

# Econ 330: Urban Economics

## Lecture 4

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# Lecture IV: City Size and Growth

# Schedule

## Today

- 1) **Clustering Continued**
- 2) **City Size**
- 3) **Intro to Growth**

## Upcoming

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

# Last Time

We discussed some **fundamentals** that lead to the existence of cities

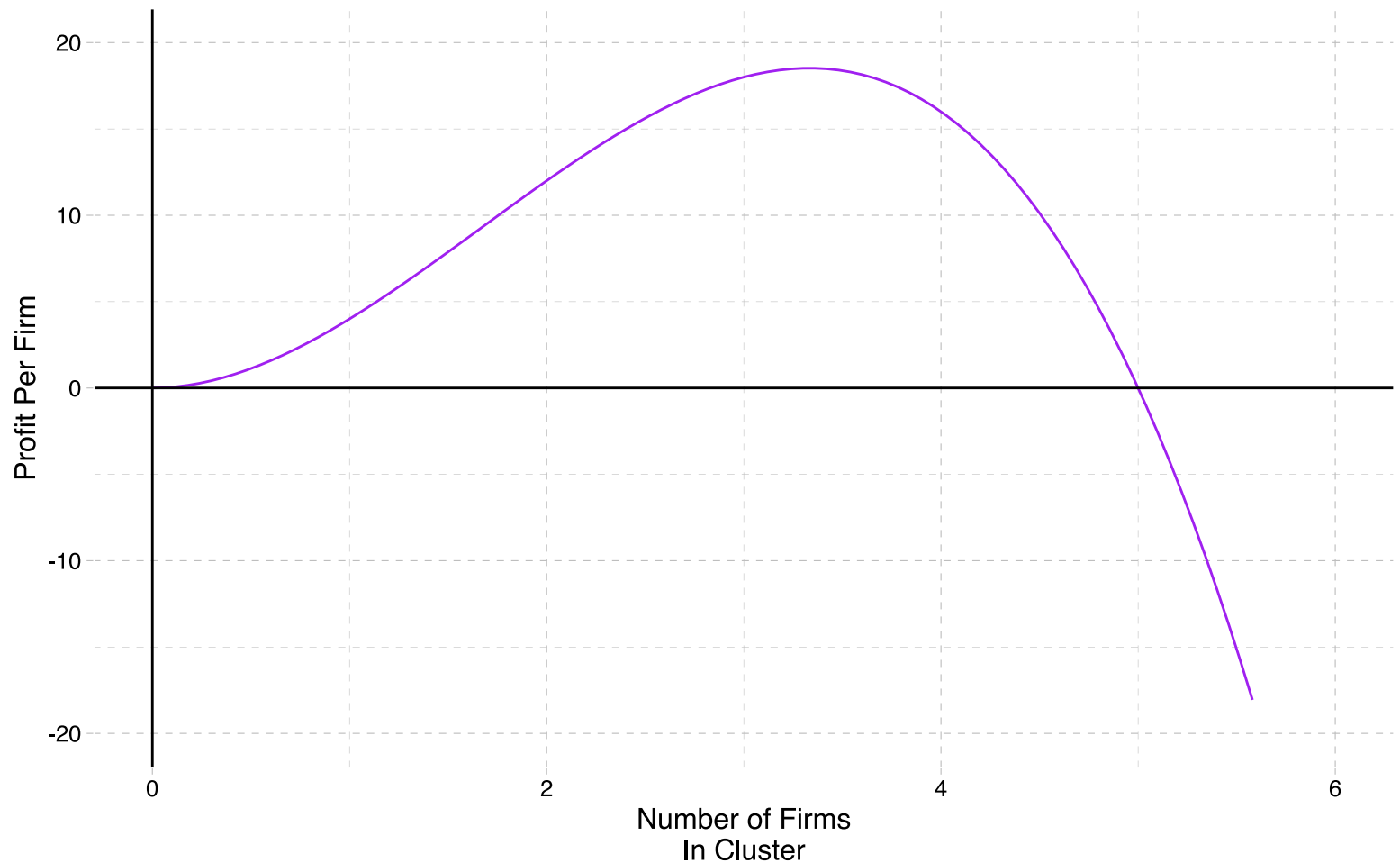
- **Main takeaway:**
  - Need some reason (**CRS** in **production** or **exchange**) for cost of cities (high land prices, for example) to be justified

## Questions:

- Why do cities grow beyond **one factory**?
- Why are there **differences in size** across cities?
- **Where** do cities emerge?

# Recall

How many firms are in the cluster?



