Economics of Globalization

Sciences Po Saint-Germain-en-Laye

Last week

- Trade is an old phenomenon but it has experienced a large increase in the 70 last years.
- Several drivers of this expansion:
  - Information and communication technologies
  - Transport and trade costs
  - Trade policies.

This week

- Why do countries trade?
- What are the theoretical gains and losses from trade?
- How all countries can gain from trade (*The establishment narrative*)?

What is a model?

- A model is not the real world, it is a simplified version of it.
  - All models are wrong but some are useful.
- It is an abstract construct that aims at understanding how things work.
- It (generally) isolates a few mechanisms and let the other apart (given or not modeled).

$\longrightarrow$ Important part of scientific reasoning: build hypothesis, study their consequences and test them empirically.

What is a model?

- A model is composed on assumptions and results.
- Assumptions are the inputs of the model
- Results are the output: given a set of assumptions about the world, what results do I find?
- Positive vs. normative statements.
  - Positive (or descriptive) statements aim at describing a phenomenon, its causes and/or its consequences. It can be tested against data from the real world.
  - Normative (or prescriptive) statements reflect value judgments, typically about what is “optimal”. It necessitates to state what ends are to be followed.
  - Some models and statements mix both types.
- Trade models are both positive (why and what do country trade) and normative (is trade good for society).

Trade models

- Assumptions:
  - **Setting** (how many countries, industries, goods, factors, etc.).
  - **Endowments** (Labor, Capital, Natural Ressources).
  - **Technology** (how economic inputs are transformed into output *e.g.* $Y = f(K, L) = K^{0.5} \times L^{0.5}$).
  - **Preferences** (how individuals, firms, or governments make decisions).
- Results:
  - What quantities are traded at equilibrium? What are the prices and quantities?
  - How outcomes change when elements of the model are modified? (*e.g.* how trade moves when trade barriers are relaxed?).

Trade models

- Long history of trade models that target different mechanisms.
- Some of them are focused on the role of cross-country differences to explain trade:
  - **Technology** (Ricardian model): Price differences between countries come from differences in productivity.

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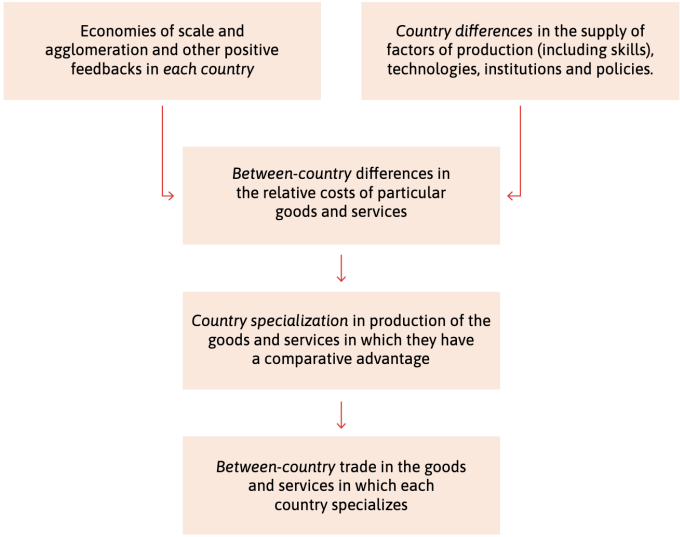
  - **Endowments** (Hecksher-Ohlin model): Price differences between countries come from differences in factor endowments.

