Negative and Positive Externalities

AP Microeconomics | Unit 6 | MSC, MSB, and deadweight loss

1. A cost nobody at the table pays

Externality

A cost or a benefit that falls on a **third party**: someone who is neither the buyer nor the seller.

- **Negative** (pollution, noise): $MSC = MPC +$ external cost
- **Positive** (vaccines, education): $MSB = MPB +$ external benefit

MPC and MPB are the private curves: ordinary supply and demand.

2. Negative externality: too much

Example. Demand $P = 12 - Q$ (this is MPB and MSB), supply $P = Q$ (MPC). Each unit does \$4 of damage, so $MSC = Q + 4$: a curve **above** supply.

- Market: $12 - Q = Q$, so $Q = 6$, $P = \$6$.
- Socially optimal: $MSB = MSC$, $12 - Q = Q + 4$, so $Q = 4$.
- The market **overproduces**. $DWL = \frac{1}{2} \times 4 \times (6 - 4) = \$4$.

3. Positive externality: too little

Example. Supply $P = Q$ (MPC and MSC), demand $P = 10 - Q$ (MPB). Each unit gives \$4 of benefit to others, so $MSB = 14 - Q$: a curve **above** demand.

- Market: $10 - Q = Q$, so $Q = 5$, $P = \$5$.
- Socially optimal: $14 - Q = Q$, so $Q = 7$.
- The market **underproduces**. $DWL = \frac{1}{2} \times 4 \times (7 - 5) = \$4$.

4. One method for both graphs

Three steps

1. **Market quantity:** where the *private* curves cross ($MPB = MPC$).
2. **Optimal quantity:** where the *social* curves cross ($MSB = MSC$).
3. **Deadweight loss:** the triangle between those two quantities, pointing at the optimal one.

	negative externality	positive externality
extra curve	MSC above supply	MSB above demand
market output	too much	too little
fix	per-unit tax = external cost	per-unit subsidy = external benefit

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5. Fixing it: taxes and subsidies

- **Pigouvian tax** equal to the marginal external cost ($4 per ton): supply shifts up by $4 onto MSC, and the market produces the optimal 4 tons. A tax *smaller* than the external cost ($2) cuts output only to 5 tons, still above the optimum; a tax larger than $4 pushes output below the optimum.
- **Subsidy** equal to the marginal external benefit ($4 per vaccine): paid to buyers, demand shifts up onto MSB; paid to sellers, supply shifts down by $4. Either way output rises from 5 to the optimal 7.

6. Externalities in production, and elasticity

Positive externality in production (bees pollinate the neighbours' orchards, $4 per jar): $MSC = MPC - \$4$, *below* supply; the vertical gap is the marginal external benefit. With demand $P = 12 - Q$ and $MPC = Q$: market 6 jars at $6, optimum 8 jars at $4 — the market quantity is too low and the price too high. Fix: a subsidy.

- A smaller external cost moves MSC toward MPC, so the optimum moves toward the market quantity. A larger external benefit moves MSB up, so the optimum moves further above it.
- The same per-unit external cost distorts quantity **less** when supply and demand are more **inelastic** (steep), and more when they are elastic (flat).

Where students lose points

1. Finding the market quantity with a social curve: use supply and demand.
2. Putting the extra curve on the wrong side.
3. The triangle in the wrong place: it lies between the two quantities.
4. Reversing the result: negative means too much, positive means too little.
5. Unlabeled curves: write MPC, MSC, MPB, MSB.
6. A tax smaller than the external cost does not reach the optimum.

Now practise it

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