

EC 380: Lecture 4

Trade Theory: Heckscher-Ohlin (HO) Model

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Prologue

To Recap

Last Time

- Countries with no absolute advantage in production can still trade!
- Since then, the **internet** and subsequent **information age** have largely narrowed differences in technology
- **What else helps us understand what drives our need to trade goods?**

Today

Heckscher-Ohlin Model suggests differences in factor endowments can explain trade patterns

Hechscher-Ohlin Model

We will go with our own version of the model.

- Two countries, Home and Foreign
- Two goods, steel and cloth
- **Two** factors of production, labor and **capital**

Suppose in our case the home country ends up exporting apple pies and importing potatoes.

What would this imply about which good each country has comparative advantage in?

Heckscher-Ohlin Model

Key terms:

Factor abundance: Relative measure, where if particular factor x represents a large share of total factors, country is x -factor abundant.

Factor scarcity: Country has less of a particular factor relative to other factors or in comparison to another country.

The **capital-labor ratio** is a common tool of comparison for assigning countries into resource endowment groups.

The higher K/L is for a given country, relative to others, the more capital-abundant it is.

Heckscher-Ohlin Model

| | Ireland | United Kingdom |
|---------|-------------|----------------|
| Capital | 90 Tractors | 150 Tractors |
| Labor | 300 Farmers | 400 Farmers |

Which country is capital-abundant?

$$\frac{K_{IRL}}{L_{IRL}} = 0.3, \quad \frac{K_{UK}}{L_{UK}} = 0.375$$

Heckscher-Ohlin Model

Production Costs

The ratio between capital and labor implies **abundancy**. Countries where a given factor is relatively **more abundant** exhibit **lower input prices** per unit of the factor.

The labor-abundant country finds labor to be relatively cheaper, per unit, than the capital-abundant country. **comparative advantage** due to its edge the cost of production of **labor-intensive goods**.

Heckscher-Ohlin Model

Production Costs

Since the US is **capital-abundant**, it faces relatively cheaper capital and faces a lower opportunity cost in production that uses relatively more capital.

This may explain US trade patterns in which **capital-intensive** exports of jet engines and agricultural products dominate its goods outflows.

Gains from Trade

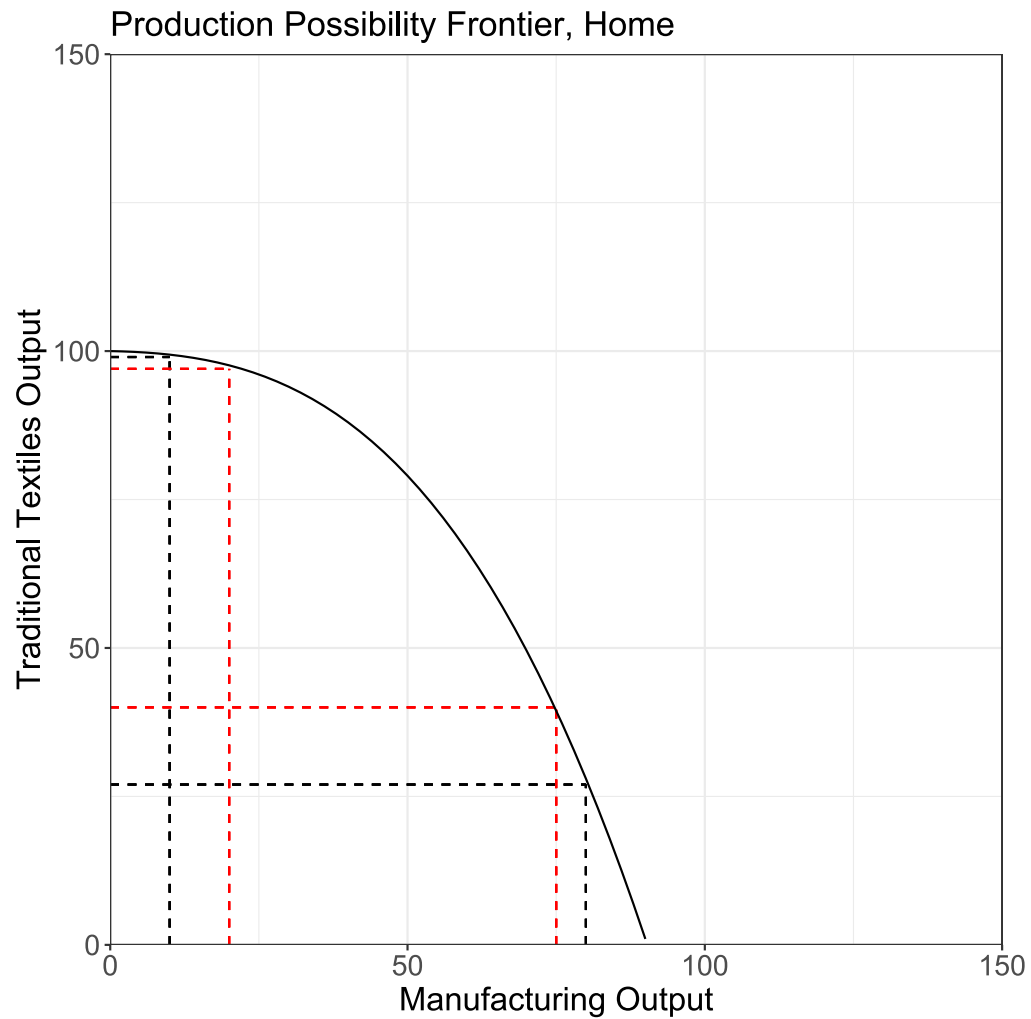
Ricardian model assumed a single factor \implies all countries face same trade-off regardless of input levels.

