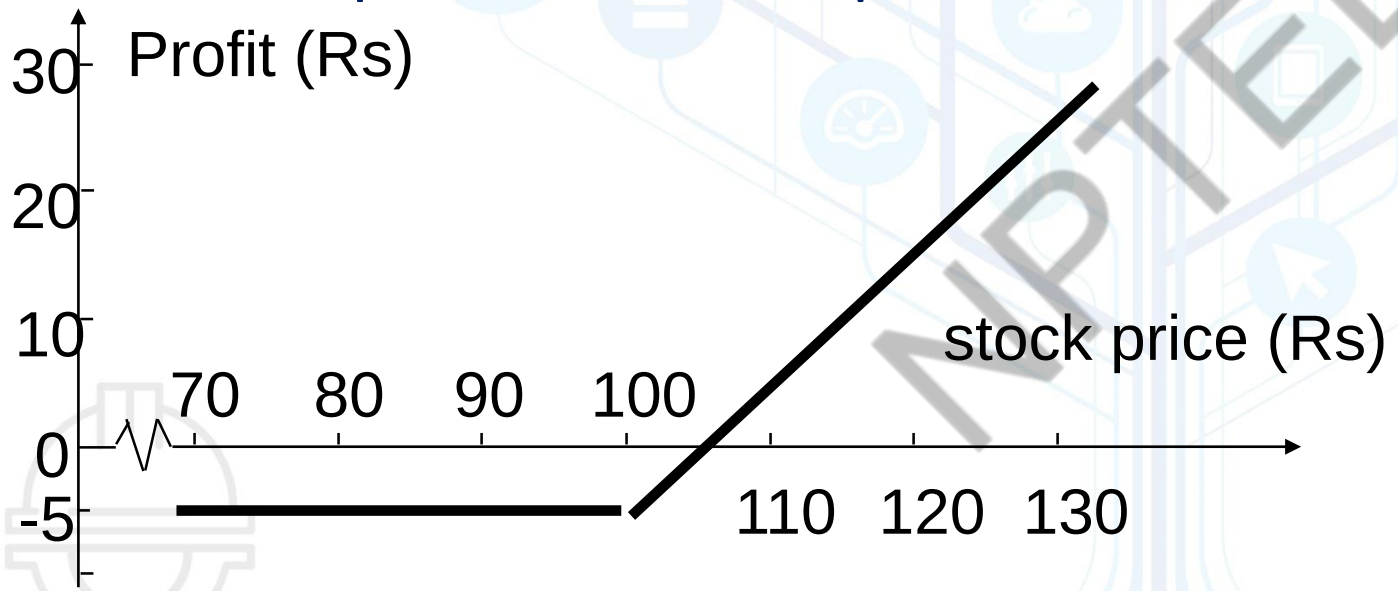


Purpose: Protect against falling yields on assets (such as current loans and future loans and investments in securities).

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Long Call

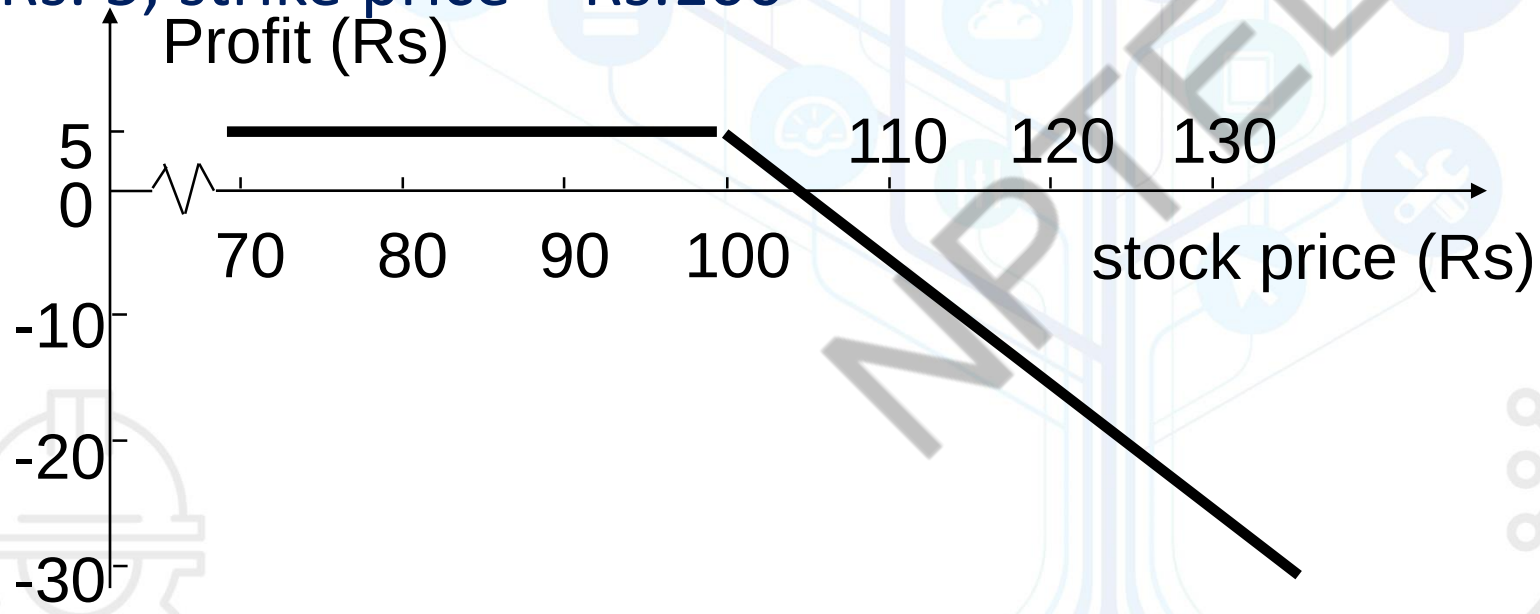
Profit from buying one European call option: option price = Rs.5, strike price = Rs.100, option life = 2 months



