

Econ 330: Urban Economics

Lecture 3

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14 January, 2020

Lecture III: City Size & Growth

Schedule

Today

- 1) **Data & History**
- 2) **Why do Cities exist?**
- 3) **Introduction to Clustering**

Upcoming

- **Letter of Intro on Canvas**
- **Reading** (Chapter II & III *ToTC*)
- **HW 1** (due on Jan 23rd)

About HWI

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

- Due on **Jan 23rd** at the **start of class**
- 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 5 (next tuesday)

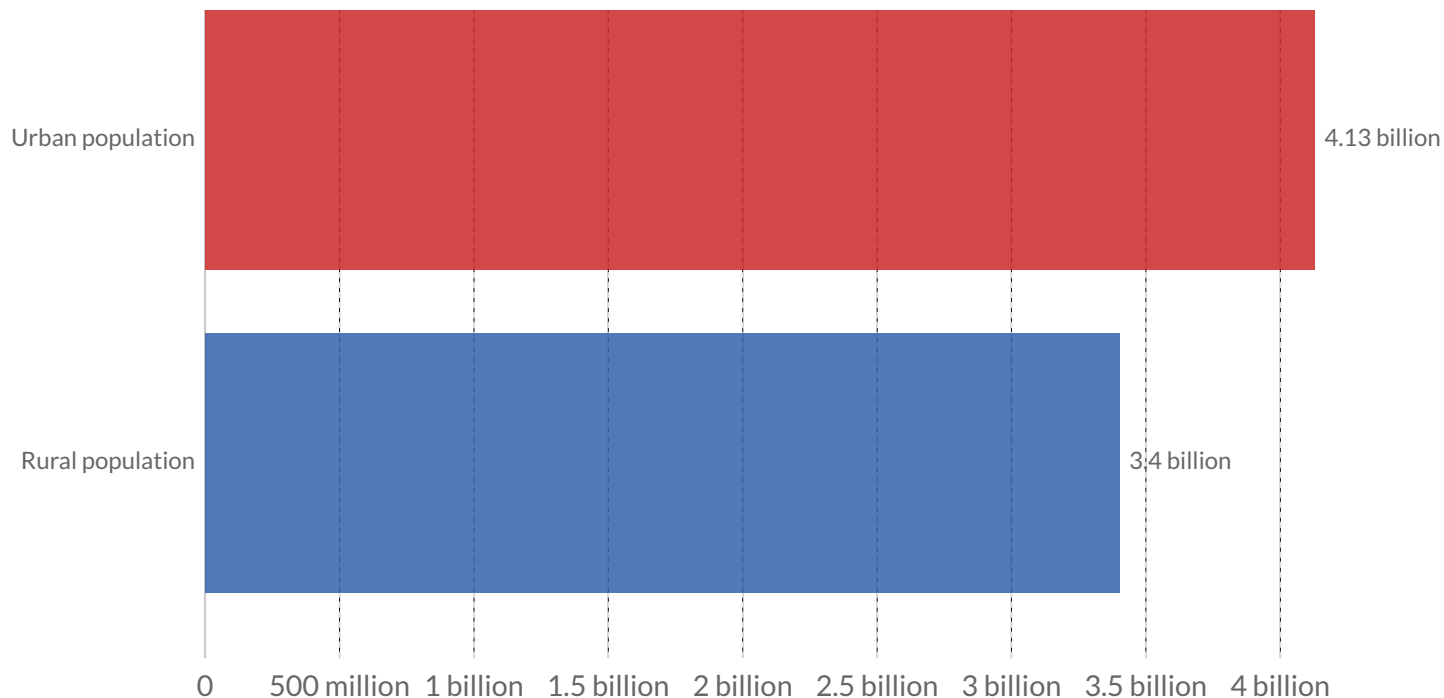
Important

- Print the assignment and turn it in on what you print out
- Use scratch paper first if needed. **Points will be deducted for messy work**

Most People Live in Cities

Number of people living in urban and rural areas, World, 2017

Our World
in Data



Source: UN World Urbanization Prospects (2018)

Note: Urban populations are defined based on the definition of urban areas by national statistical offices.

