Econ 330: Urban Economics

Lecture 06

Andrew Dickinson
27 July, 2021

Lecture 06: Neighborhood Choice

"Love thy neighbor as yourself, but choose your neighborhood."
-Louise Beal

Schedule

Today:

(i). Amenities + Public goods

(ii). Neighborhood sorting model

(iii). Racial segregation

Upcoming:

- **Reading** (Chapter 4)
- **Problem set 01 due on Friday at Midnight**

Housekeeping

Introduction to neighborhood choice

We have a fairly simple model of **residential choice** (rental prices)

Q: What factor(s) in the model determine housing demand?

A: Bid-Rent model assumes commuting costs are the **only factor**

Is this all you consider when deciding where to live?

- What factors influence neighborhood decision choices?

Examples:

- Schools
- Demographics
- Tax rates
- Public safety
- Air quality
- Natural beauty

Neighborhood choice: Amenities

Definition: Amenity

An *amenity* is a **location-specific** consumption good

- Beaches
- Weather
- Public transport
- Parks
- Restaurants
- Recreation

Different types of amenities

- Some are nonrival†: Theaters, public transport
- Some are nonexcludable††: Parks
- Some are both nonrival and nonexcludable: National defense, sports teams, fireworks

† Nonrival goods: Accessible by all; usage does limit subsequent use

†† Nonexcludable goods: Impossible to exclude other from consuming

Neighborhood choice: Amenities

Two more refined definitions:

(i). Exogenous Amenities: Location-specific consumption good that exist are not influenced by where people decide to live

- **Exogenous:** "Deteremined outside of the model" (fall from the sky)
- Weather, geographic characterisitics

(ii). Endogenous Amenities: Location-specific consumption goods that are influenced by location decisions of individuals

- **Endogenous:** "Deteremined within the model"
- School quality, crime, pollution

Neighborhood choice: Amenities

To determine whether or not an amenity is **exogenous** (**endogenous**):

"Will choosing to live here impact the amenity?"

- **Exogenous** *Beaches exist regardless whether people live near by*
- **Endogenous** *Crime is a function of the individuals in the area*

Questions regarding differences between EXOGENOUS and ENDOGENOUS?

Neighborhood choice + Sorting for public goods

Neighborhood choice

Why are city neighborhoods so heterogenous?

What economics factor influence neighborhood sorting within a city?

Let's answer these questions in a simple way.

Modeling public good: Public parks

Demand for public goods

Consider a simple sorting model for a single, non-rival public good

Model a three-person city with one public good: **Public park**

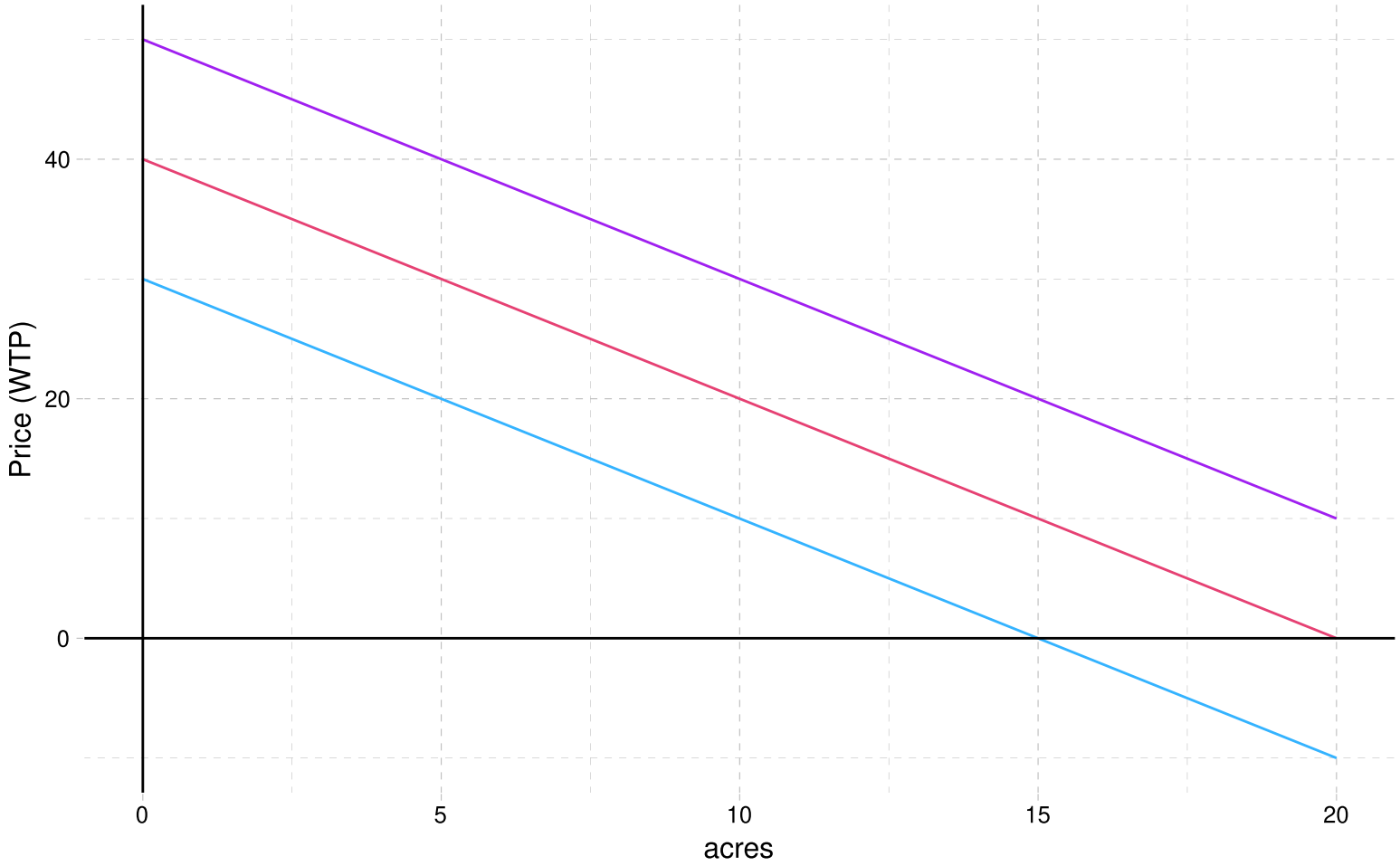
- Cost **$60 per acre** to build
- Cost is shared equally across all three citizens: **$20 per acre** each

Of the three citizen, demand for the park varies:

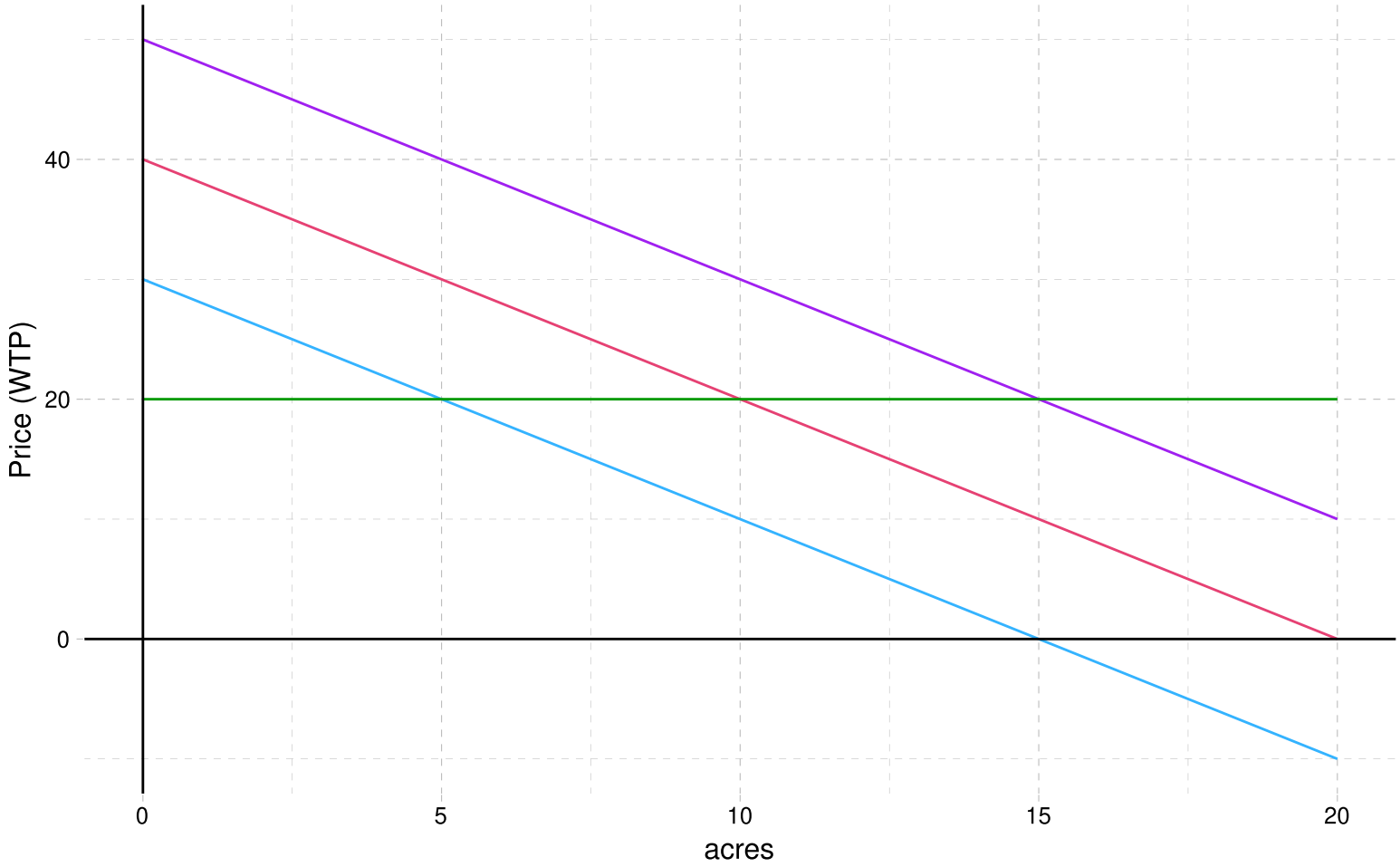
- Low demand: $\text{Lyla}: P = 30 - 2 * \text{acres}$
- Mid demand: $\text{Gracie}: P = 40 - 2 * \text{acres}$
- High demand: $\text{Cooper}: P = 50 - 2 * \text{acres}$

Together they must vote for one park size in a binary election

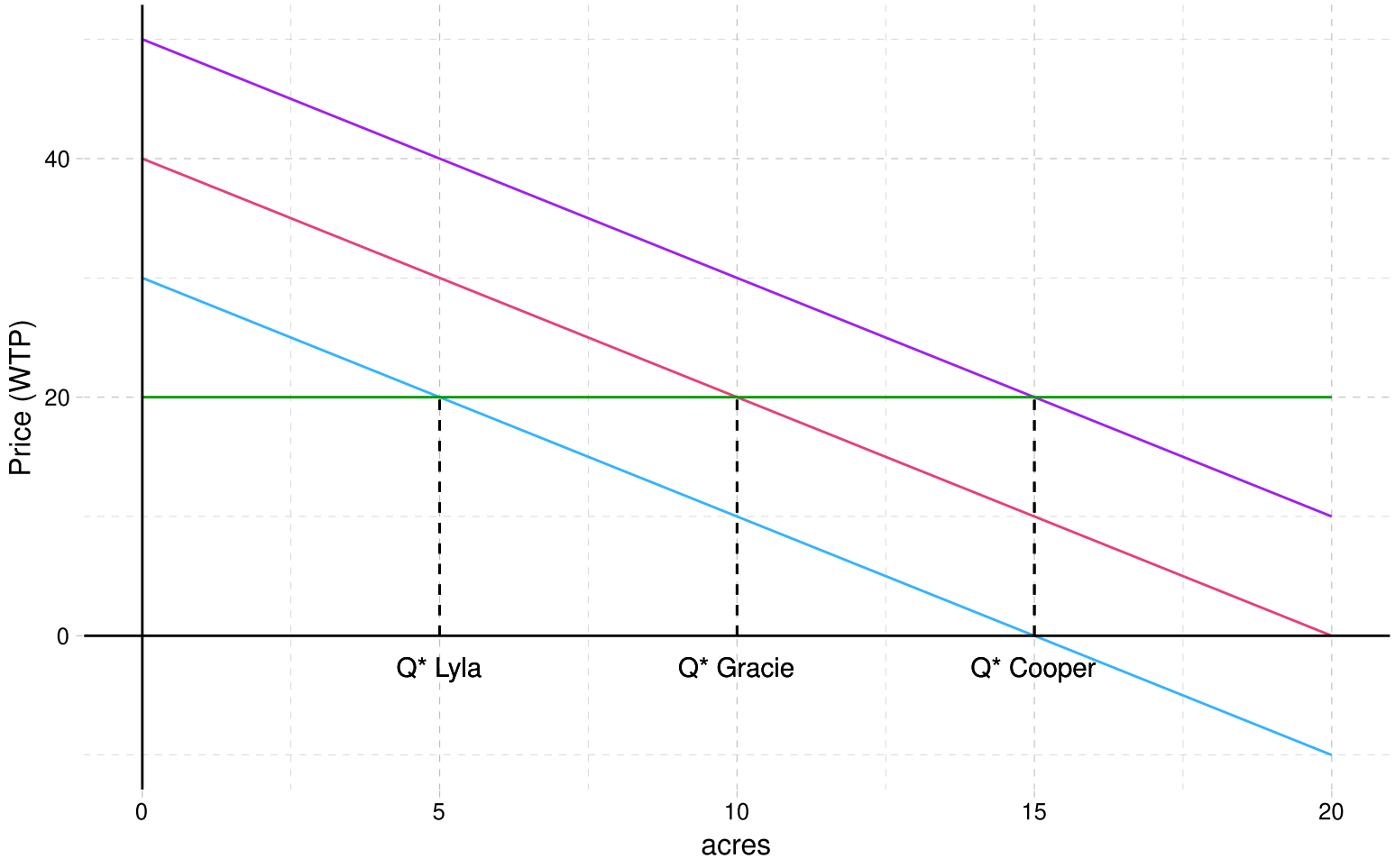
Demand for public goods



Demand for public goods



Demand for public goods



Demand for public goods: Majority rule

For each citizen, optimal park size is found when $MB_{park} = MC_{park}$

Under **majority rule** Gracie's optimal park wins

Why?

Election	10 acre votes	Other votes
5 acres vs 10 acres	Gracie and Cooper	Lyla
15 acres vs 10 acres	Gracie and Lyla	Cooper

Gracie is the **median voter**

- Splits the voting public in half

Alternative to majority rule

Majority rule always leave two citizens unhappy: Cooper and Lyla

Suppose the city can be split into **3 identical districts** with 3 citizen

- Each district votes on their own park
- Each citizen knowns each other's preferences

Key assumption: Citizens pick which district to live in

What is the implication?

Similar types sort into the same neighborhood

- Lylaville: 5 acre park
- Gracity: 10 acre park
- Cooperstown: 15 acre park

Alternative to majority rule

By **voting with their feet** each citizen sorts themselves into homogenous communities with their preferred public good allocation (park size)

Now our city has three neighborhoods with homogenous types

- Accomodates diversity in demand

Is reality this simple?

Nope

Let's add another layer of complexity: Taxes

Alternative: Property tax

Up to this point, funding for the park is financed with a **head tax**

More realistic to model neighborhood sorting using **property taxes**

- Allow for variation in preferences + property values:
  - The higher your property value, the more taxes you pay for the park
  - $\tau = PV * 10$
  - **3** different property values: 2, 10, 24
  - **9** combos: Low-Low, Low-Mid, Low-High, Mid-Low...High-High

Outcome	Tax rate per dollar in PV	Small PV	Mid PV	Big PV
Mixed municipality	$10	$20	$100	$240
Exclusive small PV	$60	$120	-	-
Exclusive mid PV	$12	-	$120	-
Exclusive big PV	$5	-	-	$120

Alternative: Property tax

Outcome	Tax rate per dollar in PV	Small PV	Mid PV	Big PV
Mixed municipality	$10	$20	$100	$240
Exclusive small PV	$60	$120	-	-
Exclusive mid PV	$12	-	$120	-
Exclusive big PV	$5	-	-	$120

Citizen of PV similar type have incentive to sort together to reduce tax

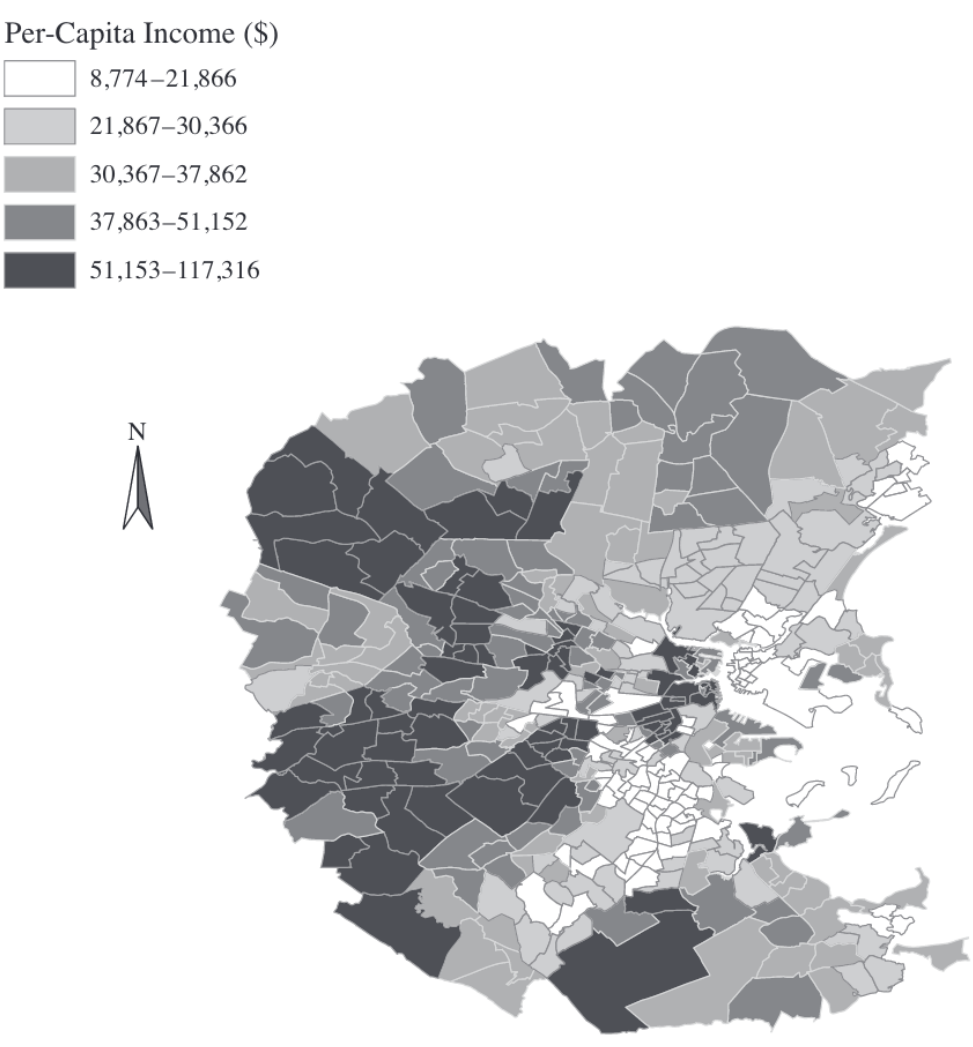
In equilibrium citizen will form **9 different neighborhoods**

Generates a fragmented system of local government in a metro area

- Negative implications arise from this sorting

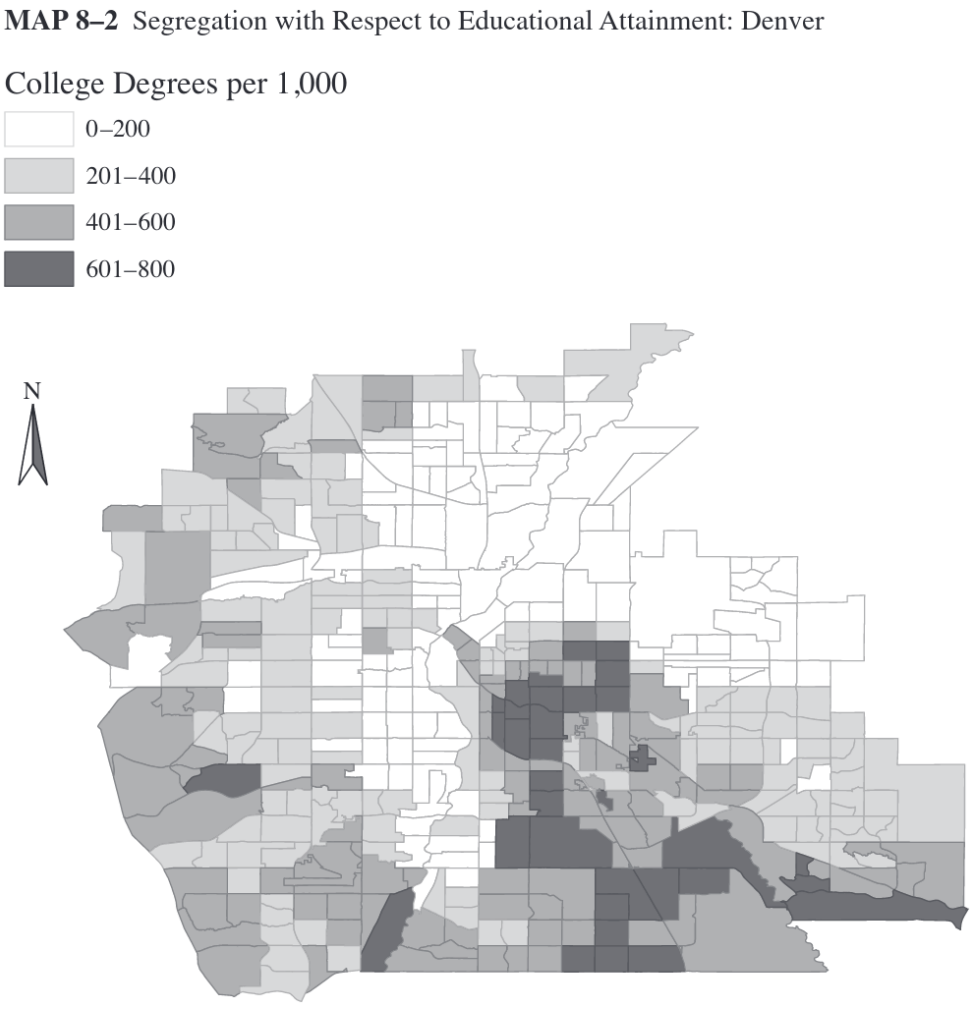
Neighborhood sorting: Income

MAP 8–1 Income Segregation: Boston

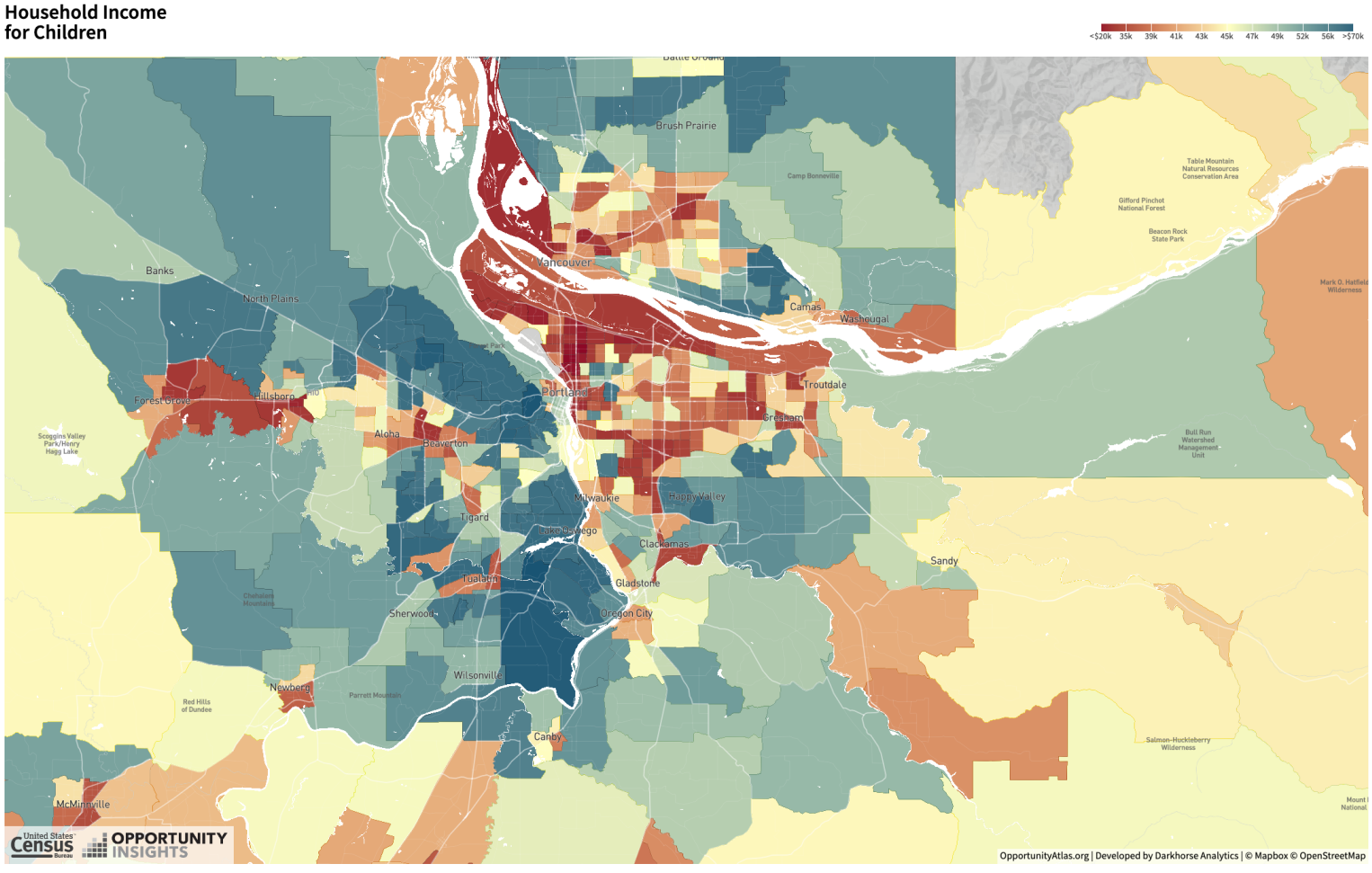


Neighborhood sorting: Education

MAP 8–2 Segregation with Respect to Educational Attainment: Denver



Neighborhood sorting: Atlas



Source: Oppurtunity Atlas

Neighborhood sorting: Externalities

Neighborhood sorting: Externalities

Do you *fully* internalize the costs and benefits of where you decide to live?

Is your choice of neighborhood free from externalities?

Nope.

Examples?

- Social networks
- Jobs
- Good schools
- Culture
- Noise
- Drug use
- Litter
- Pollution

Neighborhood externalities tend to be massively important for youth

Becker-Murphy model

Focus on positive externalities for now

- Assume these increase with income and education

Q: What is the income mix of neighborhoods - segregated or integrated?

Becker-Murphy model:

- Two neighborhoods: A and B - 80 lots each
- Infinite number of households on the market.
- Only difference between the neighborhoods is income mix

Becker-Murphy model

Individual choices to move are determined by the *rent premium*

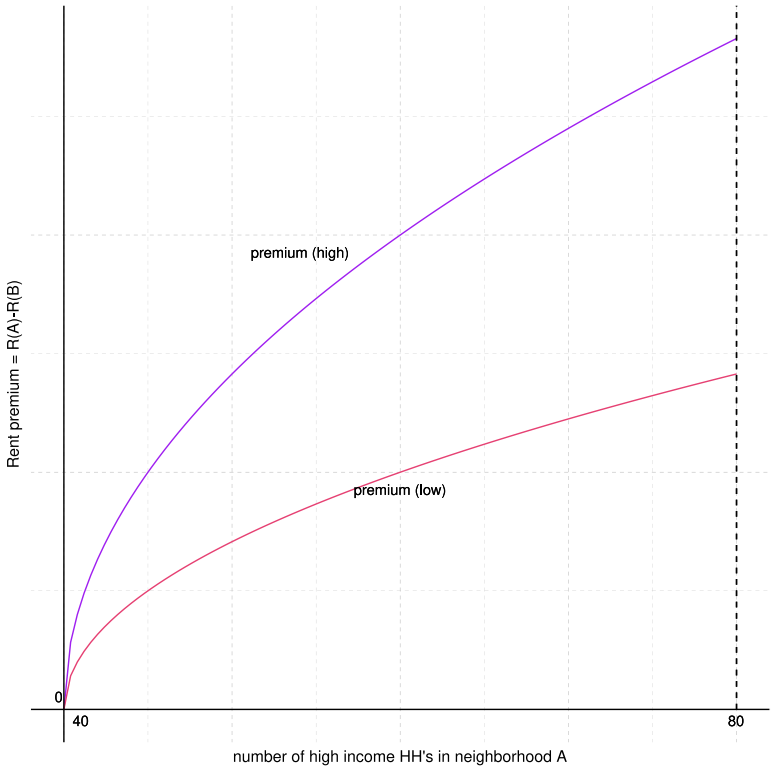
Rent Premium: Difference in rent between A and B

- $RP = R(A) - R(B)$ (for neighborhood A)
- Rent premiums for workers (may) differ by type: $RP_{high} \neq RP_{low}$
  - ie: Benefit of living close to high types might vary by type

Assume:

- Land will be allocated to the highest bidder
- Everyone in the same neighborhood pays the same rent/price

Becker-Murphy model: Segregation EQ



Suppose 40 HH's start in A $\Rightarrow$ **Perfectly intergrated** equilibrium

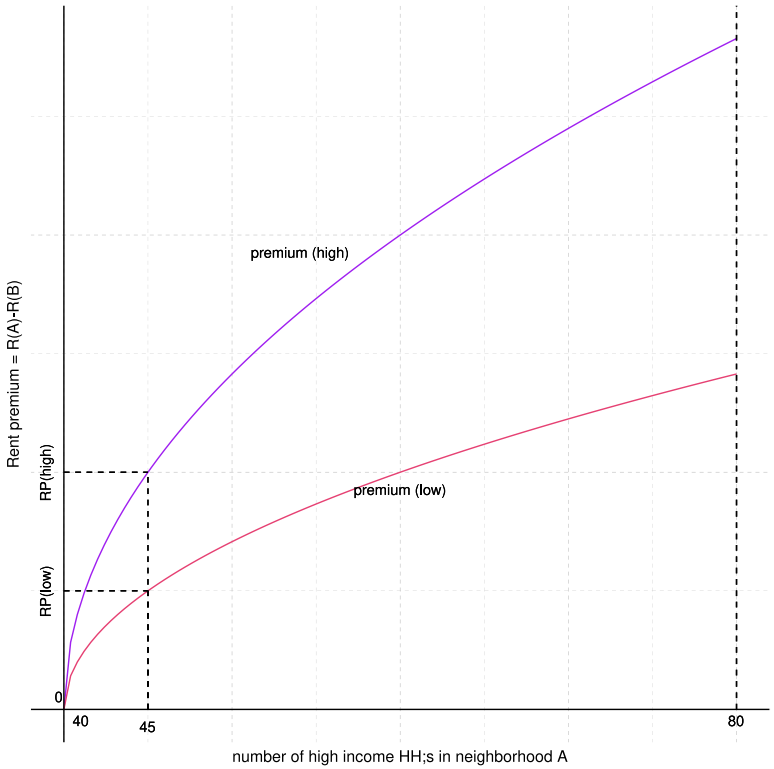
$$RP_{low} = RP_{high} = 0$$

$\Rightarrow$ HH's indifferent between A & B

--

- **EQ "Shock":** A few high income households move to A?
  - What happens?

Segregation Eq



If 5 high income HH's move into A, $RP(high) > RP(low)$

$\Rightarrow$ More favorable mix of neighbors

$\Rightarrow$ High income HH's are WTP more to move to A

$\Rightarrow$ Even more favorable mix

$\Rightarrow$ Neighborhood A is only high income HH's

- Slope purple line $>$ slope of orange line

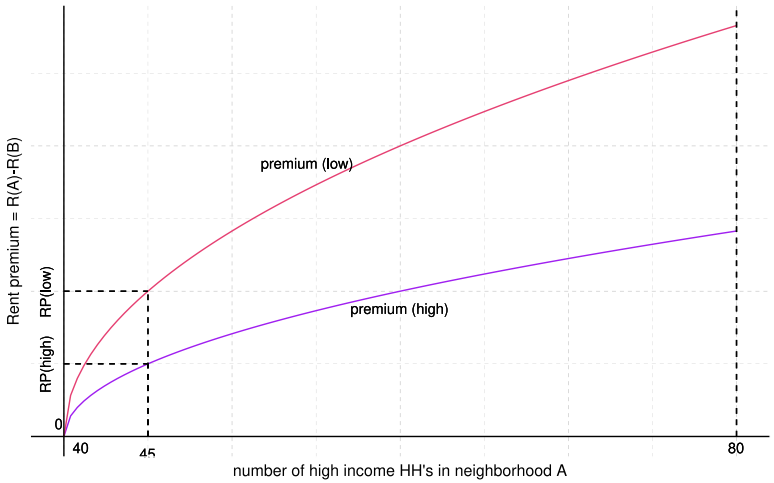
Recall **A02: Self-reinforcing changes lead to extreme outcomes**

Integration Eq

What happens in this case?

Notice: Slope purple line $<$ slope of orange line

Integration Eq



What does the shock do in this case?

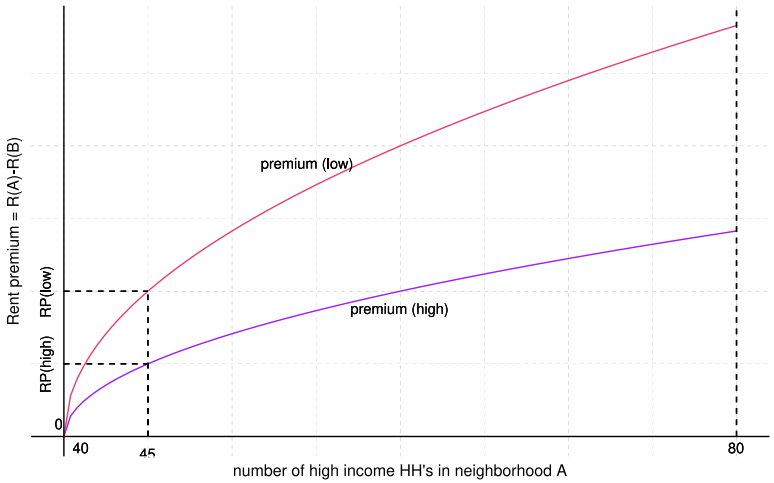
Notice: Slope purple line $<$ slope of orange line

$\Rightarrow RP(High) < RP(Low)$

$\Rightarrow$ Pushed back to the original EQ

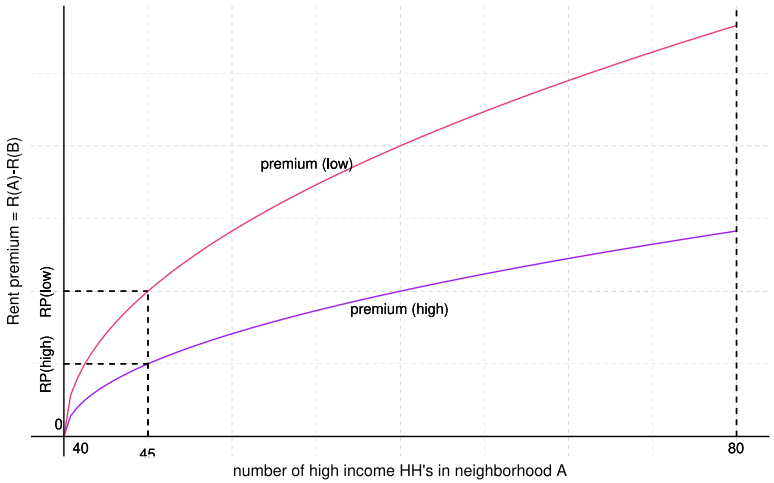
The starting EQ is the only EQ $\Rightarrow$ Stable EQ

Integration Eq



- Is the story the same here?
- Now, a small movement of high income HH's into A means $RP(High) < RP(low)$
- So we get pushed back to the initial equilibrium. In this case, intergration is the **only equilibrium**
- Furthermore, integration is a **stable equilibrium**

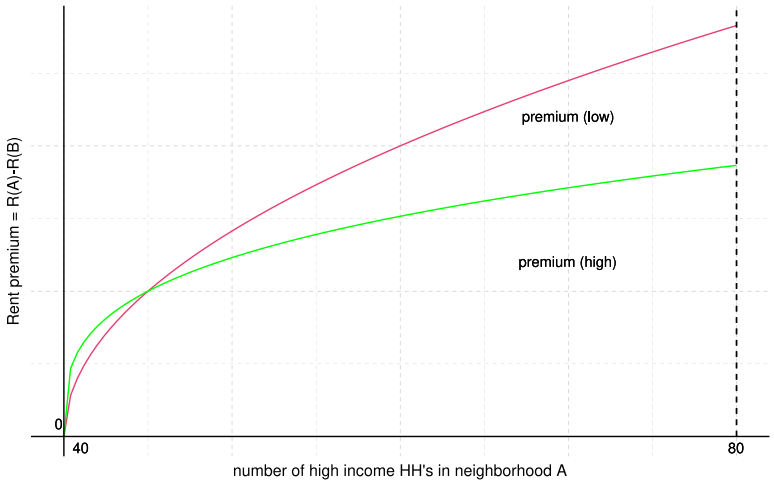
Integration Eq



Note: 80 high income HH's in A is not an EQ because $RP(low) > RP(high)$. So low incomes will outbid highs and move in

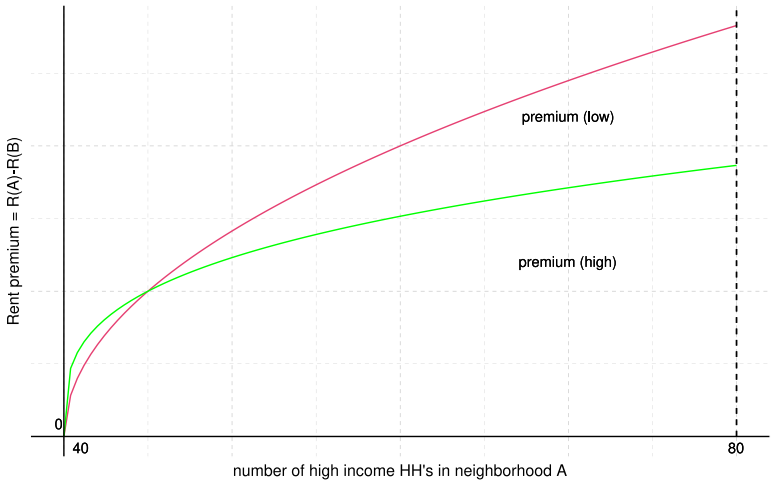
- Is the story the same here?
- Now, a small movement of high income HH's into A means $RP(High) < RP(low)$
- So we get pushed back to the initial equilibrium. In this case, intergration is the **only equilibrium**
- Furthermore, integration is a **stable equilibrium**

Mixed Eq



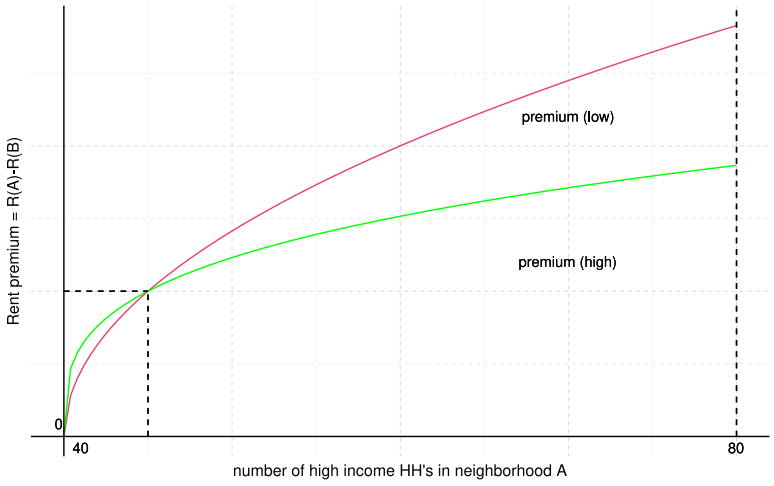
- What about a story like this?

Mixed Eq



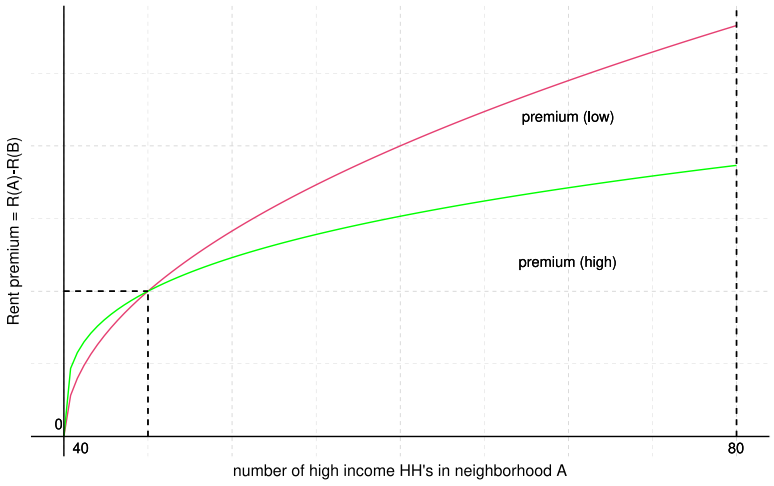
- What about a story like this?
- Integration eq (40 of each type in each nbhd) is still an equilibrium. Is it **stable**?

Mixed Eq



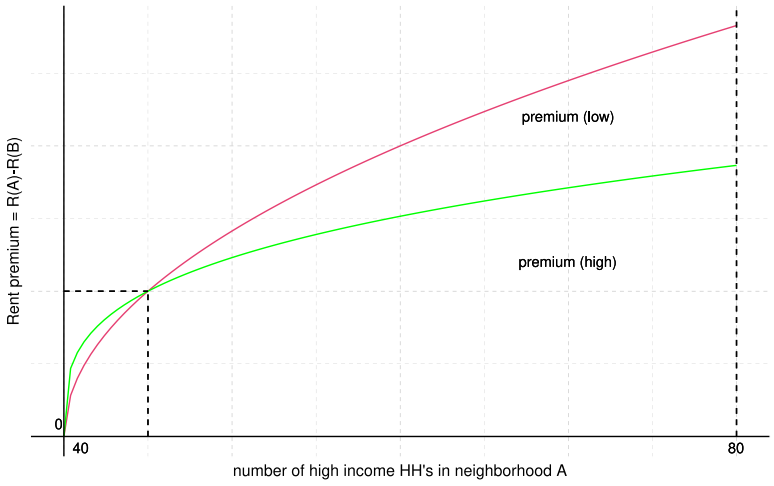
- What about a story like this?
- Integration eq (40 of each type in each nbhd) is still an equilibrium. Is it **stable**?
- No. A small deviation away means $RP(high) > RP(low)$. So highs outbid lows until $RP(high) = RP(low)$ at 45 highs in A and 35 lows.
- Is 45 highs in A stable?

Mixed Eq



- What about a story like this?
- Integration eq (40 of each type in each nbhd) is still an equilibrium. Is it **stable**?
- No. A small deviation away means $RP(high) > RP(low)$. So highs outbid lows until $RP(high) = RP(low)$ at 45 highs in A and 35 lows.
- Is 45 highs in A stable? Yes (you think about why)

Mixed Eq



- **Note**: Full segregation here is *not* an equilibrium for a similar reason to the last example

- What about a story like this?
- Integration eq (40 of each type in each nbhd) is still an equilibrium. Is it **stable**?
- No. A small deviation away means $RP(high) > RP(low)$. So highs outbid lows until $RP(high) = RP(low)$ at 45 highs in A and 35 lows.
- Is 45 highs in A stable? Yes (you think about why)

Eq Defn

To be clear, an *equilibrium* in this model is a point at which the rent premium is in balance across both groups

- This will hold when the rent premium curves intersect. Except at full segregation
  - If the RP for the group listed on the axis is *higher* then this will also be an equilibrium because **there is no tendency for change**
  - If the RP for the group listed on the axis is *lower* then population dynamics move away from this point

Stable vs Unstable Eq

1) An eq is **stable** if a small movement away will encounter self - **correcting** forces

- An eq is stable if when you move away from it, the pop. dynamics push you back to where you came from

2) A eq is **unstable** if a small movement away will encounter self - **reinforcing** forces

- That is, an eq is untable if when you move away from it, the population dynamics push you even farther than where you came from

A Heuristic

1) Draw a verticle dashed line at every intersection point

2) For every region between the verticle dashed lines, it must be the case that one of the rent premium curves is above the other

- If the rent prem curve for the group listed on the axis is **higher**, then this group will increase in number. Draw rightward arrows on the axis
- If the rent prem curve for the group listed on the axis is **lower**, then this group will decrease in number. Draw leftward arrows

A Heuristic

3) If there are rightward arrows pushing toward 100% in one nbhd, then 100% (complete segregation) is an eq even if the rent prem curves do not intersect there

4) For every eq. value, look at its immediate vicinity

- If there are arrows moving towards it, it is a **stable eq**
- If there are arrows moving away from it on one or both sides, it is a **unstable eq**

Neighborhood Sorting

Externalities for kids:

- Good/bad role models as adults
- Classmates in school: focused vs disruptive

Externalities for adults:

- Postive: job information, property valuation
- Negative: property values

In general: positive externalities increase with income and education level. Why?

Neighborhood Sorting

These externalities give rise to the following questions:

1. Who gets desirable neighbors?
2. Will there be segregated or integrated neighborhoods?
3. Will there be sorting or mixing with respect to income, age, race, or some combination of those factors?
    - Is this sorting *de jure*, *de facto*, or both? More on this next time
4. What are the implications for the price of land in various neighborhoods?

Checklist

1) ✅

- Exogenous Amenities
- Endogenous Amenities

2) ✅

3) : ✅