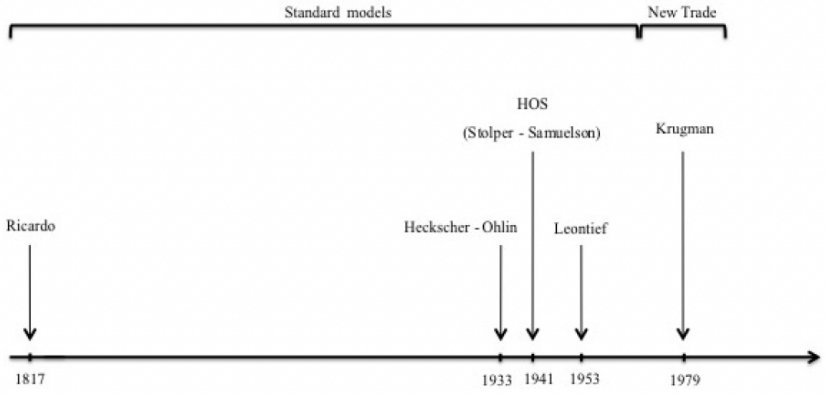
Trade models

- Long history of trade models that target different mechanisms.
- Some of them are focused on the role of cross-country differences to explain trade:
  - **Technology** (Ricardian model): Price differences between countries come from differences in productivity.
  - **Endowments** (Hecksher-Ohlin model): Price differences between countries come from differences in factor endowments.
- Other do not need country differences to explain trade:
  - **Economies of scale** generate the international division of labor through specialization.
- These models need to be seen as complementary (not substitutable). All are useful to understand some characteristics of trade.

The Ricardian Model



Trade models



The Ricardian Model

- What is the impact of opening to trade?
  - Fear of job losses in some industries.
  - Expectations of lower prices.
  - Overall, will trade be good for an economy as a whole?
- The Ricardian model explains trade through international differences in technology.
- Because countries are not all good at producing the same thing, there can be gains if each country specializes in what it does better.

The Ricardian Model

Intuition

- Take France and China and imagine they produce only two goods, cars and shirts.
- If they devote 100% of their workforce to one of the good:
  - France produces 10000 shirts a year or 10000 cars.
  - China produces 10000 shirts a year or 3000 cars.
- Assume they allocate 50% of their workforce to each good because trade is closed
  - France produces 5000 shirts a year and 5000 cars.
  - China produces 5000 shirts a year and 1500 cars.
  - 10000 shirts are produced and 6500 cars are produced
- Now assume that each country fully specializes.
  - France produces 10000 cars.
  - China produces 10000 shirts.

The Ricardian Model

Intuition

- The world experiences a net gain. With the exact same workforce employed, the world produces 10000 shirts and 10000 cars.
- This is because China is relatively more productive in producing shirts.
- It is better to specialize in it and let France produce cars.
- These are **specialization** gains.
- There are also **exchange** gains coming from the fact that consumers can consume goods produced abroad.

The Ricardian Model

Definitions

- A country has an **absolute advantage** for a good if its productivity for the production of that good is higher compared to other countries (Adam Smith).

- A country has a **comparative advantage** in a good if its relative productivity for this good is higher than in another country (David Ricardo).

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- One day the mathematician Stanislaw Ulam asked Paul Samuelson about one idea in the social sciences that is both true and non-trivial. A few years later, Samuelson answered that the theory of comparative advantages is one of them.

The Ricardian Model

Assumptions

- There are 2 countries, 2 goods, one factor of production (labor).
- Production technologies differ across countries. This is the only thing that differ.
- Constant return to scale.
- Perfect competition (free entry implies 0 profits).
- Identical preferences across countries.
- Workers move freely across sectors but do not move across borders.
- Full-employment.
- No transaction costs.

The Ricardian Model

Table: Number of hours necessary to produce a good

	Boats	Cars
Germany	100	50
France	125	125

- Who has an absolute advantage in the production of boats ? And cars ?

The Ricardian Model

Table: Number of hours necessary to produce a good

	Boats	Cars
Germany	100	50
France	125	125

- Who has an absolute advantage in the production of boats ? And cars ?
- Is there still room for specialization?
- Yes because the advantage is not the same in both sectors.
- German workers are much more efficient in producing cars than boats.

The Ricardian Model

- Think in terms of **opportunity costs**. What do you lose if you produce boats instead of cars?

