University of Athens

Department of Economics   Academic year 2023-2024
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Course: Public Finance
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Assignment No 3. *Correct Answers are in bold italics*

A. Multiple Choice Questions (Indicate the correct answer with a circle around the appropriate letter**)**

1. The losses to consumers and producers of a tax can be represented by the standard consumer and producer surplus areas
a. using the actual demand curve.
b. ***using a compensated demand curve.***
c. using the actual demand curve if it only represents income effects.
d. using the actual demand curve if it represents both income and substitution effects.

2. The sharing of the tax burden of an excise tax between consumers and producers
a. depends on who is taxed.
b. ***depends on the relative elasticities of the demand and supply curves.***
c. should not be considered when analyzing taxes.
d. none of the above are correct.

3. The more inelastic demand is relative to supply
a. the larger is the difference between the gross and net of tax prices under an excise tax.
b. the more producers bear the burden of an excise tax.
c. ***the more consumers bear the burden of an excise tax.***
d. none of the above are correct.

4. The more elastic demand is relative to supply
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b. ***the more producers bear the burden of an excise tax.***
c. the more consumers bear the burden of an excise tax.
d. none of the above are correct.

5. The side of the market that the legislature chooses to tax
a. determines the incidence of the tax.

b.   ***has no bearing on the incidence of the tax***.

c.   changes the price only in the market that is being taxed.

d.   none of the above are correct.

6.   Tax avoidance

a.   is possible because of the presence of private information.

b.   ***is entirely legal***.

c.   occurs when individuals do not fully report their income.

d.   none of the above are correct.

7.   Tax evasion

a.   is not punishable by law.

b.   refers to taxpayers taking advantage of the tax laws to reduce their taxes.

c.   refers to individuals giving to charity to reduce their tax payment.

d.   ***refers to individuals exploiting private information to reduce taxes.***

8.   What should taxes be set to in order to raise a given amount of revenue at minimum overall deadweight loss? Tax rates

a.   should be set to generate an equal percentage change in the compensated demands for most goods.

b.   should be equalized between all goods.

c.   ***should be set to generate an equal percentage change in the compensated demands for all goods***.

d.   should be set to half of the elasticity of the compensated demand curve.

9.   When designing a tax system,

a.   ***both efficiency and equity should be considered.***

b.   neither efficiency nor equity are important.

c.   efficiency is the only objective that should be considered.

d.   equity is the only objective that should be considered.

10. The deadweight loss from taxes

e.   makes society better off.

f.   ***forces the economy to operate below the utility possibilities frontier***.

g.   increases the amount of equity in society.

h.   results from not taxing all goods equally.

11. Food used for home consumption should be taxed heavily

a.   ***on efficiency grounds, but not taxed heavily on equity grounds.***

b.   on equity grounds, but not taxed heavily on efficiency grounds.

c.   under no circumstance.

d.   only in countries that do not implement an income tax.

12. Why do economists consider taxes to be a problem?

a.   Taxes decrease consumer and increase producer surplus.

b.   ***Taxes drive a wedge between the prices faced by consumers and firms.***

c.   Taxes unfairly target the poor.

d.   Taxes raise government revenue.

13. The excess burden of the tax is related to the

a.   income effect.

b.   tax revenue effect.

c.   ***substitution effect***.

d.   price effect.

14. To reduce the deadweight loss of taxes,

a.   goods with an elastic demand curve should be taxed.

b.   goods with an inelastic demand curve should be taxed.

c.   goods with an elastic supply curve should be taxed.

d.   ***goods with an inelastic compensated demand curve should be taxed.***

15. The Benthamite social welfare function assumes that society

a. only cares about inequality.

b. ***is indifferent to inequality.***

c. cares only about those who are the worst off.

d. wants to eliminate all inequality.

