

# EC 380: Lecture 2

## Trade Theory: The Ricardian Model

---

Philip Economides

Fall 2022

# Prologue

# Overview Trade Theory

**Why does trade occur?** Two strands within the field of international trade:

## **I. Neoclassical models of trade** ('old' theories):

- Ricardian model: Technology differences spur trade
- Heckscher-Ohlin model: Resource differences spur trade

## **II. 'New' Trade Theory**

- Krugman model: Love of variety spurs trade
- Melitz model: Heterogeneous firms drive trade

# Today's Class

We will begin looking into international trade theory, starting with the **Ricardo model**.

- Single factor of production (labor)
- Two-country model (home, foreign)
- Technology differences across countries

**To reiterate:** Always remember to describe each model by three attributes, such as those listed above, and the model's main takeaway(s)!

# Snapshot of US imports

In 2018, the US imported approximately 28M USD in snowboards

- Almost half of which were imported from China
- Austria, UAE and Taiwan were other notable sources

The US represents the largest economy in the world, yet it resorts to imports of goods at a level that far exceeds its exports.

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

# Reasons for Trade

With all the manufacturing capability in the US, why purchase snowboards from abroad instead of producing them domestically?

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

For now, consider **opportunity cost**. According to the **Ricardian perspective**, the US devotes domestic labor that would otherwise be used to produce these snowboards 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.

Mercantilism: a stockpile of gold and silver was considered an appropriate barometer for the state of the domestic economy.

Imports  $\implies$  less gold and exports  $\implies$  more gold. Tariffs set high to prevent trade deficits.

Ricardo would go on to demonstrate that under **balanced free trade** (no tariffs), trade benefits **every country**. This is achieved when every country exports the goods they have **comparative advantage** in.

# Comparative Advantage Overview

## Ricardo's logic:

- Two countries, Portugal and England
- Two goods, wine and cloth
- Portugal has absolute advantage in production of both goods
- England is particularly bad at making wine, making it *relatively* good at cloth production

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

Free trade puts both countries in a better state than autarky would.



# Ricardian Model of Trade

We will go with our own version of the model.

- Two countries, Home and Foreign
- Two goods, apple pie and potatoes
- One factor of production, labor

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?**

# Key Variables

**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.

$MPL_{\text{pie}}^H = 9$  and  $MPL_{\text{potato}}^H = 7$  represent the marginal change in number of pies and potatoes produced by the home country as the number of workers rises by one unit.

Essentially boils down to how "good" each country is per unit of worker.

$MPL_{\text{pie}}^F = 10$  and  $MPL_{\text{potato}}^F = 12$  for Foreign with **absolute advantage**

# Key Variables

**Production Possibilities Frontier:** Coordinates represent various production bundles of pies and potatoes for each country is capable of producing, upon using its full labor force  $\bar{L} = 10$ .

We can plot these rather easily by finding the **four axes intercepts**. Each country-good marginal product of labor times the workforce size

