

Quiz A for 2:30 Class: 11/13/13

Name Key

For short answers 1 and 2 assume that you want to build a replicating portfolio for a put on BlackFridayOnThanksgivingDay Inc. (BFOTD) that has a strike price of \$80 and which expires on Friday, December 6, 2013 (23 days from today). BFOTD's current stock price equals \$78.82, but you expect its stock price to fall to \$65 by Monday, December 2, 2013 (19 days from today) and then rise to \$75 by Friday, December 6. You expect the standard deviation of returns on BFOTD stock to equal 28% between now and December 2 and 20% between now and December 6. As a result, you expect the standard deviation on the put on BFOTD's stock to equal 598% between now and December 2 and 427% between now and December 6.

Short Answer 1 (15 points): What would you use for S when calculating your position in stock in the replicating portfolio? 78.82 +15

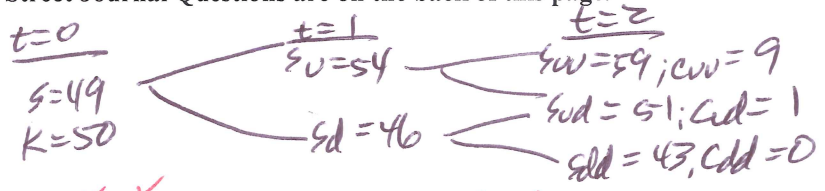
Short Answer 2 (15 points): What would you use for σ when calculating your position in risk-free bonds in the replicating portfolio? 0.2 +15

Problem (75 points): Assume you want to buy a call on Targeting Amazon's stock with a strike price of \$50 that currently trades for \$2.95. Assume also that the risk-free interest rate equals 2% per year and that Targeting Amazon's stock price currently equals \$49 per share and the stock will either rise by \$5 or fall by \$3 each of the next two years. Notes: Answer the following on a per-share basis. I will assume in inflow unless you use a "-" in front of any cash flows.

- a. What transactions and cash flows will occur today, one year from today, and two years from today if you buy the call today and the stock price rises in the first year but falls in the second year?
- b. What transactions and cash flows will occur today, one year from today, and two years from today if you build an equivalent portfolio to the call today and the stock price rises in the first year but falls in the second year? Note: You need to list all cash flows, not just net cash flows.
- c. Should you buy the call or the portfolio?

Scale: $\checkmark = +1$

Wall Street Journal Questions are on the back of this page.



(1) $\Delta_0 = \frac{9-1}{59-51} = 1$; $B_0 = \frac{1-(51)(1)}{1.02} = -49.0196$; $C_0 = 54(1) - 49.0196 = 4.98$
 (2) $\Delta_d = \frac{1-0}{51-43} = 0.125$; $B_d = \frac{0-43(1.25)}{1.02} = -5.2696$; $C_d = 46(1.25) - 5.2696 = 0.4804$
 (3) $\Delta = \frac{4.98-0.48}{54-46} = 0.5625$; $B = \frac{0.48-46(1.5625)}{1.02} = -24.897$; $C = 49(1.5625) - 24.897 = 2.665$

- a. Today: Buy \checkmark Call; $CF = -2.95$
 (1) (2) t=1: nothing happens + no cash flow
 t=2: buy stock using call; $CF = -50$; sell stock in market; $CF = +51$
- b. (3) t=0: Buy \checkmark 0.5625 shares; $CF = -27.5625$ ($= -0.5625 \times 49$); short bonds; $CF = +24.897$
 (4) t=1: Buy \checkmark 0.4375 ($= 1 - 0.5625$) shares; $CF = -23.625$ ($= -0.4375 \times 54$); short bonds; $CF = +23.625$
 (5) t=2: sell \checkmark 1 share; $CF = +51$; Buy back bond + return to lender; $CF = -50$
 $= 49.0196(1.02)$
- (2) c. Portfolio