

Problem Set 1: Financial forwards

This problem set is due at the beginning of class on **Wednesday September 17**. Hand in only one solution per group. If your group is composed of students from several sections, hand in your solutions in the earliest class attended.

Question 1

If a share in ABC currently trades for \$40 and the risk free interest rate is 8% (continuously compounded), what is the 9-month forward price?

Question 2

It is January 15. A bank offers you the opportunity to enter a forward contract to buy XYZ shares on October 15 for \$82. The interest rate is 10% (twice-annual compounding). The current price of XYZ shares is \$80. Is there an arbitrage? If so, what is it? If not, explain why not.

Question 3

The quoted price of an 11-month forward contract on LMN shares is \$23. The current share price is \$21. Assuming no arbitrage opportunity exists, what is the risk-free interest rate?

Question 4

Forward and futures contract are available on equity indexes. An important equity index in the U.S. is the Nasdaq 100 index.

Look up yesterday's settlement price of the December Nasdaq 100 futures contract on the Chicago Mercantile Exchange. (Use the pit-traded price. The exact settlement date of this contract is the third Friday in December.) Look up yesterday's closing value of the Nasdaq 100 index.

(i) Make the approximation that companies in the Nasdaq 100 do not pay any dividends to shareholders. What is the theoretical no-arbitrage price? To answer this question, you will need to use an interest rate. Tell me what interest rate you are using, and why.

(ii) Give some reasons for why the no-arbitrage price you have computed may differ from the actual quoted price.

Question 5

This question asks you to think about how the value of a forward contract changes over time.

(i) On January 30 you enter a forward contract to purchase DEF shares on November 30. DEF shares currently trade at \$200. What is the forward price? (The interest rate is 5%, continuously compounded. Moreover, for the remainder of the question you should assume that the interest rate remains at 5% for the whole calendar year.)

(ii) By March 30, the price of DEF shares has risen to \$250. What would the forward price be now (the delivery date is still November 30)?

(iii) Because forward contracts are not traded on an exchange, they do not have a market price. However, a reasonable way to define the *value* of a forward contract is as the amount of money someone would have to pay you today to give up your forward contract. Using this definition, what is the value of the forward contract on March 30?

(iv) Sometimes it is the case that you would be prepared to actually pay someone else for the right to walk away from a forward contract. In this case, the value of the forward contract is *negative*. Re-do part (iii) under the assumption that on March 30, the price of DEF shares is \$100.

(v) What is the March 30 value of a short position in the original forward contract if the DEF share price on March 30 is \$250?

(vi) What is the March 30 value of a short position in the original forward contract if the DEF share price on March 30 is \$100?

(vii) What is the value of a long position in the original forward contract on January 30 (the entry date)?