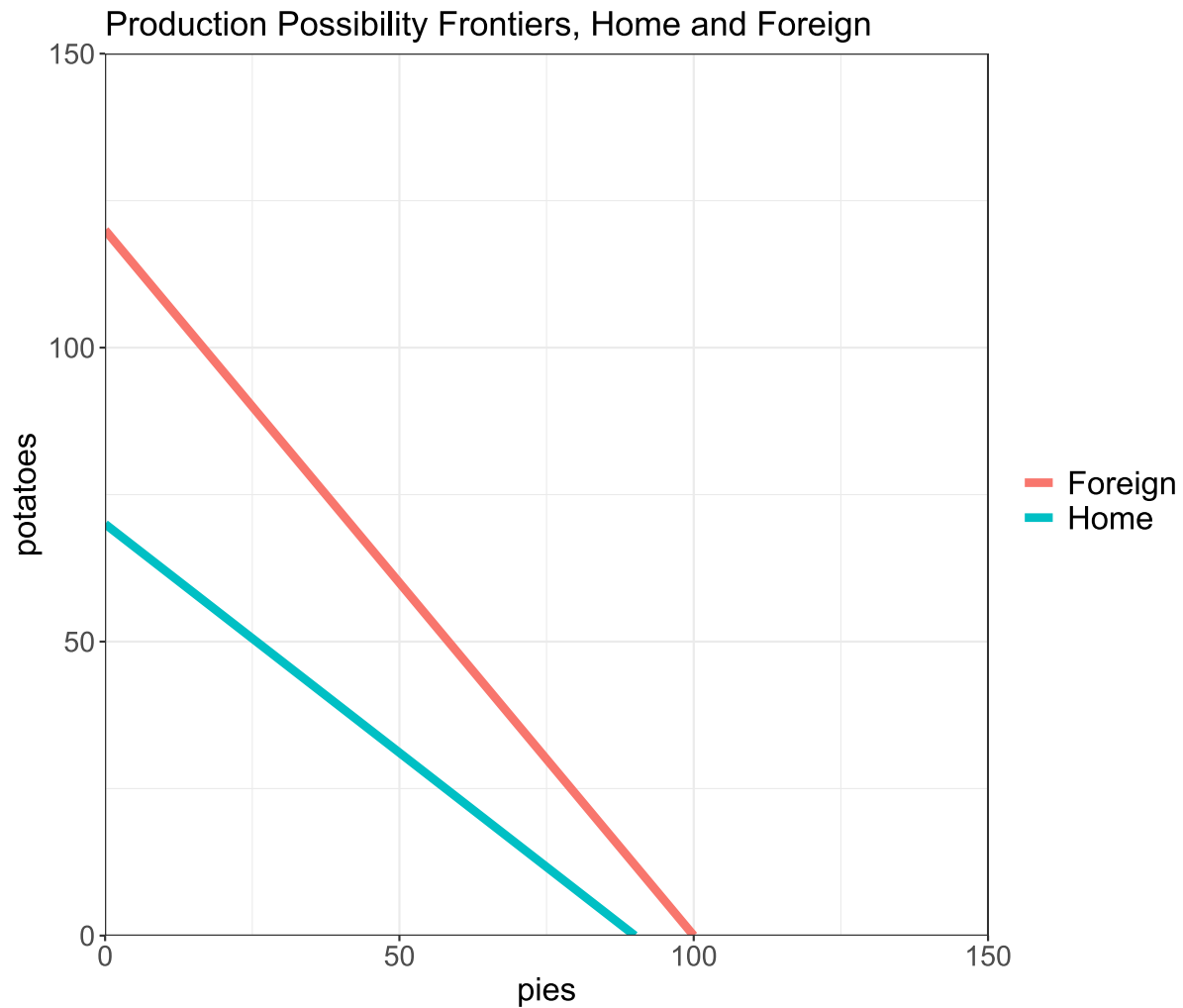
$$MPL_{\text{good}}^{\text{country}} * \bar{L}$$

In our case this leads to...

$$\implies \bar{Q}_{pie}^H = 9 * 10 = 90, \quad \bar{Q}_{potato}^H = 7 * 10 = 70$$

