The Ricardian Model

EC 380 - International Economic Issues

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Why Trade?

Quick Recap

Why does trade occur? This is our main question.

There are two strands within the field of international trade:

I. Neoclassical Models of Trade ('Old Theories'):

- **Ricardian Model $\Rightarrow$ Technology differences spur trade**
- **Hecksher-Ohlin Model Resource differences spur trade**

II. 'New' Trade Theory:

- **Krugman Model Demand/Want of variety spurs trade**
- **Melits Model Heterogenous firms drive trade**

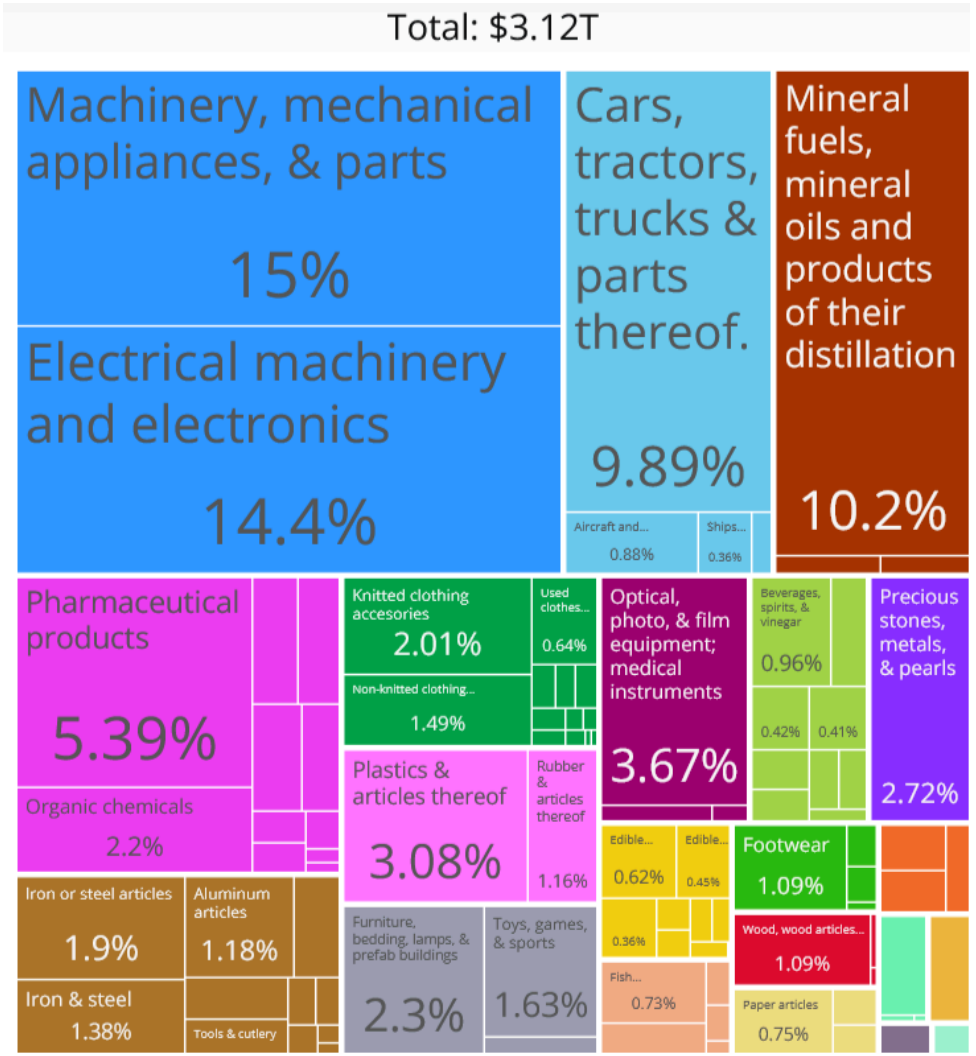
US Imports Snapshot

In 2022, the US imported $316M in Toothbrushes.
Roughly 56% from China alone. Next noticeable sources are Germany, Switzerland, and India.

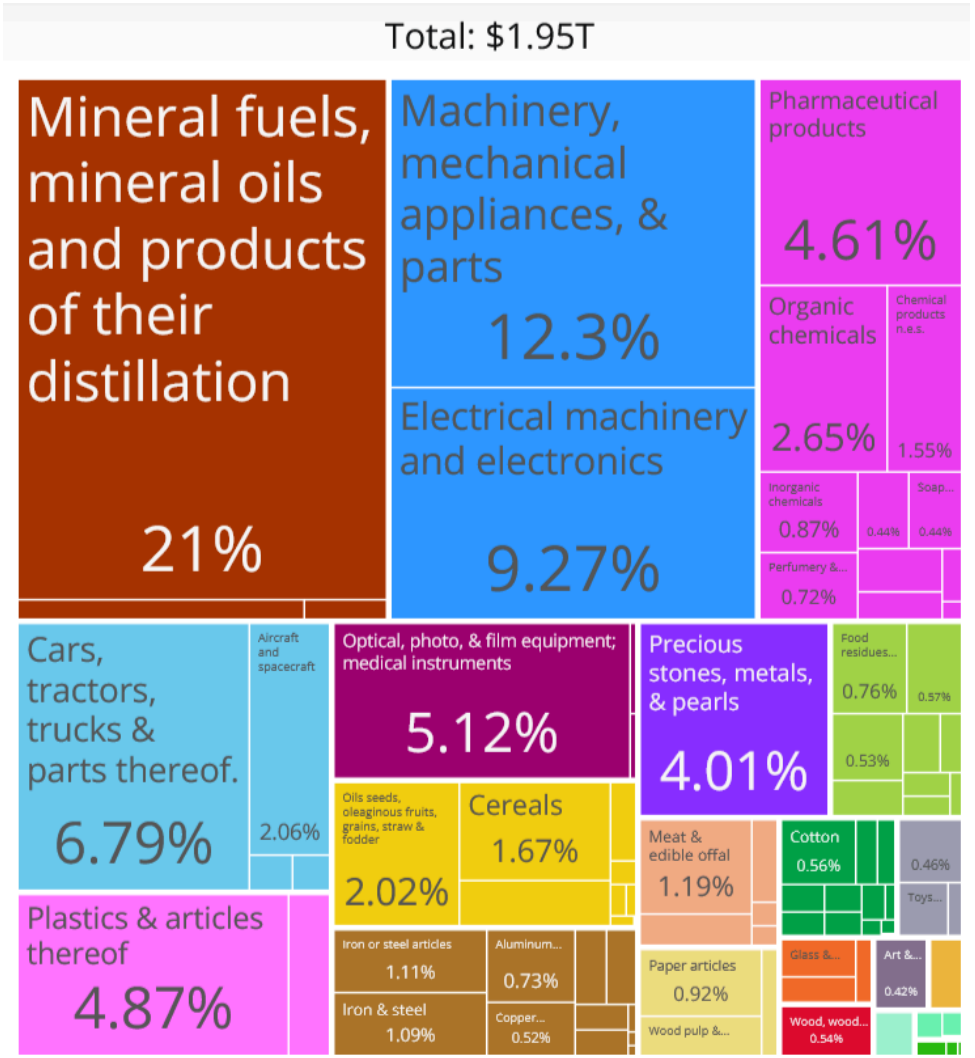
The US represents the largest economy in the world. But it still **resorts to import of goods** at a level that far exceeds what it exports.