The Ricardian Model

- Think in terms of **opportunity costs**. What do you lose if you produce boats instead of cars?

- If I produce 1 boat, I cannot produce
  - France: $125/125 = 1$ car.
  - Germany: $100/50 = 2$ cars.

- And if I produce one car, I cannot produce?

The Ricardian Model

- Think in terms of **opportunity costs**. What do you lose if you produce boats instead of cars?

- If I produce 1 boat, I cannot produce
  - France: $125/125 = 1$ car.
  - Germany: $100/50 = 2$ cars.

- And if I produce one car, I cannot produce?
  - France: $125/125 = 1$ boat.
  - Germany: $50/100 = 1/2$ boat.

- It is less costly to increase the production of boats in France than in Germany.

- France has a **comparative advantage** in boats.

- The converse is true so that Germany has a comparative advantage in cars.

The Ricardian Model

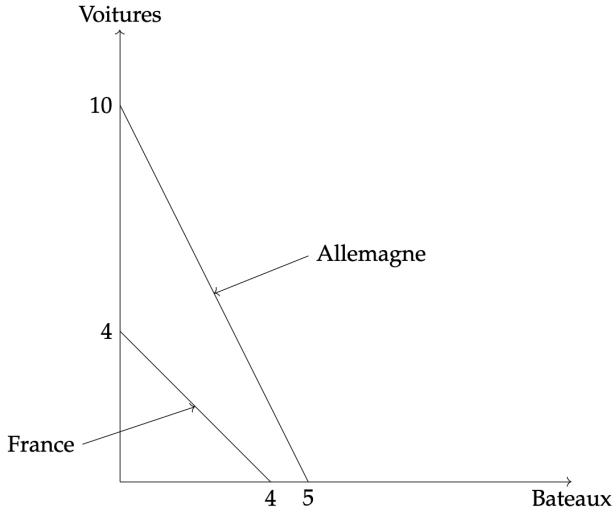

Figure: Production Possibility Frontier

The Ricardian Model

Example

- Assume there are 500 hours of work in each economy.
- In France, 1 boat is worth 1 car. This is the relative price of a boat in France (in terms of cars): $p^{France} = \frac{p_{boat}^{France}}{p_{car}^{France}} = 1$
- In Germany, it is 2: one boat costs two cars: $p^{Germany} = \frac{p_{boat}^{Germany}}{p_{car}^{Germany}} = 2$
- If you're French and produce cars (4 a year), you'd better produce boats (4 a year), go to Germany, and sell your boats at the local price (2 cars). Why?

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- If you're French and produce cars (4 a year), you'd better produce boats (4 a year), go to Germany, and sell your boats at the local price (2 cars). Why? You will have $2 \times 4 = 8$ cars.
- If you're German and produce boats (5 a year), you'd better produce cars (10 a year), go to France, and sell your cars at the local price (1 boat). Why?

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- If you're German and produce boats (5 a year), you'd better produce cars (10 a year), go to France, and sell your cars at the local price (1 boat). Why? You will have $10 \times 1 = 10$ boats.
- **Both countries gain to trade!**

The Ricardian Model

- What happens to the price when we open borders to trade?

The Ricardian Model

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- The relative prices will converge: $p^{France} = p^{Germany} = p$.
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- The relative prices will converge: $p^{France} = p^{Germany} = p$.
- What happens if prices do not adjust?
- Arbitrage opportunities. Law of one price
- What happens if there are transaction costs?
- Let's assume that the price is between 1 and 2 once borders are opened: $p \in (1, 2)$

The Ricardian Model

- Germany can produce one boat or two cars but can only sell boats for a price lower than 2.
- It's better producing cars and Germany will produce 10 cars.
- These cars can be exported in France against $1/p$ boats, with $1/p > \frac{1}{2}$.

