

Course: Economic Policy

Assignment no. 1:

Answer all questions. Deadline 17 April 2026

Question 1.

Since the free market (competitive) equilibrium maximizes social efficiency, why would the government ever intervene in an economy?

Question 1, Answer

Efficiency is not the only goal of government policy. Equity concerns induce government to intervene to help people living in poverty, even when there are efficiency losses. In economic terms, a society that willingly redistributes resources has determined that it is willing to pay for or give up some efficiency in exchange for the benefit of living in a society that cares for those who have fewer resources. Social welfare functions that reflect this willingness to pay for equity or preference for equity may be maximized when the government intervenes to redistribute resources.

Question 2

Consider a firm with no fixed costs, but continuously increasing marginal costs (MC). The demand curve is $D=6-Q$, and the supply $S=Q$. The variable Q denotes quantity, while P denotes price.

- a) Assume initially that the firm uses marginal cost pricing (as in competitive market equilibrium). Find Q and P in this case. How big is the firm's profit? How big is the producer surplus? How big is the consumer surplus? (Assume that the compensated demand curve is identical to the ordinary demand. Find social welfare as the sum of the consumer surplus and the producer surplus.)
- b) Now assume that the firm behaves like a monopolist. What is the monopoly output and price? What is the firm's profit? How big is the producer surplus? How big is the consumer surplus? Find social welfare in monopoly.
- c) Compare your findings in a) and b) and comment briefly.
- d) Calculate the deadweight loss resulting from monopoly in this case. Compare the deadweight loss under monopoly and perfect competition.

Answer to Question 2.

- a) Marginal cost pricing implies that $Q = 3$, $P = 3$. Producer surplus = $\frac{1}{2} \cdot 3 \cdot 3 = 4.5$.

- b) Profit = Producer surplus (as no fixed costs). Consumer surplus = $\frac{1}{2} \cdot 3 \cdot 3 = 4.5$. SW = $4.5 + 4.5 = 9$.
- c) Monopoly pricing implies $Q = 2, P = 4$. Producer surplus = profit = $\frac{1}{2} \cdot 2 \cdot 2 + 2 \cdot 2 = 6$. (Producer surplus = area between MC and the price line.) Consumer surplus = $\frac{1}{2} \cdot 2 \cdot 2 = 2$. SW = $6 + 2 = 8$.
- d) Social welfare lower under monopoly pricing than under marginal cost pricing.

Question 3.

There are three consumers of a public good. The demands for consumers are as follows:

$$\begin{aligned} p_1 &= 50 - G \\ p_2 &= 110 - G \\ p_3 &= 150 - G \end{aligned}$$

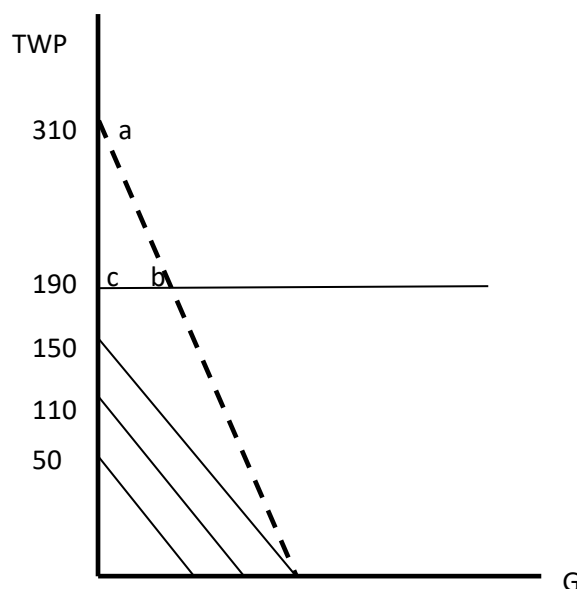
where G measures the number of units of the good and p_i the price in euros. The marginal cost of the public good is €190.