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Short Call

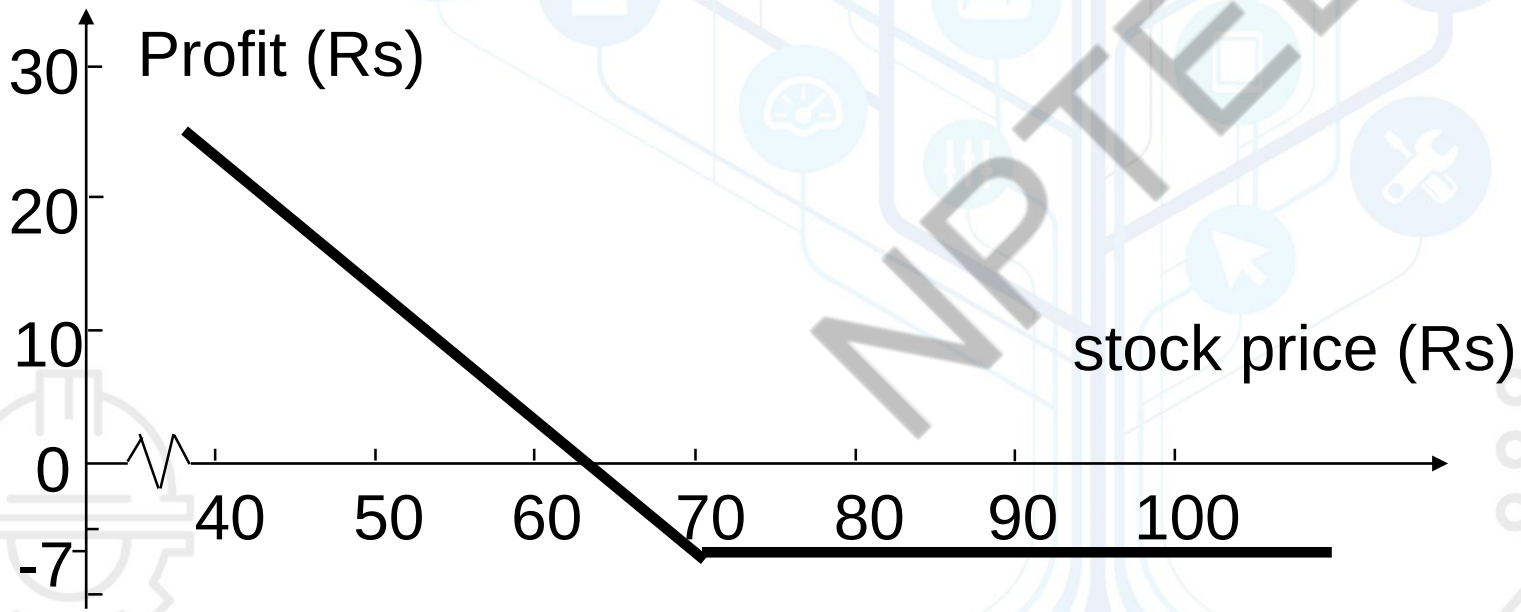
- Profit from writing one European call option: option price = Rs. 5, strike price = Rs.100



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Long Put

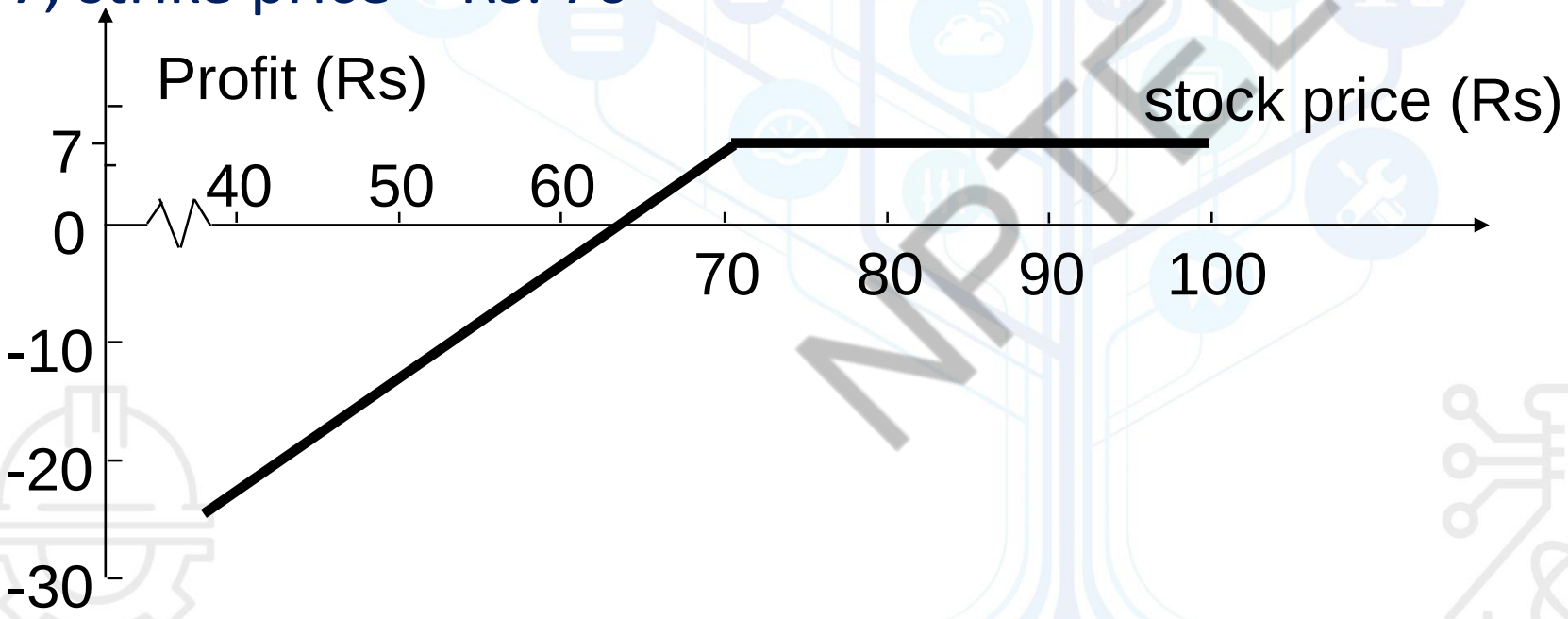
- Profit from buying an European put option: option price = Rs.7, strike price = Rs.70



