Econ 330: Urban Economics

Lecture 3

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January 11th, 2021

Lecture III: Existence of Cities

Schedule

Today

1) **Data & History**

2) **Why do cities exist?**

3) **Introduction to Clustering**

Upcoming

- **Intro Quiz (tonight!)**
- **Reading** (Chapter II & III *ToTC*)
- **HW 1** (due on Jan 24th)

About HWI

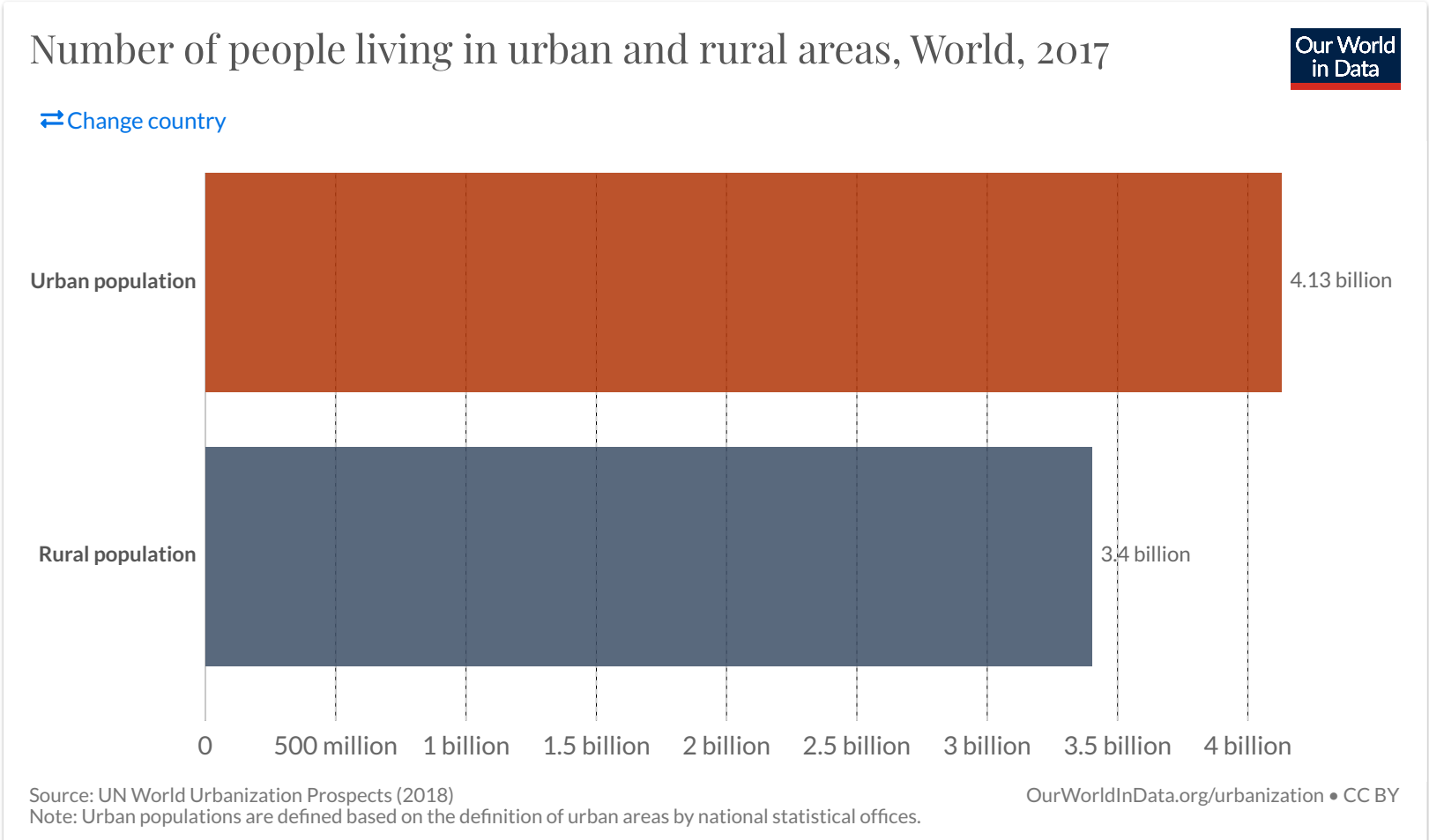
HW I will be posted after class (tonight or tomorrow morning)

- Due on **Jan 24th** on canvas
- HW I *looks* very long. I want to give everyone sufficient space to write their answers
- Majority of questions are from this week. One question from lecture 6 (next Wednesday)

Important

- Use scratch paper first if needed. **Points will be deducted for messy work**
- Do what you can to make Philip's life easier.

