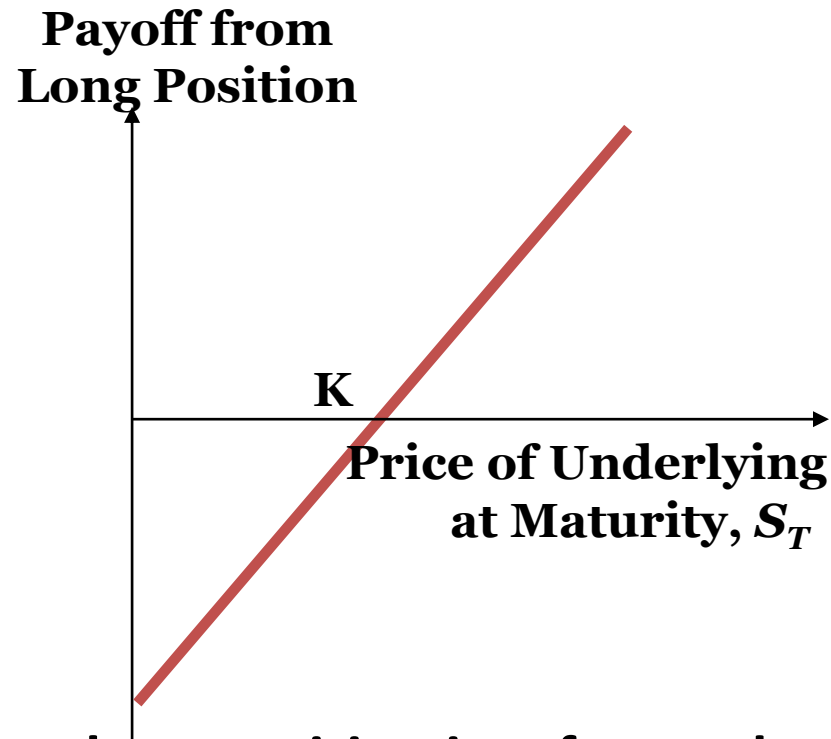


PAYOFF AND HEDGING

Objective

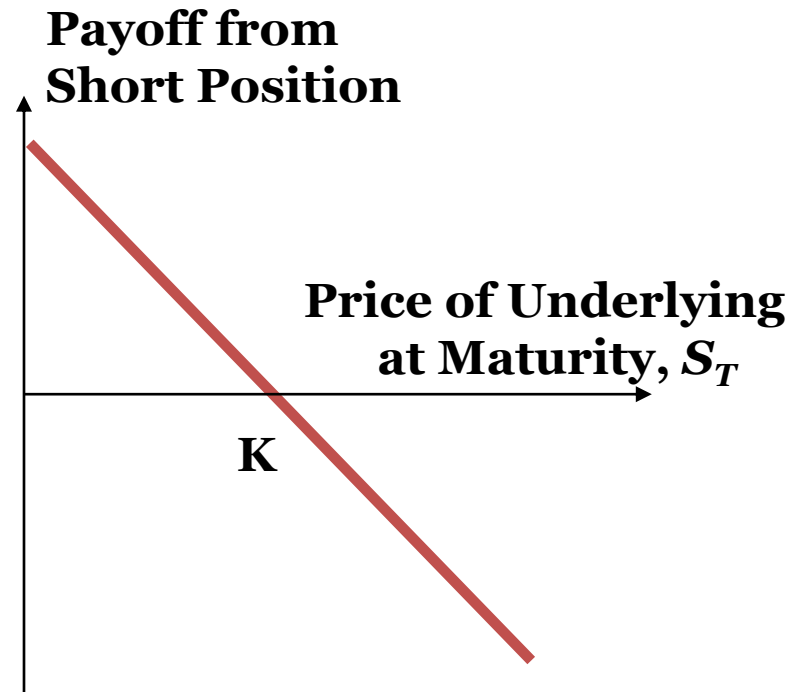
The use of futures as a tool for hedging has been explained in this chapter. The payoffs of futures and their application as long and short hedge have been elaborated.

Payoff from Long Forward contracts



The payoff from a long position in a forward contract on one unit of an asset = $S_T - K$ (K = delivery price, S_T = Price of the underlying security at maturity)

Payoff from Short Forward contracts



The payoff from a short position in a forward contract on one unit of an asset = $K - S_T$ (K = delivery price, S_T = Price of the underlying security at maturity)

Hedging using Forward Contracts

- Suppose that it is June 15, 2012, and Import Junction, a company based in the India, knows that it will pay \$ 10 million on September 15,2009, for goods it has purchased from a US supplier.
- The USDINR exchange rate quotes made by a financial institution are known.
- Import Junction can hedge its foreign exchange risk by buying DOLLAR(USD) from the financial institution in the three-month forward market at 52.00.
- This would have the effect of fixing the price to be paid to the US exporter at Rs. 52,00,00,000.