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Short Put

- Profit from writing an European put option: option price = Rs. 7, strike price = Rs. 70



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Caps and Floors

- Caps and floors are versions of options that are widely used to transfer interest rate risk
- Interest rate cap is a contract that reduces the exposure of a floating rate borrower to increase in interest rates

  It is essentially a series of interest rate call options in which the writer guarantees the buyer (i.e. the bank) that the writer will pay the buyer an additional interest cost that results from rising interest rates

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Caps and Floors Cont..

- Interest rate floor is a contract that limits the exposure of the buyer to downward movements in interest rates
- An interest rate floor is a series of interest rate put options by which the writer guarantees the buyer (i.e. the bank) that the writer will pay to the bank an amount that increases as the level of interest rates fall

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Caps and Floors Example:

- Suppose a bank has a portfolio of fixed rate assets that are financed with variable-rate (or very short-term) sources of funds
- Liability-sensitive bank has a Rs.10million negative dollar gap: chooses to purchase an interest rate cap with strike price of 8.0% with a principal of Rs.10 million
- Cap can be purchased with varying maturities: ranging from months to five years
- Writer of the cap could be an investment bank, a large commercial bank, or any other party
- Comparisons are made between market interest rates and strike price- use a reference rate of T-Bill or LIBOR- at regular intervals (six months is common) referred to as *determination date*

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Caps and Floors Example:

- If market yield(say 9%) >strike price (8%), the writer of cap would be obligated to pay Rs. 50,000 to the bank:

  =(9%-8%)(Rs. 10,000,000)(0.5) = Rs. 50,000
- This payment could offset the increased net interest cost produced by the liability sensitive position of the bank's balance sheet
- If rates do not increase, the bank does not collect on its insurance policy (i.e. cap) but also does not lose from a liability sensitive balance sheet

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Caps and Floors Example:

- Suppose the bank is asset sensitive : it has short term assets financed with long-term liabilities
- Banks will benefit if rates rise but will be harmed if rates fall
- Purchase a floor with a Rs. 10 million principal, a strike price of 7%, and a six month determination date
- If interest rate on the appropriate market instrument (say, 3 month T-bill) was 6% as of determination date, the bank would be entitled to receive Rs. 50,000 from the writer:

  (Rs. 10,000,000)(1%)(0.5)= Rs. 50,000

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CONCLUSION

- Buyer of call futures option has the right, but not the obligation, to take a long position in the futures market at the exercise (strike) price any time prior to expiration of the options contract
- Buyer of put futures option has the right, but not the obligation to take a short position in the future market at the exercise (strike) price anytime prior to expiration of option
- For negative dollar gap position, Long interest rate put option reduces the interest rate risk
- For positive dollar gap condition, banks buy interest rate call option hedge the interest rate risk

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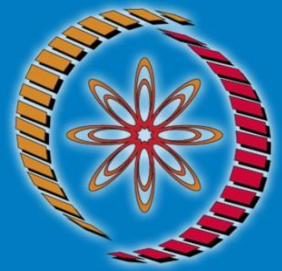
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MANAGEMENT OF COMMERCIAL BANKING

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Module 03: Asset-Liability Management (ALM): Management of Interest Rate Risk

Lecture 29: Use of Derivatives in ALM-IV

CONCEPTS COVERED

- Interest Rate Swap
- Quality Swap
- Currency Swap

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Interest Rate Swaps

- Interest rate swap is a way to change a borrowing institution's exposure to interest rate fluctuations and achieve lower borrowing costs.
- Swap participants can convert from fixed to floating interest rates or from floating to fixed interest rates and more closely match the maturities of their liabilities to the maturities of their assets

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Interest Rate Swap Cont..

- A company agrees to pay cash flows equal to interest at a predetermined fixed rate on a notional principal and in return it receives the interest at a floating on same principal for same period of time
- Mostly, swaps are used to transform the nature of assets and liabilities

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Example

- Let there is a 3 year swap started on 15 March 2018 between the companies ABC and XYZ
- Company ABC agrees to pay an interest rate of 7 % per annum on a principal of Rs. 100 crore
- In return XYZ agrees to pay ABC 6-month LIBOR rate on the same principal
- ABC is the fixed player and XYZ is the floating rate player

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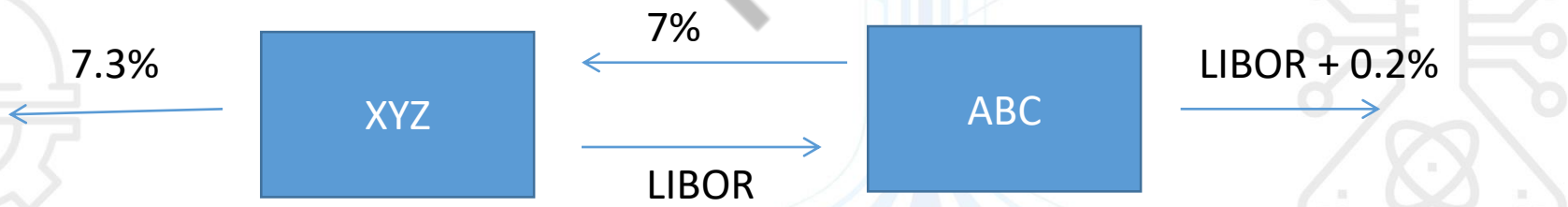
Cash Flow to ABC