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1960 2017

↔ Change country

CHART

DATA

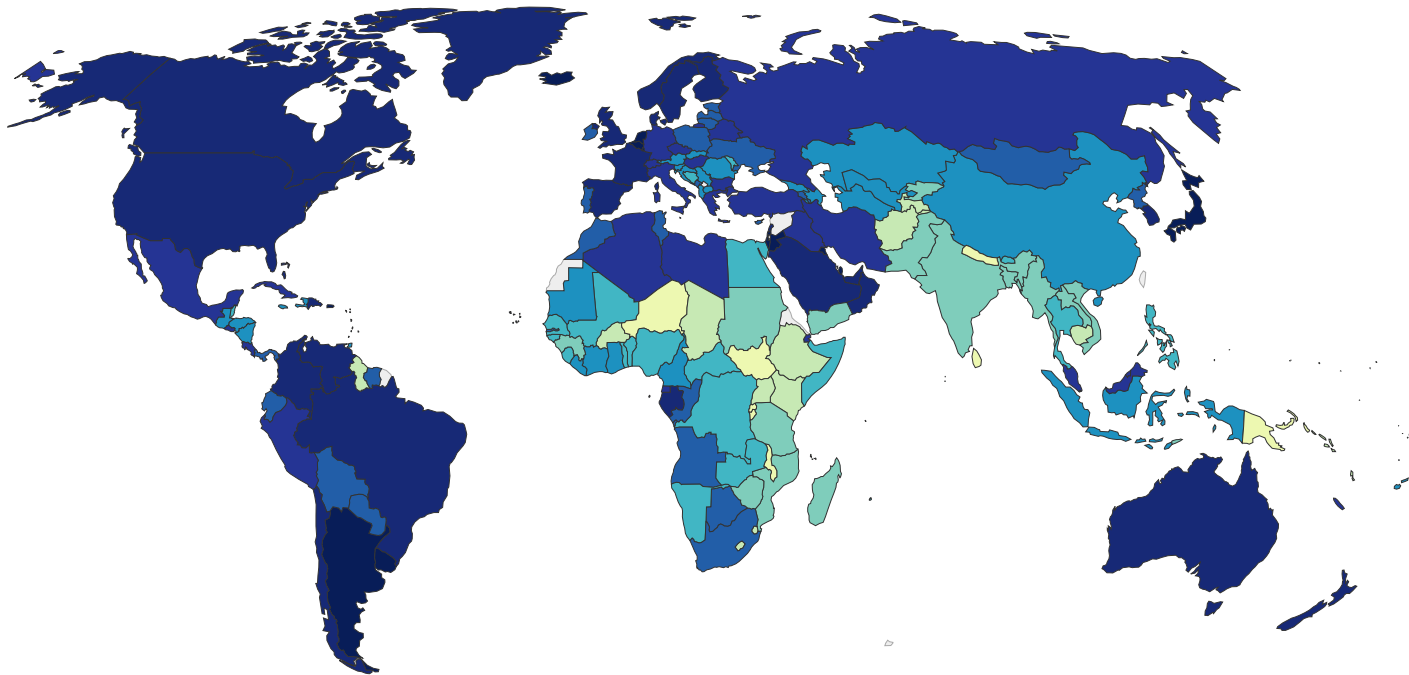
SOURCES



A Global Phenomena

Share of people living in urban areas, 2017

Our World
in Data



Source: UN World Urbanization Prospects (2018)

Note: Urban populations are defined based on the definition of urban areas by national statistical offices.

