1.4 Price determination, surplus, taxes and subsidies

Name: _____ Class: _____ Date: _____ **Total: 30 marks**

KEY WORDS consumer surplus • tax incidence

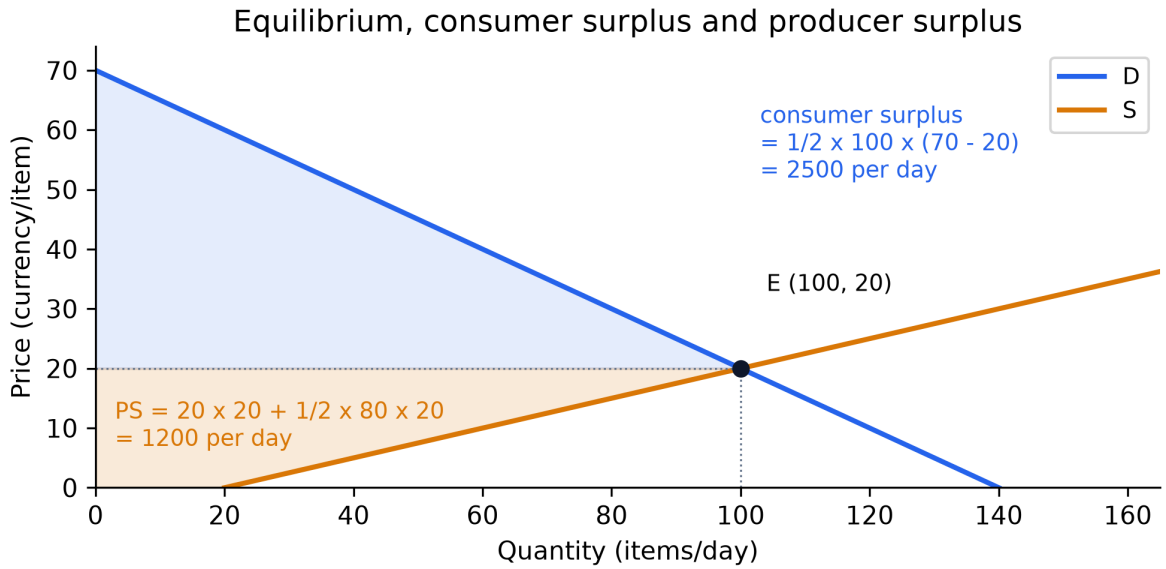
Price determination, surplus, taxes and subsidies

Objective

Determine equilibrium and disequilibrium adjustment, calculate consumer and producer surplus, explain the price mechanism's three functions, and analyse indirect tax and subsidy incidence (spec 1.3.4, rows 1–4). All calculations use the shared model $Q_d = 140 - 2P$, $Q_s = 20 + 4P$.

1 Key knowledge and worked examples

Markets at work. Equilibrium solves $Q_d = Q_s$ (here P = 20, Q = 100); excess demand at a low price and excess supply at a high price are eliminated by price movement along unchanged curves. Consumer surplus is the area below the demand curve above price; producer surplus the area above supply below price. The price mechanism rationing, incentivises and signals. A unit tax of 6 splits the burden 4 (consumers) : 2 (producers) because demand is the more inelastic side.



Original model; the shaded areas are computed in the worked examples.

2 Practice

2.1 Find the equilibrium price and quantity of the shared model. [3]

2.2 At $P = 15$, calculate the excess demand and describe the pressure on price. [2]

2.3 The demand curve's vertical intercept is 70. Calculate consumer surplus at equilibrium. [3]

2.4 The supply curve reaches price zero at a quantity of 20. Calculate producer surplus at equilibrium. [3]

2.5 Name the three functions of the price mechanism. [2]

2.6 Demand shifts right while supply shifts left. State the one variable whose direction is certain, and why. [2]

3 Exam-style questions

3.1 *(Original.)* The government imposes a specific tax of 6 currency units per item on this market. Calculate the new consumer price, the price producers receive, the quantity traded, the government's revenue, and how the 6-unit burden splits between consumers and producers. [5]

3.2 *(Original.)* Instead, the government pays a subsidy of 6 per item. Calculate the new consumer price, producer price, quantity and the total cost to the government. [4]

3.3 *(Original.)* Explain, using elasticities, why consumers bear more of the 6-unit tax in this market, and state one condition under which producers would bear more. [3]

3.4 *(Original.)* A publicity campaign raises demand while input costs rise. Explain why the new equilibrium quantity cannot be predicted from these two facts alone. [3]

Solutions

2.1 $140 - 2P = 20 + 4P$ gives $120 = 6P$, so $P^* = 20$ currency units and $Q^* = 100$ items/day.

2.2 $Q_d(15) = 110$, $Q_s(15) = 80$: excess demand = 30 items/day; buyers bid the price up towards 20.

2.3 CS $= \frac{1}{2} \times Q \times (70 - 20) = \frac{1}{2} \times 100 \times 50 = 2500$ currency units/day.

2.4 PS $= 20 \times 20 + \frac{1}{2} \times (100 - 20) \times 20 = 400 + 800 = 1200$ currency units/day – sellers offer the first 20 items even at a zero price, so each of those earns the full 20, and the triangle above the supply curve covers the other 80.

2.5 Rationing, incentive, signalling.

2.6 Price rises with certainty – both shifts are price-raising; quantity is indeterminate because the demand rise raises it and the supply fall lowers it, so the outcome depends on relative magnitudes.

3.1 Supply in consumer prices becomes $Q_s = 4P - 4$. Equilibrium: $140 - 2P = 4P - 4$, so $P_c = 24$, $Q = 92$; producers receive $24 - 6 = 18$. Revenue $= 6 \times 92 = 552$ currency units/day. Burden: consumers pay $24 - 20 = 4$ more; producers receive $20 - 18 = 2$ less – a 4:2 split.

3.2 Supply becomes $Q_s = 4P + 44$: $140 - 2P = 4P + 44$ gives $P_c = 16$, $Q = 108$; producers receive $16 + 6 = 22$. Consumers gain 4 $(20 - 16)$, producers gain 2 $(22 - 20)$; government cost $= 6 \times 108 = 648$ currency units/day.

3.3 At the original equilibrium PED $= -2 \times (20/100) = -0.4$ while PES $= +4 \times (20/100) = +0.8$: demand is relatively inelastic, so consumers cannot easily leave the market and bear 4 of the 6. If demand were more elastic than supply (e.g. close substitutes arrive), producers would bear the larger share.

3.4 The demand shift right raises equilibrium price AND quantity; the supply shift left raises price but LOWERS quantity. Price rises under both, but the quantity effects oppose each other: only the relative size of the two shifts determines whether quantity rises or falls, so no prediction is possible without magnitudes (draw both new curves and compare).

Local review guidance: the tax treated as a vertical supply shift with the new curve written out; burden split from the two price gaps, not asserted; surplus triangles with the formula shown; (R1 3.4) both shifts' effects stated separately before the indeterminacy claim. This is authored classroom guidance.