

## Problem Set 5

Corporate Finance, Sections 001 and 002  
Due Thursday, February 26th

### Suggested problems:

RWJ Problems 6.10, 6.12, 6.19

(Use revised problems on <http://finance.wharton.upenn.edu/~jwachter/fnce100>.)

Note: you do not need to know how to calculate IRR. You should confirm that the IRRs given in the solutions to the suggested problems are correct.

### Required problems:

1. The S&P 500 is a portfolio consisting of 500 large companies, weighted by their value. It is often taken as a measure of the U.S. stock market as a whole. This question examines the assumptions on growth implicit in the valuation of the S&P 500.

On February 10th, 2004, the dividend yield (the ratio of expected dividends next year to price today) of the S&P 500 is 0.0163. The price-earnings ratio (ratio of price today to expected earnings next year) is 18.5. The price of one share of the S&P 500 is \$1140. Assume the required rate of return for the S&P 500 is 12%.

- (a) Determine the expected earnings per share next year ( $EPS_1$ ) and the plowback ratio for the S&P 500.
  - (b) Assume that plowback and the return on equity for the S&P will remain the same in perpetuity. What must the return on equity (ROE) be to justify the price of \$1140 per share?
  - (c) What does this return on equity imply about expected growth in earnings and dividends?
  - (d) What is the net present value of growth opportunities (NPVGO) implicit in the price of the S&P 500 (Hint: Determine the cash cow value  $EPS_1/r$ , and use the fact that by definition,  $NPVGO = P_0 - EPS_1/r$ ).
2. Suppose you have the following two mutually exclusive projects that you can carry out on the corner of 38th Street and Walnut Street: Build a day care center or a health spa. Suppose the day care center has the following cash flows: An immediate cash outlay of \$5,000 followed by inflows of \$2500 in each of the next 3 years and zero thereafter. Suppose the health spa has the following cash flows: An immediate outlay of \$5000 followed by inflows of nothing in year one, \$1,000 in year 2 and \$7,100 in year 3 and zero thereafter. Answer the following questions:
    - (a) Show that the IRR of the day care project is 23.4% Is the IRR for the health spa lower or higher than the IRR for the day care project? If you base your investment decision on which project has the highest IRR, which do you choose?

- (b) If you base your investment decision on which investment has the highest NPV, which do you choose when the cost of capital is 15% and which do you choose if the cost of capital is 5%?
- (c) Suppose you could triple the size of the health spa project and triple its revenues but you can't change the size of the day care center. Would any of your answers in (1) or (2) change?