HO model now considers combinations of factors, where some specific combination of two is most productive.

How does this affect our visualization?

Production possibilities frontier (PPF) will be curved instead of straight.

New PPF



New PPF

As you can see, adjustments at the tailend of these frontiers require a disproportionately large exchange on equipment.

Opportunity costs are **rising** for each type of production.

Each unit increase in the labor-good leads to an increasingly sizeable loss of the other unit.

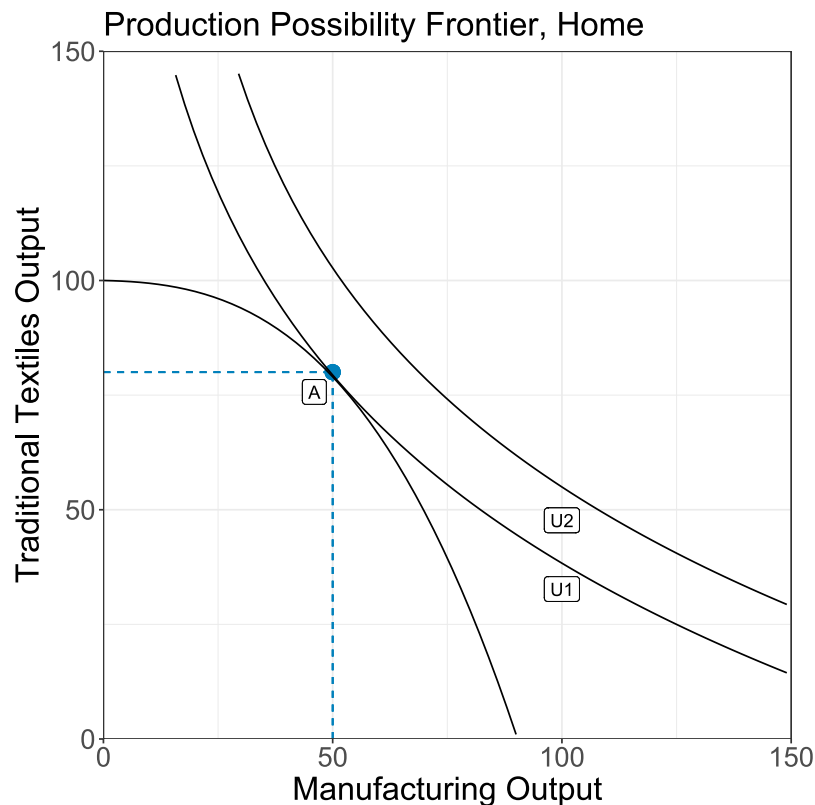
Why?