The Ricardian Model

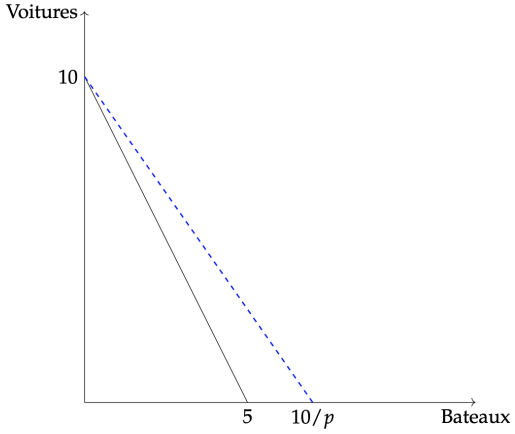
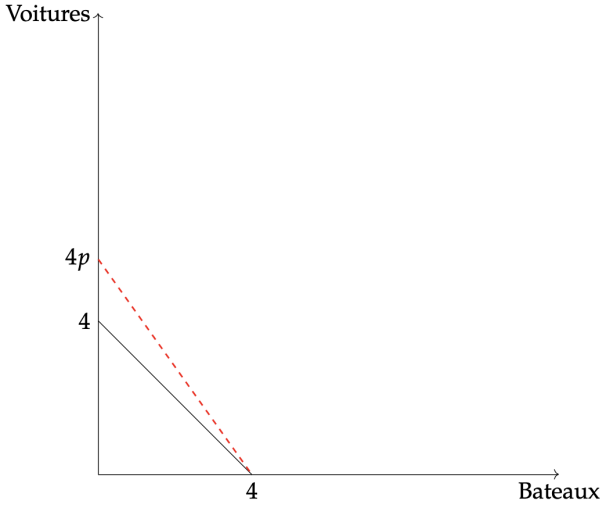


Figure: Possibility of productions frontier in Germany close and open economy.

The Ricardian Model



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The Ricardian Model

- The price level p determines the relative gains to trade.
- If it is close to 2, French can buy more cars with the same number of boats.
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- What happens if $p \geq 2$?
- Germany does not specialize: it becomes cheaper to produce locally than to trade.
- Same for France if $p < 1$.
- When $p \in (1, 2)$, France produces 4 boats and Germany 10 cars.
- If $p < 1$, France and Germany produce cars only: 14 cars are produced.
- If $p > 2$, France and Germany produce boats only: 9 boats are produced.

The Ricardian Model

- This determines the **supply** of the model.
- Again, we rely on relative supply: $S(p) = \frac{S_{boats}(p)}{S_{cars}(p)}$

Price	< 1	$= 1$	$p \in]1, 2[$	$= 2$	> 2
Boats produced by France	0	$\in [0, 4]$	4	4	4
Boats produced by Germany	0	0	0	$\in [0, 4]$	5
Cars produced by France	4	$\in [0, 4]$	0	0	0
Cars produced by Germany	10	10	10	$\in [0, 10]$	0
Relative supply	0	$\in [0, \frac{4}{10}]$	$\frac{4}{10}$	$\in [\frac{4}{10}, \infty]$	∞

- We also define relative demand: $D(p) = \frac{D_{boats}(p)}{D_{cars}(p)}$

The Ricardian Model

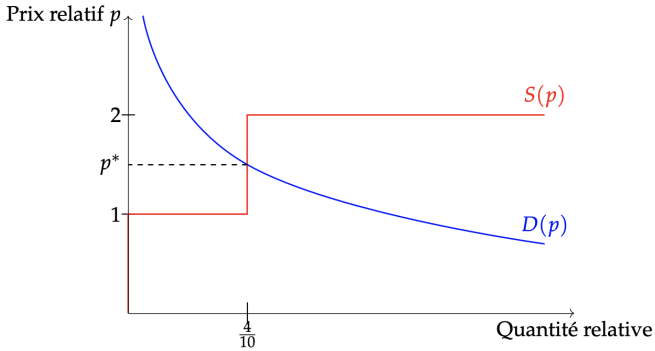

Figure: Relative supply and demand

The Ricardian Model

- You should not produce what you do better than others ... (absolute advantage)
- **But what you're relatively better at** (comparative advantage).
- If countries specialize according to their comparative advantages, the world is better off by producing more with the same amount of labor.
- All countries gain to trade thanks to the division of labor.
- Here, trade is inter-industry: it is cars *vs.* boats.