As an example, while 99% of shipping containers that enter the Los Angeles port are fully loaded with goods, **70% of containers leaving the port are empty**!

Imports



Exports



Reasons for Trade

With all the manufacturing capacity of the US, why not make toothbrushes at home and consume them domestically?

- Technology differences in each country?
- Total resources available differ by country?
- Production cost differences?
- Proximity to countries with more productive labor forces?

For now, let's consider the **opportunity cost** of doing so. **The Ricardian Perspective** says that the US devotes domestic labor that would otherwise be used to produce these toothbrushes to **comparatively** more productive tasks.

Comparative Advantage

During the 16th and 17th century, the study of economics was in its infancy. Misguided beliefs in public policy were widely held across nations.

> **Mercantalism:** A stockpile of gold and silver was considered an appropriate barometer for the state of the domestic economy
>
> **Imports** Less gold
>
> **Exports** More gold
>
> Tariffs are set high to prevent trade deficits'

Ricardo would demonstrate that under **balanced free trade (no tariffs)**, trade then **benefits every country**

Ricardo's Logic

If every country exports the goods in which they have the **comparative advantage** in, then every country benefits from trade

Let's view at an example

- Two countries: Portugal and England
- Two goods: Wine and Cloth
- Portugal has the **absolute advantage** in production of both goods
- England is particularly bad at making wine, which makes it **relatively good** at producing cloth

England has the **comparative advantage** in cloth. Portugal has the **comparative advantage** in wine.

Ricardo says that **both** are better off trading than under **autarky**

Autarky

Autarky

Definition: The complete absence of foreign trade; total self-sufficiency of a national economy

To understand how trade affects national welfare, we have to understand how they do on their own

We can do this by looking at the **Production Possibilities Curve (PPC)**

- These show the trade-offs when a country chooses their production combination of two goods
- It is closely related to the opportunity cost of the good on the **horizontal axis**

Production Possibilities Curves (PPC)

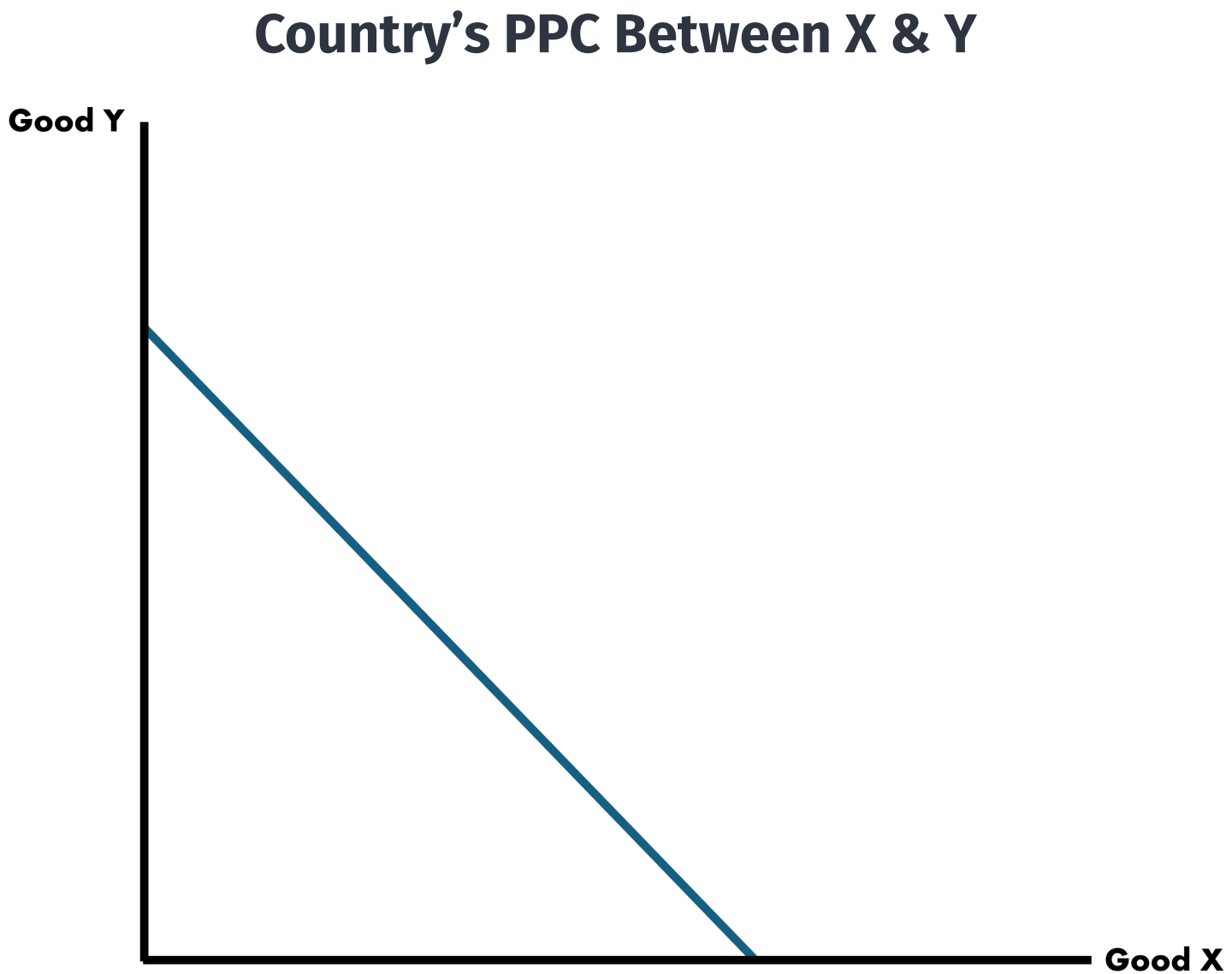
For the moment, we will be dealing with PPCs that look like straight lines because **we assume that the trade-off between two goods does not change**