# Clustering

Why does **profit increase** as firms **cluster**? Firms cluster because

# 1: Sharing Inputs

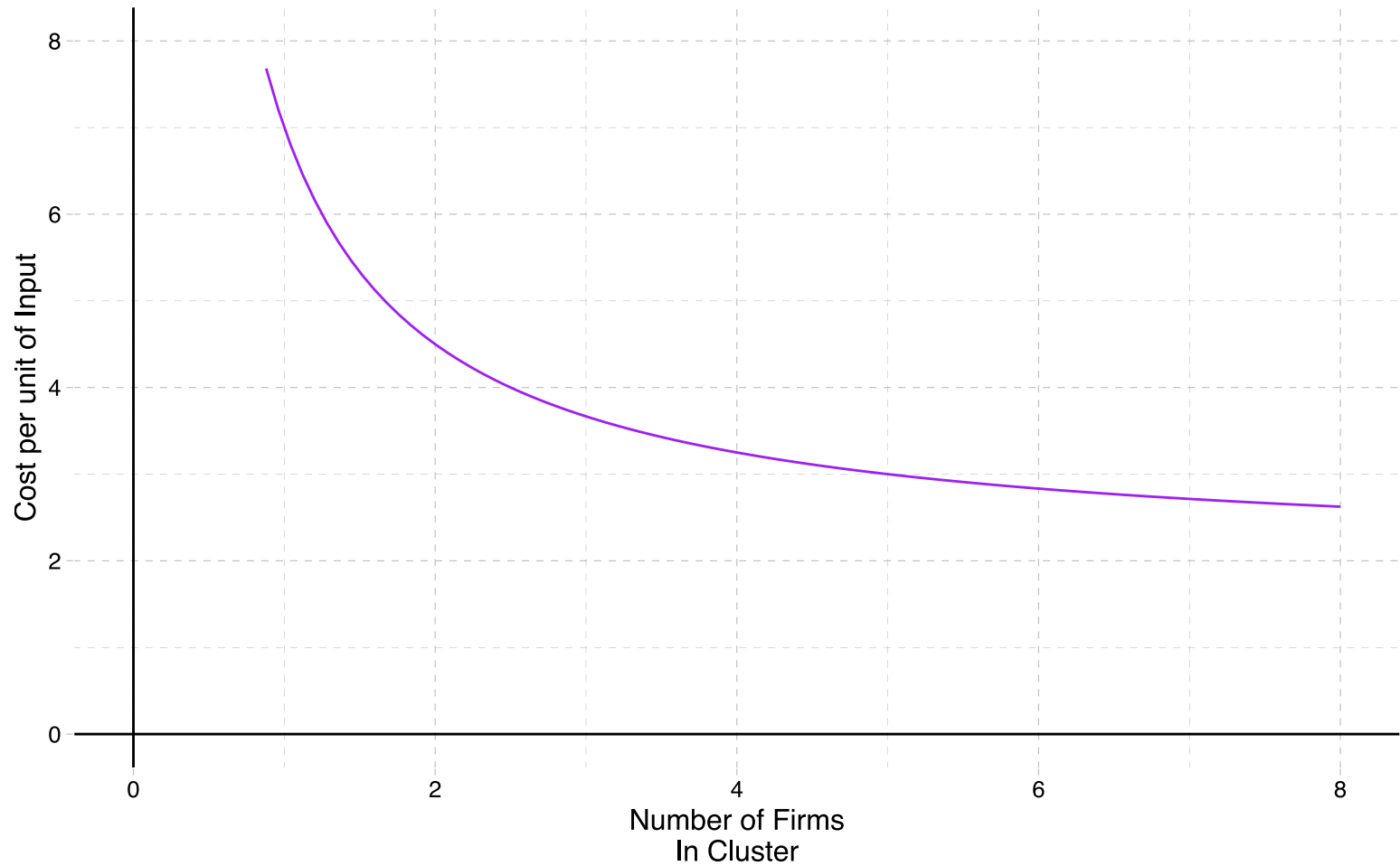
Firms in **similar industries** share inputs to take advantage of scale economies†

**Example:** High Tech Firms

- Rapidly changing products that require sophisticated intermediate inputs
- Electronic components and testing facilities
- Firms share intermediate input suppliers

† Scale economies: *bigger* → *cheaper per unit*

# 1: Sharing Inputs Graph





# 2: Labor Matching

Back to our **tech firms** example:

- Clustering attracts more of the kind of workers they want
- Firms and workers are **not always perfectly matched**
- Mismatched **require training** to eliminate skill gap. **Training is costly**
- Better for firm if they can find a worker to fill role immediately. More likely in a cluster

# 3: Knowledge Sharing

**Defn: Agglomeration Economies:** benefits that come when firms and people locate near one another together in cities and industrial clusters

Agglomeration economies are the benefits that come when firms and people locate near one another together in cities and industrial clusters. These benefits all ultimately come from transport costs savings: the only real difference between a nearby firm and one across the continent is that it is easier to connect with a neighbor. Of course, transportation costs must be interpreted broadly, and they include the difficulties in exchanging goods, people, and ideas

Source: Ed. Glaeser

# Firm Clustering

# Localization Economies

A **localization economy** occurs when an increase in the size of an industry leads to an increase in productivity of production

Why?

# Urbanization Economies

**Urbanization Economies** are when the size of a city leads to an increase in productivity

Why?

# Examples

Two major examples of **localization** & **urbanization** economies:

# Checklist

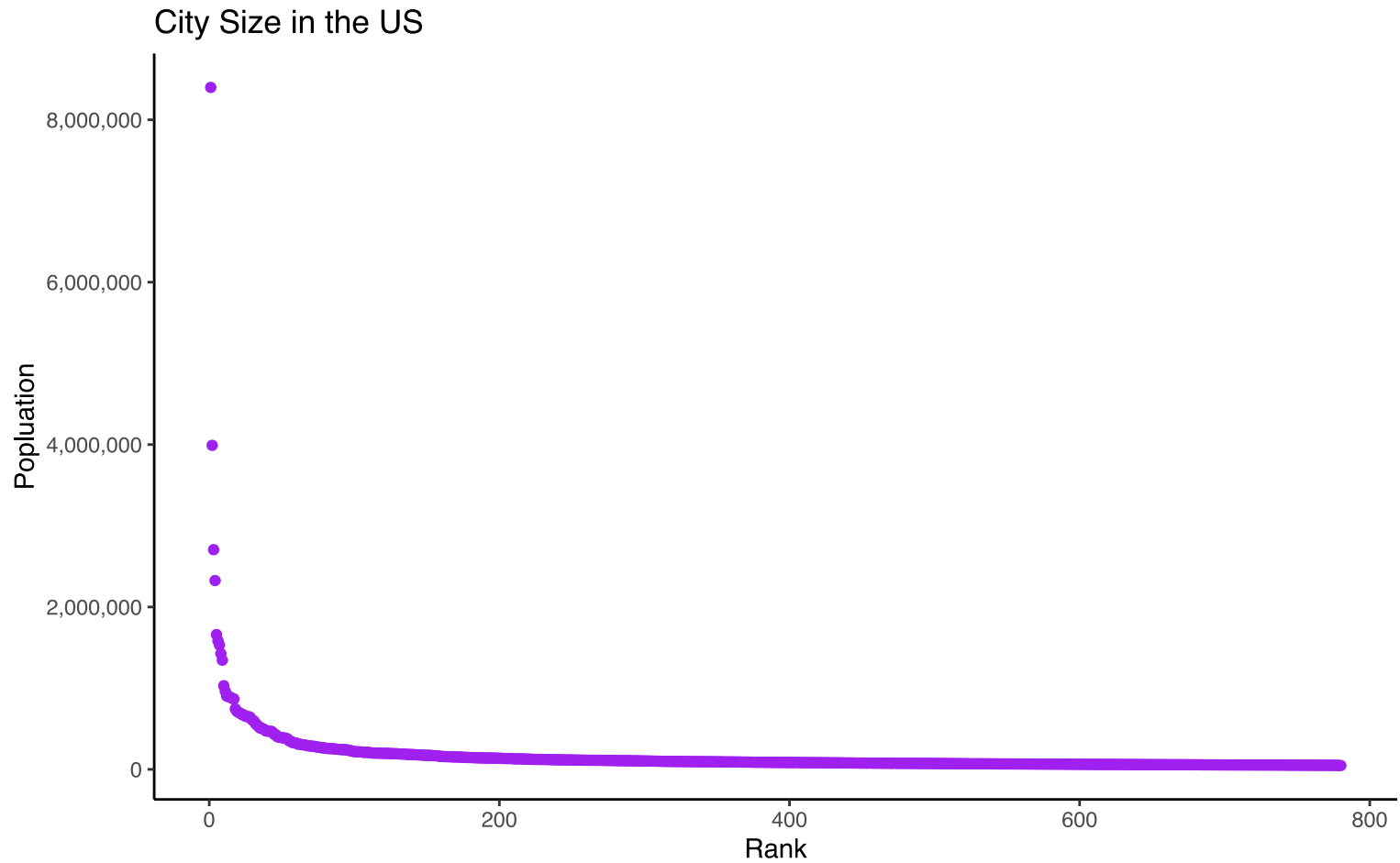
## 1) **Clustering**

- Reasons for firm clustering
- Urbanization vs Localization Economies

## 2) **City Size**

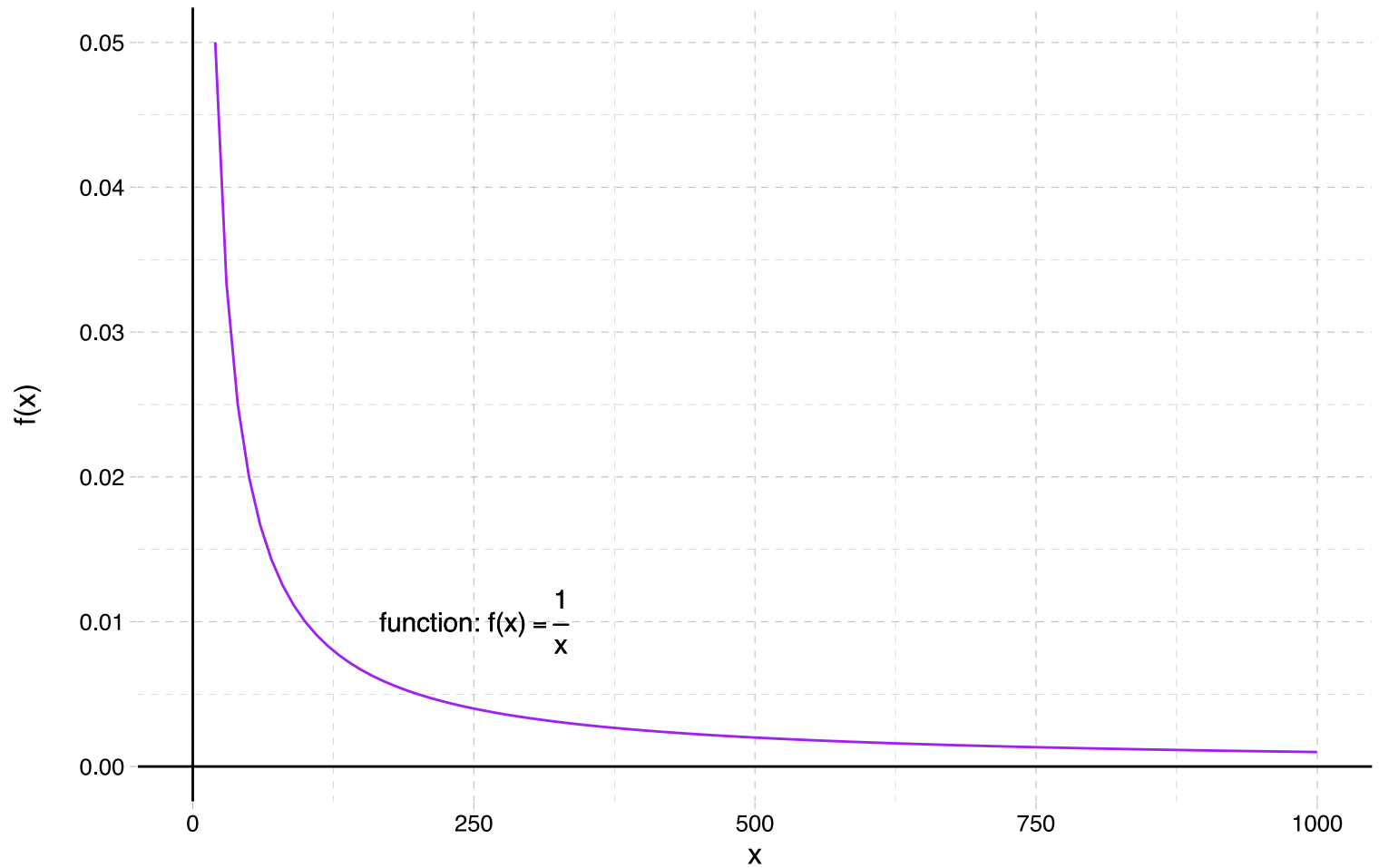
## 3) **Intro to Growth**

# City Size

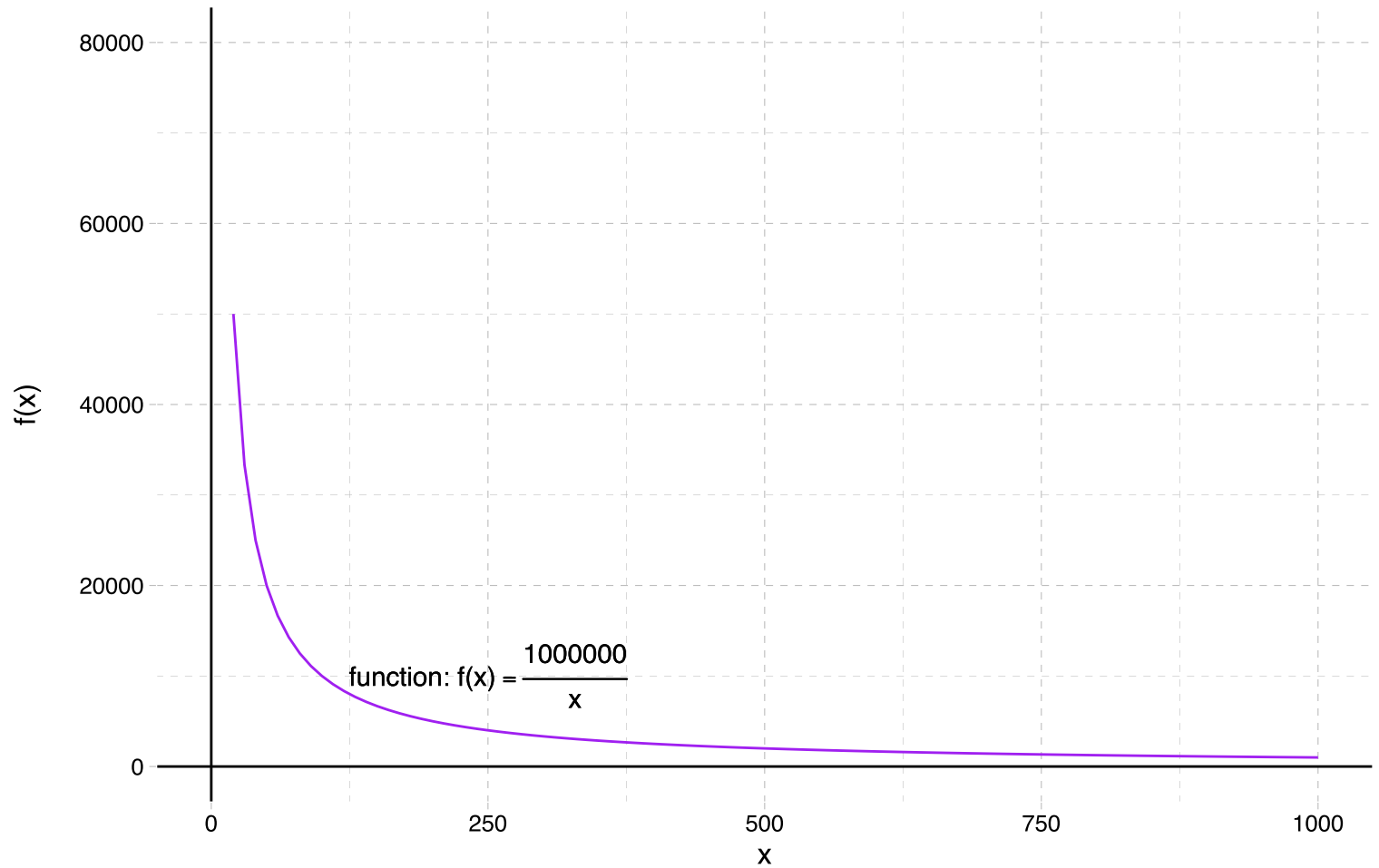




# What Function?



# What Function?



# Size: Zipf's Law

Zipf's Law of city size can be expressed as:

$$rank = \frac{C}{N}$$

- C represents a constant for a country/region
- N represents the population level

# Zipf's Law: Example

Assume the *third largest* city in a region has 200,000 people.

- Use Zipf's law to figure out how many people are in the *fifth-largest* city

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# Zipf's Law: Intuition

**Q1:** In words, what does **zipf's law** tell us about the relationship between **rank** and **city size**?

# Primate Cities

**Definition:** A **primate city** is

A major city that works as the **financial, political, and population center of a country** and is not rivaled in any of these aspects by any other city in that country. Normally, a primate city must be at least **twice as populous as the second largest city** in the country.

**Examples:**

City	Percent of Total Population
Seoul, South Korea	45.8%
Santiago, Chile	35.5%
Buenos Aires, Argentina	33.7%
Lima, Peru	31.7%

# Why Primate Cities?

What might generate primate cities?