Most People Live in Cities



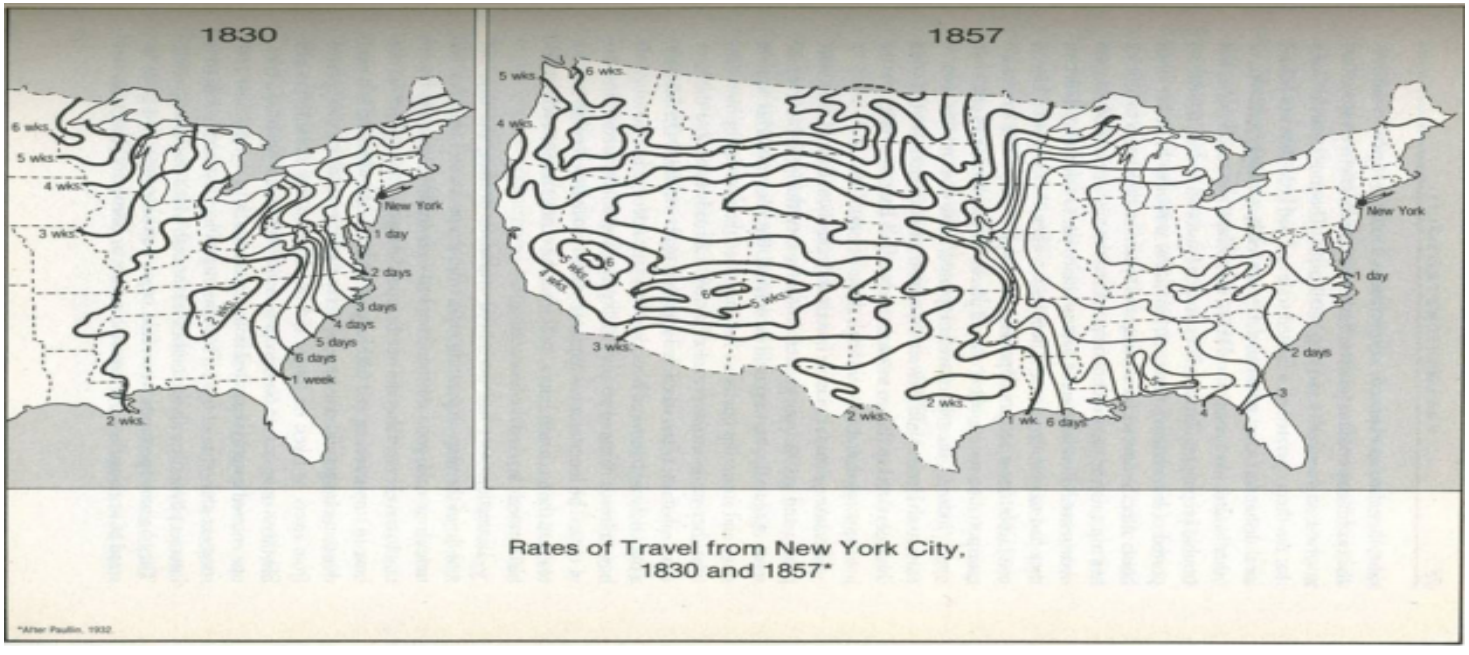
A Global Phenomena

A Brief History Lesson

Claim

Over the last few hundred years the world *has become* **flat**

- **1840s** + : **Rail transit** takes over



Source: Cronon's *Natures Metropolis: Chicago and the Great West*

A Brief History Lesson

Claim

Over the last few hundred years the world *has become* **flat**

- 1840s >: Rail transit takes over
- **1840s**: **telegraph 1870's**: **telephone**. Informational distance $\rightarrow 0$

