Economics 390

Spring 2022

Homework #4

Due 4/14/2022

Homework is due by midnight Central Standard Time on its due date. Homework is to be submitted to the CANVAS course site: follow the directions for submission that are provided on the CANVAS page. The professor reserves the right to not accept homework if it is late. The expectation is that the homework will be done in a professional manner: it should be neat, well organized, and complete. You cannot receive full credit if you omit questions and do not follow the provided instructions. You will not be able to get full credit for the homework if you do not show your work in an organized, easy-to-follow manner. Illegible answers will not get full credit.

**Health Insurance**

1. Suppose you are the President of a small country and you have decided to provide health insurance to all the residents of your country. You plan to provide this health insurance by first assessing how much money you will need to set aside per year to cover the health costs of your citizens; second, figuring out what each person would need to contribute if everyone contributed the same amount to insure that all would get health insurance coverage; third, figuring out how big a subsidy per person would need to be paid by the government in order that all could afford the health insurance; and fourth, figuring out how much more needs to be collected from the affluent in order to cover the costs of these subsidies for the lower income individuals.

Luckily you do have some information:

* The population of your country is 20 people; this population is constant over time.
* 10% of your population in any given year will have significant healthcare costs of $200,000 per person; 40% of your population in any given year will have some healthcare costs of $20,000 per person; and 50% of your population in any given year will have low healthcare costs of $3000 per person. No one in the population knows with certainty whether they will have significant healthcare costs, some health care costs, or low healthcare costs each year.
* You also have the following information about everyone in your country:

|  |  |
| --- | --- |
| Individual | Income Available to be spent on health insurance (this is related to total gross income of the individual) |
| Bob | $40,000 |
| Karen | $23,000 |
| Marco | $28,000 |
| Helena | $32,000 |
| YuChi | $20,000 |
| Xiao | $32,000 |
| May | $30,000 |
| Dennis | $25,000 |
| Vivian | $55,000 |
| April | $25,000 |
| Zau | $24,000 |
| Haixli | $28,000 |
| Marty | $16,000 |
| Jerry | $20,000 |
| Tim | $28,000 |
| George | $28,000 |
| Peter | $35,000 |
| Mariah | $26,000 |
| Tom | $35,000 |
| Luke | $40,000 |

a. Given the above information calculate the amount of money you will need to collect in order to cover this year’s health care costs in your country. Use the following table to help you calculate these costs.

|  |  |  |  |
| --- | --- | --- | --- |
| % of population with health issue | Number of people with particular health issue | Cost per person of this particular health issue | Total cost for this health issue |
| 10% of population have significant health costs |  |  |  |
| 40% of population have some health costs |  |  |  |
| 50% of population have low health costs |  |  |  |
| TOTAL COST OF COVERING ALL HEALTH ISSUES | ----- | ----- |  |

b. If everyone in the country is required to pay an equal amount for health insurance and the President wishes to collect enough funds to cover all health costs for the year, what payment will each individual be required to make?

c. Now that you have calculated the amount of money per person (the healthcare insurance premium) you will need to collect to cover the costs of the year’s health care, take the time to calculate how much additional money you will need to collect from the affluent in order to subsidize the lower income individuals when they go to purchase their health insurance. You will find it helpful to use the following table. Note: lest you think that this is an all-together dumb plan (against the Affordable Care Act) recall that in the U.S. our policy has been to provide healthcare even if you do not have insurance-and this healthcare cost does get past on to someone who has to pay in the form of a combination of higher taxes and higher medical costs.

|  |  |  |
| --- | --- | --- |
| Individual | Income Available to be spent on health insurance (this is related to total gross income of the individual) | Amount of subsidy required for the individual to be able to afford the healthcare insurance premium for the year |
| Bob | $40,000 |  |
| Karen | $23,000 |  |
| Marco | $28,000 |  |
| Helena | $32,000 |  |
| YuChi | $20,000 |  |
| Xiao | $32,000 |  |
| May | $30,000 |  |
| Dennis | $25,000 |  |
| Vivian | $55,000 |  |
| April | $25,000 |  |
| Zau | $24,000 |  |
| Haixli | $28,000 |  |
| Marty | $16,000 |  |
| Jerry | $20,000 |  |
| Tim | $28,000 |  |
| George | $28,000 |  |
| Peter | $35,000 |  |
| Mariah | $26,000 |  |
| Tom | $35,000 |  |
| Luke | $40,000 |  |
|  | TOTAL ADDITIONAL AMOUNT OF MONEY THAT MUST BE COLLECTED TO COVER SUBSIDY TO LOWER INCOME INDIVIDUALS |  |

d. Suppose the cost of the healthcare insurance subsidy is divided among those who have more income available for health insurance than the amount of required premium. Start by divvying up the healthcare insurance premium so that no one supports the subsidy beyond the level of income they have available for health insurance; and then divide any remaining subsidy needed evenly among those individuals who still have funds available (you will need to think carefully here). Show how you found your answer. Also fill in the following table to consolidate your work in this problem. Remember that each individual cannot spend more than the amount of their income they have available for health insurance: this implies that you may have to do some thinking about the amount of subsidy that is being paid by lower income individuals. [Hint: I found it extremely helpful to use Excel so that I could quickly check my math calculations! You might want to give it a try.]

