

AP MICROECONOMICS

Unit 2: Supply and Demand

Topics 2.5 – 2.9 | Lesson Reference Guide

AP Exam Weight: 20-25% | Continues Directly From Topics 2.1-2.4

What This Section Is About

Having established how buyers and sellers behave individually, this section brings them together. You will measure how demand responds to income and to the price of other goods, find where the market settles and why that point is efficient, see what happens when a market is knocked off balance, and trace the effects of government policy and international trade on price, quantity, and surplus.

Topics covered:

- 2.5 Other Elasticities – how demand responds to income and to other goods' prices
- 2.6 Market Equilibrium and Consumer/Producer Surplus – where the market settles, and why
- 2.7 Market Disequilibrium and Changes in Equilibrium – what happens when it doesn't
- 2.8 The Effects of Government Intervention in Markets – ceilings, floors, taxes, and subsidies
- 2.9 International Trade and Public Policy – tariffs, quotas, and the world price

TOPIC 2.5 — OTHER ELASTICITIES

What Are Income and Cross-Price Elasticity?

Price isn't the only thing quantity demanded responds to. Income elasticity of demand tracks how purchases change as consumer income changes. Cross-price elasticity of demand tracks how purchases of one good change when the price of a different, related good changes. Both formulas look like PED, but with a critical difference — neither one uses absolute value, because here the sign itself is the answer.

Income Elasticity of Demand

$$E_i = \% \text{ Change in Quantity Demanded} \div \% \text{ Change in Income}$$

Note: no absolute value here — the sign tells you whether the good is normal or inferior.

E_i Value	Classification	Example
$E_i < 0$	Inferior good — demand falls as income rises	<i>Instant ramen, bus rides, thrift-store clothing</i>
$0 \leq E_i < 1$	Normal good, necessity	<i>Groceries, toothpaste, basic utilities</i>
$E_i > 1$	Normal good, luxury	<i>Vacations, designer goods, fine dining</i>

Worked Example: Income Elasticity

Household income rises from \$40,000 to \$44,000 (+10%). Instant-ramen purchases fall from 200 packs/year to 160 packs/year (−20%).

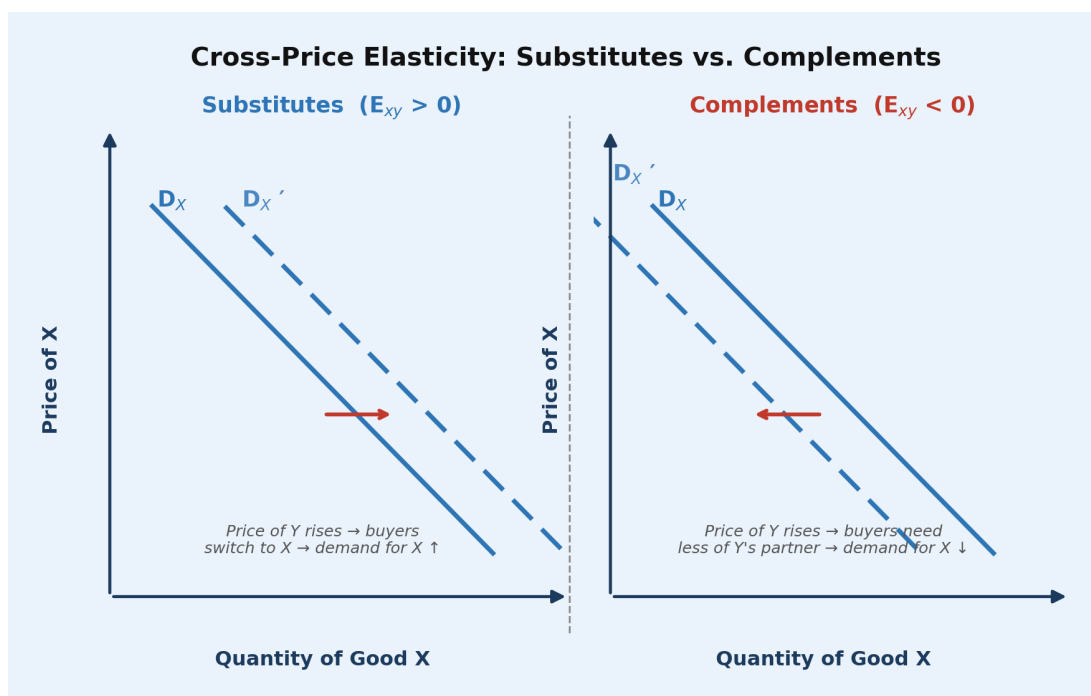
$E_i = -20\% \div 10\% = -2.0 \rightarrow$ a strongly INFERIOR good: as this household gets richer, it buys less ramen, not more.

