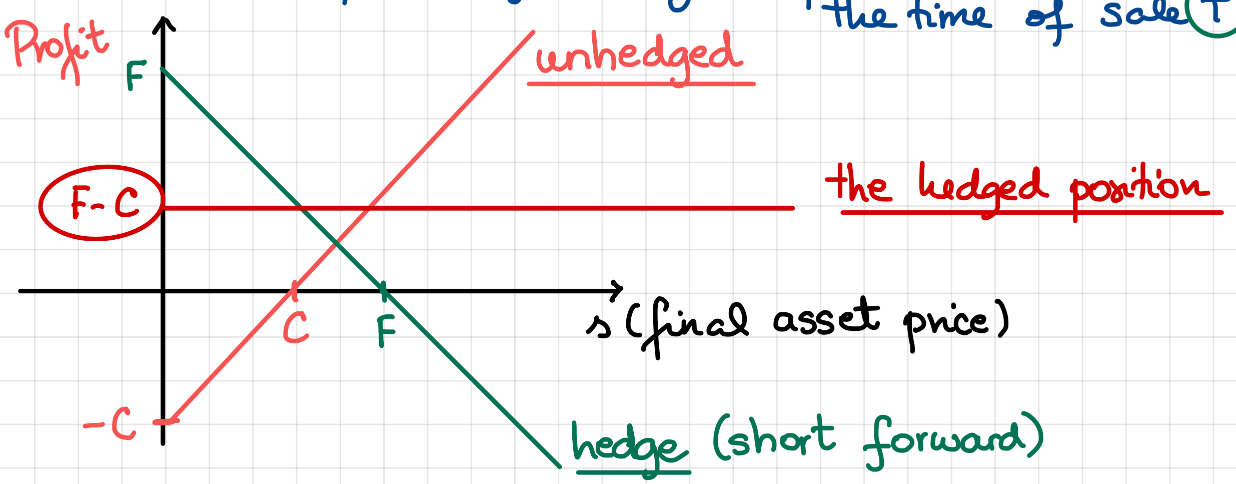
M339D: March 5^{th}, 2021.

Hedging Using Forward Contracts.

Producer of a good.

C... total aggregate cost of production per unit of good valued @ the time of sale T

S(T)... the market price of the good per unit @ the time of sale T



The appropriate hedge allows you to sell forward, i.e., you short a forward contract w/ delivery date T and with some F as the forward price

Assume $F > C$.

The combination of the unhedged position and the hedge is the total hedged position.

Algebraically:

$$\text{Profit(Total hedged)} = \text{Profit(Unhedged)} + \text{Profit(Hedge)}$$
$$= \cancel{S(T)} - C \quad + F - \cancel{S(T)}$$
$$= F - C$$

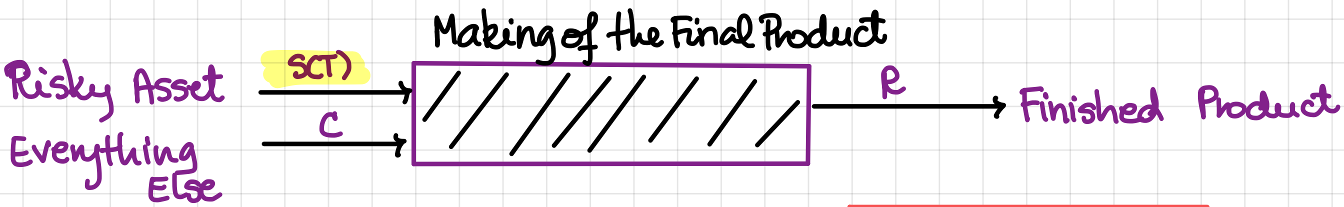
User/Buyer of Goods (to use as raw material).

fixed and deterministic:

C… the total aggregate costs of production of some final product without the underlying asset valued @ time·T when the underlying asset is needed & purchased

