SLOAN SCHOOL OF MANAGEMENT
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Jonathan Lewellen
15.414

Financial Management
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Assignment 1 – Due Thursday, July 24

The calculations needed for this assignment can be performed either on a calculator or in Excel. The course web page has a spreadsheet, called FinFunctions, that illustrates some of the financial functions available in Excel.

1. In May 2000, the U.S. Treasury issued 30-year bonds with a coupon rate of 6.25%, paid semiannually. A bond with a face value of $1,000 pays $31.25 (1,000 × 0.0625 / 2) every six months for the next 30 years; in May 2030, the bond also repays the principal amount, $1,000.

   (a) What is the value of the bond if, immediately after issue in May 2000, the 30-year interest rate increases to 7.5%?

   (b) What is the value of the bond if, immediately after issue in May 2000, the 30-year interest rate decreases to 5.0%?

   (c) On a graph in Excel, show how the value of the bond changes as the interest rate changes (plot the value as a function of the interest rate). At what interest rate is the value of the bond equal to its face value of $1,000?

2. Your company is trying to decide whether it should purchase a copier from Xerox or lease it. The copier has an expected life of 6 years, after which it has only marginal value (you can ignore any residual value). If you purchase it, the price is $145,000, payable now, and you would have to pay an annual service charge of $8,000. If you lease it, you would have an annual payment of $36,000 each year (for 6 years), which includes service. The lease payment and the annual service charge occur at the **beginning** of each year.

   The interest rate is 3.8%. Which option is least costly?

3. You are evaluating two possible projects for your company, both of which involve the development of a new kind of computer mouse. The projects are mutually exclusive, meaning that the company can invest in only one of them.

   Both projects require an initial investment of $32 million to be made in each of the next three years. Sales and profits will begin in the 4th year, and this is where the two projects differ. Version A, which is more innovative, is expected to have sales in year 4 of $24 million and cash profits of $7.8 million. Profits are expected to increase 6% annually. Version B, which is less innovative but cheaper to produce, is expected to have the same sales in year 4, but profits of $8.9 million. Profits for version B are expected to increase only 4% annually.

   Assume for simplicity that all cashflows occur at the end of the year. The cost of capital for both projects is 12%.

   (a) Which is the better project? How much is each project worth?

(b) You have the opportunity to increase the growth rate of project B to 6%. How much would you be willing to invest (today) to get this higher growth?

(c) You are not sure that the discount rate is really 12%. What happens to the value of each project if the discount rate rises to 14% or falls to 10%? Which project is more sensitive to changes in r? Why?