Cross-Price Elasticity of Demand

$$E_{xy} = \% \text{ Change in Q. Demanded of X} \div \% \text{ Change in Price of Y}$$

Again, no absolute value — the sign identifies the relationship between the two goods.

E_{xy} Value	Relationship	Example
$E_{xy} > 0$	Substitutes — used in place of each other	<i>Coke and Pepsi, butter and margarine</i>
$E_{xy} < 0$	Complements — used together	<i>Printers and ink, cars and gasoline</i>
$E_{xy} = 0$	Unrelated goods	<i>Bananas and car tires</i>



The sign of cross-price elasticity — not its size — tells you whether two goods are substitutes or complements.

→ **Worked Example: Cross-Price**

Gasoline prices rise 33% (\$3 → \$4). Electric-bike sales rise 25% (100 → 125 units).

$E_{xy} = 25\% \div 33\% \approx +0.76$. Positive → **SUBSTITUTES**: pricier gas pushes commuters toward e-bikes.

★ **AP Exam Tips — Income & Cross-Price Elasticity**

Do NOT take the absolute value for income or cross-price elasticity — the sign is the whole point.

Positive cross-price elasticity = substitutes; negative = complements. Memorize this pairing cold.

The magnitude still matters: a cross-price elasticity near 0 (even if positive) signals a weak relationship.

Watch for distractor numbers in FRQs — a cross-price question often also gives an own-price % change you don't need.

Key Terms — Topic 2.5

Income Elasticity	Measures how quantity demanded responds to a change in consumer income.
Normal Good	A good for which demand rises as income rises ($0 \leq E_i$).
Inferior Good	A good for which demand falls as income rises ($E_i < 0$).

Cross-Price Elasticity	Measures how quantity demanded of one good responds to a price change in a related good.
Substitute Good	A good that can replace another; cross-price elasticity is positive.
Complement Good	A good used together with another; cross-price elasticity is negative.

TOPIC 2.6 — MARKET EQUILIBRIUM AND CONSUMER/PRODUCER SURPLUS

What Is Market Equilibrium?

Market equilibrium occurs at the price and quantity where the demand curve and the supply curve intersect — the point where $Q_d = Q_s$. At this price (P_e) there's no shortage and no surplus: every buyer willing to pay at least P_e finds a seller, and every seller willing to accept P_e finds a buyer.