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▶ 1960 2017

CHART

MAP

DATA

SOURCES



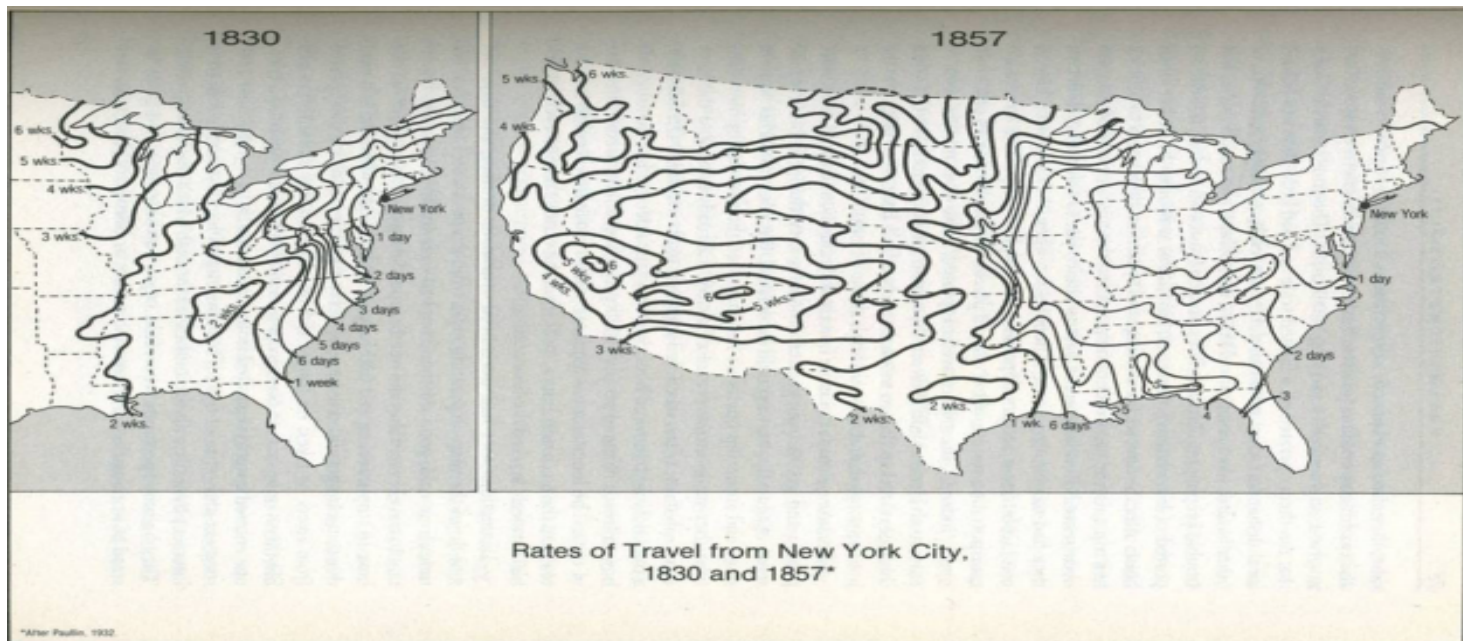
And it is pretty recent

A Brief History Lesson

Claim

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

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



A Brief History Lesson

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

A Brief History Lesson

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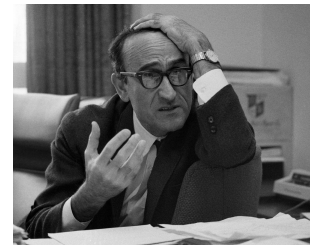
- 1840's >: Rail transit takes over
- 1840's: telegraph 1870's: telephone. Informational distance $\rightarrow 0$
- **1914**: First commercial **airline flight**. Physical distance shrinks again

A Brief History Lesson

Claim

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

- 1840's >: Rail transit takes over
- 1840's: telegraph 1870's: telephone. Informational distance $\rightarrow 0$
- 1914: First commercial airline flight. Physical distance shrinks again
- **1980's** (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**

Implications?

