International Economics — Explanation Expansion

How to use this document

This is the skeleton: definitions, logic chains, results, and the graphs you must be able to reproduce. It is not a transcript of the class. Worked numerical examples live in the exercises (C in class, P for practice) — this document states the general rule each exercise is built on, and points to where it is worked. You do not need to take further notes on anything in this document; take notes on the logic of arguments as they develop in class.

Designed for undergraduate students.
If you discover any mistakes in this material, please report them to Zoltán Bartha @ zoltan.bartha@ekon.me
Version 2026.1

Table of contents

International Economics — Explanation Expansion

§1 — Week 1: The Affordability Puzzle, and the Ricardian Answer

1.1 The affordability puzzle

A price can be measured in money, or it can be measured in something more durable: the number of hours of work it takes to earn that money.

Price in hours of work — The price of a good divided by the hourly wage. It measures how much of a person's working life a good costs, independent of currency or inflation.

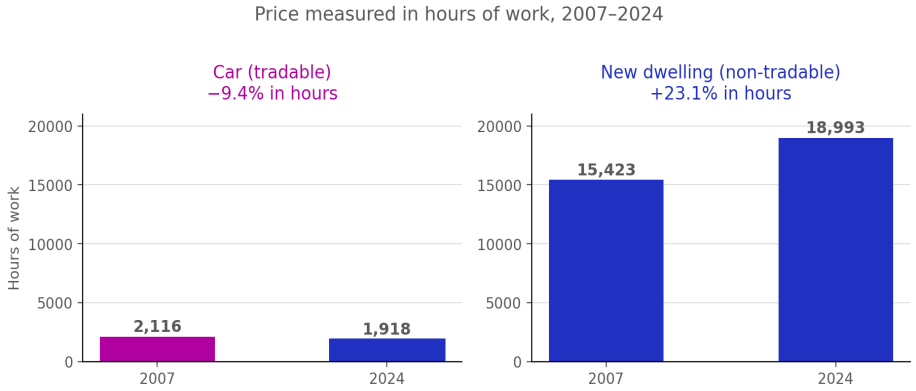
The two measures do not move together. A good's money price and the average wage can both rise, and the good can still become cheaper or more expensive in hours of work, depending on which grew faster.

Worked case — a tradable and a non-tradable good

Two goods, over the same period, set against the national average gross monthly wage. The car is a tradable good — it can be produced abroad and imported. A dwelling is not. Both are priced at 2007* and at 2024, so the comparison is not distorted by measuring one good over a longer stretch than the other.

	2007	2024	Change
Car price, list (HUF)	2,250,000	7,130,000	×3.17
New dwelling, national avg (HUF)	16,400,000	70,600,000	×4.30
Gross monthly wage (HUF)	185,017	646,800	×3.50
Car in hours of work*	2,116	1,918	−9.4%
New dwelling in hours of work*	15,423	18,993	+23.1%

**At a standard 174-hour working month. Sources: KSH STADAT 2.1.1 (wages); KSH 18.1.1.14, new dwellings, all types (dwellings); Suzuki Swift GC, 1.3 L/92 hp, 5-door, base launch price, Magyar Suzuki press release, 4 February 2005, via totalcar.hu (car). The 2007 car figure is the 2005 launch price of that model generation, which ran unchanged in trim through to a late-2007 facelift — the closest reliably documented price to 2007. Full citations and current-year figures are on the class slides.*



Over the same seventeen years, the two goods' forint prices rose at different rates (×3.17 for the car, ×4.30 for the dwelling), and the wage rose in between the two (×3.50). Measured in hours of work, the result is that the car became modestly cheaper and the dwelling substantially dearer — the two goods move in opposite directions even on an identical window.

The candidate answer, which the rest of the course tests: a car can be produced somewhere else and brought here. A dwelling in Miskolc cannot. Goods that can cross a border have a channel through which their price in hours of work can fall; goods that cannot, do not.

1.2 Three candidate explanations

Three mechanisms could explain why a good becomes cheaper in hours of work. All three are on the table at the start of the course; the semester is spent examining each.

1. Better technology — the good is produced with fewer inputs than before.
2. Division of labour — production is reorganised, with people and firms specialising in what they do best.
3. Trade — the good, or its inputs, are obtained from wherever they can be produced most efficiently, rather than only at home.

This course is primarily about the third mechanism, but the first two return explicitly in Week 4 (the two ways of growing) and are not treated as separate, unrelated topics.

1.3 Theories based on labour requirements: definitions

The simplest trade model asks why two countries would trade at all. Its assumptions: two countries, two goods, one factor of production (labour), and a difference in technology between the countries.

Unit labour requirement (a_L) — The number of hours of labour needed to produce one unit of a good, measured in hours per unit.

A second subscript names the good: a_{LO} is the hours of labour needed for one unit of oranges, a_{LW} the hours needed for one unit of wine.

Absolute advantage — A country has an absolute advantage in a good if it can produce one unit of that good with fewer labour hours than the other country (a lower unit labour requirement).

Rule (absolute advantage): if each country has an absolute advantage in a different good, both should specialise in the good they produce more efficiently, and trade for the other. This is Adam Smith's argument.

The rule breaks down the moment one country is more efficient at producing both goods. It gives no guidance in that case — which is exactly the situation Ricardo's argument is built to resolve.

1.4 Opportunity cost and comparative advantage

Opportunity cost — The opportunity cost of good A in terms of good B is the amount of B that must be sacrificed in production in order to produce one more unit of A. It is a fact about production: what the economy physically gives up when it moves resources from one good to the other.

With a single factor (labour), the opportunity cost of wine in terms of oranges is the ratio of the two unit labour requirements, a_{LW} / a_{LO}.

Keep this distinct from a relative price, which is a fact about exchange: the rate at which one good actually trades for another in a market. The two are separate ideas that happen to coincide in one special case — a closed economy, where a country can only obtain a good by producing it.

The *domestic* relative price of wine, written $(P_W/P_O)_d$, is this special case: in a closed economy it equals the opportunity cost exactly, because producing at home is the only way to obtain either good. Once trade opens, a country faces a second, different relative price — what wine actually trades for on world markets. Week 2 gives that price its own notation and shows why it need not equal $(P_W/P_O)_d$ — and why the gap between the two is exactly where the gains from trade come from.

Comparative advantage — A country has a comparative advantage in a good if it can produce that good at a lower opportunity cost than the other country — regardless of whether it also holds the absolute advantage.

Rule (comparative advantage): every country has a comparative advantage in something, even a country with no absolute advantage in anything (unless opportunity costs are identical, which is very rare). Two countries gain from trade if each specialises in the good in which it holds the comparative advantage.

This is the Ricardian result: mutual gain from trade does not require either country to be the more efficient producer overall — only that the two countries' opportunity costs differ.

Worked instance

The full numerical case — two countries, two goods, computing both opportunity costs and identifying the direction of comparative advantage — is worked in class exercise C-1, with a structurally different practice version in P-1. This document states the rule; the exercise is where you apply it.

1.5 The linear production possibility frontier

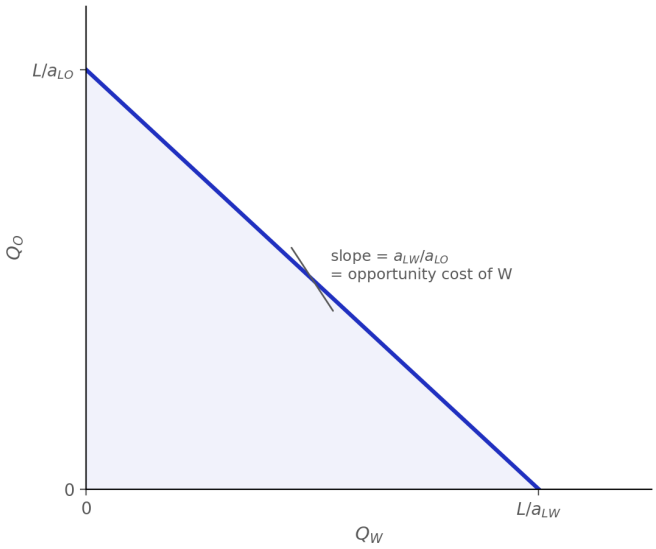
Production possibility frontier (PPF) — The combinations of two goods an economy can produce when all its resources are fully employed.

With a single factor (labour, total endowment L) and constant unit labour requirements, the constraint on production is:

$$a_{LO} \times Q_O + a_{LW} \times Q_W \leq L$$

The frontier is a straight line. Its intercepts are L / a_{LO} (all resources into oranges) and L / a_{LW} (all resources into wine). Its slope is a_{LW} / a_{LO} — exactly the opportunity cost of wine defined in §1.4. The frontier is opportunity cost, drawn.

G1.2 The linear production possibility frontier



Result: in the single-factor case the frontier is linear, because opportunity cost is constant. Every unit of wine given up releases exactly the same amount of labour, and therefore buys the same additional quantity of oranges, no matter how much wine is already being produced.

Forward reference — the concave frontier

This constant-opportunity-cost result is the special case of a more general one. In Week 3, resources stop being identical (heterogeneous parcels of labour or land), opportunity cost starts to rise as production shifts toward one good, and the frontier becomes concave. The linear frontier here is recovered from that general case when all parcels happen to be identical — not a separate model, but the same logic with a simplifying assumption removed.

Does specialisation actually raise output?

The comparative-advantage rule (§1.4) states that both countries gain from specialising and trading. It does not yet show it. The two frontiers just derived make it possible to check.

Take a benchmark before trade: suppose each country devotes exactly half its labour to each good.

	Hungary	Ecuador	World
Wine (half-labour benchmark)	200	200	400
Oranges (half-labour benchmark)	250	400	650

Now compare with full specialisation — Hungary entirely into wine, Ecuador entirely into oranges, read directly off the two frontiers' intercepts:

	Hungary	Ecuador	World
Wine (full specialisation)	400	0	400
Oranges (full specialisation)	0	800	800

World wine output is unchanged; world orange output rises by 150. Nothing was given up — the same total labour now produces strictly more. This is the gain the comparative-advantage rule promised, made visible rather than merely asserted. In this particular example one good happens to be unchanged rather than falling; that is a feature of these numbers, not a general law — with different endowments both goods can move, but the combined gain, valued at any price in the mutually beneficial range, is always positive. The full argument for any starting point (not just a half-labour benchmark) is a short exercise in reallocating labour at the margin, and is worked in C-1(g).

> **Forward reference — production surplus**
>
> This gain is a first instance of something Week 2 gives a name and a general treatment: the production surplus from trade. Week 2, §2.2 asks not just whether the gain exists, but how large it is at a given world price, and how it splits between the two countries.

1.6 Logic chain — Week 1 in one line

- A good's price in hours of work can fall even while its money price rises, if wages rise faster — the affordability puzzle.
- Three mechanisms can produce that fall: technology, division of labour, trade.
- Absolute advantage (a lower unit labour requirement) explains some trade, but not all of it.
- Comparative advantage (lower opportunity cost) explains all of it — every country has one.
- The frontier is opportunity cost made visible: its slope is the opportunity cost, and with one factor that slope is constant.
- Opportunity cost is about production; relative price is about exchange. They coincide only in a closed economy.

Glossary — English / Hungarian

English	Hungarian	Symbol
unit labour requirement	egységnyi munkaerő-ráfordítás	a_L
absolute advantage	abszolút előny	
opportunity cost	alternatív költség	
comparative advantage	komparatív előny	
relative price (domestic)	relatív ár (hazai)	$(P_W/P_O)_d$
production possibility frontier	termelési lehetőségek határa	PPF
price in hours of work	ár munkaórában kifejezve	

International Economics — Explanation Expansion

§2 — Week 2: Splitting the Gains, and Country Size

2.1 The mutually beneficial price range

Week 1 showed that two countries gain from specialising according to comparative advantage and trading — and, in §1.5, that the gain is real, not just asserted. This section asks a sharper question: at what prices does that gain actually exist — for both countries at once?

Mutually beneficial relative price range — the set of world relative prices at which both countries gain from specialising and trading, rather than remaining in autarky. It is bounded by the two countries' own domestic relative prices for the same good.

A country gains from exporting a good only if the price it can get for that good on world markets exceeds what the good costs at home. Its trading partner gains from importing the same good only if that world price is below the partner's own domestic price for it. Both conditions hold at once only for prices strictly between the two.

We write the world — or *international* — relative price of wine as $(P_W/P_O)_i$. This is the price actually available when trading with the rest of the world, and — unlike the domestic relative price $(P_W/P_O)_d$ introduced in Week 1, §1.4 — it need not equal either country's own opportunity cost.

Continuing the Hungary / Ecuador case

From C-1: Hungary's domestic relative price of wine, $(P_W/P_O)_d$, is 1.25 oranges; Ecuador's is 2.0 oranges. Any world price $(P_W/P_O)_i$ strictly between 1.25 and 2.0 leaves both countries better off than autarky. At exactly $(P_W/P_O)_i = 1.25$, Hungary is indifferent; at exactly $(P_W/P_O)_i = 2.0$, Ecuador is indifferent.

G2.1 The mutually beneficial relative price range
(world price of wine, in oranges)

> **Worked instance**
> Deriving the mutually beneficial range from a full data set, and checking a proposed world price against it, is worked in class exercise C-2, with a structurally different practice version in P-2.

2.2 Where the gain comes from: production surplus

Week 1, §1.5 showed that specialising and trading raises total output — for the world, and for each country individually. That gain, generalised to any world price and any starting point, is the production surplus.

Production surplus — for a given world price inside the mutually beneficial range, the additional quantity of the imported good a country obtains through specialising and trading, compared with producing that quantity itself using the same labour.

For Hungary, producing one unit of wine costs a_{LW} hours of labour. Trading that unit at the world price, $(P_W/P_O)_i$, yields $(P_W/P_O)_i$ oranges. The same a_{LW} hours, spent instead on oranges directly, would have yielded a_{LW} / a_{LO} oranges. The surplus per unit of wine traded is the difference between these two quantities — positive throughout the mutually beneficial range, and zero exactly at Hungary's own domestic relative price, $(P_W/P_O)_d$, where trading stops being worth it at all.

The same logic applies to Ecuador in the opposite direction: its surplus per unit of oranges traded is positive throughout the range and zero at its own domestic relative price.

Result: the total production surplus from trade is split between the two countries, and the split depends entirely on where inside the range the actual world price settles — §2.3 and §2.5 take this up directly.

2.3 Splitting the surplus: short-term incentives, long-term benefits

The mutually beneficial range typically contains many possible prices, not one. Where the price actually settles decides how the surplus is divided — §2.5 shows what settles it.

Short-term incentive — the temptation, within a single transaction or trading period, to push the price toward the boundary that favours one's own country — capturing a larger share of the surplus at the partner's expense.

Long-term benefit — the gain from a trading relationship that continues, because the partner still finds it worthwhile. Pushing the price all the way to the partner's own domestic relative price leaves the partner indifferent between trading and not — and indifferent partners are the ones most likely to stop trading when circumstances change.

A country that repeatedly extracts the maximum short-term surplus risks a partner who exits the relationship, ending future gains altogether. This tension — between the surplus available in one period and the value of a partner who keeps trading — reappears explicitly in Week 9 and Week 10, once trade becomes a matter of policy rather than pure exchange.

2.4 Terms of trade

Terms of trade — the name given to the international relative price introduced in §2.1 — the rate at which a country actually trades with the rest of the world.

Written $(P_W/P_O)_i$, to be read against $(P_W/P_O)_d$, the domestic relative price from Week 1, §1.4. The two are *not* the same number in an open economy: $(P_W/P_O)_d$ equals a country's own opportunity cost, fixed by its technology alone; $(P_W/P_O)_i$ is whatever price the country actually faces once trade opens, and §2.1 showed it must lie strictly between both countries' domestic prices for trade to benefit them both.

A country's terms of trade improving means $(P_W/P_O)_i$ moves in its favour — more imports per unit exported, a larger share of the production surplus. Terms of trade worsening means the reverse. This single idea threads through §2.3 above, biased growth in Week 4, tariff incidence in Week 8, and the strategic arguments of Weeks 9 and 10.

2.5 Large country, small country

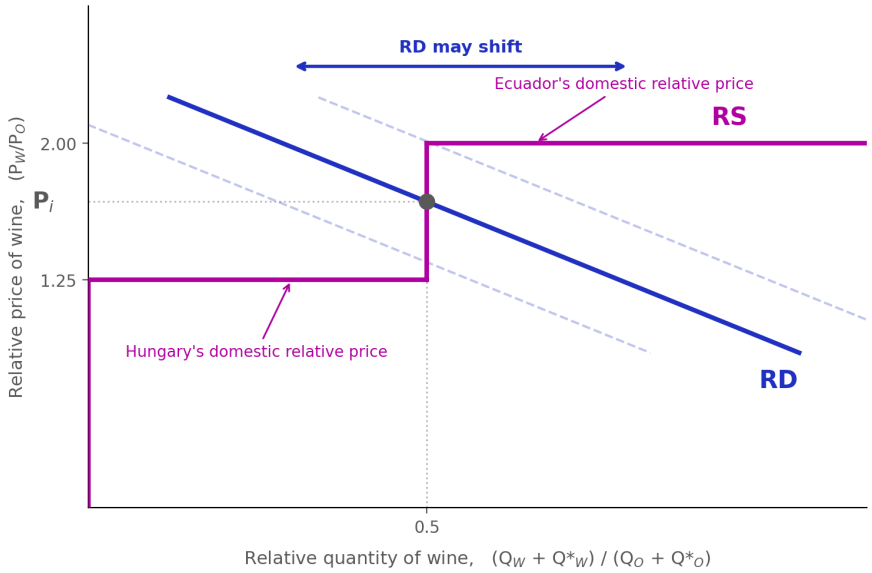
So far §2.1–§2.4 have treated the world price as something that simply lies inside the mutually beneficial range, without asking exactly where. The answer depends on the relative size of the two trading partners — and the same diagram that fixes the price also answers that question.

World relative supply (RS) — the world's combined output of wine relative to oranges, (QW + Q*W) / (QO + Q*O), as a function of the international relative price. It depends only on technology, exactly as the individual frontiers in §1.5 did — no assumption about preferences is needed to draw it.

World relative demand (RD) — the world's combined desired consumption of wine relative to oranges, as a function of the international relative price. Unlike RS, this depends on preferences — how much wine people actually want at each price — not on technology. Drawing a falling RD therefore requires an assumption about preferences; the exercises state this assumption rather than leaving it implicit.

RS, built from the two countries' frontiers, is a staircase rather than a smooth curve: at low prices nobody makes wine; at each country's own domestic relative price that country is indifferent and its wine output can be anything from zero up to full specialisation; between the two domestic prices both countries are fully specialised and world output is fixed; above the higher of the two, the second country starts making wine as well.