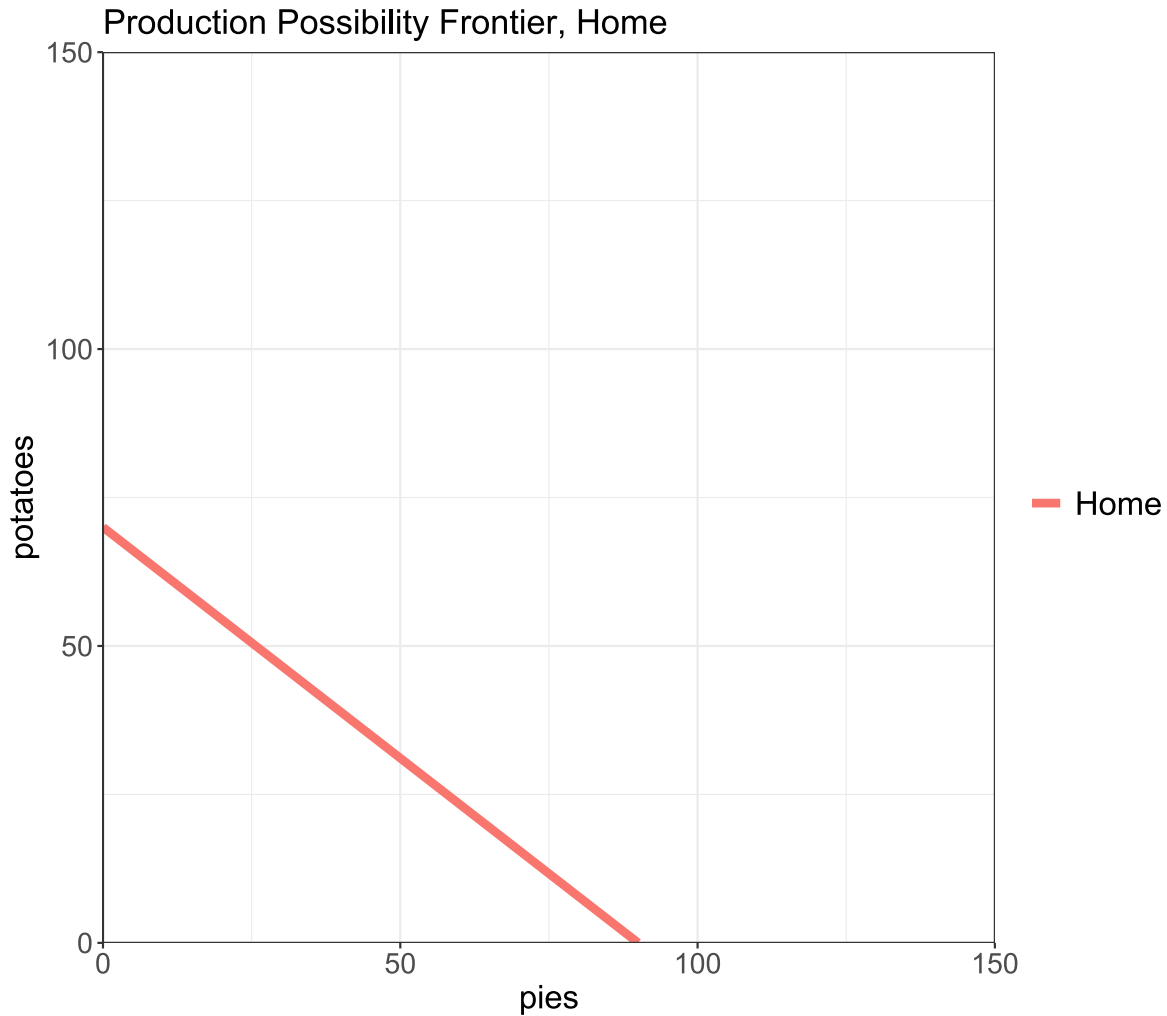
$$\implies \bar{Q}_{pie}^F = 10 * 10 = 100, \quad \bar{Q}_{potato}^F = 12 * 10 = 120$$

# PPF Scenario



# Autarky (No Trade)

# Autarky (No Trade)



# Home PPF

**Assumption:** PPFs straight due to constant MPLs

**Slope of PPF:** equal to the marginal rate of substitution between potatoes and pies.

$$\text{Slope of PPF}^H = -\frac{70}{90} = -\frac{MPL_{\text{potato}}^H * \bar{L}}{MPL_{\text{pie}}^H * \bar{L}} = -\frac{MPL_{\text{potato}}^H}{MPL_{\text{pie}}^H} = -\frac{7}{9}$$

**Opportunity cost** measured by slope of PPF. For  $\Delta Q_{\text{pie}}^H = 1$ , this would come at the cost of less potatoes being produced  $\implies \Delta Q_{\text{potato}}^H = -\frac{7}{9}$ .