1. **No exchange**

- Everybody is equally productive and all land is the same

2. **No cities**

- Dense living is costly (higher land prices). No benefit

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

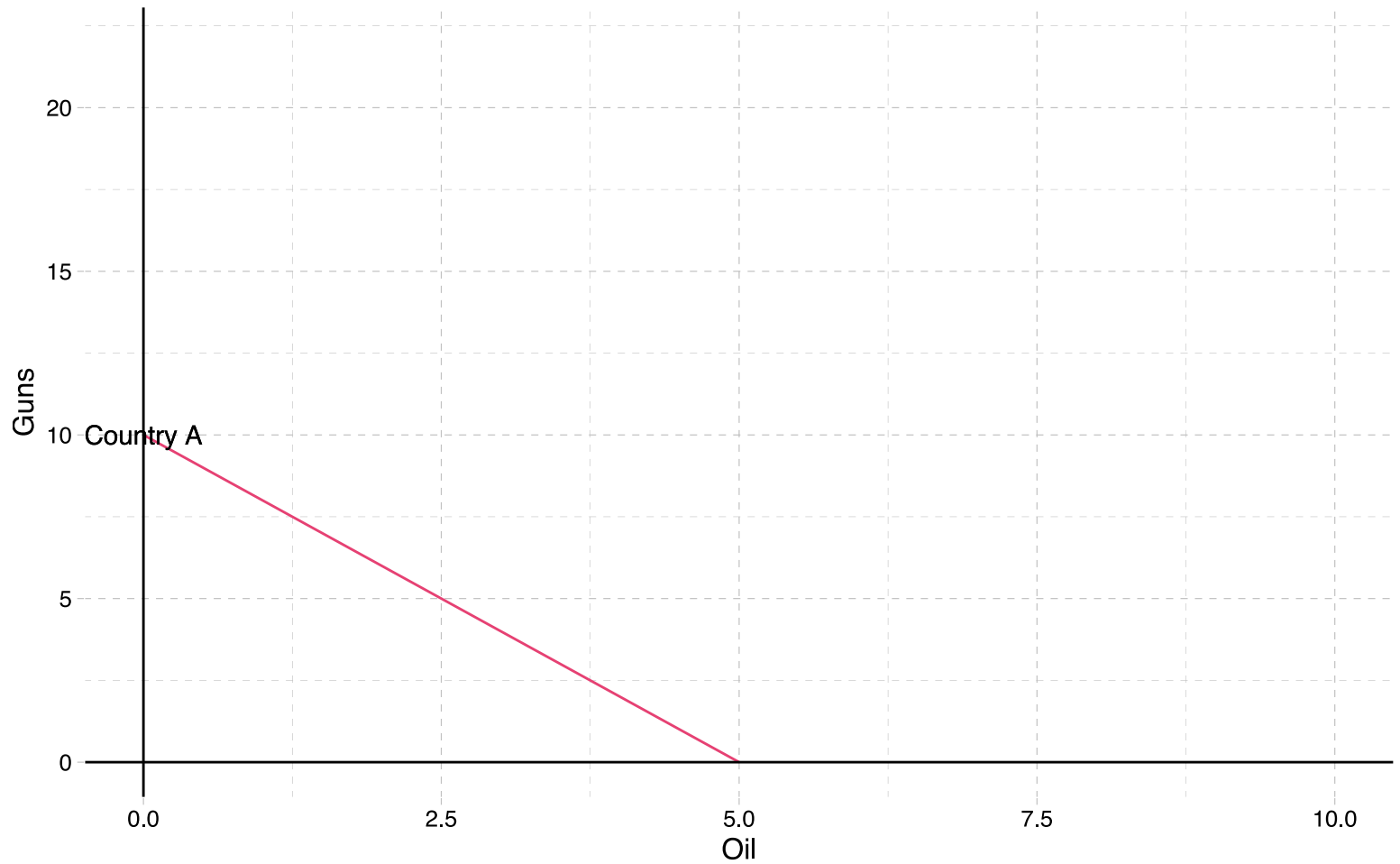
Each countries PPF is *given* by:

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

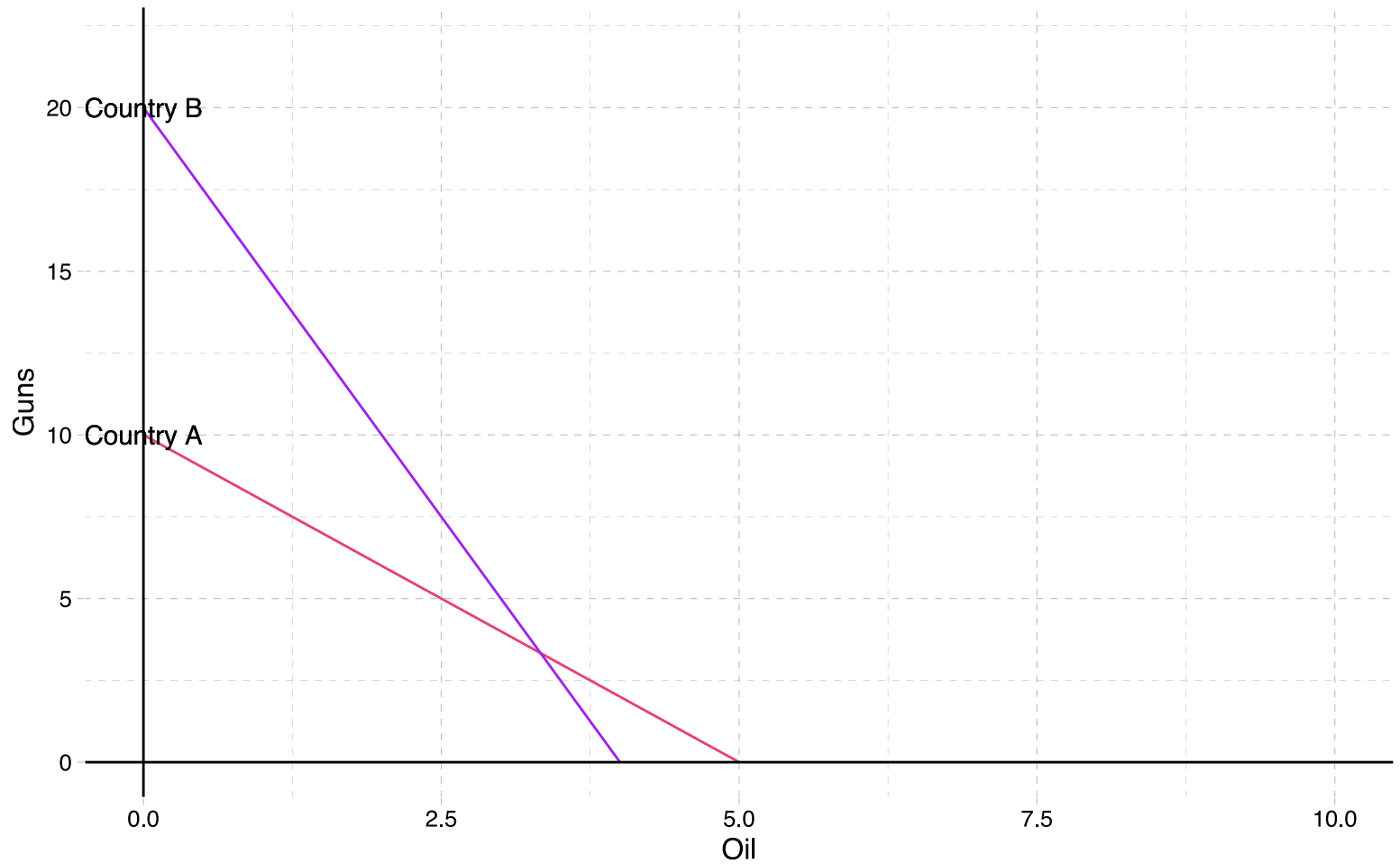
1) Graph each countries PPF

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

PPF's



PPF's



PPF Heuristics

When looking at PPF's, 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[†]

- **Scale economies**: trading firm's are beneficial
- Workers do not like commuting \implies they live close to firm
 - **Land prices** are bid up
- Higher price of land increases density \implies city!

