Econ 330: Urban Economics

Lecture 5

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January 21st, 2020

Lecture V: Rents

Schedule

Today

1) **Intro to Rents**

2) **Rents Across Cities**

3) **Rents Within Cities**

Upcoming

- ‼ **HWI due next class** (thurs, Jan 21) ‼
    - ⚠️ **No late homeworks will be accepted**
- **Reading** (Chapter IV *ToTC*)

Taking Stock

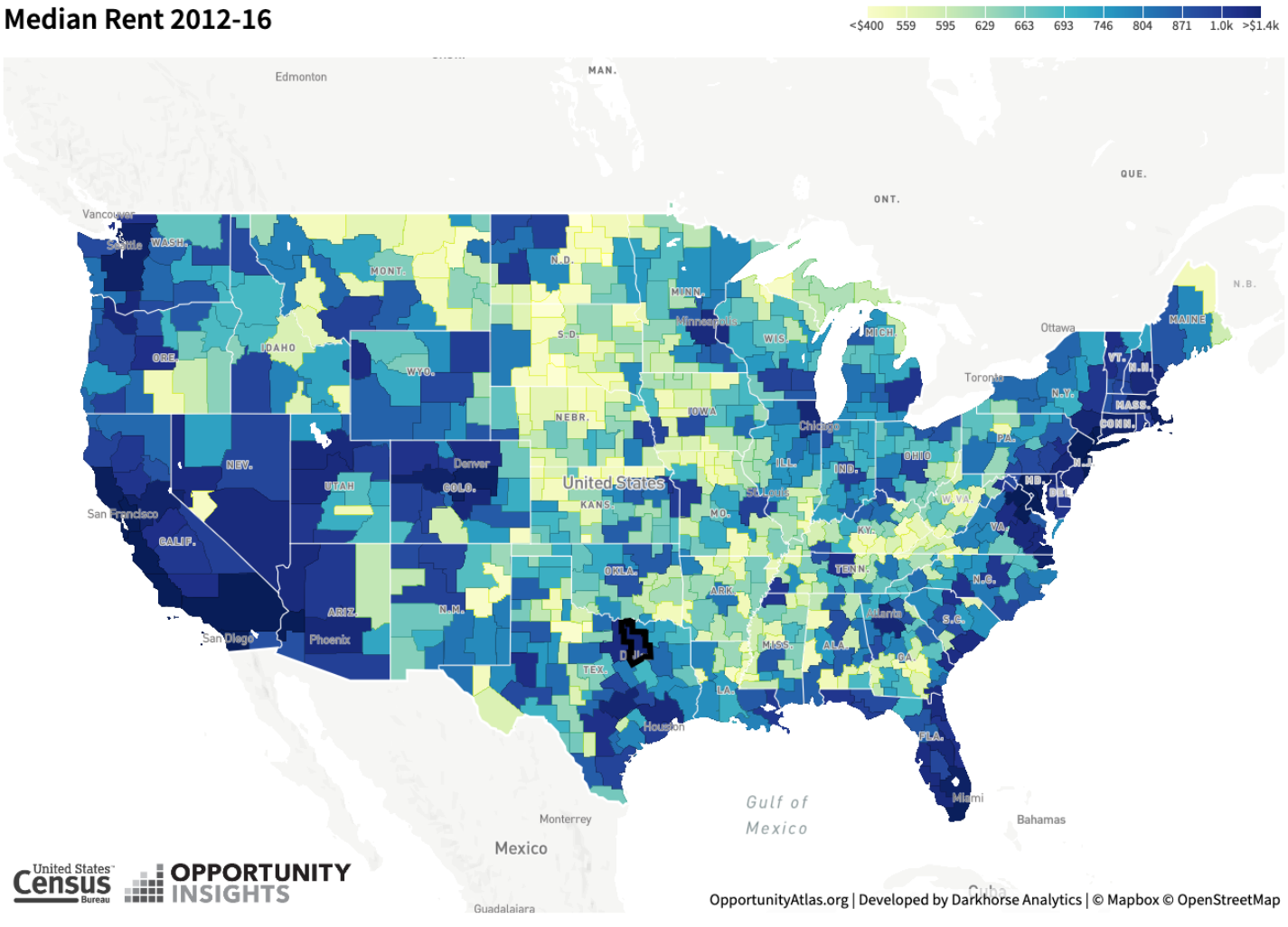
First Two Weeks: Intoduction and **existence, size & growth** (philosophical-ish questions)

