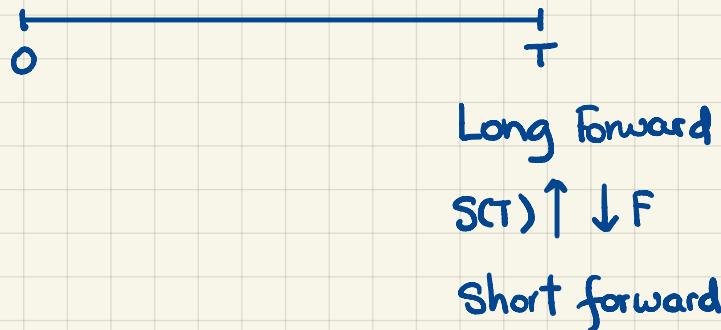


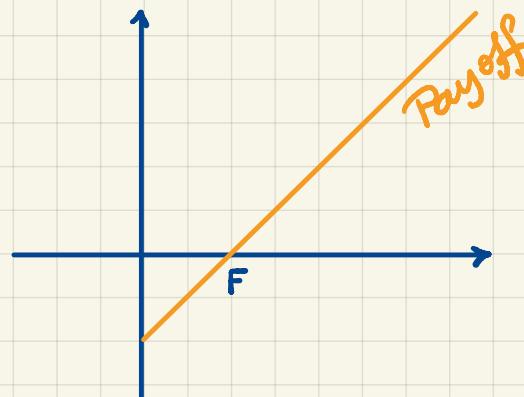
M339D: February 6th, 2023.

Forward Contracts.



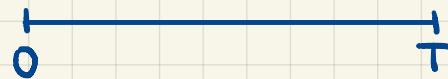
$$\text{Profit} = \text{Payoff} = S(T) - F$$

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



Problem. [Sample SOA Problem].

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



$$\text{Initial Cost: } -S(0)$$

$$\text{Payoff: } -S(T)$$

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

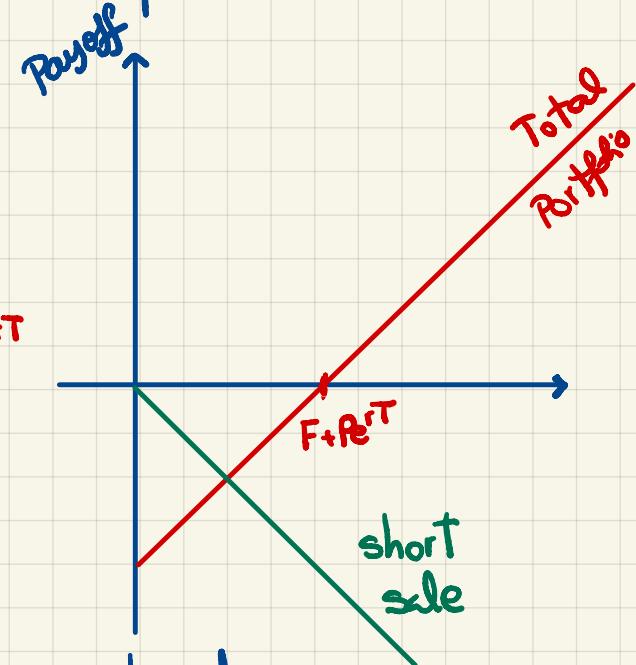
Initial Cost: Price of Bond > 0

X (ii) long forward and a short forward

Initial Cost: 0

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

	<u>Init. Cost</u>	<u>Payoff</u>
Long forward	0	$S(T) - F$
Short Bond	$-P$	$-Pe^{rT}$
Total	$-P$	$S(T) - F - Pe^{rT}$



X (iv) short forward and a long zero-coupon bond

Initial Cost > 0

(v) short forward and a short zero-coupon bond

	<u>Init. Cost</u>	<u>Payoff</u>
Short Forward	0	$F - S(T)$
Short Bond	$-P$	$-Pe^{rT}$
Total	$-P$	$F - S(T) - Pe^{rT}$

Short Sale: $-S(0)$ $-S(T)$

If we let the forward price match the redemption amount:

$$F = Pe^{rT}$$

Also matching the bond price to the initial asset price:

$$P = S(0)$$

$$F = S(0)e^{rT}$$

Important!

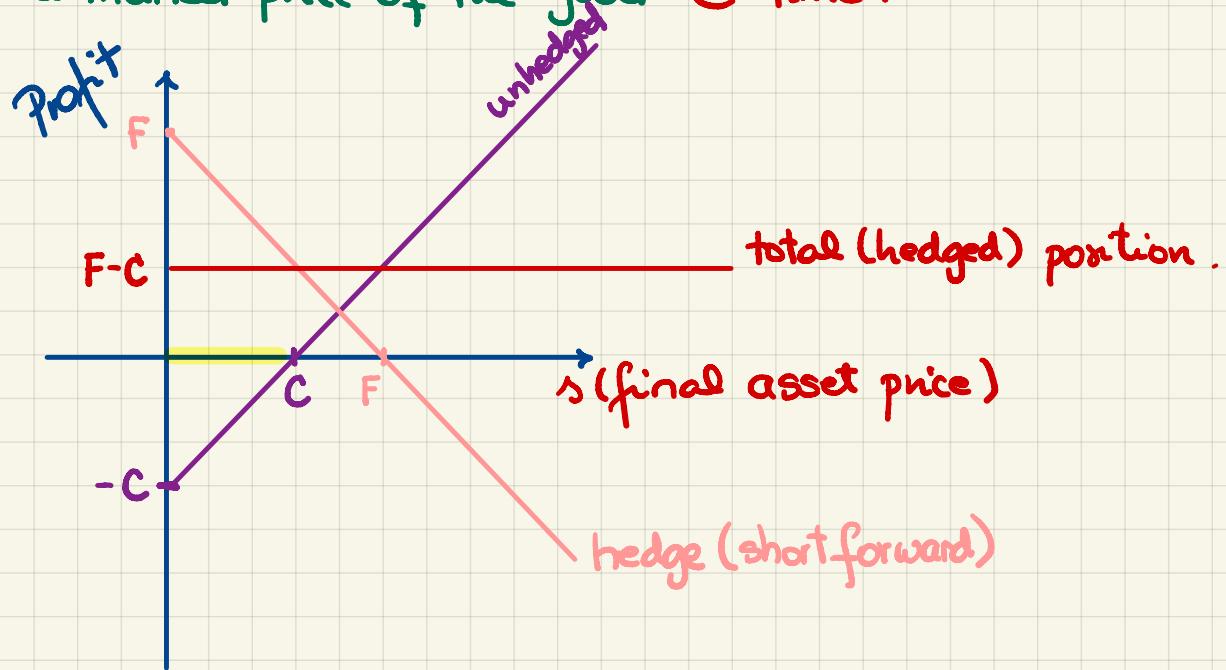


Hedging Using Forward Contracts.

Focus on a producer of goods.

C... total aggregate cost of production valued @ time T

$S(T)$... the market price of the good @ time T



Algebraically:

$$\text{Profit(Unhedged)} + \text{Profit(Hedge)} = \text{Profit>Total Hedged)$$

$$\cancel{S(T) - C} + \cancel{F - S(T)} = \underline{\underline{F - C}}$$