- Large **economies of scale** in exchange
- Inadequate **transportation infrastructure** elsewhere
- **Political factors?**
  - Easier for dictators to bribe, surveil populations of a primary city (?)
  - Capital cities with dictatorships are 45% larger than capital cities of other countries
  - Is this relationship **causal**? †

† I don't know. Maybe somebody does. But you definitely can't say from the 45% number. Much of modern econ is about figuring out when relationships *are* causal. For a completely unrelated, but informative and entertaining example, see [this video](#).



# Why Zipf's Law?

**Q2:** *Why does Zipf's Law do pretty well in general at describing city size?*

# Size

Why do costs increase as workers move in?

- 1) **Commute costs increase**
- 2) **Pollution** increases
- 3) **Disease**

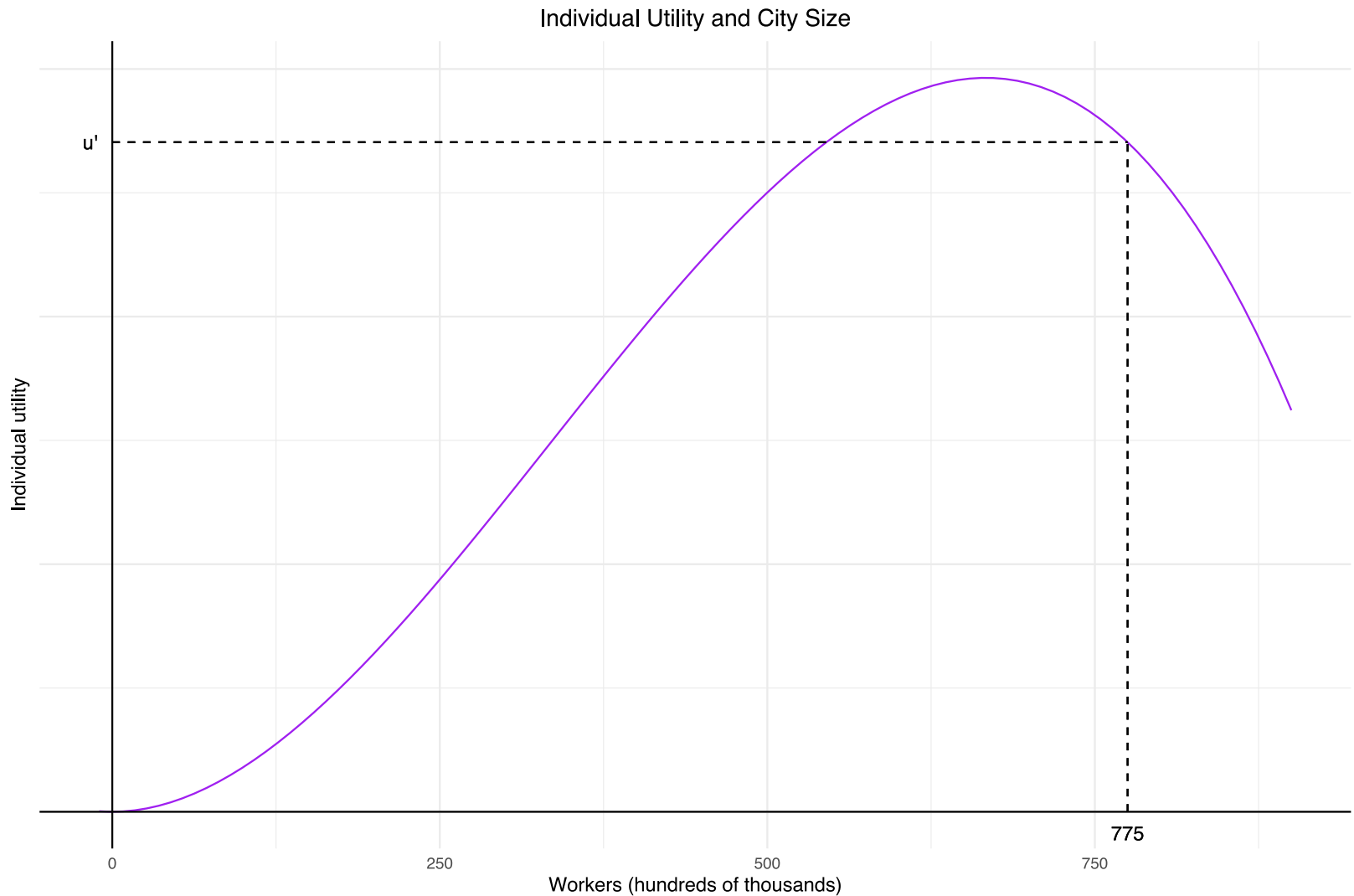
# Utility

What can we use to model the value individuals place on different attributes of cities? **Utility**