G2.2 World relative supply and demand for wine
two countries, both large



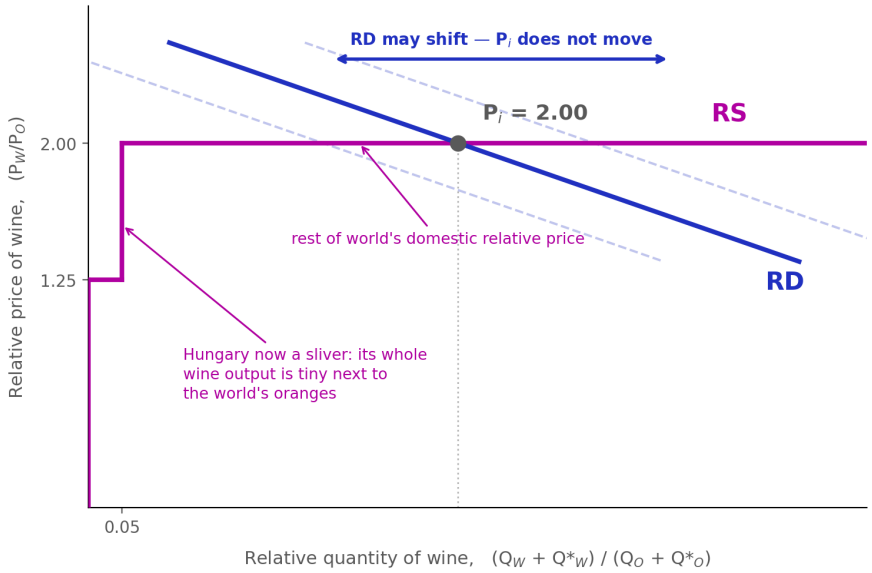
For Hungary and Ecuador (from C-1), the flat middle step sits at 400/800 = 0.5, running from $(P_W/P_O)_i = 1.25$ to $(P_W/P_O)_i = 2.00$. RD crosses that flat step, so $(P_W/P_O)_i$ settles strictly between the two — both countries fully specialise, and both gain.

The arrows show RD shifting. Within the vertical step, a rightward shift (the world wants relatively more wine) raises the price — Hungary's terms of trade improve — until RD reaches Ecuador's own domestic relative price, where Ecuador starts making wine too and the step ends.

Where the small country comes from

The flat step sits at Hungary's maximum wine output divided by the partner's maximum orange output. Make the partner bigger, and the step slides toward the origin — without changing anything about Hungary.

G2.3 Hungary trades with the rest of the world
Hungary small, partner large



Replace Ecuador with a rest-of-world aggregate roughly ten times its size, and the step moves to 400/8,000 = 0.05. RD — unchanged in shape — no longer crosses the (now very short) vertical step. It crosses the upper *horizontal* arm instead, exactly at $(P_W/P_O)_i = 2.00$: the rest of the world's own domestic relative price.

Result: a horizontal arm is not empty space — it is the incomplete-specialisation case. On that arm the large side is indifferent and still produces both goods, which is exactly why the price sits at *its* domestic relative price. Hungary, small enough that its entire wine output barely registers against world orange output, fully specialises and sells at 2.00 rather than its own 1.25 — capturing almost the whole gain from trade. The arrow on this graph makes the point

directly: RD can shift a long way and $(P_W/P_O)_i$ does not move at all. That is the whole content of "small country" in one picture.

Being large sets the price; it does not automatically mean gaining more from trade — worth remembering when Weeks 8–10 make the opposite-sounding case that large countries hold more leverage in trade policy.

Small country — a country whose own volume of trade is too small, relative to its trading partner, to move the international relative price — the partner's RD or RS crosses its horizontal arm rather than its vertical step.

Large country — a country whose own volume of trade is large enough, relative to its trading partner, to move the international relative price — the crossing sits on the vertical step, or on the arm that belongs to the smaller partner.

> **Anchoring the idea**
>
> Hungary, in most goods, is the small country: its purchases and sales are too small a share of world or EU markets to move prices. The European Union, taken as a bloc, is frequently the large country in the same markets. This single distinction is why the EU negotiates trade policy collectively rather than leaving it to individual member states — a point returned to directly in Weeks 9 and 10.

Forward reference — from RS/RD to MD/XS: RS and RD are relative-price objects from a two-good, general-equilibrium world — Hungary's exports of wine are exactly Ecuador's imports of wine, and Ecuador's exports of oranges are exactly Hungary's imports of oranges, with no money changing hands. Week 8 introduces a differently built pair — MD (import demand) and XS (export supply) — from ordinary domestic supply and demand for one good at a time, at a money price. The two frameworks ask related but different questions, and Week 8 opens by naming the difference explicitly. What carries over is the shape of the argument, not the objects themselves: a flat partner curve still means small country; a partner curve that responds to your own volume still means large.

2.6 Logic chain — Week 2 in one line

- Both countries gain only where the international price lies strictly between their two domestic relative prices — the mutually beneficial range.
- The gain at any such price is the production surplus, positive for both countries and zero at each country's own boundary.
- Where the price actually settles inside the range determines how the surplus is split — short-term extraction risks the long-term relationship.
- That price is the terms of trade — distinct from the domestic relative price of Week 1, and named for its role in trade policy.
- World relative supply meets world relative demand at the terms of trade. When the partner is large enough that the crossing falls on its horizontal arm, the price settles at the partner's own cost — and the small country keeps almost all the gain.

Glossary — English / Hungarian

English	Hungarian	Symbol
production surplus	termelési többlet	
mutually beneficial price range	kölcsönösen előnyös ársáv	
terms of trade (international relative price)	cserearány (nemzetközi relatív ár)	P_i
small country	kis ország	
large country	nagy ország	
world relative supply	világ relatív kínálata	RS
world relative demand	világ relatív kereslete	RD

International Economics — Explanation Expansion

§3 — Week 3: The Concave Frontier, and Choosing a Point on It

3.1 Why the straight frontier was a special case

Weeks 1 and 2 assumed a single factor of production with a constant unit labour requirement. Every hour of labour was as good as every other hour, whichever good it was used for. That gave a constant opportunity cost and therefore a straight-line frontier.

Real economies are not like that. Land differs in what it grows well; workers differ in what they are trained for; machines differ in what they are built to make. A vineyard on a south-facing slope is excellent for wine and poor for oranges; an irrigated plain may be the reverse. The moment resources stop being identical, the frontier stops being straight — and one prediction of Weeks 1–2 stops being true: countries no longer specialise completely.

Heterogeneous parcels — a way of representing resources that differ. The economy is divided into parcels — plots of land, teams of workers, plants — each of which can produce either good, but each with its own opportunity cost.

3.2 Building the frontier

Take an economy with four parcels. Each can produce 100 units of wine if devoted entirely to wine, or some quantity of oranges if devoted entirely to oranges:

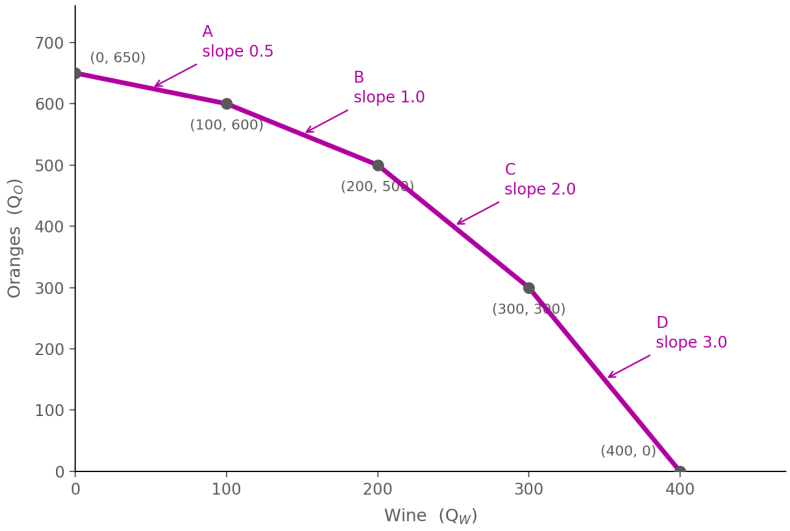
Parcel	Wine, if all wine	Oranges, if all oranges	Opportunity cost of wine
A	100	50	0.5 oranges
B	100	100	1.0 oranges
C	100	200	2.0 oranges
D	100	300	3.0 oranges

Each parcel's opportunity cost of wine is what it gives up in oranges to make one unit of wine — its orange output divided by its wine output. Parcel A is the cheap source of wine (it was poor at oranges anyway); parcel D is the expensive source (it was excellent at oranges).

Now build the frontier. Start with every parcel in oranges: 0 wine, 650 oranges. To produce wine, switch parcels one at a time — and switch the cheapest source of wine first, because any other order would give up more oranges for the same wine.

Switch	Wine	Oranges	Slope of that segment
— (all oranges)	0	650	—
A	100	600	0.5
B	200	500	1.0
C	300	300	2.0
D	400	0	3.0

G3.1 Four parcels, ordered by opportunity cost
The frontier bends because the parcels differ



Result: the frontier is a chain of straight segments, each one a parcel. The slope of a segment is that parcel's opportunity cost. Because the parcels were ordered cheapest-first, the slopes rise as we move right, and the frontier bends — it is concave.

Increasing opportunity cost

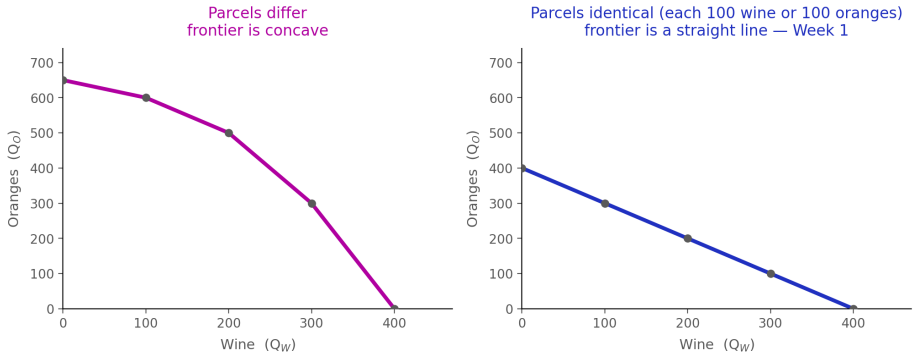
Increasing opportunity cost — each additional unit of a good costs more of the other good than the last one did, because the economy runs out of resources well suited to producing it and must move on to resources that are worse suited.

This is not an extra assumption bolted on. It follows from ordering the parcels: once the cheap parcels are used up, only expensive ones remain. The first 100 wine cost 50 oranges; the last 100 wine cost 300.

The straight frontier, recovered

Suppose all four parcels were identical — each able to produce 100 wine or 100 oranges. Every opportunity cost would be 1.0, every segment would have the same slope, and the four segments would lie on a single straight line from 400 oranges to 400 wine.

G3.2 The linear frontier is the special case



> **Not a different model**
>
> Weeks 1 and 2 are not superseded here. The linear frontier is what this construction produces when the parcels happen to be identical — the same logic with a simplifying assumption removed. Everything derived in Weeks 1 and 2 still holds in that special case.

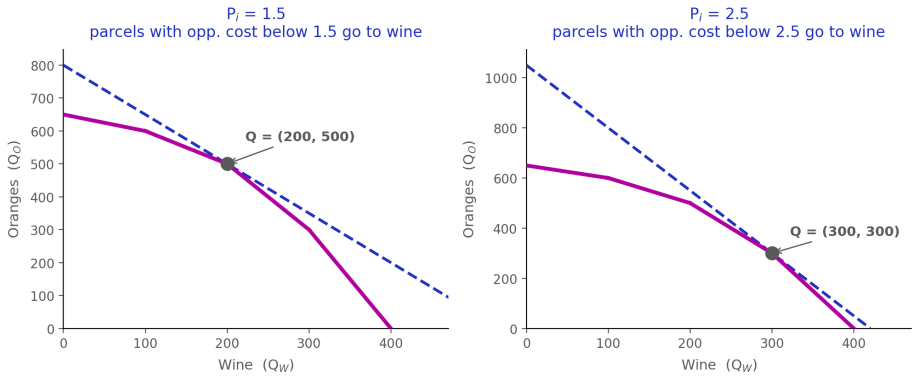
3.3 Choosing a point on the frontier

The frontier says what an economy can produce. It does not say what it will produce. That depends on the price at which wine can be traded for oranges — the terms of trade of §2.4.

Take a parcel currently making oranges, and ask whether to switch it to wine. Switching costs that parcel's opportunity cost, in oranges given up. It gains $(P_W/P_O)_i$, the oranges the wine will fetch on the world market. So the parcel is worth switching whenever its opportunity cost is below $(P_W/P_O)_i$ — and not otherwise.

The optimum rule: put a parcel into wine if its opportunity cost is below $(P_W/P_O)_i$; leave it in oranges if above. No calculus, no tangency condition — compare each parcel's number against one price and count.

G3.3 The optimum sits at the kink where opportunity cost crosses the price



At $(P_W/P_O)_i$ = 1.5, parcels A (0.5) and B (1.0) are below the price and go to wine; C (2.0) and D (3.0) stay in oranges. Production is 200 wine and 500 oranges — the kink between the B and C segments. At $(P_W/P_O)_i$ = 2.5, parcel C joins them and production moves to 300 wine, 300 oranges.

Geometrically, the price line just touches the frontier at that kink and lies above it everywhere else — which is exactly what it means for that point to have the highest value at those prices. The kink is where the frontier stops being flatter than the price line and starts being steeper.

Incomplete specialisation

Incomplete specialisation — an outcome in which a country produces some of both goods, rather than devoting all its resources to one. It arises whenever the world price falls between the cheapest and the dearest parcel's opportunity cost.

Complete specialisation returns only at the extremes: if $(P_W/P_O)_i$ rises above 3.0, even parcel D is worth switching and the country makes only wine; if it falls below 0.5, not even parcel A is worth switching and the country makes only oranges. Between those bounds the country always makes both. This is the prediction that the straight-line frontier of Weeks 1–2 could not deliver — and it is much closer to what real economies do.

3.4 Production and consumption come apart

The value of a country's output, at market prices, is GDP = $Q_W \times P_W + Q_O \times P_O$ — each quantity times its own money price. Divide through by P_O and the money prices collapse into the one relative price already in use throughout this course:

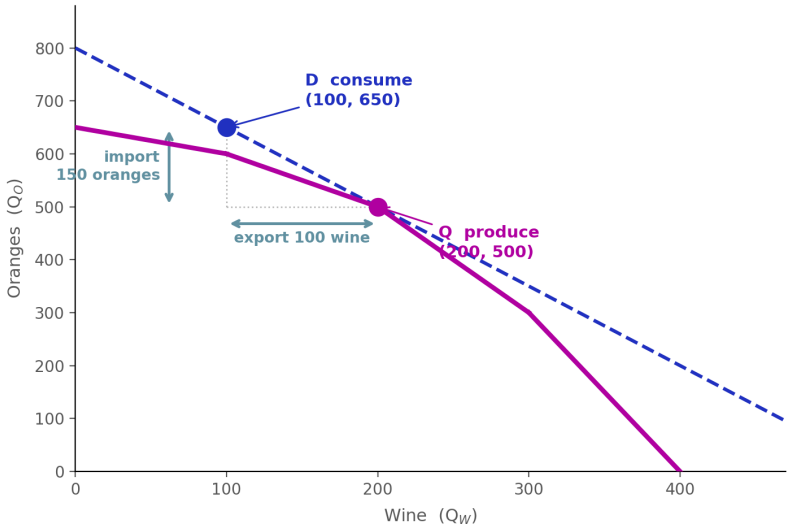
$$GDP / P_O = Q_W \times (P_W/P_O)_i + Q_O = Q_W \times P_i + Q_O$$

This is value measured in oranges — which is exactly the quantity computed below. Because it depends on Pi, a change in the world price changes which point on the frontier gives the highest value, and therefore which point is chosen. That is the same optimum rule as §3.3, seen from the value side rather than the opportunity-cost side: at Pi = 1.5 the highest-value point was (200, 500); at Pi = 2.5 a different point, (300, 300), became the one worth most.

Iso-value line — the set of output combinations having the same total value at the world price. Its slope is the terms of trade, and the country can trade freely along it.

At $(P_W/P_O)_i$ = 1.5 the optimum Q = (200 wine, 500 oranges) is worth 500 + 1.5×200 = 800, measured in oranges. Every point on the line through Q with slope 1.5 has that same value — and trade lets the country move along it.

G3.5 At world prices, production and consumption come apart
no planner decides this — the price line does



Suppose the country prefers to consume at D = (100 wine, 650 oranges). Check the value: 650 + 1.5×100 = 800. Same line, so this is affordable. The country produces 200 wine but consumes 100, so it exports 100 wine; it produces 500 oranges but consumes 650, so it imports 150. The two match at the world price: 100 wine × 1.5 = 150 oranges.

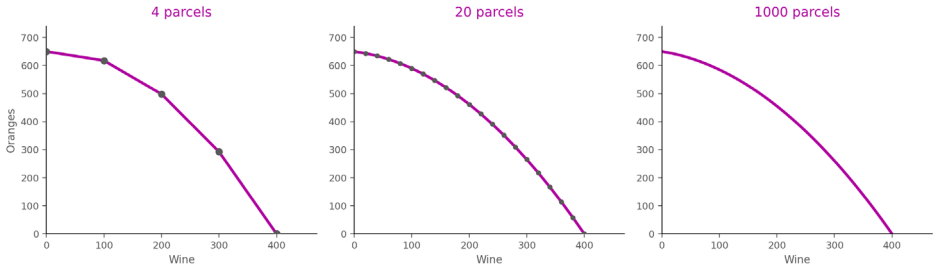
Result: in an open economy the production point and the consumption point are two different decisions, and they separate automatically. Production goes wherever value is highest at world prices; consumption goes wherever preferences point along the same line. No planner arranges this — the price line does it. In a closed economy the two points must coincide, because a country can only consume what it makes.

Which point along the line is actually chosen is a question about preferences, not production. Suppose that, around D, consumers regard one more wine and 6.5 more oranges as equally satisfying — they would trade one for the other without feeling better or worse off. That personal rate of trade-off is what fixes the chosen point, in exactly the same way the parcels' opportunity costs fixed the production point in §3.3: a choice is optimal when the chooser's own rate of trade-off equals the price actually faced. This course does not build the full apparatus for that — no indifference curves — but the principle is the same one used throughout.

3.5 What if there were a thousand parcels?

With four parcels, the optimum is found by scanning a list of four numbers. With twenty it is still possible. With a thousand, the kinks are too fine to see and the list too long to read — the frontier looks like a smooth curve.

G3.4 As parcels multiply the kinks become too fine to see — and the list too long to scan



The rule has not changed. We still want the point where opportunity cost equals the world price. What has changed is that opportunity cost is no longer an entry in a table — it is the slope of a curve at a point. Finding where a curve has a given slope is precisely what a derivative is for.

