BNY MELLON

Derivatives

BUSINESS L1 TRAINING I-NAUTIX

Outline

1. **INTRO – WHAT ARE DERIVATIVE SECURITIES?**
2. **OVERVIEW AND DIFFERENT PERSPECTIVES**
3. **TYPES OF DERIVATIVES**
4. **PARTICIPANTS IN THE DERIVATIVES WORLD**
5. **USES OF DERIVATIVES**

An Overview of the Derivatives

DERIVATIVES : A SECURITY WHOSE PRICE IS DEPENDENT UPON OR DERIVED FROM ONE OR MORE UNDERLYING ASSETS

TYPES OF DERIVATIVES

- Forwards and Futures
- Options
- Rights
- Warrants

USES OF DERIVATIVES

- To hedge risks
- To speculate (take a view on the future direction of the market)
- To lock in an arbitrage profit
- To obtain exposure to the underlying where it is not possible to trade in the underlying (e.g., weather derivatives)

Forward Contracts

A forward contract is a contract made today for future delivery of an asset at a pre-specified price.

No money or assets change hands prior to maturity.

Forwards are traded in the over-the-counter market.

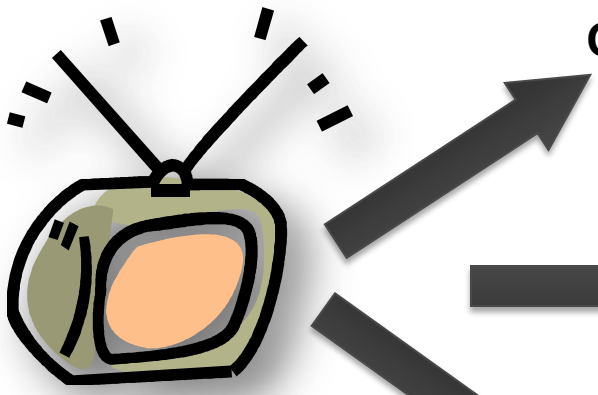
THE BUYER (LONG POSITION) OF A FORWARD CONTRACT IS OBLIGATED TO:

- take delivery of the asset at the maturity date.
- pay the agreed-upon price at the maturity date.

THE SELLER (SHORT POSITION) OF A FORWARD CONTRACT IS OBLIGATED TO:

- deliver the asset at the maturity date.
- accept the agreed-upon price at the maturity date

Derivatives



$1,000
Buy
Today

$1,200
One Month Later

$ 850
One Month Later

$ 175
Save

Pay $25 and Book TV
Buy One Month Later
Pay Today's Price

$ 175
Loss

There is no deal without a TV here – Fundamental Product

Forward contact – An example

JAN 1 YY

- Assume spot price of coffee is USD 5 per pound
- Company A agrees to buy 10,000 pounds of coffee from company B on Apr 1 YY at USD 5 per pound

APR 1 YY

- Company A pays USD 50,000 to company B and company B delivers 10,000 pounds of coffee
- If spot price of coffee = USD 5.2 per pound,
  - Company A's gain = USD 2000
  - Company B's loss = USD 2000
- If spot price of coffee = USD 4.7 per pound,
  - Company A's loss = USD 3000
  - Company B's gain = USD 3000

Futures Contracts

A FUTURES CONTRACT IS IDENTICAL TO A FORWARD CONTRACT, EXCEPT FOR THE FOLLOWING DIFFERENCES:

- Futures contracts are standardized contracts and are traded on organized exchanges.
- Futures contracts are marked-to-market daily.

FUTURES CONTRACTS ALLOW INVESTORS TO:

- Hedge
- Speculate

FUTURES CONTRACTS ARE AVAILABLE ON COMMODITIES AND FINANCIAL ASSETS:

- Agricultural products, weather and livestock
- Metals and petroleum
- Interest rates
- Currencies
- Stock market indices

Trading Positions

THERE ARE TWO BASIC **POSITIONS** ON STOCK FUTURES: **LONG** AND **SHORT**.

LONG POSITION - BUY FOLLOWED BY SALE : The long position agrees to buy the stock when the contract expires. If you think that the price of your stock will be higher in three months than it is today, you want to go long.

SHORT POSITION – SALE FOLLOWED BY BUY : The short position agrees to sell the stock when the contract expires. If you think the stock price will be lower in three months, then you'll go short.