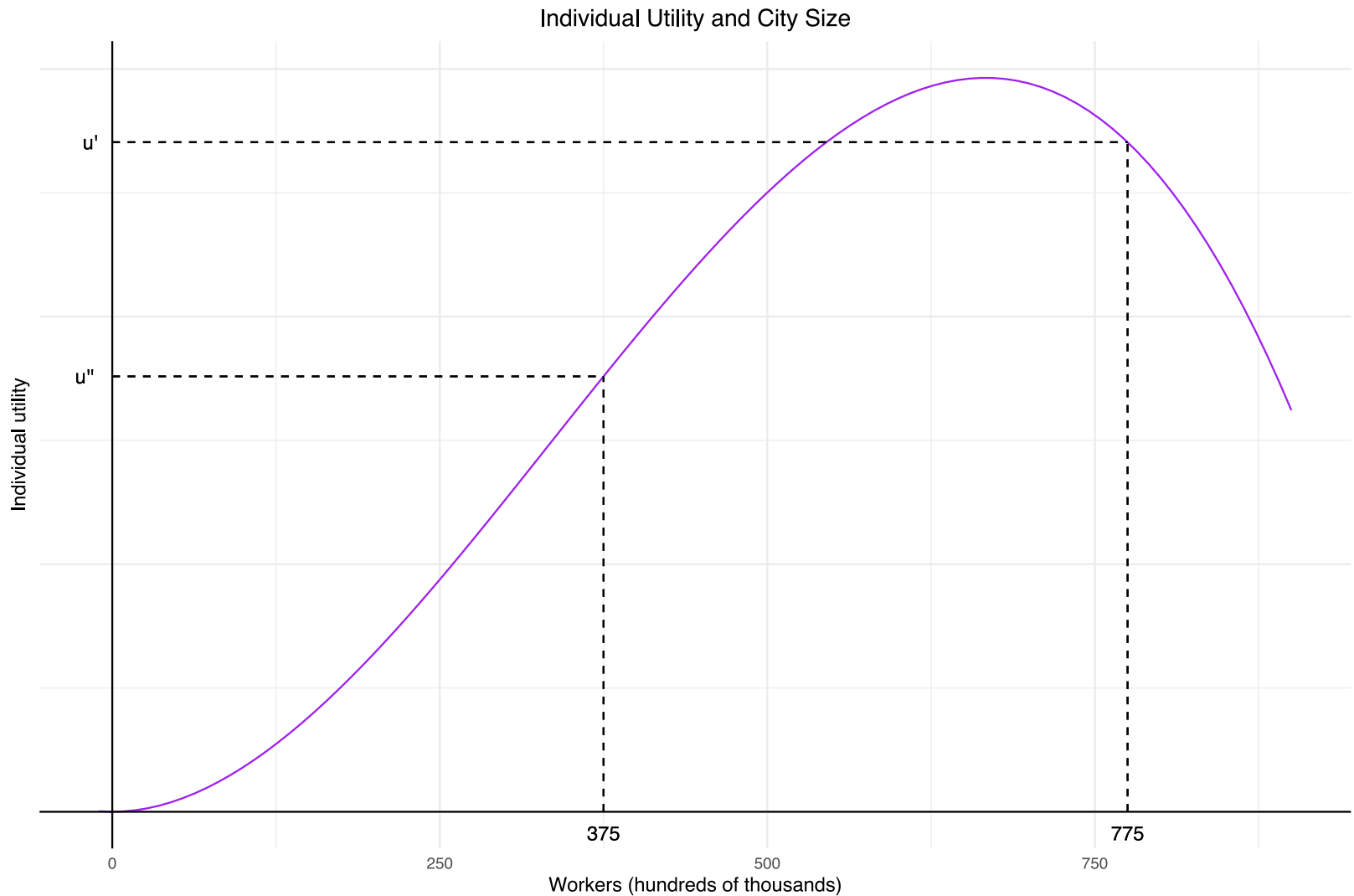
**Utility** is an abstract notion of peoples preferences. A few assumptions

1. Higher levels of utility are preferred to lower levels. And more consumption is better than less
2. Utility is *ordinal, not cardinal* meaning only the rank of the number matters, **not the level**
3. Marginal utility is diminishing (marginal value is diminishing)