Optional — the same answer by calculus (not examinable)

Suppose the smooth frontier is $Q_O = 35 - Q_W^2/4$. Its slope is $dQ_O/dQ_W = -Q_W/2$, so the opportunity cost of wine at any point is $Q_W/2$. Setting opportunity cost equal to the price, $Q_W/2 = P_i$, gives $Q_W = 2{\times}P_i$. Three lines, the same rule as §3.3, and no new economics — calculus is the search technique for when the list is too long to scan. The same

move (find where a slope equals a target) reappears in cost minimisation, profit maximisation, and the optimum tariff of Week 8.

3.6 Logic chain — Week 3 in one line

- Resources are not identical; represent them as parcels, each with its own opportunity cost.
- Order the parcels cheapest-first and the frontier becomes a chain of segments whose slopes rise — concave, with increasing opportunity cost.
- Identical parcels give back the straight frontier of Weeks 1–2 — a special case, not a rival model.
- Switch a parcel into wine if its opportunity cost is below the terms of trade. The optimum sits at the kink where the two cross.
- Between the cheapest and dearest parcel, the country produces both goods — incomplete specialisation.
- At world prices, production and consumption separate along the iso-value line, and the gap between them is trade.

Glossary — English / Hungarian

English	Hungarian	Symbol
heterogeneous parcels	eltérő termőterületek / erőforrás-egységek	
concave frontier	konkáv termelési lehetőségek határa	
increasing opportunity cost	növekvő alternatív költség	
incomplete specialisation	részleges szakosodás	
complete specialisation	teljes szakosodás	
iso-value line	azonos értékű egyenes	
production point	termelési pont	Q
consumption point	fogyasztási pont	D

International Economics — Explanation Expansion

§4 — Week 4: Two Ways of Growing, and When Growth Hurts

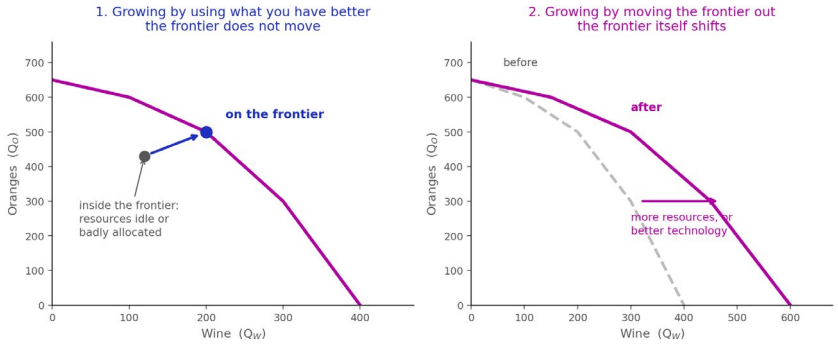
4.1 Two ways of growing

Week 1 asked where the affordability gain came from, and put three candidates on the table: better technology, division of labour, and trade. This section sorts them. Two of the three are ways of growing, and they are not the same thing.

Growing by using what you have better — moving from a point inside the frontier onto it, or from a worse point on it to a better one. Resources that were idle, or allocated to the wrong parcels, are put to their best use. The frontier itself does not move.

Growing by moving the frontier out — acquiring more resources, or better technology, so that combinations previously impossible become possible. The frontier shifts outward.

G4.1 Two ways of growing



The distinction matters because the two have different limits. The first kind runs out: once every parcel is allocated to whichever good it is relatively best at, there is nothing left to reorganise. That is the gain from specialisation, and Weeks 1–3 have already measured it. The second kind does not run out in the same way — but, as §4.4 shows, it does not guarantee a country ends up better off either.

Where trade fits: trade is not a third way of growing the frontier. It is what lets a country consume outside its own frontier — the separation of production from consumption shown in §3.4. The frontier tells you what you can make; trade tells you what you can have.

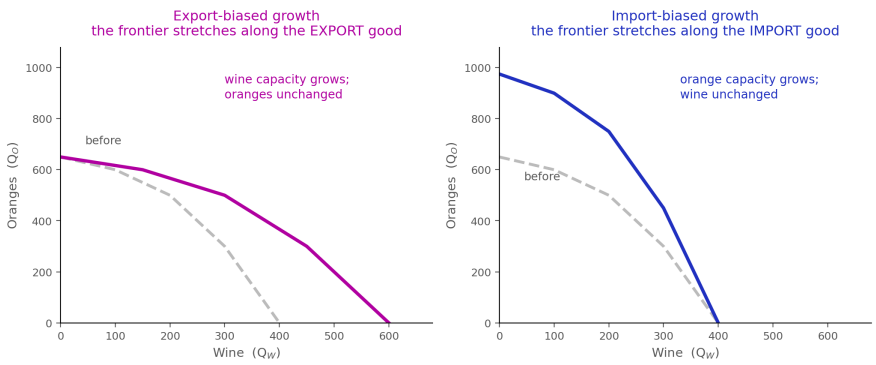
4.2 Growth is rarely even

When a frontier moves out, it rarely moves out proportionally. New technology usually helps one sector more than another; new resources usually suit one good more than the other. The direction of the bias is what matters for trade.

Export-biased growth — growth that expands the country's capacity to produce its export good more than its import good. For a wine exporter, growth concentrated in wine.

Import-biased growth — growth that expands capacity in the import good more than the export good. For a wine exporter, growth concentrated in oranges.

G4.2 Growth is rarely even — for a wine exporter



The example used from here on

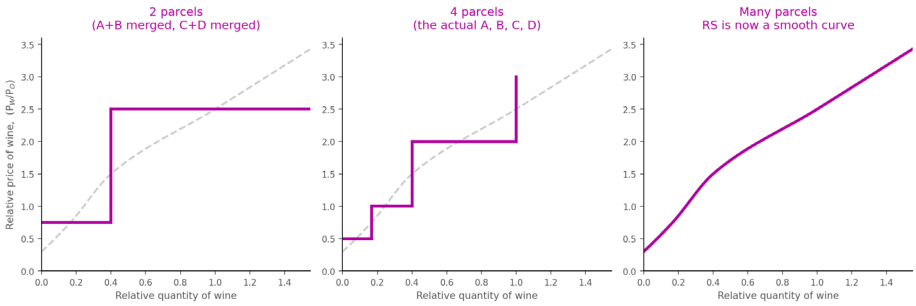
Take the four-parcel economy of §3 — parcels A, B, C, D, each producing 100 wine or 50, 100, 200 and 300 oranges. Now suppose a new grape variety raises every parcel's wine capacity by half, to 150 units, leaving orange capacity untouched. Maximum wine output rises from 400 to 600; maximum oranges stays at 650. This is export-biased growth, and it is the case worked through in C-4.

4.3 Growth changes the terms of trade — if the country is large

Export-biased growth puts more wine on the world market at every price. In the language of §2.5, world relative supply shifts right, and if the country is large enough for its own output to matter, the crossing with RD moves — and typically $(P_W/P_O)_i$ falls.

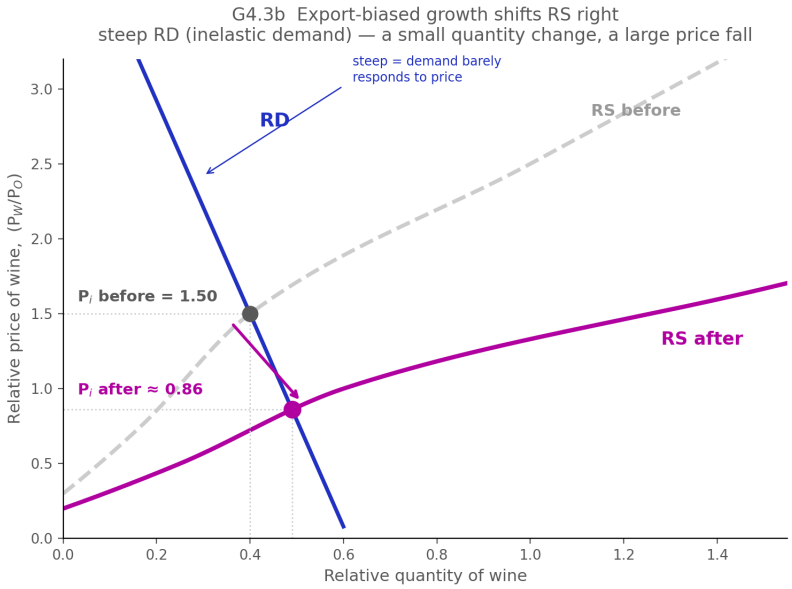
With only four parcels, RS is a staircase, and a staircase is awkward for showing a shift clearly — the flat and vertical segments of the before and after curves tend to sit on top of each other. But §3.5 already established the fix: with many parcels the same staircase becomes a smooth curve. The same device applies here.

G4.3a Same economy, three resolutions — RS is always the same rule



Nothing about the rule changes — a parcel still switches to wine exactly when its opportunity cost falls below the world price. What changes is only how finely that rule is chopped up. The smooth curve on the right is the same RS relationship as the four-parcel staircase in the middle, at higher resolution; it passes through the same key point used throughout this course, (relative quantity 0.4, price 1.5).

Working with the smooth version, export-biased growth shifts the whole RS curve to the right — at every price, the economy is now willing to supply more wine. Where RD crosses the new curve depends on how steeply RD slopes: a flat RD absorbs the extra wine with hardly any price change, while a steep RD — demand that barely responds to price — forces almost the whole adjustment onto the price.



Here a demand curve steep enough to represent strongly inelastic world demand takes the price from 1.5 down to about 0.86 — a small quantity change absorbing a large price fall. This is condition 3 of §4.4 made visible: inelastic world demand is what turns extra supply into a falling price rather than a growing quantity sold.

Terms-of-trade effect of growth — the change in the world relative price caused by a country's own growth. Export-biased growth in a large country worsens its terms of trade; import-biased growth improves them.

For a small country, none of this happens. Its output is too small a share of the world market to move $(P_W/P_O)_I$, so it grows at unchanged terms of trade and is unambiguously better off. Everything that follows in §4.4 applies only to the large-country case.

4.4 Immiserising growth

Export-biased growth in a large country pulls in two directions at once. The country can produce more — that is a gain. But the price of what it sells has fallen — that is a loss. The question is which is bigger.

Immiserising growth — growth that leaves a country worse off than before, because the terms-of-trade loss it causes outweighs the gain in output. The possibility was first identified by Jagdish Bhagwati in 1958.

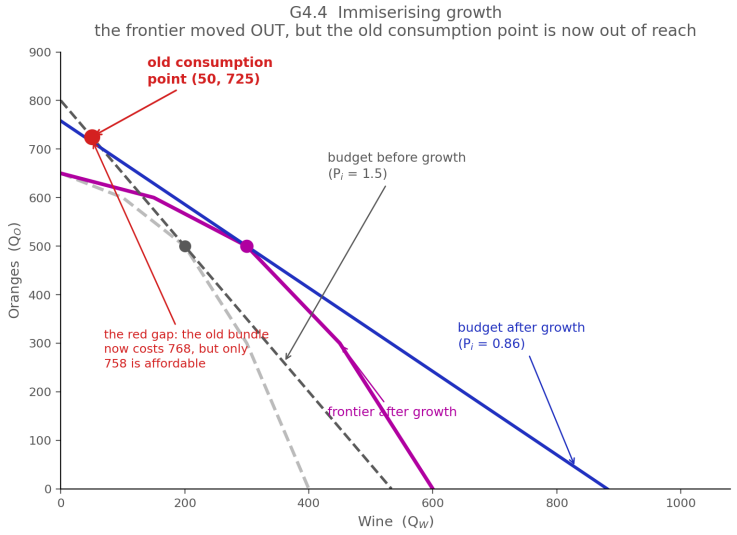
Testing it without indifference curves

There is a clean way to decide, using only arithmetic already familiar from §3.4. Take the bundle the country was consuming before it grew, and ask a single question: can it still afford that bundle at the new price? If not, it is unambiguously worse off — whatever its preferences are, it can no longer have what it used to have.

Before growth. At $(P_W/P_O)_I = 1.5$ the four-parcel economy produces 200 wine and 500 oranges (§3.3), worth 500 + 1.5×200 = 800 measured in oranges. This country is heavily reliant on trade: it consumes wine and oranges in roughly a 1-to-14.5 ratio, exporting most of the wine it makes. That puts consumption at 50 wine and 725 oranges, costing 725 + 1.5×50 = 800 — exactly affordable. It exports 150 wine and imports 225 oranges.

After growth, if the country were small. The price stays at 1.5. Parcels A, B and C now have opportunity costs of 0.33, 0.67 and 1.33, all below 1.5, so production becomes 450 wine and 300 oranges — worth 300 + 1.5×450 = 975. The old bundle still costs 800. The country can afford it and much more. Growth helps, unambiguously.

After growth, if the country is large. Its own extra wine drives the world price down — to about $(P_W/P_O)_I = 0.86$, the fall shown in §4.3's G4.3b. Now only parcels A and B are worth putting into wine, so production is 300 wine and 500 oranges, worth 500 + 0.86×300 = 758. But the old bundle now costs 725 + 0.86×50 = 768. The country cannot afford what it used to consume — it falls about 10 oranges short. It has grown, and it is worse off.



Read the graph carefully: the frontier has genuinely moved outward — the country can make more of everything it could make before. Yet the budget line it now faces passes below the point it used to consume. More capacity, less welfare.

When does this happen?

Immiserising growth is not the normal case. It requires all of the following at once, and if any one fails the country gains:

1. The country must be large enough for its own growth to move the world price.
2. Growth must be strongly export-biased, so it is the export good that floods the market.
3. World demand must be price-inelastic enough that the extra supply pushes the price down sharply.
4. The country must be heavily dependent on trade, so the terms-of-trade loss outweighs the production gain. This is why the consumption ratio was set at 1-to-14.5: a country consuming a large share of its own wine — say the 1-to-6.5 ratio of §3.4, giving the bundle (100, 650) — is partly shielded, because a lower wine price also makes its own wine consumption cheaper. At that ratio the same growth and the same price fall to 0.86 leave the country still able to afford its old bundle (income 758 against a cost of 736): it gains. Immiserising growth needs a country that sells most of what it grows.

In the worked case the threshold can be computed exactly. With parcels A and B in wine, the country's income is $500 + 300\times(P_W/P_O)_i$ and the old bundle costs $725 + 50\times(P_W/P_O)_i$. The country is worse off whenever $500 + 300(P_W/P_O)_i < 725 + 50(P_W/P_O)_i$, that is whenever $(P_W/P_O)_i$ falls below 0.9. The price fall to 0.86 clears that bar, though not by much; a shallower fall would not.

> **Why this matters beyond the model**
>
> The immiserising-growth argument is the formal core of a long-running worry in development economics: that a country which expands a single primary export can drive its own price down and end up running to stand still. It is also the first case in this course where a country's own action changes the price it faces — the same mechanism that makes tariffs work for a large country in Week 8, and that gives leverage its meaning in Weeks 9 and 10.

4.5 Growth abroad

A country's terms of trade also move when its trading partner grows. The logic is the same graph read from the other side.

If the partner's growth is biased toward *our* export good, world supply of that good rises, $(P_W/P_O)_i$ falls, and our terms of trade worsen — the partner is now competing with us in what we sell. If instead the partner's growth is biased toward *their* export good, the good we import becomes more plentiful, its price falls, and our terms of trade improve.

Result: growth abroad is good for us when it happens in the goods we buy, and bad for us when it happens in the goods we sell. This is why a country can watch a trading partner's boom with either satisfaction or alarm, depending entirely on which sector is booming.

4.6 Logic chain — Week 4 in one line

- Two ways of growing: using existing resources better (the frontier stays put) and acquiring more (the frontier shifts out).
- Growth is rarely even — export-biased growth stretches the frontier along the export good, import-biased along the import good.
- A large country's export-biased growth pushes world relative supply right and drives its own terms of trade down.
- If that terms-of-trade loss outweighs the output gain, the country is worse off after growing — immiserising growth.
- The test needs no preferences: can the country still afford the bundle it used to consume? If not, it is unambiguously worse off.
- A small country is immune, because its growth does not move the price.
- Growth abroad helps us when it happens in what we import, and hurts us when it happens in what we export.

Glossary — English / Hungarian

English	Hungarian	Symbol
export-biased growth	exportorientált növekedés	
import-biased growth	importorientált növekedés	
immiserising growth	elszegényítő növekedés	
terms-of-trade effect	cserearány-hatás	
biased growth	kibillent növekedés	

International Economics — Explanation Expansion

§5 — Week 5: Factor Endowments — Heckscher-Ohlin and Stolper-Samuelson

5.1 A second factor

Weeks 1–4 used one factor — labour — and let countries differ in technology. That was Ricardo's model. This week keeps the 2×2 structure (two countries, two goods) but changes what varies: technology is now IDENTICAL everywhere, and countries instead differ in how much of each of two factors — land and labour — they hold.

What carries over from Ricardo: two countries, two goods, perfect competition, factors fully mobile between industries within a country. What changes: a second factor: labour and land, not labour alone. Comparative advantage no longer comes from technology — it comes from endowments: how much land and labour a country has, relative to its trading partner.

This is the Heckscher–Ohlin model (Heckscher, 1919; Ohlin, 1933): the same trade logic as Ricardo, run on a different engine.

5.2 Two ratios, not one

Two goods, wine and cloth, use land and labour in different proportions.

Good	Land per unit	Labour per unit	Land per labour
Wine	3	1	3
Cloth	1	3	0.33

Factor intensity — a property of a GOOD — the ratio of land to labour it uses in production. Wine is land-intensive; cloth is labour-intensive. This ratio is fixed by the table above only for convenience — §5.4 shows it actually depends on factor prices, and a firm can choose from many combinations that produce the same output.

Factor abundance — a property of a COUNTRY — the ratio of land to labour it holds, relative to its trading partner. Abundance is a comparison of ratios, not a comparison of totals: a country with less land in absolute terms can still be the land-abundant one, if its labour force is smaller still.

Hungary and Italy illustrate the distinction:

Country	Land	Labour	Land per worker
Hungary	600	1,200	0.5
Italy	4,000	2,000	2.0

Italy has more of both factors in absolute terms — more land AND more labour than Hungary. Yet Hungary is the labour-abundant country and Italy the land-abundant one, because abundance compares the RATIO of the two factors, not their totals. This is the same move as opportunity cost in Week 1: what matters is a ratio, not a level.

The factor a country holds relatively little of, compared with its trading partner, is that country's scarce factor — land is Hungary's scarce factor, labour is Italy's.

5.3 Who produces what — the Heckscher-Ohlin theorem

With the fixed ratios in §5.2 and full employment of both factors, each country's production is pinned down exactly.

Hungary: $3Q_W + Q_C = 600$ (land) and $Q_W + 3Q_C = 1{,}200$ (labour). Solving: 75 wine, 375 cloth.

Italy: $3Q_W + Q_C = 4{,}000$ (land) and $Q_W + 3Q_C = 2{,}000$ (labour). Solving: 1,250 wine, 250 cloth.