- a. What is the optimal level of provision of the public good? Illustrate your answer with a graph.
- b. Explain why the public good may not be supplied at all because of the free-rider problem.
- c. If the public good is not supplied at all, what is the size of the deadweight loss arising from this market failure?

Answer Question 3.

According to the Samuelson rule total willingness to pay (TWP) is

$$p_1 + p_2 + p_3 = 50 - G + 110 - G + 150 - G = 310 - 3G$$



and $TWP=MC$ that is $310 - 3G = 190$. Hence $G=40$ which is illustrated in the diagram above.

b. Demand for the public good is positive for any price below 310. However, no individual is willing to pay more than 150. To meet the price of 190 requires at least two of the consumers to be willing to contribute. This opens the possibility for free riding. Each consumer may choose to rely on the other two to contribute to the public good. If they all behave in this way, then none of the public good will be provided.

c. The benefit from the provision of the public good is equal to the triangle *abc* in the figure. This benefit will be lost if the public good is not provided and is the deadweight loss. The size of the triangle *abc* is $\frac{1}{2} (310-190)*(40) = 4800$.

Question 4.

Suppose that demand for a product is $Q = 1,200 - 4P$ and supply is $Q = -200 + 2P$. Furthermore, suppose that the marginal external damage of this product is €8 per unit. How many more units of this product will the free market produce than is socially optimal? Calculate the deadweight loss associated with the externality.

Question 4.

To answer this question, first calculate what the free market would do by setting demand equal to supply:

$$1,200 - 4P = -200 + 2P, \text{ or } 1,400 = 6P. P \approx 233.33,$$

$$\text{so } Q_{\text{Free Market}} = 1,200 - 4(233.33) \approx 266.67.$$

The socially optimal level occurs when the marginal external cost is included in the calculation. Suppose the €8 externality were added to the price each consumer had to pay. Then demand would be $Q = 1,200 - 4(P + 8)$.

$$\text{Solving for } P, 1,200 - 4(P + 8) = -200 + 2P, \text{ or } P = 228.$$

Solving for Q , $1,200 - 4(228 + 8) = 1,200 - 944$. $Q_{\text{Social Opt}} = 256$, $10(2/3)$ units less than provided by the free market.

Deadweight loss is the area of a triangle of height 8 and width $10(2/3)$: $\frac{1}{2} (8 \times 10(2/3)) \approx 42.67$.

Question 5.

We add the demands of private goods horizontally but add the demands of public goods vertically when determining the associated marginal benefit to society. Why do we do this and why are the procedures different for public and private goods?

Answer Question 5.

The horizontal summation of private goods adds up the individual quantities demanded by each consumer, which we do because each consumer uses up the quantity he or she purchases. The vertical summation for public goods adds up each consumer's willingness to pay for each additional unit. Because the good is public, each consumer gets to consume each unit. This sum therefore gives the total social valuation of each additional unit—society's demand curve.

Question 6.

It is known that some fraction d of all new cars are defective. Defective cars cannot be identified as such except by those who own them. Each consumer is risk neutral and values a non-defective car at €16,000. New cars sell for €14,000 each, and used ones for €2,000. If cars do not depreciate physically with use, what is the proportion d of defective new cars?

Answer Question 6.

In the market equilibrium the price of new cars equals the expected value of the new cars, which is the average of the value of non-defective with probability $(1-d)$ and the value of defective cars with probability d . (with Δ the loss of value of a defective car). Since cars do not depreciate physically, the consumers are indifferent between used cars and defective new cars (i.e. they value defective cars for €20,000). So equating the market price of new cars with their expected value obtains

$$[1-d] \times 16,000 + d \times 2,000 = 14,000$$

Solving for the proportion of defective new cars, we get

$16.000-d [16,000-2,000]=14,000$ or $d=1/7$.

Question 7

There are two types of drivers on the road today. Speed Racers have a 5% chance of causing an accident per year, while Low Riders have a 1% chance of causing an accident per year. There are the same number of Speed Racers as there are Low Riders. The cost of an accident is €12,000.