As you reallocate resources from a capital-intensive good to labor-intensive, you need greater amounts of factors due to factor combinations being misaligned.

Gains from Trade: Autarky

Closed economy scenario: Consider a case in which the US does **not** trade.

In absense of trade, Home consumes exactly what it produces.



Gains from Trade: Free Trade

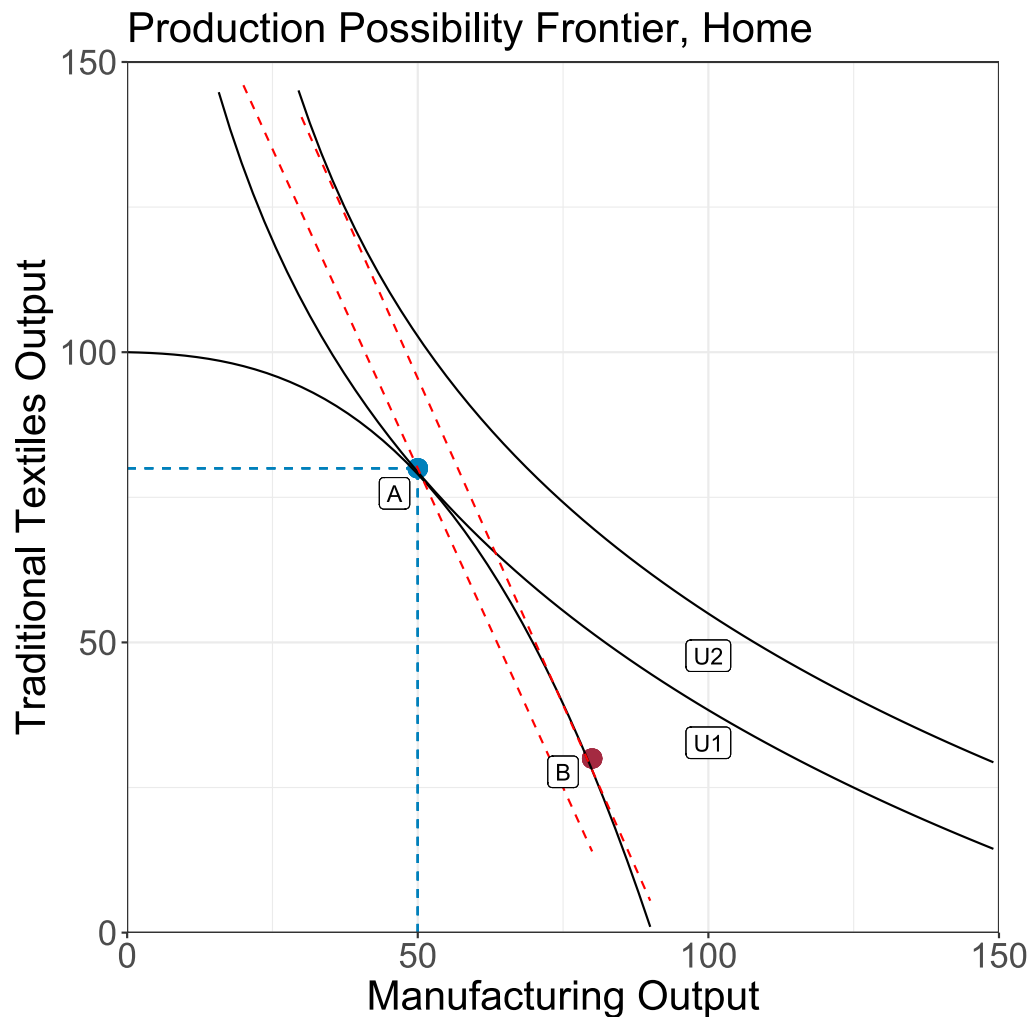
Upon opening up trade and facing no trade costs, the world PPF is now the item of material interest.

The previous relative prices of goods changes to a **world relative price**. This identifies the slope of the CPC described in IE Ch. 4.2.2.