	Wine	Cloth
Hungary (labour-abundant)	75	375
Italy (land-abundant)	1,250	250

The Heckscher–Ohlin theorem: a country produces relatively more of, and exports the good that uses its abundant factor intensively. Hungary, labour-abundant, produces mostly cloth (labour-intensive). Italy, land-abundant, produces mostly wine (land-intensive) — despite having more labour in absolute terms than Hungary has of anything. Comparative advantage follows the abundant factor, and trade follows comparative advantage exactly as in Week 1.

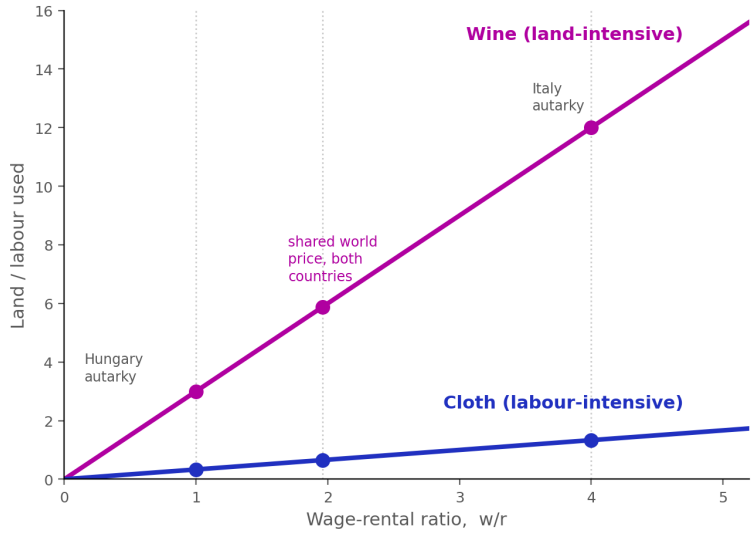
5.4 One derivation chain: from goods prices to who gains

The land/labour ratios in §5.2–§5.3 were held fixed to keep the production numbers simple. In fact a firm chooses its input combination to minimise cost at the factor prices it faces, and many combinations can produce a given good — more land and less labour, or the reverse, trading off against each other. The ratios in the table are the combination each industry chooses at ONE particular pair of factor prices; a different wage and rent would produce a different table. This section works out that dependence explicitly.

Wage-rental ratio — the wage divided by the rent, written w/r. It measures how expensive labour is relative to land, and is the single number that determines every industry's chosen input ratio.

At the wage and rent where the §5.2 table holds — call it w/r = 1 — wine's cost-minimising choice is 3 land to 1 labour, and cloth's is 1 land to 3 labour, exactly matching the table. Away from that point, both industries substitute continuously: as labour becomes relatively dearer (w/r rises), every industry uses less labour and more land, but wine — always the land-intensive one — stays more land-intensive than cloth at every wage-rental ratio.

G5.1 Factor intensity: each good's chosen input ratio
wine always more land-intensive than cloth, at every w/r



From factor prices to goods prices — and back

Zero profit ties each good's price to the cost of the inputs behind it. Land-intensive wine's price depends more heavily on rent; labour-intensive cloth's price depends more heavily on the wage. Working through both zero-profit conditions together gives a single relationship between the wage-rental ratio and the relative price of the two goods — higher whenever labour is relatively dear, because that is exactly when the labour-intensive good, cloth, becomes relatively expensive to make.

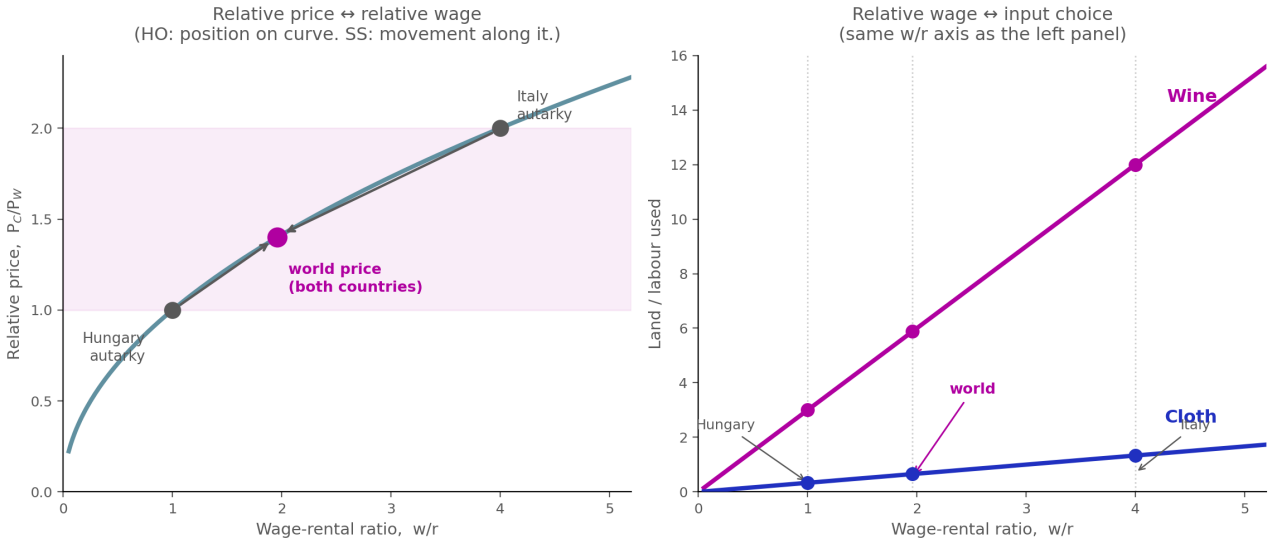
Stolper–Samuelson relationship — the link between the wage-rental ratio (w/r) and the relative price of the two goods, (PC/PW). The relationship is monotonic: a rise in the relative price of the labour-intensive good is always accompanied by a rise in the wage relative to the rent, and vice versa.

Because technology is identical in both countries, the SAME curve applies to Hungary and Italy alike — only where each country sits on it differs, and that difference is entirely due to factor abundance.

In autarky, Hungary's abundant, cheap labour keeps w/r low, so it sits low on the curve: cloth is relatively cheap at home ($P_C/P_W = 1$). Italy's abundant, cheap land keeps its own labour relatively dear, so it sits high on the curve: cloth is

relatively expensive at home ($P_C/P_W = 2$). This is the Heckscher–Ohlin theorem again, read directly off the curve: each country's comparative advantage is exactly its position on a shared technology curve, fixed by nothing but its own factor abundance.

G5.2 From factor abundance to who gains — Hungary and Italy on one shared diagram



A world price of 1.4 — strictly between Hungary's autarky price and Italy's, exactly the mutually beneficial range of §2.1 — pulls both countries toward it along the SAME curve. Hungary's w/r rises from 1 toward 1.96; Italy's falls from 4 toward the same 1.96. Because the curve is shared, a common relative price forces a common wage-rental ratio: this is factor price equalisation, and the right-hand panel shows what it does to each country's chosen input mix as it happens.

	Hungary	Italy	Direction
Rent (r)	25 → 21.13	17.68 → 21.13	opposite
Wage (w)	25 → 41.41	70.71 → 41.41	opposite

Hungary's workers gain and its landowners lose; Italy's landowners gain and its workers lose — the same theorem, applied on both sides of the same trade.

G5.2b One axis, two stories
factor abundance sets w/r; w/r sets both comparative advantage and who gains

The worked case

Suppose both goods start at a price of 100, with the wage and rent both at 25 (so w/r = 1). Trade then raises the price of cloth — Hungary's export — to 140, while wine stays at 100.

	Before	After	Change
Wine price	100	100	0%
Cloth price	100	140	+40%
Rent (r)	25	21.13	−15.5%
Wage (w)	25	41.41	+65.6%

Result — the magnification effect: rent − 15.5% < wine price 0% < cloth price +40% < wage +65.6%. Both factor prices move MORE than either goods price — further in the same direction as the good that uses that factor intensively. The wage rises by more than the price of the labour-intensive good it is tied to; the rent falls even though no goods price fell at all.

The wage-rental ratio itself moves from 1 to 1.96 — nearly double — for a 40% change in relative goods prices. Small movements in relative prices can imply large movements in relative factor prices; this is the same relationship plotted as the left panel of G5.2.

Stolper–Samuelson theorem — a rise in the relative price of a good raises the real return to the factor used intensively in producing it, and lowers the real return to the other factor — unambiguously, regardless of what either factor owner consumes. (Stolper and Samuelson, 1941.)

In short: owners of the abundant factor win from trade; owners of the scarce factor lose. Hungary's workers (its abundant factor) gain; its landowners (its scarce factor) lose — exactly what the worked case below shows.

Real returns confirm this without needing preferences. The wage rises 65.6%, more than either goods price — workers can buy strictly more of both wine and cloth. The rent falls to 21.13, while both goods prices are flat or higher — landowners can buy strictly less of both. Trade that raises Hungary's total income still makes its landowners worse off.

> **The input ratios shift too**
>
> At w/r = 1.96, wine's land/labour ratio rises from 3 to 5.88, and cloth's rises from 0.33 to 0.65 — both industries substitute toward the now-cheaper factor, land. Wine remains the more land-intensive of the two throughout, but the exact table of §5.2 was only ever a snapshot at one wage-rental ratio.

5.5 Two corollaries

Rybczynski theorem — holding goods prices fixed, an increase in one factor's endowment raises the output of the good that uses that factor intensively, and LOWERS the output of the other good — in absolute terms. (Rybczynski, 1955.)

Holding goods prices fixed is exactly the small-country assumption of §2.5: a country too small for its own trade to move the world price. Rybczynski is the Heckscher–Ohlin production side of that same idea — more of a factor changes what a small country produces, without changing the prices it faces.

Factor price equalisation — under the full Heckscher–Ohlin assumptions (identical technology, no trade costs, both countries producing both goods), free trade in goods equalises the wage and the rent ACROSS countries, even with no factor ever crossing a border. Trading goods is, indirectly, trading the factors embodied in them.

This is a strong prediction, and it does not hold precisely in the real world — technology differs across countries, trade is not free, and countries do not always produce both goods. §5.6 takes up a more direct empirical test of the model.

5.6 The Leontief paradox

The Heckscher–Ohlin theorem makes a testable prediction: a capital-abundant country should export capital-intensive goods. In 1953, Wassily Leontief tested this directly on US trade data — and found the opposite. US exports were LESS capital-intensive than the goods the US imported, even though the US was, by any reasonable measure, the most capital-abundant country in the world.

Leontief paradox — the empirical finding that US exports were more labour-intensive, and imports more capital-intensive, than the simple Heckscher–Ohlin prediction — the reverse of what the theorem predicts for a capital-abundant country. (Leontief, 1953.)

The paradox does not overturn the model's logic — the derivation in §5.3–§5.4 still holds given its assumptions. It points instead at which assumption is doing the most damage: identical technology across countries is the least plausible of the differences from Ricardo listed in §5.1, and much of the later literature on trade patterns is an attempt to relax exactly that assumption.

5.7 Logic chain — Week 5 in one line

- A second factor, land, alongside labour — technology now identical across countries; endowments differ instead.
- Factor intensity is a property of a good; factor abundance is a property of a country — both are ratios, not totals.
- Heckscher–Ohlin: a country produces relatively more of the good using its abundant factor intensively.
- The input ratios in the production table are a snapshot at one wage-rental ratio, not a technological constant — firms substitute as w/r changes.
- Stolper–Samuelson: a rise in a good's relative price raises the real return to the factor it uses intensively, and lowers the other — unambiguously.
- Rybczynski (prices fixed, small-country case): more of a factor raises the output using it intensively and lowers the other.
- Factor price equalisation is the model's strongest prediction — and the Leontief paradox is evidence it does not hold as stated.

Glossary — English / Hungarian

English	Hungarian	Symbol
factor intensity	tényezőintenzitás	
factor abundance	tényezőbőség – tényezőellátottság	
Heckscher-Ohlin theorem	Heckscher–Ohlin-tétel	
wage-rental ratio	munkabér-bérleti díj arány	w/r
Stolper-Samuelson theorem	Stolper–Samuelson-tétel	
magnification effect	fölerősítési hatás	
Rybczynski theorem	Rybczynski-tétel	
factor price equalisation	tényezőár-kiegyenlítődés	
Leontief paradox	Leontyiev-paradoxon	

International Economics — Explanation Expansion

§6 — Week 6: Increasing Returns and Intra-Industry Trade

6.1 A puzzle Weeks 1–5 cannot solve

Germany sells cars to France. France sells cars to Germany. Both flows are large, and both are the same industry. Ricardo cannot explain this — with identical technology there is nothing to gain from trading the same good both ways. Heckscher–Ohlin cannot explain it either — two similar, similarly endowed economies have no comparative advantage to exploit against each other. Yet this kind of trade, two similar countries exchanging similar goods, is a large share of world trade, concentrated in exactly the industrialised, similar-country pairs where Weeks 1–5 predict the least trade of all.

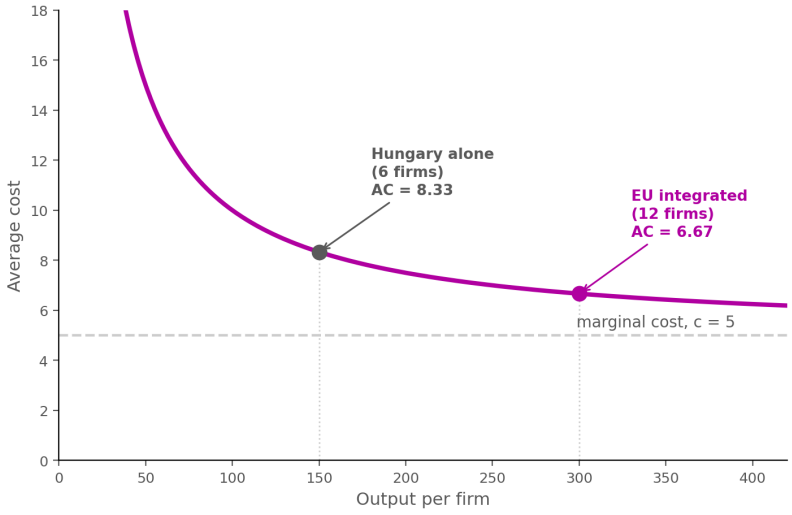
The missing piece is the third candidate from Week 1 that has not been used yet: division of labour. This week builds the model where it does the work.

6.2 Economies of scale

Economies of scale — a good is produced more cheaply, per unit, the more of it one firm makes. Average cost falls as output rises.

A simple way to see why: a firm faces a fixed cost F (a factory, a design, a certification) and a constant marginal cost c for every extra unit. Average cost is AC = F/Q + c — the fixed cost spread over more units, plus the marginal cost. As Q rises, F/Q shrinks toward zero and AC falls toward c.

G6.1 Economies of scale
average cost falls as one firm produces more



This breaks the perfect-competition assumption every earlier week relied on. With economies of scale, a bigger firm always beats a smaller one on cost — there is no stable position with many small firms all charging price equal to marginal cost. The market tips toward a few large firms, each with some power over its own price.

External economies of scale (a whole industry, not one firm, gets cheaper as the industry clusters together — the logic behind Silicon Valley) exist too, but are a matter for a different course; this week is about internal economies, within a single firm.

6.3 Monopolistic competition: what a bigger market does

Take an industry of near-identical firms, each selling a slightly different variety of the same good — different car models, say. Two relationships describe this market. Both are stated here, not derived; the reasoning is the same as §5.4's $(P_C/P_W) = \sqrt{(w/r)}$ — a tool to use, not to build from scratch.

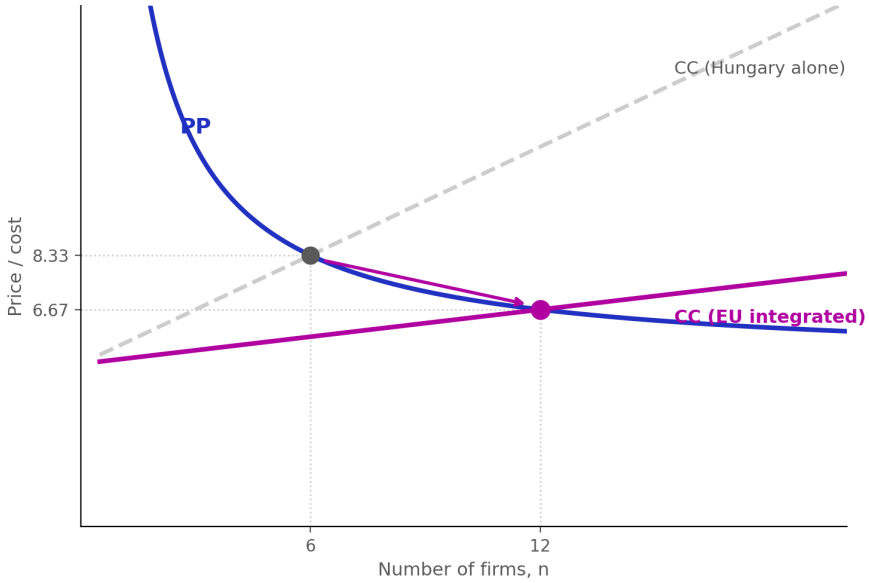
CC curve — average cost as a function of the number of firms, n, given the market's total size S: AC = nF/S + c. More firms sharing a fixed market means less output per firm, so cost per unit rises with n.

PP curve — the price each firm charges as a function of n: P = c + 1/(bn), where b measures how sharply demand falls for a firm that prices above its rivals. More firms means fiercer competition, so price falls with n.

Equilibrium is where entry stops paying — price equals average cost, CC meets PP. Take marginal cost c = 5, fixed cost F = 500, and b = 0.05.

	Hungary alone	EU integrated	Change
Market size, S	900	3,600	×4
Number of firms, n	6	12	×2
Price	8.33	6.67	−20%
Output per firm	150	300	×2

G6.2 Market integration: more firms, lower price
CC rotates down as the market grows — PP does not move



A larger market rotates CC downward — the same fixed cost F now spread across a bigger S at any given n, so cost per unit is lower at every n. PP does not move: it depends only on c and b, not on market size. The crossing point slides down and to the right along the unchanged PP curve.

Three gains at once, and none of them is comparative advantage: more varieties (6 firms' models becomes 12), a lower price for every variety, and each surviving firm actually larger and further down its own average-cost curve. Hungary and France could have identical technology and identical endowments in every industry, and this gain would still be there — it comes purely from the market being bigger.

