

Problem Set #3
Answers Due Session 7 (including a spreadsheet for Commonwealth A)

This problem set contains the three problems below and a realistic, extended case on a CDC investment project, Commonwealth Development A, which is on the web site just under this.

Solving these problems requires using the concepts of Net Present Value and Internal Rate of Return. Beyond the class lecture, the concepts are contained in any good microeconomics textbook – e.g. Nicholson. As an alternative, I have put a short note on the web site explaining both concepts and you can visualize some of the ideas by going to the last two tools on the Open Courseware Web site.

1) The town of Sea City sits on a wide expanse of beach and is a famous summer resort. You are considering purchasing a particular single family home there purely as an investment opportunity. You will not live in the house yourself but you will rent it out to vacationers. In order to decide whether or not to buy, you take an extensive survey of other houses in the area that gives you an idea of:

R = rent per month you can charge for the house during the summer season.

T = the total property taxes you will have to pay per year

U = the amount of upkeep you will have to spend on the house per year.

N = the number of years the house will last before it becomes too dilapidated to rent.

a) Develop a formula that combines this information you into an estimate of V, the maximum amount you would consider paying for the house. (If you need other variables to complete the formula, define them and include them.)

Using the formula you have just developed, show how (if at all) V would change if:

b) An article in People magazine says that Britney Spears wants to make Sea City her summer home.

c) The Sea City government increases property taxes by 15% to improve the Sea City Public School system.

d) The Sea City government increases property taxes by 15% to build a set of open access tennis

courts.

2) Consider the stream of costs and benefits from the first ten years of a small parking lot that requires both initial construction costs and annual maintenance and staffing costs

	Year 1	Year 2	Year 3	Year 4	Year 5	etc. through year 10
Costs	\$880,000	\$40,000	\$40,000	\$40,000	\$40,000	\$40,000
Revenue	0	\$200,000	\$200,000	\$200,000	\$200,000	\$200,000

a) Familiarize yourself with the NPV function in Excel. Using this function, determine whether you would undertake the project if the annual interest rate were 5%. Then determine whether you would undertake the project if the annual interest rate were 10%? To use the NPV function, you may find it easier to collapse revenues and costs into a single “net revenue” figure for each year - i.e. -\$880,000 for Year 1, \$160,000 for Year 2 and so on.

b) Explain what your answers in (a) tell you about the parking lot’s internal rate of return. Use the IRR function in Excel to verify your answer.

c) Suppose you are unsure whether the correct interest rate on the project is 5% or 10%? This means that the project’s net present value is uncertain. Following Weitzman, consider two ways to calculate NPV under this uncertainty:

- i) Take the two values of net present value you calculated in (a) and average them – i.e. average the NPV calculated under each of the two possible rates.
- ii) Average the two interest rates themselves and calculate a single, new NPV based on this average interest rate.

Compare your answers. Then briefly discuss the relevance of your comparison to the case of assessing the NPV of a project to reduce global warming where the costs and benefits extend far into the future and the appropriate discount rate is uncertain.

3) From about 2001 to 2003, economists argued that a “mortgage refinance boom” helped boost consumption spending as falling interest rates allowed “people to take money out of their houses”.

Assume that in \$2,000, you had purchased a house for \$275,000 using a 30 year mortgage at an interest rate of 7.5 percent which is fixed over the life of your mortgage. Assume, also, that by 2002, the interest rate on a newly purchased 30 mortgage had fallen to 5.5%.

Using these data as part of your example, explain what a “mortgage refinance boom” is and explain how it might give a household more money to spend on consumption.

4) The final problem for this week is the Commonwealth Development A case on the web site. The case has a lot of financial information. Your job is to read through the case and select the particular pieces of information you need to calculate a Net Present Value and Internal Rate of Return for the project. Enter this information in an Excel spread sheet and print off the sheet to include with your problem set.