

Homework Assignment 1

- 1) Valuing cashflow (Review of FIN I). You have just won the Kellogg Public/Non-Profit lottery.
- A) The PNP lottery will pay you \$110 dollars next year. It continues to pay you money at the end of the year for 10 years. However, the amount of each payment rises by 10% per year. If your discount rate is 15%, what is the present value of your winnings?
 - B) The current NPN lottery only pays out to its winner for 10 years. How much more would the lottery be worth if payouts continued forever? To answer this question, you may need the formula for the value of a growing perpetuity.
- 2) Junk Bond Valuation. This question looks at the expected default premium that is implicit in the pricing of junk bonds. It is based on a *Wall Street Journal* article from January 31, 1991. Your job will be to calculate the expected probability of default each year for the Fort Howard junk bonds. These bonds are due January 1st 1997 and have a coupon rate of 12.375 percent. The coupon payments are made annually, the next one will be made in a year. The "appropriate discount rate" for junk bonds is 12.4%. This rate is based on a one-year risk free rate of 6.9% and a debt beta of 0.65. Calculate the value of the junk bonds as of January 1st 1991. Thus, the bonds have a remaining maturity of 6 years.
- A) What would the bond sell for if the bonds never defaulted? The bonds have a \$1000 face value. Assume that the yield curve is flat—the risk-free rate for all maturities is 6.9%.
 - B) Assume that the probability of default on the junk bonds is p per year. This probability is the same each year. What is the probability that the bond makes its promised payment at the end of 1991? Your answer should be a function of p . What is the probability that the bond makes its promised payment at the end of 1992? Assume that once the bonds default, no further interest or principal payments are made.
 - C) The bonds have been selling at a significant discount to face value. On January 1, these bonds were selling for \$750 per \$1000 face value. Assume that probability of default for Fort Howard's junk bonds is the same in every year and that the probability of default is equal to p . Based on the market price of the bonds, what is the implied probability of default (p)? Assume that if the bonds default, no more interest or principal payments are made. Hint: Use a spreadsheet.
 - D) On January 4th, Fort Howard announced an equity infusion of \$250 million and its plans to repurchase some of its debt. The price of its junk bonds jumped to \$870 per \$1000 face value. What is the implied probability of default now? You should still assume that if the bonds default, no more interest or principal payments are made. Assume that the first interest payment is still one year away.

3) Stone Container is a major producer of cardboard boxes. Stone Container has \$10M in outstanding equity. In addition, it has \$2M in outstanding debt. The debt is a ten-year mortgage and is rated AAA. This is low risk debt. \$2M is both the book and market value of the debt. In addition to its cardboard box production and sales facilities, Stone Container also has a portfolio of 3-month government t-bills. These are currently worth \$3M. The market price of risk, $E[r_m - r_f]$ is 8.4 percent. Assume that the yield curve is flat. (this is a past exam question).

A) Stone Container's debt has a beta of 0.20. The equity beta was estimated using the following equation:

$$r_{\text{Stone Container's Equity}} - r_{\text{risk Free}} = 0.0 + 1.4 (r_{\text{Stock Market}} - r_{\text{risk Free}}) + \epsilon$$

Calculate the beta that measures the risk of Stone Container's assets.

B) Stone Container is considering expanding its capacity by 15 percent. It will do this by building a new production facility. It will also expand its sales force by 15% to market the additional cardboard boxes. The total investment required for this project is \$2M. The firm will liquidate part of its T-bill portfolio to pay for the investment. Since Stone Container will lose the 3 percent yield on the bonds, should 3 percent be the discount rate it uses for evaluating its capacity expansion? Explain.

C) An alternative method for deriving a discount rate is to use the Capital Asset Pricing Model. What discount rate for the capacity expansion investment does CAPM suggest?

D) A year after Stone Container builds the cardboard box production facility you could estimate their equity beta. Using only equity return data from the year following the construction of the cardboard production facility, do you expect your estimate to be above 1.4, below 1.4 or approximately equal to 1.4? Explain.