6.4 Intra-industry trade and the Grubel–Lloyd index

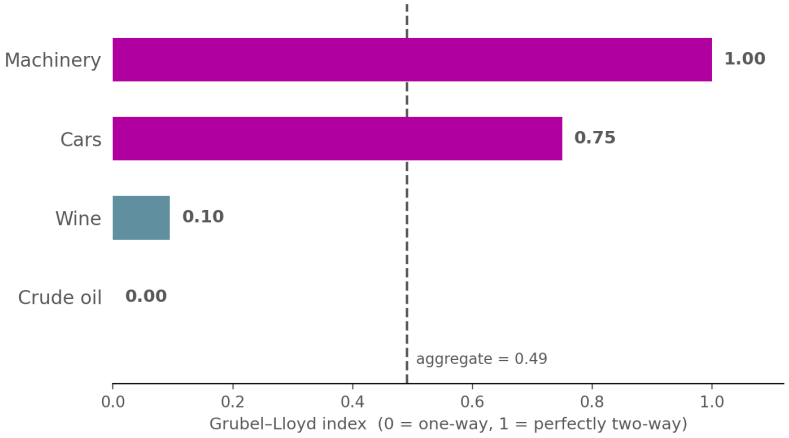
If two similar countries both make cars, and each sells the world a different mix of models, both countries can show up in the trade data as exporters AND importers of 'cars'. This is intra-industry trade, and it needs a way to measure how much of it there is.

Grubel–Lloyd index — for one industry, GL = 1 − |X − M| / (X + M), where X and M are that industry's exports and imports. GL = 0 means trade is entirely one-way (pure inter-industry trade, the Ricardo/HO case); GL = 1 means exports and imports are exactly equal (pure intra-industry trade).

Industry	Exports	Imports	GL
Machinery	250	250	1.00

Industry	Exports	Imports	GL
Cars	300	500	0.75
Wine	400	20	0.10
Crude oil	0	600	0.00

G6.3 Manufactures trade both ways; primary goods do not



Aggregating across all four industries (summing |X−M| and X+M separately before applying the formula) gives 0.49 for this economy as a whole. The pattern across industries is the real content: manufactured goods, where economies of scale and product variety matter, trade heavily both ways; primary commodities, where one country simply has the resource and another does not, trade almost entirely one way. The Grubel–Lloyd index, industry by industry, is a rough guide to which chapter of this course explains which industry's trade. (Grubel and Lloyd, 1975.)

6.5 Intra-firm trade

A large share of what crosses a border never changes owner — a car-parts plant in one country ships components to an assembly plant in another, both owned by the same multinational. This is intra-firm trade, and the price attached to that internal shipment is a transfer price: set by the firm itself, not by a market.

Transfer prices can be chosen for tax reasons as well as cost reasons — a firm has an incentive to book profit in whichever country taxes it least — which is one reason trade statistics built from these prices are harder to interpret than they look.

6.6 Logic chain — Week 6 in one line

- Similar countries trade similar goods both ways — a pattern neither Ricardo nor Heckscher–Ohlin predicts.
- Economies of scale (average cost falling with output) break perfect competition and push an industry toward a few large firms.
- A bigger market supports more firms AND lower prices AND larger firms, all at once — gains from trade with no comparative advantage anywhere in the model.
- The Grubel–Lloyd index measures how much of an industry's trade is two-way — high for manufactures, near zero for primary commodities.
- Intra-firm trade, priced by transfer prices rather than markets, complicates reading trade statistics at face value.
- This model sits alongside Ricardo and Heckscher–Ohlin, not in place of them — different industries are explained by different chapters.

Glossary — English / Hungarian

English	Hungarian	Symbol
economies of scale	méretgazdaságosság	
monopolistic competition	monopolisztikus verseny	
intra-industry trade	iparágon belüli kereskedelem	
Grubel-Lloyd index	Grubel–Lloyd-index	GL
intra-firm trade	vállalaton belüli kereskedelem	
transfer price	transzferár	

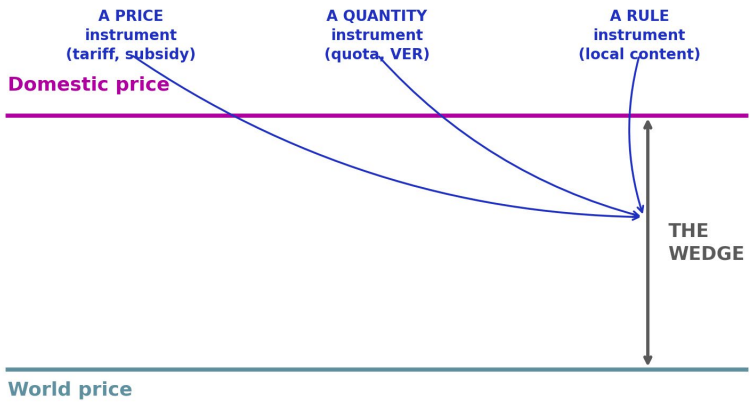
International Economics — Explanation Expansion

§7 — Week 7: Trade Policy Instruments

7.1 What trade policy does

Every instrument this week does the same underlying thing: it makes foreign output different from domestic output. A tariff makes the foreign good more expensive once it crosses the border. A quota makes only a limited amount of it available at all. A local content rule makes a good count as 'domestic' only if enough of it actually was. Different mechanics, same move — driving a wedge between the world price and the price at home.

G7.1 Trade policy makes foreign output different from domestic
three ways to create the same wedge



A short history, lightly: the mid-nineteenth century leaned toward openness — the Cobden–Chevalier Treaty (Britain and France, 1860) cut tariffs sharply and spread most-favoured-nation treatment across Europe through a wave of copycat agreements. That reversed after 1930, when the United States' Smoot–Hawley Tariff Act raised average tariffs by roughly 60% and other countries retaliated in kind, deepening the Great Depression. The postwar order was built explicitly against a repeat: the General Agreement on Tariffs and Trade (GATT, 1947, 23 countries) set rules for tariff reduction and non-discrimination, and in 1995 GATT was absorbed into the World Trade Organization, which still administers most of the rules this week describes.

7.2 Price instruments

Tariff — a tax on an imported good, paid at the border. An ad valorem tariff is a percentage of the good's value; a specific tariff is a fixed amount per unit (per tonne, per litre), regardless of price.

The tariff is Week 8's subject, not this week's — here it is the reference case everything else gets compared against. Rates vary enormously by product and by country, and the EU's own tariff schedule (TARIC, the EU's online tariff database) is worth a look for a reality check on how granular this gets in practice — different rates for almost every product code, updated continuously.

> **A live case**
>
> Since October 2024 the EU has applied anti-subsidy duties on Chinese-made electric vehicles: the standard 10% car tariff plus an additional 17–35.3% depending on the manufacturer, taking the total as high as 45–48% for some producers. It remains in force. This is the running example for the rest of this section.

Export subsidy — a payment from the government to a domestic firm for each unit it exports, lowering the price the firm can profitably charge abroad. Unlike a tariff, an export subsidy costs the government money rather than raising it.

7.3 Quantity instruments

Quota — a limit on the physical quantity of a good that may be imported in a given period, regardless of price. Once the quota is filled, no more of the good may enter — at any price.

The EU's steel safeguard is a live example of a related instrument, the tariff-rate quota: a fixed quantity enters duty-free, and only imports beyond that quantity pay a tariff. The safeguard has run since 2018; a tightened version took effect on 1 July 2026, allowing 18.3 million tonnes in duty free each year and applying a 50% tariff to anything above that — one of the highest rates in this week's material, and a useful anchor for what an 'extreme' instrument looks like.

Voluntary export restraint (VER) — a quota administered by the EXPORTING country's own government or industry, agreed under pressure from the importing country. The most-cited case is the 1981 US–Japan agreement limiting Japanese car exports to the US to 1.68 million units a year; one estimate put the cost to the US economy at roughly $8 billion over 1981–1984.

VERs no longer exist as a legal option: the WTO's 1995 Agreement on Safeguards prohibits new voluntary export restraints outright. Their economic logic survives, though, in a WTO-legal descendant: the **price undertaking**, where an individual exporting firm agrees to a minimum price and a quantity limit in exchange for exemption from a tariff. In February 2026 the EU let Volkswagen's China-made Cupra Tavascan opt out of the EV tariff on exactly these terms — a minimum price and an import quota, negotiated firm by firm. Same economics as a VER; different legal box.

7.4 Rule instruments

Rule instruments do not touch price or quantity directly — they change what counts as 'domestic' in the first place, usually to qualify for a subsidy, a tax credit, or the right to bid on a government contract.

Local content requirement — a rule that a good must contain at least a stated share of domestically produced inputs to receive some benefit — a subsidy, preferential tax treatment, or eligibility for public procurement.

These have become one of the most actively used trade-policy tools of the last few years, not a historical curiosity. The US Buy American Act (1933, still in force) requires most direct federal government purchases above $10,000 to be wholly US-manufactured. In Europe, the picture is live rather than settled: the European Commission's proposed Industrial Accelerator Act (March 2026) would require electric vehicles to source 70% of their components from the EU to qualify for state support — not yet law, still moving through Parliament and Council as this is written, but exactly the kind of instrument this section is about.

7.5 Equivalence — and where it breaks

A quota can be set to reproduce a given tariff's effect exactly, at least for a moment. Suppose a 40% tariff on a world price of 100 pushes the domestic price to 140, and 60 units get imported at that price. A quota fixed at 60 units produces the identical domestic price and the identical quantity — for now.

G7.2 A tariff and a quota can start equivalent — demand growth breaks the equivalence

Now let domestic demand grow. Under the tariff, the wedge stays fixed at 40% — the domestic price stays at 140, and the extra demand is simply met by more imports (60 rising to 90). Under the quota, the physical limit of 60 cannot move: the extra demand has nowhere to go but the domestic price, which is pushed up further (to 170) to choke it back. The tariff lets the market absorb growth in quantity; the quota forces it to absorb growth in price. A quota that looked identical to a tariff on the day it was set becomes MORE restrictive over time, automatically, without anyone changing the policy.

The other break in the equivalence is who gets the money — the subject of the next section.

7.6 Who gets the money?

Every instrument in this week creates a gap between the world price and the domestic price. Someone captures the value of that gap. Which someone depends entirely on which instrument was chosen.

Instrument	Who captures the wedge
Tariff	The home government (tariff revenue)
Quota (licences auctioned)	The home government (auction proceeds)
Quota (licences given away)	Whoever holds the licence — often domestic importers
VER / price undertaking	The FOREIGN exporting firms
Export subsidy	Costs the home government money, rather than raising it

The VER row is the sharpest result in this table: a 'voluntary' restraint hands the wedge's value to the very foreign firms it is meant to restrain. That is not an accident — it is precisely why foreign exporters have historically been willing to accept one instead of fighting a tariff. An instrument can be chosen for who it pays as much as for how much protection it gives, which is the thread Weeks 9 and 10 pick up.

7.7 Logic chain — Week 7 in one line

- Every trade-policy instrument makes foreign output different from domestic output — a wedge between the world price and the domestic price.
- Price instruments (tariffs, export subsidies) fix the size of the wedge directly.
- Quantity instruments (quotas, VERs/price undertakings) fix the amount that may cross the border, letting the price move.
- Rule instruments (local content requirements) fix what counts as domestic in the first place — increasingly central to current policy.
- A quota can mimic a tariff at one point in time, but not as demand grows — the tariff lets quantity adjust, the quota forces price to.
- Who captures the wedge's value differs sharply by instrument — government, licence-holder, or (in a VER's case) the foreign exporter itself.

Glossary — English / Hungarian

English	Hungarian	Symbol
tariff	vámtarifa	
ad valorem tariff	értékvám	
specific tariff	fix vám	
export subsidy	exporttámogatás	
quota	kvóta	
voluntary export restraint	önkéntes exportkorlátozás	VER
price undertaking	árkötelezettségvállalás	
local content requirement	helyi tartalom követelmény	

International Economics — Explanation Expansion

§8 — Week 8: Modelling the Tariff

8.1 A different diagram for a different question

Weeks 1–5 used the RS/RD diagram: relative price, two goods, general equilibrium — built to answer who trades what, and why. This week needs a different tool, because the question is different: what does a specific policy, on a specific good, do to a specific price? For that, one good and one price is exactly right, and the two curves are the import demand (MD) and export supply (XS) already introduced in §2.5 in outline.

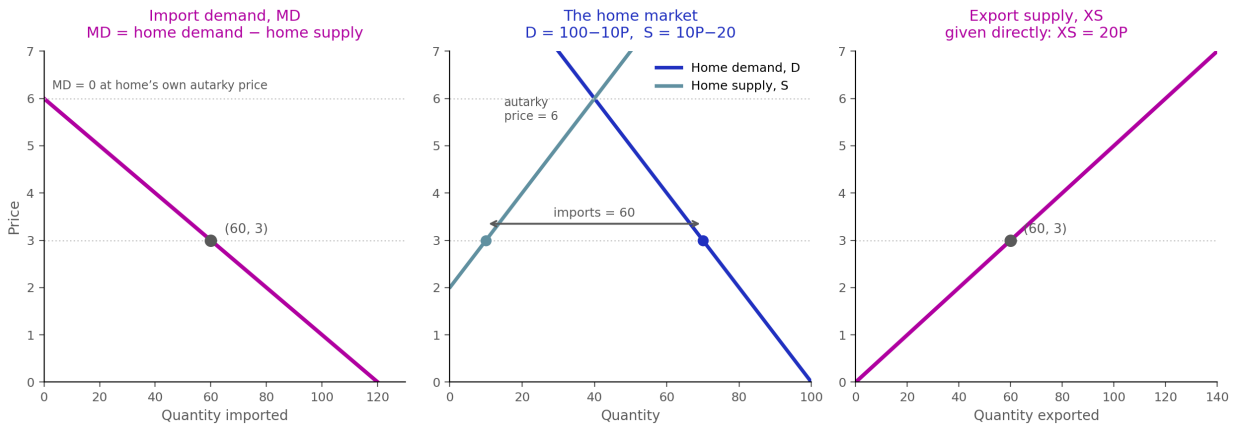
	RS / RD (Weeks 1–5)	MD / XS (this week)
Price	Relative price of two goods	Money price of one good (same currency)
Goods	Two, traded against each other	One, traded for money
Scope	General equilibrium	Partial equilibrium
Answers	Who trades what, and why	What a policy does to a market

Same country, same trade — just a different question asked of it.

8.2 Building MD and XS

Take a home market with demand D = 100 − 10P and supply S = 10P − 20. Import demand is what home buyers want beyond what home producers supply: MD = D − S = 120 − 20P. MD reaches zero exactly at home's own autarky price (where D = S), which here is P = 6. Export supply works the same way on the other side: XS is foreign supply minus foreign demand — what foreign producers have left over once their own consumers are served. Here it is given directly, as a reduced form: XS = 20P. World equilibrium is where MD = XS: P = 3, with 60 units traded.

G8.1 Building the import-market diagram from the home market



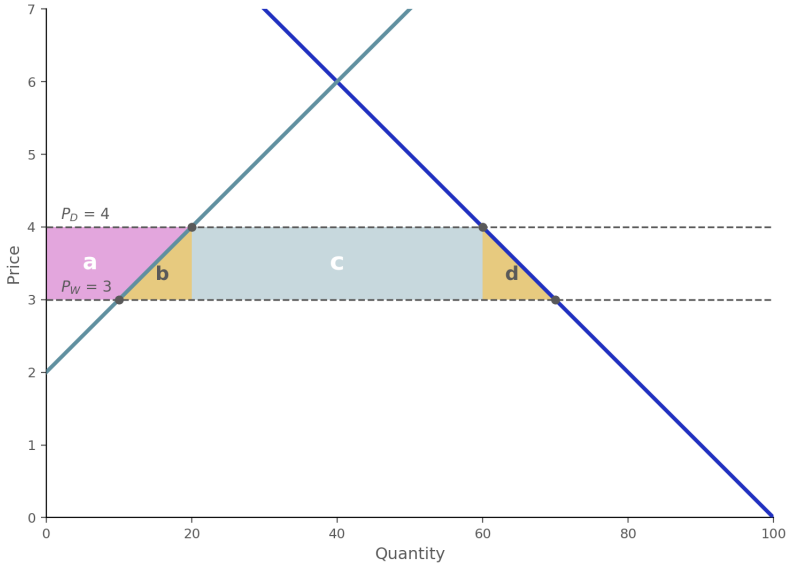
The right-hand panel here is a simplification worth being explicit about: XS is given directly rather than built from a foreign country's own supply and demand. In the full model it would be derived exactly like MD, just from the foreign market instead of the home one — the machinery is identical, and nothing this week needs the foreign country's own curves separately.

8.3 A small country's tariff

A small country cannot move the world price — the same assumption behind §2.5's horizontal RS arm and §4.3's Rybczynski case. A tariff of t simply adds t to the world price: the home price becomes PW + t, and every unit still crosses the border at the unchanged world price.

With t = 1: home price rises from 3 to 4. Consumption falls from 70 to 60; production rises from 10 to 20; imports fall from 60 to 40.

G8.2 A small country's tariff
no 'e' — the world price never moves



Area	What it is	Value	Who gets it
a	Producer surplus gain (trapezoid)	15	Home producers
b	Production distortion (triangle)	5	Lost — nobody
c	Tariff revenue (rectangle)	40	Home government
d	Consumption distortion (triangle)	5	Lost — nobody

b and d together are the efficiency loss (deadweight loss) — resources and consumption genuinely destroyed, not transferred to anyone. Net welfare change = −(b + d) = −10.

There is no 'e' — see G8.3 for a counterexample.

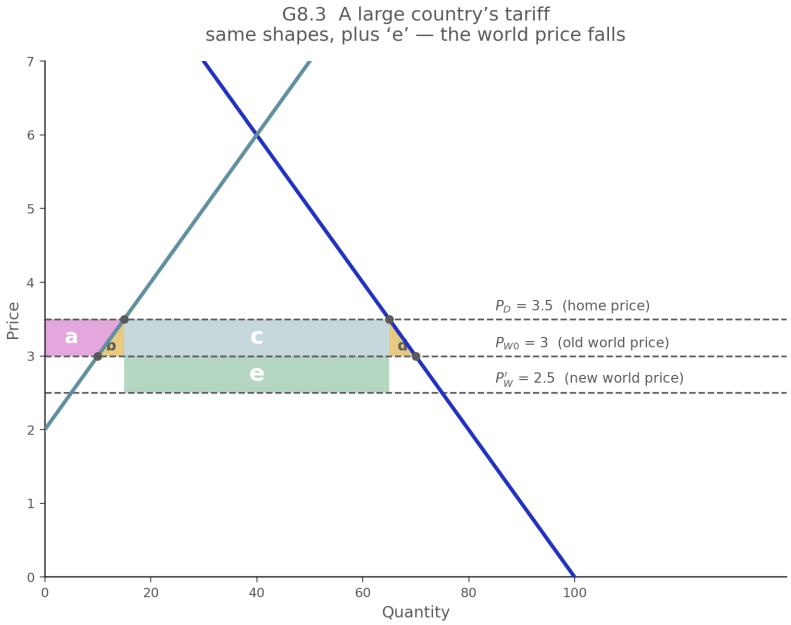
8.4 Where the value goes

Consumers lose a + b + c + d = 65 in total. Of that, a (15) is transferred to producers and c (40) is transferred to the government — both real, but both transfers within the country, not a net loss to the country as a whole. Only b and d (5 + 5 = 10) are genuinely destroyed: resources pulled into production that costs more than the world price, and consumption given up that was worth more than the world price.