In the long run, any investor is expected to close the position

Mark to Market

KNOWN AS “DAILY SETTLEMENT” IN FUTURES TRADING CONTEXT

PROCEDURE OF VALUING ASSETS COVERED IN A FUTURES CONTRACT AT THE END OF EACH TRADING DAY

- Conducted by clearinghouse
- Asset values are determined according to market prices at the end of each day
- Profit and loss is settled between the long and the short

MARGIN ACCOUNT

- Contains initial amount of cash, that will act as a guarantee, put up by a counterparty
- This is used for daily settlement
- Account owner must replenish this account when it goes below a certain value

Futures contact – An example

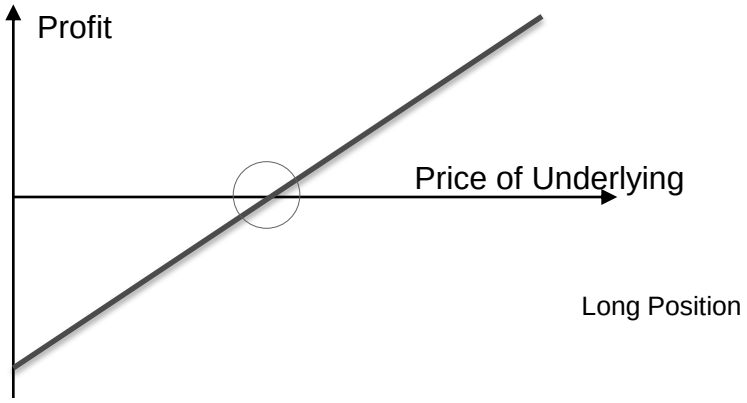
DAY 1: BUY ONE LOT OF GOOG FUTURES CONTRACT COVERING 1000 SHARES FOR; ASSUME

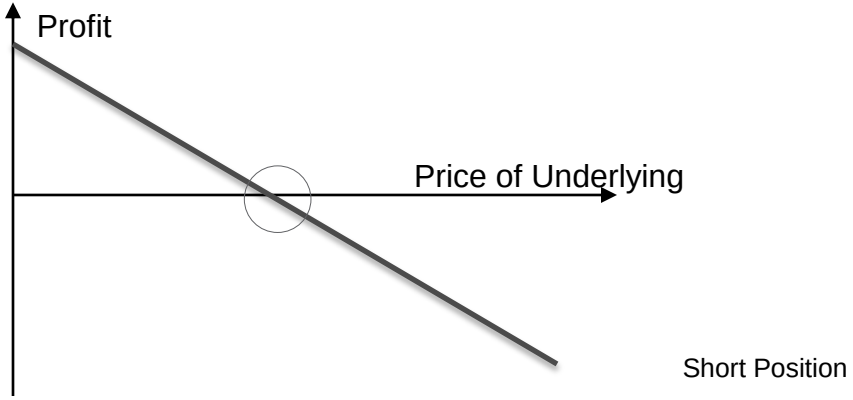
- Futures price on the GOOG= USD 100 per Share
- Lot Value = Futures price (x) Lot Size = 100 X 1000 = 100000 USD
- Margin requirement = 20% of Lot Value = 100000 x 20/100 = 20000 USD

MARK TO MARKET TABLE

Day	Margin (%)	Margin	Maintenance Margin	Balance	EOD Price ($)	MTM
Day 1	20%	20000	0		100	0
Day 2	20%	20000	2000	22000	102	2000
Day 3	20%	20000	-1000	21000	101	-1000
Day 4	20%	20000			99	
Day 5	20%	20000			100	

Pay Off of Forward / Futures Position





Forwards and Futures – A comparison

No.	Parameter	Forwards	Futures
1	Size of contract	Flexible	Standardized
2	Maturity	Flexible	Specified days of the year only
3	Availability	Inter-bank market	Organized exchange
4	Collateral	No explicit collateral; informal most of the time, e.g., line of credit or 5-10% on account	Margin
5	Settlement	Delivery (90% of cases)	Offsetting position (99% of cases)
6	Major Users	Primarily hedgers	Primarily speculators
7	Risk	Variable	Marked-to-market daily, contract guaranteed by Futures Clearing Corporations

Options

TERMINOLOGY

- Rights and Obligations (to buy or sell)
- Specific Stock (Round lot)
- Specific Time Frame (Expiration date)
- Specific Price (strike)
- Premium

REASONS TO BUY OPTIONS

- Directional Speculation
- Volatility Speculation
- Protection of Stock Position
- Income Generation

GETTING OUT OF OPTIONS

- Liquidate or Buy Back in Market
- Exercise
- Expiration

Call & Put Options

CALLS

- Call Buyer has the right to buy the security at the specified price (Strike Price)
- Call Seller has the obligation to honor the contract

PUTS

- Put Buyer has the right to sell the security at the specified price (Strike Price)
- Put Seller has the obligation to honor the contract

Trading

Option Buyer **Option Writer**

"I have a Right"
(Control)

"I have an Obligation"
(No Control)

"I *paid* $"

"I *got paid* $ "

Buyers Have rights
"are in Charge"
Pay for the privilege

Sellers take on obligations
"Are Passive"
Get paid for their promise

Call Options

Call Buyer

Call Writer

Right to <u>Buy</u>
(Control)

Obligation to
<u>Sell</u>
(No Control)

Bullish

Bearish

Call Option – Right to Buy assumes price would go up

Put Options

Put Buyer | **Put Writer**

Right to <u>Sell</u>
(Control)

Obligation to
<u>Buy</u>
(No Control)

Bearish | ***Bullish***

Put Option – Right To Sell, Assumes Price to Go Down

Strike Price Terminology

The type of option and the relationship between the spot price of the underlying asset and the strike price of the option determine whether an option is in-the-money, at-the-money or out-of-the-money.

