Price Ceilings & Price Floors

AP Microeconomics | Unit 2 | shortage, surplus, and the deadweight loss of price controls

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

1. Price ceiling: a maximum price

Price ceiling

A legal **maximum** price. It matters (is *binding*) only when set **below** the equilibrium price. Result: a **shortage**. Example: rent control.

Ceiling at \$2: buyers want 40, sellers offer 20. Shortage of 20, and the price cannot rise to remove it. Only 20 units are traded: the *short side* of the market sets the quantity.

2. Price floor: a minimum price

Price floor

A legal **minimum** price. It is binding only when set **above** the equilibrium price. Result: a **surplus**. Example: the minimum wage (the surplus is unemployment).

Floor at \$4: sellers offer 40, buyers want 20. Surplus of 20; only 20 units are traded.

	binding when	creates	quantity traded
Price ceiling	below equilibrium	shortage ($Q_d > Q_s$)	Q_s (read from supply)
Price floor	above equilibrium	surplus ($Q_s > Q_d$)	Q_d (read from demand)

3. Who gains, who loses

With the \$2 ceiling (20 units traded instead of 30):

- **Consumers**: those who still get the good pay less and gain; those who cannot find it get nothing.
- **Producers**: a lower price and fewer sales. Producer surplus falls.
- **Deadweight loss**: the 10 units between 20 and 30 are no longer traded although buyers valued them above their cost.

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

A binding floor creates the same kind of triangle, for the same reason.

4. Binding or not, and quotas

A ceiling *above* equilibrium (say \$5) or a floor *below* it changes nothing: the market price is already legal. The control is **non-binding**.

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On the graph, a binding ceiling is the *low* line and a binding floor is the *high* line.

Quantity control (quota)

A legal limit on the quantity sold. With a limit of 20, buyers pay the demand price ($4) while the last unit costs sellers only $2. The units between 20 and 30 are not traded: the same deadweight loss.

5. Measuring the areas, and when something changes

Areas stop at the quantity traded. With the $2 ceiling (20 traded): $CS = \frac{1}{2}(4+2)(20) = \$60$, $PS = \frac{1}{2}(20)(2) = \$20$ (free market: $45 each); sellers' revenue = buyers' spending = $2 × 20 = $40. With the $4 floor: $PS = \frac{1}{2}(4+2)(20) = \$60$, $CS = \frac{1}{2}(20)(2) = \$20$. A quota of 20: buyers pay $4, and PS = revenue − area under supply = 80 − 20 = $60.

Who loses for sure. A binding ceiling always lowers producer surplus; consumer surplus could rise or fall (shut-out buyers, and rationing by lines or luck). A binding floor always lowers consumer surplus; producer surplus could rise or fall. Total surplus falls in both cases: deadweight loss.

Changes under a control. The price is stuck, so read both curves at it. Ceiling fixed and supply falls: Q_d unchanged, Q_s falls, the shortage grows. Floor fixed and demand rises: Q_d rises, the surplus shrinks. A lower ceiling: the shortage grows. Ceiling removed: the price rises, Q_s up, Q_d down. Quota removed: the price falls, the quantity rises. A control exactly at equilibrium changes nothing.

From equations. $Q_d = 200 - 4P$, $Q_s = 50 + 6P$: equilibrium $15 and 140. A $10 ceiling binds: $Q_d = 160$, $Q_s = 110$, shortage 50; 110 are traded, revenue $10 × 110 = $1,100.

Where students lose points

1. Drawing a binding ceiling above equilibrium (or a floor below).
2. Ceiling → shortage; floor → surplus (not the other way round).
3. Reading the quantity traded from the wrong curve: use the short side.
4. Saying a non-binding control changes the price.
5. Forgetting the deadweight loss, or shading it past the equilibrium.

Now practise it

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