Exercise 5: Market Failure

Problem 1 (*Monopoly*)

A profit-maximizing catering firm applies for the exclusive right to sell sparkling wine in the *Bavarian State Opera*. The firm's variable costs are

$$c(Q) = 2Q,$$

where $Q \geq 0$ denotes the quantity, i.e. servings of sparkling wine. Market demand per opera season is

$$Q^D(p) = 10{,}000 - 1{,}000p.$$

(a) Determine the firm's maximum willingness to pay for the exclusive right of sale during one opera season.

(b) How would the firm's maximum willingness to pay change, if the city of Munich levied a tax on the seller of sparkling wine

(i) at the rate $t = 2$ per unit sold?

(ii) at the rate $t = 0.25$ on profit?

Problems 2-4 (*Monopoly*)

Consider a monopoly market in the long run. The profit-maximizing monopolist faces market demand

$$Q^D(p) = 75 - p,$$

where $p \geq 0$ denotes the market price. The monopolist's total costs are

$$C(Q) = \begin{cases} c^f + \frac{1}{4}Q^2, & Q > 0 \\ 0, & Q = 0, \end{cases}$$

where $c^f > 0$ denotes quasi-fixed costs, and $Q \geq 0$ denotes output.

Problem 2

Which is the threshold regarding quasi-fixed costs, below which the monopolist's output is $Q > 0$?

(A) $c^f = 0$

(B) $c^f = 375$

(C) $c^f = 1{,}125$

(D) $c^f = 1{,}875$

Problem 3

If quasi-fixed costs are $c^f = 625$, the equilibrium

(A) consumer surplus is CS = 600.

(B) producer surplus is PS = 900.

(C) total surplus is TS = 1,500.

(D) welfare loss is WL = 300.

Problem 4

If quasi-fixed costs are $c^f = 0$, the introduction of a price ceiling at $p' = 40$

(A) causes an increase in consumer surplus.

(B) causes a decrease in consumer surplus.

(C) causes an increase in monopoly profit.

(D) neither affects consumer surplus nor monopoly profit.

Problem 5-8 (*External Effects*)

Consider a market served by two profit-maximizing firms in the short run. Firm $i \in \{A, B\}$ has total costs of

$$C(q_i) = 15 + \frac{1}{100}q_i^2 + \frac{1}{5}q_j,$$

where $q_i \geq 0$ denotes output of firm $i \in \{A, B\}$, and $q_j \geq 0$ denotes output of firm $j \in \{A, B\}$, with $i \neq j$. The firms are price takers. Market demand is

$$Q^D(p) = 200 - 100p,$$

where $p \geq 0$ denotes the market prize.

Problem 5

Individual profit maximization results in a market equilibrium where each firm's profit is

(A) 0.

(B) 15.

(C) 30.

(D) 45.

Problem 6

The welfare-maximizing total output is

(A) $Q_{Opt} = 30$.

(B) $Q_{Opt} = 60$.

(C) $Q_{Opt} = 90$.

(D) $Q_{Opt} = 120$.

Problem 7

The welfare loss in market equilibrium resulting from individual profit maximization is

(A) WL $= 0$.

(B) WL $= 1$.

(C) WL $= 19$.

(D) WL $= 20$.

Problem 8

Assume that a tax at the rate $t = \frac{1}{5}$ per unit of output is levied on producers. The tax is combined with a lump-sum subsidy $S > 0$ for each firm. Individual profit maximization results in a market equilibrium where firms make zero profits if

(A) $S = 3.75$.

(B) $S = 7.5$.

(C) $S = 11.25$.

(D) $S = 15$.

Problem 9-10 (*Public Goods*)

Consider a public good available to five identical individuals. The individuals can provide the public good at total costs of

$$C(Q) = 10Q + \frac{1}{4}Q^2,$$

where $Q \geq 0$ denotes the quantity. Each individual's marginal benefit from the public good is

$$\text{MB}(Q) = 4 - \frac{1}{10}Q.$$

Problem 9

The welfare maximizing quantity of the public good is

(A) $Q_{Opt} = 0$.

(B) $Q_{Opt} = 10$.

(C) $Q_{Opt} = 20$.

(D) $Q_{Opt} = 40$.

Problem 10

Individual provision of the public good implies a welfare loss of

(A) $\text{WL} = 0$.

(B) $\text{WL} = 25$.

(C) $\text{WL} = 50$.

(D) $\text{WL} = 100$.