A Brief History Lesson

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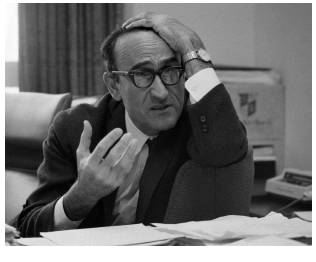
- **1914**: First commercial **airline flight**. Physical distance shrinks again

A Brief History Lesson

Claim

Over the last few hundred years the world *has become* **flat**

- 1840s >: Rail transit takes over
- 1840s: telegraph 1870s: telephone. Informational distance $\rightarrow$ 0
- 1914: First commercial airline flight. Physical distance shrinks again
- **1980s** (US): Deregulation of airlines. Competition increases. **Prices plummet**
  - This guy celebrates crowded flights



A Paradox

Q: What is the **paradox** between the things I have just discussed?

A: *Despite* the world "becoming **smaller**" the urban population has rapidly **increased**

- Would you expect the opposite? Why?

This is **motivation** to ponder the question: why do cities **exist**?

- **Fundamentals** of this question can also inform why:
  - Some cities have **succeeded**
  - and other have **declined**

Checklist

1) **Data & History** ✅

- Growth of urban populations
- Shrinking of the earth
- The paradox

2) **Why do Cities exist?**

3) **Introduction to Clustering**

Why do Cities Exist?

What do you think? **Discuss**

This question has a pretty simple answer. What is it?

Trade

with a few caveats...

Suppose there was **no trade**. What would we need for this to be true? *Would this lead to no cities?*

- Even with trade, *possible* that households trade amongst themselves (still no cities)

No Cities

1) No differences in **productivity** of **land** *or* **labor**

- Differences in either of these generate **comparative advantage**

2) Constant Returns to Scale (CRS) in **Exchange** & transportation

- **Per unit price** to **trade** goods *is the same* no matter how much is traded
- No need for distributors/exchange firms

3) CRS in **Production**

- **Per unit price** of **producing** goods is the same no matter how many you produce
- **Factory** (a collection of workers and capital) can make goods *at the same cost* as **homes**

Relax Assumption 1

Question: Is all land and labor equally productive?

Answer: Nope. Let's relax this assumption

- Differences in productivity across cities generate **comparative advantage**

Back to 201

Reminder:

- **Absolute Advantage** (AA): An economic agent or entity has **AA** in exchange if they can produce more of the good in the same amount of time
    - or the same amount of the good in less time
- **Comparative Advantage** (CA) : An economic agent or entity has **CA** in exchange if they can produce the good at a lower *oppurtunity cost*

Production Possibilities Frontier (PPF): All possible combinations of goods that an economic agent or entity can produce

PPF's

Example:

- Suppose we have two countries, A & B. They are producing guns and oil

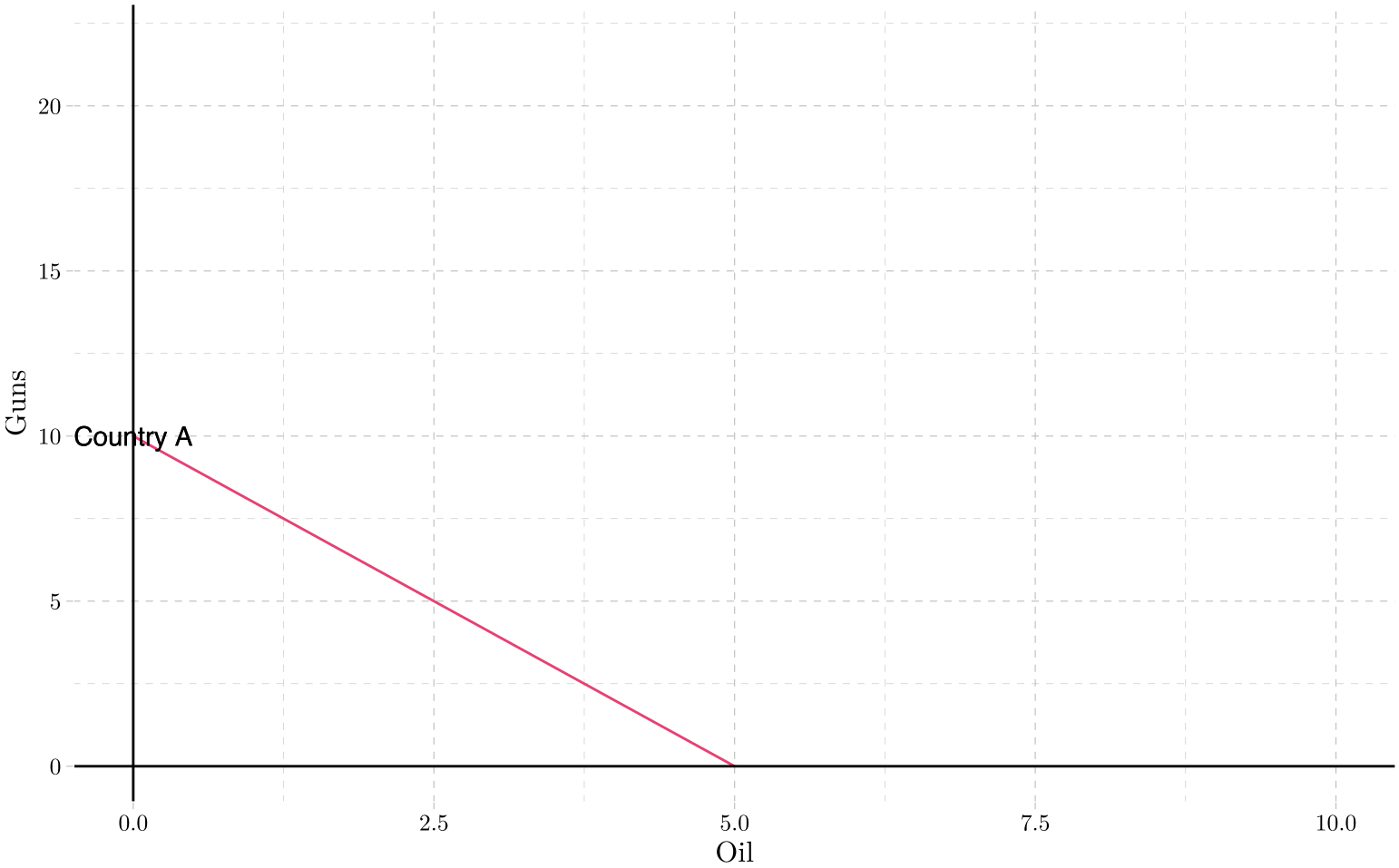
Each counties PPF is *given* by:

- **County A**: $Guns_A = 10 - 2 * Oil_A$
- **County B**: $Guns_B = 20 - 5 * Oil_B$