Exercising an in-the-money call or in-the-money put will result in a payoff. Neither a call nor put that is at-the-money will produce a payoff.

	Call Option	Put Option
In-the-Money	Spot > Strike	Spot < Strike
At-the-Money	Spot = Strike	Spot = Strike
Out-of-the-Money	Spot < Strike	Spot > Strike

Types of Options

ON THE BASIS OF EXERCISE OPTIONS

AMERICAN OPTIONS

Can be exercised at any time between the date of purchase and the expiration date.

Mostly American options are exercised at the time of maturity. But when the underlying makes cash payments during the life of option, early exercise can be worthwhile.

EUROPEAN OPTIONS

Can only be exercised at the end of their lives

Option Characteristics

BUY	• Holder has the right to Buy (or Sell) the underlying security; writer has the obligation
1	• Size of the option contract
ABC	• Underlying security
OCT	• Option contract expiry month
50	• Strike or exercise price
CALL	• Option Type; Call indicates right to Buy and Put indicates right to Sell
A	• Exercise style; can be American or European option
@3	• Premium to be paid for buying or writing an option contract

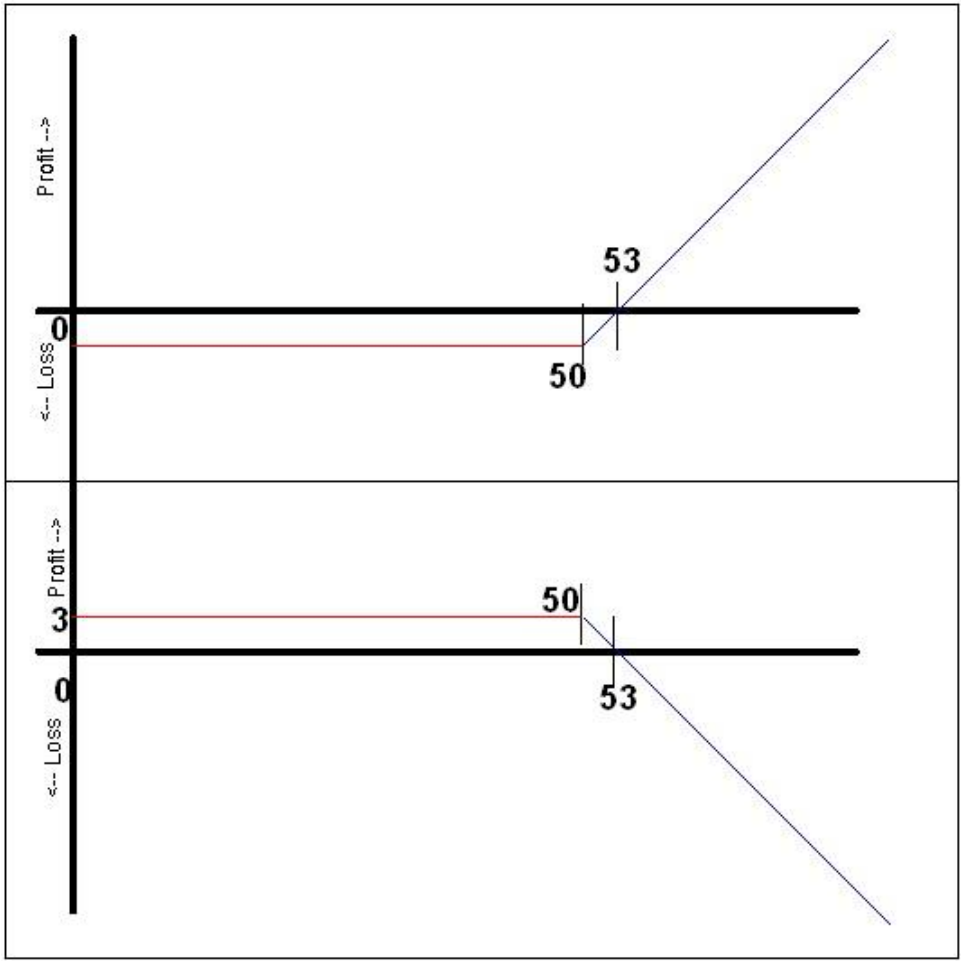
Call Options Pay-off

BUYER OF CALL OPTION

- Strike Price $50
- Option Premium $3

SELLER OF CALL OPTION

- Strike Price $50
- Option Premium $3



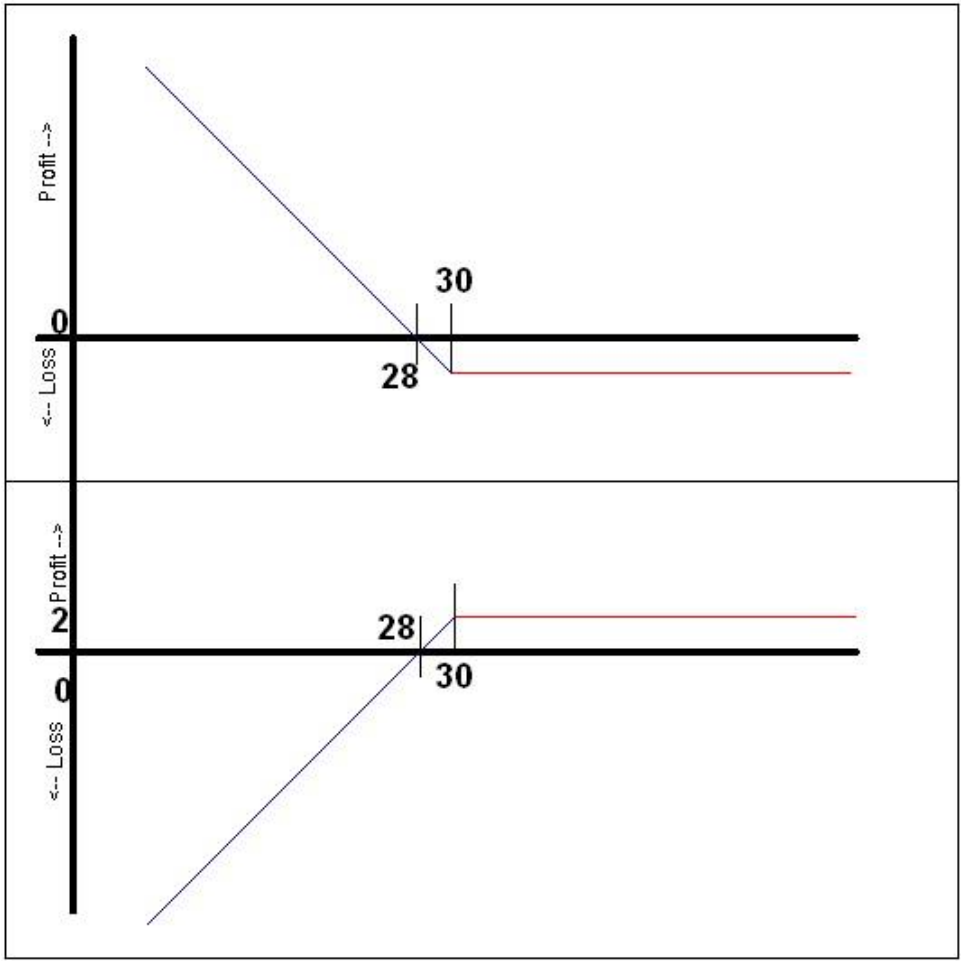
Put Options Pay-off

BUYER OF PUT OPTION

- Strike Price $30
- Option Premium $2

SELLER OF PUT OPTION

- Strike Price $30
- Option Premium $2



Options – Example 1

CURRENT PRICE OF RHAT IS $17. INVESTOR A BUYS 2 RHAT JULY CALL OPTIONS WITH STRIKE PRICE OF $18 AND PAYS $1 PREMIUM. IN JULY, PRICE OF RHAT RISES TO $21, WHAT IS A'S PROFIT / LOSS?

- Since Current price > Strike Price, A will exercise the Option.
- So, A gets RHAT @ $18, whereas the Mkt Price is $21