First conclusions

- Trade is driven by **relative** productivity differences.
- This is a model of **inter-industry trade**.
- Predicts **full specialization** of countries.
- Countries do not trade if they are equally productive.
- **Free-trade increases world output**.
- **No country loses from free-trade**.
- Trade does not impact inequalities... by definition!
  - Individuals are homogeneous here.

What about wages?

- The wage differential depends on:
  - The difference of productivity.
  - The relative prices.
- A country can get richer if
  - The labor productivity of the exporting sector increases (increasing productivity differences).
  - The price of the exported good increases.
- While the structure of trade depends on the relative productivities, wages depend on the absolute productivity in the sector of specialization.

What can go wrong?

- Many goods
  - The conclusions extend to settings with many goods (Dornbush, Fischer, Samuelson, 1977, Eaton and Kortum, 2002).
- Trade costs
  - Some goods become non-traded goods: it is not valuable anymore to trade them, despite the price differences.
- Imperfect mobility of workers across sectors and unemployment
  - Much bigger issue.
  - In reality, changing sector can take many years: (large) transitory costs to trade.

Empirical exploration

In which goods countries have their comparative advantages?

- It would be hard to measure comparative advantages *ex-ante* but we can measure them *ex-post*.

- A country i has a revealed comparative advantage in product k if its share of exports of product k with respect to the world share of export of product k is larger than 1.

- Formally:

$$\frac{\frac{X_{ik}}{\sum_k X_{ik}}}{\frac{X_{Wk}}{\sum_k X_{Wk}}} > 1$$

Empirical exploration

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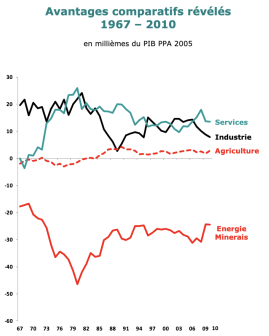


1967

Points forts		Points faibles	
en millièmes du PIB courant			
Automobiles particulières	3,6	Pétrole brut	-15,8
Produits raffinés du pétrole	2,5	Autres produits agricoles	-1,6
Produits pharmaceutiques	2,4	Charbon	-1,6
Fournitures électriques	1,6	Meubles	-1,4
Articles en caoutchouc	1,4	Métallurgie non ferreuse	-1,2
Boissons	1,4	Composants électroniques	-1,2
Produits de toilette	1,2	Viandes et poissons	-1,0
Eléments de véhicules auto.	1,2	Instruments de mesure	-0,8
Cuirs	1,1	Prod. agric. non comestibles	-0,6
Fer et acier	1,0	Papier	-0,6

2010

Points forts		Points faibles	
en millièmes du PIB courant			
Aéronautique et espace	12,8	Pétrole brut	-12,7
Produits pharmaceutiques	5,0	Gaz naturel	-4,1
Produits de toilette	4,9	Matériel informatique	-3,0
Boissons	4,5	Produits raffinés du pétrole	-2,8
Eléments de véhicules auto.	3,4	Automobiles particulières	-2,4
Céréales	3,0	Vêtements de bonneterie	-2,3
Moteurs	2,6	Vêtements de confection	-1,9
Corps gras	1,6	Meubles	-1,9
Fer et acier	1,0	Electronique grand public	-1,5
Peintures	0,9	Matériel de télécommunicatio	-1,5

Source : CEPII, bases de données CHELEM-commerce international, CHELEM-PIB et CHELEM-balance des paiements.