8.5 A large country's tariff

A large country's own demand is a large enough share of the world market that restricting it changes the world price. The tariff still adds t to the price gap, but the gap now splits: part of it raises the home price, part of it lowers the price foreign exporters receive.

With the same t = 1: MD(P_W + t) = XS(PW) now solves to P_W = 2.5 (down from 3) and home price PD = 3.5 (up from 3, not to 4). Imports fall only to 50.



Area	What it is	Value	Who gets it
a	Producer surplus gain	6.25	Home producers
b	Production distortion	1.25	Lost — nobody
c	Tariff revenue (domestic portion)	25	Home government
d	Consumption distortion	1.25	Lost — nobody
e	Terms-of-trade gain	25	Home government (from FOREIGN exporters)

Net welfare change = e − (b + d) = 25 − 2.5 = +22.5. The identical instrument, on the identical home market, now makes the country better off. The only thing that changed is whether the country was large enough for e to exist. Area e is paid for by foreign exporters accepting a lower price — a large country's tariff exports part of its cost abroad.

> **A live large-country case**
>
> The EU's anti-subsidy duties on Chinese EVs (Week 7, §7.2) are exactly this case: the EU is a large enough market that the duties are widely reported to have pushed Chinese manufacturers toward lower export prices and, in some cases, production inside the EU itself — the terms-of-trade and investment-diversion effects a large country's tariff can produce.

The split depends on the slopes

Fifty-fifty is not a law — it is what happens to fall out of THESE particular numbers. Hold the tariff at 1 and change only how flat XS is:

XS = kP	MD : XS slope	World price falls to	Home price rises to	Foreign share of t
k = 5 (steep)	20 : 5 = 4 : 1	2.20	3.20	80%
k = 20 (baseline)	20 : 20 = 1 : 1	2.50	3.50	50%
k = 80 (flat)	20 : 80 = 1 : 4	2.80	3.80	20%
k → ∞ (horizontal)	→ 0 : 1	→ 3.00	→ 4.00	→ 0%

MD's own slope never changes — only XS's does. The ratio makes the pattern in the foreign share column concrete: a 4:1 ratio in MD's favour puts 80% of the tariff on foreign exporters; a 1:4 ratio the other way puts 80% of it on the home price instead.

The side that responds LESS to price bears MORE of the tariff. A steep XS means foreign export volume barely reacts to price, so most of the adjustment falls on the foreign price itself — foreign exporters absorb most of the tariff. A flat XS means foreign supply reacts strongly, so exporters can hold their price and let quantity adjust instead — home absorbs most of the tariff. The small-country case of §8.3 is simply this table's last row: a perfectly flat (horizontal) XS, where home absorbs the entire tariff and e is exactly zero.

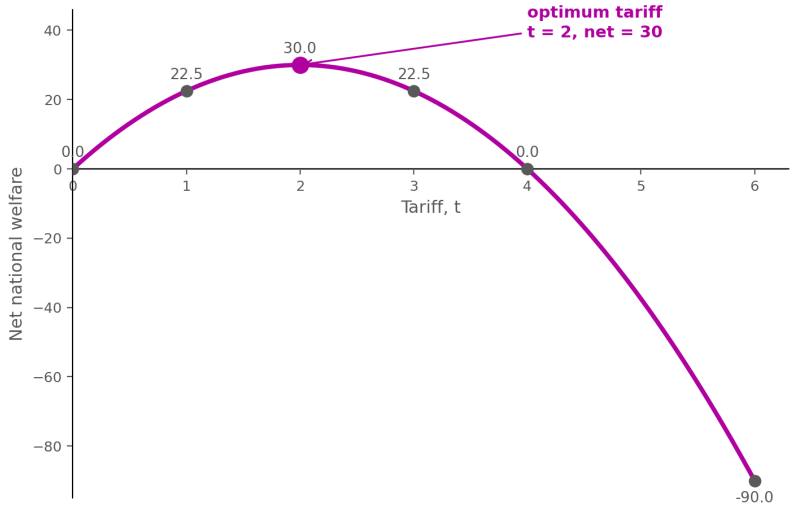
8.6 How high should the tariff be?

For a large country, raising the tariff keeps growing e — but b and d grow faster, since a triangle's area rises with the SQUARE of the price change while the rectangle e only rises with the tariff's width times the (shrinking) trade volume. Somewhere between zero and the tariff that stops trade entirely, net welfare peaks.

t	0	1	2	3	4	6
Net	0	22.5	30	22.5	0	− 90

The table alone finds it: net welfare rises, peaks at t = 2 (net = 30), then falls back through the same values in reverse — symmetric around the peak — reaching zero again at t = 4 and turning sharply negative once the tariff starts choking off trade, until at t = 6 imports fall to zero altogether.

G8.4 The optimum tariff
net welfare = e − (b+d), a large country only



Optional — the same answer by equation (not examinable)

Net welfare is e(t) − [b(t) + d(t)], and with linear curves both pieces are quadratic in t — net welfare is an inverted parabola, peaking where a small increase in the tariff would gain exactly as much on e as it costs on b + d. Solving that condition here gives t = 2 exactly, matching the table. The same condition shows WHY the optimum tariff is small when XS is flat: a flatter XS means e grows more slowly with every extra unit of tariff, so the balance point — and the optimum tariff itself — sits close to zero. A small country's optimum tariff is zero for the same reason: e cannot grow at all.

One sentence on why this isn't the end of the story: a large country pushing its optimum tariff invites retaliation — the foreign country has exactly the same incentive to tax back. Next week takes up why that happens, and what it costs.

8.7 Logic chain — Week 8 in one line

- MD/XS answers a different question from RS/RD — one good, money price, partial equilibrium.
- A small country's tariff raises the home price by the full tariff — pure loss, areas b + d, no offsetting gain.
- A large country's tariff splits between the home price and the world price — area e captures value from foreign exporters.
- The split between home and foreign depends on the relative slopes of MD and XS, not on any fixed rule — the small-country case is the limit where XS is flat.
- Net welfare for a large country is e − (b + d) — rising then falling in the tariff, with a genuine optimum in between.

- A tariff that helps a large country invites retaliation — the subject of Week 9.

Glossary — English / Hungarian

English	Hungarian	Symbol
import demand	importkereslet	MD
export supply	exportkínálat	XS
production distortion	termelési torzítás	b
consumption distortion	fogyasztási torzítás	d
terms-of-trade gain	cserearány-nyereség	e
deadweight loss (efficiency loss)	holtteher-veszteség	b + d
optimum tariff	optimális vám	

International Economics — Explanation Expansion

§9 — Week 9: Security, Chokepoints, and Sanctions

9.1 The turn

Every week so far has answered some version of one question: what is efficient? Weeks 1–6 found the efficient pattern of trade. Weeks 7–8 found the efficient response to a distortion — and Week 8 ended on a warning: a country that finds its own optimum tariff invites a trading partner with exactly the same incentive to tax back. That is where this week starts. Efficiency was never the only thing a country cares about — it also cares about not being at another country's mercy, and those two goals do not always point the same way.

9.2 Retaliation: the trade-war game

A brief vocabulary, enough to read the table below and no more: a game is a situation where each side's best choice depends on what the other side does; a dominant strategy is a choice that is best regardless of what the other side does.

Week 8 found Home's optimum tariff on its steel market: t = 2, giving Home a net gain of +30 while extracting e = 40 from Foreign through the terms-of-trade channel. Suppose Foreign can do exactly the same thing back — tariff Home's exports at its own optimum rate. Treating Foreign's gain from a unilateral tariff as symmetric to Home's (+30), and Home's loss as approximately what was extracted (−40), gives a stylised payoff table calibrated to the Week 8 numbers..

	Foreign: free trade	Foreign: tariff
Home: free trade	(0, 0)	(−40, +30)
Home: tariff	(+30, −40)	(−10, −10)

Tariff is dominant for both sides. If Foreign stays open, Home gains by tariffing (+30 beats 0). If Foreign tariffs, Home still gains by tariffing (−10 beats −40). Whatever Foreign does, Home is better off tariffing — and by the identical logic, so is Foreign. Both tariffing is the equilibrium, at (−10, −10) — worse for BOTH than the (0, 0) they could have had by both staying open. This is the classic structure of a Prisoner's Dilemma. (Johnson, 1953, on the economics of tariff retaliation.)

Mutual tariffs cancel each side's terms-of-trade gain — neither can move the world price against the other any more, since both are pulling on it — leaving each stuck with its own pure efficiency loss (b + d = 10, straight from Week 8). Nobody wanted this outcome individually, and both reached it by behaving rationally. This is the economic case for the WTO rules Week 7 introduced historically: an institution that lets both sides commit to free trade together, rather than being ground down by playing this game unsupervised.

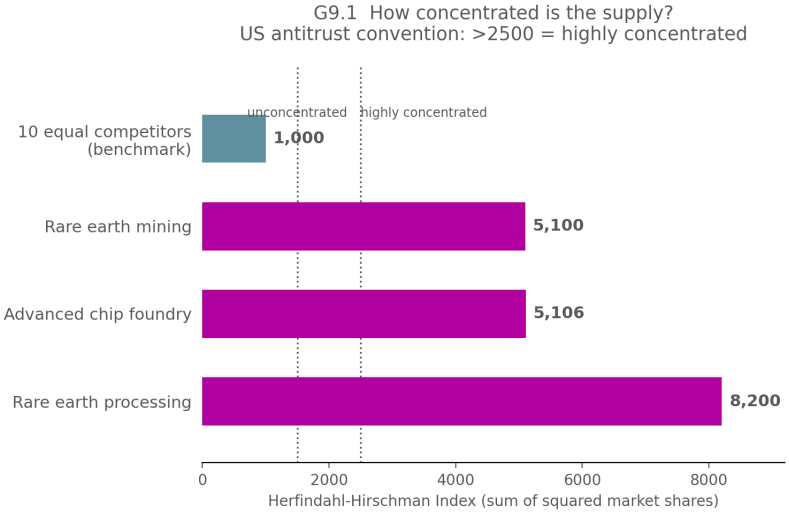
9.3 Chokepoints — and how to measure them

Chokepoint — a point in a supply chain so concentrated that disrupting it disrupts nearly everyone downstream, regardless of how many countries eventually use the product.

Herfindahl–Hirschman Index (HHI) — a measure of market concentration: square each supplier's percentage market share, then add them up. Ranges from near 0 (many equal-sized suppliers) to 10,000 (a single monopolist). A common convention: below 1,500 is unconcentrated, 1,500–2,500 is moderately concentrated, above 2,500 is highly concentrated.

Two real supply chains, at two different stages, make the point sharply.

Supply chain	Shares (2025–26)	HHI
Rare earth mining	China 69%, US 13%, Australia 7%, others 11%	5,100
Rare earth processing	China ~90%, rest of world ~10%	8,200
Advanced chip foundry	TSMC 70%, Samsung 7%, SMIC 5%, others 18%	5,106



The bottleneck is rarely where the raw material is. China mines a majority of the world's rare earths, but PROCESSES roughly 90% of them — including a near-monopoly on the heavy rare earths used in the strongest magnets. Mining is spread across several countries; refining them into usable material is not. The concentration figure that matters for supply security is the one further down the chain, not the one at the mine.

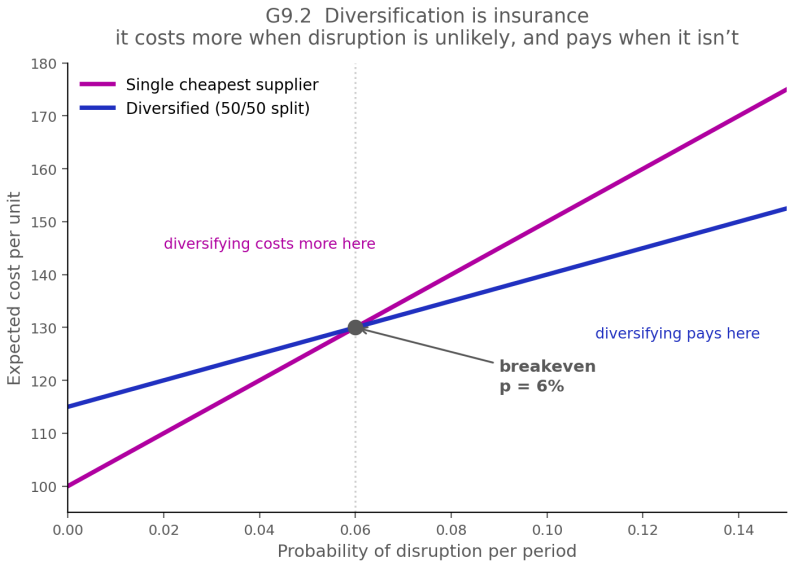
Semiconductors show a similar pattern one level up: TSMC alone supplies roughly 70% of the world's contract chip manufacturing, and over 90% at the most advanced nodes — the ones inside the AI hardware currently being built. There is, at present, no second source for that specific capability on another continent. (Hirschman first made the case that trade concentration is a source of national power, and gave his name to the index above he shares credit for — National Power and the Structure of Foreign Trade, 1945.)

A note on the HHI calculation: the results shown here represent an upper-bound HHI, because of the use of an aggregated residual ("others" taken together as a single market actor).

9.4 The price of security

Diversifying suppliers is a form of insurance, and it has the same economics as any other insurance: it costs something for certain, in exchange for protection against something uncertain.

Suppose the cheapest supplier costs 100 per unit, and a second, less efficient source costs 130. Splitting sourcing 50/50 costs 115 — a premium of 15 over staying with the cheapest source alone, paid whether or not anything ever goes wrong. Now suppose a disruption, with probability p each period, would cost 500 per unit if it hit a single-sourced supply chain, but only half that (250) if the country had already diversified.



Diversifying pays whenever p exceeds 6%. Below that, the single cheapest supplier has the lower expected cost; above it, the diversified strategy does. Exactly the same shape as Week 8's optimum tariff — compare a certain cost against an uncertain benefit, and there is an interior threshold, not an all-or-nothing answer.

Hungary's bet on batteries

Hungary has become Europe's largest battery manufacturing hub by capacity: over €15 billion in committed investment, operational cell capacity above 87.5 GWh in 2026, and a target of roughly 200 GWh by 2030 — about a third of all European production. CATL's Debrecen plant (€7.3 billion, 40 GWh, cell production started in early 2026) and BYD's plant in Szeged (€4 billion) are the two largest; CATL has also signed dual-education partnerships with several Hungarian institutions, including the University of Miskolc. This is diversification in the sense of §9.4: Europe paying to build capacity outside Asia rather than relying on the cheapest existing source. It has not been free of the risk that comes with betting on future demand — CATL suspended the second phase of its Debrecen investment, and BYD has delayed mass production and expects to run below capacity for at least its first two years. Diversifying against one risk (supply concentration) does not remove the other (uncertain demand).

9.5 Sanctions: a wedge with a destination

A sanction restricts trade with one specific partner, while leaving trade with everyone else open. The nearest thing this course has already built is a partial tariff — not a wedge against the whole world, but against one country in particular.

The evidence is unambiguous on one point: sanctioned trade mostly REDIRECTS rather than disappears. Since 2022, Russian oil exports have shifted from mostly pipeline deliveries to Europe toward mostly maritime deliveries to China and India — roughly 80% of Russian oil now goes to those two buyers. The trade did not vanish; it found a new destination, at a real cost: Russian crude has been selling at discounts exceeding $22 per barrel below benchmark prices, on top of higher shipping, insurance, and intermediary costs.

That discount is the sanction's wedge, in exactly the sense Week 7 introduced — it is value the seller no longer captures. Whether that cost is large enough to change the sanctioned country's behaviour is a harder, contested question this course will not try to settle; what is measurable, and what the price data actually shows, is that the wedge is real and the trade did not stop.

9.6 Logic chain — Week 9 in one line

- Efficiency was never the only objective — security against disruption matters too, and the two can conflict.
- Retaliation turns Week 8's optimum tariff into a Prisoner's Dilemma: tariffing is individually rational, but mutual tariffs leave both sides worse off than mutual free trade.
- The Herfindahl–Hirschman Index measures how concentrated a supply chain is — and the most concentrated link is often processing, not the raw material itself.

- Diversifying suppliers is insurance: a certain cost today against an uncertain disruption tomorrow, with a genuine breakeven point.
- Sanctions create a wedge against one partner specifically — trade typically redirects at a discount rather than disappearing.

Glossary — English / Hungarian

English	Hungarian	Symbol
dominant strategy	domináns stratégia	
Prisoner's Dilemma	fogolydilemma	
chokepoint	szűk keresztmetszet / fojtópont	
Herfindahl-Hirschman Index	Herfindahl–Hirschman-index	HHI
diversification	diverzifikáció	
sanction	szankció	

International Economics — Explanation Expansion

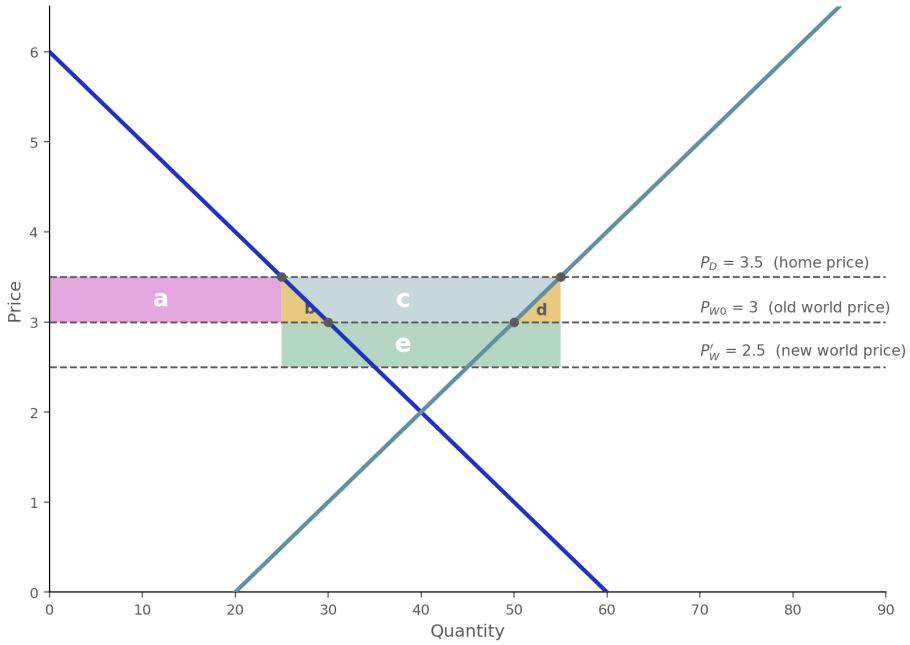
§10 — Week 10: Countermeasures and the Politics of Protection

10.1 The mirror image: an export subsidy

Week 8 modelled the tariff. Its mirror is the export subsidy — a payment per unit exported, rather than a tax per unit imported. The government pays instead of collects, and for a large country the terms-of-trade effect runs the opposite way.