Now: fundamentals of location choice theory. Questions

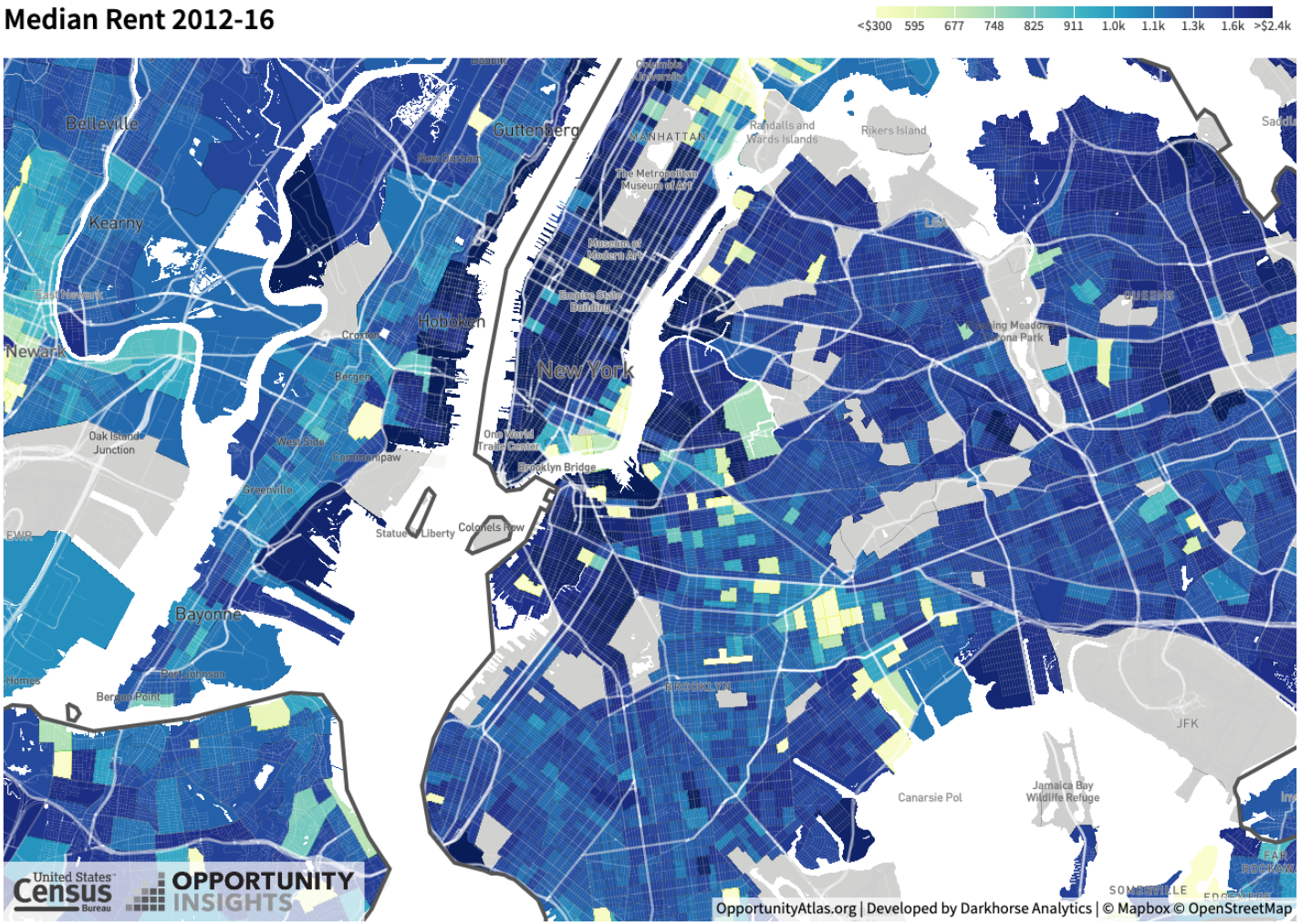
- Why do people choose to live in one place vs another? (SF vs Detroit)
    - **Today**: How do these choices impact rental prices (across cities)