- **This follows from an assumption we make on labor:** Labor is homogeneous and no group of workers is more skilled than another group

How are they related to opportunity costs?

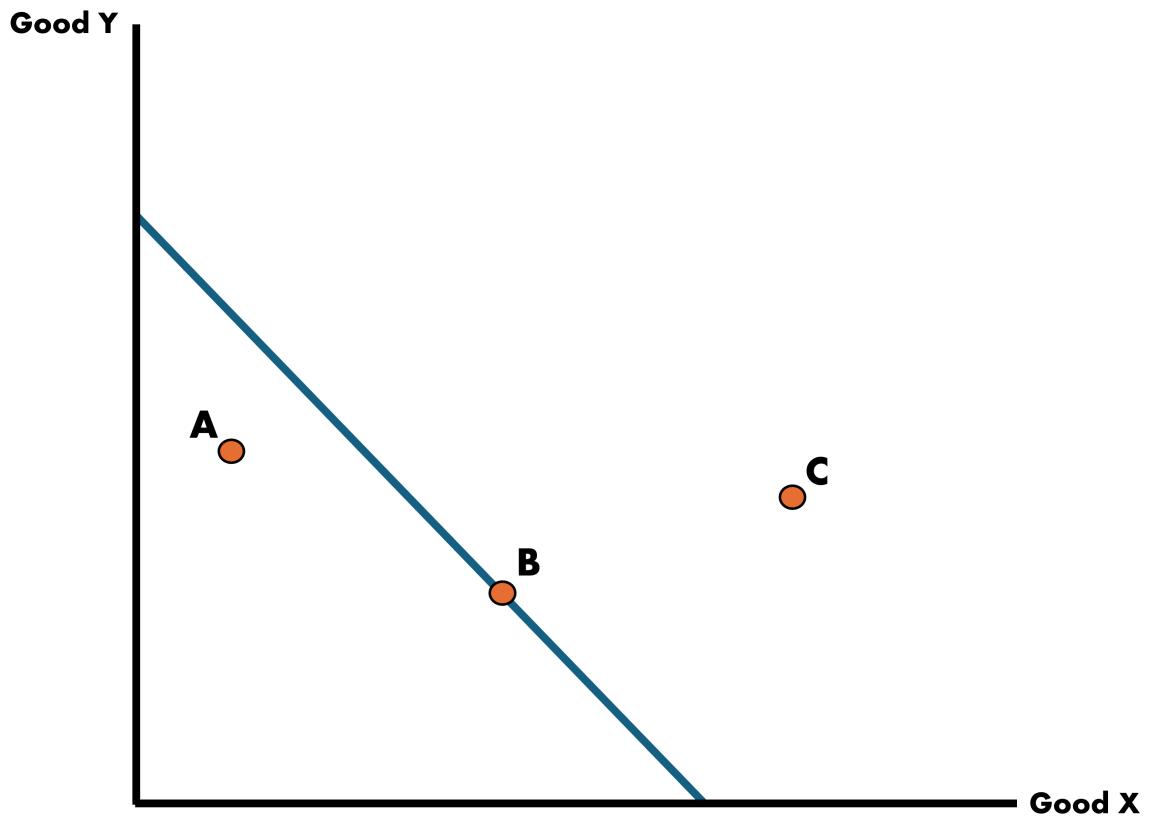
- **Opportunity costs are the best forgone alternative**: In order to produce 1 unit of good X, the country has to give up some amount of good Y.
  - Because this is a "rate of change", we say that the **slope of the PPC** is the **Opportunity Cost of good X**

Production Possibilities Curves (PPC)



