02/02/2018.

Short Sales.

* continuous dividends *

δ ... dividend yield

$0 \longleftrightarrow T$

Init. Cost:

$-S(0)$

Payoff:

$-e^{\delta T} \cdot S(T)$

$\Rightarrow$ **Payoff function:**

$$v(s) = \underbrace{-e^{\delta T}}_{\text{constant}} \cdot s$$

$$\Rightarrow \text{Profit} = \text{Payoff} - FV_{0,T}(\text{Init. Cost})$$

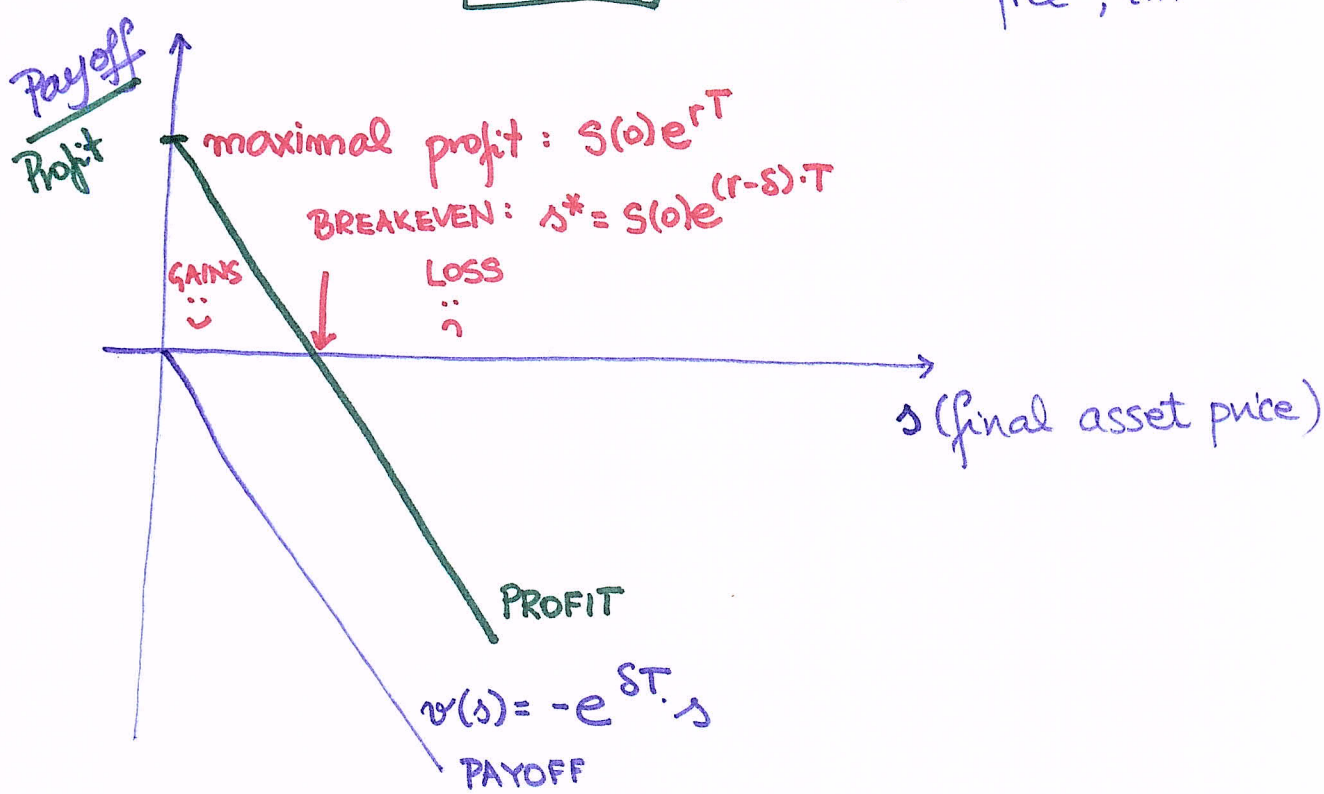
$$= -e^{\delta T} \cdot S(T) + FV_{0,T}(+S(0))$$

$$= -e^{\delta T} \cdot S(T) + FV_{0,T}(S(0))$$

$$= -e^{\delta T} \cdot S(T) \underbrace{+ S(0) e^{rT}}$$

if

r ... continuously compounded, risk free, i.r.