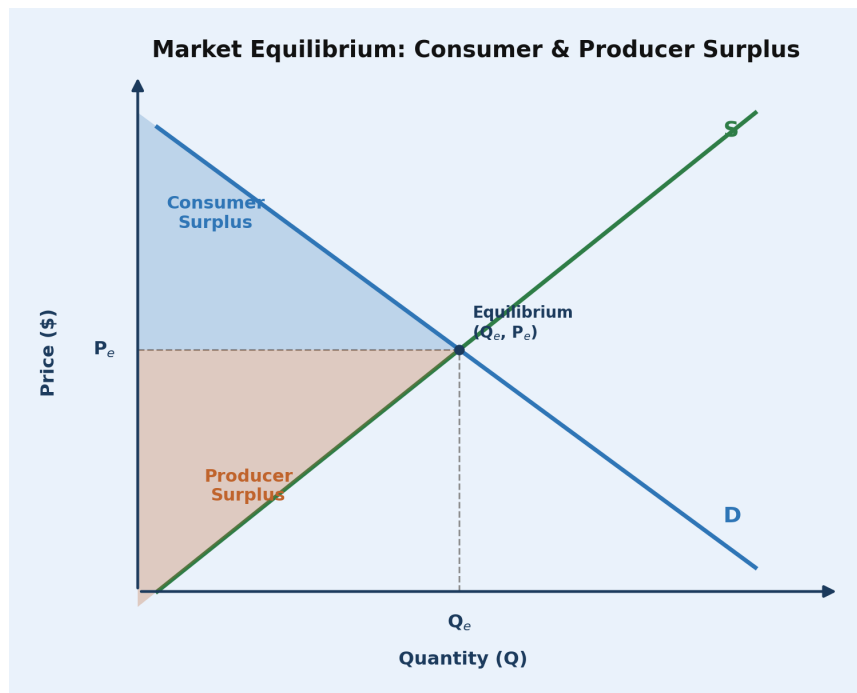
♪ *Real-World Example: Concert Tickets*

A venue prices tickets at \$80, and at that price the number of tickets fans want to buy exactly matches the number of seats the venue is willing to sell. Raise the price and empty seats appear; lower it and lines form around the block. \$80 is the market-clearing price for this show.

Consumer Surplus and Producer Surplus

Consumer surplus is the difference between what a buyer was willing to pay (given by points on the demand curve) and what they actually paid (P_e) — the area below demand, above price. Producer surplus is the mirror image: the difference between what a seller actually received (P_e) and the minimum they'd have accepted (given by points on the supply curve) — the area above supply, below price.

$$\text{CS} = \frac{1}{2} \times \text{base} \times \text{height} \quad | \quad \text{PS} = \frac{1}{2} \times \text{base} \times \text{height}$$



Consumer surplus (blue) sits above P_e , below D . Producer surplus (orange) sits below P_e , above S . Their sum — total economic surplus — is maximized nowhere else but Q_e .

◆ **Worked Example: Calculating Surplus**

Demand: $P = 20 - 0.5Q$. Supply: $P = 2 + 0.5Q$.

Equilibrium: $20 - 0.5Q = 2 + 0.5Q \rightarrow Q_e = 18, P_e = 11$.

$CS = \frac{1}{2} \times 18 \times (20 - 11) = \$81$. $PS = \frac{1}{2} \times 18 \times (11 - 2) = \$81$.

Total economic surplus = \$162 — the maximum this market can generate.

★ **AP Exam Tips — Equilibrium & Surplus**

Total surplus is maximized **ONLY** at the competitive equilibrium quantity — producing more or less than Q_e destroys value.

CS triangle's three corners: demand's price-intercept $\rightarrow$ the equilibrium point $\rightarrow P_e$ on the price axis.

PS triangle's three corners: supply's price-intercept $\rightarrow$ the equilibrium point $\rightarrow P_e$ on the price axis.

Allocative efficiency means producing where marginal benefit (height of D) equals marginal cost (height of S).

Key Terms — Topic 2.6

Market Equilibrium	The price-quantity pair where $Q_e = Q_s$; no shortage or surplus exists.
Equilibrium Price	The price at which the demand and supply curves intersect (P_e).
Equilibrium Quantity	The quantity bought and sold at the equilibrium price (Q_e).
Consumer Surplus	The area below demand and above price; buyers' net benefit from trading.
Producer Surplus	The area above supply and below price; sellers' net benefit from trading.
Allocative Efficiency	Producing the quantity where marginal benefit equals marginal cost; total surplus is maximized.

