

Fully leveraged Purchase

- At time 0:
- borrow $S(0)$ @ the risk-free interest rate to be paid back in full @ time T ✓
 - buy one share of cont. div. paying stock

\Rightarrow Init. cost : $-S(0) + S(0) = 0$

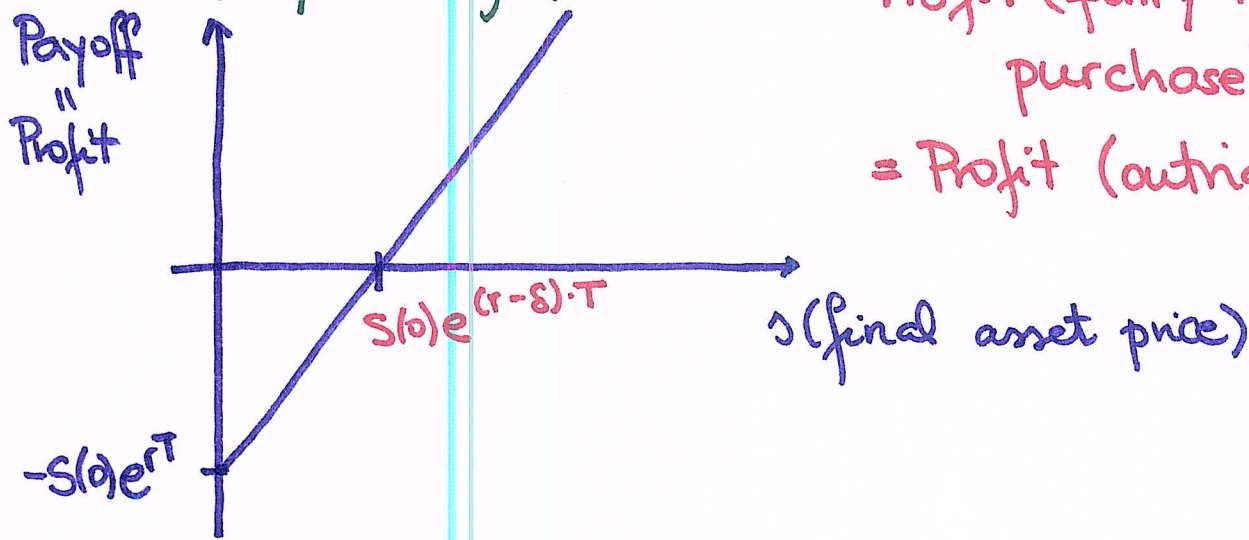
Fully leveraged ∴

- At time T:
- pay back $S(0)e^{rT}$
 - own $e^{\delta T}$ shares of stock; the worth of these shares is $e^{\delta T} S(T)$

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

\Rightarrow Profit $\stackrel{\uparrow}{=} \text{Payoff} = e^{\delta T} S(T) - S(0)e^{rT}$

Fully leveraged



Profit (fully leveraged purchase) =
= Profit (outright purchase)

Hedging Motivation.

Example. PRODUCER OF GOODS.

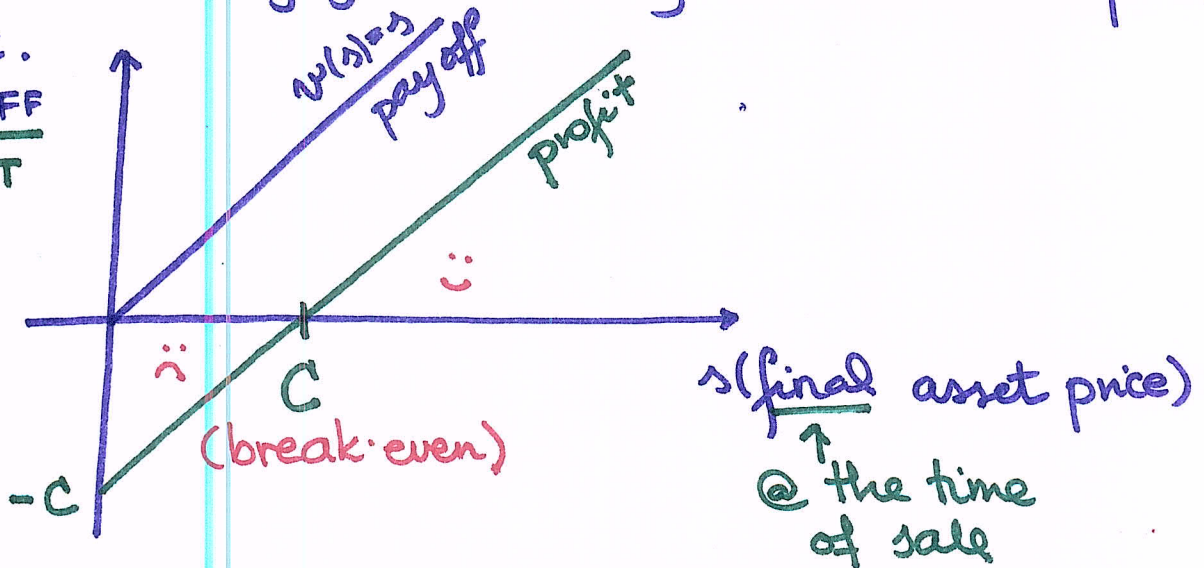
- e.g.
- farmers producing corn, wheat, soy beans, ...
 - oil companies extracting crude oil
 - mining companies : gold, silver, ...
 - factory making "widgets"