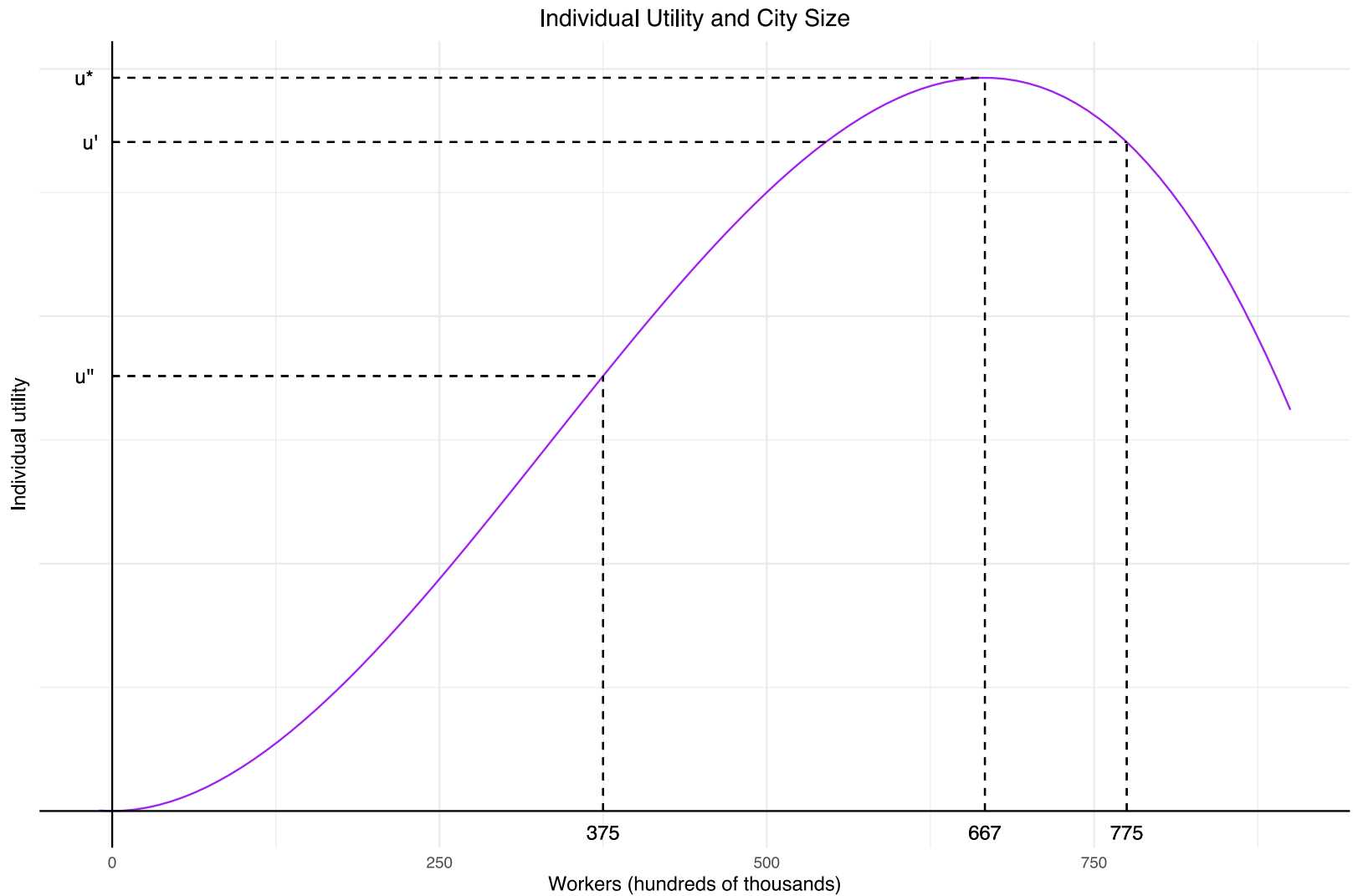
# Modeling City Size



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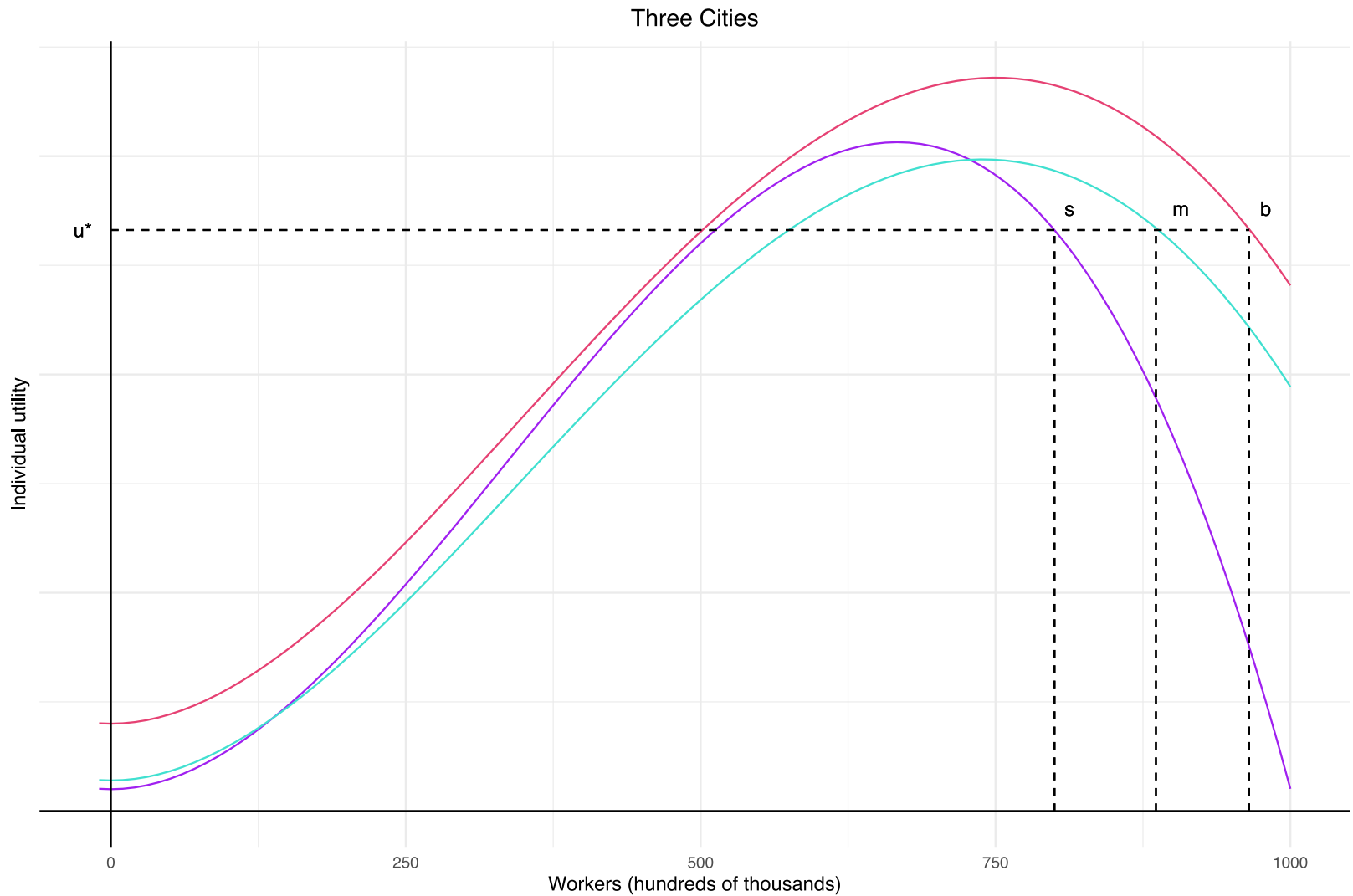


# Locational Equilibrium

**Locational Equilibrium** occurs when utility levels (valuations) across cities are the same for all workers

- In practice, we usually do this by **worker type** (demographic, income level, education, etc)
- For now, we will just consider the case when **all workers are equivalent** (*but not cities*)
- This assumption is mostly for accounting purposes

# Locational Eq Graph





# The Implication?

Back to the **real world**: *why is this framework useful?*

- Put differently, if utility really does look something like the above curve, what does this mean for policy?

