

## CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT ASSIGNMENT 3

Answers to this assignment are due back by Friday, March 11, 2022. You may work on this assignment alone or in pairs.

### 1. Basic Cost-Benefit Analysis

You have been asked to evaluate the financial viability of a mining project. Here is the relevant information about the investment plan for the project: There is an Excel sheet with a template on Blackboard.

Investment Plan	Year 0	1	2	3	4
<b>Site Preparation</b>					
Materials, imported, net of tax	400				
Tariffs at 15%	60				
Sales tax at 5%	20				
Skilled labour	150				
Unskilled labour	250				
<b>Equipment</b>					
Imported, net of tax	600				
Tariffs at 15%	90				
Sales tax at 5%	30				
<b>Land</b>	<b>100</b>				
<b>= Total Investment Expenditure</b>	<b>1,700</b>				

Here is the operating plan for the mine, which will only work for three years.

Operating Plan	Year 0	1	2	3	4
<b>Sales</b>		<b>2,000</b>	<b>2,800</b>	<b>2,800</b>	
<b>Purchases</b>					
Material inputs					
Local		200	240	240	
Sales tax at 5%		10	12	12	
Imported		600	700	700	
Tariffs at 15%		90	105	105	
Sales tax at 5%		30	35	35	
Skilled labour		100	100	100	
Unskilled labour		50	50	50	
<b>Other: depreciation</b>		<b>500</b>	<b>425</b>	<b>375</b>	<b>400</b>

- Use the parameter tables above to create a pro forma cash flow. [A spreadsheet file with these numbers may be found at <https://sites.suffolk.edu/jonathanhaughton/> ]
- For the case of total capital (i.e. the net cash flow for the pro forma sheet), calculate
  - Net present value. Assume a discount rate of 13%.
  - Internal rate of return.

## 2. Lottery

A lottery advertises “Win a million bucks” so you are elated when you find you have the winning ticket. But then you find that the lottery offers you five options:

- (i) You get your million dollars at the end of ten years.
- (ii) You get \$50,000 annually for twenty years.
- (iii) You get \$30,000 annually for ever, and can sell this right. [Hint: The value of \$1 annually in perpetuity is given by  $\$1/r$ , where  $r$  is the interest rate.]
- (iv) You get \$100,000 now, and \$45,000 for each of the subsequent 20 years.
- (v) You get \$35,000 annually until you die.

[Note: For (v) you will need to calculate your life expectancy. Here are a few sites that might help:

<https://media.nmfn.com/tnetwork/lifespan/#0> <https://www.projectbiglife.ca/life-expectancy-calculator>

**Which option should you choose?** Explain your answers. You may assume a discount rate of 6%. Set out any further assumptions that you make. [Hint: Set this up on a spreadsheet.]

## 3. Willingness to Pay

A project would involve purchasing relatively unproductive farmland that would then be allowed to return to wetlands capable of supporting migrant birds. Researchers designed a survey to implement the dichotomous choice method, and report the following data:

Stated Price (annual payment, \$)	0	5	10	15	20	25	30	35	40	45	50
% of respondents accepting stated price	98	91	82	66	48	32	20	12	6	4	2

What is the mean willingness-to-pay for the sampled population? [Assume 100 people were sampled, if you wish.]

## 4. Writing CV questions

You have been asked to design a questionnaire for a contingent valuation of a project. Pick a project that you would like to evaluate and write a few questions that would yield answers than could be used to measure the value of the item in question. You will need to include an adequate description of the project. One page maximum! You may need to do a bit of background research, and be inventive about the project.

Here are some suggestions, just to get the ideas flowing.

- a. Project to reduce pollution from the cement factory in Rufisque, Senegal.
- b. Build fences to keep grazing animals out, allowing forest to regenerate in The Gambia.
- c. Ban on-street parking in Accra.
- d. End a project to site windmills in the waters off the coast of Togo.
- e. Reduce carbon dioxide emissions by 10%, compared to what they would otherwise be, over the next two years.
- f. Add dedicated bicycle lanes on the main streets of Lagos.
- g. Clean up the Gambia River so that it becomes swimmable.
- h. Put the electricity cables underground in your neighborhood (assuming that they are currently on poles).
- i. ... your idea!