- A's profit = $3 - $1 (premium paid) = $2 per option contract
- A has 2 contracts, and each option contract = 100 shares
- A's total Profit = $2 * 2 * 100 = $400

Options – Example 2

INVESTOR B BUYS 5 MSFT AUG PUT OPTIONS AT THE STRIKE PRICE OF $40, WITH A PREMIUM OF $1.5.

- What is the Total Premium paid?
  - 5 * 100 * 1.5 = $750.
- In Aug, Price of MSFT is $49. What is B's profit / loss?
  - At $49, B will not exercise the option.
  - B's Loss = Premium paid = $750.
- In Aug, Price of MSFT is $39. What is B's profit / loss?
  - B will exercise the option and gain $1 per share, but since he has paid a premium of $1.5,
  - Loss = 0.5 * 100 * 5 = $250
- At what price will B break even?
  - $38.50

Option Contract Outcomes

LIQUIDATE OR BUY BACK IN MARKET

- Holder of Call Option offsets by selling equal number of contracts of same expiry month usually at a lower premium
- Writer of Put Option offsets by buying equal number of contracts of same expiry month usually at a higher premium

EXERCISE

- Holder of Call Option buys the underlying asset at strike price if the spot price is > strike price
- Holder of Put Option sells the underlying asset at strike price if the spot price is < strike price

EXPIRATION

- Take no action and allow the option to expire
- Loss is limited to the premium paid up front for the option

Use of Options

HEDGING

- Use derivatives (or other instruments) in the market to offset the risk of any adverse price movements
- Investors hedge one investment by making another

SPECULATION

- Bet on movement of a security
- Ability to make a profit irrespective of whether the stock value goes up, down or sideways

ARBITRAGE

- Simultaneously buying and selling a security to make marginal risk-free profit through price differential

