

ELEC 481

Assignment 5

Submitted to Prof. Jeff Carmichael

Jun 1, 2020

Jian Gao

Problem 1

a)

Wage/Foregone earnings method and hedonic price method would be useful in this situation. To be more specific, we can look at the 'opportunity cost' of commuting for one hour. For example, for a person, the cost is likely to be the average hourly local income. For a specified area, the estimated value would be the hourly income times the number of local commuting people in the hour. In addition, this will reduce air pollution and improve public health as a general benefit to the society.

Conjoint analysis wouldn't work well here since it doesn't involve the process of making complex choices. Individuals tend to have fixed daily commuting method to work.

b)

All of hedonic price method, travel cost method, and travel cost method should be considered. Again, there will be a reduction in air pollution since it will be a lot easier for a lot of citizens to bike around. Meanwhile, the long new bike path may attract tourists to the city. Lastly, figuring out the preferences of the tourists helps us make decisions when building the bike path.

Wage/Foregone earnings method would not be applicable since it is hard to estimate the monetary difference between having railway tracks and the new bike path (the railway has been unused for a while).

c)

Averting behavior method and hedonic price method are related to it. Firstly, the most direct benefit can be estimated as 5% of the economic losses a flood from Mississippi River used to cause on average. Secondly, nearby property values will increase. Thirdly, due to the related precaution measures/engineering improvement, there is a possibility that more businesses are to be developed by the river.

Travel cost method is not suitable dealing this since 5% of flood risk reduction doesn't directly involve tourism.

d)

Travel cost method and conjoint analysis can be implemented in this case. After measuring benefits that people get from a particular site, we can also find the relevant data of a similar project in BC/Canada with a similar number of local residents. Meanwhile, using the data, we can analyze which factors are important to the local residents and visiting tourists.

Wage/Foregone earnings method would not be applicable since no clear relation of wage and cultural assets is established.

e)

Contingent valuation method (CVM) and wage/forgone earnings method should be used in this case, because life expectancy and monthly income could vary significantly from place to place. Life expectancy relates to political environment, local climate etc. If an average person is willing to work in the specified area, the extra/less part of the salary refers to the local income level.

Hedonic price method would not be helpful in this case, since we are targeting at a specific person not the environment itself directly.

Problem 2

a)

$$\text{Annual average market rate of salary increases} = \left(\frac{\$140,000}{\$65,000} \right)^{\frac{1}{30}} - 1 = 2.59\%$$

b)

$$\text{According to } i' = \frac{i-f}{1+f}:$$

$$\text{Annual average real rate of salary increase} = \frac{2.59\% - 2\%}{1 + 2\%} = 0.58\%$$

c)

$$i = f = 2\%$$

$$\text{Salary in 2050} = \$65,000 (F/P, 2\%, 30) = \$117,738.50$$

Problem 3 (See the spreadsheet)

a)

Duro is purchased at a borrowing interest rate of 10%.

Present worth analysis is implemented in this case. In the spreadsheet, borrowing interest rate of 10% is taken as the discount rate so that the actual sum of each year's cost can be converted to the present value. More details are in the spreadsheet.

b)

Duro is purchased at a borrowing interest rate of 15%.

The calculation here is the same as the one for part a.

Problem 4

a)

$$a = (93-87)/87 = 6.90\%$$

$$b = 93 * (1.07) = 99.51 \approx 100$$

$$c = (103-100)/100 = 3.00\%$$

$$d = (108-103)/103 = 4.85\%$$

$$e = 108 * 1.0517 = 113.58 \approx 114$$

b)

The base year of PSI is 2015 since the PSI of 2015 is 100.

c)

Use i to represent the average annual price increase.

4 years between 2012 and 2016:

$$i = \left(\frac{103}{82}\right)^{\frac{1}{4}} - 1 = 5.87\%$$

5 years between 2014 and 2019:

$$i = \left(\frac{118}{93}\right)^{\frac{1}{5}} - 1 = 4.88\%$$

Problem 5 (See the spreadsheet)

a)

$$i' = \frac{i - f}{1 + f}$$

Using Excel, actual dollars in 15 years are calculated to be \$36,424.82

b)

Using Excel, real dollars in 15 years are calculated to be \$17,121.28

c)

$$\text{Real average annual growth rate} = \left(\frac{\$17,121.28}{\$10,000}\right)^{\frac{1}{15}} - 1 = 3.65\%$$

Problem 6 (See the spreadsheet)

a)

The inflation rate I chose is 5% since it's the annual increase of utilities cost in both options. Also, the mortgage interest rate of 7% is greater than this inflation rate, and I see 7% as the annual nominal rate.

$$\text{Annual effective rate} = \left(1 + \frac{7\%}{12}\right)^{12} - 1 = 7.23\%$$

$$\text{Discount rate} = 1.05 * 1.0723 - 1 = 12.59\%$$

b)

Renting the duplex:

NPW of the cost = \$44,627.93

Buying the house:

NPW of the cost = \$51,435.14

Thus, renting is better than buying.

c)

It is missing the inflation rate, and also, the analysis would be more precise if the annual interest rate is given. From there, the discount rate can be accurately estimated.