R… "revenue".. the price @ which the user of goods can sell their final product valued @ time·T

$S(T)$… the market price @ a temporarily fixed time·T of the underlying asset



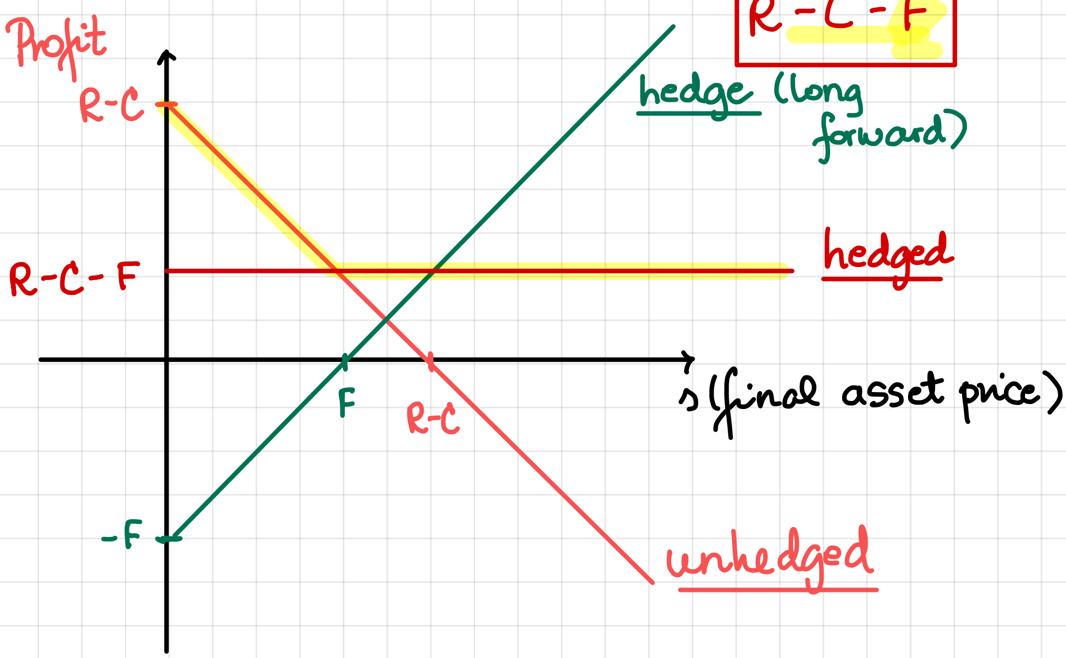
The Bottom Line @ Time·T : $\boxed{R - C - \cancel{S(T)}}$ unhedged

The appropriate hedge is the LONG FORWARD (BUY FORWARD):

$\boxed{\cancel{S(T)} - F}$ hedge

$\boxed{R - C - F}$ total hedged position

Assume : $F < R - C$

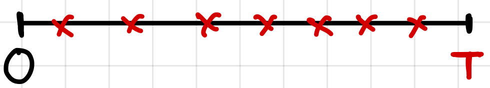


European Call Options.

Usually, the option's owner is NOT OBLIGATED to exercise the option.

The option can be EXERCISED, i.e., the cashflow can be collected only on a fixed EXERCISE DATE.

Usually, this means it's a RIGHT to BUY the underlying asset.



Option WRITTEN. EXERCISE DATE

At time 0:
- The writer of the call option is said to write/short the call.
- The other party is said to long the call; they will be referred to as the call's owners.
- They agree on:
  - the underlying asset: $S(t), t \geq 0$
  - T... exercise date
  - K... the STRIKE/EXERCISE PRICE

At time T:
- The call's OWNER has a RIGHT, but not an obligation to BUY one unit of the underlying for the strike price.
- The call's WRITER is OBLIGATED to do what the call's owner opts for.

Questions:

Q: What's the structure of the payoff in terms of the final price of the underlying and the strike price?

Q: Is there anything else that should take place @ time 0?