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 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 reservation price for the exclusive right of sale during one opera season.

(b) How would the firm's reservation price 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 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 perfectly competitive market in the short run. Market demand is

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

where $p \geq 0$ denotes market prize. The market is served by two identical profit-maximizing firms. 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 $i \neq j$.

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) $Q_E = 30$.

(B) $Q_E = 60$.

(C) $Q_E = 90$.

(D) $Q_E = 120$.

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. Individual profit maximization results in a market equilibrium where firms make zero profits if the tax on output is combined with a lump-sum subsidy for each firm amounting to

(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

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

Problem 9

The welfare maximizing quantity of the public good is

(A) $Q_E = 0$.

(B) $Q_E = 10$.

(C) $Q_E = 20$.

(D) $Q_E = 40$.

Problem 10

Individual provision of the public good implies a welfare loss of

(A) $WL = 0$.

(B) $WL = 25$.

(C) $WL = 50$.

(D) $WL = 100$.