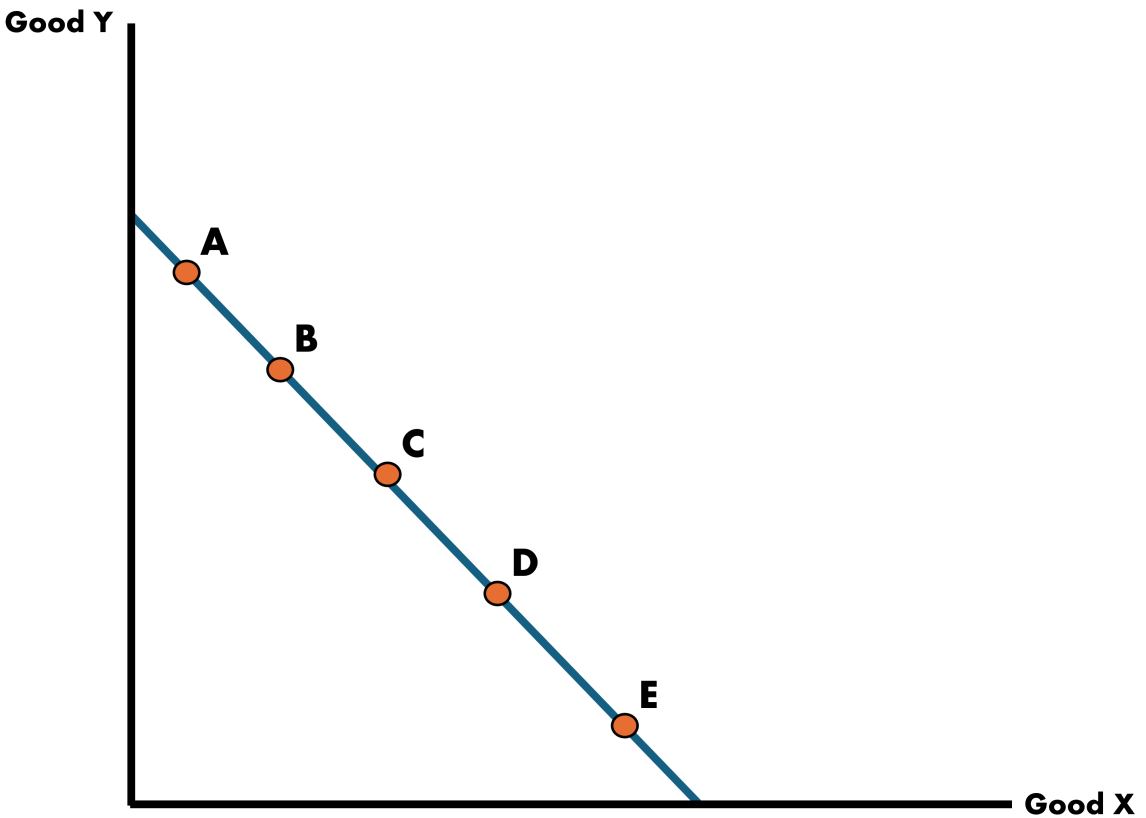
Production Possibilities Curves (PPC)

Country's Bundle Choices Between X & Y



- **Point A:** Producing at an inefficient and wasteful level
- **Point B:** Efficient point of production where maximum level of output is obtained
- **Point C:** Infeasible. The country does not have the resources to produce at this level

How Does a Country Optimally Choose?

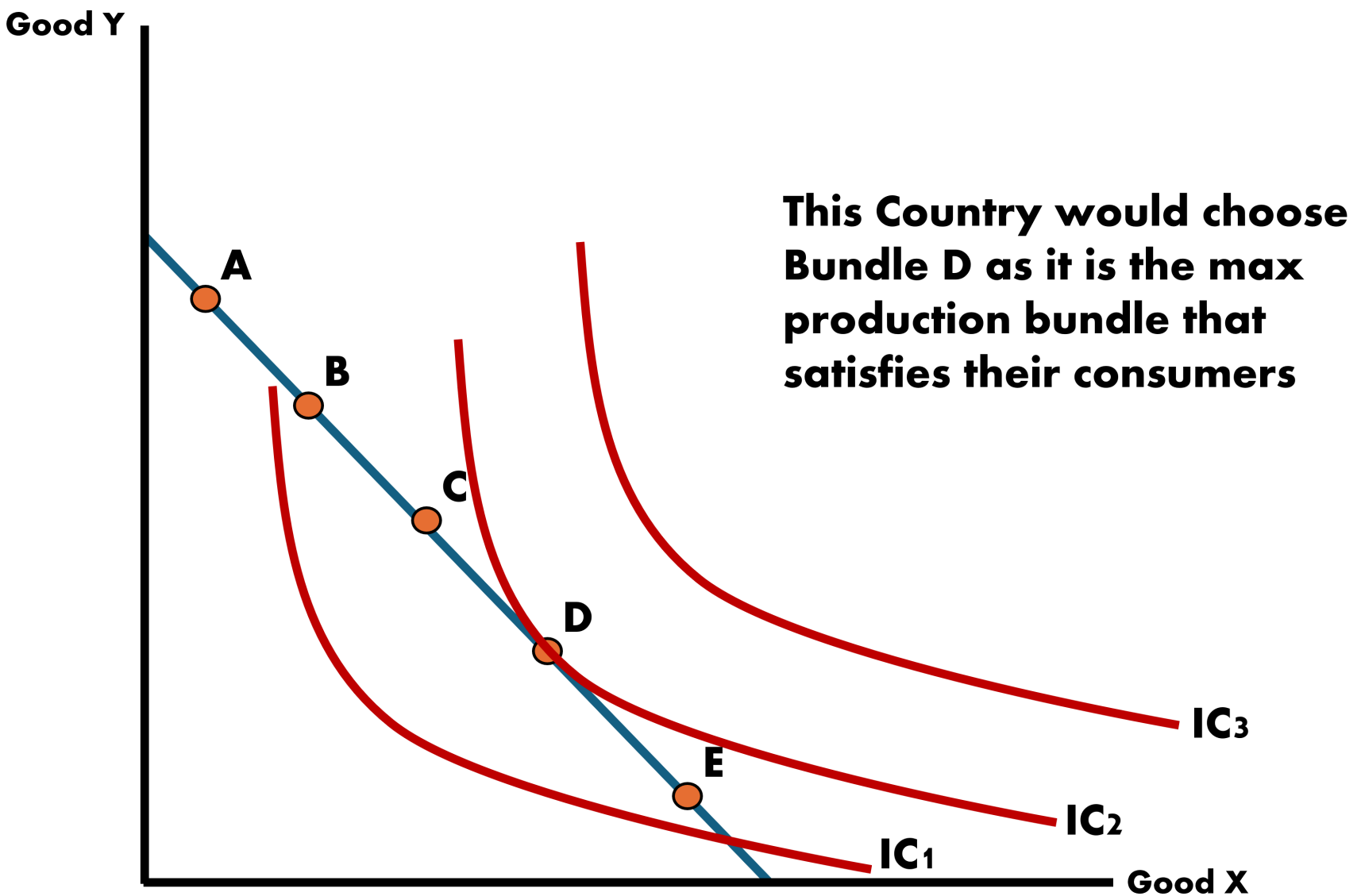


Choice depends on the country's demand for the two goods

We call these **Indifference Curves**

- Each curve shows the consumption bundles of goods that the economy can consume and be equally satisfied
- The consumers are **indifferent** in its own preference across the bundles on a particular indifference curve