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Individual | Income Available to be spent on health insurance (this is related to total gross income of the individual) | Amount of subsidy required for the individual to be able to afford the healthcare insurance premium for the year | Healthcare Insurance Premium (what the individual paid for their healthcare insurance) | Additional charge per person to cover healthcare subsidy costs | Total Payment per person for Healthcare Insurance (includes premium plus subsidy) |
| Bob | $40,000 |  |  |  |  |
| Karen | $23,000 |  |  |  |  |
| Marco | $28,000 |  |  |  |  |
| Helena | $32,000 |  |  |  |  |
| YuChi | $20,000 |  |  |  |  |
| Xiao | $32,000 |  |  |  |  |
| May | $30,000 |  |  |  |  |
| Dennis | $25,000 |  |  |  |  |
| Vivian | $55,000 |  |  |  |  |
| April | $25,000 |  |  |  |  |
| Zau | $24,000 |  |  |  |  |
| Haixli | $28,000 |  |  |  |  |
| Marty | $16,000 |  |  |  |  |
| Jerry | $20,000 |  |  |  |  |
| Tim | $28,000 |  |  |  |  |
| George | $28,000 |  |  |  |  |
| Peter | $35,000 |  |  |  |  |
| Mariah | $26,000 |  |  |  |  |
| Tom | $35,000 |  |  |  |  |
| Luke | $40,000 |  |  |  |  |
| COLUMN TOTALS | --- |  |  |  |  |

e. To further complicate this issue let’s imagine that people in this group actually know more about their healthcare situation than does the President. The following table tells us what they privately know about their healthcare situation for the coming year (assume that this information is completely accurate).

|  |  |  |
| --- | --- | --- |
| Individual | Income Available to be spent on health insurance (this is related to total gross income of the individual) | Private Information the individual has about his healthcare for this year |
| Bob | $40,000 | Low Healthcare costs |
| Karen | $23,000 | Significant Healthcare costs |
| Marco | $28,000 | Some Healthcare costs |
| Helena | $32,000 | Significant Healthcare costs |
| YuChi | $20,000 | Some Healthcare costs |
| Xiao | $32,000 | Low Healthcare costs |
| May | $30,000 | Some Healthcare costs |
| Dennis | $25,000 | Some Healthcare costs |
| Vivian | $55,000 | Low Healthcare costs |
| April | $25,000 | Low Healthcare costs |
| Zau | $24,000 | Low Healthcare costs |
| Haixli | $28,000 | Low Healthcare costs |
| Marty | $16,000 | Some Healthcare costs |
| Jerry | $20,000 | Low Healthcare costs |
| Tim | $28,000 | Some Healthcare costs |
| George | $28,000 | Low Healthcare costs |
| Peter | $35,000 | Low Healthcare costs |
| Mariah | $26,000 | Some Healthcare costs |
| Tom | $35,000 | Low Healthcare costs |
| Luke | $40,000 | Some Healthcare costs |

Given your answers in (b) and (d), make a prediction about whether each of these individuals will be willing to voluntarily pay into the healthcare pool. Assume that all individuals in this country consider only the financial costs to themselves of buying the healthcare insurance and their private healthcare information (that is, no one is altruistic in this community!). Use the following table to consolidate your predictions. Explain your answers.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Individual | Income Available to be spent on health insurance (this is related to total gross income of the individual) | Private Information the individual has about his healthcare for this year | Projected Total Payment per person for Healthcare Insurance (includes premium as well as any share of subsidy cost) from (d) | Projected Healthcare costs for the year | Prediction as to participation in healthcare insurance program if given option to participate or not |
| Bob | $40,000 | Low Healthcare costs |  |  |  |
| Karen | $23,000 | Significant Healthcare costs |  |  |  |
| Marco | $28,000 | Some Healthcare costs |  |  |  |
| Helena | $32,000 | Significant Healthcare costs |  |  |  |
| YuChi | $20,000 | Some Healthcare costs |  |  |  |
| Xiao | $32,000 | Low Healthcare costs |  |  |  |
| May | $30,000 | Some Healthcare costs |  |  |  |
| Dennis | $25,000 | Some Healthcare costs |  |  |  |
| Vivian | $55,000 | Low Healthcare costs |  |  |  |
| April | $25,000 | Low Healthcare costs |  |  |  |
| Zau | $24,000 | Low Healthcare costs |  |  |  |
| Haixli | $28,000 | Low Healthcare costs |  |  |  |
| Marty | $16,000 | Some Healthcare costs |  |  |  |
| Jerry | $20,000 | Low Healthcare costs |  |  |  |
| Tim | $28,000 | Some Healthcare costs |  |  |  |
| George | $28,000 | Some Healthcare costs |  |  |  |
| Peter | $35,000 | Low Healthcare costs |  |  |  |
| Mariah | $26,000 | Some Healthcare costs |  |  |  |
| Tom | $35,000 | Low Healthcare costs |  |  |  |
| Luke | $40,000 | Low Healthcare costs |  |  |  |