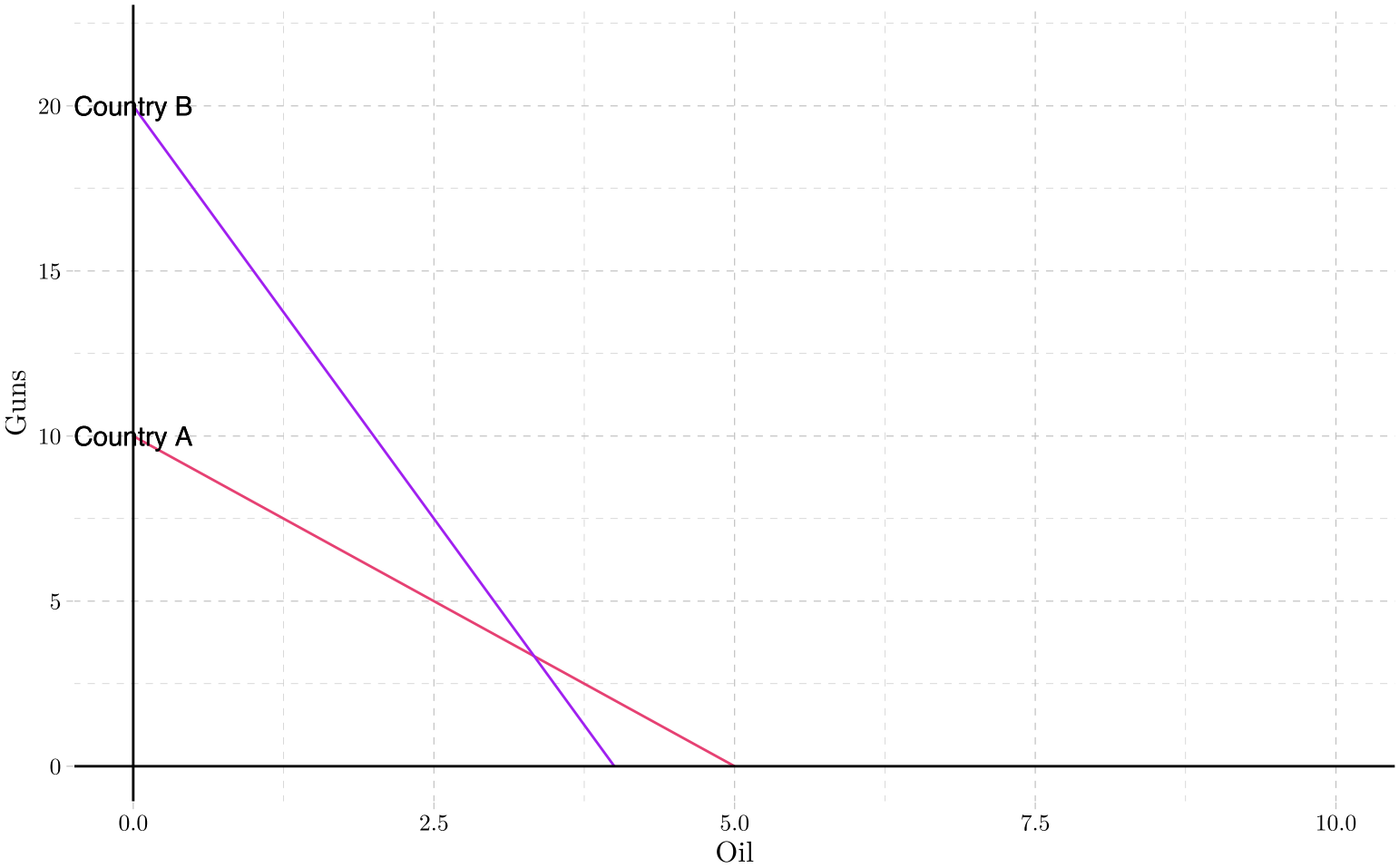
1) Graph each countries PPF

2) Determine who has the AA in each good and who has the CA in each good

PPF's

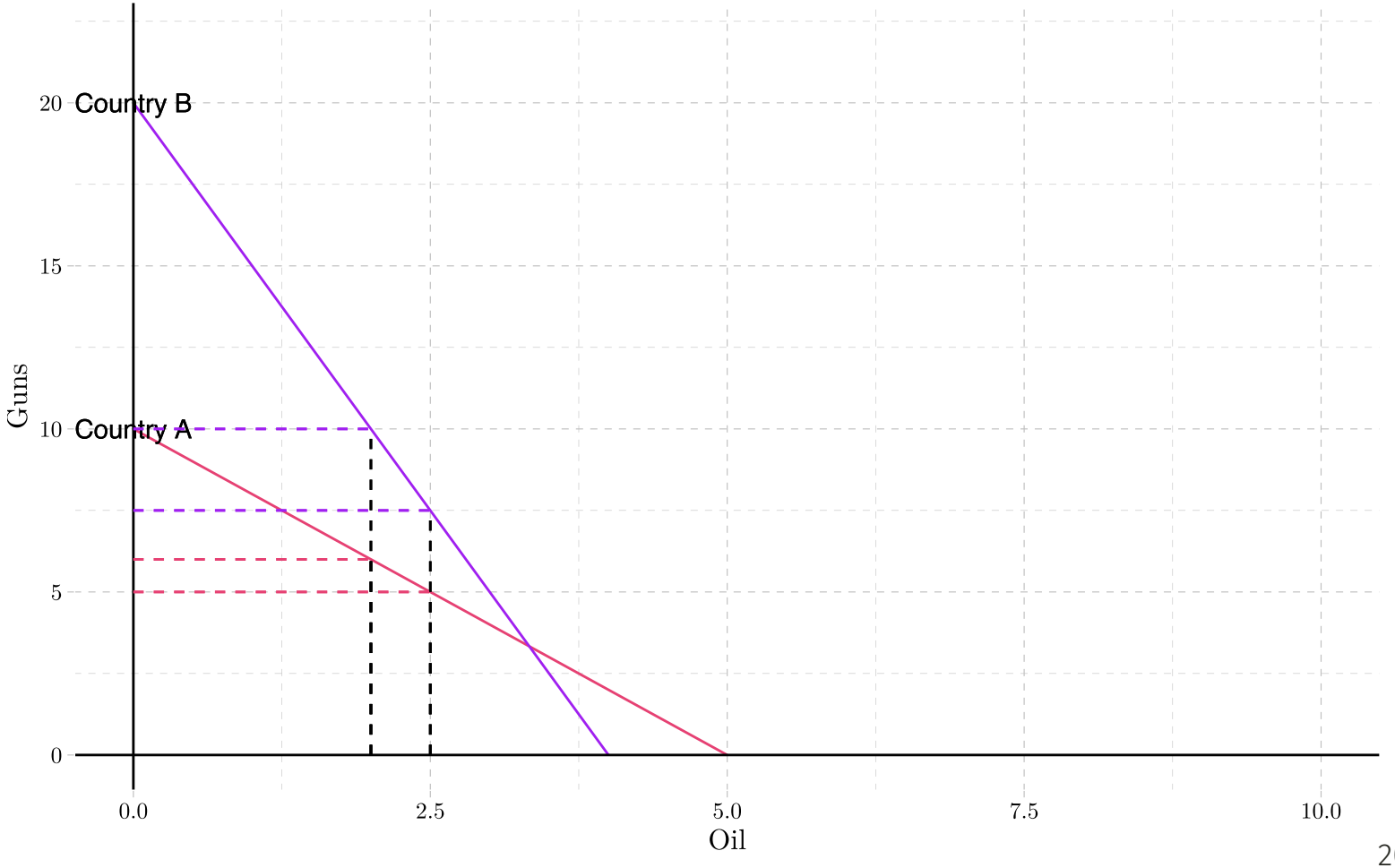


PPF's



CA in Oil?

Idea: Whoever *gives up less* to produce the same amount extra has the comparative advantage. Check:



PPF Heuristics

When looking at PPFs, to determine:

1) **AA**: Check **intercepts**

- Whoever has higher - valued **intercept** has the **AA** in production of that good

2) **CA**: Check **slopes**

- A **steeper** **slope** indicates **CA** on the vertical axis
- A **shallower** **slope** indicates **CA** on the horizontal axis

Relax Assumption 2

In absence of scale economies, households trade directly†

- **CRS in Exchange**: $\Longrightarrow$ households are just as efficient at executing trades as firms (no cost benefits to scaling)
- No reason to pay a firm to do so (and thus no reason to pay for density)

† Scale economies: *bigger* $\rightarrow$ *cheaper per unit*

Relax Assumption 2

However, firms generally have lower transaction costs than individuals, so individuals are willing to pay firms to facilitate trade (meaning there are economies of scale in exchange).

- To fully take advantage of scale economies in exchange, firms locate such that they minimize costs of distributing output
    - They locate near rivers, ports, crossroads, etc $\implies$ higher prices of land $\implies$ density
- **Result:** trading cities. This is what we had before the industrial revolution.

Relax Assumption 3

Suppose we relax the CRS in production assumption

- This means the cost per unit of production changes as quantity changes

Example

Consider a shirt making factory

- **Home** production: 20 p shirt. **Factory**: 12 p shirt
  - economies of scale
- Locates in a town with 50 miles to east and west of villages
  - 50 cents/mile to ship west. 20 cents/mile to ship east