$\frac{7}{9}$  bags of potatoes is the **opportunity cost** of obtaining 1 more apple pie and the slope of the PPF for Home.

# Indifference Curve

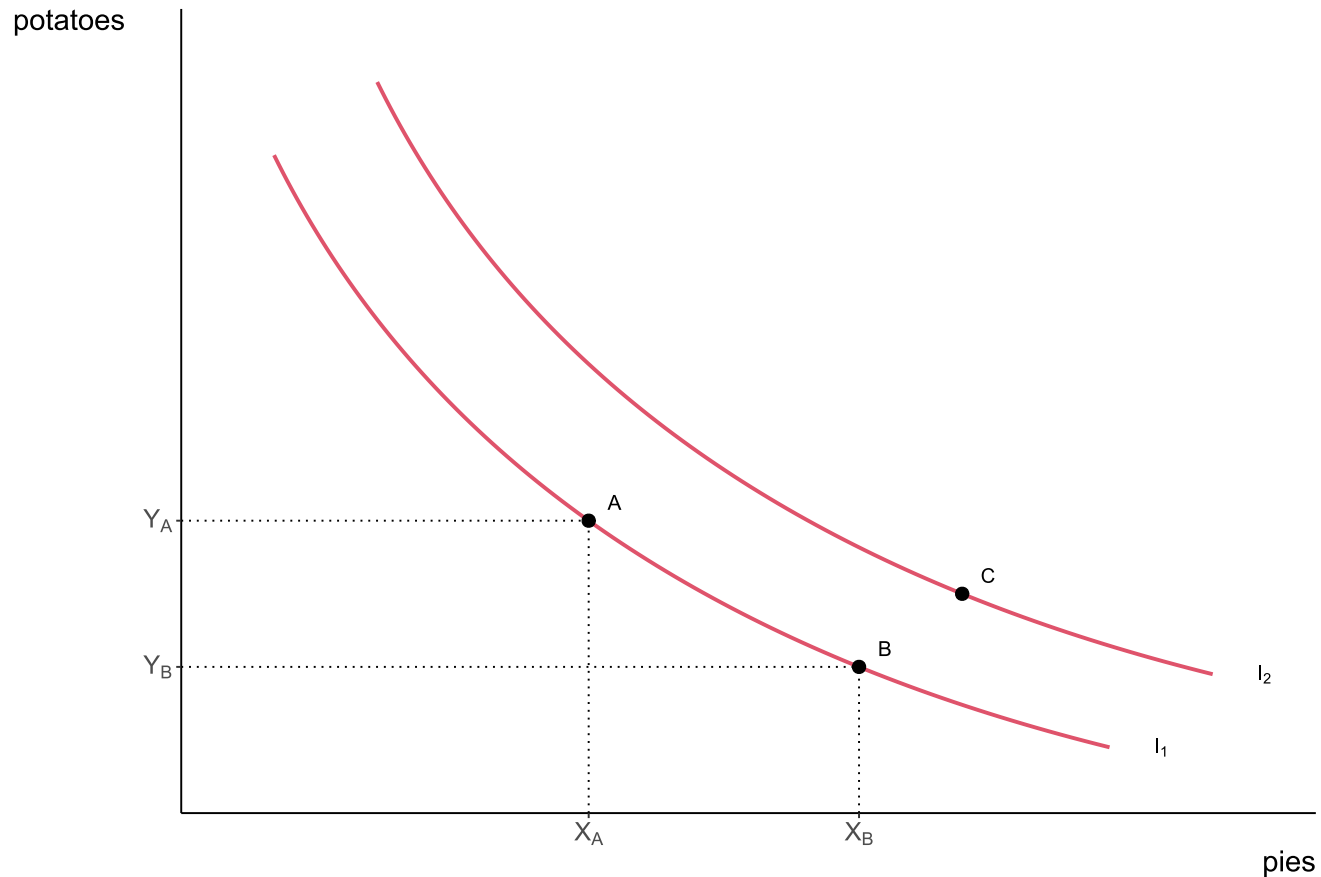
- PPF: whole set of possible production outcomes, all use the entire workforce
- Any production bundle below the PPF line is suboptimal, utilizes  $L < \bar{L}$
- Which of these max bundles do we choose?