Take a home market with demand D = 60 − 10P and supply S = 10P + 20, so this country is a net exporter at any price above the autarky price of 2. Foreign import demand is such that the no-subsidy world price is 3, with 20 units exported. A subsidy of 1 per unit raises the price domestic producers receive to 3.5 — but because the country is large, dumping more onto the world market pushes the price foreign buyers pay DOWN, to 2.5. Exports rise to 30.

G10.1 A large country's export subsidy
same grammar as Week 8's tariff diagrams — but e is now a LOSS



Area	What it is	Value	Sign
a	Rectangle — higher price on units still consumed	12.5	transfer
b	Triangle — consumption distortion	1.25	lost
c	Trapezoid — extra producer gain beyond a	12.5	transfer
d	Triangle — production distortion	1.25	lost
e	Rectangle — terms-of-trade LOSS	15	lost

a + b = the fall in consumer surplus (13.75). a + b + c = the rise in producer surplus (26.25). b + c + d + e = the government's subsidy bill (30, matching 1 × 30 units exported). Net welfare change = −(b + d + e) = −17.5.

The inversion is the point. In Week 8, a large country's tariff could genuinely pay, because area e was a GAIN — captured from foreign sellers accepting a lower price. Here, area e is a LOSS: subsidising exports pushes more supply onto the world market, and a large country's own selling drives its own price down. A small country could never generate this e (its selling is too small to move the world price at all) — but a small country's export subsidy is not

thereby safe; it still loses b + d, exactly as it would from any tariff. A large country makes the same mistake worse, not better: it pays for the privilege of depressing the very price it sells at.

10.2 Effective protection: what a tariff schedule actually protects

China gives its EV producers a 25% subsidy. How much of an advantage does that actually hand them — and if Europe wants to offset it, is a matching 25% tariff on Chinese EVs the right response?

The honest answer is: not necessarily. A nominal rate — 25% subsidy, 25% tariff — is charged on a good's FULL price. But a producer does not keep the full price; some of it pays for imported inputs. What a subsidy or a tariff actually protects is VALUE ADDED, and the nominal rate on the finished good can badly misstate how much protection that value added receives. This is why this section exists: before deciding how much protection to offer, you first need to know how much protection is really being given — on both sides.

Value added — $VA = P_{out} - P_{in}$, the price of the finished good minus the cost of its imported inputs — computed once before any policy (VA), and again after a subsidy or tariff is applied to both the output and the inputs (VA').

Effective rate of protection (g) — $g = (VA' - VA) / VA$ — the percentage change in value added caused by the policy, as distinct from its nominal rate.

Take an EV priced at 30,000 with 20,000 of imported battery cells and other inputs, so VA = 10,000.

China's side: what does a 25% subsidy actually buy?

China's subsidy applies to the finished car, not the inputs. A Chinese producer effectively receives 30,000 × 1.25 = 37,500 for the car, while paying the same 20,000 for inputs. VA' = 37,500 − 20,000 = 17,500.

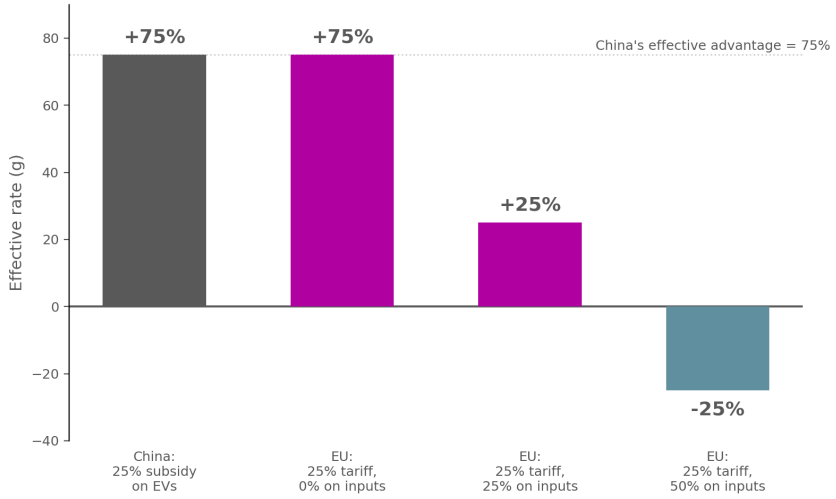
g = (17,500 − 10,000) / 10,000 = +75%. A 25% nominal subsidy on the OUTPUT delivers a 75% effective boost to value added — three times the headline number, because the subsidy applies to the whole car price while only value added is what the producer actually keeps.

Europe's side: does a 25% tariff match it?

Suppose the EU responds with its own 25% tariff on EVs. Whether that MATCHES China's 75% advantage, falls short of it, or overshoots it depends entirely on what happens to EU producers' OWN input costs — and those inputs, very possibly including battery cells, may themselves be imported (a direct echo of Week 9's chokepoint material).

EU tariff schedule	VA'	g	Compared to China's +75%
25% on EVs, 0% on inputs	17,500	+75%	exactly matches
25% on EVs, 25% on inputs	12,500	+25%	undershoots badly
25% on EVs, 50% on inputs	7,500	−25%	NEGATIVE — worse than doing nothing

G10.2 Matching the nominal rate isn't enough
only ONE of these three EU schedules actually matches China's advantage



A 25% tariff is not one policy — it is three, depending on what else is taxed. Only the schedule that leaves inputs untouched actually matches China's advantage. The moment the EU also taxes battery-cell imports — whether deliberately, or just because they happen to fall under the same trade measure — its own effective protection falls well short, and can turn negative even while its NOMINAL tariff is still positive. The same amplification logic as Week 5's magnification effect: a small nominal number can hide a much larger, or a genuinely reversed, effect on the activity actually being protected. This is exactly the tool countermeasures require: a proposed tariff schedule can only be judged against a foreign subsidy once its own input tariffs are accounted for.

10.3 Why bad policy survives: concentrated gains, diffuse losses

Olson's logic (1965) — a small, concentrated group organises more effectively than a large, diffuse one, even when the diffuse group's total stake is far larger — because each member of the small group has much more to gain individually from organising.

Week 8's own tariff numbers make this concrete. Producers gained 15; consumers lost 65. Suppose that gain is shared among 10 firms, and that loss is spread across 10 million households.

	Producers	Consumers
Total	+15 million	−65 million
Per head	+1,500,000 each	−6.50 each

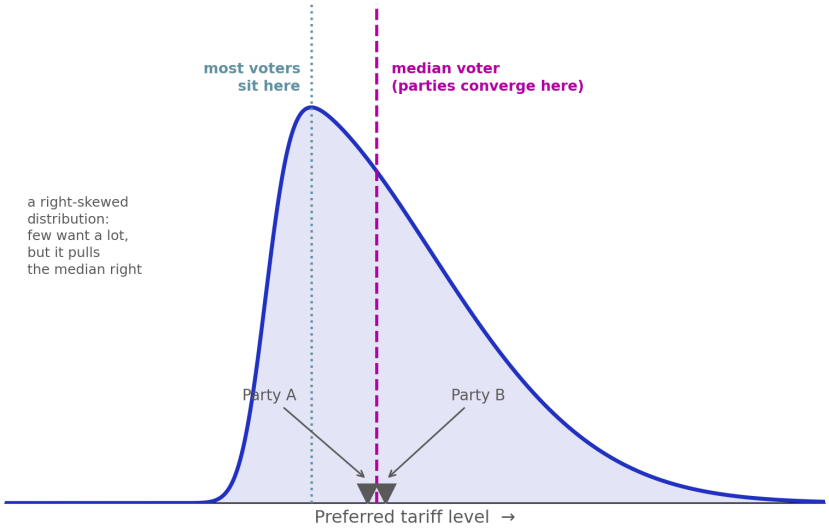
Nobody organises a campaign over 6.50. Ten firms, each with 1.5 million on the table, absolutely do. The lobbying effort is not proportional to the total welfare at stake — it is proportional to the stake per organised actor, and that is why policies with large aggregate costs and small aggregate benefits are not merely possible but common.

10.4 When the majority itself wants protection

Olson explains protection that a majority dislikes but cannot stop. That is not the only route to bad policy. Sometimes the majority itself comes to WANT protection — not because it was organised or lobbied, but because it has come to believe a particular argument.

Median voter theorem — (Black, 1948; Downs, 1957) with preferences arranged along a single dimension, competitive politics converges on the policy preferred by the voter in the middle of that distribution. If the median voter's preference shifts, every competing party has an incentive to shift its platform to follow.

G10.3 Skew moves the median, and parties follow the median
not the mode — not where most voters actually are

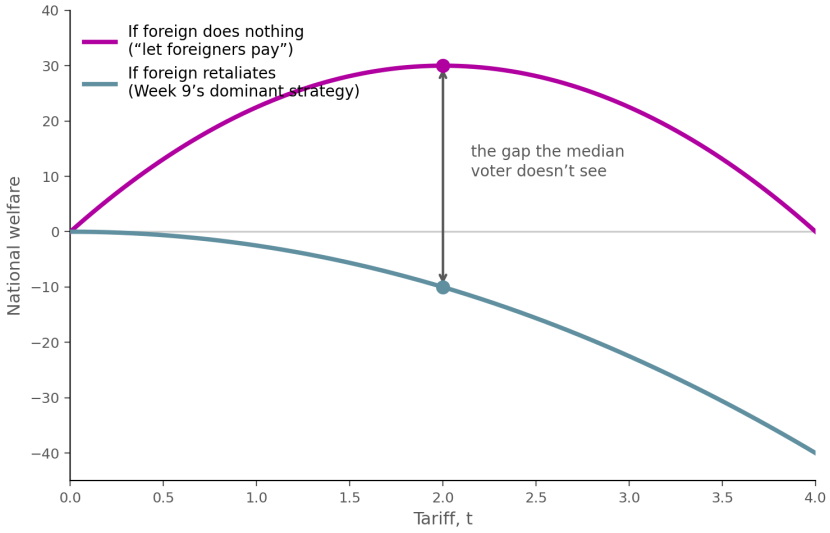


Parties chase the MEDIAN, not the typical voter. If preferences over the tariff are skewed — most voters cluster near a low preferred tariff, but a smaller group wants a much higher one — the median can sit well to the right of where most people actually are. A small persuaded minority does not need to become a majority to shift outcomes; it only needs to pull the 50th-percentile voter past the point most people would have chosen on their own. Both parties then converge on that point, since neither can win by offering less.

The argument that moves the median voter is Week 8's own result, stated informally: "a tariff makes FOREIGNERS pay." This is not a myth invented by a lobbyist — it is literally area e, the terms-of-trade gain, from §8.5. A large country genuinely can extract value from foreign exporters through a tariff. If voters come to believe this, a non-zero tariff looks like a free lunch, the median voter wants one, and every party competing for that voter has an incentive to offer it.

The trouble is what the belief leaves out. Area e only exists if the country is large enough to move the world price — and Week 9 showed that a foreign country facing a profitable tariff has exactly the same incentive to retaliate. "Let foreigners pay" is true only in the version of the world where the country is large AND the foreign partner does nothing back, and the second condition is precisely the one that does NOT hold once the foreign country is rational.

G10.4 The belief the median voter is asked to hold true only if the country is large AND nobody retaliates



The gap between the two curves is the cost of a popular half-truth. At Home's own optimum tariff (t = 2), the "let foreigners pay" curve promises +30 — genuinely correct, in the world where Foreign stays passive. But Week 9's payoff matrix already showed tariffing is Foreign's dominant strategy too, and once Foreign retaliates the true outcome is −10: not merely smaller than promised, but negative. The median voter theorem correctly predicts that politicians converge on what the median voter wants — the theorem is not wrong. What is wrong is the median voter's belief about what a tariff actually does once the rest of the model is taken seriously.

10.5 The second-best problem: efficient, but too slow

Theory of the second best — (Lipsey and Lancaster, 1956) when one distortion cannot be removed, removing a second distortion elsewhere does not guarantee an improvement — the theoretically best outcome and the best ACHIEVABLE outcome, given real-world constraints, can differ.

Free trade — market allocation, no intervention — is the first-best outcome this entire course has been building toward. It has real costs: workers displaced from import-competing industries, exposure at Week 9's chokepoints, reduced strategic security. None of this is in dispute. What is at issue is how those costs should be handled.

The first-best fixes for these costs are not protection — they are labour-market policy (retraining, mobility support for displaced workers) and diplomacy (alliances and supply agreements that reduce chokepoint exposure without closing markets). Both are compatible with keeping trade free. Both also take YEARS to work: retraining programmes take time to enrol people and show results; diplomatic relationships take time to build and to be trusted.

Protection — a tariff, a local-content rule, a subsidised domestic plant — can be announced this quarter and show visible results within one political cycle. A politician who genuinely accepts that free trade plus patient adjustment is the better long-run policy still faces constituents who are unemployed NOW, and a chokepoint that is exposed NOW. Given a short political horizon, the fast, visibly second-best option is often the rational choice available, even to a policymaker who knows it is not the best one — and once in place, the industry it protects becomes its own Olson-style constituency, which is part of why second-best measures so often outlast the emergency that justified them.

A real test: the Common Agricultural Policy

The EU's Common Agricultural Policy is close to a pure case of this section's logic. Launched in 1962, it responded to a genuine emergency: postwar Europe had just lived through serious food shortages, and guaranteeing domestic

food supply was a real, urgent problem — structurally similar to Week 9's chokepoints. The tool chosen was fast and visible: guaranteed floor prices for EU farmers and tariff preference for EU produce over imports, in place almost immediately. It worked, in the narrow sense that Europe became self-sufficient in food within a couple of decades — and then kept going: agricultural subsidies reached roughly two-thirds of the ENTIRE EU budget by the late 1960s and 1980s. Today, more than sixty years after the food-security emergency that justified it, the CAP still accounts for close to a third of the EU budget, even though agriculture is only about 1.4% of EU GDP and 4% of EU employment. The guaranteed-price mechanism also produced the famous "butter mountains" and "wine lakes" of chronic overproduction — a direct efficiency cost, not just an opportunity one. The emergency that justified the CAP ended decades ago. The organised farm lobby it created did not.

10.6 Logic chain — Week 10 in one line

- An export subsidy mirrors a tariff — same a-b-c-d-e machinery, but a large country's terms-of-trade area e is now a LOSS, not a gain.
- Effective protection (g) measures what happens to value added, not the nominal tariff on the finished good — input tariffs can turn positive protection negative.
- Concentrated producers organise; diffuse consumers do not — Olson's logic, visible directly in Week 8's own numbers.
- A majority can also WANT protection, if it believes "let foreigners pay" — true only if the country is large and nobody retaliates, and Week 9 shows retaliation is the rational response.
- First-best fixes for trade's real costs (retraining, diplomacy) work but are slow; protection is fast — which is why the efficient policy often loses to the second-best one on a short political clock.

Glossary — English / Hungarian

English	Hungarian	Symbol
export subsidy	exporttámogatás	
value added	hozzáadott érték	VA
effective rate of protection	effektív (tényleges) vámvédelem	g
collective action	kollektív cselekvés	
median voter theorem	medián szavazó tétel	
theory of the second best	a második legjobb megoldás elve	

International Economics — Explanation Expansion

§11 — Week 11: The Balance of Payments and Exchange Rates

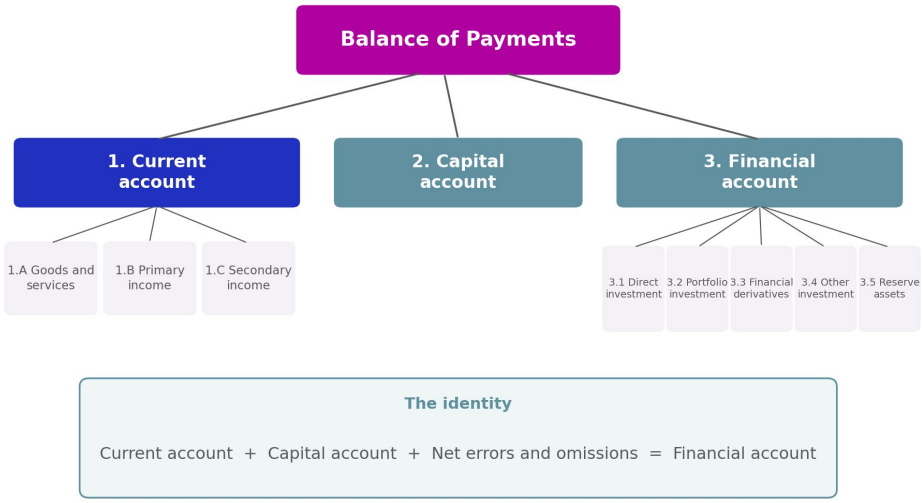
11.1 What the balance of payments is

Every earlier week has tracked trade in goods, in factors, in policy — one transaction at a time. The balance of payments is the record of ALL of a country's transactions with the rest of the world over a period, organised into one consistent accounting system. Nothing in it is new economics; it is the bookkeeping that everything from Weeks 1–10 eventually has to show up in somewhere.

11.2 The BPM6 structure

Hungary's central bank (MNB) reports the balance of payments following the IMF's sixth Balance of Payments Manual (BPM6), organised into three accounts.

G11.1 The structure of the Balance of Payments (BPM6)



Account	2024 (bn HUF)	What it is
1. Current account	+1,410.7	Goods, services, income earned/paid, transfers — covered below
2. Capital account	+286.1	Capital transfers and non-produced assets (e.g. EU structural funds)
3. Financial account	+504.6	Net acquisition of foreign financial assets and liabilities

The current account itself splits three ways, and the split matters — it is not just "exports minus imports."

Component	2024 (bn HUF)	
1.A Goods and services	+3,642.1	of which goods −417.3, services +4,059.3
1.B Primary income	−1,723.6	wages and investment income (dividends, interest) paid/received
1.C Secondary income	−507.7	transfers with no good, service, or asset given in return

Hungary ran a GOODS DEFICIT alongside a large SERVICES SURPLUS in 2024. The trade balance most people picture — physical goods crossing the border — was actually negative. The entire current account surplus came from services: tourism, transport, business and IT services, the kind of trade Week 6 built the tools for. “The balance of trade” and “the balance of goods” are not the same number, and for Hungary in 2024 they point in opposite directions.

11.3 The sign-convention trap

Two conventions describe the same transactions, and they disagree on the sign of the financial account. Neither is wrong — but mixing them up while reading a real report is the single easiest way to misread a balance of payments.

MNB’s own convention: the financial account is reported as NET LENDING — the same sign as a current account surplus. A positive financial account (+504.6) means Hungary is a net ACQUIRER of foreign assets, in the same direction as the current and capital account surpluses that financed it.

The textbook (Krugman) convention: all accounts are defined to SUM TO ZERO. Acquiring a foreign asset is treated as a USE of funds — symmetric to an import — so the financial account is recorded with the OPPOSITE sign from MNB’s. Same 504.6, opposite sign.

