Public economics (Prof. Parisi, academic year 2023-24)

Exercises: social indifference curves; inequality (Lorenz curve), poverty indexes.

1. Solve exercises 1, 2, 3, 4, 5 in Chapter 7 of our textbook. In exercise 2 remember that if for example Friday (or Crusoe) gets 1 orange, the other person gets no oranges and in this case his utility will be 0. Then, if Friday gets 7 oranges, Crusoe will get 1 orange and so on. You can easily calculate the social welfare corresponding to each allocation. Discussion in class.
2. Draw the social indifference curves corresponding to the welfare function: $W=U^1+U^2$. Then repeat for the social welfare function $W=\min\{U^1,U^2\}$.welfare function. What do these indifference curves imply about the degree of concern for equity of the social planner? Discussion in class.
    a) Consider a community with 10 persons and the following income distribution: (2,4,6,8,10,12,14,16,18,20).
    b) Plot the Lorenz curve for the.
    c) Consider an alternative income distribution that takes two units of income from each of the four richest individuals and gives two units to each of the four poorest. Plot the Lorenz curve again.
    d) How can you interpret the effects of the redistribution process on inequality?

    Results: for the calculation of the values of the Lorenz curve you can use the example provided in the excel file available on the classroom page.

3. Consider the income distribution of exercise 2. Leaving total income unchanged, what would be the income distribution in the case of:
    a) perfect income equality;
    b) maximum income inequality?

    What would be the shape of the Lorenz curve in both cases? Use the excel file available on the classroom page to discuss your results. Hint: you can change individual income in column B and derive the Lorenz curve.

    Results: discussion in class. For the shape of the Lorenz curve in the two cases refer to the textbook.

4. Consider a hypothetical island with only ten people. Eight have income of 10,000 Euros, one has income of 50,000 Euros, and one has income of 100,000 Euros.
    a) Draw the Lorenz curve for this income distribution.
    b) Suppose income of the richest person increases to 500,000 Euros. How does it change the Lorenz curve?

    Results: again, for the calculation of the values of Lorenz curve you can use the example provided in the excel file available on the classroom page.

5. Consider again the income distribution of exercise 2. Now assume the government introduces a proportional income tax with a rate t of 30% on all individuals. Calculate the new income distribution and plot the relative Lorenz curve. Can you conclude that a proportional income tax is redistributive? Hint: after-tax income can be written as $Y_{post} = (1-t)\ Y_{pre}$.

    Results: discussion in class.

6. Consider the income distribution (20,40,60,80,100,120,140,160,180,200). Now assume the

government introduces a proportional income tax with a statutory rate t of 20% with a fixed deduction d of 10 Euros from individual income. Calculate the new income distribution and plot the relative Lorenz curve. How does this case compare with the previous one? Can you conclude a proportional income tax with a fixed income deduction is redistributive? Hint: After-tax income can be written as $Y_{post} = (1-t)\,(Y_{pre} - d)$ where d is the fixed income deduction.

7. Consider the income distribution (20,50,80,100,140,180,200,250.300,500). The poverty line is defined as half of the average income of the population. Calculate the:
   a) poverty line;
   b) poverty ratio;
   c) poverty gap ratio.

   Results: (a) 91; (b) 0,3; (c) 0,45.

8. Consider data of exercise 2. What would be the poverty rate and the poverty gap ratio in the case of (a) perfect equality; (b) maximum inequality?

   Results: discussion in class.

9. Consider again the previous exercise. In order to reduce poverty, the Government introduces a minimum income scheme where the subsidy (S) equals 80% of the difference between the poverty line and individual income (Y_i): $S = 0{,}8*(P - Y_i)$. Calculate:
   a) the new income distribution
   b) the poverty index after the reform;
   c) the poverty gap ratio after the reform.

   Moreover, discuss the effects of the reform on labour supply (poverty trap).

   Results: (a) for the poor individuals the new income levels are: 76,8, 82,8, and 88,9; (b) 0,3; (c) 0,09.

10. Consider again the income distribution of exercise 6. Now assume the Government wants to eliminate poverty by introducing a minimum income scheme where the subsidy (S) equals the difference between the poverty line and individual income (Y_i): $S = (P - Y_i)$. Do you think this scheme is more efficient than the one considered in the previous exercise? In particular, discuss the effects of the income support on labour supply. (Hint: compare the effects of producing an additional unit of income under the two schemes on the amount of the subsidy).

    Results: discussion in class.