University of Athens
Department of Economics
Master's program in Applied Economics and Finance

Academic year 2025-2026
Spring-Summer term

Course: Economic Policy

DEADLINE: 10th of June

Assignment no. 2: Answer all questions

Question 1

a) Consider a mini-society consisting of five individuals. They earn respectively 5, 20, 25, 10, and 40. Draw the Lorenz curve for this mini-society.
b) Assume that the government implements a programme yielding the following distribution: 20, 5, 15, 40, and 20. How did the programme impact the distribution as measured by the Lorenz curve?
c) Assume that instead of the programme in c), the government implements a redistribution programme resulting in the following incomes: 5, 30, 30, 5, and 30. How did this programme change the distribution in b) as measured by the Lorenz curve?

Question 2.

Sketch the indifference curves of the Bergson-Samuelson social welfare function $W = U^1 + U^2$. What do these indifference curves imply about the degree of concern for equity of the social planner? Repeat for the welfare function $W = \min\{U^1, U^2\}$.

Question 3.

There are H consumers who each have utility function $U^h = \log(M^h)$. If the social welfare function is given $W = \sum U^h$, show that a fixed stock of income will be allocated equitably. Explain why this is so.

Question 4.

Consider a community with ten persons.
a. Plot the Lorenz curve for the income distribution (2, 4, 6, 8, 10, 12, 14, 16, 18, 20).
b. Consider an income redistribution that takes two units of income from each of the four richest consumers and gives two units to each of the four poorest. Plot the Lorenz curve again to demonstrate that inequality has decreased.
c. Show that the Lorenz curve for the income distribution (2, 3, 5, 9, 11, 12, 15, 17, 19, 20), crosses the Lorenz curve for the distribution in part a.
d. Show that the two social welfare functions $W = \sum M^h$ and $W = \sum \log(M^h)$ rank the income distributions in parts a and c differently.

Question 5.

Consider the utility function $U = \alpha \log(x_1) + \beta \log(x_2) - l$ and budget constraint $wl = q_1x_1 + q_2x_2$.
a. Show that the price elasticity of demand for both commodities is equal to -1.
b. Setting producer prices at $p_1 = p_2 = 1$, show that the inverse elasticity rule implies $t_1/t_2 = q_1/q_2$.
c. Letting $w = 100$ and $\alpha + \beta = 1$, calculate the tax rates required to achieve revenue of $R = 10$.

Question 6.

''If all commodities are taxed at the same rate, the distortion in prices is minimized.'' Explain why this statement does not act as a guide for setting optimal commodity taxes.

Question 7.

One country has a tax rate of 10% on the first 20,000 euros of taxable income, then 25% on the next 30,000 euros, then 50% on all taxable income above 50,000 euros. This country also provides a 4,000 euro exemption per family member. Mario's family has 3 members and earns 50,000 euros per year. What is the marginal and average tax rates faced by this family?

Question 8.

Consider an economy with two consumers who have skill levels $s_1 = 1$ and $s_2 = 2$ and utility function $U = 10x^{1/2} - l^2$. Let the government employ an income tax function that leads to the allocation $x = 4$, $z = 5$ for the consumer of skill $s = 1$ and $x = 9$, $z = 8$ for the consumer of skill $s = 2$.
a. Show that this allocation satisfies the incentive compatibility constraint that each consumer must prefer his allocation to that of the other.
b. Keeping incomes fixed, consider a transfer of 0.01 units of consumption from the high-skill to the low-skill consumer.
i. Calculate the effect on each consumer's utility.
ii. Show that the sum of utilities increases.
iii. Show that the incentive compatibility constraint is still satisfied.
iv. Use parts i through iii to prove that the initial allocation is not optimal for a utilitarian social welfare function.

Question 9.

A consumer has a choice between two occupations. One occupation pays a salary of €80,000 but gives no chance for tax evasion. The other pays €75,000 but does permit evasion. With the probability of detection $p = 0.3$, the tax rate $t = 0.3$, and the fine rate $F = 0.5$, which occupation will be chosen if $U = Y^{1/2}$?

Question 10.

Are the following statements true or false?

(a) The theory of optimal commodity taxation argues that tax rates should be set equal across all commodities so as to maximize efficiency by "smoothing taxes".

(b) In the United States prescription drugs and CDs are taxed at the same rate of 10 percent. The Ramsey rule suggests that this is the optimal tax policy.

(c) Some economists have proposed replacing the income tax with a consumption tax to avoid taxing savings twice. This is a good policy both in terms of efficiency and equity.

Question 11.

Suppose that the tax rate is 30%. Suppose also that the probability of getting caught evading taxes is 10% plus an additional 2.5% for every €1,000 in tax evasion. (Hence, the probability of been caught P = 0.1 + 0.025X, where X is the number of euros (in thousands) of evasion.) Individuals who are caught evading taxes will be forced to pay the taxes they owe in addition to a €10,000 penalty. How much evasion will a risk-neutral taxpayer engage in? How would your answer change for a risk-averse taxpayer?

Question 12.

1. Marmara, Inc., is a monopolist whose cost of production is given by $10Q + Q^2$. Demand for Marmara's products is $Q = 200 - 2P$.

a. What price will the monopolist charge and what profits will the monopolist earn? What will consumer surplus be?

b. How will the monopolist's price and profits change if a tax of €15 per unit is imposed on the buyers of the product?

c. What is the excess burden of the tax?

Question 13.

In an effort to reduce alcohol consumption, the government is considering a €1 tax on each litre of liquor sold (the tax is levied on producers). Suppose that the demand curve is $Q^D = 500{,}000 - 20{,}000P$ (where Q^D is the number of litres of liquor demanded and P is the price per litre), and the supply curve for liquor is $Q^S = 30{,}000P$ (where Q^S is the number of litres supplied).

a. Compute how the tax affects the price paid by consumers and the price received by producers.

b. How much revenue does the tax raise for the government? How much of the revenue comes from consumers, and how much from producers?

c. Suppose that the demand for liquor is more elastic for younger drinkers than for older drinkers. Will the liquor tax be more, less, or equally effective at reducing liquor consumption among young drinkers? Explain.

Question 14.

A good is traded in a competitive market. The demand function is given by X = 75 — 5P and supply is perfectly elastic at the price P = 10.

a. A specific tax of value t = 2 is introduced. Determine the tax incidence.

b. An ad valorem tax at a rate of t = 0.2 is introduced. Determine the tax incidence.

c. How do the incidence of the specific tax and the ad valorem tax differ if supply is given by Y = 2.5P

Question 15.

Are the following statements true or false?

a. The theory of optimal commodity taxation argues that tax rates should be set equal across all commodities so as to maximize efficiency by "smoothing taxes."

b. In the United States prescription drugs and CDs are taxed at the same rate of 10 percent. The Ramsey rub' suggests that this is the optimal tax policy.

c. Some economists have proposed replacing the income tax with a consumption tax to avoid taxing savings twice. This is a good policy both in terms of efficiency and equity.

Question 16.

Tax evasion is particularly common for workers in professions such as waiting tables and bartending, where tips make up a substantial fraction of compensation. Use economic theory to explain why this is the case.

Question 17.

What is the difference between tax evasion and tax avoidance? How would you empirically distinguish the two phenomena?