M339D: February 6th, 2026.

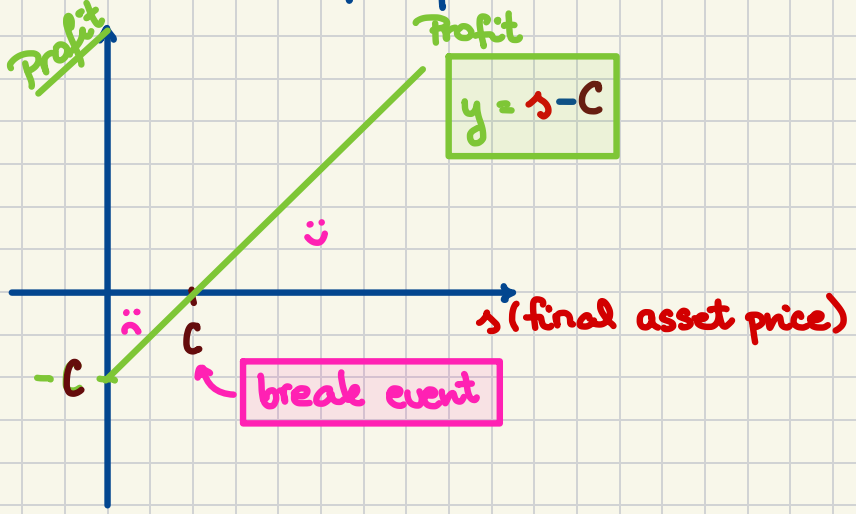
Hedging Motivation.

Example. Producer of Goods.

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

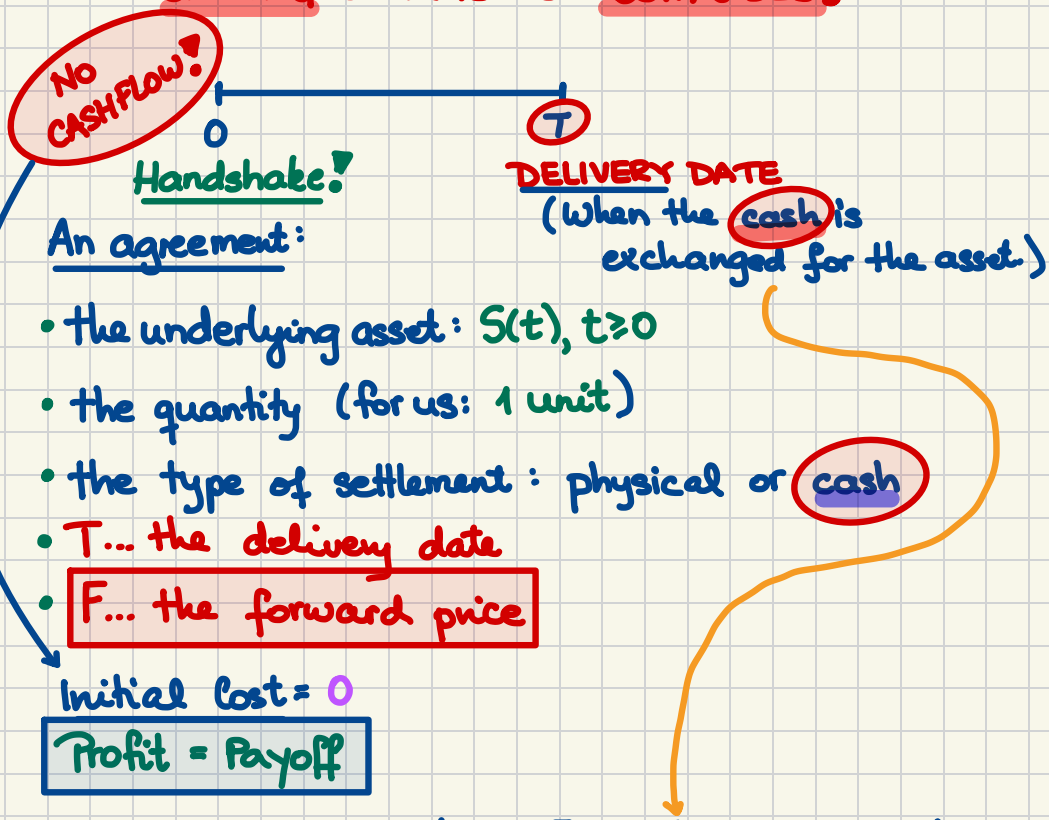
C... deterministic, total aggregate fixed and variable costs of production valued @ the time of sale, i.e., @ time-T

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



Forward Contracts.

* A BINDING CONTRACT ON BOTH SIDES! *



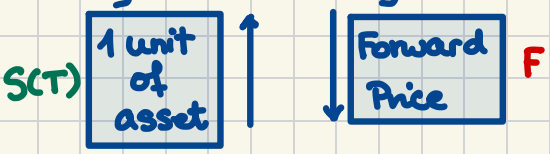
An agreement:

- the underlying asset: $S(t)$, $t \geq 0$
- the quantity (for us: 1 unit)
- the type of settlement: physical or cash
- T... the delivery date
- F... the forward price

Initial cost = 0

Profit = Payoff

Long Forward: Buy Forward

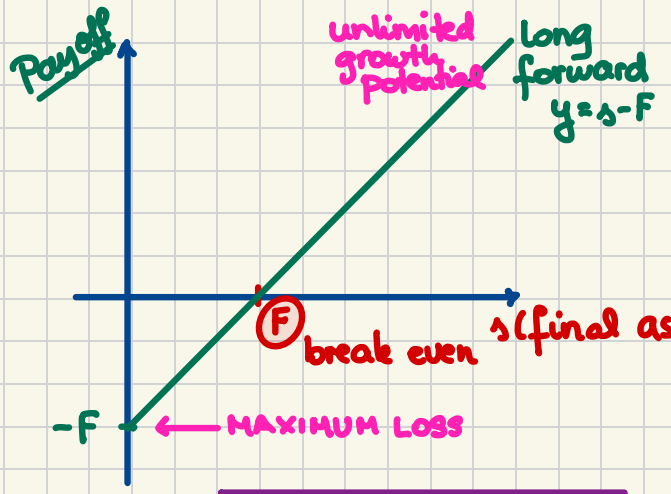


Short Forward: Sell Forward

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

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

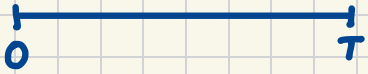
Payoff F'tion: $v(s) = s - F$



A long forward is a LONG position w.r.t. the underlying

Problem. **Sample SOA Problem.**

Determine which of the following portfolios have the same cashflows as a SHORT SALE of a non-dividend-paying stock.



Initial Cost: $\underbrace{-S(0)}_{<0}$ Payoff: $\underbrace{-S(T)}_{<0}$

X (i) long forward and a long zero-coupon bond

Idea 1: Payoff $\xrightarrow[s\to\infty]{} \infty$

Idea 2: Initial Cost: Price of bond >0

X (ii) long forward and a short forward

Initial Cost = 0

(iii) long forward and a short zero-coupon bond

	Initial Cost	Payoff
Long Forward	0	$S(T) - F$
Short Bond	$-P$	$-Pe^{rT}$
Total	$-P$	$S(T) - F - Pe^{rT}$

Q: Are there F and P such that the cashflows match w/ the short sale one?