[†] Scale economies: *bigger \rightarrow cheaper per unit*

Relax Assumption 3

Suppose we do not have CRS

- 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
- 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

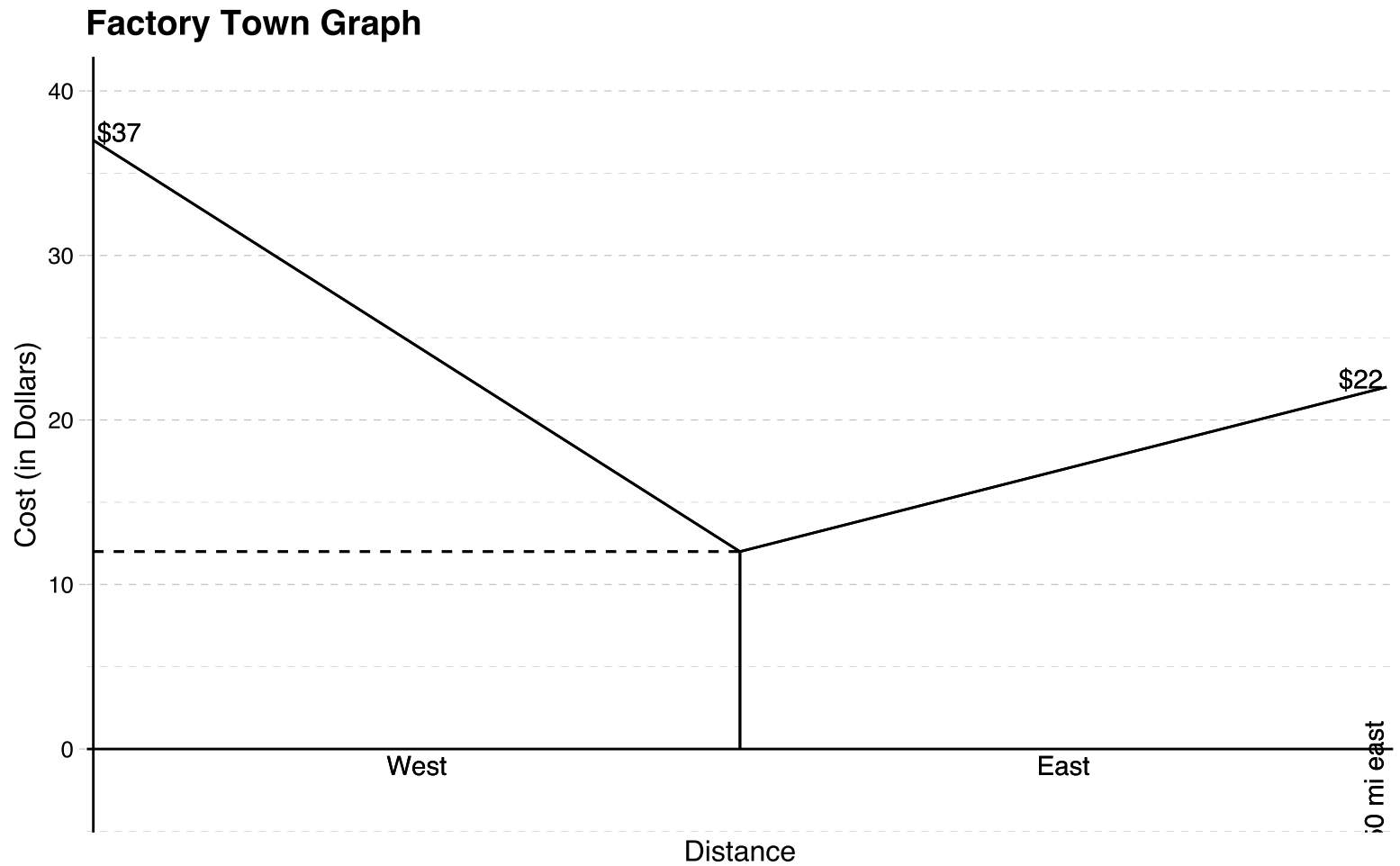
Under what condition will a consumer purchase the shirt from a factory over home?

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

Questions:

1. Graph the cost of shirts throughout the entire region
2. Find the **market area** of the town
 - Find the **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

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

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**

Checklist

1) **Data & History** ✓

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

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 their size?

