

Consumer & Producer Surplus

AP Microeconomics | Unit 2 | surplus as area, efficiency, and deadweight loss

Running example. Demand: $P = 6 - \frac{Q}{10}$. Supply: $P = \frac{Q}{10}$. Equilibrium: price \$3, quantity 30.

1. Consumer surplus

Consumer surplus (CS)

What buyers were willing to pay minus what they actually paid.

Area below the demand curve and above the price, out to the quantity sold.

$$CS = \frac{1}{2} \times 30 \times (6 - 3) = \$45$$

2. Producer surplus

Producer surplus (PS)

What sellers actually received minus the least they would accept (their marginal cost).

Area above the supply curve and below the price, out to the quantity sold.

$$PS = \frac{1}{2} \times 30 \times (3 - 0) = \$45$$

Both are triangles: $\frac{1}{2} \times \text{base} \times \text{height}$, with the height measured from the price to where the curve meets the price axis.

3. Total surplus and efficiency

$$\text{total surplus} = CS + PS = \$45 + \$45 = \$90$$

At the equilibrium quantity every unit that is worth more to a buyer than it costs a seller is traded, and none that is not. Total surplus is at its **maximum**: the market is *allocatively efficient*.

4. Deadweight loss

Suppose only 20 units are traded instead of 30 (a tax, a quota or a price control). Between 20 and 30 the demand curve is above the supply curve: each of those units is worth more to a buyer than it costs a seller, and it is not traded.

Deadweight loss (DWL)

The total surplus lost when the quantity traded is not the efficient quantity. **Nobody gets it**: not buyers, not sellers, not the government.

$$DWL = \frac{1}{2} \times (4 - 2) \times (30 - 20) = \$10$$

The triangle lies between the quantity traded and the efficient quantity, and points at the efficient quantity. It appears when too little is traded *and* when too much is traded.

Where students lose points

1. Swapping the areas: consumers are above the price, producers below.
2. Forgetting the one-half: they are triangles, not rectangles.
3. Using the wrong height: measure from the price to the axis intercept.
4. Shading deadweight loss on the wrong side of the quantity traded.
5. Saying the lost surplus “goes to” someone: nobody gets it.

Now practise it

Theory sticks once you use it. On **sad-academy.com** you'll find practice questions for this exact subtopic in the AP format, and an AI that grades your free-response answers against the scoring guidelines, the way an AP reader would.

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