Depends on home's demand for the two goods. Each **indifference curve** shows consumption bundles of goods that economy can consume and be equally satisfied.

The consumer is **indifferent** in its own preferences across the consumption bundles listed on a particular indifference curve.



# Indifference Curve



Indifferent between A and B and prefers any point on  $I_2$  to  $I_1$ .

# Home Equilibrium

Suppose we are in **closed economy** where Home PPF acts as a budget constraint.

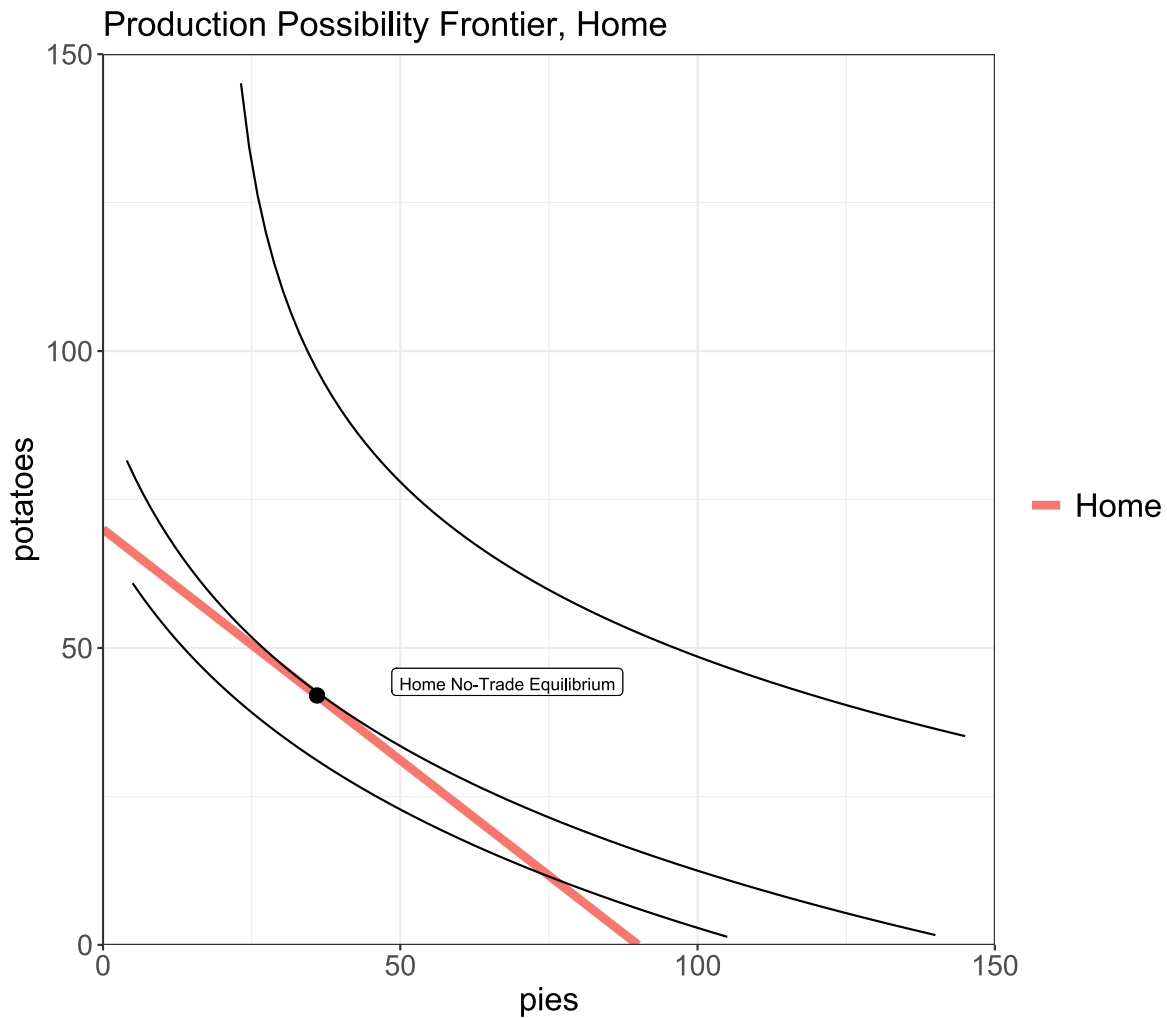
IC of Home's consumers tangent to PPF at **(36, 42)**.