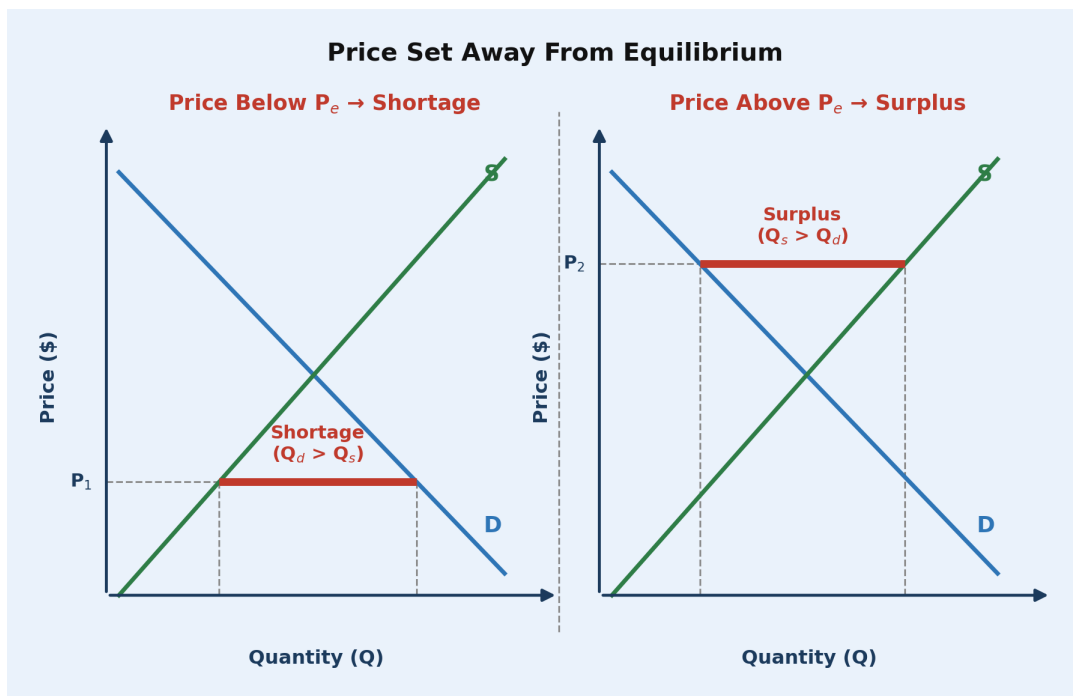
TOPIC 2.7 — MARKET DISEQUILIBRIUM AND CHANGES IN EQUILIBRIUM

Shortages and Surpluses

A shortage (excess demand) exists when $Q_d > Q_s$ at the current price — this happens whenever price sits below equilibrium. A surplus (excess supply) exists when $Q_s > Q_d$ — whenever price sits above equilibrium. Left alone, the market self-corrects: sellers facing unsold inventory cut prices; buyers facing empty shelves bid prices up.

♪ Real-World Example: Concert Tickets, Revisited

Price the \$80 show at \$40 and a shortage appears — scalpers emerge and fans camp out overnight. Price it at \$150 and a surplus appears — seats go unsold and the venue eventually discounts them.



A price set below P_e leaves quantity demanded above quantity supplied (shortage); a price set above P_e leaves quantity supplied above quantity demanded (surplus).

Shifts Move the Equilibrium Itself

A temporary disequilibrium happens along a fixed pair of curves. A shift in demand or supply is different — it moves an entire curve and creates a genuinely new equilibrium. When only one curve shifts, the direction of both P_e and Q_e is always determinate. When both curves shift at once, one of the two variables becomes ambiguous unless you know which shift is larger.

	Supply Increases	Supply Decreases
Demand Increases	P: ambiguous · Q: ↑	P: ↑ · Q: ambiguous

	Supply Increases	Supply Decreases
Demand Decreases	P: ↓ · Q: ambiguous	P: ambiguous · Q: ↓

★ AP Exam Tips — Disequilibrium & Shifts

A shortage or surplus is TEMPORARY and self-corrects along a fixed curve. A shift moves the whole curve and is permanent until something reverses it.