Hedging using Forward Contracts

- Consider next another Indian company, which we will refer to as Export Junction, that is exporting goods to the United States and on June 15, 2012, knows that it will receive \$10 million three months later.
- Export Junction can hedge its foreign exchange risk by selling \$10 million in the three month forward market at an exchange rate of 52.00.
- This would have the effect of locking in the U.S. dollars to be realized from the sterling receipts at Rs.52,00,00,000.

Hedging using Forward Contracts: Issues

- **For Import Junction:**

- If the exchange rate is 50.00 on September 15 and the company has not hedged, the \$10 million that it has to pay will cost Rs.50,00,00,000, which is less than Rs.52,00,00,000
- If the exchange rate is 54.00, the trade will cost \$54,00,00,000

- **For Export Junction the outcomes are reverse:**

- If the exchange rate on September 15 proves to be less than 52.00, hedging would give better result
- If the rate is greater than 52, it will be pleased that it had not hedged

Hedging using Futures

Long Hedge

Short Hedge

Long Hedge

- Long hedge is undertaken when a trader anticipates the need to buy an asset in future and wants to lock in a price
- The trader undertakes a long futures contract when he anticipates the need to buy in future. Later he shorts the same contract on the date when he buys in the spot market

Long Hedge: An Example

- At Aug 15, a petroleum product producer has negotiated a contract to **buy** 100 barrels of crude oil. The price that will apply in the contract is market price on Dec 15.
- The producer:
 - Gain Rs. 100 for each 1 Re. decrease in the price of oil over the next three months
 - Lose Rs. 100 for each 1 Re. increase in the price during this period
- Spot price on Aug 15 is Rs. 5000 per barrel
- December crude oil futures price on the MCX is Rs. 5030 per barrel
- Each futures contract on MCX is for the lot size of 100 barrels
 - The company can hedge its exposure by taking **long position** in 1 Dec futures contract
- **If the oil producer closes out its position on Dec 15, the effect of the strategy should be to lock in a price close to Rs. 5030 per barrel**

Long Hedge: An Example

Case 1:

- Let spot price of oil on Dec 15 be Rs. 5100, which is > future contract price
- The company buys oil by paying Rs. 5030
- On that date co's gain from futures position
= $5100 - 5030 = \text{Rs. } 70 * 100 = \text{Rs. } 7000$

Long Hedge: An Example

Case 2:

- Let spot price of oil on Dec 15 is Rs. 4900 < future contract price
- The company buys oil by paying Rs. 5030
- On that date co's loss from futures position
= $4900 - 5030 = -\text{Rs. } 130 * 100 = -\text{Rs. } 13000$

Hedging using Futures

Long Hedge

Short Hedge

Short Hedge

- Short hedge is undertaken when a trader anticipates the need to sell an asset in future and wants to lock in a price
- The trader undertakes a short futures contract when he anticipates the need to sell in future. Later he goes long on the same contract on the date when he sells in the spot market

Short Hedge: An Example

- At Aug 15, an oil producer has negotiated a contract to **sell** 100 barrels of crude oil. The price that will apply in the contract is market price on Dec 15.
- The oil producer:
 - Gain Rs. 100 for each 1 Re. increase in the price of oil over the next three months
 - Lose Rs. 100 for each 1 Re. decrease in the price during this period
- Spot price on Aug 15 is Rs. 5000 per barrel
- Dec crude oil futures price on the MCX is Rs. 5030 per barrel.
- Each futures contract on MCX is for the lot size of 100 barrels.
 - The company can hedge its exposure by **shorting** 1 Dec futures contract.
- **If the oil producer closes out its position on december 15, the effect of the strategy should be to lock in a price close to Rs. 5030 per barrel.**

Short Hedge: An Example

Case 1:

Let spot price of oil on Dec 15 be Rs. 4900 which is < future contract price

- The company sells at Rs. 5030
- On that date co's gain from short futures position = $5030 - 4900 = \text{Rs. } 130 * 100 = \text{Rs. } 13000$

Short Hedge: An Example

Case 2:

- Let spot price of oil on Dec 15 is Rs. 5100 which is $>$ future contract price
- The company sells at Rs. 5030
- Because Dec is the delivery month for futures contract, the future price on Dec 15 should be very close to spot.
- On that date co's loss from short futures position
 $= \text{Rs } 5030 - \text{Rs } 5100 = - \text{Rs } 70 * 100 = - \text{Rs } 7000$