Date	Six Month LIBOR rate	Floating Rate Cash Flow (Received)	Fixed Cash Flow (Paid)	Net Cash Flow
March 15, 2018	6.0			
Sept 15, 2018	6.2	3	-3.5	-0.5
March 15, 1019	7.4	3.1	-3.5	-0.4
Sept, 15, 2019	7.5	3.7	-3.5	0.2
March 15, 1020	7.8	3.75	-3.5	0.25
Sept, 15, 2020	8.0	3.9	-3.5	0.40
March 15, 20		4.0	-3.5	0.50

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Using Swap to Transform a Liability

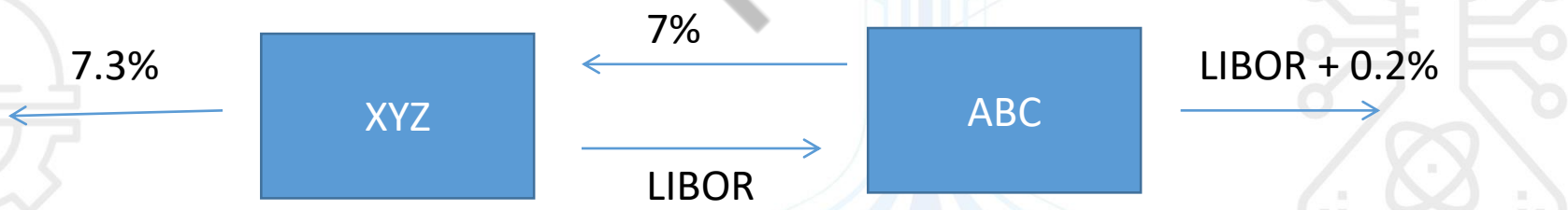
- For ABC this swap may be used to transform a floating rate loan into a fixed rate loan. How?
- Let ABC has borrowed Rs. 100 crore at LIBOR plus 20 basis point (from outside). After entering into swap the cash flows will be:
- It pays LIBOR plus 0.2% to the outside lender
- It receives LIBOR under the terms of swap
- It pays 7% under the terms of swap
- This arrangement makes the floating rate loan to fixed rate loan (7.2%)



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Using Swap to Transform a Liability

- Let ABC has borrowed Rs. 100 crore at 7.3% (from outside). After entering into swap the cash flows will be:
- It pays 7.3% to the outside lender
- It pays LIBOR under the terms of swap
- It receives 7% under the terms of swap
- This arrangement makes the fixed rate loan to floating rate loan (LIBOR + 0.3%)



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Quality Swap

- Under the terms of agreement called quality swap, a borrower with a lower credit rating enters into an agreement to exchange interest payment with a borrower having a higher credit rating
- Lower credit rated borrower agrees to pay the higher credit rated borrower fixed long term borrowing cost; the borrower with the higher credit rating covers all or portion of the lower rated borrower's short term floating loan rate
- Often the lower-rated borrower, such as a thrift institution or insurance company, has longer duration assets than liabilities, while higher rated borrower may have longer duration liabilities than assets(such as bank)

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Lower Credit-Rated Borrower (known as the swap buyer)

Wants lower credit costs

Prefers fixed-rate, longer term loans due to substantial holdings of long-term assets or short run uncertainties, but is prevented by size or credit rating from having access to cheap, long-term funds (must borrow short-term instead at a higher interest rate)

Often has a positive duration gap: (Duration of Assets>Duration of Liabilities)

Pays long-term, fixed interest rate, usually based on recently offered Treasury securities

The net difference paid by one or the other borrower often through an intermediary

Pays interest rate on short-term loan tied perhaps to the prime bank rate or the London Interbank Offered Rate (LIBOR)

Higher Credit-Rated Borrower (known as the swap buyer)

Wants lower credit costs

Can borrow at low long-term bond interest rate, but prefers flexible, short-term interest rate in place of long term fixed rate due to large holdings of short term assets or because of long-run uncertainties

Often has a negative duration gap: (Duration of Liabilities >Duration of Assets)

Commercial bank, security dealer, insurance company, or other financial institution acts as a broker to arrange the swap and, perhaps, guarantee performance by each party to the swap for a fee

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Use of Swap

- Firms with a negative GAP can reduce risk by making a fixed-rate interest payment in exchange for a floating-rate interest receipt

- Firms with a positive GAP take the opposite position, by making floating-interest payments in exchange for a fixed-rate receipt

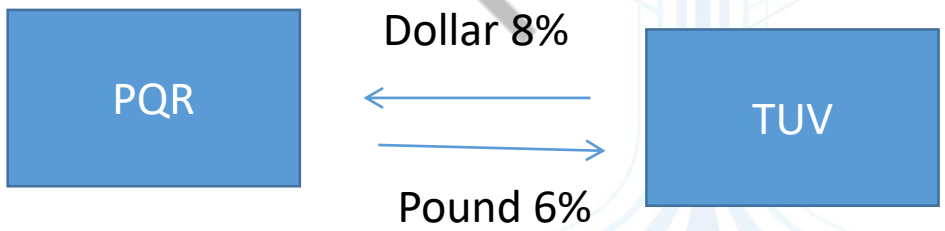
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Currency Swap

- It involves exchanging principal and interest payments in one currency for principal and interest payments in another
- The principal amounts in each currency are usually exchanged at the beginning and at the end of the life of the swap
- Assume a currency swap between company PQR in USA and TUV in UK
- Entered into the contract on February 15, 2018
- It is a fixed vs fixed currency swap
- Interest payments are made once in a year
- Principal amounts are $20 million and £ 10 million
- PQR pays $20 million and receives £ 10 million

Cash flow to PQR

Date	Dollar Cash Flow (Million)	Pound Cash Flow (Millions)
February 15, 2018	-20	+10
February 15, 2019	+1.60	-0.60
February 15, 2020	+1.60	-0.60
February 15, 2021	+1.60	-0.60
February 15, 2022	+1.60	-0.60
February 15, 2023	+21.60	-10.60



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Limitations of swap markets

- It is difficult to find counterparties wanting to take the opposite side of a specific transaction
- Swap agreements are difficult to alter and hard to terminate once they are initiated
- The counterparties are both exposed to default risk.