Home consumes 36 pies and 42 potatoes under autarky.

Underlying assumption of **perfectly competitive markets** such that goods are sold at cost.

Given these resource constraints, this market generates the highest consumer welfare.

# Home Equilibrium



# Opportunity Cost and Prices

- Slope of the PPF reflects the **opportunity cost** of producing one apple pie
- Under perfect competition the **opportunity cost** of should also equal the relative price of pie
- This follows from the economic principle that price reflects the **opportunity cost** of a good
- We can now check that this equality between the **opportunity cost** and the relative price of wheat holds at point A.

# Wages

How do we solve for prices of potatoes and pies at Home under autarky?

- **Perfectly competitive market:** Workers hired until value of additional worker is equal to marginal cost of additional worker
- Value represents the price of the good sold times the marginal change in units of good produced
- Workers are paid the equivalent of their MPL times the price of that additional unit they produce

# Wages

Potato (pie) firms hire until wage equals  $P_{\text{potato}} * MPL_{\text{potato}}$  ( $P_{\text{pie}} * MPL_{\text{pie}}$ )

If we assume labor moves freely between markets, we can assume wages equalized across these industries.

$$P_{\text{potato}} * MPL_{\text{potato}} = P_{\text{pie}} * MPL_{\text{pie}}$$

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

$$\frac{P_{\text{pie}}}{P_{\text{potato}}} = \frac{MPL_{\text{potato}}}{MPL_{\text{pie}}}$$

Relative price of pies is equal to the opportunity cost of pies at the **no-trade equilibrium**.

# Foreign Country

# Foreign Country

Introduce Foreign Country into the model.

Due to broadly superior technology, labor achieves higher MPL for both goods:

$MPL_{pie}^H = 9$  and  $MPL_{potato}^H = 7$  represent the marginal change in number of pies and potatoes produced by the home country as the number of workers rises by one unit.

$MPL_{pie}^F = 10$  and  $MPL_{potato}^F = 12$  for Foreign with **absolute advantage**

Home will still export to Foreign. Why? **Comparative Advantage**.