C ... deterministic

total aggregate fixed and variable costs valued @ the time of sale of the final product

(If) the producer sells the final product in the market, they get exactly the market price per unit.

PAYOFF
PROFIT



Example. USER or PURCHASER of GOODS

Forward Contracts.

* A binding contract for both sides! *

HANDSHAKE!

i.e., An agreement:

- the underlying asset
- the quantity
- settlement $\begin{cases} \text{physical} \Rightarrow \text{logistics} \\ \text{cash} \end{cases}$
- T... the delivery date
- F... the forward price

No cashflow @ time - 0!

\Rightarrow Initial cost (forward) = 0

Payoff = ?

LONG FORWARD: BUYING FORWARD
1 unit of asset \uparrow forward price
 $+S(T)$ \downarrow F

SHORT FORWARD: SELLING FORWARD

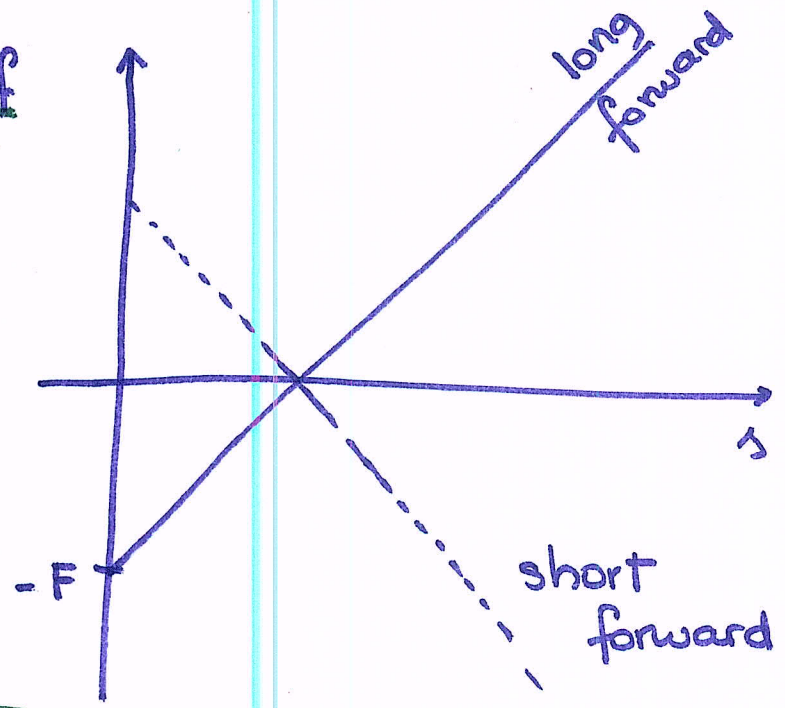
$$\left. \begin{aligned} \text{Payoff (LONG FORWARD)} &= S(T) - F \\ \text{Payoff (SHORT FORWARD)} &= F - S(T) \end{aligned} \right\}$$

Negatives of each other!

For any position / option P:

$$\text{Payoff (long position P)} = -\text{Payoff (short position P)}$$

Payoff
Profit



$$v(s) = s - F$$

Profit \equiv Payoff
 \uparrow
Init. cost = 0

67.

Consider the following investment strategy involving put options on a stock with the same expiration date.

- i) Buy one 25-strike put
- ii) Sell two 30-strike puts
- iii) Buy one 35-strike put

Calculate the payoffs of this strategy assuming stock prices (i.e., at the time the put options expire) of 27 and 37, respectively.

- (A) -2 and 2
- (B) 0 and 0
- (C) 2 and 0
- (D) 2 and 2
- (E) 14 and 0

68.

For a non-dividend-paying stock index, the current price is 1100 and the 6-month forward price is 1150. Assume the price of the stock index in 6 months will be 1210.

Which of the following is true regarding forward positions in the stock index?

- (A) Long position gains 50
- (B) Long position gains 60
- (C) Long position gains 110
- (D) Short position gains 60
- (E) Short position gains 110

$$\begin{aligned} \text{Payoff of the long forward} &= \\ &= S(T) - F \\ &= 1210 - 1150 = 60 \end{aligned}$$