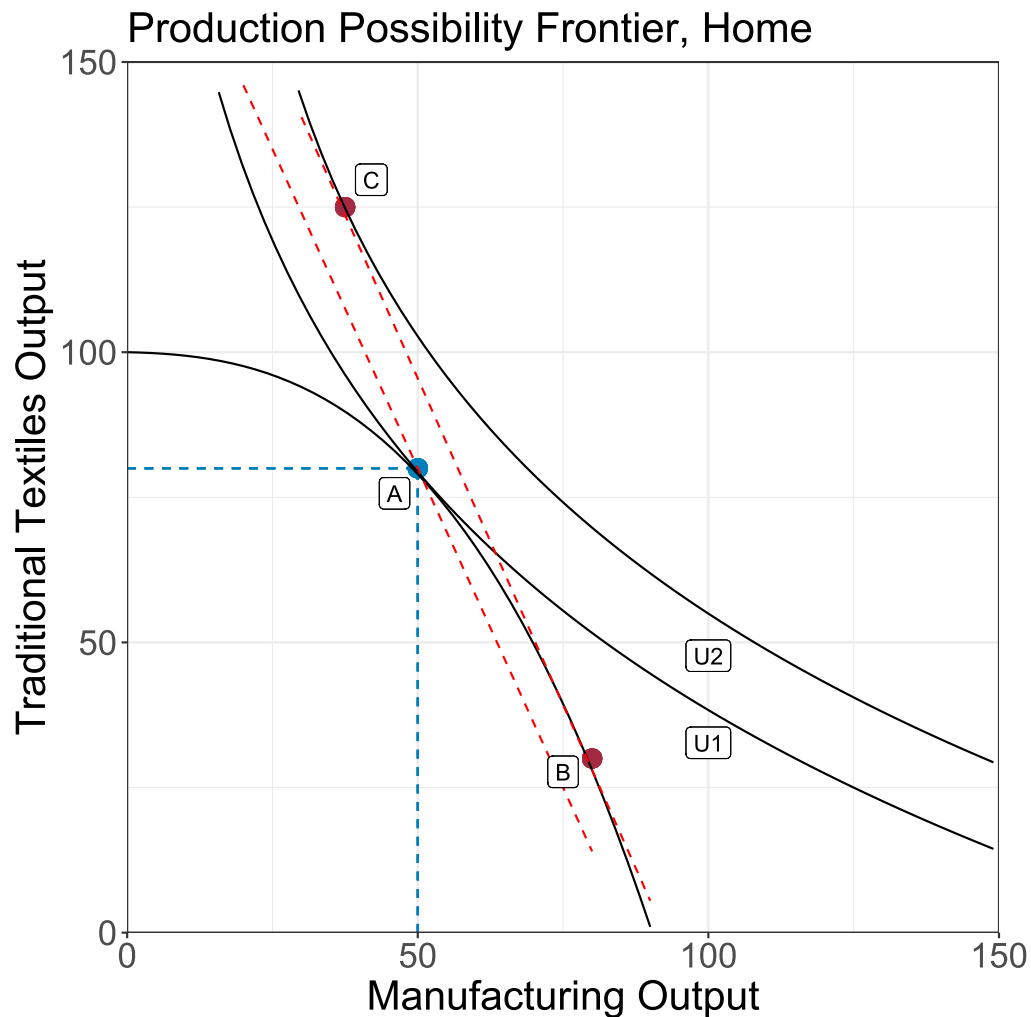
Given that this line is not tangential to the production possibility frontier, there are other bundles of goods that reach higher indifference curves U_i .

In our case, Home reaches U_2 by reallocating production away from textiles and towards manufacturing, given that Home is a capital intensive nation.

