

## Problem Set 2

### Due April 16, 2021 by 11:59pm

You are required to turn in an **Excel file**, i.e., all work must be completed in Excel. Please submit through Brightspace, assignments will not be accepted after April 16, 2021 at 11:59pm. You are allowed to work in groups of 2-4 students and turn in one assignment for the group. You can work alone, if desired. Please submit your own work, do not copy from classmates, the internet, or any other sources. Plagiarism will result with a grade of zero for this problem set.

Note:  $0(x)y$  means to vary some number from 0 to  $y$  at intervals of  $x$ .

1. Use information on [US treasury bills, notes, and bonds](#) to graph the yield curve on 2/20/2018.
2. You are considering two bonds, Air Canada and Scotiabank. Air Canada's bonds have a coupon rate of 9% and a YTM of 6.5%. Scotiabank's bonds have a coupon rate of 6.5% and a YTM of 9%. Both bonds pay coupons semi-annually and have 14 years left to maturity. Assume a face value of 1,000.
  - (a) What is each bond trading at today?
  - (b) Assuming no changes in interest rates. What do you expect the bond prices to be one year from now? Two years? Five years? Ten years? Illustrate your answers by graphing bond prices versus time to maturity for each bond. (Use  $0(1)14$ )
  - (c) Explain the observed relationship.
3. Ducktales and Chip and Dale R.R. both have bonds with a 7% semi-annual coupon priced at par. Ducktales bonds have 3 years to maturity and Chip and Dale R.R. have 19 years to maturity. Assume a face value of 1,000.
  - (a) What is the percentage change in price if interest rates rise by 2%? Fall by 2%?
  - (b) Illustrate the relationship between bond prices for these two bonds and YTM. (Use YTM  $0(1)15$ )
  - (c) Explain the observed relationship.
4. If you can buy 20 Pokemon today and 25 Pokemon next year. What is the real rate? What is the nominal rate if inflation is 5%?
5. You are considering renovating your "Nuts for Doughnuts" store. This renovation will take several years and generate the cash flows below. When should you undergo this renovation? Why? To receive full credit your answer should include an NPV profile.

Year	Cash Flows
0	-3,024
1	17,172
2	-36,420
3	34,200
4	-12,000

6. You have an unused garage on your property. Your significant other wants to renovate the garage into a loft-style apartment in order to rent the space. Alternatively, your neighbor says he will rent the space for his workshop if you make some minor improvements. You calculate the expected cash flows below. You and your spouse sit down to make the decision. Having taken BCOR 3410 with such an amazing professor you remember you can calculate NPV, IRR, and Payback period to help make your decision. Your required return is a conservative 5% and your spouse wants to recover your initial investment in 2.5 years. Based on each criteria what should you do? What criteria/tool should you use? Why not use the other tools? Calculate the crossover rate for these projects and graph the NPV profile. Briefly describe the NPV profile.

Year	Loft-style	Neighbor
0	-80,000	-8,000
1	26,400	3,200
2	30,000	3,400
3	33,000	3,600
4	36,000	4,800
5	37,200	4,800
6	37,800	4,800

7. Your boss prefers IRR since it is simple to understand. You are writing a short memo to argue for the use of NPV. Please write a draft of that email.
8. Your consulting firm, "Very good consultants", have been hired by Lil' Sebastian's (LILS), a manufacturer of children toys. LILS is evaluating manufacturing and selling a line of toy horses. Three years ago, the company paid \$3.1 million to acquire a building downtown in anticipation of opening a indoor playground, the plans for this project have been put on hold. Based on a recent appraisal, the company believes it could sell the building for \$2.3 million on an after-tax basis. In four years, the building could be sold for \$2.4 million after taxes. The company also hired a marketing firm to analyze the market for toy horses at a cost of \$525,000. The marketing firm believes that the company will be able to sell 3,600, 4,300, 5,200, and 3,900 units each year for the next four years, respectively. They believe that we can capitalize on the strong market for toy horses and the "Lil Sebastian" name and charge a premium price of \$750. Though they believe this is a fad and that sales should be discontinued after four years. The fixed costs per year for this project are \$415,000 and variable costs are expected to be 15% of sales. The equipment to produce to toy horses will cost \$2.5 million and will be depreciated according to a three-year MACRS schedule. We believe we can scrap this equipment for \$350,000 at the end of the project. The toy horses would be sold manufactured and sold in the downtown building. LILS will require an immediate \$125,000 from NWC. The marginal tax rate is 22% and they require a 11% return. Should LILS build toy horse? Why?
9. You and your best friend are considering dropping out of college to pursue a new business venture. You've calculated expected future cash flows if you stay in college and if you pursue your business venture. Your friend thinks you should include the cost of college to this point in your calculation. Should you? Why or why not?