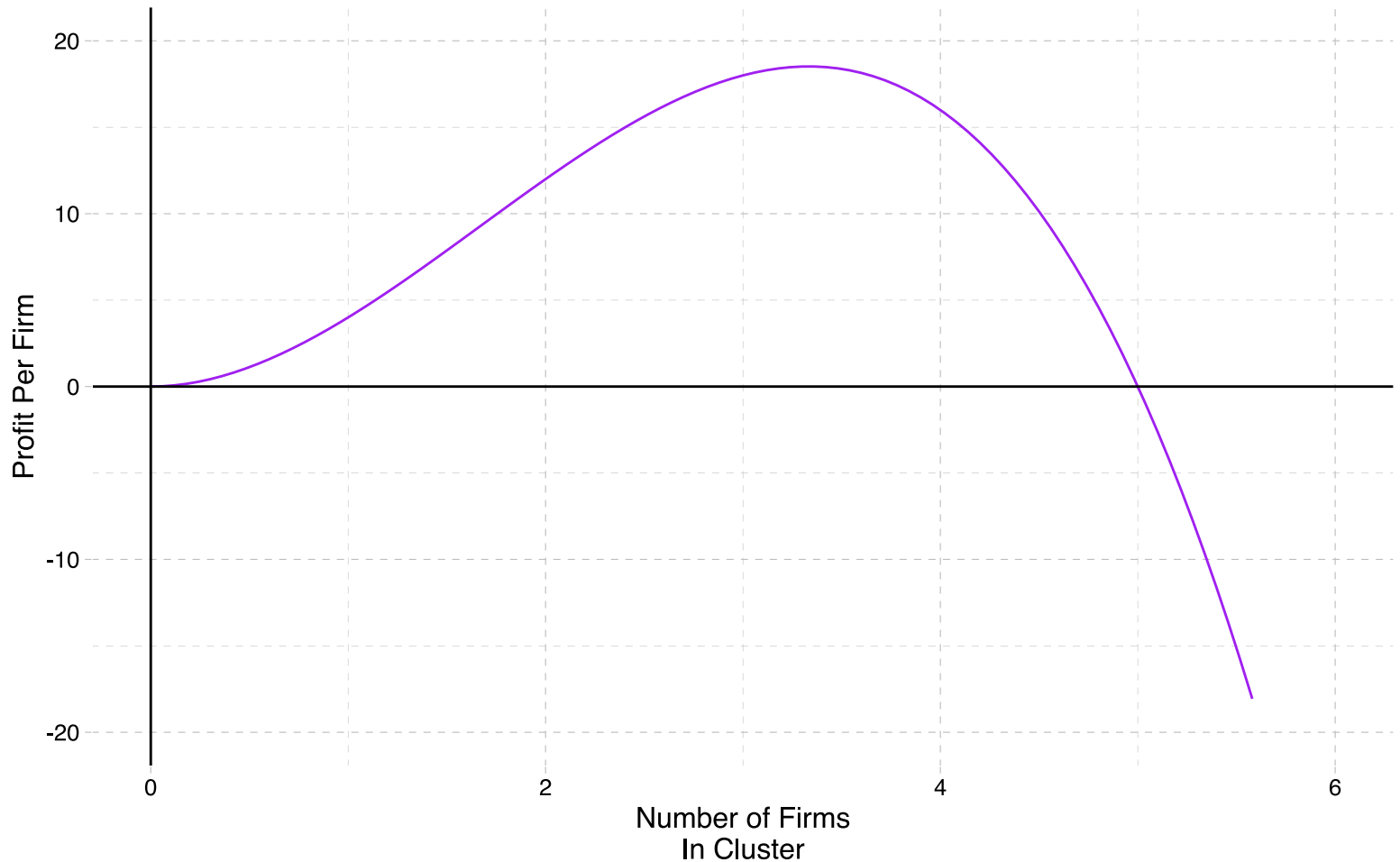
- Let's start by asking why firms cluster. Where to start? **Axiom 5**

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?



Checklist

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3) **Introduction to Clustering** ✓

- The zero profit condition

Table of Contents

Data & History

1. Urban Populations
2. History
3. Paradox

Existence

1. Why do Cities Exist?
2. Trade Basics
3. Factory Towns

Clustering

1. Zero Profit