Indifference Curves



Back to the Ricardo Model

Starting with the **Ricardo Model**, we look at it's primary components:

- Single Factor of Production (Labor)
- Two-Country Model (Home and Foreign)
- Technology differences across countries

We will use our own example

- Factor of production: **Labor (L)**
- Two Countries: **Home** and **Foreign**
- Two Goods: **Coffee and Tea**

- Suppose that in this case, the **Home Country** exports **coffee** and imports **tea**
- **What would this imply about which good each country has comparative advantage in?**

Ricardo Model Assumptions

TABLE 3.1 Assumptions of the Simple Ricardian Trade Model

Labor	■ The only input ■ Cannot migrate across borders ■ Is completely mobile between sectors ■ Fully employed
Markets	■ Two outputs ■ Perfect competition ■ No transportation or trade costs
Technology	■ Constant returns to scale ■ No changes in technology or skills

Introducing some Key Variables - Marginal Product of Labor

Marginal Product of Labor (MPL): Represents the **additional units of a good produced**, given a **one unit increase in the number of workers assigned** to a particular task

The MPL for the **Home Country** for each good is written as and , for **coffee** and **tea** respectively.

We can assign numbers to each such that:

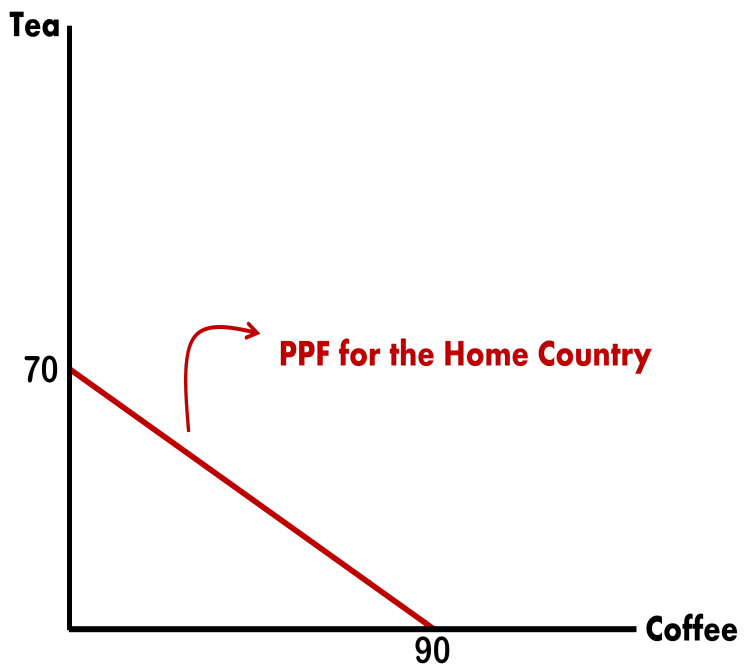
Let's also say that the country has a full labor force

We will add the **Foreign Country** later

Home PPF

We can plot the **Home PPF** by finding the intercepts for each good. We can do this by multiplying the marginal product of labor by the workforce size

The **Home Country** produces



Home PPF

Assume: PPF is a straight line due to the constant **MPLs**

Slope of PPF: Equal to the marginal rate of substitution between goods (**Coffee & Tea**)

This is also the **Opportunity Cost** of **coffee**. So we can say that if we want one more unit of **coffee** we must trade off **tea** at a rate of

Equivalently, the **opportunity cost** of **tea** would be units of **coffee**

Home Prices

We can determine prices in the country from this information as well. We assume to be under **Perfect Competition** which means that all goods are sold at cost.

Prices

These are in terms relative to both goods and **measured in units**:

Home Wages

We use the **Perfect Competition** assumptions to also determine wages

Wages

Workers are paid the equivalent of their MPL times the price of that additional unit they produce:

Home Wages Across Industries

Additionally, because we assume that labor moves freely between industries, we can assume that wages are equalized across industries

We can rearrange this such that the price ratio is equal to the MPL ratio

Relative price of coffee is equal to the **Opportunity Cost** of coffee at the **autarky/no-trade equilibrium**

Foreign PPF, Prices, and Wages

We can find the **Foreign Country** results as well

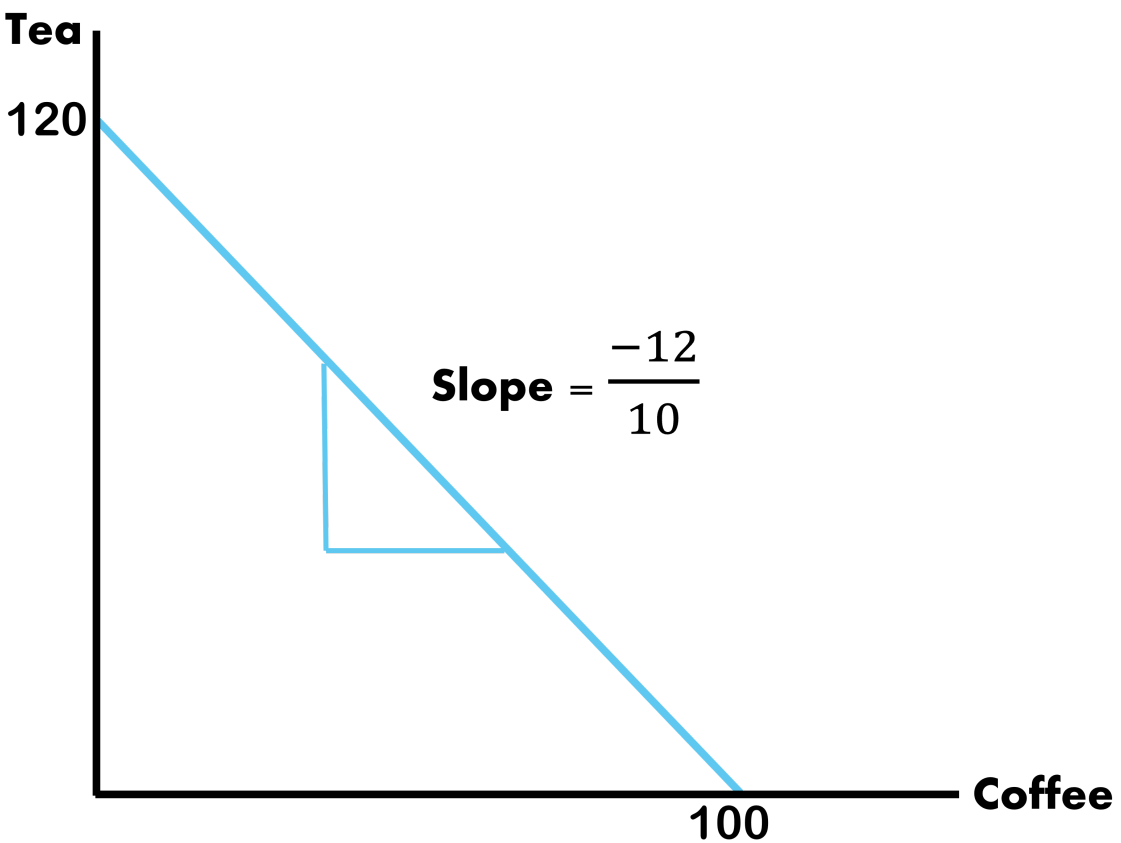
Find them for yourself and we will pick it up next class. Let:

