M339D: February 5th, 2025.

Forward Contracts [cont'd].

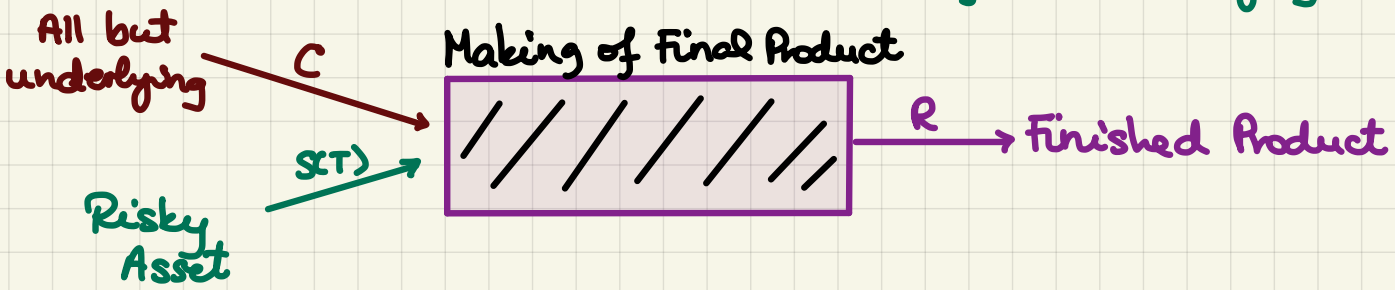
User/Buyer of Goods (to use as raw material).

fixed, deterministic

C... total aggregate costs of production of some final product without the underlying asset valued @ time-T when the underlying asset is needed & purchased

R... "revenue"... the price @ which the user of goods can sell their final product valued @ time-T

S(T)... the market price @ time-T of the underlying asset

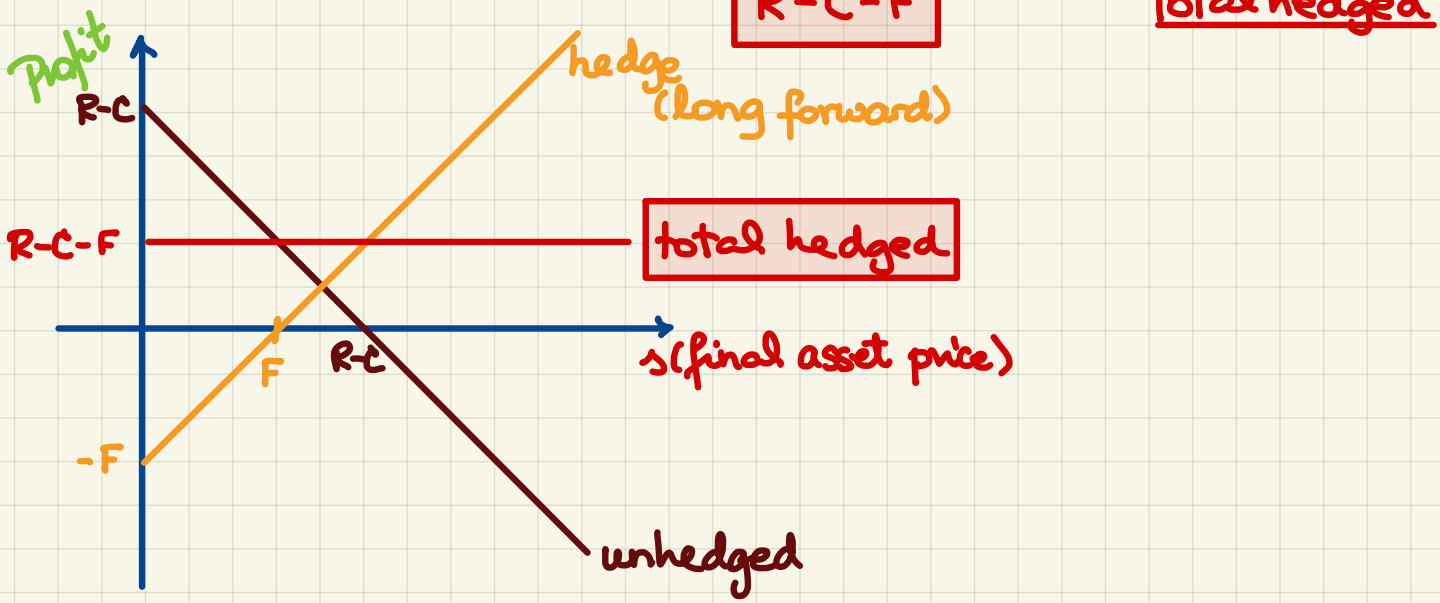


The Bottom Line @ time-T: $R-C-S(T)$ unhedged

The appropriate hedge is the

LONG FORWARD (BUY FORWARD) $S(T)-F$ hedge

$R-C-F$ total hedged



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Problem Set #4

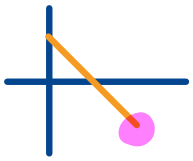
Forward contracts.