Hedging Example

A US COMPANY WILL PAY £10 MILLION FOR IMPORTS FROM BRITAIN IN 3 MONTHS

- Hedge using a long position in a forward contract

AN INVESTOR OWNS 1,000 MICROSOFT SHARES CURRENTLY WORTH $28 PER SHARE

- A two-month put with a strike price of $27.50 costs $1.
- The investor decides to hedge by buying 10 contracts

Speculation Example

AN INVESTOR WITH $2,000 TO INVEST FEELS THAT A STOCK PRICE WILL INCREASE OVER THE NEXT 2 MONTHS. THE CURRENT STOCK PRICE IS $20 AND THE PRICE OF A 2-MONTH CALL OPTION WITH A STRIKE OF 22.50 IS $1

Arbitrage Example

A stock price is quoted as £100 in London and $172 in New York

The current exchange rate is 1.75

You exchange £100 and get $175

You purchase stock for $172 in New York

Sell the stock in London for £100

$3(~£ 1.7) is the profit out of Arbitrage

Open Interest

- Open interest (also known as open contracts or open commitments) refers to the total number of derivative contracts, like futures and options, that have not been settled in the immediately previous time period for a specific underlying security.

- Open interest is a concept all futures traders should understand, because it is often used to confirm trends and trend reversals for futures and options contracts.

- A contract has both a buyer and a seller, so the two market players combine to make one contract. The open interest position that is reported each day represents the increase or decrease in the number of contracts for that day, and it is shown as a positive or negative number

THE RELATIONSHIP BETWEEN THE PREVAILING PRICE TREND AND OPEN INTEREST CAN BE SUMMARIZED BY THE FOLLOWING TABLE;

Price	Open Interest	Interpretation
Rising	Rising	Market is Strong
Rising	Falling	Market is weakening
Falling	Rising	Market is Weak
Falling	Falling	Market is strengthening

Example on Open Interest

Time	Trading Activity	Open Interest
Feb 2	A buys 1 option and B sells 1 option contract	1
Feb 3	C buys 5 options and D sells 5 option contracts	6
Feb 4	A sells his 1 option and D buys 1 options contract	5
Feb 5	E buys 5 options from C who sells 5 options contracts	5

Swaps

INTRODUCTION

INTEREST RATE SWAP

FOREIGN CURRENCY SWAP

Introduction

•SWAPS ARE ARRANGEMENTS IN WHICH ONE PARTY TRADES SOMETHING WITH ANOTHER PARTY

•A SWAP is a derivative in which two counterparties agree to exchange one stream of cash flows against another stream. These streams are called the legs of the swap

The swap market is very large, with trillions of dollars outstanding in swap agreements

- Currency swaps
- Interest rate swaps

Commodity & other swaps - e.g. Natural gas pricing

Interest Rate Swap

An agreement between two parties where one stream of future interest payments is exchanged for another based on a specified principal amount. Interest rate swaps often exchange a fixed payment for a floating payment that is linked to an interest rate.

Typical Characteristics of the Interest Rate Swaps

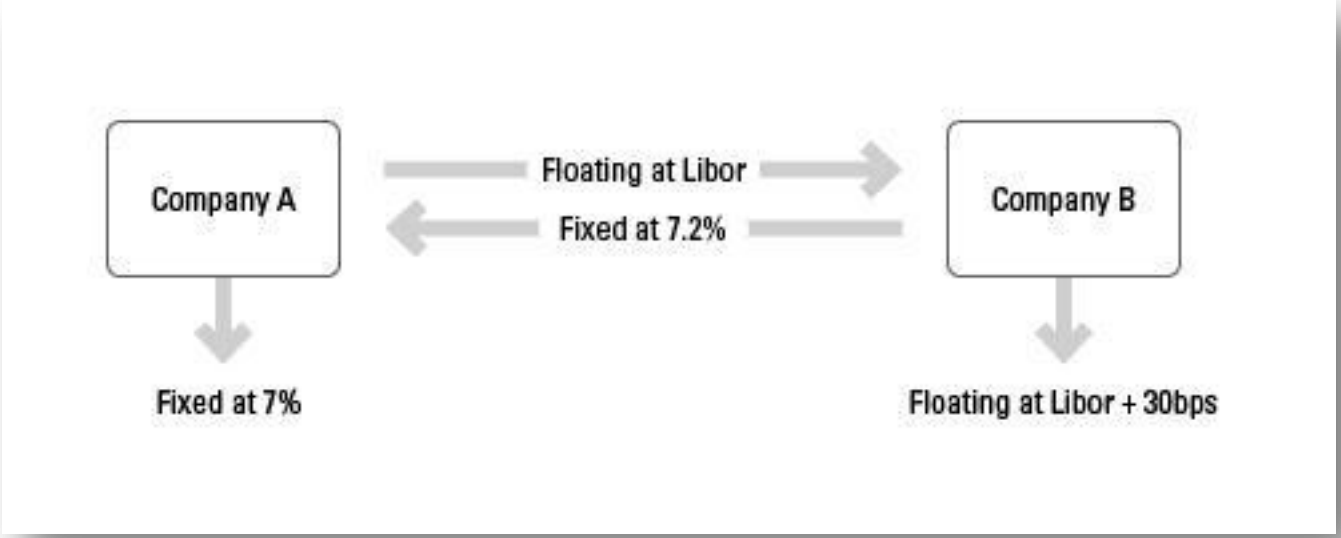
- The principal amount is only notional.
- Opposing payments through the swap are normally netted.
- The frequency of payment reflects the tenor of the floating rate index.