f. Given your work in this problem, provide a brief explanation of why the Affordable Care Act (“Obamacare”) includes both a subsidy for low income individuals as well as an Individual Mandate that requires everyone to purchase healthcare insurance.

2. Consider a health insurance market that is made up of poor people and non-poor people. You are provided the following information where P is the price per medical visit and Q is the number of medical visits. For simplicity we will assume that all medical visits are the same and result in equivalent costs for the provider of medical services.

Demand for medical visits by the poor: P = 200 – Q

Demand for medical visits by the non-poor: P = 1000 – Q

Supply of medical visits: P = 20 + (2/25)Q

a. Suppose that the government does not make any provision for providing reduced cost or free medical care to the poor. Given this assumption determine the following values, making sure you show your work.

i. Equation(s) for the market demand curve and the relevant domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ii. Price of a medical visit = \_\_\_\_

iii. Quantity of medical visits the poor receive = \_\_\_\_\_

iv. Quantity of medical visits the non-poor receive = \_\_\_\_\_\_

b. Suppose that instead of the approach of the government described in (a), that the government instead decides to implement a program that provides all medical visits for the poor for free. Given this assumption determine the following values, making sure you show your work. [Hint: keep all prices and quantities as improper fractions as you work through your answers.]

i. Equation(s) for the market demand curve and the relevant domain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ii. Price of a medical visit = \_\_\_\_

iii. Quantity of medical visits the poor receive = \_\_\_\_\_

iv. Quantity of medical visits the non-poor receive = \_\_\_\_\_\_

c. Compare the two programs described in (a) and (b). Which program will the non-poor prefer and why? Which program will the poor prefer and why? Use your data to strengthen your answer.

3. Consider a market for health care that is described as follows where P is the price per medical visit and Q is the quantity of medical visits. For simplicity we will assume that all medical visits are the same and result in equivalent costs for the provider of medical services.

Demand for medical visits: P = 1000 - Q

Supply of medical visits: P = 100 + (1/2)Q

a. Given the above information, what is the equilibrium price and equilibrium quantity of medical visits in this market? Show your work.

b. Now, suppose that the consumers in this market get health insurance that covers 50% of the cost of a medical visit. Given this assumption and the provided information, provide your answers to the following.

i. What is the new market demand curve given this insurance?

ii. What is the new equilibrium price per medical visit?

iii. What is the new equilibrium quantity of medical visits?

**Mortgages**

4. In class we have studied mortgages and, in particular, a fixed rate thirty-year mortgage. Let us consider that kind of loan for this set of questions.

Suppose you have signed a thirty-year fixed rate mortgage in order to buy a house. Evaluate each of the following statements about this mortgage.

i. Each month this mortgage requires that the borrower make a payment of the same dollar amount to the lending institution. During the spring of 2020 some lending institutions implemented different responses to the COVID-19 crisis. One intervention that some institutions implemented was an ability to miss a mortgage payment and simply tack that missing payment onto the end of the mortgage (so, for example if you still had X monthly payments to make with the final payment in June 2035, the lending company said you could miss a month and have your final payment in July of 2035). Write a short essay explaining why the lending institution might have implemented the policy.

ii. In the first years of this mortgage the borrower’s payment consists primarily of paying interest to the lender and in the last years of the mortgage the borrower’s payments consists primarily of paying back the principal of the loan to the lender.

iii. The principal balance on the loan initially decreases at a very fast rate and it is only after a number of years that the principal balance on the loan declines at a decreasing rate.

iv. If a borrower borrows $500,000 at 5% interest per year for thirty years then the borrower, if they keep the loan for thirty years, will pay back (500,000)(1 + .05) = $525,000.

v. A requirement by the lender for the borrower to provide a down payment when securing a mortgage is a requirement that protects only the borrower and not the lender.