

**Problem Set 4**  
Foundations of Financial Markets  
Summer 2007, Section 01  
Due: End of class, June 12

1. The stock of the Internet company PolarBear.com trades on both the South Pole Stock Exchange and the North Pole Stock Exchange.
  - (a) Suppose the price on the North Pole is \$18. What does the No-Arbitrage Condition say about the price on the South Pole? (Assume no trading costs.)
  - (b) Suppose the price on the North Pole is \$18 and the price on the the South Pole is \$17? How can you make an arbitrage profit? (Assume no trading costs.)
  - (c) Suppose that the price on the North Pole is \$18, that buying or selling on the North Pole costs \$2, and that buying or selling on the South Pole is free. What does the No-Arbitrage Condition say about the price on the South Pole?
  
2. Suppose that there are two securities RAIN and SUN. RAIN pays \$100 if there is any rain on the day of the soccer world cup final, \$0 otherwise. SUN pays \$100 if there is no rain, \$0 otherwise. Suppose that the soccer world cup final is 1 year from today, and suppose that RAIN is trading at a price of \$23 and SUN is trading at a price of \$70.
  - (a) If you buy 1 share of RAIN and 1 share of SUN, what is your payoff after 1 year, depending on the weather?
  - (b) What does the No-Arbitrage Condition imply about the price of a 1-year zero-coupon bond with face value \$100? (Assume no trading costs.)
  - (c) Suppose that a 1-year zero-coupon bond with face value \$100 is trading at \$90. Show how you would set up a transaction to earn a riskless arbitrage profit. (Assume no trading costs.)
  - (d) Suppose that trading zero-coupon bonds is costless, but trading RAIN and SUN each cost \$2 per \$100 face value. Can you still make an arbitrage profit?
  
3. Suppose that the consensus forecast of security analysts of your favorite company is that earnings *next year* will be  $E_1 = \$5.00$  per share. Suppose that the company tends to plow back 50% of its earnings and pay the rest as dividends. If the Chief Financial Officer (CFO) estimates that the company's growth rate will be 8% from now onwards, answer the following questions.
  - (a) If your estimate of the company's required rate of return on its stock is 10%, what is the equilibrium price of the stock?
  - (b) Suppose you observe that the stock is selling for \$50.00 per share, and that this is the best estimate of its equilibrium price. What would you conclude about either (i) your estimate of the stock's required rate of return; or (ii) the CFO's estimate of the company's future growth rate?

- (c) Suppose your own 10% estimate of the stock's required rate of return is shared by the rest of the market. What does the market price of \$50.00 per share imply about the market's estimate of the company's growth rate?