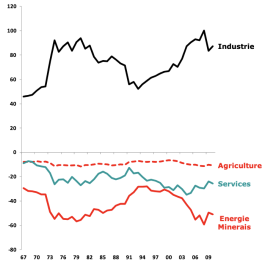
RCA in France

Empirical exploration

In which goods countries have their comparative advantages?

Avantages comparatifs révélés
1967 – 2010

en millièmes du PIB PPA 2005



1967

Points forts		Points faibles	
en millièmes du PIB courant			
Automobiles particulières	8,4	Pétrole brut	-18,3
Fournitures électriques	5,8	Autres produits agricoles	-5,8
Machines spécialisées	5,5	Métallurgie non ferreuse	-4,6
Produits pharmaceutiques	5,0	Produits raffinés du pétrole	-4,6
Moteurs	4,7	Viandes et poissons	-2,5
Articles en plastique	4,4	Vêtements de bonneterie	-2,4
Quincaillerie	4,4	Papier	-2,2
Eléments de véhicules auto.	3,3	Minerais non ferreux	-2,2
Matériel de télécommunicatio	2,6	Minerais de fer	-2,0
Chimie organique de base	2,4	Vêtements de confection	-2,0

2010

Points forts		Points faibles	
en millièmes du PIB courant			
Automobiles particulières	22,9	Pétrole brut	-16,8
Machines spécialisées	8,0	Gaz naturel	-8,9
Moteurs	5,5	Autres produits agricoles	-7,1
Instruments de mesure	4,8	Matériel informatique	-5,2
Quincaillerie	4,7	Produits raffinés du pétrole	-4,6
Véhicules utilitaires	3,5	Composants électroniques	-4,0
Articles en plastique	3,5	Vêtements de bonneterie	-3,3
Eléments de véhicules auto.	3,4	Vêtements de confection	-2,9
Matériel BTP	3,1	Métallurgie non ferreuse	-2,9
Produits pharmaceutiques	2,6	Cuirs	-2,7

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RCA in Germany

Empirical exploration

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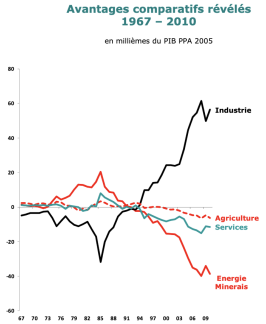

1967

Points forts		Points faibles	
en millièmes du PIB courant			
Autres produits agricoles	1,3	Chimie organique de base	-1,6
Articles manufacturés nda	0,9	Fer et acier	-1,2
Viandes et poissons	0,8	Première transform. du fer	-0,7
Fils et tissus	0,6	Engrais	-0,6
Vêtements de confection	0,5	Instruments de mesure	-0,5
Conserves végétales	0,4	Articles en plastique	-0,4
Cuirs	0,3	Métallurgie non ferreuse	-0,4
Minerais non ferreux	0,3	Moteurs	-0,3
Charbon	0,3	Machines-outils	-0,3
Vêtements de bonneterie	0,3	Céréales	-0,3

2010

Points forts		Points faibles	
en millièmes du PIB courant			
Matériel informatique	21,9	Pétrole brut	-23,6
Matériel de télécommunicatior	17,8	Composants électroniques	-14,2
Articles manufacturés nda	9,9	Minerais de fer	-14,0
Cuirs	9,5	Minerais non ferreux	-7,9
Vêtements de bonneterie	8,9	Métallurgie non ferreuse	-6,5
Vêtements de confection	8,0	Appareils d'optique	-6,5
Electronique grand public	6,8	Articles en plastique	-5,5
Meubles	5,1	Chimie organique de base	-5,1
Quincaillerie	4,5	Prod. agric. non comestibles	-4,6
Fournitures électriques	4,3	Machines spécialisées	-4,1