When both curves shift simultaneously, one of price or quantity is indeterminate without knowing the relative size of each shift — a classic AP free-response trap.

Always state explicitly which variable is determinate and which is ambiguous when both curves move together.

Key Terms — Topic 2.7

Shortage	Excess demand: Q_d exceeds Q_s at the current price, which sits below equilibrium.
Surplus	Excess supply: Q_s exceeds Q_d at the current price, which sits above equilibrium.
Self-Correcting Market	A market where unregulated price adjustment eliminates shortages and surpluses over time.
Simultaneous Shift	When demand and supply shift at the same time, leaving one of price or quantity ambiguous.

TOPIC 2.8 — THE EFFECTS OF GOVERNMENT INTERVENTION IN MARKETS

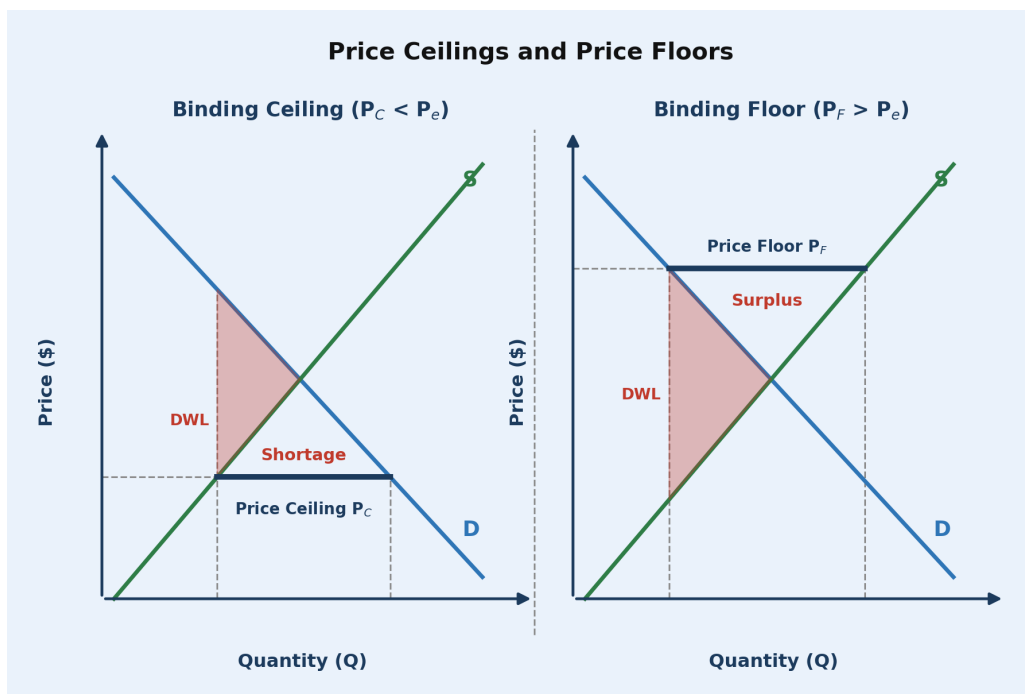
Price Ceilings and Price Floors

A price ceiling is a legal maximum price. It only “binds” — has any effect at all — when set below equilibrium, where it creates a persistent shortage. A price floor is a legal minimum price; it only binds when set above equilibrium, creating a persistent surplus.

Real-World Example: Rent Control and the Minimum Wage

Rent control caps apartment rent below the market rate: landlords have less incentive to maintain or build units, so a persistent housing shortage results.