Later: Formalize this. Learn **basics** of discrete choice modeling

Rents: An Overview

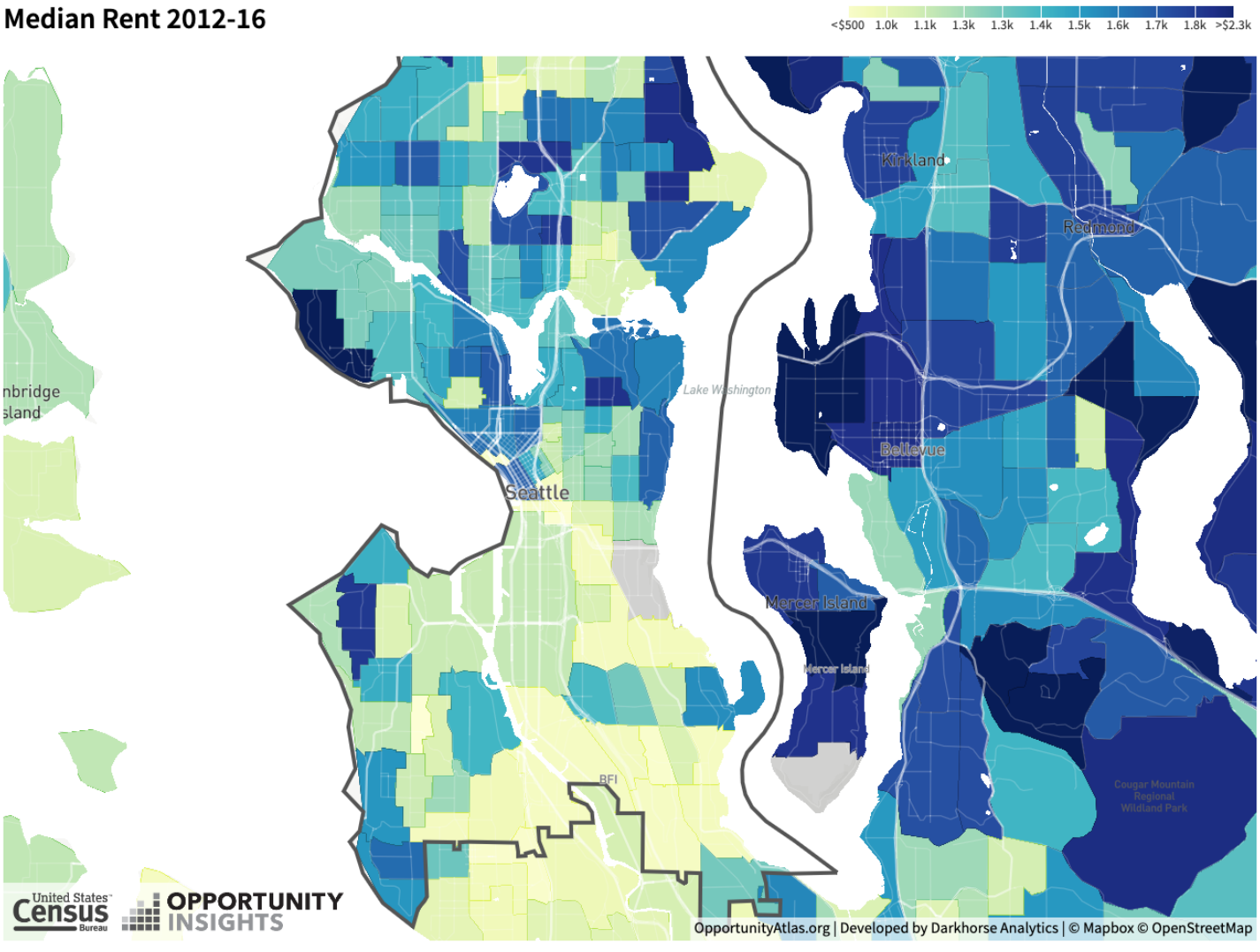


Rents: NY

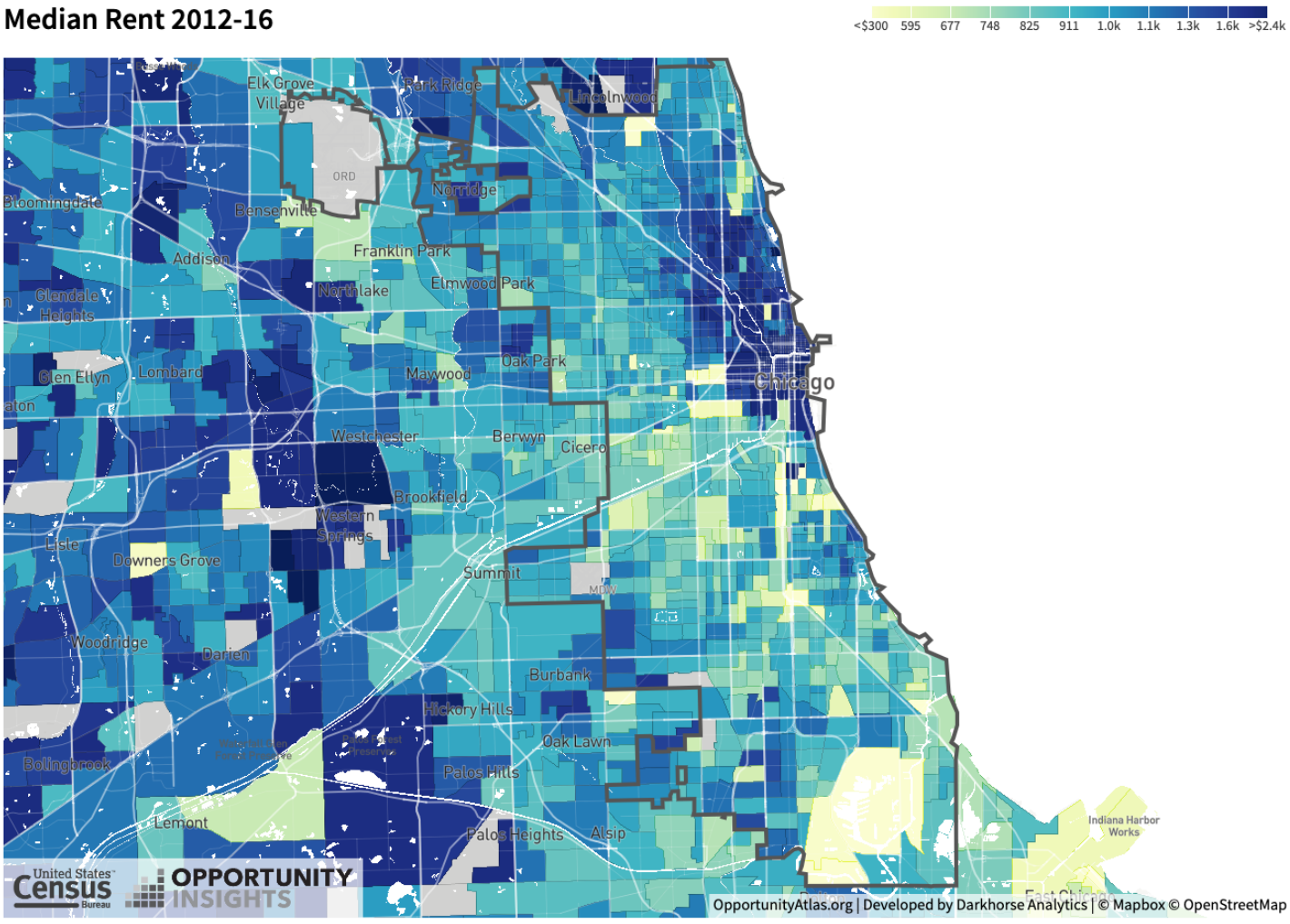


source: Oppurtunity Atlas

Rents: Seattle



Rents: Chicago



Checklist

1) **Intro to Rents** ✅

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Prices across cities

