Four different ways of acquiring assets

Outright Purchase:
- pmt $S(0)$
- delivery

Fully-leveraged Purchase:
- delivery
- pmt : $S(0)e^{rT}$

Forward Contracts:
- pmt : $F_{0,T}$
- delivery

Prepaid forward contract:
- pmt : $F^P_{0,T}$
- delivery

D: March 1st, '19. (1.)

Prepaid forward: Init. Cost $= F^P_{0,T}$

Payoff $= S(T)$

Forward: Init. Cost $= 0$

Payoff $= S(T) - F_{0,T}$

$\Rightarrow$ We propose a replicating portfolio for the (prepaid) forward:

- forward contract.
- invest $PV_{0,T}(F_{0,T})$ @ the ccrfir r to be repaid @ time T

Payoff( ) $= S(T) - F_{0,T} + FV_{0,T}(PV_{0,T}(F_{0,T})) = S(T)$

This is a static portfolio and the payoffs match

$\Rightarrow$ it's a replicating portfolio for the prepaid forward

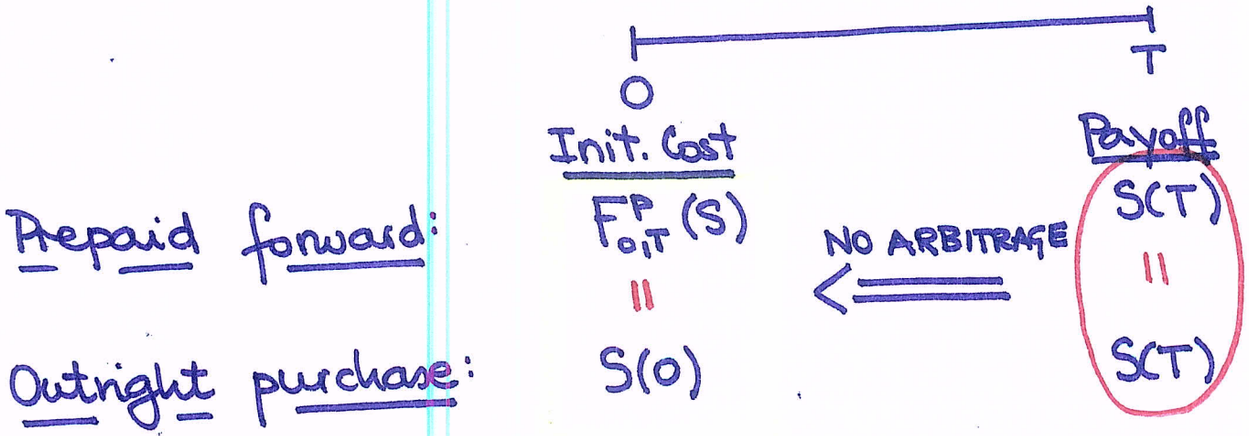
$\Rightarrow$ $\boxed{F^P_{0,T} = PV_{0,T}(F_{0,T})}$

$\Leftrightarrow$

$\boxed{F_{0,T} = FV_{0,T}(F^P_{0,T})}$

Focus on (prepaid) forwards on stocks.

Case #1. NO DIVIDENDS.



$\Rightarrow F^P_{0,T}(S) = S(0)$

Q: What is the dependence on the delivery date T?

NONE.

