M339D: March 1st, 2021.

Payoff. Profit [cont'd].

Example. [Fully-Leveraged Purchase]

We want to invest borrowed money in one share of continuous-dividend-paying stock.

At time-0:

- borrow $S(0)$ @ the ccrfir (r) to be repaid in full @ time-T
- buy one share of the continuous-dividend-paying stock

Initial Cost: $-S(0) + S(0) = 0$

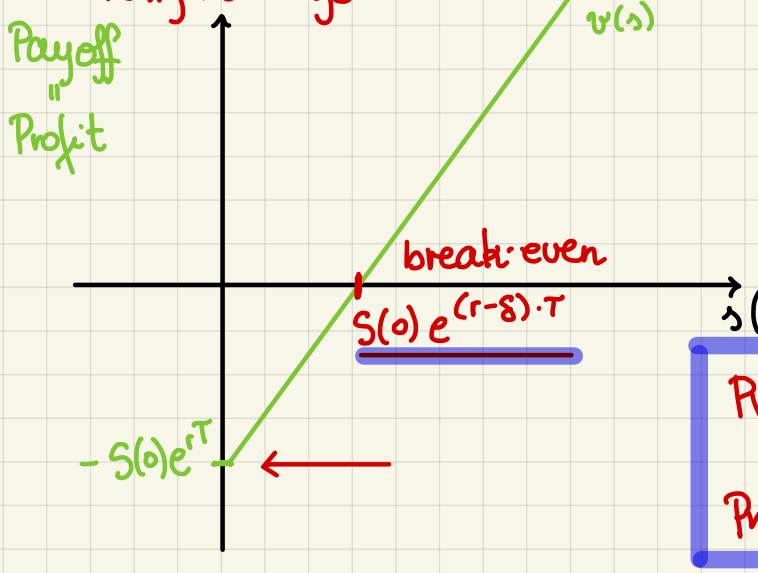
At time-T:

- pay back $S(0)e^{r \cdot T}$
- own $e^{\delta \cdot T}$ shares of stock $\Rightarrow$ the worth of these shares is $\boxed{e^{\delta \cdot T} \cdot S(T)}$

Payoff: $-S(0)e^{rT} + e^{\delta \cdot T} \cdot S(T)$

$\Longrightarrow$ **Profit = Payoff** $= e^{\delta \cdot T} \cdot S(T) - S(0)e^{rT}$

Fully Leveraged



Payoff function:

$v(s) = e^{\delta \cdot T} \cdot s - S(0)e^{rT}$

Long position w.r.t. the underlying

$\boxed{\begin{array}{c}\text{Profit (Outright purchase)} \\ = \\ \text{Profit (Fully Leveraged purchase)}\end{array}}$

Basic Risk Management.

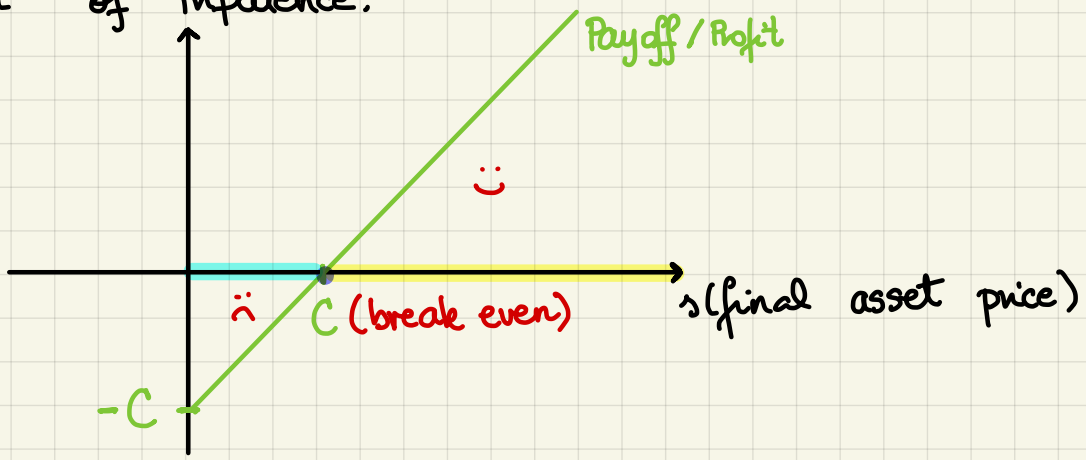
Hedging Motivation.

Example. [PRODUCER OF A GOOD].

e.g.,
- farmers producing soy beans, peanuts, corn, ...
- mining company excavating: gold, silver, ...
- oil company extracting crude oil
- factories making "widgets", "verges", ...

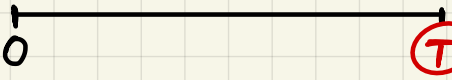
(C) deterministic total aggregate fixed and variable costs valued @ the time of sale of the good

(If) the producer sells the good in the market, they get exactly the market price. This value is outside of their area of influence.



Forward Contract.

* A binding contract on both sides! *



... delivery date (when cash is exchanged for the underlying)

Handshake!

An agreement:

- underlying asset
- the quantity (for us: 1 unit)
- the type of settlement < physical (logistics!) / cash
- T... delivery date
- (F) ... forward price

On the delivery date:

LONG FORWARD : BUYING FORWARD

+S(T) 1 unit of asset ↑ ↓ forward price F

SHORT FORWARD : SELLING FORWARD

Payoff(Long Forward) = S(T) - F
Payoff(Short Forward) = F - S(T)

} Negatives of each other!

For any contingent claim (CC):

Payoff (long CC) = - Payoff (short CC)