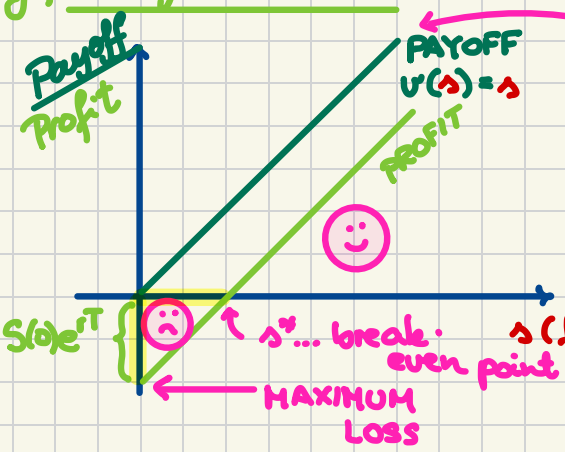
M339D: September 15th, 2025.

Analysis of the Profit Curve.

e.g., Outright Purchase



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

The payoff/profit curves are increasing. (not necessarily strictly)

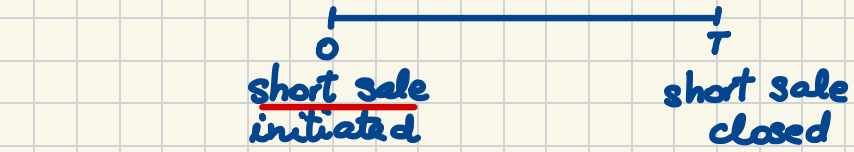
Def'n. A function $f: \mathbb{R} \to \mathbb{R}$ is increasing if for all $x_1 \leq x_2 \Rightarrow f(x_1) \leq f(x_2)$

Terminology

If the payoff/profit is increasing (not necessarily strictly) as a f'tion of the final asset price s, we say that the portfolio is

long with respect to the underlying asset.

Short Sales.

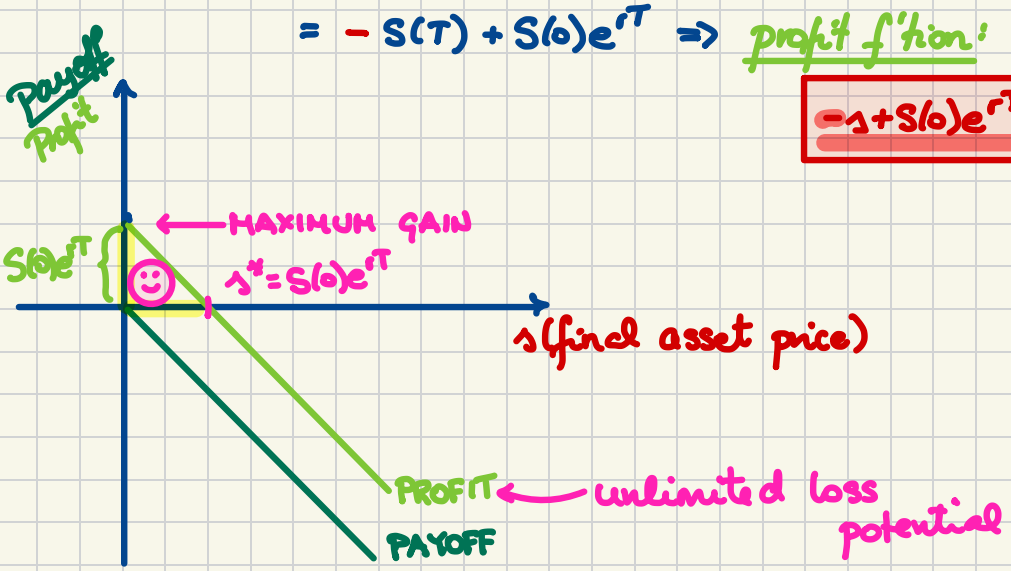


Initial Cost: $-S(0)$

Payoff: $-S(T)$ $\Rightarrow$ payoff f'tion: $v(s) = -s$

Profit $= -S(T) + FV_{0,T}(+S(0))$

$= -S(T) + S(0)e^{rT}$ $\Rightarrow$ profit f'tion: $-s + S(0)e^{rT}$



The payoff/profit is decreasing,

i.e., the short sale is short with respect to the underlying.

Problem 3.2. To plant and harvest 20,000 bushels of corn, Farmer Jayne incurs total aggregate costs totaling $33,000. The current spot price of corn is $1.80 per bushel. What is the profit if the spot price is $1.90 per bushel when she harvests and sells her corn?

(a) About $3,000 gain
(b) About $3,000 loss
(c) About $5,000 loss
(d) About $5,000 gain
(e) None of the above

Solution: (d)

$$1.90 \cdot 20,000 - 33,000 = 5,000$$

deterministic and valued @ time T (e.g., harvest time)

Hedging Motivation.

Example **Producer of Goods.**

- farmers producing corn, soy beans, peaches, ...
- crude oil
- ore mining
- "widgets"

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