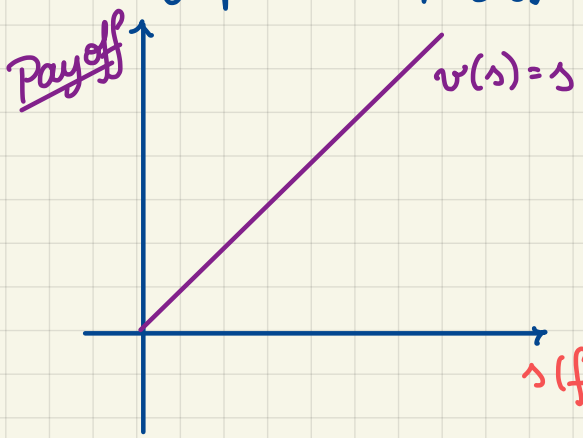
09/30/2022

=> In the example w/ the outright purchase, we have

$v(s) = s$ identity function

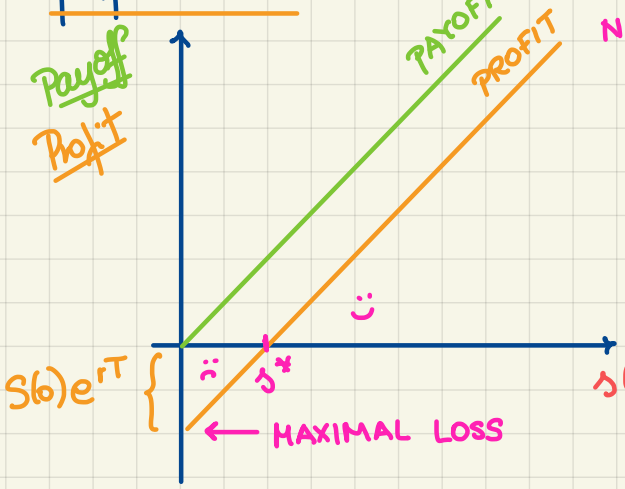
When we graph the payoff function, we get the payoff curve (or the payoff diagram).



In general, the profit function is: $v(s) - FV_{0,T}(\text{Init. Cost})$

Outright Purchase: $s - S(0)e^{rT}$

=> The profit curve:



NO UPPER BOUND, i.e., unlimited growth potential

s^*... break-even point

Here: $s^* = S(0)e^{rT}$

The payoff and profit curves are increasing.

Terminology: If the payoff/profit is increasing (not necessarily strictly) as a function of the final asset price s, we say that the portfolio is long with respect to the underlying asset.

Example. [A Short Sale of a Non-Dividend-Paying Stock]

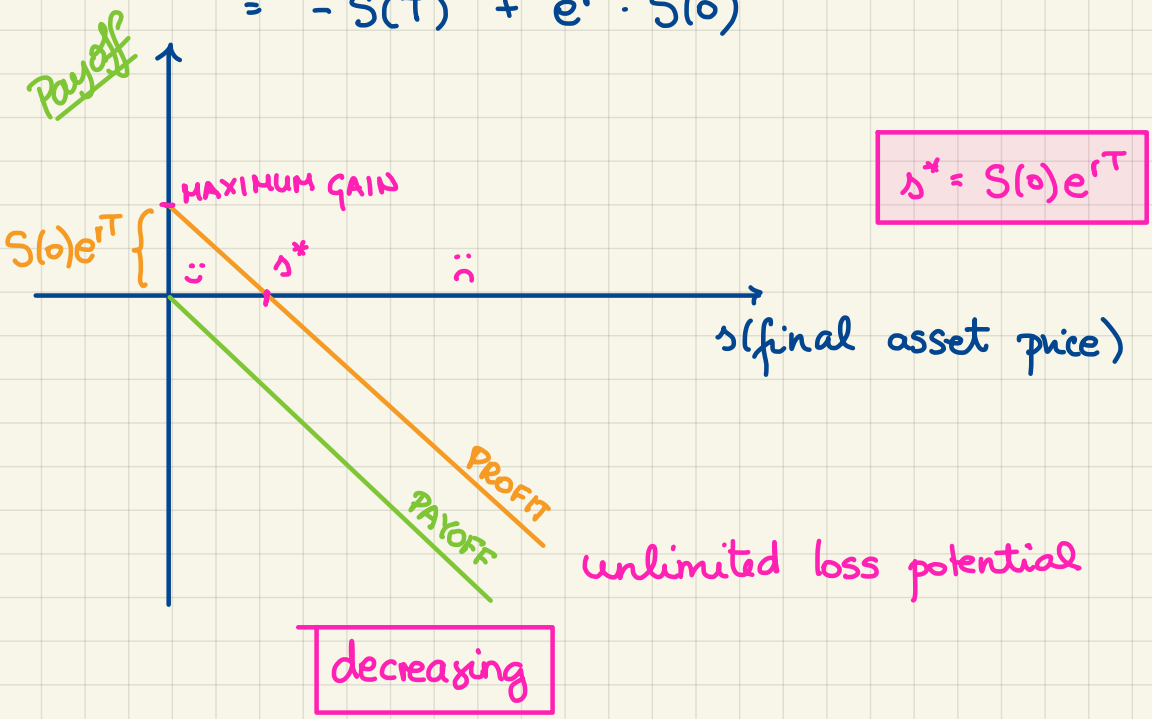
At time-0: The short seller receives $S(0)$.