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RCA in China

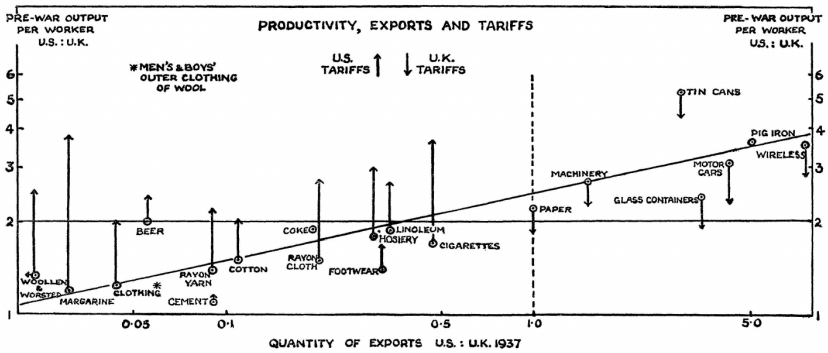
Empirical exploration

Do pattern of trade follow comparative advantages?

- The Ricardian model suggests that a country should export the goods for which it is relatively more productive.
- First empirical tests of the Ricardian model in 1951 (MacDougall).

Empirical exploration

Do pattern of trade follow comparative advantages?



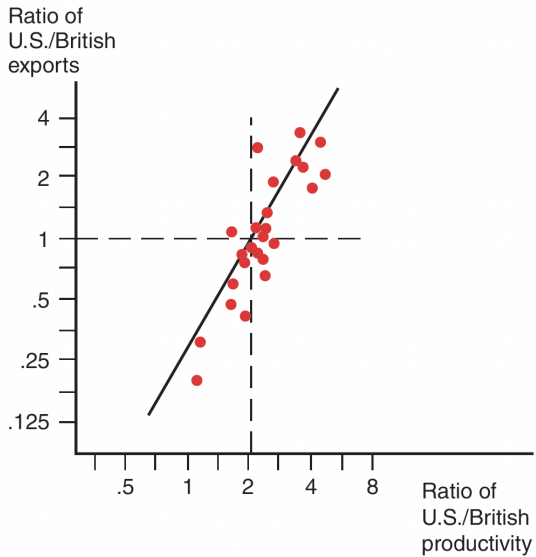
Empirical exploration

Do pattern of trade follow comparative advantages?

- The Ricardian model suggests that a country should export the goods for which it is relatively more productive.
- First empirical tests of the Ricardian model in 1951 (MacDougall).
- British labor productivity is lower than U.S. labor productivity in all sectors!
  - The U.S. have an absolute advantage in everything.
- Though, British exports are as large as U.S. exports at the time.
  - The U.K. exports in sectors in which it has a comparative advantage.

Empirical exploration

Do pattern of trade follow comparative advantages?



Do pattern of trade follow comparative advantages?

- Less clear-cut evidence in recent years.
- The specialization of the economy make that countries simply do not produce goods in which they are bad, so we cannot measure their productivity.
- The example of Bangladesh:
  - Output per worker as % of China in any industry: 28.5%
  - Exports per worker as % of China in any industry: 1%
  - Output per worker as % of China in apparel: 77%
  - Exports per worker as % of China in any apparel: 15.5%

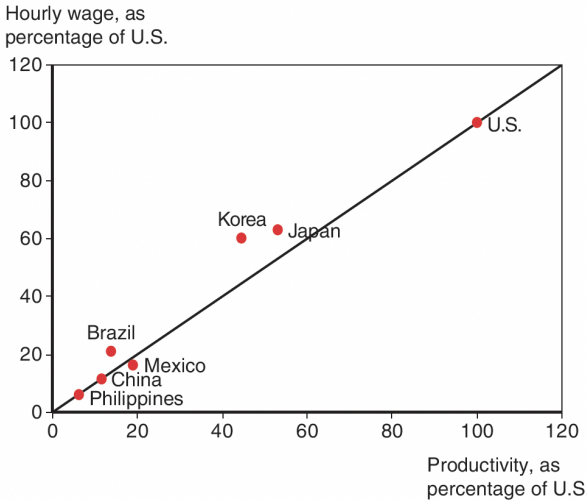
Empirical exploration

Do wages reflect productivity?