Example: Vanilla Fixed for Floating Interest Rate Swap

FROM A COUNTERPARTY'S PERSPECTIVE, A SWAP CAN BE VIEWED AS TWO SERIES OF CASH FLOWS: OUTFLOWS ARE KNOWN AS THE "PAY LEG" AND INFLOWS ARE KNOWN AS THE "RECEIVE LEG". SUPPOSE THE FOLLOWING SITUATION EXISTS:

Company A	**Company B**
'AA' credit rating	'A' credit rating
can issue fixed debt at 7%	can issue fixed debt at 7.65%
can borrow floating at LIBOR + 10 bps	can borrow floating at LIBOR + 30 bps
believes rates will be stable or falling, wants floating	wants secure funding - fixed debt

THE CURRENT SWAP RATE IS 7.2% VS. LIBOR FLAT. BOTH COMPANIES WILL FIND IT ADVANTAGEOUS TO ENTER INTO THE SWAP, AS ILLUSTRATED BY THE FOLLOWING DIAGRAM:



THE NET FUNDING COST FOR EACH COMPANY CAN BE REPRESENTED AS FOLLOWS:

Company A		Company B	
Pay:	7% fixed	**Pay:**	LIBOR + 30bps
Receive:	7.2% fixed	**Receive:**	LIBOR floating
Pay:	LIBOR floating	**Pay:**	7.2% fixed
Net:	LIBOR - 20bps	**Net:**	7.5% fixed

- Company A effectively borrows floating at LIBOR - 20bps for a net savings of 30bps compared to funding by way of LIBOR directly.
- Company B effectively borrows fixed at 7.5%, a 15bps discount compared to issuing fixed debt at 7.65%.

Currency Swap

A swap that involves the exchange of principal and interest in one currency for the same in another currency. It is considered to be a foreign exchange transaction and is required by law to be shown on the balance sheet.

In a cross currency swap, two firms initially trade one currency for another

Subsequently, the two firms exchange interest payments, one based on a foreign interest rate and the other based on a U.S. interest rate. Finally, the two firms re-exchange the two currencies

EXAMPLE

To further elaborate the modus operandi and underlying fundamentals of a swap transaction we shall discuss a simple ready against six month forward swap. As the first leg of the transaction is in ready therefore it would be executed today at the today prevailing exchange rate. For sake of simplicity we shall make the following assumptions:

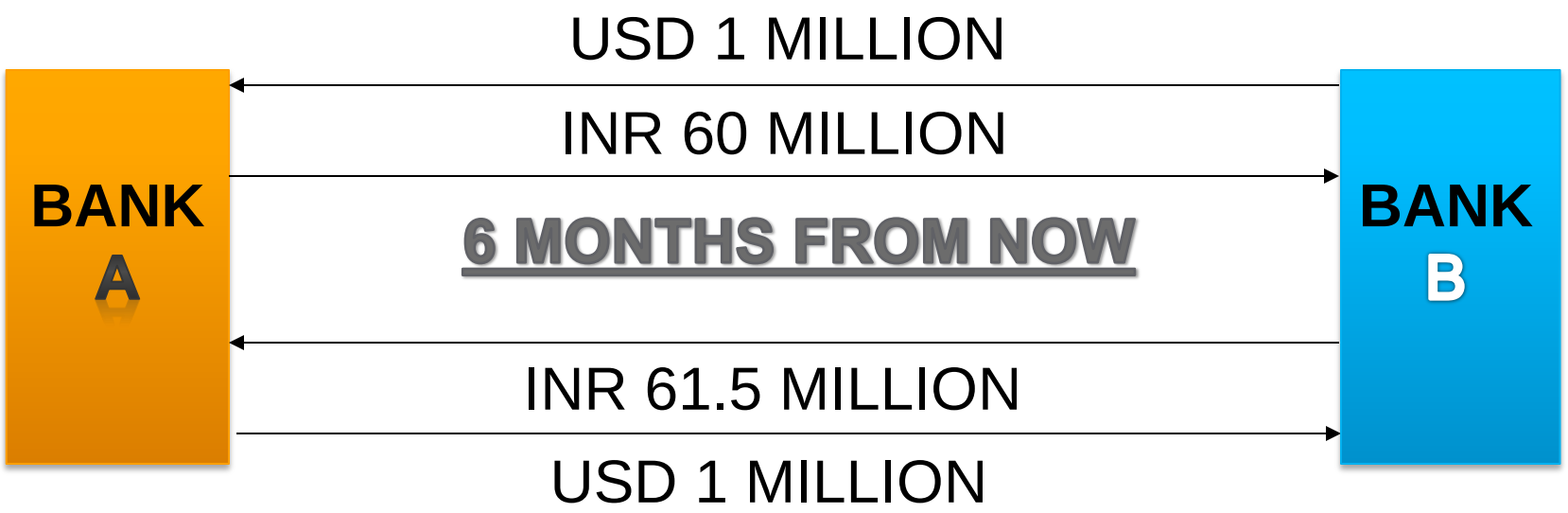
READY USD/INR Rate	60.00
INR 6-month interest rate	7.00%
USD 6-month interest rate	2.00%