Factory Towns

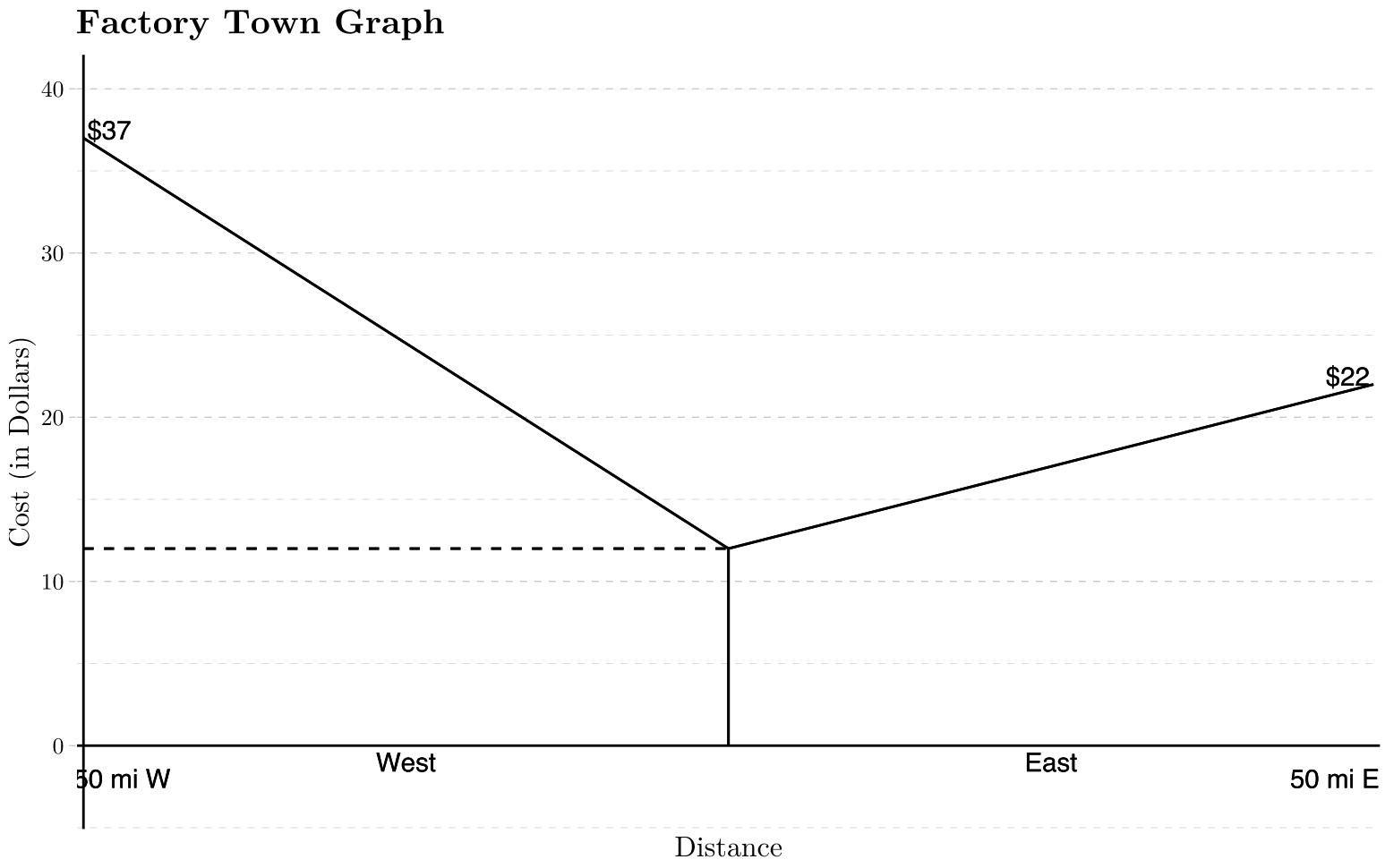
Under what condition will a consumer purchase the shirt from a factory over home?

$$\underbrace{p_f}_{\text{factory price}} + \underbrace{t \times d}_{\text{transit cost} = \text{cost p mile} \times \text{miles}} \leq \underbrace{p_h}_{\text{Home Price}}$$

Questions:

1. Graph the cost of shirts throughout the entire region
2. Find the **market area** of the town
    - Find the **sum** of the **maximum distances** to the east and west that consumers will purchase the shirt from the factory

Regional Costs



Market Area Calculation

Market area depends on which side we are looking at. Let m denote miles

- **West**
  - Consumers buy from factory if

$$12 + .5 * m_{west} \leq 20 \implies m_{west} \leq 16$$

- **East**
  - Consumers buy from factory if

$$12 + .2 * m_{east} \leq 20 \implies m_{east} \leq 40$$

Market area: $40 + 16 = 56$

Factory Towns

1. Would workers rather live **closer** or **further** from the factory?
    - **Closer!**
2. What happens to land-prices **close** to the factory?
    - They **increase**
3. What happens to **density**?
    - It will **increase**

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2) **Why do Cities exist?** ✅

- 3 conditions for no trade
- Comparative advantage & Factory Towns

3) **Introduction to Clustering**

Clustering

So we explained *why* cities exist. Can we explain why there might be more than one firm?