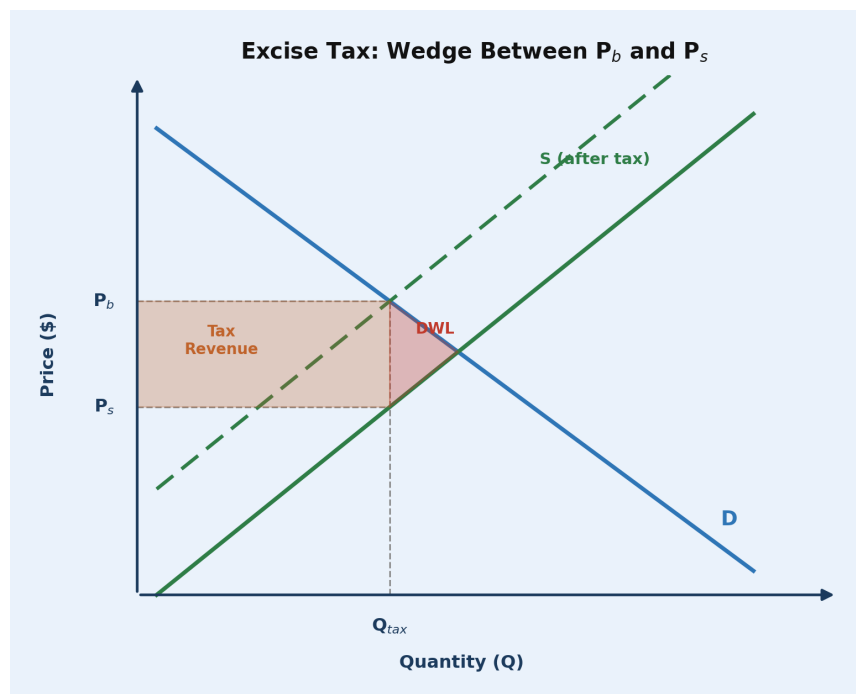
A minimum wage set above the market-clearing wage for low-skill labor means employers hire fewer workers than want jobs — a labor surplus.



A binding price ceiling ($P_C < P_e$) creates a shortage; a binding price floor ($P_F > P_e$) creates a surplus. Both destroy the shaded deadweight-loss triangle.

Excise Taxes and Subsidies

An excise tax drives a wedge between the price buyers pay (P_b) and the price sellers receive (P_s), shrinking quantity traded below the efficient level. A subsidy does the reverse, pushing quantity above the efficient level. Either way, whenever quantity moves off Q_e , deadweight loss appears — the triangle of surplus that used to exist and simply doesn't anymore.



An excise tax wedges P_b above and P_s below P_e . The orange rectangle is government tax revenue; the red triangle is deadweight loss.

Tax Incidence: Who Really Pays?

The side of the market that is more inelastic (less able to walk away) bears more of a tax's burden — and keeps more of a subsidy's benefit.

△ Real-World Example: Cigarette Taxes

Cigarette taxes land mostly on smokers, not tobacco companies. Demand for cigarettes is highly inelastic — few substitutes, habit-forming — so consumers absorb most of the burden.

Elasticity Scenario	Who Bears More of the Tax
Perfectly inelastic demand	Consumers pay ~100%
Perfectly elastic demand	Producers pay ~100%
Perfectly inelastic supply	Producers pay ~100%
Perfectly elastic supply	Consumers pay ~100%

★ AP Exam Tips — Government Intervention

Always check whether a ceiling or floor is actually BINDING before analyzing its effects.

Deadweight loss is always the triangle between the after-policy quantity and Q_e .

On FRQs, draw and shade DWL as a distinct triangle, and government revenue or subsidy cost as a distinct rectangle.

Tax incidence follows relative elasticity, not who legally writes the check to the government.

Key Terms — Topic 2.8

Price Ceiling	A legal maximum price; binds only when set below P_e .
Price Floor	A legal minimum price; binds only when set above P_e .
Binding	Describes a price control that actually constrains the market, creating a shortage or surplus.
Excise Tax	A per-unit tax that wedges apart the price buyers pay and the price sellers receive.
Subsidy	A per-unit government payment that pushes quantity traded above the efficient level.
Deadweight Loss	The surplus destroyed when a policy moves quantity away from Q_e .
Tax Incidence	The division of a tax's burden between buyers and sellers, determined by relative elasticity.