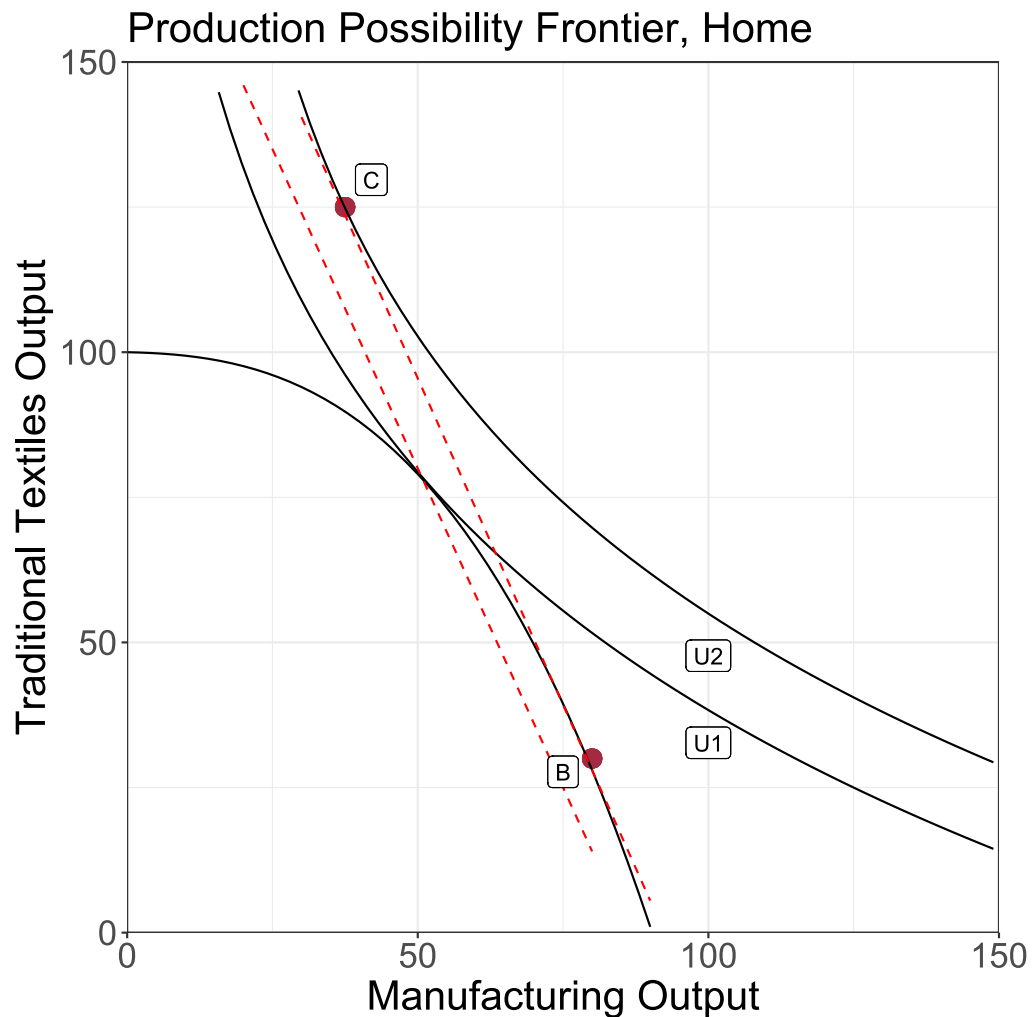
Gains from Trade: Free Trade



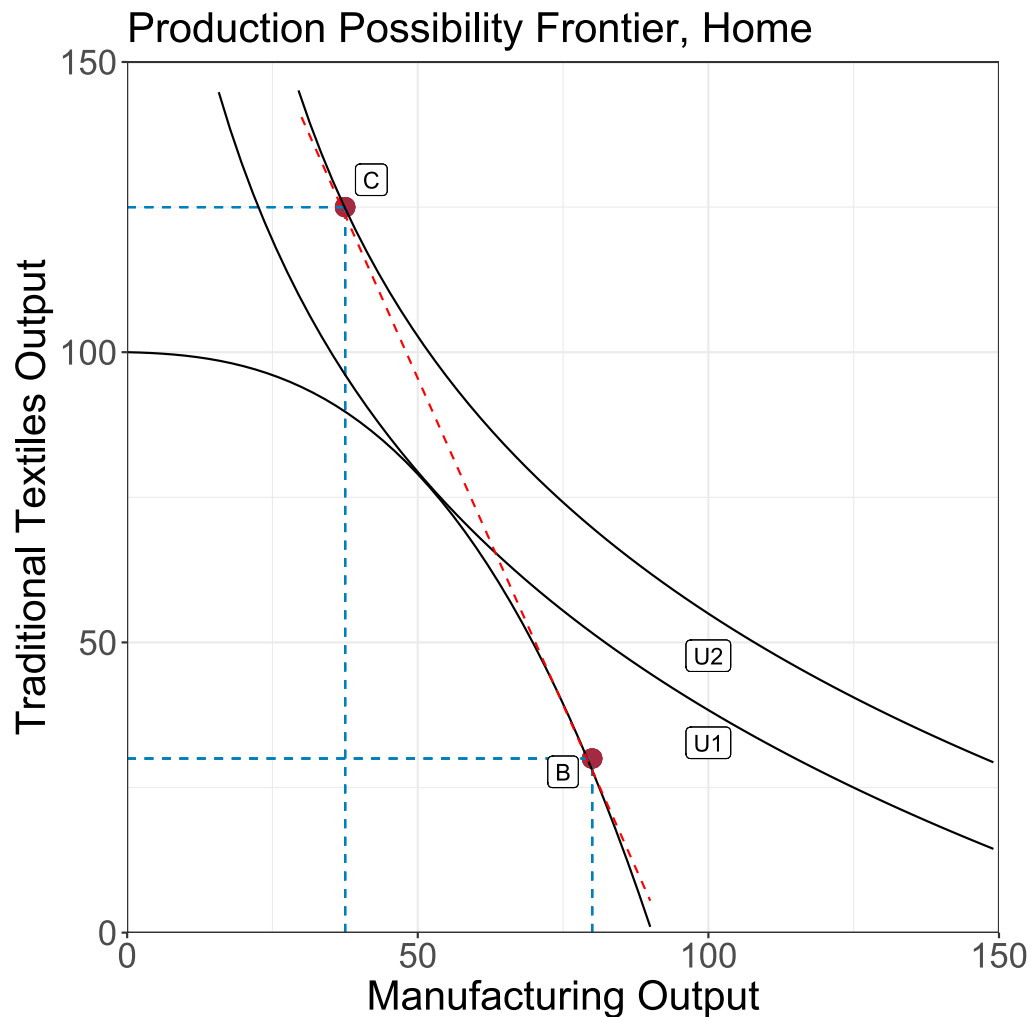
Gains from Trade: Free Trade



Gains from Trade: Free Trade



Gains from Trade: Free Trade



Gains from Trade: Free Trade

Since we are trading at **world price level**, we can reach **higher** indifference curves.

We **produce at B** and **consume at C** at Home country.