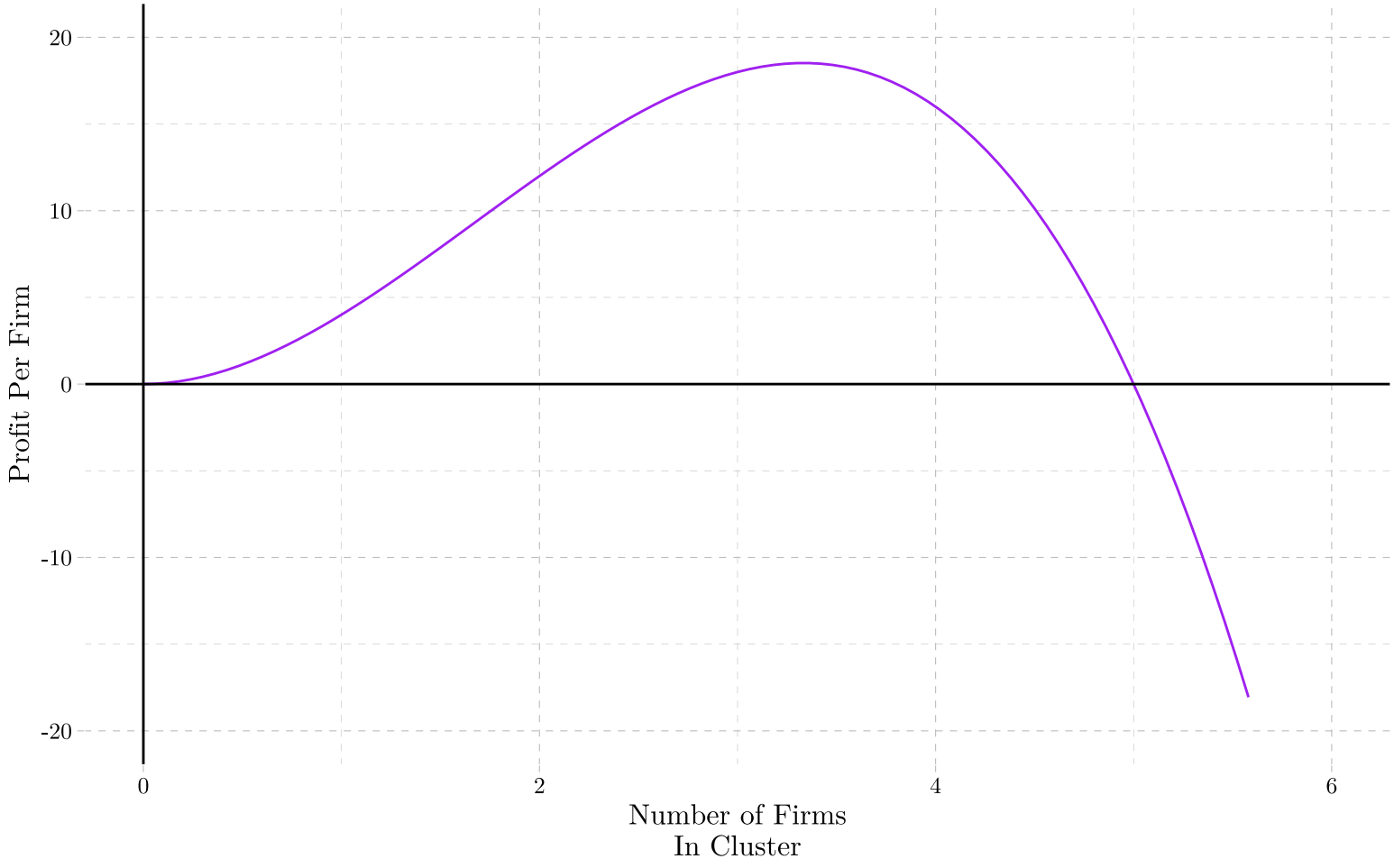
- Let's start by asking why firms cluster. Where to start? **Axiom 5**

Axiom 5: ***Competition generates zero economic profit***

- If a firm is making positive economic profit, more firms enter the market
- What happens to the profit per firm as more firms enter?
- It decreases. Eventually goes to zero

Example

How many firms are in the cluster?



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- The zero profit condition

Table of Contents