

Q1: Go to internet and find what the following terms mean: yield, preferred stock, convertible bond, credit default swap, stock option.

Q2: Read "Corporate debt: CEOs' conundrum" (Financial Time, August 7, 2011; in the CMR) and make sense of figures in paragraphs 2 and 3.

A: Normalize the number of the firm's shares to be 1 unit so that the earning per share, denoted by  $E$ , is also the overall earning of the firm. Let the shareprice be  $p$ . The earning per share is then  $\frac{E}{p}$ .

For the second paragraph: Now suppose the firm borrows  $D$  at yield rate 5.36% to buy back shares. At price  $p$ , it buys back  $\frac{D}{p}$  unit of shares. And out of the earning,  $E$ ,  $D \times 5.36\%$  is used to service the debt and thus only  $E - D \times 5.36\%$  are for the remained shares, which is  $1 - \frac{D}{p}$  unit. Therefore, the new earning-per-share is

$$\frac{E - D \times 5.36\%}{1 - \frac{D}{p}}.$$

And the borrowing increases the earning-per-share, that is,

$$\frac{E - D \times 5.36\%}{1 - \frac{D}{p}} > E,$$

if and only if

$$\frac{p}{E} < \frac{1}{0.0536} = 18.657.$$

For the third paragraph: Suppose  $\frac{p}{E} = 12$ . If the firm buys another firm which is of the same size and price-earning rate at premium of 20%, it needs to borrow  $D = p \times 1.2$ . The merged the firm has cash flow  $2E$ , out of which  $D \times 5.36\% = 1.2p \times 5.36\%$  is used to service the debt. So  $2E - 1.2p \times 5.36\%$  is for the shareholders of the buyer-firm, who are also the shareholders of the merged firm. Thus the earning-per-share of the merged firm is  $2E - 1.2p \times 5.36\%$ . The earning-per-share of the stand-alone buyer firm is  $E$ . Thus merger increases earning-per-share by

$$\begin{aligned} & \frac{2E - 1.2p \times 5.36\%}{E} - 1 \\ &= 2 - 1.2 \times \frac{p}{E} \times 5.36\% - 1 \\ &= 1 - 1.2 \times 12 \times 5.36\% \\ &= 22.8\%. \end{aligned}$$

Q3: Read "FRB survey of consumer finances" (in the CMR) and construct (try your best) the balance sheet of the median US family of the top 10% by wealth.

Q4: Read "AIG set to sue BofA for \$10.5bn" (in the CMR). Why does the share price of Bank of American drop so much? Does the price of its debt drop as much? Think more generally why share prices are so sensitive to news. If you want to make profit out of news, which kind of firms's shares should you focus on? High leveraged or low leveraged?

Q5: Consider a single period binomial setting where the risk free interest rate is zero (so the discount rate is 1) and everyone is risk neutral. A firm produces cash flows of \$ 210 if the economy is good and \$ 80 if the economy is bad. The good and bad states occur with equal probability. Initially, the firm has 100 shares outstanding and debt with a face value of \$50 due at the end of the period.

Suppose the firm above unexpectedly announces that it will issue additional debt, with the same seniority as existing debt and a face value \$50. *The firm will use the entire proceeds to repurchase some of the outstanding shares.*

(i) What is the market price of the new debt? What is the effect on the old debt?

(ii) Just after the announcement, what will the price of a share jump to? How many outstanding shares will be repurchased?

A:(i): Before the new debt issuance, the expected payoff to equity is:  $.5(210-50)+.5(80-50)=95$ . So the price per share is  $95/100 = \$0.95$ . And the value of the old debt is 50.

After the issuance, in the good state, both the new debt and old debt are paid in full. In the bad state, the debt holders split the \$80 available equally because the new debt has equal priority with the old debt, and both are owed \$50. Thus, the new debt has a value of  $.5(\$50) + .5(\$40) = \$45$ . So does the old debt. Therefore, old debt holders lose \$5.

(ii): After the capital structure change, the expected value of the remaining equity is:  $.5(\$210 - \$100) + .5(\$0) = \$55$ . To find out the price per share  $p$ , we must find out how many shares  $n$  were repurchased at this price. We solve the following two equations:  $np = \$45$  and  $(100 - n)p = \$55$ . The first says that the new debt is used to repurchase shares, and the second is that the value of the shares remaining must equal the value of the remaining equity calculated above. *Solving these gives  $p = 1$  and  $n = 45$* , which means that the firm uses the proceeds of the new debt to buy back 45 shares at a price of \$1 each. The share price jumps

from \$ 0.95 per share to \$ 1. The shareholders make a gain. The gains are at the expense of old debt holders' loss:  $\$50 - \$45 = \$5$ . From this \$5, each share gains \$0.05.