Problem 4.1. (5 points) A soy-bean farmer shorts forward contracts on soy in an amount matching his crop volume and with delivery at harvest time. Then, he is considered:

(a) an arbitrageur.
(b) a broker.
(c) a speculator.
(d) a hedger.
(e) None of the above.

Problem 4.2. Derivative securities can reduce the risk of both the buyer and the writer of the security. *True or false?*

Problem 4.3. A short forward contract has an unlimited loss potential. *True or false?*



Problem 4.4. A farmer produces one million bushels of corn. The total cost of production is \$1.3 million. The farmer entered a forward contract to hedge at a forward price of \$2.50 per bushel on one million bushels. What is the farmer's profit?

→ : $(2.5-1.3)\cdot 10^6 = 1.2\cdot 10^6$ □

Problem 4.5. Assume that farmer Brown is uncertain about his crop yield. Based on past experience, he thinks the following is a good model:

- 100,000 bushels with probability 1/4;
- 80,000 bushels with probability 3/4.

How many forward contracts do you think farmer Brow should short to hedge against fluctuations in corn prices at harvest time? Explain your way of thinking ...

Idea#1. The Expectation: $\frac{1}{4}(100000)+\frac{3}{4}(80000) = 85000$

Idea#2. The Mode/ The Subhedge: 80,000 → 90000

Idea#3. The Superhedge: 100,000

Idea#4. The Break-Even Andyn's

Problem 4.6. **Pancakes, Inc.** produces chocolate chip pancakes. It longed a forward contract on 100 lbs of chocolate chips at \$3.00 per pound. Total fixed revenue is \$2,000 for the pancakes produced with the above chocolate chips. Other costs total \$1200. Find the company's profit.

(a) 2,000
(b) 1,700
(c) 800
(d) 500
(e) None of the above.

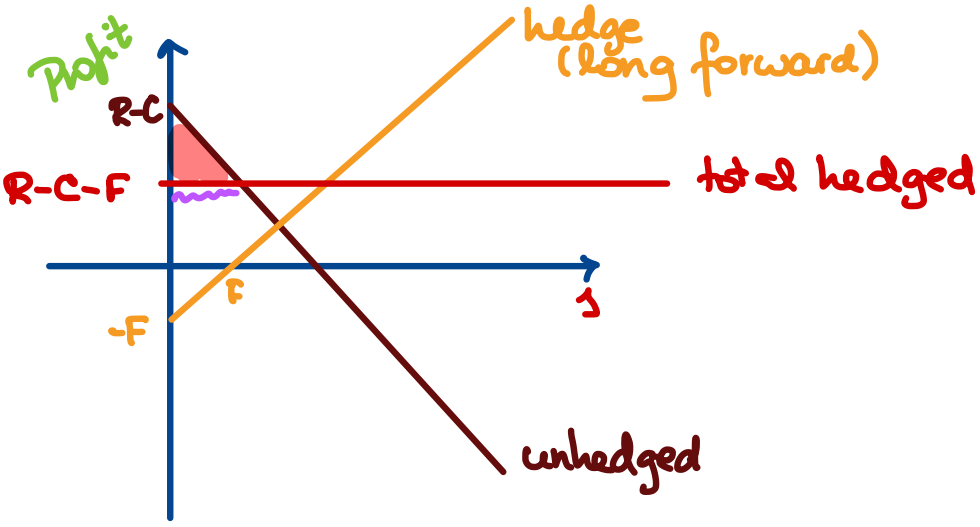
→: $R - C - F = 2000 - 1200 - 3 \cdot 100 = 500$ □

Problem 4.7. The **Extra-Healty Cereal (EHC)** company longed 20,000 forward contracts on corn at \$2.80 per bushel. The revenue from cereal made with the above corn is \$200,000 while the other (non-corn) aggregate fixed and variable costs amount to \$120,000. What is the EHC's profit?

→: $200{,}000 - 20000 \cdot 2.8 - 120000 = 24\,000$ □

Q: What if I add: "the price of corn @ time-T is \$2.50 in the market."?

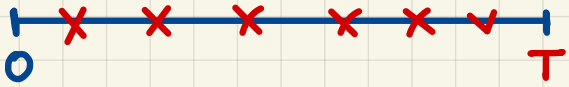
Inspiration. **Buyer/User of Goods**



European — The option can only be exercised, i.e., the transactions can take place on the exercise date.

Call — Usually, this means a right to buy the underlying asset.

Options. — Usually, the option's owner has the right but not an obligation to exercise the option.



Option written. EXERCISE DATE

At time 0:

- The writer of the option write/shorts the call.
- The buyer of the call is said to long the call. They are referred to as the option's owner.
- The agreement:
  - the underlying asset: $S(t), t \geq 0$
  - the exercise date: T
  - K... the strike/exercise price
- The buyer pays the premium to the writer.