16. Rawls view of distributive justice is based on the concept of

a. the greatest good for the greatest number.

b. impersonality.

c. equality for all.

d. ***the veil of ignorance.***

17. Rawls view of distributive justice is based on the idea that

a. self-knowledge biases our thinking about distributive justice.

b. society does not care about distributive justice.

c. ***society only cares about distributive justice.***

d. a lack of self-knowledge biases our thinking about distributive justice.

18. Rawls argues that due to uncertainty as to one's place in the income distribution

a. *citizens would choose not to tax and transfer.*

b. citizens would choose to maximize the well-being of the individual with the highest utility.

c. citizens would choose to maximize the well-being of the individual with the lowest utility.

d. citizens would choose to maximize the well-being of the individual with the average utility.

19. Which of the following shapes do most economists argue that social welfare

   indifference curves should have?

a. Straight lines.

b. *Right angles.*

c. Negatively-sloped curves that are convex to the origin.

d. 45-degree lines.

20. Income distribution is more equal the closer the value of the Gini coefficient to

a. 2.

b. 1.

c. 0.5

d. 0.

21. A social welfare function following the utilitarian approach

a. is maximized in the case of identical individuals when income is equally distributed.

b. is maximized in the case of identical individuals when income is unequally distributed.

c. is maximized in the case of individuals who are not identical when income is equally distributed.

d. assumes marginal utility increases per euro of income.

22. An in-kind income transfer results in an

a. increase in consumption equal to the in-kind transfer.

b. increase in consumption of the good transferred and an increase in consumption of other goods as well.

c. increase in consumption of other goods and no increase in consumption of the in-kind good.

d. indeterminate change in consumption, with consumption of at least one of the goods increasing.

Problems

1. Mantara, Inc., is a monopolist whose cost of production is given by $10Q + Q^2$. Demand for Mantara'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?

First we calculate the profit-maximizing quantity by setting marginal cost equal to marginal revenue. Marginal cost is $10 + 2Q$. Marginal revenue can be found by solving for the inverse demand curve, $P = 100 - \frac{1}{2}Q$ and noting that the marginal revenue curve has the same P-axis intercept and is twice as steeply sloped. Hence, marginal revenue is $100 - Q$. Setting MR = MC and solving for Q, $10 + 2Q = 100 - Q$, or $3Q = 90$, or $Q = 30$. Therefore, the profit-maximizing quantity is 30, and the profitmaximizing price can be found from the inverse demand curve: $P = 100 - \frac{1}{2}(30) = €85$. Profits are computed as the difference between total revenue and total cost, or $€85(30) - 10(30) - 30*30 = 2,550 - 1,200 = 1,350$. Consumer surplus can be computed as the area of the triangle with width $Q = 30$ and height $100 - 85 = 15$ (the difference between the P-intercept of demand and the price paid). Computing, consumer surplus $= \frac{1}{2}(30)(15) = 225$.

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?

Imposing a €15 tax on buyers will change their demand curve to $Q = 200 - 2(P+15)$, or $Q = 170 - 2P$, where P is the pretax ("sticker") price. The new inverse demand is $P = 85 - \frac{1}{2}Q$, and the new marginal revenue is $P = 85 - Q$. Setting equal to marginal cost and solving gives $10 + 2Q = 85 - Q$, or $3Q = 75$, or $Q = 25$.
The profit-maximizing price is thus $P = 85 - \frac{1}{2}Q = €72.50$. Profits are given by $€72.50(25) - 10(25) - 25^2 = 1,812 - 875 = 937.5$.

c. What is the excess burden of the tax?

To compute the excess burden of the tax, we look at the change in total surplus (including tax revenue as surplus). The after-tax consumer surplus can be computed from the new demand curve:
$\frac{1}{2}(25)(12.50) = 156.25$, where 25 is the quantity purchased and $12.50 = 85 - 72.5$ is the difference between the P-intercept of demand and the price paid. The tax revenue is $25(15) = 375$. Hence, the excess burden of the tax is $(1,350 + 225) - (937.5 + 156.25 + 375) = 1575 - 1468.75 = 106.25$.