Tasks

- Graph the **Foreign Country PPF**
- Slope of
- **Opportunity Cost** of **coffee** and **tea**
- Prices for both goods
- Read Ch.3.1 to Ch.3.3

Foreign Country

Foreign PPF



Opportunity Costs

- Coffee: & Tea:

Prices

- Coffee: & Tea:

Who has the Advantage?

Now we have two countries, we can begin to compare their **Marginal Productivities of Labor**

- A nation has the **Absolute Advantage in a good** if they produce more per labor input
- A nation has the **Comparative Advantage** if the **Opportunity Cost** of producing a good is lower than that of the other country

- **Absolute Advantage: Foreign** in both
- **Comparative Advantage: Home** in Coffee | **Foreign** in Tea

Trade

Why Would Foreign Trade?

Foreign is outright better at producing **Coffee & Tea** than **Home**. How could they benefit from trading with the inferior country?

If **Foreign** doesn't trade, they are bound by their own production possibilities. With trade, they can exceed their own production capacities, **even when they hold an Absolute Advantage**

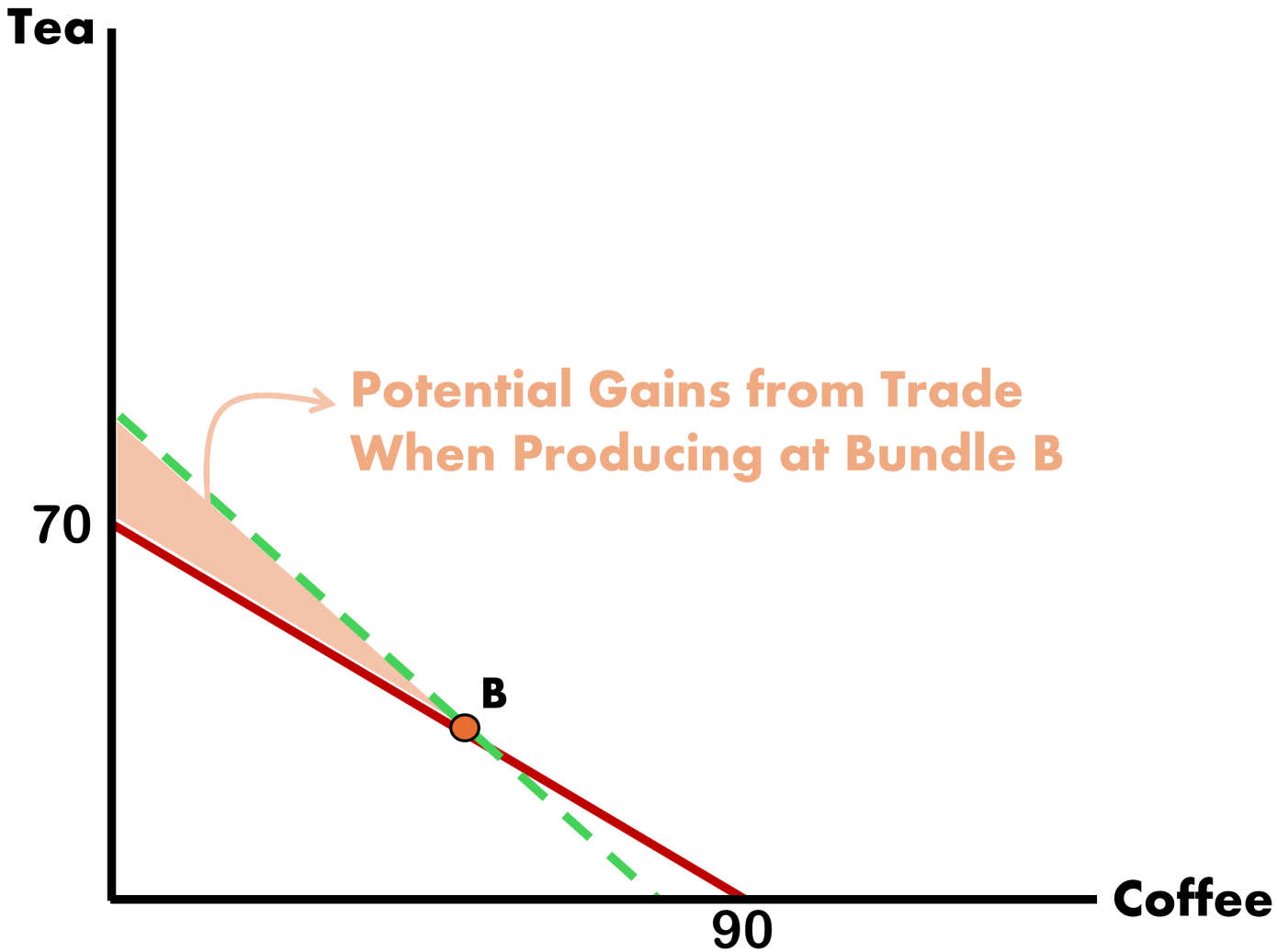
The same logic can be applied to **Home**. They will be able to exceed domestic production capacity by trading.