$\Rightarrow$ Initial Cost: $-S(0)$

At time-T: The short seller spends $S(T)$.

$\Rightarrow$ Payoff: $-S(T)$

$$\text{Profit} = \text{Payoff} - FV_{0,T}(\text{Initial Cost})$$
$$= -S(T) + e^{rT}(+S(0))$$
$$= -S(T) + e^{rT} \cdot S(0)$$



$s^* = S(0)e^{rT}$

unlimited loss potential

decreasing

The short sale is short w.r.t. the underlying.

Basic Risk Management.

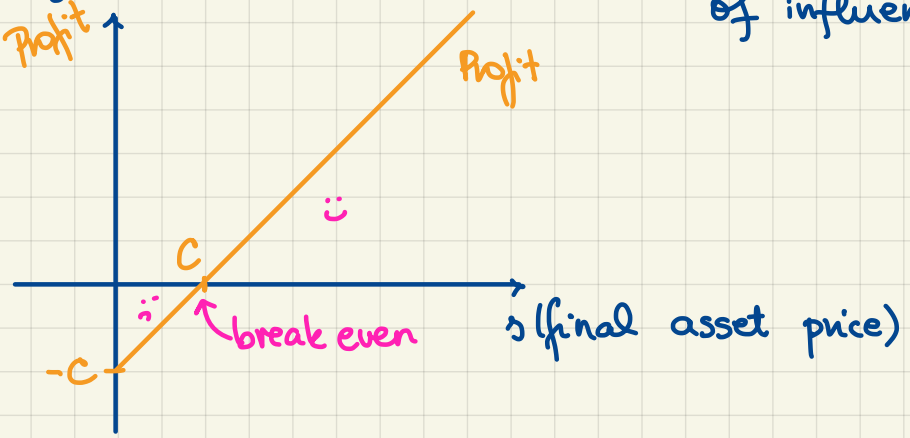
Hedging Motivation.

Example. [Producer of Goods]

- factory producing laptops
- farmers producing apples, oranges, peanuts, ...
- mining ore
- factories making "widgets", "verges", ...

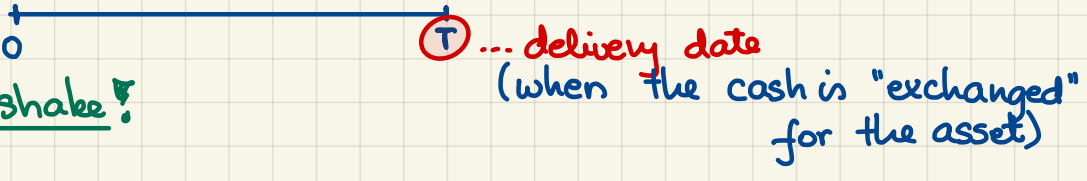
C.. deterministic total aggregate fixed and variable costs of production valued @ the time of sale of the good, i.e., time T

If the producer sells their goods in the market, they get the market price. This is outside of their domain of influence.



Forward Contract.

* A binding contract on both sides! *



Handshake!

An agreement:

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