- The model implies that the relative wage of two countries reflects their relative productivities.
- Is it correct empirically?

Empirical exploration

Do wages reflect productivity?



Empirical exploration

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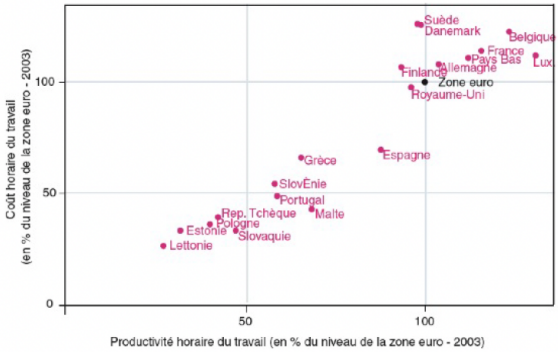

Take-aways

- A simple model of productivity differences generates beneficial trade.
- Trade can be beneficial to both countries if they fully specialize in their **relative advantage**.
- Results unrealistic, but helpful.
- What we observe reflects Ricardo's predictions.
- Next sessions: introduce new trade models to explain more trade patterns.

The Law of One Price

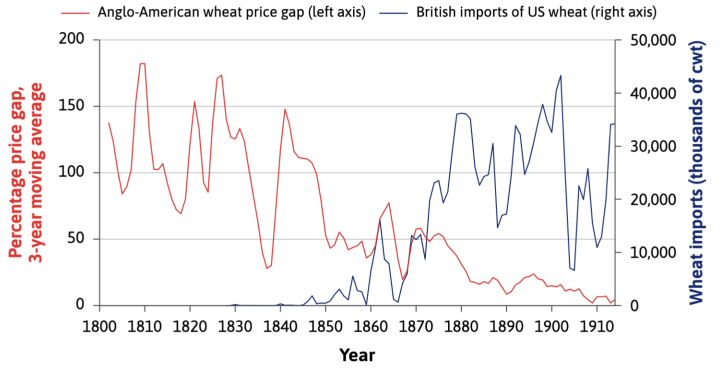

Figure 18.4 The Anglo-American wheat trade (1800–1914).

Figure 3 in Kevin H. O'Rourke and Jeffrey G. Williamson. 2005. 'From Malthus to Ohlin: Trade, Industrialization and distribution since 1500'. *Journal of Economic Growth* 10 (1) (March): pp. 5–34.

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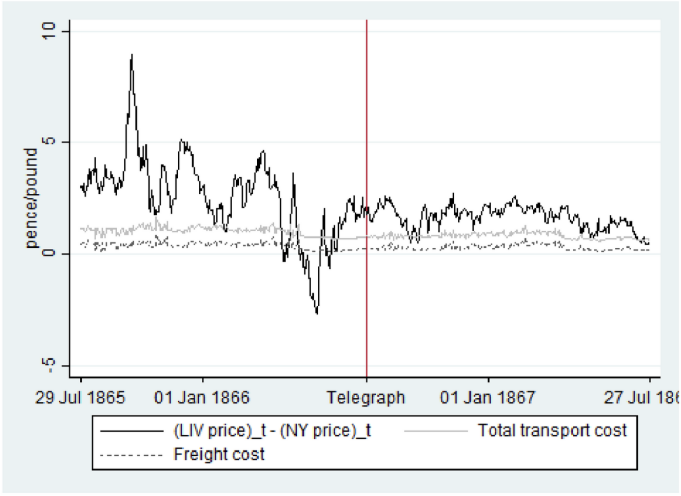

Figure: Impact of the introduction of the telegraph on Anglo–American wheat trade prices