# Comparative Advantage

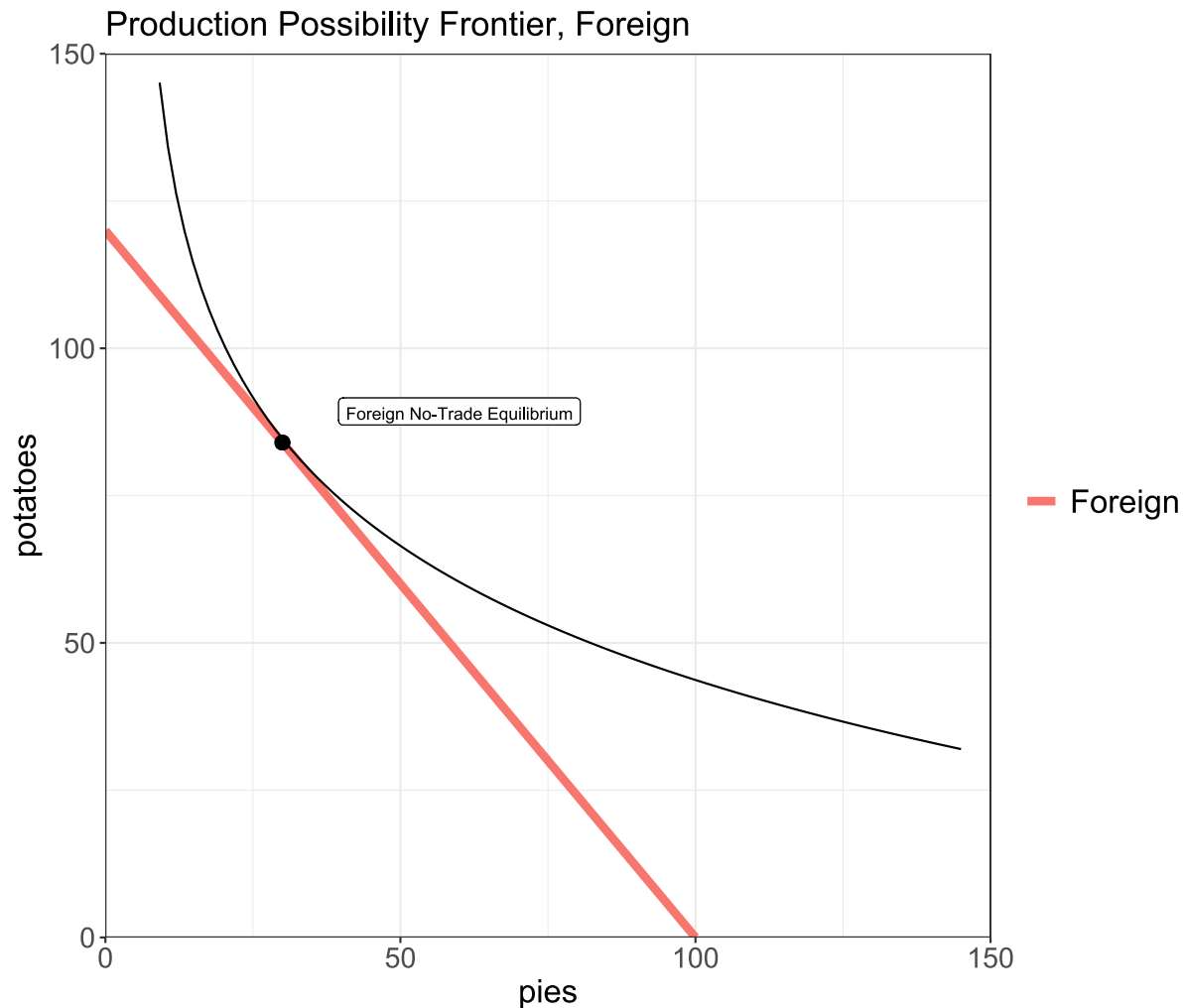
What is the **opportunity cost** of producing one additional apple pie? This should be equal to the relative price of pies.

$$\text{Home: } \frac{P_{\text{pie}}^H}{P_{\text{potato}}^H} = \frac{MPL_{\text{potato}}^H}{MPL_{\text{pie}}^H} = \frac{7}{9}$$

$$\text{Foreign: } \frac{P_{\text{pie}}^F}{P_{\text{potato}}^F} = \frac{MPL_{\text{potato}}^F}{MPL_{\text{pie}}^F} = \frac{12}{10}$$

Home has a **comparative advantage** in producing pies because home's opportunity cost of producing an additional pie is lower than Foreign's.

# PPF: Foreign Country



# Next Time

Currently, we have kept both countries closed off.

These countries only consume the bundle of goods that they produce.

From autarky scenario  $\implies$  free trade. How will **equilibrium outcomes** change?

- What will they produce?
- How much will they consume?
- Do prices change?
- Who benefits from trade under our assumptions?

**Readings:** International Economics, Ch.2: Trade and Technology (Sec 3-5)