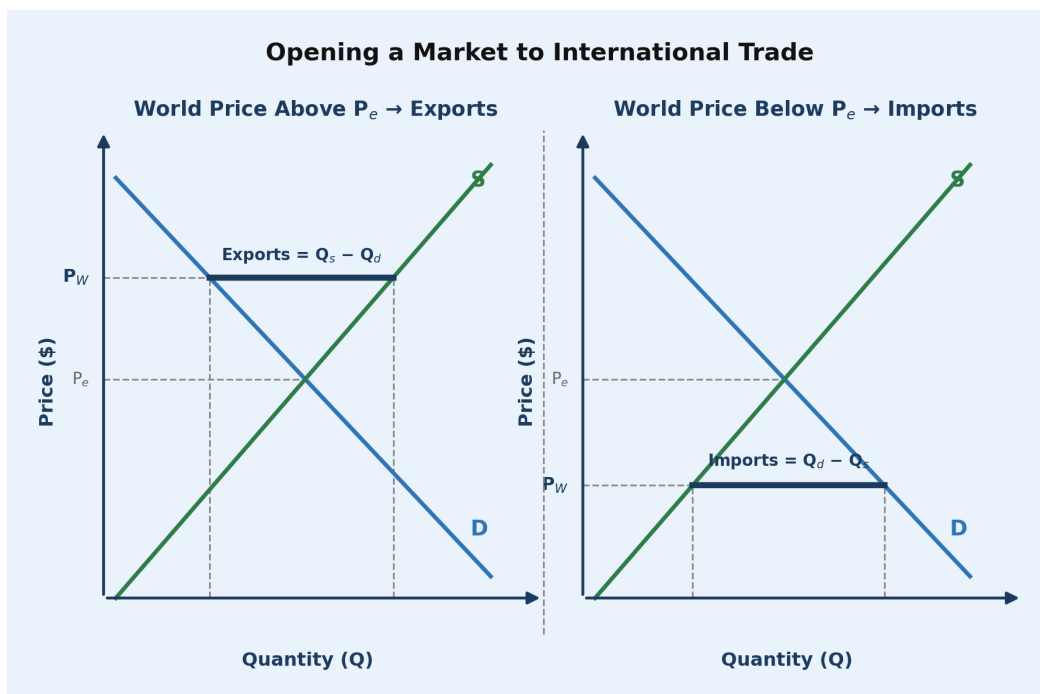
TOPIC 2.9 — INTERNATIONAL TRADE AND PUBLIC POLICY

Opening a Market to Trade

Every domestic market has a no-trade equilibrium price, called the autarky price. Comparing it to the world price tells you what a country will do once trade opens. If the world price is higher than the domestic price, the country exports: the domestic price rises to meet the world price, producer surplus rises, and consumer surplus falls (though total surplus rises). If the world price is lower, the country imports: the domestic price falls to meet the world price, consumer surplus rises, and producer surplus falls (again, total surplus rises).