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CONCLUSION

- Interest rate swap is a way to change a borrowing institution's exposure to interest rate fluctuations and achieve lower borrowing costs.
- Swaps are used to transform the nature of assets and liabilities
- Under the terms of agreement called quality swap, a borrower with a lower credit rating enters into an agreement to exchange interest payment with a borrower having a higher credit rating
- Currency swap involves exchanging principal and interest payments in one currency for principal and interest payments in another. The principal amounts in each currency are usually exchanged at the beginning and at the end of the life of the swap

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Module 03: Asset-Liability Management (ALM): Management of Interest Rate Risk

Lecture 30: Use of Derivatives in ALM-V

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CONCEPTS COVERED

- The Securitization Process
- Sales of Loans
- Standby Credits
- Credit Derivatives and CDOs
- Benefits and Risks of Credit Derivative

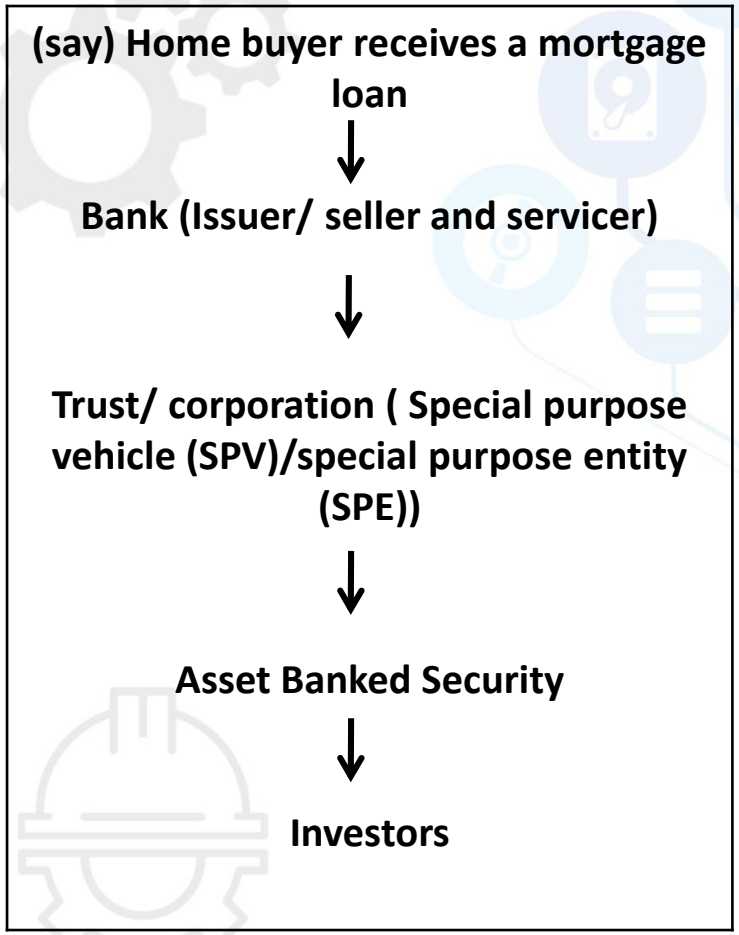
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What is Securitization?

- Process by which financial assets (e.g. mortgages, accounts receivable etc) are purchased by an entity that then issues securities supported by the cash flow from those financial securities
- It raises new funds and reduces risk exposure
- It uses the securities market to fund a portion of a lender's loan portfolio, allocate capital more efficiently, diversify funds sources, and lower the cost of fund raising

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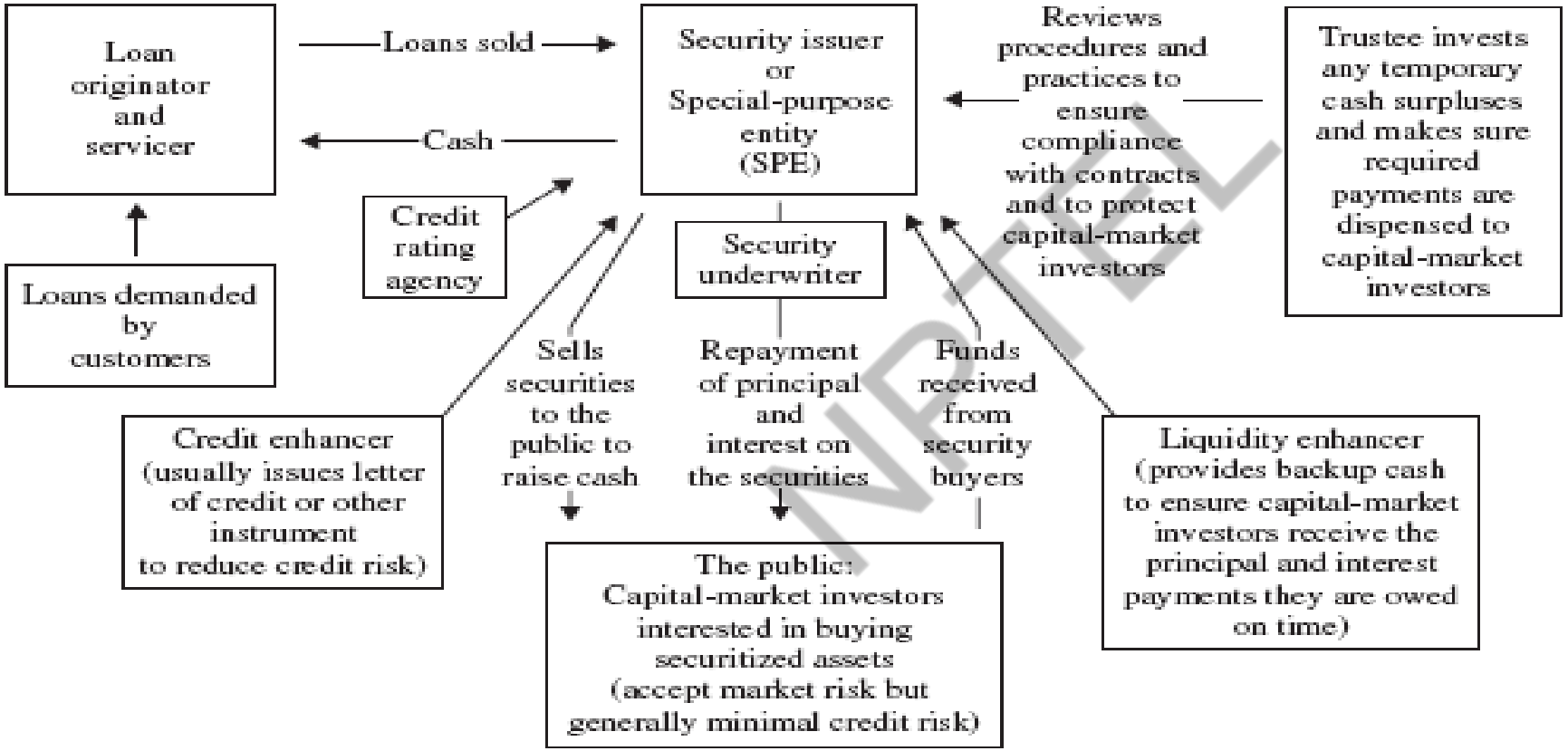
Securitization Process