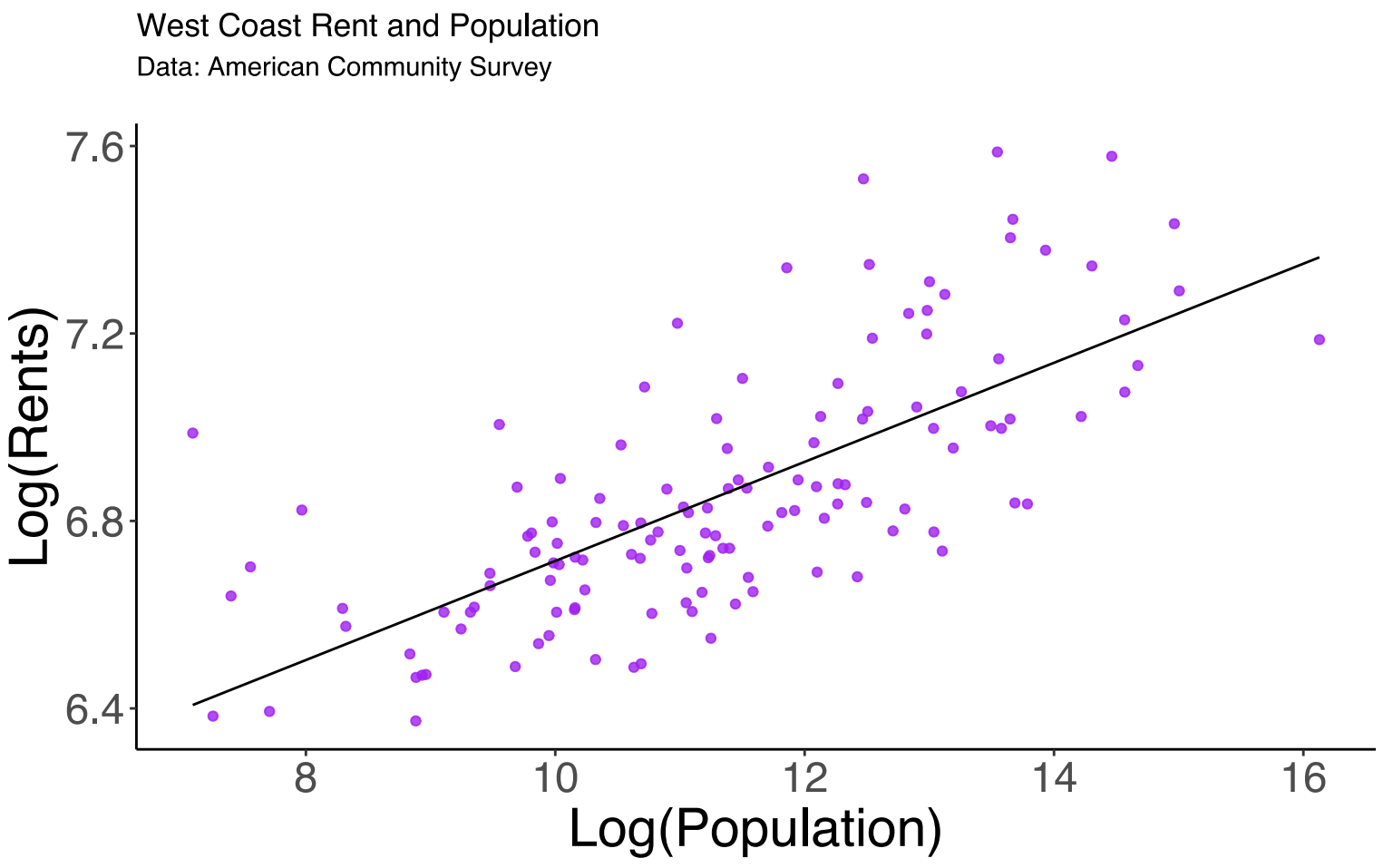
Easy version Supply and demand curves vary across cities (today)

- Equilibrium will be different across cities (and hence prices are different)

Hard Version Solving for equilibrium when wages respond to population changes as well (not today)

Q: Why would **supply** and **demand** curves **vary across cities?**

Rents: An Overview

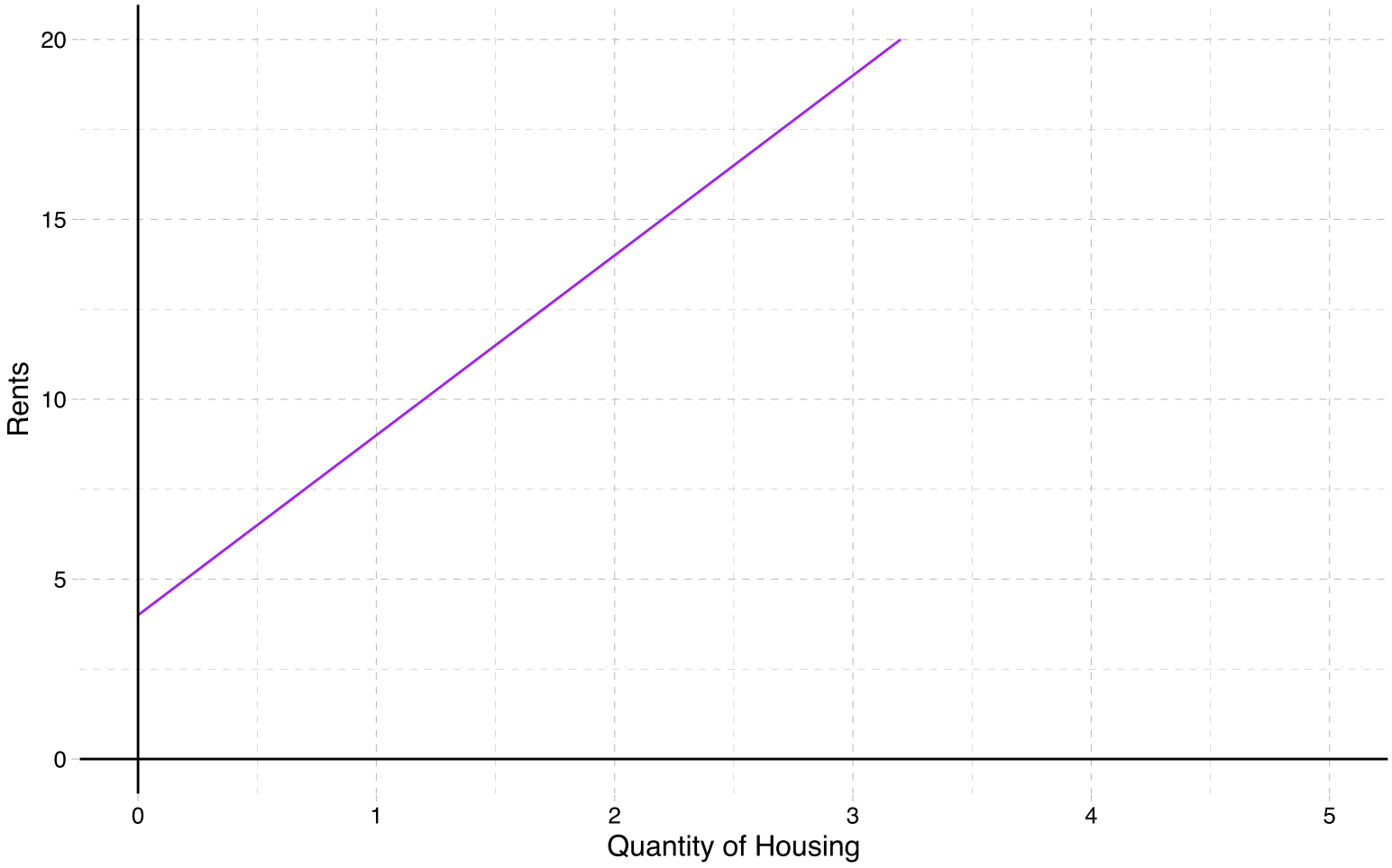


Urban Housing Supply Curves

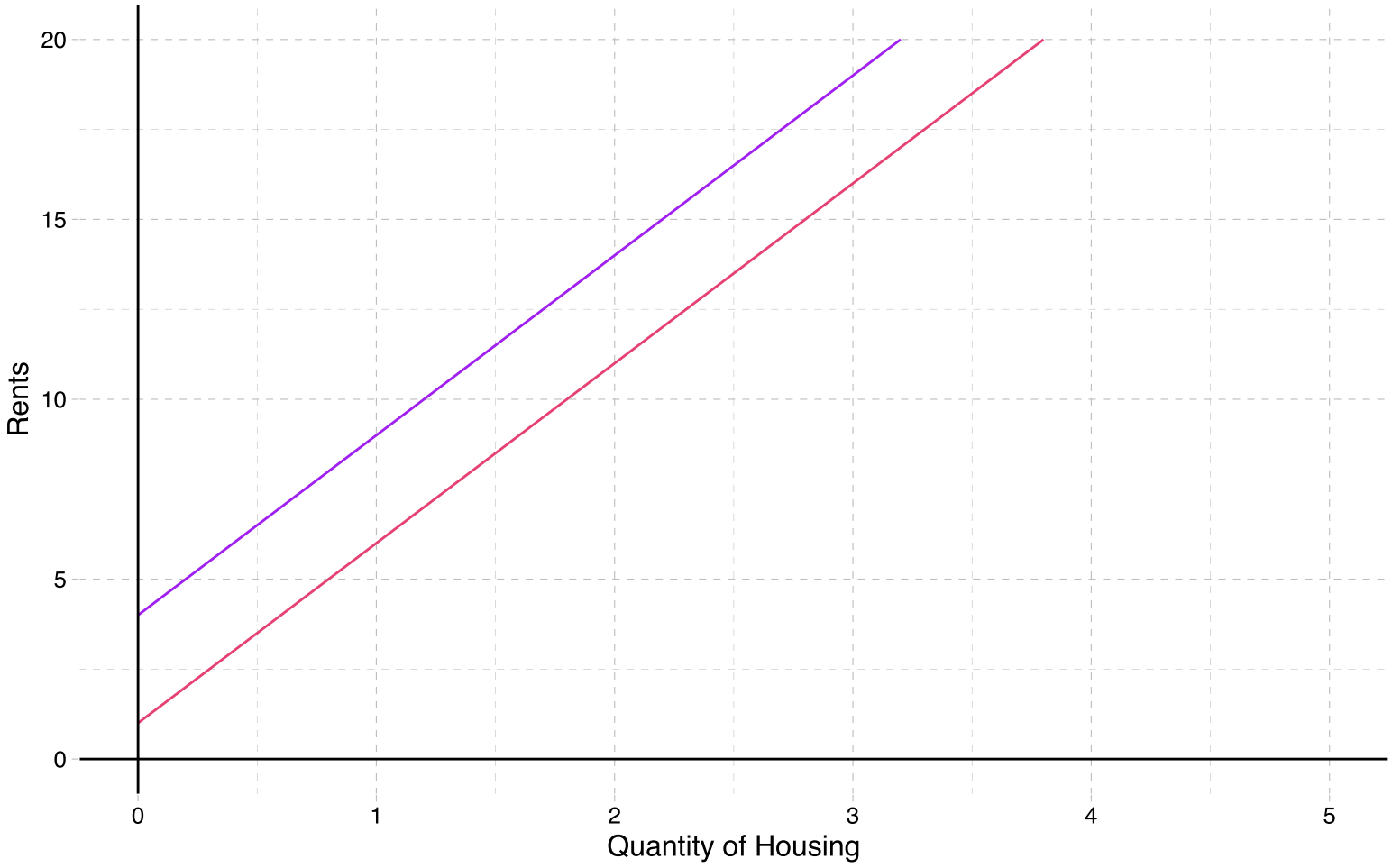
In general, supply curves across cities are impacted by: local construction costs, land available for development, and land-use regulations

- **Local construction costs**: shifts intercept (labor is more expensive for all firms in one area vs another)
- **Land available for development** and **land use regulations**: slope (changes **marginal cost**) of developing land. Why?

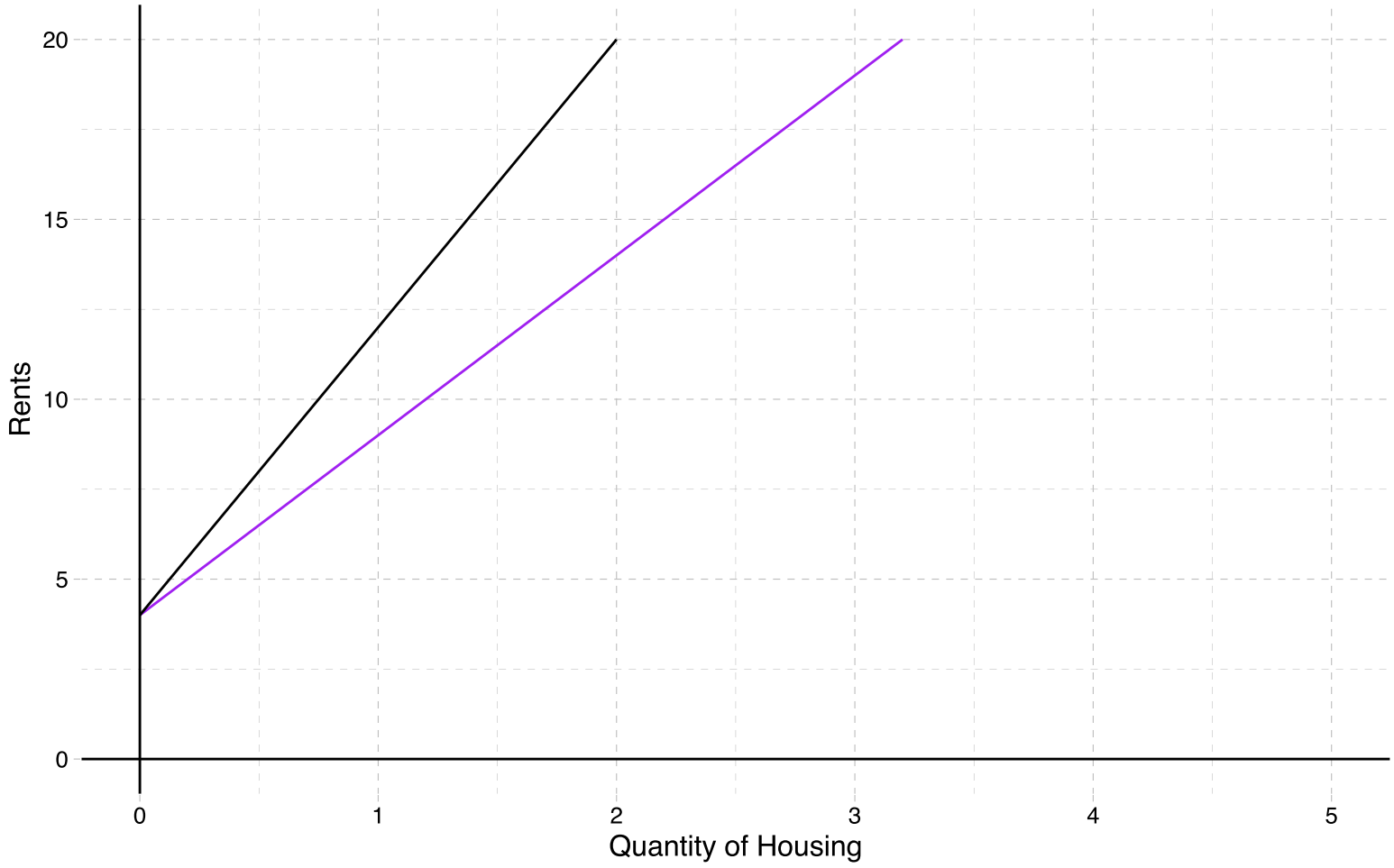
Urban Housing Supply Curves



Urban Housing Supply Curves



Urban Housing Supply Curves



Example:

- **Seattle**:

$$R_{SEA} = 10 + H_{SEA}$$
$$R_{SEA} = 25 - 2 * H_{SEA}$$

- **SF**:

$$R_{SF} = 10 + 2 * H_{SF}$$
$$R_{SF} = 30 - 3 * H_{SF}$$

Tasks:

1) Solve for equilibrium in both cities

2) Given your answer to 1, and knowledge of the term ***locational equilibrium*** what can you say must be the case about **wages and or amenity values** in one city vs the other?

Example

Stepping Back

One assumption underling the above example:

Is this reasonable? **Discuss**

Checklist

1) **Intro to Rents** ✅

2) **Rents Across Cities** ✅

- Supply and Demand variation
- Eq computation

3) **Rents Within Cities**

The Bid-Rent Curve

The **Bid - Rent Curve** is the *relationship between housing prices and the distance of land from the city center* †

These curves vary across sectors

- **Consumer Bid rent curve**: commuting costs
- Rural Bid Rent: fertility of land
- Manufacturing: Accessibility to consumers and suppliers
- Tech/info: Accessibility to Information

† It actually does not have to be the city center -- can be a point of attraction. In this class we will always use the city center though.

Housing Prices Model

We now build a simple model of rental/housing prices **within** a city

1) Commuting cost is **only location factor** in decision making

- All locations are otherwise identical

2) Only **one member** of household commutes to employment area

3) Only considers the **monetary (not time) cost of commuting**

4) Noncommuting travel is insignificant

5) Public services, **taxes, amenities** are the same everywhere (implication from 1)

Locational Indifference

Axiom 1: *Housing prices adjusts until there is locational indifference* (and prices in general)

- IE: until an increase in rent for a closer location just offsets the lower commuting costs

In math:

- P: **price** of housing (price per square foot)
- h: **amount** of housing (in ft^2)
- x: **distance** to employment area
- t: **commuting cost** per mile

Slope of the Housing Bid-Rent Curve

If there is locational indifference we can derive the slope of the bid-rent curve:

Slope of the Housing Bid-Rent Curve

If there is locational indifference we can derive the **slope** of the **bid-rent** curve:

Slope of the Housing Bid-Rent Curve

If there is locational indifference we can derive the **slope** of the **bid-rent** curve:

Another Derivation

Suppose you have decided that the optimal amount of money to spend on housing and commuting per month is M^*

- You can allocate this as

$$P \cdot h + x \cdot t = M^*$$

- Since we graph the bid rent curve in the (x,P) space, we solve for p:

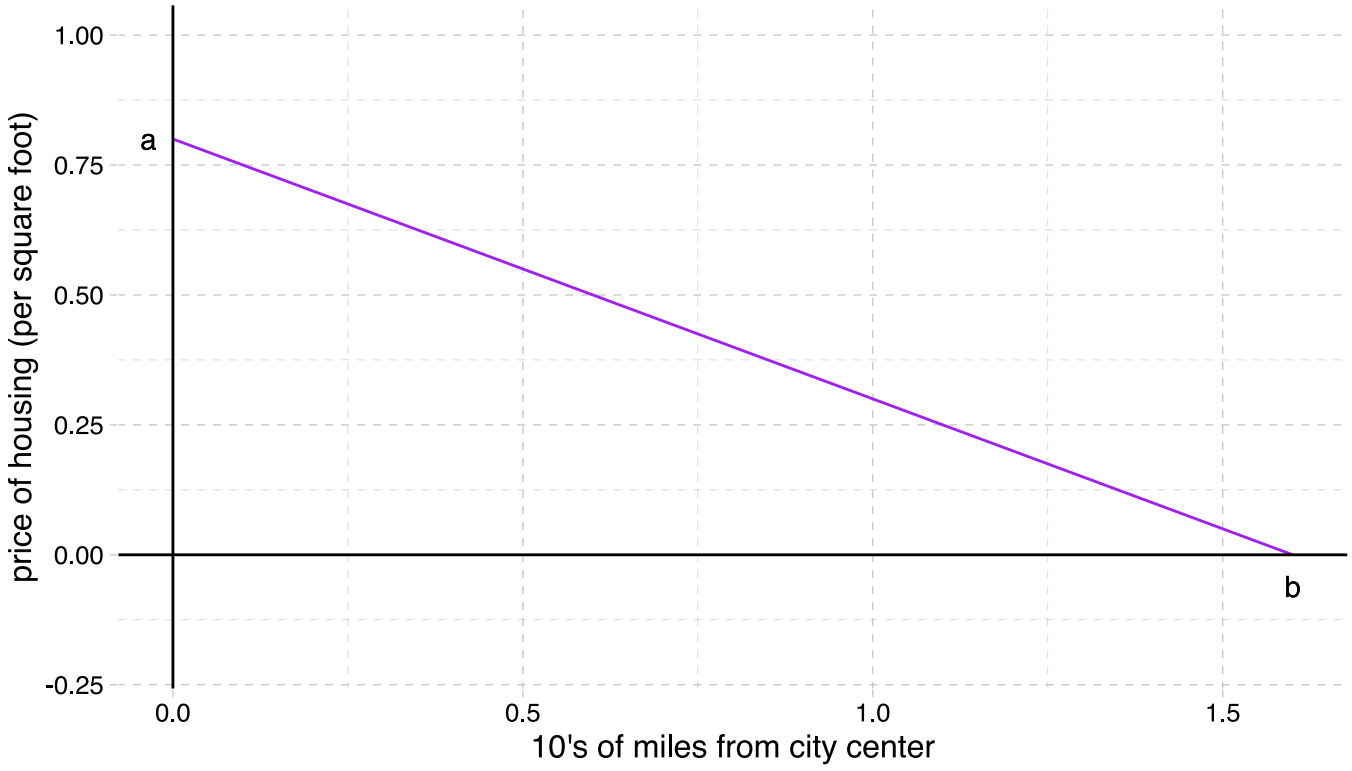
No Substitution

Example Suppose the following:

- Each household has $800 a month to spend on housing and commuting
- All rental units are the same size, with each HH occupying a rental unit that is 1000 sq ft
- Monthly commuting cost is $50 dollars per mile from employment center

Task: Draw the housing - price curve. Put miles from city center on **x axis** and price per square foot on **y axis**

Example: The housing price curve



Substitution

Q1: If you really wanted to live closer to campus -- or an exciting downtown in a big city -- would you be willing to live in a smaller apartment to do so?

Substitution

Let's formalize the mechanism for substitution a bit:

higher prices $\implies$ higher oppurtunity cost per square foot of housing (for the consumer)

- As price of rent increases, consumers are likely to substitute (atleast somewhat) towards other goods, decreasing the square footage of housing demanded
- **Housing units closer to city centers are thus likely to be smaller in size**

Adding substitution to the model

Q3: Did our model of locational indifference accomdate for substitution? Why or Why not?

$$\Delta P \cdot h + \Delta x \cdot t = 0$$

A3: No because h (the quantity of housing consumed) is **independent of distance** from center (x)

If consumers can substitute, our locational indifference condition becomes:

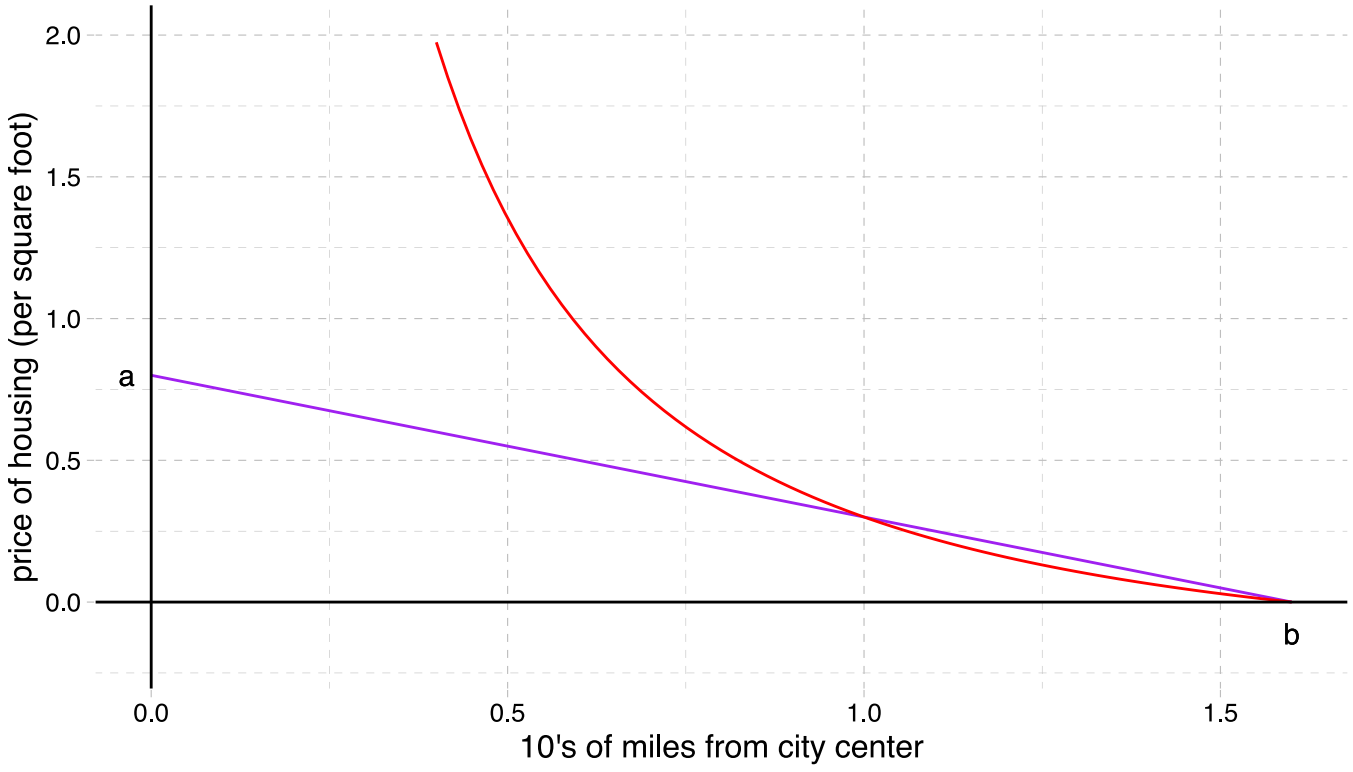
- Where $h(x)$ is an *increasing* function of x
- **Ex**: $h(10) > h(5)$ (the quantity of housing demanded 10 miles from the center exceeds that of 5 miles)

Quick Q

Q4 What is the new slope of the bid-rent curve?

Q5 Using the equation above what happens to the slope of the housing bid-rent curve as x increases. **Why**?

Model with Substitution Graph



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- Supply and Demand variation across cities
- Eq computation

3) **Rents Within Cities** ✅

- The bid rent curve for consumers
    - Locational Indifference
    - With substitution