
UNIVERSITY OF TEXAS AT AUSTINExtra-credit homework assignment 1

Prepaid forward contracts. Forward contracts.

Please, provide **your complete solution** to the following problems. Only the final answer without justification will receive zero credit.

Problem 1.1. (2 points) An agent is **only** allowed to long a forward contract if he/she is willing to take physical delivery of the underlying asset. *True or false? Why?*

Problem 1.2. (2 points) A short forward contract has an unlimited loss potential. *True or false? Why?*

Problem 1.3. (2 points)

Assume that the continuously compounded, risk-free interest rate is strictly positive. The forward price of a non-dividend-paying stock is always strictly increasing with respect to the delivery date. *True or false? Why?*

Problem 1.4. (2 points) A portfolio consisting of a long forward contract and a bond can replicate a long prepaid forward contract. *True or false? Why?*

Problem 1.5. (2 pts) A non-dividend-paying stock sells today for \$100 per share. The yearly effective interest rate is 0.21. Then, $F_{0,1/2}(S) > 110$. *True or false? Why?*

Problem 1.6. (2 points) The profit diagram and the payoff diagram for long positions in a forward contract are identical. *True or false? Why?*

Problem 1.7. If the stock pays discrete dividends, there is a comparative advantage to an outright purchase of the stock as compared to the prepaid forward contract on that stock. *True or false? Why?*

Problem 1.8. In our usual notation, the difference between the **profit** of a long forward contract and a long investment in one unit of the non-dividend-paying underlying asset equals the forward price. *True or false? Why?*

Problem 1.9. (2 points)

The prepaid forward price of a non-dividend-paying stock is strictly decreasing with respect to the delivery date. *True or false? Why?*

Problem 1.10. (2 points)

The forward price of a continuous-dividend-paying stock is always strictly increasing with respect to the delivery date. *True or false? Why?*

Problem 1.11. Nick Mallory dabbles in the stock market in his spare time. He short-sells one share of stock whose current price is \$100 per share. At this time he also notices that the prepaid forward price of this continuous-dividend-paying stock for delivery in one year equals \$98.02 per share.

Upon the short sale, Nick invests the proceeds at the risk-free interest rate of 0.04. What is the expression for the profit Nick will have at time -1 when he closes his short-sale as a function of the final stock price s ?

Problem 1.12. For a continuous-dividend-paying stock, the current stock price is observed to be \$80. The forward price for delivery in two years is \$82.44. What is the forward price for delivery in three years?

Problem 1.13. Maryam bakes batches of cupcakes for a cupcake convention. She buys forward 21 pounds of raspberries from a local farmer at the forward price of \$5.60 per pound.

She projects to bake 336 cupcakes and sell each for \$3. The total and aggregate non-raspberry costs of baking the cupcakes are \$200.

If the market price of raspberries on the day of the cupcake convention is \$5.40, what is Maryam's profit?

Problem 1.14. The current price of a discrete-dividend-paying stock is \$90 per share. The company projects to pay quarterly dividends starting three months from today to perpetuity. The first dividend amount is \$2 and the dividends are scheduled to increase by a factor of 0.01 every time a dividend is paid.

The continuously compounded, risk-free interest rate is 0.06. What is the prepaid forward price of the above stock for delivery in eight months?

Problem 1.15. (5 points) A non-dividend-paying stock sells for \$100 per share today. The continuously compounded risk-free interest rate equals 0.05. You are the seller in a one-year forward contract. Find your profit if the stock's spot price in one year equals \$130 per share.

Problem 1.16. (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.

Why?