- Bank issues mortgage loan : an asset
- This loan and similar loans are pooled and removed from the lender's balance sheet and sold a special purpose entity (SPE) (corporation or trust)
- SPE is separate from the originator. If originating lender goes bankrupt, this event will not affect the credit status of pooled loans and its cash flow: "bankruptcy remote"
- The SPE is set for specific purpose to buy loans and sell asset backed securities (ABS)
- ABS are sold to market investors who are attracted by their credit rating and superior liquidity
- Investors receive loan interest and principal payments through servicing firms that collect loan payments

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Key Players in the Securitization Process



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Securitization Process: Advantages & Disadvantages

Advantages of Securitization	Problems with Securitization
• Diversifies a Bank's Credit Risk Exposure • Creates Liquid Assets Out of Illiquid Assets • Transforms These Assets into New Sources of Capital • Allows the Bank to Hold a More Geographically Diversified Loan Portfolio • Allows the Bank to Better Manage Interest Rate Risk • Allows the Bank to Generate Fee Income	• May Not Reduce a Bank's Capital Requirements • Prepayment Risk • May Increase Competition for the Best Quality Loans • May Increase Competition for Deposits • Credit Crisis of 2007-2009 showed that the "bankruptcy remote" SPE arrangements can get into trouble if the underlying loans go bad • GSEs: Ethical Controversies Around Fannie Mae and Freddie Mac

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Promised Fees and Payments on Securitized Loans

- Coupon Rate Promised to Investors Who Buy Securities
- Default Rate on the Pooled Loans
- Fees to Compensate for Servicing Loans
- Fees Paid to Advise on Setting Up Securitization Process
- Fees Paid for Providing Liquidity Enhancement
- Residual Income For Security Seller, Trust or Credit Enhancer

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Types of Securitized Assets

- Residential Mortgages – the beginnings of securitization
- Home Equity Loans
- Automobile Loans (CARs)
- Commercial Mortgages
- Small Business Administration Loans
- Mobile Home Loans
- Credit Card Receivables

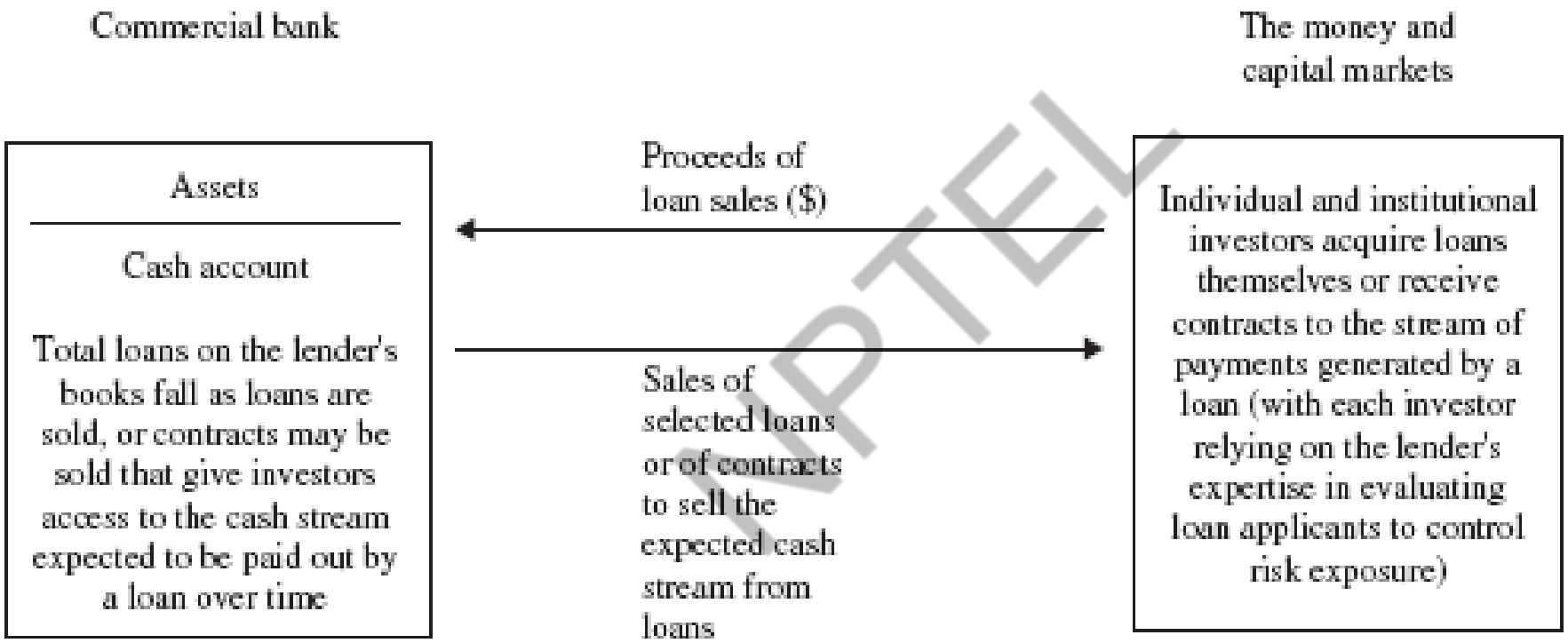
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Loan Sales