2. 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.

2. Answer
a.   *Before-tax equilibrium: P = €10 and Q = 300,000 After-tax equilibrium: P = €10.60 and Q = 288,000.*
Consumers pay €10.60 and producers receive €9.60.

b.   *Revenue = €288,000. Consumers bear 60 percent of the tax burden and producers bear 40 percent. So, €172,800 comes from consumers and €115,200 from producers.*

c.   *With a more elastic demand curve, quantity consumed will decrease even more as a result of the tax, so the liquor tax will be more effective at reducing consumption among young drinkers.*

3. Luxury goods often have much higher elasticities of demand than do goods purchased by a broad base of people. Why, then, are governments more likely to tax luxuries than these "staple" goods?

3. Answer
While the Ramsey Rule would suggest taxing goods that are inelastically demanded, thus minimizing deadweight loss, there are other factors to consider; in particular, equity concerns are often inconsistent with this implication of optimal taxation. A tax on inelastically demanded staples such as food would be regressive. Poorer people would spend a higher proportion of their income on necessities, so they would bear a disproportional share of a tax on those items. Wealthy people are much more likely to purchase luxury items, so the direct effects of a tax on these goods would be progressive. (Indirect effects, like employment in the sectors that produce and service luxury goods, might not be as progressive.)

4. Which of the following is likely to impose a large excess burden? *a.*
A tax on land.
b. A tax of 24 percent on the use of cellular phones.
c. A subsidy for investment in "high-tech" companies.
d. A tax on the economic profits of a monopolist.

4. Answer
a. Since land is fixed in supply, we expect no excess burden when it is taxed. The supply curve is inelastic.

b. There are fairly good substitute for cell phones. Therefore, their demand is quite elastic, and a tax on them will have a substantial excess burden, relative to the size of revenues collected.

c. Without knowing exactly what "high-tech" means, it is likely that many companies could relabel themselves as high-tech in order to receive the subsidy. Thus, the supply is quite elastic, and there will be substantial excess burden.

d. A tax on economic profits does not affect behaviour, and hence has no excess burden.

5. The government of Blueland is thinking about imposing a very small tax on one or more of the following goods: videos, books, and sweaters. videos and books are both produced in competitive markets with constant marginal costs, while sweaters are produced by a monopoly with constant marginal costs. The elasticities of demand for the three goods are –3, –1.5, and –1. What good or goods should the government put the very small tax on if it wants to minimize the deadweight burden?

5. Answer
The government should tax both videos and books but not sweaters. The marginal deadweight burden from a small tax on a competitively produced good is very small (limiting to zero at zero tax), so small taxes on both these goods is not very costly. Because the monopoly output is below the social optimum already, however, a small tax on sweaters would create more deadweight burden. Thus, equating the marginal deadweight burden across goods requires both taxing the competitively produced goods and subsidizing the monopoly sales.

6. "Peter the Great at one time levied a tax upon beards. He held that the beard was a superfluous and useless ornament. The tax is said to have been proportional according to the length of the beard and progressive according to the social position of its possessor". Evaluate Peter's beard tax from the standpoint of optimal tax theory and from the standpoint of horizontal equity.

6. Answer

The beard tax was progressive because it was a function of social position. It's hard to know about the efficiency consequences unless one knows more about the price elasticity of demand for the privilege of having a beard. If the elasticity was small, then it would be an efficient tax. However, conventional notions of horizontal equity suggest that the tax was unfair.

7. Suppose that Anna faces a marginal income tax rate of 35 percent, and if she cheats on her taxes, there is a 2 percent chance that she will be caught. Suppose also that the marginal penalty of tax evasion is $10I$, where I is the amount of unreported income (in thousands of euros). How much income will Anna fail to report?