Therefore if we produce more **manufacturing output** than we consumer, we must be **exporting** a subset of these goods (difference between B outcome and C outcome).

In contrast, we produce less **textiles** than we consume, suggesting that Home is **importing** the difference.

Comparing to Ricardian Model

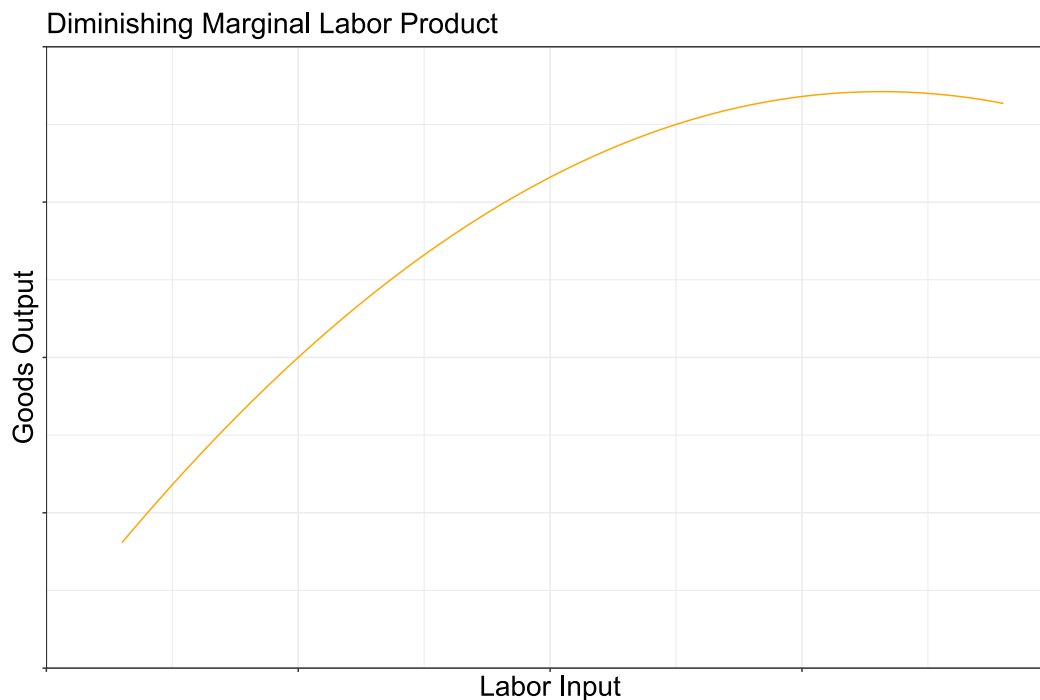
Why B?