→ Real-World Example: Corn and Trade

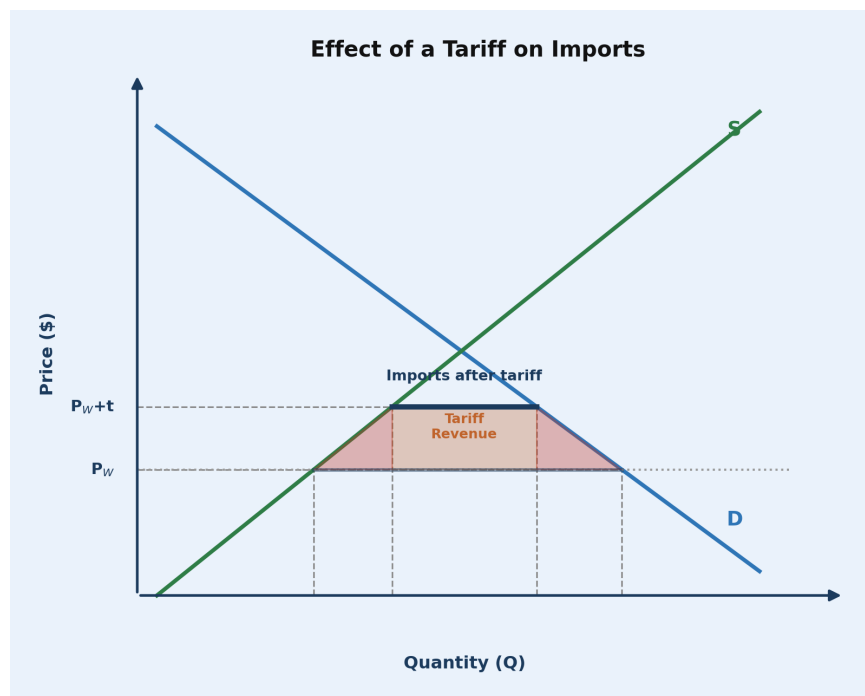
A country with a high domestic corn price opens to trade. The world corn price is lower, so the country imports corn: consumers gain access to cheaper corn, but domestic corn farmers lose market share and income.



World price above P_e : the gap between Q_s and Q_e at the world price is exported. World price below P_e : the gap between Q_e and Q_s at the world price is imported.

Tariffs and Quotas

A tariff is a tax on imports. It raises the domestic price toward — but generally not all the way to — the pre-trade autarky level, shrinks the quantity imported, raises government revenue, and creates two deadweight-loss triangles: one from lost consumption and one from inefficient domestic overproduction. A quota is a direct limit on the quantity that can be imported; it has similar price and quantity effects, but generates no government revenue by default.



A tariff raises the domestic price from P_W to P_W+t , shrinking imports. The orange rectangle is tariff revenue; the two red triangles are deadweight loss.

★ AP Exam Tips — International Trade

Exporting: producer surplus $\uparrow$, consumer surplus $\downarrow$, total surplus $\uparrow$.

Importing: consumer surplus $\uparrow$, producer surplus $\downarrow$, total surplus $\uparrow$.

A tariff moves the market PART WAY back toward autarky — it never fully eliminates the gains from trade unless set prohibitively high.

On FRQs, name all four tariff effects: domestic price $\uparrow$, quantity imported $\downarrow$, government revenue $\uparrow$, and two DWL triangles.

Key Terms — Topic 2.9

Autarky	The no-trade domestic equilibrium price and quantity.
World Price	The price at which a good trades on the international market.
Exports	Domestic production sold abroad, arising when the world price exceeds the domestic price.
Imports	Foreign production bought domestically, arising when the world price is below the domestic price.
Tariff	A tax on imported goods that raises domestic price and raises government revenue.

Quota

A direct quantity limit on imports; similar to a tariff but generates no government revenue by default.

UNIT 2 QUICK REFERENCE SUMMARY (continued: 2.5-2.9)

Topic	Key Formula / Concept	Graphical Signature	Key Terms to Remember
2.5 Other Elasticities	$E_i = \% \Delta Q_e / \% \Delta Inc$ $E_{xy} = \% \Delta Q_{ex} / \% \Delta P_y$	Sign (not size) tells the whole story	Normal / inferior good; substitutes / complements
2.6 Equilibrium & Surplus	Equilibrium: $Q_e = Q_s$	CS triangle above P_e ; PS triangle below P_e	Consumer surplus, producer surplus, allocative efficiency
2.7 Disequilibrium & Shifts	Shortage: $Q_e > Q_s$ Surplus: $Q_s > Q_e$	Gap between curves at a non-equilibrium price	Self-correction, simultaneous shifts
2.8 Government Intervention	Ceiling binds if $< P_e$ Floor binds if $> P_e$	DWL triangle plus a shortage / surplus gap	Tax incidence, deadweight loss
2.9 International Trade	Compare P_{world} vs. $P_{autarky}$	Export / import gap at P_{world}	Tariff, quota, terms of trade