

Subjective Probabilities.

Our agents form models about the relative likelihoods of the price of a particular asset at a later date. Formally, they create a probabilistic model for the distribution of the time T asset price $S(T)$.

At least, the expected value $E[S(T)]$ is worth paying attention to.

Assume: Among the admissible portfolios in the market model, agents invest in the portfolio which maximizes their profit (according the model).

Note: Our agents always have the possibility to invest at the risk-free interest rate.

=> Our agents will, at least, require a strictly positive expected profit.

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Subjective expectations.**Problem 4.1. IFM Sample (Introductory) Problem #6.**

The following relates to one share of XYZ stock:

- The current price is 100.
- The forward price for delivery in one year is 105.
- An investor who decides to long the forward contract denotes by P the expected stock price in one year.

Determine which of the following statements about P is TRUE.

- (A) $P < 100$
 (B) $P = 100$
 (C) $100 < P < 105$
 (D) $P = 105$
 (E) $P > 105$

$$\mathbb{E}[\text{Profit [Long forward]}] > 0$$

$$\mathbb{E}[S(1) - F_{0,1}] > 0$$

$$P = \mathbb{E}[S(1)] > F_{0,1} = 105$$

$$S(0) = 75$$

$$\mathbb{E}[S(3)] = 90$$

Problem 4.2. IFM Sample (Introductory) Problem #38.

The current price of a medical company's stock is 75. The expected value of the stock price in three years is 90 per share. The stock pays no dividends. You are also given:

- The risk-free interest rate is positive.
- There are no transaction costs.
- Investors require compensation for risk.

$$\Rightarrow \mathbb{E}[\text{Profit}] > 0$$

The price of a three-year forward on a share of this stock is X , and at this price an investor is willing to enter into the forward. Determine what can be concluded about X .

- (A) $X < 75$
 (B) $X = 75$
 (C) $75 < X < 90$
 X (D) $X = 90$
 X (E) $X > 90$

- Using the same reasoning as in the previous problem: $\mathbb{E}[S(3)] > F_{0,3}$

$$90 > X \quad \checkmark$$

- The formula for the forward price:

$$X = F_{0,3} = S(0)e^{3r} > S(0) = 75$$

↑ ↑
no div. r > 0