EXAMPLE

In order to ensure that no opportunities of arbitrage arise the Therefore, interest rate differential being **(7-2) 5%** the theoretical depreciation in rupee would be **60.00 * 5% * ½** (as interest rates are quoted on annual basis the six months impact would be roughly ½) = **1.5**

This will result in a six month forward rate of **60 + 1.5=61.5**

TODAY


USD 1 MILLION
INR 60 MILLION
BANK A
6 MONTHS FROM NOW
BANK B
INR 61.5 MILLION
USD 1 MILLION

Cross Currency Swap

Cross-currency swaps offer companies opportunities to reduce borrowing costs in both domestic and foreign markets

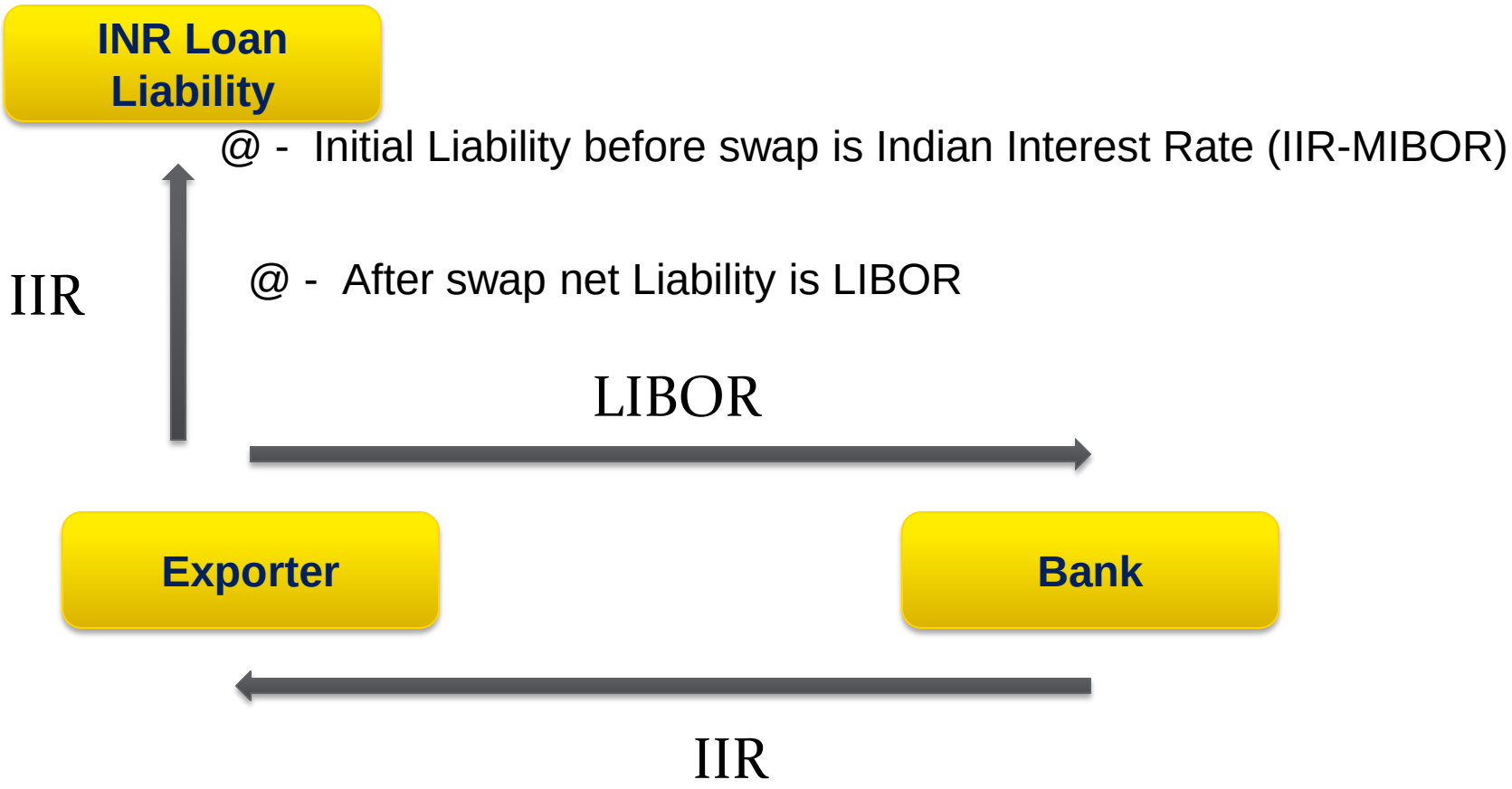
A currency swap involves the exchange of payments denominated in one currency for payments denominated in another. Payments are based on a notional principal amount the value of which is fixed in exchange rate terms at the swap's inception

