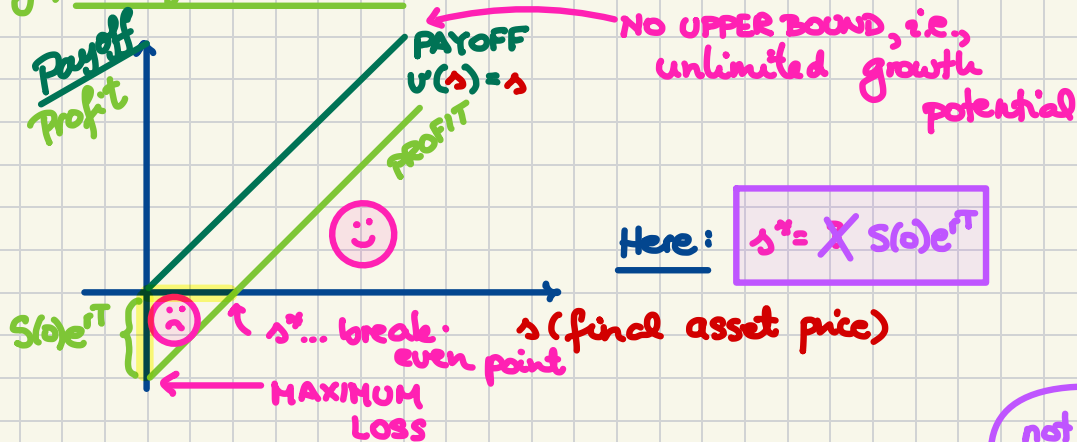


M339D: September 15<sup>th</sup>, 2025.

## Analysis of the Profit Curve.

e.g., Outright Purchase



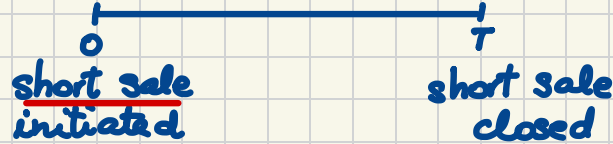
The payoff/profit curves are increasing.

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

### 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.

## Short Sales.



Initial Cost:  $-S(0)$

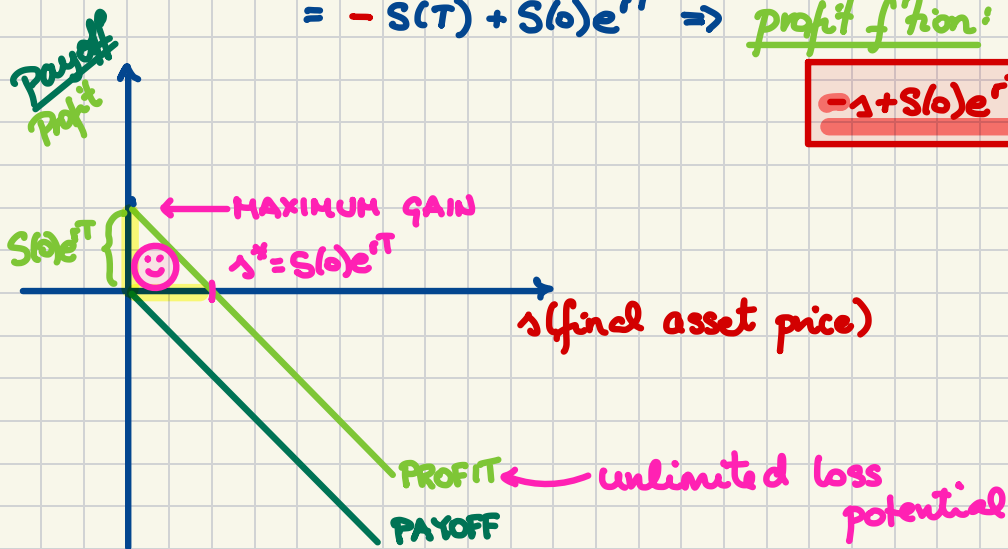
Payoff:  $-S(T)$   $\Rightarrow$  payoff f'n:

$$v(s) = -s$$

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

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

$$-s + S(0)e^{rT}$$



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.