To trade, both nations must be better off from doing so. This will mean that the price of the good should fall somewhere in between both markets

Benefits from Trading - Home

Home

Arbitrarily, let



Benefits from Trading - Foreign

Foreign

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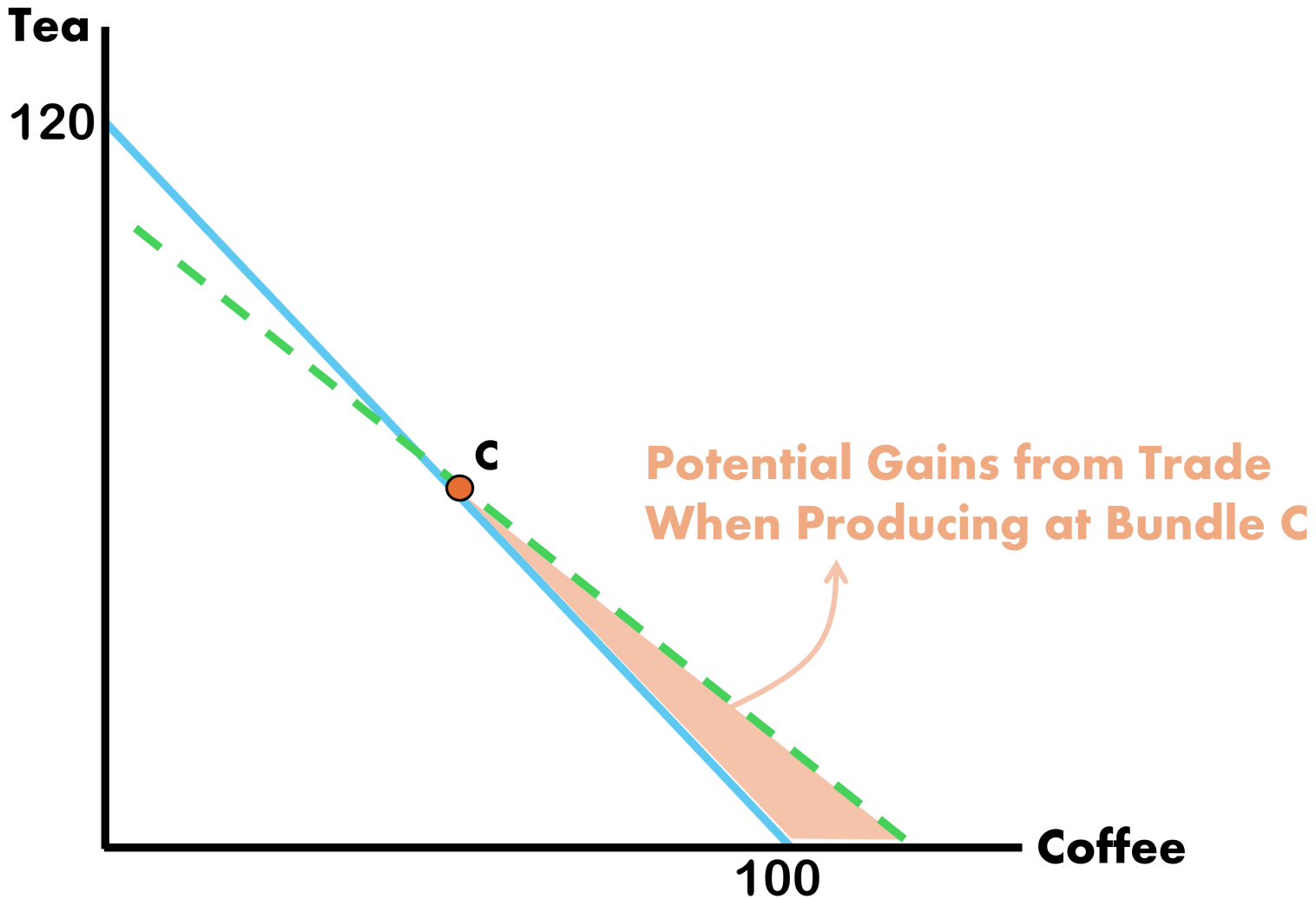


Free Trade

Now that we have established that both countries benefit from trade, how do we determine who produces what?

The pattern of exports and imports is determined by **Opportunity Costs** of production in each country, which identifies each country's pattern of **Comparative Advantage**

Free Trade Prices

Since the relative price of **coffee** is at **Home** but in **Foreign**, there is an incentive to export **Home's coffee** to **Foreign** for a higher return

Alternatively, the relative price of **tea** is:

Since **tea** sells better in **Home**, **Foreign** is incentivized to export their **tea** to **Home**

The **Ricardo Model** predicts that **Home exports Coffee** and **Foreign exports Tea**

Free Trade Dynamics

As **Home exports coffee** , the local supply (making it more scarce)

- Less local supply Higher **coffee price at Home**
- Higher **Foreign supply** Lower **coffee price in Foreign**

Similarly, **Foreign exports of tea** to **Home** bid down prices abroad and up locally

Changes to exports and imports stop once the relative price is the same in both countries

No incentive to deviate from this point Equilibrium condition met

Free Trade Equilibrium

What would the new **world price** of **coffee** look like for **Home** in this setting?

We first measure the world capacity to produce **coffee & tea**. This is calculated by seeing how much both countries can produce if they focus their entire workforces towards a single good:

The **World PPF's** slope is the line between these two "max" prodcution points, and it has **slope equal to -1**. The **World Price would be 1**.

Free Trade Equilibrium

The **World Price (1)** of **coffee** is greater than the **Opportunity Cost** of producing **coffee** at **Home**

What do **Home producers** do?

- They shift labor toward producing more **coffee**

How much does labor shift?