- Loans can be used as collateral for issuing securities to raise new funds ; can also be sold in entirety to a new owner
- Principal buyers of loan are banks (foreign banking firms seeking a foothold on the domestic market), insurance companies, pension funds, nonfinancial corporations, mutual funds (including vulture and hedge funds that choose to concentrate on purchasing troubled loans)

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Impact of Loan Sales



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Types of Loan Sales

- **Participation Loans:** The purchaser is an outsider to the loan between lender and borrower.

  Buyer faces substantial risk: loan seller/borrower may fail

- **Assignments:** Ownership is transferred to buyer who thereby acquires a direct claim against borrower
- **Loan Strips**: Short dated pieces of long term loan and often mature in a few days or weeks.

  Buyer of strip entitled to a fraction of expected income from a loan

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Reasons Behind Loan Sales

- Way to Rid the Bank of Lower-Yielding Assets to Make Room for Higher-Yielding Assets when Interest Rates Rise
- Way to Increase Marketability and Liquidity of Assets
- Way to Eliminate Credit and Interest Rate Risk
- Way to Generate Fee Income
- Purchasing Bank can Diversify Loan Portfolio and Reduce Risk

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Risks In Loan Sales

- Best Quality Loans are the Easiest to Sell Which May Increase Volatility of Earnings for the Bank Which Sells the Loans
- Loan Purchased From Another Bank Can Turn Bad Just as Easily As One From Their Own Bank
- Loan Sales are Cyclical

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Financial Guarantees: Standby Letter of Credit

- **Financial Instrument that Enhances the Credit Standing of a Borrower by Providing Guarantees of Performance or Insures Against Default in Return for Payment of a Fee - It is a Contingent Obligation**
  - ✓ **Performance Guarantees – Guarantees a Project Will be Completed On Time**
  - ✓ **Default Guarantees – Financial Institution Pledges Repayment of Defaulted Notes When Borrowers Cannot Pay**

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Structure of Standby Letter of Credit

Three Essential Elements:

- **Commitment From Issuer (often a bank or insurance company)**
- **An Account Party – for whom the letter is issued**
- **A Beneficiary – investor concerned about funds committed to account party**

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Credit Derivatives

- Over-the-counter financial agreements offering protection to a designated beneficiary in case of default on a loan, bond, or other debt instruments
- Was one of the fastest-growing markets, but the credit crisis uncovered problems with recordkeeping and possible increasing risk exposure
- Types of Credit Derivatives:
  - Credit Swaps
  - Credit Options
  - Credit Default Swaps
  - Credit Linked Notes
  - Collateralized Debt Obligations

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Credit Derivatives: Credit Swaps

- Two lenders agree to swap a portion of their customer's loan payments
- Can help each lender further spread out their risk
- Total Return Swap: Variation of Credit Swaps where the dealer guarantees parties a specific rate of return on credit assets

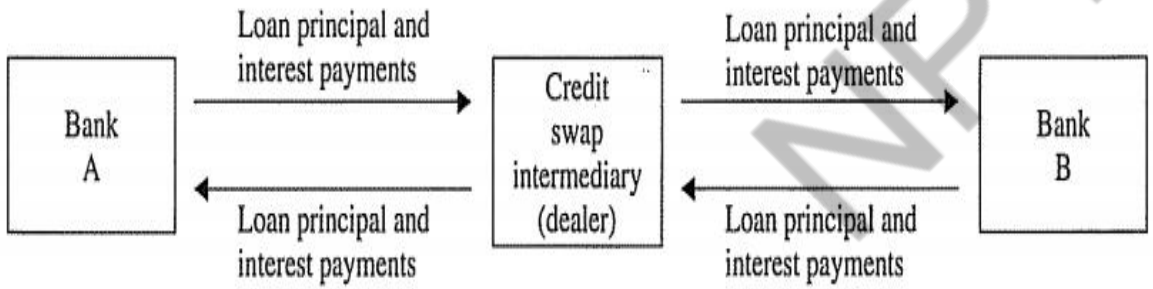


Figure: Credit Swaps

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Credit Derivatives: Credit Options

Guards against losses in value of a credit asset or helps offset higher borrowing costs due to changes in credit ratings of the borrower

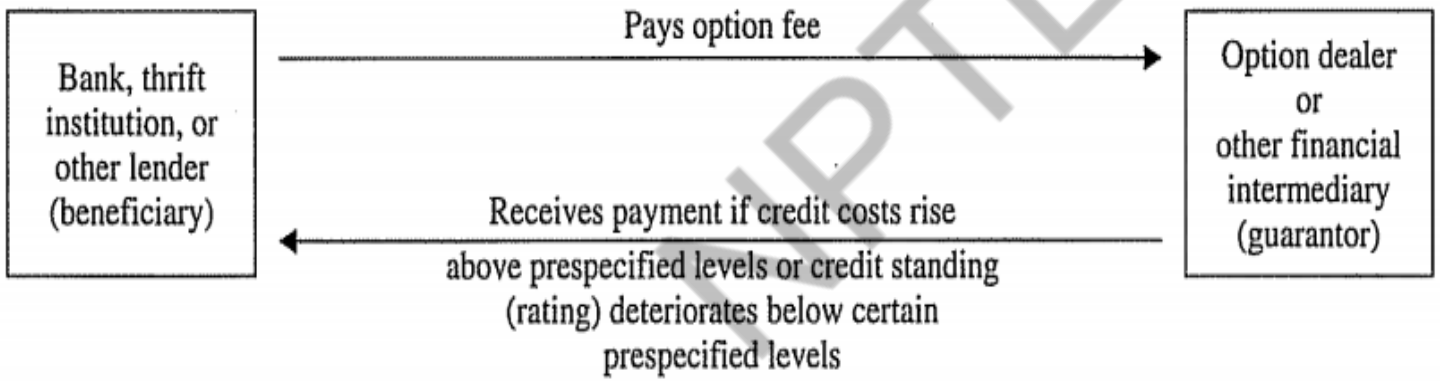


Fig: Credit Options

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Credit Derivatives: Credit Default Swaps

