# MN50412

Lecture 7: Derivatives

### Derivatives

- A financial Instrument whose payoff is 'derived' from the behaviour of a separately traded commodity or financial instrument.
- eg futures contracts on sugar.
- Eg call options (on company shares).

#### Derivatives: Double-edged Sword!!!

- They can be used by traders/corporations/IBs/ to hedge/manage/reduce risk
- But they can be used to speculate/increase risk
- Risk <sup>†</sup> expected return <sup>†</sup> ?
- Or: win when things go well, but extreme losses in the bad times!

# Hedging Foreign Exchange Risk

- Act of reducing forex risk by undertaking an offsetting transaction in the derivatives market.
- Eg a British firm long in dollars: risk <u>losing</u> if value of dollar falls.
- Therefore hedges by taking out a contract in a derivative market that gains if the value of the dollar falls

# Forms of exposure to exchange rate risk

- British exporting company, selling in the US: contracted to supply goods over the next year.
- Payment to be received in US dollars within a stated period after delivery of the goods.
- UK firm bases its selling sterling price on current UK production costs.
- Must assume an exchange rate to convert into dollar prices
- Long in dollars (has net assets in dollars = future payments to be received in dollars).
- Risk: foreign currency will weaken.

# Firms' risk management

- Internal: accounting systems, payment and invoicing procedures.
- External: development of new financial instruments and markets to help firms offset forex risk.
- Eg Forward exchange markets, derivatives markets (futures and options), swap deals...

## Forward exchange markets

 UK firm selling in the US estimates when it will receive dollar payments. UK firm sells those dollars forward at an exchange rate agreed now => locks in current exchange rates => form of insurance against exchange rate changes.

## **Derivatives Markets**

- Financial derivatives markets have grown over the last 35 years.
- Derivatives contracts: promise to deliver underlying products at some time in the future at price agreed now (futures)
- Options: Right (but not obligation) to buy or sell products (usually shares) at price agreed now.

## **Financial Futures**

- Legally binding agreements to deliver, or take delivery of, a commodity or a financial instrument at some specified future date.
- Eg Sterling Futures contract (see box 9.1 in the chapter).
- Futures can be traded.
- Financial futures may be traded by speculators (speculating on changes in instruments without actually buying the underlying).

## Speculation.

- Speculators may trade financial instruments, hoping to profit from future rises or falls in interest rates, exchange rates, or stock prices.
- Eg: speculator thinks interest rates likely to rise, goes short in share options (why?)
- Derivatives: hedging versus speculation.
- Safe Versus dangerous? Nick Leeson: Barings Bank.

# Options

- Options traded in an options exchange (similar to shares traded on the stock exchange)
- Option is a contract: Writer of an option (initial seller): holder (buyer)
- Call option gives the holder the right (but not the obligation) to buy an underlying share at a specified time in the future (maturity date) at a price agreed now (exercise price or strike price)
- Put option: gives the holder the right (but not the obligation) to *sell* an underlying share at a specified time in the future (maturity date) at a price agreed now (exercise price or strike price)

## **Payoff Profiles**



Short-selling: borrowing shares from a broker to sell now: must buy them back later to give back to him: therefore: you gain if shares go down: lose if shares go up!

## Options.



# **Combining options**



### Upside down Straddle



#### **Risk-free**

- Also possible to combine options to get risk-free (hedging)
- But low return.
- Put-call parity S + P = B + C
- => S + P C = B.

# Value of an option

- Intrinsic value of an option: Profit available from immediately exercising an option (exercise price versus mkt price of underlying).
- At-the-money (no profit available from immediate exercise: intrinsic value =0)
- In the money (intrinsic value positive)
- Out of the money: (intrinsic value negative)

# **Exotic Options**

- Barrier options
- Credit risk derivatives
- Lookback options
- Asian Options
- Options on options
- Flex options

## Use and Abuse of derivatives

- Policy Debate
- Derivatives allow hedging of risk:
- But also attract speculators.
- Barings Bank: Nick Leeson
- LTCM (Long-term Capital Management)
- Nobel Prize-winning economists (Black, Scholes, Merton) => bankrupted LTCM by their derivatives-trading!

# Advantages of Derivatives

- Facilitate hedging.
- Information revelation/price discovery (efficient markets?)
- Standardisation of financial instrument contracts.
- Integration of global capital markets.
- Reduce adverse effects of volatile commodity markets (especially in developing countries.
- Facilitate speculation, increasing liquidity

# Speculation

- Complexity: difficult to regulate
- Spectacular losses in individual companies and banks.
- Stock mkt crash 1987: derivative trading to blame?
- Barings: bankrupted in 1995 by its star trader Nick Leeson.
- Leeson was running a hedged position in futures on the Japanese Nikkei SE index.

# Barings (continued)

- Leeson aimed to make money by arbitrage:
- Different prices on the Singapore and Osaka exchanges.
- Stopped hedging: instead built up positions in futures and options in Nikkei 225 (speculating) 1992 - 1995
- Initially, highly profitable for Barings

# Barings (continued)

- Leeson's gamble: that mkt would not be very volatile.
- Gains if index remained stable, losses if index very volatile.
- 1994: stable => fine!
- 1995: large Kobe earthquake: plus investor sentiment turned against Japanese mkts: => index ↓
- Barings bankrupted!
- LTCM.