- a. Suppose an insurance company knows with certainty each driver's type. What premium would the insurance company charge each type of driver?
- b. Now suppose that there is asymmetric information so that the insurance company does not know with certainty each driver's type. Would insurance be sold if:
 - i. Drivers self-reported their types to the insurance company?
 - ii. No information at all is known about individual driver's types?

If you are uncertain whether insurance would be sold, explain why.

Answer Question 7.

a. The insurance company expects to pay out €12,000 in claims to 5% of the Speed Racers it covers, so it must collect at least $0.05(€12,000) = €600$ from each one. Similarly, it must collect at least $0.01(€12,000) = €120$ from each Low Rider.

b.

i. Every individual would claim to be a Low Rider, but if the insurance company sold insurance to everyone for €120, it would lose money because of the presence of Speed Racers in the population. The insurance company would quickly increase premiums, but if it increased them by too much the Low Riders would leave the market. It cannot be determined here exactly how much more than €120 the Low Riders would tolerate, as their risk aversion is not specified. As more Low Riders chose not to purchase insurance, the pool of covered drivers would include a higher and higher proportion of Speed Racers, requiring the insurance company to increase premiums again to cover the claims.

ii. The insurance company could offer a premium that averages the expected claims. In a population of half Low Riders and half Speed Racers, the pooling premium would be $(€600 + €120)/2 = €360$. The Low Riders would have to be extremely risk averse to be willing to

pay €360 to cover an expected loss of €120. If they (the Low Riders) opted out of the market, the insurance company would be back to the adverse selection problem discussed above: an insured pool containing a high proportion of Speed Racers.

Question 8.

Answer whether the following statements are true or false

- a) Because the free market delivers efficient outcomes, the government should not intervene in the economy.

Answer

False: there are two key roles of government: addressing market failures (situations where the free market fails to deliver efficient outcomes) and addressing inequality through taxes and transfers.

- b) Evaluate the following statement: "Since pollution is bad, it would be socially optimal to prohibit the use of any production process that creates pollution."

Answer

The statement, in general, is not true. In every case the cost of pollution must be compared to the benefits from the production that generates this pollution, and the losses the society may incur if the ban on pollution causes this production to stop. Economics focus on comparing marginal costs to marginal benefits in order to guide choices. As long as the benefits and the costs are correctly measured, an efficient outcome may be reached.

- c) Is it true that in a market where there is a separating equilibrium, different types of agents make different choices of actions?

Answer

True. Different types of agents separate from each other by acting differently. In contrast, under a pooling equilibrium it is impossible to distinguish different types of agents because they act the same. For example, in the insurance market, low-risk individuals can separate from high-risk individuals by buying less insurance.

Question 9

Suppose that a firm's marginal production costs are given by $MC = 10 + 3Q$. The firm's production process generates a toxic waste, which imposes an increasingly large cost on the residents of the town where it operates: the marginal external cost associated with the Q th unit of production is given by $6Q$. What is the marginal private cost associated with the 10th unit produced? What is the total marginal cost to society associated with producing the 10th unit (the marginal social cost of the 10th unit)?

Question 9, answer

The marginal private cost is $10 + 3(10) = 40$. The external cost associated with the 10th unit is $6(10) = 60$. So the marginal social cost of producing the 10th unit is 100.

Question 10.

What negative externalities arise when an individual does not have health insurance?

Question 10. Answer

When someone does not have insurance, costs are imposed on those who do in several ways. First, many diseases are contagious. If contagious diseases go untreated because the infected person lacks insurance and thus cannot afford treatment, they will spread to the rest of the population. Second, emergency treatment is not denied to people who cannot afford to pay; therefore, uninsured people will go to hospitals and receive care. The cost of providing the care is borne by the insured patients. Third, uninsured care is often given in a hospital emergency room rather than a doctor's office. The resource costs of providing care in a hospital setting are much higher than in a doctor's office, so the care the uninsured do receive is more costly than the care they would have received if they had insurance. Inefficiently used hospital resources impose a social cost.