Aimed at lenders able to handle comparatively limited declines in value but who want insurance against serious losses

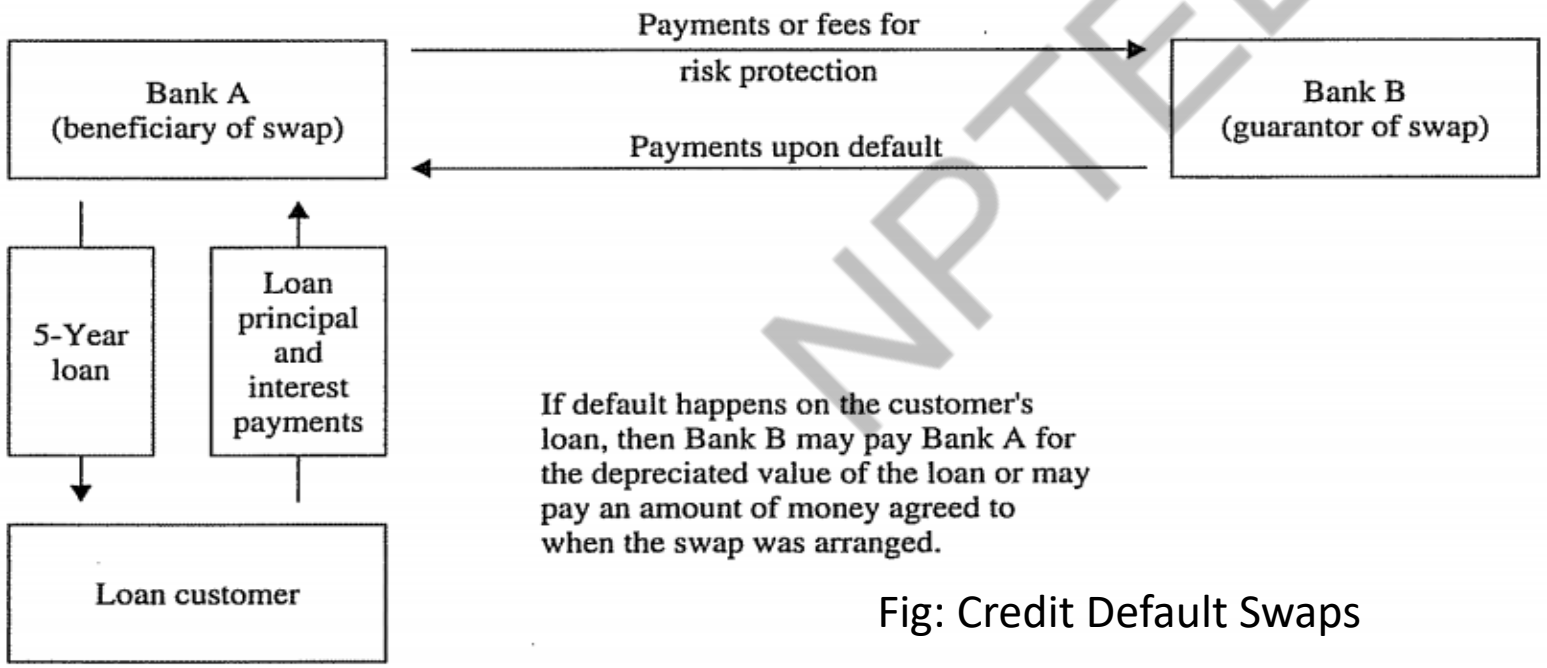


Fig: Credit Default Swaps

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Credit Derivatives: Credit Linked Notes

- Fuses together a normal debt instrument, such as bonds, with a credit option contract to give borrower greater payment flexibility
- Grants issuer the privilege of lowering the amount of loan repayments it must make if significant factors change

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Collateralized Debt Obligations

- Contain pools of high-yield corporate bonds, stocks or other financial instruments contributed by businesses interested in strengthening their balance sheets and raising new funds.
- Notes of varying grades are sold to investors seeing income from pooled assets
- Claims sold are divided into tranches similar to those created for the securitization of home mortgages
- The most risky tranche offer the highest potential return

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Risks of Credit Derivatives

- Partners in swap or option contract may fail to perform
- Smaller volume – markets are thinner and more volatile
- Legal issues
- Regulatory concerns
- Lessons of credit crisis:
  - Securitized assets and credit swaps are complex financial instruments that are difficult to correctly value and measure in terms of risk exposures
  - Operate in cyclically sensitive markets
  - Contagion effect cannot be stopped without active government intervention

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CONCLUSION

- Securitization is a process by which financial assets (e.g. mortgages, accounts receivable etc) are purchased by an entity that then issues securities supported by the cash flow from those financial securities
  - Loans can be used as collateral for issuing securities to raise new funds ; can also be sold in entirety to a new owner
  - Standby letter of credit is a financial Instrument that Enhances the Credit Standing of a Borrower by Providing Guarantees of Performance or Insures Against Default in Return for Payment of a Fee
  - Credit derivatives are the over-the-counter financial agreements offering protection to a designated beneficiary in case of default on a loan, bond, or other debt instruments
  - Credit Swaps, Credit Options, Credit Default Swaps, Credit Linked Notes and Collateralized Debt Obligations are the major credit derivatives traded in the market

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