$\Rightarrow F_{0,T}(S) = FV_{0,T}(F^P_{0,T}(S))$

$= FV_{0,T}(S(0)) = S(0)e^{r \cdot T}$

↑ r... ccrfir r>0

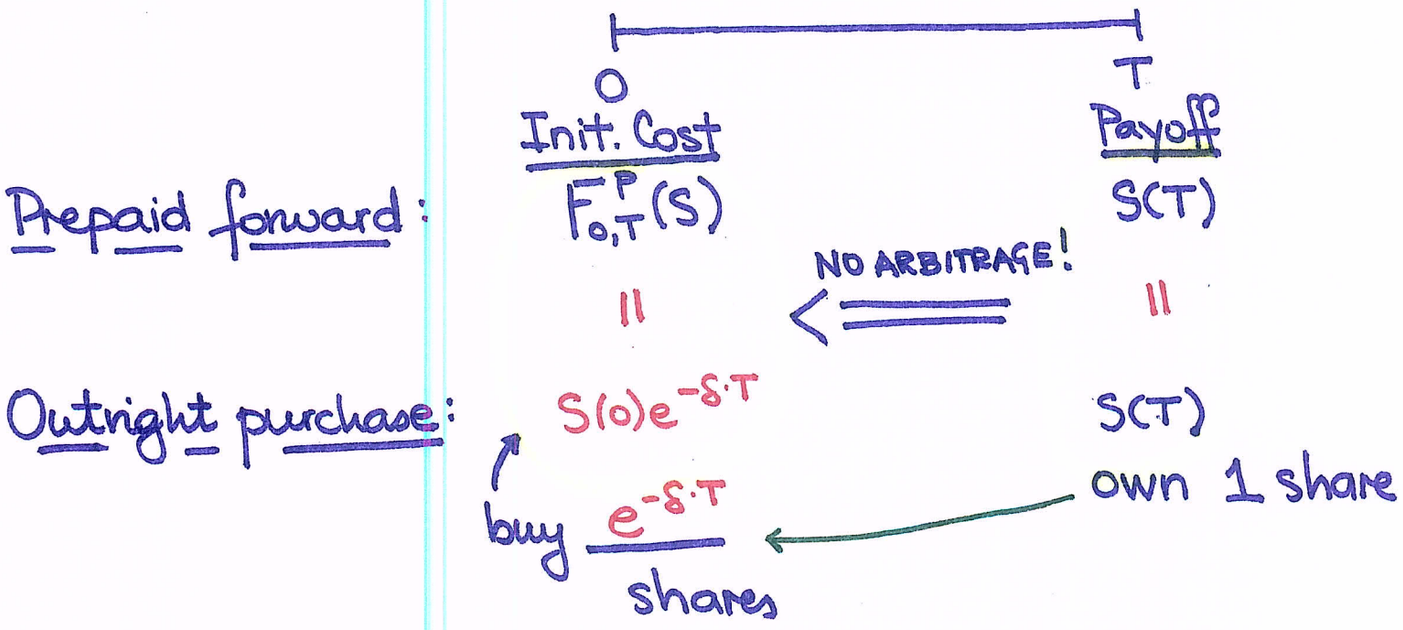
Increasing w/ the delivery date!

Q: A replicating portfolio for the forward contract?

A Fully-leveraged Purchase is a synthetic forward.

Case #2. CONTINUOUS DIVIDENDS

δ... dividend yield



$$\Rightarrow F^P_{0,T}(S) = S(0)e^{-\delta \cdot T} \xrightarrow[T\to\infty]{} 0$$

⚠ Decreasing w/ the delivery date!

$$\Rightarrow F_{0,T}(S) = FV_{0,T}\left(F^P_{0,T}(S)\right)$$

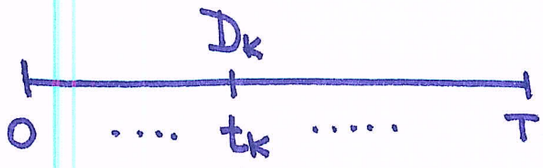
$$= e^{r \cdot T} \cdot S(0) \cdot e^{-\delta \cdot T} = \underbrace{S(0)e^{(r-\delta)\cdot T}}$$

recall: the break-even point for the long stock.

↑ r... ccrfir

⚠ Depends on the order of r & δ whether there is increase/decrease/no dependence on T.!

Case #3. DISCRETE DIVIDENDS.



$k = 1..n$; $t_n \leq T$

by convention: if $t_n = T$, the dividend is paid <u>just prior</u> to the delivery

$$F^P_{0,T}(S) = S(0) - \sum_{k=1}^{n} PV_{0,t_k}(D_k)$$

In words: in the prepaid forward price, the investor must be compensated for the forfeited dividend pmts.

$$F^P_{0,T}(S) \underset{\uparrow}{=} S(0) - \sum_k D_k e^{-r \cdot t_k}$$

r ... ccrfir

$$\Rightarrow F_{0,T}(S) = FV_{0,T}\left(F^P_{0,T}(S)\right) = e^{r \cdot T} \cdot F^P_{0,T}(S)$$

$$= S(0)e^{r \cdot T} - \sum_k D_k e^{r(T - t_k)}$$

27.

DELETED

28.

DELETED

29.

The dividend yield on a stock and the interest rate used to discount the stock's cash flows are both continuously compounded. The dividend yield is less than the interest rate, but both are positive. $0 < \delta < r$

The following table shows four methods to buy the stock and the total payment needed for each method. The payment amounts are as of the time of payment and have not been discounted to the present date.

METHOD	TOTAL PAYMENT
Outright purchase	A : $S(0)$
Fully leveraged purchase	B : $S(0)e^{rT}$
Prepaid forward contract	C : $S(0)e^{-\delta \cdot T}$
Forward contract	D : $S(0)e^{(r-\delta)\cdot T}$

Determine which of the following is the correct ranking, from smallest to largest, for the amount of payment needed to acquire the stock.

(A) C < A < D < B $C < A < D < B$

(B) A < C < D < B

(C) D < C < A < B

(D) C < A < B < D

(E) A < C < B < D

6.