Fully leveraged purchase

A portfolio:
- → buy / long one share of stock
- → borrow $S(0)$ @ the risk-free interest rate to be repaid @ time-T

Init. cost:

$+S(0)$ (purchase of asset)

$-S(0)$ (taking a loan)

0

Payoff:

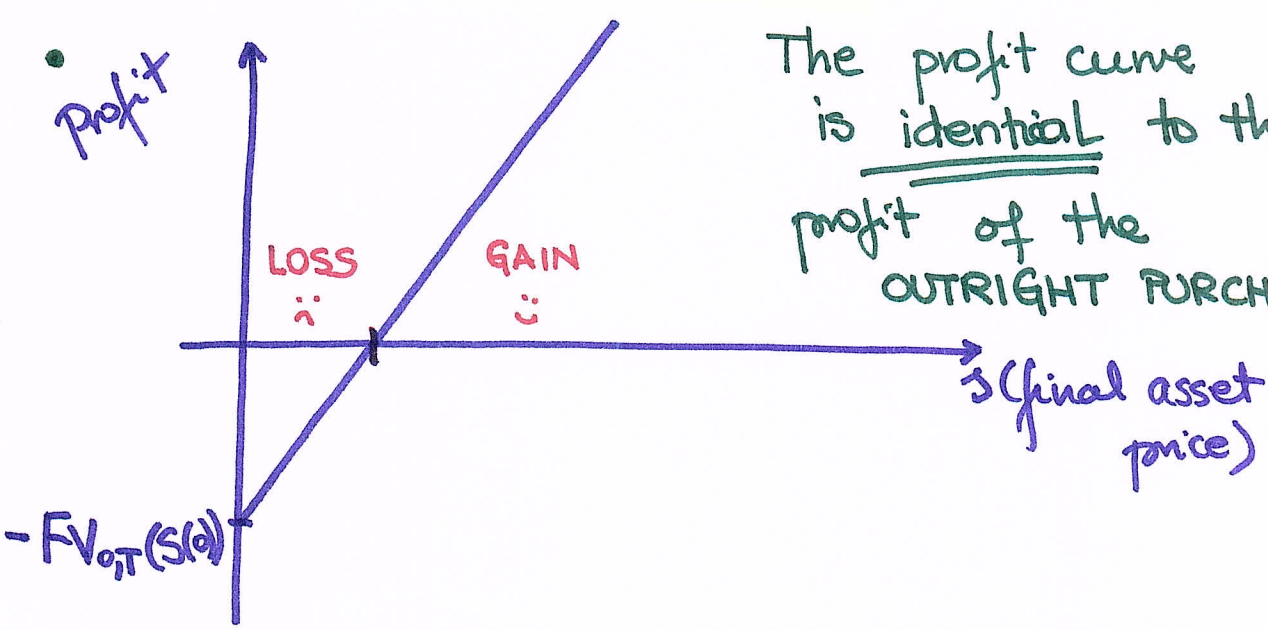
$$e^{\delta \cdot T} \cdot S(T) - FV_{0,T}(S(0))$$

$$\underbrace{e^{\delta \cdot T}}_{\text{const.}} \cdot S(T) - FV_{0,T}(S(0))$$

⇒ **Profit:** $e^{\delta \cdot T} \cdot S(T) - FV_{0,T}(S(0))$

Note: • For a fully-leveraged position:

PAYOFF = PROFIT



The profit curve is identical to the profit of the OUTRIGHT PURCHASE.

Forward Contracts.

Binding Contract.

0 ——— T

Handshake!

AGREE ON:
- the underlying asset
- the quantity
- SETTLEMENT < physical ⇒ logistics / cash
- THE DELIVERY DATE T
- THE FORWARD PRICE F

Payoff:

LONG FORWARD : BUYING FORWARD

1 unit of asset ↑ S(T) ↓ Forward Price F

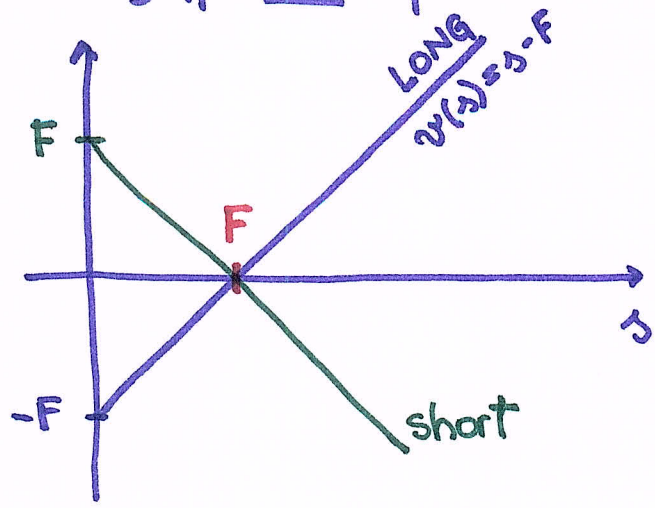
SHORT FORWARD : SELLING FORWARD

Initial Cost: 0

⇒ Payoff(long forward) = + S(T) − F

⇒ Payoff(short forward) = F − S(T)

Payoff = Profit



Hedging w/ a forward contract.

Assume a non-dividend-paying asset.

Start:
- unhedged position, say, an outright purchase of 1 share of stock.
- the hedge is a SHORT FORWARD

Form a hedged position!