

## Hwk 6 Finance

Due date to be announced.

(The assignment is currently incomplete. I may add more problems later.) You may work in groups of up to 3 people. Problem 1 is from Finance 440 at Kellogg.

**1)** Saving with Inflation and Taxes. Dr. Leisure wants to buy a villa on the 18th green at The Country Club when he turns 65. Such a villa costs \$150,000 now, but inflation is 5% per year. Dr. Leisure is currently 40 years old (today is his birthday) and in the 35% income tax bracket. He invests his savings at an 8% nominal rate, compounded quarterly (that is, four times per year, at the end of each 3 month period). Assume that tax payments are also made quarterly.

a) Dr. Leisure currently has \$25,000 saved toward the purchase of the villa. He wants to save a constant nominal amount every quarter, starting one quarter from now. How much does he need to add to his savings every quarter in order to have enough to buy the villa when he turns 65?

b) In a fit of mid-life guilt, Dr. Leisure decides to switch jobs when he is 50 and do charity work for "Doctors without Borders". Since his income will fall substantially, he decides that he must have \$125,000 (in real terms, or today's dollars) saved toward his villa when he makes the job change at age 50. Also, with his lower income, Dr. Leisure's tax rate will be reduced to 20% at age 50. Calculate how much Dr. Leisure needs to save each quarter from now (age 40) to age 50 in order to meet his goal (with constant nominal payments each quarter), assuming he still starts with \$25,000 as his current saving. How much will Dr. Leisure have to save each quarter (with new constant nominal payments) from age 50 to age 65 in order to buy his villa on schedule?

**2)** Recall that duration is  $\frac{-\Delta p/p}{\Delta y}$  where  $\Delta p$  is a small change in the price  $p$  and  $\Delta y$  is a small change in the yield.

a) Plot the duration of a bond with a 5% yield and a 2% coupon rate and of a bond with 5% yield and a 5% coupon rate as a function of the time to maturity. Coupons are paid semiannually. That is, make one graph with two curves (one for each bond) with time to maturity on the x-axis and duration on the y-axis.

b) You decide to invest 30% of your bond portfolio into a short-term bond fund with a 2% yield and a 2.5 year duration and the remaining 70% into a long-term bond fund with a 5% yield and a 8 year duration. What is the duration on the combined portfolio (assuming the long-term and short-term yields move together)? That is, how will the value of the portfolio change if both the short and long-term yields move up by 0.1%?

**3)** Perform the Dupont analysis on Microsoft comparing the June-08 numbers to the June-06 numbers. Did the Return on Equity change? Why?