# Checklist

## 1) **Clustering** ✓

- Reasons for firm clustering
- Urbanization vs Localization Economies

## 2) **City Size** ✓

- Zipf's Law
- Utility & City Size
- Locational Eq

## 3) **Intro to Growth**

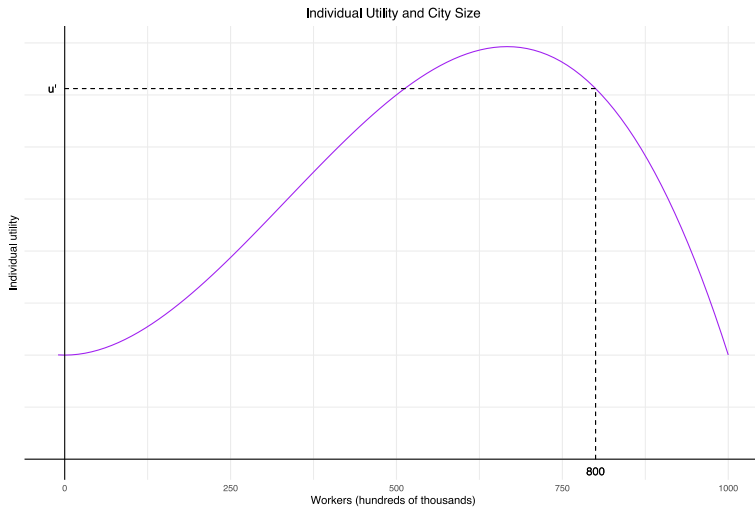
# Growth

**Econ in General:** Economic Growth is defined as an increase in per-capita income.

**Urban Economics:** **Economic Growth** is an increase in the *utility level* of a typical resident

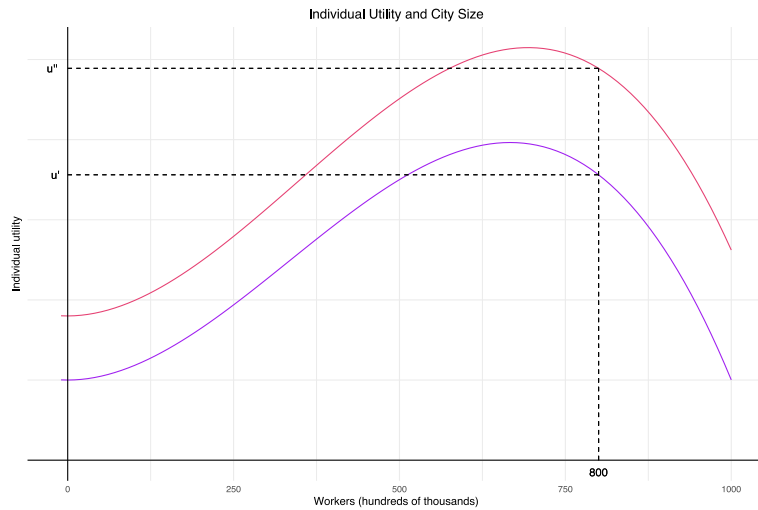
- Urban definition accounts for factors other than wage

# Example: Innovation

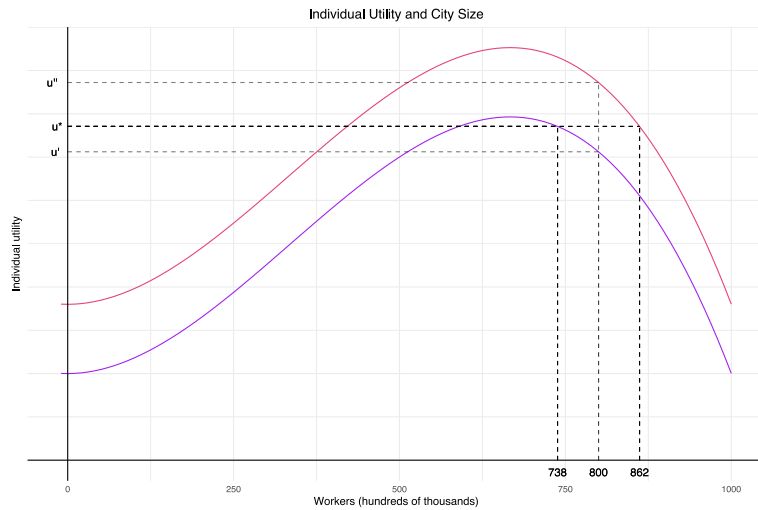


- **Initially:** 2 cities, both with same utility curve
- Population each city: 800k (total pop, 1.6 m)

# Example: Innovation



# Example: Innovation



# Example Recap

Consider two cities: each with an equilibrium population of 800k and the same utility per worker curve

- **Innovation** (tech progress) in one city **shifts utility per worker** curve up
- Workers in the innovative city enjoy a **higher level of utility**
- Workers migrate to the innovative city from the city that failed to innovate
- Eventually, a **new equilibrium** is reached where **utility per worker** is the **same across both cities**
  - Innovative city is larger

# Economy - Wide Growth

**Note:** If there is an **innovation for the entire economy**, then:

- **Both cities** experience **upward shift** of utility curve
- No utility gap at original populations, so **no migration**
- Increase in utility in **both cities**
- Still economic growth, but city sizes stay the same



# Checklist

## 1) **Clustering** ✓

- Reasons for firm clustering
- Urbanization vs Localization Economies

## 2) **City Size** ✓

- Zipf's Law
- Utility & Size of Cities
- Locational Eq.

## 3) **Intro to Growth** ✓

- Factors that lead to urban growth
- Example with utility curves
- Economy wide vs regional

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## Clustering

1. Reasons for Firm Clustering
2. Urbanizations vs Localization

## City Size

1. Zipf's Law
2. Utility
3. Locational Eq

## Growth

1. Growth factors
2. Example
3. Economy Wide Growth