G11.2 Same transactions, two conventions
only the financial account changes sign — everything else is identical

Net errors and omissions — the gap between the current-and-capital-account measure of a country’s net lending and the financial-account measure of the same thing. For Hungary in 2024 this gap was −1,192.3 bn HUF — comparable in size to the ENTIRE current account surplus.

This is not a Hungary-specific quirk or a one-off mistake. Properly recording every good, service, income payment, and financial transaction crossing a border — in real time, from thousands of independent reporting sources, using different valuation and timing conventions — is genuinely difficult, and no country’s statistics office does it perfectly. Errors and omissions is a PERMANENT, STRUCTURAL line in every country’s balance of payments, every year — not a sign that something unusual happened in 2024. Hungary’s own quarterly figures make the point: −524, +272, −287, −652 across the four quarters of 2024 — large and volatile from one quarter to the next, exactly what you’d expect from a genuinely hard measurement problem rather than a one-time event.

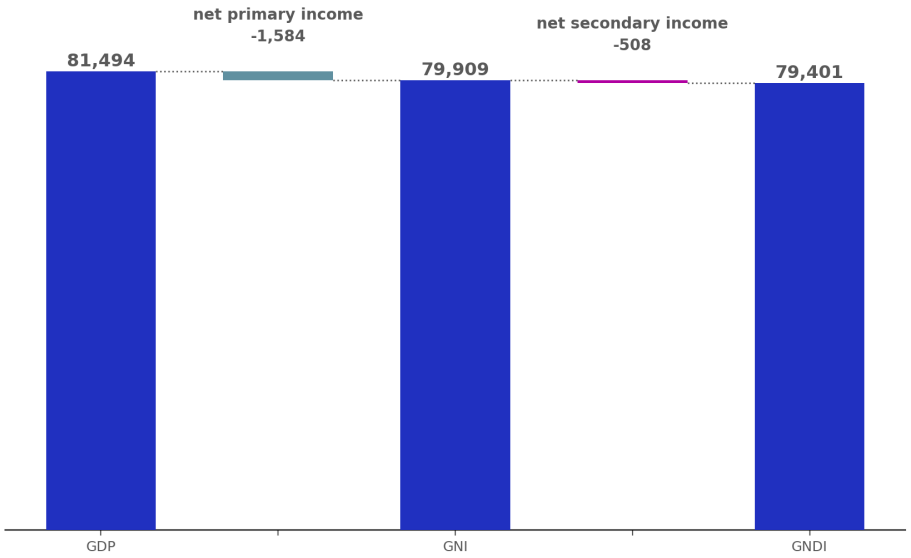
11.4 From GDP to GNI to GNDI

GDP measures output produced WITHIN Hungary’s borders. It is not the same as the income Hungarian residents actually receive — two further adjustments, both visible in the balance of payments, close that gap.

Gross National Income (GNI) — GDP plus net primary income received from abroad (wages and investment income earned abroad minus the same paid to foreign residents, PLUS net subsidies and taxes on production exchanged with EU institutions — all of this together is exactly BoP item 1.B).

Gross National Disposable Income (GNDI) — GNI plus net secondary income received from abroad (transfers with nothing given in direct return — exactly BoP item 1.C).

G11.3 GDP to GNDI, Hungary 2024 (revised)
billion HUF (KSH, revised vintage; secondary income per MNB)



Both adjustments have a real story behind them. GNI fell BELOW GDP by 1,584 bn HUF, netting two very different flows: profits earned by foreign-owned firms operating in Hungary (car manufacturers among them) are counted in Hungarian GDP but belong, as income, to their foreign owners — a large negative — partly offset by a net INFLOW of subsidies and taxes exchanged with EU institutions (Hungary receives more in agricultural and structural funds than it pays in EU own-resource contributions). GNDI fell a further 508 bn HUF below GNI — Hungary is, on balance, a net PAYER of other current transfers.

11.5 Exchange rates

Two links matter for this course: how the exchange rate connects to the balance of payments, and how it behaves like the trade-policy instruments already built.

Exchange rate (E) — the price of one unit of foreign currency in terms of the home currency. For Hungary, E = the HUF price of one euro. If E RISES, more forint is needed to buy one euro — the forint has DEPRECIATED (weaker). If E FALLS, fewer forint are needed — the forint has APPRECIATED (stronger).

The BoP link

A current account deficit has to be financed. This follows directly from §11.2's identity: if the current account is negative, the capital and financial accounts must together be positive to balance it — someone abroad is lending to, or investing in, the deficit country. What happens next depends entirely on the exchange rate regime.

Exchange rate regime — the rule a country follows for its currency's value — floating (market-determined), fixed (pegged to another currency, defended with reserves), or managed float (mostly market-determined, with occasional intervention).

Floating: the exchange rate does the adjusting. A current account deficit means the country needs more foreign currency than it earns — excess demand for foreign currency, in the market where forint is traded for euros. Under a floating regime, E simply rises to clear that market: the forint depreciates. That makes imports dearer and exports cheaper, which narrows the deficit — an automatic corrective mechanism, with no policy decision required. Hungary operates a floating regime.

Fixed: the central bank does the adjusting instead. A central bank that has promised to hold E constant cannot let it rise to clear the market. Instead, it must supply the missing foreign currency itself, by selling reserve assets — exactly the 3.5 line in §11.2's financial account. This is NOT self-correcting: reserves are finite, and a persistent deficit defended this way is a country slowly spending down a limited stock. The euro area's members went further still, fixing their currencies to each other permanently by adopting a single currency, removing the exchange rate as an adjustment tool entirely.

Managed float sits between the two: the rate is mostly market-determined, but the central bank intervenes — buying or selling reserves — to smooth particularly sharp moves without committing to hold E at any fixed level. In every case, the reserve-assets line in the financial account is where the regime choice becomes visible in the accounts: near zero under a clean float, active and sometimes large under a fixed or managed one.

The price link — a familiar shape

A depreciation acts like a tariff and an export subsidy at once — uniformly, and without collecting or paying anything. Using the definition above: a rise in E is a depreciation.

Suppose E rises from 380 to 400 (a depreciation of about 5.3%). A car imported at €20,000 costs 380×20,000 = 7,600,000 HUF before, and 400×20,000 = 8,000,000 HUF after — dearer in forint terms, exactly like a tariff, without any tariff being imposed. A bottle of Hungarian wine priced at 3,800 HUF costs a euro buyer 3,800/380 = €10 before, and 3,800/400 = €9.50 after — cheaper in euro terms, exactly like an export subsidy, without the government paying anything.

The difference from an actual tariff or subsidy: a depreciation applies to EVERY good and EVERY trading partner at once, uniformly — it cannot be targeted at one product or one country the way a trade-policy instrument can, and it raises no revenue and costs no budget. Same qualitative direction of effect, entirely different mechanism.

11.6 What the balance of payments does not record

This closes a thread running since Week 1. Week 1 showed that trade makes countries better off. Week 9 showed that efficiency was never the only objective — it carries a security cost, in chokepoints and dependence. Week 11 asks the natural final question: does the balance of payments capture any of that?

It records the flows completely and precisely, on its own terms. Every good, service, income payment, and financial transaction has a place in the structure built this week. What it does NOT record is WHO a deficit is financed by, or WHAT that dependence is worth strategically. A current account deficit financed by a diversified set of trading partners and one financed overwhelmingly by a single partner Hungary would rather not depend on look IDENTICAL in the balance of payments — same numbers, same accounts, same accounting identity satisfied either way. Week 9's chokepoint concentration is invisible in the accounts that record the trade creating it.

The balance of payments is a complete answer to "what happened." It was never built to answer "what does it cost us if it stops." That second question is exactly where this course started — and it is the one the accounting, however carefully built, cannot answer on its own.

11.7 Logic chain — Week 11 in one line

- The balance of payments records every transaction with the rest of the world in one consistent accounting system — current, capital, and financial accounts.
- MNB reports the financial account as net lending (same sign as the current account); the textbook convention has all accounts sum to zero — same data, opposite-looking books.
- Net errors and omissions is large and volatile every year, in every country — a structural feature of a genuinely hard measurement problem, not a one-off anomaly.
- GNI and GNDI adjust GDP for income actually received by residents — matching BoP items 1.B and 1.C exactly, once EU subsidies and taxes are correctly classified as primary income in both systems.
- Exchange rate regimes determine how a current account gap gets resolved — automatically via depreciation under floating, or by the central bank spending reserves under fixed.
- A depreciation acts like a uniform tariff-plus-export-subsidy with no revenue and no target — same direction of effect as Weeks 7, 8, and 10, entirely different mechanism.
- The balance of payments records flows completely and says nothing about the security cost of relying on them — the question this course opened with.

Glossary — English / Hungarian

English	Hungarian	Symbol
balance of payments	fizetési mérleg	
current account	folyó fizetési mérleg	
capital account	tőkemérleg	
financial account	pénzügyi mérleg	
net errors and omissions	tévedések és kihagyások egyenlege	
exchange rate	árfolyam	E
exchange rate regime	árfolyamrendszer	
appreciation / depreciation	felértékelődés / leértékelődés	

References

Theoretical and academic sources

Bhagwati, J. N. (1958). Immiserizing growth: A geometrical note. *The Review of Economic Studies, 25*(3), 201–205. https://doi.org/10.2307/2295990

Black, D. (1948). On the rationale of group decision-making. *Journal of Political Economy, 56*(1), 23–34. https://doi.org/10.1086/256633

Downs, A. (1957). *An economic theory of democracy*. Harper & Brothers.

Grubel, H. G., & Lloyd, P. J. (1975). *Intra-industry trade: The theory and measurement of international trade in differentiated products*. Macmillan.

Heckscher, E. F. (1949). The effect of foreign trade on the distribution of income. In H. S. Ellis & L. A. Metzler (Eds.), *Readings in the theory of international trade* (pp. 272–300). Blakiston. (Original work published 1919)

Hirschman, A. O. (1945). *National power and the structure of foreign trade*. University of California Press.

Johnson, H. G. (1953). Optimum tariffs and retaliation. *The Review of Economic Studies, 21*(2), 142–153. https://doi.org/10.2307/2296006

Krugman, P. R. (1979). Increasing returns, monopolistic competition, and international trade. *Journal of International Economics, 9*(4), 469–479. https://doi.org/10.1016/0022-1996(79)90017-5

Krugman, P. R., Obstfeld, M., & Melitz, M. J. (2022). *International economics: Theory and policy* (12th ed.). Pearson.

Lampe, M. (2009). Effects of bilateralism and the MFN clause on international trade: Evidence for the Cobden–Chevalier network, 1860–1875. *The Journal of Economic History, 69*(4), 1012–1040. https://doi.org/10.1017/S0022050709001363

Leontief, W. (1953). Domestic production and foreign trade: The American capital position re-examined. *Proceedings of the American Philosophical Society, 97*(4), 332–349. https://www.jstor.org/stable/3149288

Lipsey, R. G., & Lancaster, K. (1956). The general theory of second best. *The Review of Economic Studies, 24*(1), 11–32. https://doi.org/10.2307/2296233

Ohlin, B. (1933). *Interregional and international trade*. Harvard University Press.

Olson, M. (1965). *The logic of collective action: Public goods and the theory of groups*. Harvard University Press. https://doi.org/10.4159/9780674041660

Ricardo, D. (2004). *On the principles of political economy and taxation*. Liberty Fund. (Original work published 1817). https://www.econlib.org/library/Ricardo/ricP.html

Rybczynski, T. M. (1955). Factor endowment and relative commodity prices. *Economica, 22*(88), 336–341. https://doi.org/10.2307/2551188

Smith, A. (1981). *An inquiry into the nature and causes of the wealth of nations* (R. H. Campbell & A. S. Skinner, Eds.). Liberty Fund. (Original work published 1776). https://www.econlib.org/library/Smith/smWN.html

Stolper, W. F., & Samuelson, P. A. (1941). Protection and real wages. *The Review of Economic Studies, 9*(1), 58–73. https://doi.org/10.2307/2967638

Empirical, institutional, and policy sources

Andróczi, B. (2005, February 4). Megérkezett az új magyar népautó. *Totalcar*. https://totalcar.hu/tesztek/2005/02/04/swift05bem/

BYD. (2023, December 22). *BYD to build a new energy passenger vehicle factory in Hungary for localised production in Europe*. https://www.byd.com/eu/news-list/BYD_to_Build_A_New_Energy_Passenger_Vehicle_Factory_in_Hungary_for_Localised_Production_in_Europe.html

Centre for Research on Energy and Clean Air. (n.d.). *Russia fossil tracker* [Data set]. Retrieved September 2, 2026, from https://www.russiafossiltracker.com/

Collyns, C., & Dunaway, S. (1987). The cost of trade restraints: The case of Japanese automobile exports to the United States. *IMF Staff Papers, 34*(1), 150–175. https://www.elibrary.imf.org/view/journals/024/1987/001/article-A006-en.xml

Contemporary Amperex Technology Co., Limited. (2025). *Global offering* [Prospectus]. https://www.catl.com/en/uploads/1/file/public/202505/20250512071033_9of2dqw816.pdf

European Commission. (n.d.-a). *Common agricultural policy funds*. Retrieved September 2, 2026, from https://agriculture.ec.europa.eu/common-agricultural-policy/financing-cap/cap-funds_en

European Commission. (n.d.-b). *TARIC consultation*. Taxation and Customs Union. Retrieved September 2, 2026, from https://ec.europa.eu/taxation_customs/dds2/taric/taric_consultation.jsp?Lang=en

European Commission. (2024, October 29). *EU imposes duties on unfairly subsidised electric vehicles from China while discussions on price undertakings continue*. https://ec.europa.eu/commission/presscorner/api/files/document/print/en/ip_24_5589/IP_24_5589_EN.pdf

European Commission. (2026a, February 10). *Commission accepts price undertaking from Chinese electric car producer*. https://policy.trade.ec.europa.eu/news/commission-accepts-price-undertaking-chinese-electric-car-producer-2026-02-10_en

European Commission. (2026b). *Factsheet: EU steel measure*. https://policy.trade.ec.europa.eu/enforcement-and-protection/protecting-eu-steelmaking/factsheet-eu-steel-measure_en
European Commission. (2026c, March 4). *Proposal for a regulation of the European Parliament and of the Council establishing a framework of measures for strengthening Europe's industrial ecosystem: Industrial Accelerator Act* (COM(2026) 100 final). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2026%3A100%3AFIN
Eurostat. (2024). *Key figures on the European food chain—2024 edition*. Publications Office of the European Union. https://ec.europa.eu/eurostat/documents/15216629/20555393/KS-01-24-000-EN-N.pdf
Eurostat. (n.d.). *International trade in goods database* [Data set]. Retrieved September 2, 2026, from https://ec.europa.eu/eurostat/web/international-trade-in-goods/database
Hungarian Central Statistical Office. (n.d.-a). *18.1.1.14. Mean price per dwelling and square metre by region and building type* [Data set]. Retrieved September 2, 2026, from https://www.ksh.hu/stadat_files/lak/en/lak0014.html
Hungarian Central Statistical Office. (n.d.-b). *Gross national income (GNI) of Hungary* [Data set]. Retrieved September 2, 2026, from https://www.ksh.hu/stadat_files/gdp/en/gdp0012.html
Hungarian Central Statistical Office. (n.d.-c). *Integrated economic accounts* [Data set]. Retrieved September 2, 2026, from https://www.ksh.hu/stadat_files/gdp/en/gdp0120.html
Hungarian Central Statistical Office. (2025, February 25). *Earnings, December 2024*. https://www.ksh.hu/en/first-releases/ker/eker2412.html
Hungarian Investment Promotion Agency. (2022). *CATL's record-volume Hungarian project formally launched in Debrecen*. https://hipa.hu/news/catl-s-record-volume-hungarian-project-formally-launched-in-debrecen/
International Energy Agency. (2025). *Oil 2025: Analysis and forecast to 2030*. https://www.iea.org/reports/oil-2025
International Energy Agency. (2026). *Rare earth elements: Executive summary*. https://www.iea.org/reports/rare-earth-elements/executive-summary
International Monetary Fund. (2009). *Balance of payments and international investment position manual* (6th ed.). https://www.imf.org/external/pubs/ft/bop/2007/pdf/bpm6.pdf
Irwin, D. A. (1998). From Smoot–Hawley to reciprocal trade agreements: Changing the course of U.S. trade policy in the 1930s. In M. D. Bordo, C. Goldin, & E. N. White (Eds.), *The defining moment: The Great Depression and the American economy in the twentieth century* (pp. 325–352). University of Chicago Press. https://www.nber.org/chapters/c6899
Magyar Nemzeti Bank. (2025). *Balance of payments and international investment position—2024 Q4*. https://statisztika.mnb.hu/sw/static/file/bpm6-kozlemeny-2024-q4-en.pdf
Magyar Suzuki Zrt. (n.d.). *Factory history*. Retrieved September 2, 2026, from https://www.suzuki.hu/corporate/en/company/factory/factory-history
Reuters. (2025, July 22). *BYD to delay mass production at new Hungarian plant, make fewer EVs, sources say*. https://www.reuters.com/business/autos-transportation/byd-delay-mass-production-new-hungarian-plant-make-fewer-evs-sources-say-2025-07-22/
TrendForce. (2025, September 1). *2Q25 foundry revenue surges 14.6% to record high, TSMC's market share hits 70%, says TrendForce*. https://www.trendforce.com/presscenter/news/20250901-12691.html
United Nations Statistics Division. (n.d.). *UN Comtrade database* [Data set]. Retrieved September 2, 2026, from https://comtradeplus.un.org/
U.S. Department of Justice, & Federal Trade Commission. (2010). *Horizontal merger guidelines*. https://www.justice.gov/atr/file/810276/dl
U.S. Department of State, Office of the Historian. (n.d.). *Protectionism in the interwar period*. Retrieved September 2, 2026, from https://history.state.gov/milestones/1921-1936/protectionism
U.S. General Services Administration. (n.d.). *Federal Acquisition Regulation, Part 25—Foreign acquisition*. Retrieved September 2, 2026, from https://www.acquisition.gov/far/part-25
U.S. Geological Survey. (2025). *Mineral commodity summaries 2025: Rare earths* [Data set]. https://data.usgs.gov/datacatalog/data/USGS%3A6798f088d34ea8c18376e7f9
World Bank. (n.d.). *World Development Indicators* [Data set]. Retrieved September 2, 2026, from https://databank.worldbank.org/source/world-development-indicators
World Trade Organization. (1947). *General Agreement on Tariffs and Trade 1947*. https://www.wto.org/english/docs_e/legal_e/gatt47_e.htm
World Trade Organization. (1994). *Agreement on safeguards*. https://www.wto.org/english/docs_e/legal_e/sg_e.htm
World Trade Organization. (n.d.-a). *The GATT years: From Havana to Marrakesh*. Retrieved September 2, 2026, from https://www.wto.org/english/thewto_e/whatis_e/tif_e/fact4_e.htm
World Trade Organization. (n.d.-b). *WTO Stats* [Data set]. Retrieved September 2, 2026, from https://stats.wto.org/