

Quiz A for 1:15 Class: 8/1/12

Name Key

Assume you are planning to buy a call on the stock of Mega Bank Inc. that expires two years from today with a strike price of \$35. Assume also that Mega's current stock price is \$36 and its stock price will increase by \$6 or fall by \$4 each of the next two years. Finally, assume that the risk-free interest rate equals 3% per year and is not expected to change.

- a. Calculate the current value of the call.
- b. Assume that instead of buying the call, you construct an equivalent portfolio. Calculate the number of bonds you would need to buy or sell to rebalance your portfolio a year from today if Mega's stock price falls by a year from today.

a.  $S_u = 36 + 6 = 42; S_d = 36 - 4 = 32$

$S_{uu} = 36 + 6 + 6 = 48; S_{ud} = S_{du} = 36 + 6 - 4 = 38; S_{dd} = 36 - 4 - 4 = 28$

$K = 35$

$C_{uu} = 13 = 48 - 35; C_{ud} = C_{du} = 38 - 35 = 3; C_{dd} = 0$

$t=1$   
 $\Delta_u = \frac{13 - 3}{42 - 38} = 1; B_u = \frac{3 - 38(1)}{1.03} = -33.9806$

$C_u = 42(1) - 33.9806 = 8.0194$

$\Delta_d = \frac{3 - 0}{38 - 28} = 0.3; B_d = \frac{0 - 28(3)}{1.03} = -8.1553$

$C_d = 32(3) - 8.1553 = 1.4447$

$t=0$   
 $\Delta = \frac{8.0194 - 1.4447}{42 - 32} = 0.65747; B = \frac{1.4447 - 32(.65747)}{1.03} = -19.0238$

$C = 36(.65747) - 19.0238 = 4.645$

b. 1) change in stock =  $0.3 - 0.65747 = -0.35747$   
 $\Rightarrow$  sell 0.35747 shares for 11.43904 = 3.5747(32)

$+3 \Rightarrow$  buy 11.43904 of bonds  
 2) bond balance if no action =  $-19.0238(1.03) = -19.5945$   
 $\Rightarrow$  change in bonds =  $-8.1553 - (-19.5945) = +11.4392$   
 $+3 \Rightarrow$  buy \$11.4392 of bonds