We must produce where the opportunity cost of producing a manufactured good is equal to the relative world price slope (CPC).

Our notion of trade gains are pretty similar to Ricardian views, but specialization is not complete due to **diminishing marginal productivity** associated with each factor.

Diminishing marginal productivity: Holding your other factor fixed, the marginal unit increase of a given factor yields increasingly smaller contributions to overall output.

Comparing to Ricardian Model



Imagine having one shovel to share between 5 workers. Sure they can exchange the shovel whenever they get tired, but including 10 more is going to make very little difference to total work output.

Trade & Income Distribution

In **Ricardian model** we ruled out harmful effects and suggest everyone benefits in society.

Reallocated workers simply left and shrinking industry for an expanding one and were able to exchange their unchanged labor supply for a **larger bundle of goods**.

The **HO model** takes a more moderate view

Rather than capital and labor, consider two labor sectors

- Skilled
- Unskilled

Industries require different combinations of skilled and unskilled labor

Heterogenous Income Effects

We will go into this further later into the course but for now keep in mind that trade openness can have heterogeneous effects depending on which part of the skill bracket a laborer belongs to.

It can be shown that a systematic relationship exists between endowments of factors for a country and who ends up being these winners and losers.

I'll show you a **theoretical argument** for how this can occur. Later we'll examine **empirical evidence**, based on applied econometric analysis.

Stolper-Samuelson Theorem

Explains theoretical outcomes of asymmetric factor outcomes.

- Income depends on input supplied to value of final product
- Wages will vary based on their skill level
- Labor input earnings (wages) demand on their demand and supply

Derived demand: Demand for a good or service that is derived from demand for something else (e.g. demand for labor is based on demand for goods and services).

Stolper-Samuelson Theorem

Under high output demand, price is high and inputs used to produce benefit by receiving greater returns on their contribution.

Any change that impacts prices will have direct impacts on outcomes.

Open trade causes the **export good price** to rise and **import good price** to fall. Demand for each factor readjusts, leading to change in returns to each factor.

Resources leave sector of imported good and enter sector of exported good, which cause changes in demand for each input in Ricardian model.

Stolper-Samuelson Theorem

If manufacturing good is the export, demand for capital factor rises and demand for labor factor falls.

This implies income for actors used intensively for the import sector fall and rises for the intensive factor of the export sector.

Stolper-Samuelson Theorem suggests that increase in price of good raises income earned by factors intensively used in its production. Fall in price of goods lowers income of factors used intensively.

Stolper-Samuelson Theorem

According to this **theory**, a country with a capital-intensive presence (e.g. USA) will shift away from labor demand.

Capital owners will benefit from trade. Laborers will lose out.

Read further into the **magnification effect**. This may come up in the future.

To Recap

- Countries with no absolute advantage in production can still trade in both Ricardian and HO models
- In HO case, advantages are driven by abundancies in different factors which vary across countries
- While Ricardian trade openness is a broad gain for everyone, HO highlights a **reallocation** of resources towards specific industries that may disadvantage the factor belonging predominantly to the now partially import-reliant sector.

Next Class

- Specific Factors model, Model Empirics & Extensions