7. Answer
The marginal benefit of underreporting is equal to the taxes saved, which is simply the person's marginal tax rate, or MB = t. The expected marginal cost of underreporting €1 of income is equal to the product of the probability of getting caught and the fine per dollar of underreporting, or MC = ρ*Marginal Penalty. The optimal amount of underreporting, R^* equals zero if MC ≥ MB. Thus, if ρ*Marginal Penalty ≥ t, then there will be no underreporting. With ρ = 0.02 and t = 0.35, the inequality becomes 0.02*Marginal Penalty ≥ 0.35, or Marginal Penalty ≥ €17.50. With a fine of €17.50 (or more), Anna would not cheat on her taxes.

8. Suppose there are only two people, Simon and Charity, who must split a fixed income of €100. For Simon, the marginal utility of income is

$$MU_s = 400 - 2I_s$$

while for Charity, marginal utility is

$$MUc = 400 - 6Ic$$

where I_c, I_s are the amounts of income to Charity and Simon, respectively.

a. What is the optimal distribution of income if the social welfare function is additive?

b. What is the optimal distribution if society values only the utility of Charity? What if the reverse is true? Comment on your answers.

c. Finally, comment on how your answers change if the marginal utility of income for both Simon and Charity is constant:

$$MUc = 400 \quad MUc = 400$$

8. Answer

a. To maximize W, set marginal utilities equal; the constraint is $I_s + I_c = 100$. So,

$$400 - 2I_s = 400 - 6I_c.$$

substituting $I_c = 100 - I_s$ gives us $2I_s = 6 (100 - I_s)$.

Therefore, $I_s = 75$, $I_c = 25$.

b. If only Charity matters, then give money to Charity until $MU_c = 0$ (unless all the money in the economy is exhausted first). So, $400-6 I_c = 0$; hence, $I_c = 66.67$. Giving any more money to Charity causes her marginal utility to become negative, which is not optimal. Note that we don't care if the remaining money (€33.33) is given to Simon or not.
If only Simon matters, then, proceeding as above, $MU_s. 0$ if $I_s = 100$; hence, giving all the money to Simon is optimal. (In fact, we would like to give him up to €200.)

c. $MU_s = MU_c$ for all levels of income. Hence, society is indifferent among all distributions of income.

9. Would a government program that transferred income from the middle class to both the poor and the rich be supported by someone with the maximin social welfare function?

Answer

According to the maximin criterion, social welfare depends on the utility of the individual who has the minimum utility in the society. A peculiar implication of this criterion, as noted by Feldstein, is that if society has the opportunity to raise the welfare of the least advantaged by a slight amount, but make almost everyone else substantially worse off except for a few individuals who would become extremely wealthy, then society should pursue this opportunity. Transferring large sums of income from the middle class to both the poor and the rich would achieve this end, and so would be supported by someone with the maximin social welfare function.

10. An economy consists of two individuals, Lynne and Jonathan, whose utility levels are given by U_L and U_J, respectively.

a. Suppose that the social welfare function is
$$W = U_L + U_J$$

True or false: Society is indifferent between giving a euro to Lynne and a euro to

Jonathan.

b. Now suppose that, instead, the social welfare function is

$$W = U_L + 8U_J$$

True or false: Society values Jonathan's happiness more than Lynne's.

c. Now suppose that, instead, the social welfare function is

$$W = \min [U_L, U_J]$$

True or false: In this society, the optimal distribution of income is complete equality.

Answer

a. False. Society is indifferent between a util to each individual, not a euro to each individual. Imagine that $U_L=I$ and $U_J=2I$. Then each euro given to Jonathan raises welfare more than the same euro given to Lynne.

b. True. The social welfare function assumes a cardinal interpretation of utility so that comparisons across people are valid.

c. False. Departures from complete equality raise social welfare to the extent that they raise the welfare of the person with the minimum level of utility. For example, with the utility functions $U_L=I$ and $U_J=2I$, the social welfare function $W=\min[U_L,U_J]$ would allocate twice as much income to Lynne than Jonathan.