Cross Currency Swap

Consider a Indian Exporter having exports' proceeds in USD. He / She has a INR(IIBOR) loan liability on its balance sheet and he/she wants to convert this INR liability to USD(LIBOR) liability to exploit the low interest rates as compared to that of INR.

In doing so he/she is taking on exchange risk but with his exports' proceeds in FX he/she has a natural hedge.

Mechanics of a Cross Currency Swap



Uses of Derivatives

RISK MANAGEMENT

INCOME GENERATION

FINANCIAL ENGINEERING

Risk Management

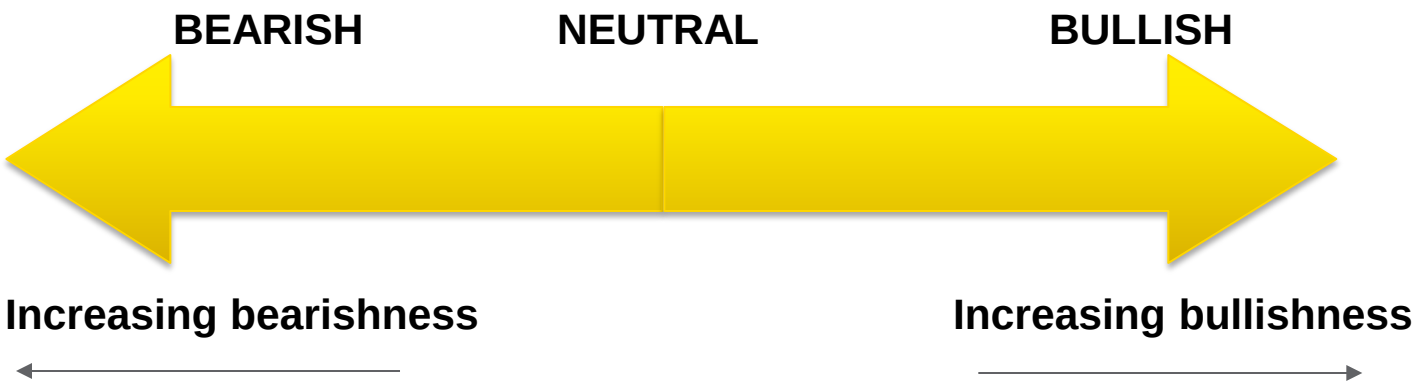
- The hedger's primary motivation is risk management
- Someone who is *bullish* believes prices are going to rise
- Someone who is *bearish* believes prices are going to fall
- We can tailor our risk exposure to any points we wish along a bullish/bearish continuum

Risk Management (cont'd)

FALLING PRICES EXPECTED

FLAT MARKET EXPECTED

RISING PRICES EXPECTED



for a producer
the consumer has the opposite view

Income Generation

WRITING A *COVERED CALL* IS A WAY TO GENERATE INCOME

- **Involves giving someone the right to purchase your stock at a set price in exchange for an up-front fee (the option premium) that is yours to keep no matter what happens**

WRITING CALLS IS ESPECIALLY POPULAR DURING A FLAT PERIOD IN THE MARKET OR WHEN PRICES ARE TRENDING DOWNWARD

Financial Engineering

FINANCIAL ENGINEERING REFERS TO THE PRACTICE OF USING DERIVATIVES AS BUILDING BLOCKS IN THE CREATION OF SOME SPECIALIZED PRODUCT

- **e.g linking the interest due on a bond issue to the price of oil (for an oil producer)**

'FINANCIAL ENGINEERS':

- **Select from a wide array of puts, calls futures, and other derivatives**
- **Know that derivatives are neutral products (neither inherently risky nor safe)**

.....'derivatives are something like electricity: dangerous if mishandled, but bearing the potential to do good'

Arthur Leavitt

Chairman, SEC - 1995

Effective Study of Derivatives

A BROAD RANGE OF INSTITUTIONS CAN MAKE PRODUCTIVE USE OF DERIVATIVE ASSETS:

FINANCIAL INSTITUTIONS

- **Investment houses**
- **Asset-liability managers at banks**
- **Bank trust officers**
- **Mortgage officers**
- **Pension fund managers**

CORPORATIONS - OIL & GAS, METALS, FORESTRY ETC.

INDIVIDUAL INVESTORS/SPECULATORS

References

INVESTOPEDIA – http://www.investopedia.com

INVESTMENT FAQ – http://www.invest-faq.com

INVESTOR WORDS – http://www.investorwords.com

Questions

Thank You