- It depends on wages across industries

Free Trade Labor Shift

Recall **wages at home** are given by:

Also recall that under trade we have

The wage ratio is given by

Which implies that wages are higher in the **coffee industry** than in the **tea industry**

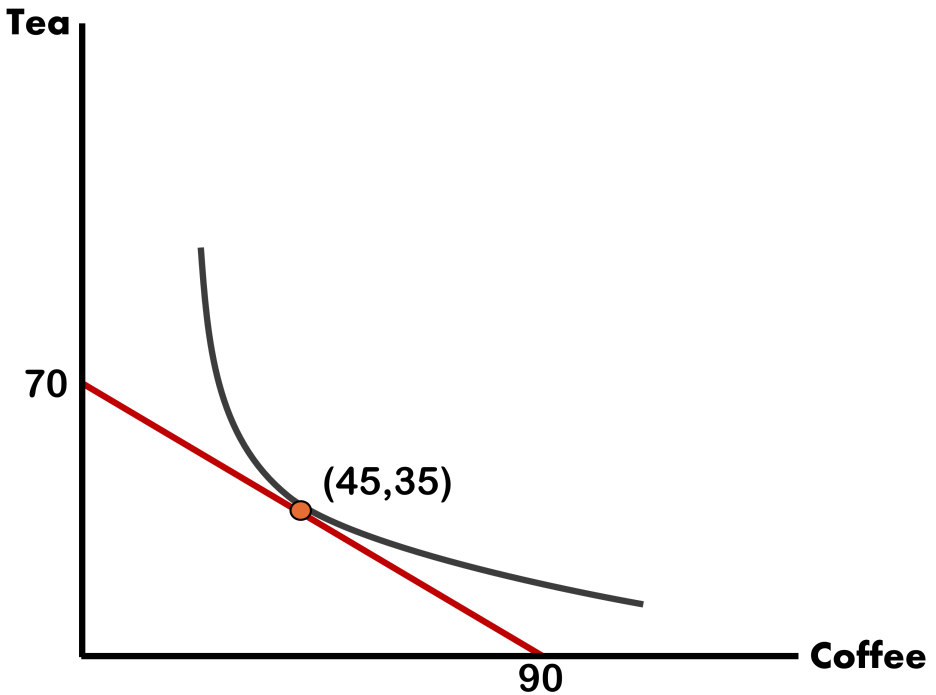
All Home workers go work in the coffee industry

Autarky Production & Consumption

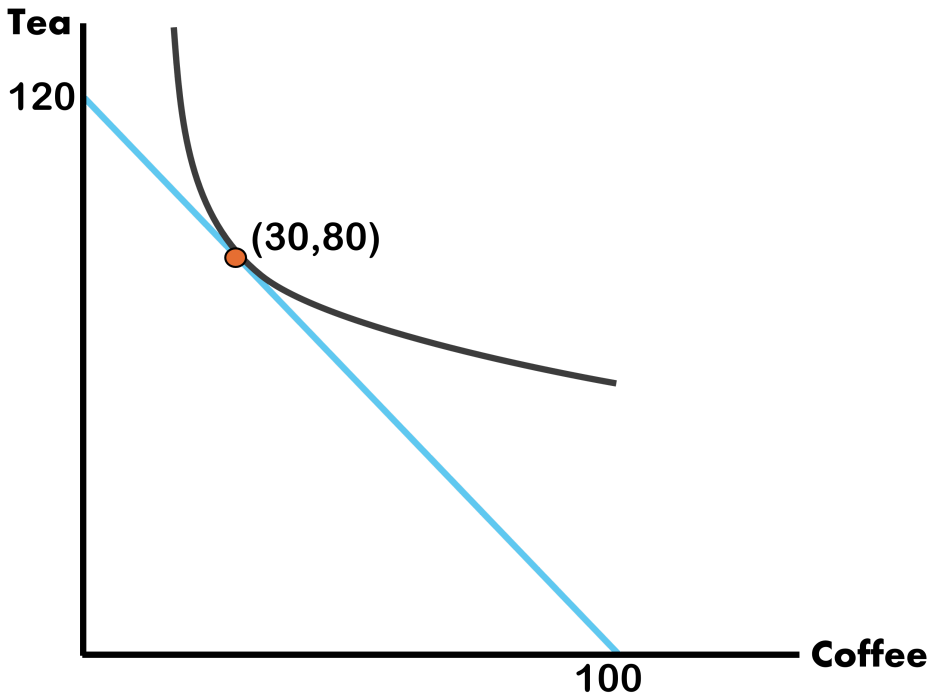
Let's visualize the gains of trade. First, let's see where each country would produce & consume under **Autarky**

Let the ICs and PPFs for each country be equal at bundles:

Home



Foreign



Autarky Production & Consumption

Under **Autarky**, a nation consumes as much as they produce.

Production Bundles

Country	Coffee	Tea
Home	45	35
Foreign	30	80

Consumption Bundles

Country	Coffee	Tea
Home	45	35
Foreign	30	80

Ricardo's logic states that both countries will **enhance their welfare** by specializing and trading

Free Trade Production & Consumption

Under **Free Trade**, both countries specialize in the good they have the **Comparative Advantage**

Production Bundles

Country	Coffee	Tea
Home	90	0
Foreign	0	120

Consumption Bundles

Country	Coffee	Tea
Home	45	40
Foreign	45	80

- **Home** consumes **more tea** than they did under **Autarky** (35 40)
- **Foreign** consumes **more coffee** than they did under **Autarky** (30 45)

Free Trade - Relative Wages

So far we have seen that there are **gains from trade** and that **trade flows are determined by comparative advantages**

- Prices converged, but wages do not
- Wage levels differ across countries with trade, and **wages are determined by absolute advantage**, not comparative advantage
  - This is a third, less-emphasized lesson of the **Ricardian Model**

Free Trade - Relative Wages

Due to markets being perfectly competitive, firms pay workers the value they add to production (marginal product)

Recall that . This is a **real wage**, measured in quantity of goods rather than money.

Workers sell the coffee they earn at the **world market price of 1**, making their real wage: