The Impact of Racial Segregation on College Attainment in Spatial Equilibrium

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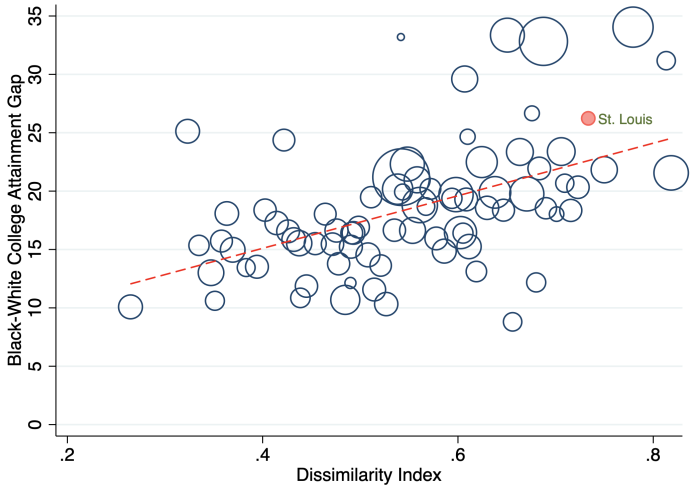
Black-White College Gap and Racial Segregation

- Large literature arguing that a child's neighborhood matters for their adult outcomes
- Racial and economic segregation are predominant features of many American cities
- Racial inequality in exposure to "high quality" neighborhoods (Bayer et al., 2021)

Do racial differences in exposure to high-quality neighborhoods explain the Black-White college gap?

Black-White College Gap and Segregation



In St. Louis:

- 47% of White children graduate from college
- 19% of Black children graduate from college
- 28 p.p. college gap

▷ College gap time series ▷ Maps St. Louis

Spatial Equilibrium and Race

- Spatial equilibrium model of a city with racial differences:

1. Black-White wage gap
   Gap in lifetime earnings between Black and White households

2. Amenity externalities: households care about the racial composition of neighbors
   Fear of discrimination in all White neighborhood, White flight, homophily

3. Moving costs vary by race
   Differences in borrowing constraints, discrimination in housing markets, information frictions

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  3. Moving costs vary by race
     Differences in borrowing constraints, discrimination in housing markets, information frictions
- General equilibrium neighborhood effects:
  - Rental markets
  - Human capital spillovers
    Peer effects, networks, school quality
  - Racial composition
    Matters due to amenity externalities

The Impact of Segregation on Racial Gap in College Attainment

- Model explains 80% of Black-White college gap and the level of segregation in St. Louis
  - The wage gap has a direct effect on the college gap, but a minor effect on segregation
  - The amenity externalities and the mobility costs have direct effects on segregation
  - Changes in segregation affect the exposure to high-quality neighborhoods and the college gap

The Impact of Segregation on Racial Gap in College Attainment

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  - The amenity externalities and the mobility costs have direct effects on segregation
  - Changes in segregation affect the exposure to high-quality neighborhoods and the college gap
- Escaping segregation traps
  - Spillovers + amenity externalities $\Longrightarrow$ multiple equilibria
  - Economy can coordinate to live in a less segregated equilibrium

▷ Related literature

Model

Model

- Overlapping generations who each live 2 periods
- Households are of race r in $\{B, W\}$ which impacts:
  - Wages: calibrated Black-White wage gap
  - Amenity externalities: preferences over the racial composition of the neighborhood
  - Mobility cost: barriers to moving faced by Black households

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- 3 neighborhoods n in $\{A, B, C\}$, with 3 equilibrium characteristics:
  - Rent: p_n
  - Local spillover: X_n, college share
  - Racial composition: $S_{r,n}$, population share of each race

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- Timing:
  - Adults choose their neighborhood
  - They decide how much to consume and invest in their child
  - The child is born, realization of ability and education preference shock
  - Child chooses education level, e in $\{e^L, e^H\}$, with which they will enter adulthood

Adult Problem: Consumption, Investment, and Neighborhood Choices

$$V(r, a, s, e, n_0, n) = \max_{c,i} \log(c) + \log\left(A(n, r, S_{r,n})\right) + \beta \mathbb{E}_{e,a}\left[\mathcal{V}\left(r, a', s', e', n\right)\right]$$

subject to

$$\begin{aligned} c + i + p_n + m(r)\mathbb{I}(n \neq n_0) &= y(r, e, s) \\ a' &\sim \Gamma(a) \\ s' &= F^s(a', i, X_n) \\ P(e' = e^H) &= G^e\left(r, a', s', n\right) \end{aligned}$$

- Amenity externalities: neighborhood valuation depends on racial composition, $S_{r,n}$
- Mobility cost: depends on race
- Income: depends on race, education, and skills
- Local spillover: share of college-educated adults, X_n

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- Income: depends on race, education, and skills
- Local spillover: share of college-educated adults, X_n
- Neighborhood choice:

$$\mathcal{V}(r, a, s, e, n_0) = \max_n \{V(r, a, s, e, n_0, n) + \varepsilon^n\}$$

ε^n: neighborhood preference shock drawn from a type 1 extreme value distribution

Child's Problem: Education Choice

- Skill formation:

$$\log s = \theta_c + \underbrace{\theta_a \log(a) + \theta_i \log(i)}_{\text{individual}} + \underbrace{\theta_X \log(X_n)}_{\text{neighborhood}}$$

- Skill affects: (i) income, (ii) education cost
- Education choice:

$$e = \underset{\{e^L, e^H\}}{\text{argmax}} \{\mathcal{V}\left(r, a, s, e^L, n\right) + \sigma^L, \mathcal{V}\left(r, a, s, e^H, n\right) - \underbrace{(\bar{c} - s)}_{\text{educ. cost}} + \sigma^H\}$$

  - σ^H, σ^L are preference shocks drawn from a type 1 extreme value distribution
  - The cost of acquiring education is decreasing in skill

Three General Equilibrium Forces

- Housing: elastically supplied, $S_n = \eta_n p_n^{\psi}$
- Local spillovers: X_n, share of adults with e^H
- Amenity externalities: $S_{r,n}$, race shares by neighborhood

▷ Equilibrium Definition

Quantification

Calibration Strategy

Focus on St. Louis MSA

- **Five key empirical estimates:**

  1. Amenity externalities
  2. Black-White wage gap
     Race penalty of $\approx 8\%$
  3. Moving across neighborhoods
     Black households ≈ 6 p.p. less likely to move
  4. Neighborhoods
  5. Skills and education

  } Sources of racial differences

- **Calibration:** some external and some internal, to match the data
- **Validation:** replicate 2 estimates of causal effects from the literature

▷ Details wage gap ▷ Details moving across neighborhoods ▷ Details skill

Amenity Externalities

Why do amenities depend on racial composition?

- Homophily, discrimination (Becker and Murphy, 2000)

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Model:

- Penalty on exogenous amenities (Banzhaf and Walsh, 2013):

$$A(n, r, S_{r,n}) = A_n \left(1 - \varphi_r \left(S_{r,n} - \gamma_r\right)^2\right)$$

- Utility from exogenous amenities A_n decreases as racial composition differs from ideal
- $S_{r,n}$ is the share of population of race r in n
- γ_r is the "bliss point" for racial composition, φ_r is a weight on the penalty

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Data:

- Survey evidence: $\gamma_B = 0.5$, $\gamma_W = 0.9$ (Farley et al., 1997; Krysan and Farley, 2002) ▷ Details
- Causal effect of racial composition on neighborhood choice (Caetano and Maheshri, 2021)
  Choose φ_r to target these causal effects ▷ Details

Neighborhoods

- Use a k-means clustering of Census tracts based on: (i) household income, (ii) house prices, (iii) share of adults with college degree, and (iv) Black share
- 3 neighborhoods:
  - A: Black (78%) and low-income ($33k)
  - B: White (91%) and middle-income ($55k)
  - C: White (93%) and high-income ($85k)

▷ Details ▷ Map

Calibration: Internal Parameters and Targeted Moments

Parameter	Description	Value	Moment	Data	Model
Neighborhoods					
A_A	Amenity in A	1.0000	Population neighborhood A	0.1700	0.1743
A_B	Amenity in B	1.1178	Population neighborhood B	0.6200	0.6159
A_C	Amenity in C	1.2207	Population neighborhood C	0.2100	0.2098
η_A	Housing supply in A	25.3023	Rent neighborhood A	0.1200	0.1213
η_B	Housing supply in B	22.6165	Rent neighborhood B	0.2178	0.2172
η_C	Housing supply in C	1.4118	Rent neighborhood C	0.4460	0.4459
κ	Shape parameter for location	0.1492	Neighborhood flows	0.3500	0.4076
m^B	Migration cost for Black HHs	0.0595	Difference in moving prob for Black HHs	-0.0610	-0.0629

▷ External parameters ▷ Details: flows ▷ Policy functions

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Amenities: Importance of bliss point					
φ_W	White	0.6541	Migration response to Black share, Black non-college	0.0241	0.0356
φ_B	Black	1.0420	Migration response to Black share, Black college	0.0345	0.0358
			Migration response to Black share, White non-college	-0.0225	-0.0273
			Migration response to Black share, White college	-0.0283	-0.0270

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Skill					
θ_c	Constant term	0.5552	Mean skills	1.0000	1.2178
θ_a	Ability	0.5471	Regression coefficient of education on skills	0.1910	0.1895
θ_i	Investment	0.4529	Covariance (s, i)	0.1612	0.2199
θ_X	Spillovers	0.1697	Ratio college share neighborhood C to A	3.5333	3.3946

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Ability					
ρ_a	Persistence ability	0.3984	Regression coefficient of child on parent ability	0.5100	0.5055
σ_a	Std. dev. ability	1.1881	R^2 child on parent ability	0.2600	0.2555
Education					
$\bar{c}$	Education cost level	2.1125	Educational probability	0.4166	0.4245
σ	Shape parameter education	0.4109	R^2 education choice	0.1570	0.1450

▷ External parameters ▷ Details: flows ▷ Policy functions

Model Validations

Validation 1: Moving to Opportunity (Chetty et al., 2016)

- Data: MTO voucher program increased college attainment
- Model: Subsidize rent differences across neighborhoods for households living in A

	Data	Model
Takeup rate (%)	[46.0, 49.3]	31.0
College attainment, treatment-on-the-treated (%)	[2.9, 7.6]	4.1
College attainment, intent-to-treat (%)	[1.4, 3.7]	1.3

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Validation 2: Causal effect of segregation (Ananat, 2011)

- Data: Use train tracks instrument to measure causal effect of segregation on college attainment
- Model: Eliminate amenity externality, evaluate the response in college

	Data	Model
Δ college attainment, White	[-0.29, 0.012]	0.0791
Δ college attainment, Black	[-0.52, -0.078]	-0.2108

Model: Segregation and College Gap

Model Explains Segregation and the College Gap

Model generates 80% of the college gap and the level of segregation

	Data	Model
College attainment:		
All, %	0.42	0.42
White, %	0.47	0.47
Black, %	0.19	0.25
College gap, p.p.	0.28	0.22
Black share:		
All	0.20	0.20
Neighborhood A	0.78	0.79
Neighborhood B	0.09	0.09
Neighborhood C	0.07	0.04
Dissimilarity Index	0.61	0.65

Wage gap:
Higher earnings enable White HH to afford better neighborhoods, invest in kids

Amenity externalities:
Drives White HHs to C and Black HHs to A
Segregation $\Longrightarrow$ lower spillovers for Black $\Longrightarrow$ college gap

Mobility cost differences:
Reinforces these outcomes

▷ Dissimilarity index ▷ Role of heterogeneity

Sources of College Gap: Wage Gap, Amenity Externality, Mobility Cost

No Wage Gap Counterfactual, $w(B, e) = w(W, e)$

	GE change in X_n	GE change in $S_{r,n}$	GE change in p_n	College gap	Dissimilarity index
Benchmark				0.22	0.65
General equilibrium	$\surd$	$\surd$	$\surd$	0.06	0.46

- Removing the Black-White wage gap decreases segregation by 29% and college gap by 16 p.p.

▷ Investment

No Wage Gap Counterfactual, $w(B, e) = w(W, e)$

	GE change in X_n	GE change in $S_{r,n}$	GE change in p_n	College gap	Dissimilarity index
Benchmark				0.22	0.65
General equilibrium	$\surd$	$\surd$	$\surd$	0.06	0.46
Partial equilibrium	$\times$	$\times$	$\times$	0.17	0.60
No Δ spillovers	$\times$	$\surd$	$\surd$	0.16	0.61
No Δ race amenities	$\surd$	$\times$	$\surd$	0.13	0.59
No Δ rental price	$\surd$	$\surd$	$\times$	0.10	0.47

- Removing the Black-White wage gap decreases segregation by 29% and college gap by 16 p.p.
- Strong GE effects of change in spillovers for the college gap
- Strong GE effects of change in spillovers and race amenities for segregation

▷ Investment

Race-Blind Counterfactual: No Amenity Externality, $\varphi_b = \varphi_w = 0$

	GE change in X_n	GE change in $S_{r,n}$	GE change in p_n	College gap	Dissimilarity index
Benchmark				0.22	0.65
General equilibrium	$\surd$	$\surd$	$\surd$	0.05	0.07

- Removing amenity externality decreases segregation by 89% and college gap by 17 p.p.

Race-Blind Counterfactual: No Amenity Externality, $\varphi_b = \varphi_w = 0$

	GE change in X_n	GE change in $S_{r,n}$	GE change in p_n	College gap	Dissimilarity index
Benchmark				0.22	0.65
General equilibrium	$\surd$	$\surd$	$\surd$	0.05	0.07
Partial equilibrium	$\times$	$\times$	$\times$	0.06	0.07
No Δ spillovers	$\times$	$\surd$	$\surd$	0.05	0.07
No Δ race amenities	$\surd$	$\times$	$\surd$	0.05	0.07
No Δ rental price	$\surd$	$\surd$	$\times$	0.06	0.07

- Removing amenity externality decreases segregation by 89% and college gap by 17 p.p.
- GE effects are not important
- Changes in segregation affect the exposure to high-quality neighborhoods and the college gap

Equal Mobility Cost

	GE change in X_n	GE change in $S_{r,n}$	GE change in p_n	College gap	Dissimilarity index
Benchmark				0.22	0.65
General equilibrium	$\surd$	$\surd$	$\surd$	0.12	0.28

- Equalizing mobility costs decreases segregation by 57% and college gap by 10 p.p.

▷ Effects on intergenerational mobility

Equal Mobility Cost

	GE change in X_n	GE change in $S_{r,n}$	GE change in p_n	College gap	Dissimilarity index
Benchmark				0.22	0.65
General equilibrium	$\surd$	$\surd$	$\surd$	0.12	0.28
Partial equilibrium	$\times$	$\times$	$\times$	0.22	0.59
No Δ spillovers	$\times$	$\surd$	$\surd$	0.16	0.40
No Δ race amenities	$\surd$	$\times$	$\surd$	0.22	0.60
No Δ rental price	$\surd$	$\surd$	$\times$	0.15	0.37

- Equalizing mobility costs decreases segregation by 57% and college gap by 10 p.p.
- Strong GE effects of spillovers and racial composition
- Changes in segregation affect the exposure to high-quality neighborhoods and the college gap

▷ Effects on intergenerational mobility

Multiple Equilibrium

Spillovers + Amenity Externality $\Longrightarrow$ Multiple Equilibrium

	Equilibrium 1	Equilibrium 2
Dissimilarity index	0.65	0.42
College gap	0.22	0.10
SSE	0.03	1.27

Equilibrium 1:

- Segregated equilibrium
- Matches the data

Equilibrium 2:

- Integrated equilibrium
- Lower college gap

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Equilibrium 1:

- Segregated equilibrium
- Matches the data

Equilibrium 2:

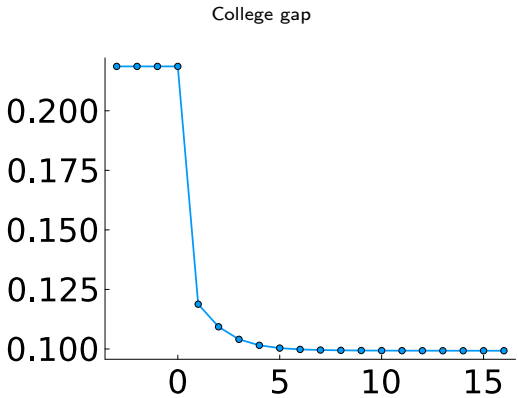
- Integrated equilibrium
- Lower college gap

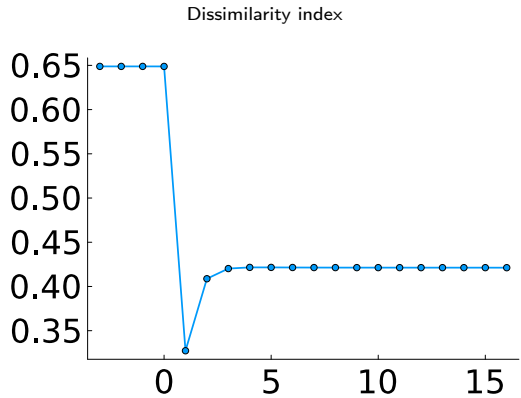
Can we coordinate to move the economy from the segregated to the integrated equilibrium?

- Start in Equilibrium 1
- In period $t = 0$ agents learn that in period $t = \tau$ they will coordinate to be in Equilibrium 2
- What is the transition path?

▷ Third equilibrium

Escaping the Segregation Trap





- Fast coordination to equilibrium 2, robust for different values of τ
- Lower college gap and segregation

▷ Neighborhoods

Conclusion

Conclusion

Add race to a benchmark model of a city with neighborhood spillovers

- Model replicates 80% of the Black-White college gap, and the level of segregation

Takeaways:

1. Closing the Black-White wage gap alone does *not* completely reduce college gap or segregation
   - Neighborhood racial segregation largely maintained
2. Other way to reduce the gap: households move across neighborhoods, equalizing spillovers
   - Eliminating the amenity externality in preferences has the largest impact
   - Reduces segregation even though racial income and financial constraints remain in place
3. Multiple equilibria
   - The data indicate that St. Louis is in the segregated equilibrium
   - Exists a second, more integrated equilibrium with a lower college gap
   - A transition from the segregated to the integrated equilibrium can be fast

Appendices

Related Literature

- **Empirical literature:**
  - Ananat (2011); Biasi (2021); Billings et al. (2013); Boustan (2013); Cameron and Heckman (2001); Card and Rothstein (2007); Chetty and Hendren (2018a,b); Chetty et al. (2016); Cutler and Glaeser (1997); Derenoncourt (2022); Graham (2018); Hyman (2017); Jackson et al. (2016); Monarrez and Schönholzer (nd); Neal and Johnson (1996)
- **Racial segregation in spatial equilibrium, but no human capital:**
  - Schelling (1969), Schelling (1971)
  - Banzhaf and Walsh (2013), Bayer et al. (2004), Bayer and McMillan (2005), (Caetano and Maheshri, 2021)
- **Neighborhood spillovers in human capital accumulation, but no race:**
  - Fernandez and Rogerson (1996), Brock and Durlauf (1995), Benabou (1996)
  - Aliprantis and Carroll (2018), Fogli and Guerrieri (2019), Zheng and Graham (2022), Eckert and Kleineberg (2019), Chyn and Daruich (2022)
- **Our contribution:** Add race to a spatial model with education and neighborhood spillovers
  - Badel (2015)

▷ Back

Recursive Competitive Equilibrium

A *Recursive Competitive Equilibrium* is characterized by policy functions for the neighborhood choice $n(r, a, s, e, n_0)$, consumption $c(r, a, s, e, n_0, n)$, and investment $i(r, a, s, e, n_0, n)$ decisions of the parent, the education choice $e'(r, a, s, e, n)$ of the child, value functions $V(r, a, s, e, n_0, n)$, house prices $\{p_n\}_{n=1}^N$, local spillovers $\{X_n\}_{n=1}^N$, neighborhood racial shares $\{S_{r,n}\}_{n=1}^N \forall r \in \{B, W\}$, and an ergodic distribution $F(r, a, s, e, n_0, n)$ over race, ability, skills, education, birth neighborhood, and adult neighborhood, which satisfy the following:

1. Household optimization: the policy functions n, e', c, i solve both the adult's and child's problem.
2. Housing market clearing:

$$\eta_n p_n^{\psi} = S_n = \int F(dr, da, ds, de, dn_0, n) \qquad \forall\, n = 1, \ldots, N$$

3. Spillover consistency:

$$X_n = \frac{\int F(dr, da, ds, e^H, dn_0, n)}{\int F(dr, da, ds, de, dn_0, n)} \qquad \forall\, n = 1, \ldots, N$$

4. Location consistency:

$$S_{r,n} = \frac{\int F(r, da, ds, de, dn_0, n)}{\int F(dr, da, ds, de, dn_0, n)} \qquad \forall\, n = 1, \ldots, N \text{ and } r = \{b, w\}.$$

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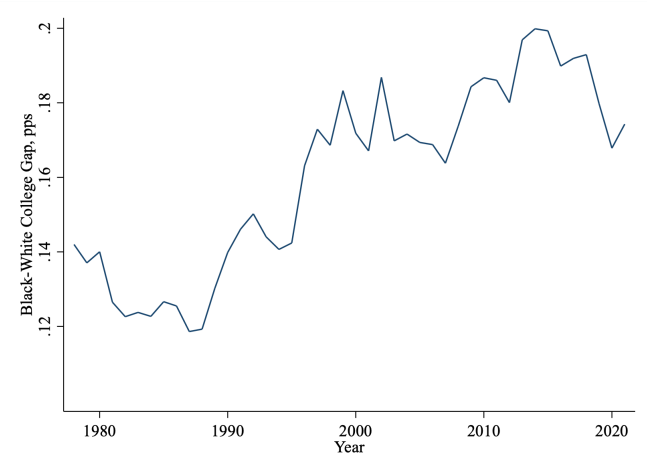
Data

Black-White College Attainment Gap



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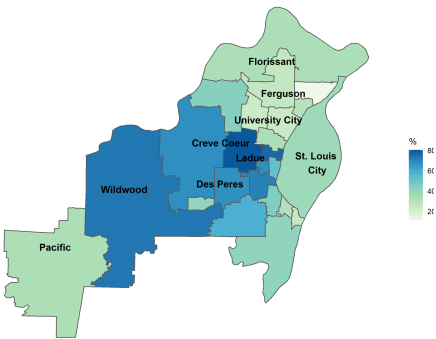
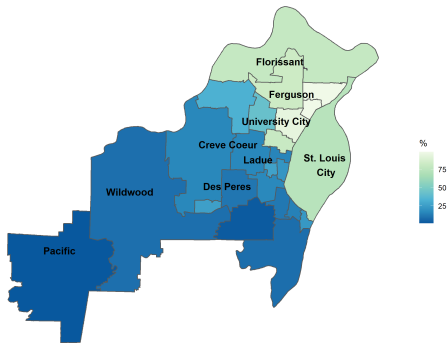
High Correlation between Race and College Attainment in St. Louis

College Enrollment



Black Share



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Survey Evidence

Survey evidence from (Farley et al., 1997; Krysan and Farley, 2002)

	Attractiveness Ratings of Neighborhoods by Racial Composition (Black Respondents)
All Black	20%
Majority Black	23%
50% Black	50%
Majority White	5%
All White	2%

	Reasons Blacks Find A Neighborhood Most Attractive
Because it is mixed	56%
Positive effects of integration	22%
Better neighborhood characteristics	7%
White hostility	4%
Other	11%

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Survey Evidence

Krysan and Farley (2002)

TABLE 1: Attractiveness Ratings of Neighborhoods by Racial Composition and Rank Order (Black Respondents)

	First Choice Percent	Second Choice Percent	Third Choice Percent	Fourth Choice Percent	Fifth Choice Percent
All black	20	7	24	32	16
10 black–4 white	23	58	13	6	1
7 black–7 white	50	22	26	1	< 1
2 black–12 white	5	12	34	49	1
All white	2	2	3	12	81
Total	100	100	100	100	100
Sample size	2001	1995	1989	1977	1975

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Estimating the Causal Effect of Race

(Caetano and Maheshri, 2021): Model of neighborhood choice isolating the causal effect of race from other neighborhood characteristics

	White		Black	
	Rich	Poor	Rich	Poor
Response to:				
Black Share	-2.83***	-2.25***	3.45***	2.41***
	(0.40)	(0.45)	(0.43)	(0.42)
Poor Share	-0.69***	3.60***	-2.35***	0.44
	(0.24)	(0.42)	(0.37)	(0.29)

Source: (Caetano and Maheshri, 2021)

- For White households, probability of choosing a neighborhood declines 2.25 or 2.83 percent when the Black share increases by 10 percentage points, for poor and rich households respectively
- Responses to race are larger than responses for income (except for poor White)
- Other papers find similar effects of race Bayer et al. (2017); Bayer and McMillan (2005); Bayer et al. (2004); Boustan (2013); Card et al. (2008)
- Validate our model comparing causal effect of race with (Caetano and Maheshri, 2021)

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Black-White Wage Gap

Mincer regression in NLSY-97:

$$\log(\text{earnings}_i) = \alpha\ \text{race}_i + \beta\ \text{college}_i + \underbrace{\chi\ \log(ASVAB_i)}_{\text{skill}} + \delta\ \text{gender}_i + \varepsilon_i$$

Implies $y(r, e, s) = w(r, e)s^{\chi}$

	Wage
Below college	
White	1.00
Black	0.92
College or above	
White	1.71
Black	1.58
Return to skill	
χ	0.185

Gaps consistent with the literature (Heckman et al., 2006; Neal and Johnson, 1996)

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Black-White Wage Gap Across Decades, St. Louis

	1980-1989	1990-1999	2000-2009	2010-2019
Below college				
White	1.000	1.000	1.000	1.000
Black	0.783	0.831	0.875	0.819
College or above				
White	1.281	1.567	1.632	1.817
Black	1.004	1.302	1.427	1.489

Black-White Wage Gap Across Decades, National:

	1980-1989	1990-1999	2000-2009	2010-2019
Below college				
White	1.000	1.000	1.000	1.000
Black	0.823	0.893	0.910	0.895
College or above				
White	1.446	1.704	1.802	1.988
Black	1.190	1.522	1.639	1.729

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Moving Across Neighborhoods

- Differential moving costs to capture a range of forces including:
  - Differences in borrowing constraints
  - Discrimination in housing markets
  - Information frictions
- Target: Racial difference in the intergenerational neighborhood moving probability controlling for:
  - Childhood household income
  - Parents education
  - Childhood neighborhood type
- Black households $\approx$ 6 p.p. less likely to move across neighborhood types

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Mobility Difference for Black Households

Dependent variable: indicator for parent neighborhood type $\neq$ child neighborhood type

	(1)
Childhood neighborhood type	
B	-0.328^{***}
	(0.026)
C	-0.188^{***}
	(0.029)
Log income	0.003
	(0.009)
Race	-0.061^{**}
	(0.028)
Constant	0.681^{***}
	(0.102)
N	3848
R^2	.047
FE for parents' education	✓

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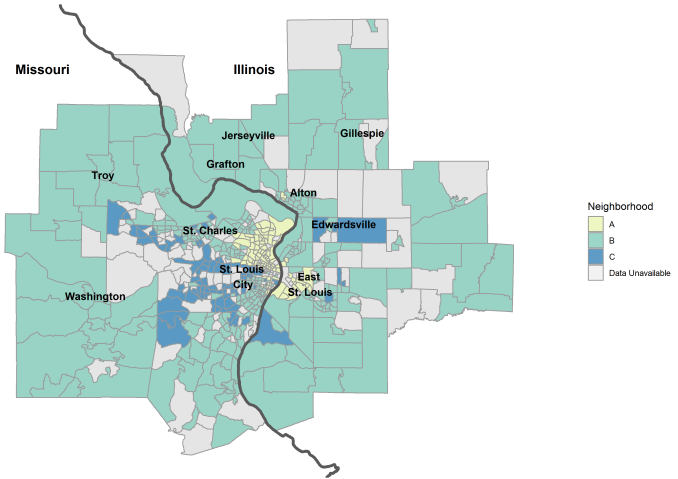
Neighborhood Segregation



Clusters:

A: Black & low-income

B: White & middle-income

C: White & high-income

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Neighborhood Segregation

	All	Cluster A	Cluster B	Cluster C
Population Share	1.00	0.17	0.62	0.21
Black Share	0.20	0.78	0.09	0.07
College Share of Adults	0.28	0.15	0.23	0.53
Income ($)	57,835	33,273	55,405	84,749
Median House Price ($)	171,749	82,699	150,060	307,244

Notes: K-means clustering for St. Louis MSA. Data from 2000 Census and (Chetty et al., 2018)

- Cluster A: Majority Black & low-income
- Cluster B: Majority White & middle-income
- Cluster C: Majority White & high-income

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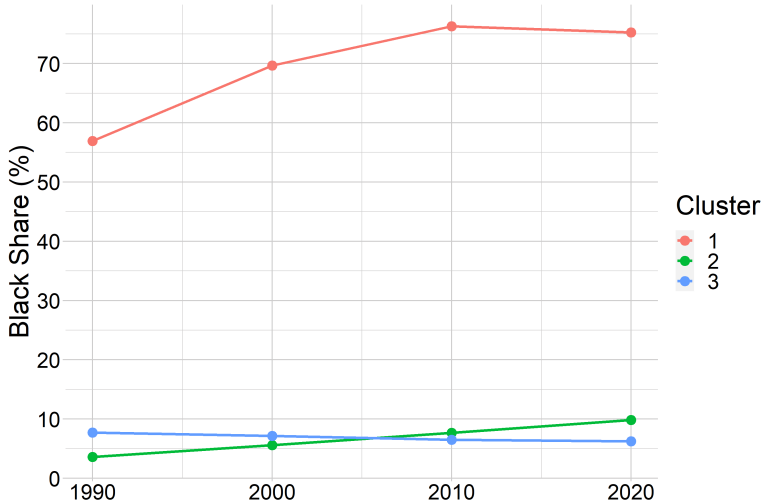
Black Share by Cluster Over Time



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Skills and Education

Model:

- Education cost depends on skill, s
- $\log s = \theta_s + \underbrace{\theta_a \log(a) + \theta_i \log(i)}_{\text{individual}} + \underbrace{\theta_X \log(X_n)}_{\text{neighborhood}}$

Target moments:

1. Importance of skill for education: $\text{educ}_i = \alpha + \beta\, s_i + \varepsilon_i$
2. Importance of parental investment: covariance(s, i)
3. Spillovers: Ratio college share neighborhood C to A, $\frac{X_C}{X_A}$

Map between model and data from NLSY-97 and Census:

Model	Data
s = skill	ASVAB score
a = ability	unobserved
i = investment	parental transfers
X_n = neighborhood college share	neighborhood college share

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Calibration: External Parameters

Parameter	Description	Value	Source
β	Discount factor	0.97^{40}	
γ_B	Bliss points for Black households	0.50	Banzhaf and Walsh (2013)
γ_W	Bliss points for White households	0.90	Banzhaf and Walsh (2013)
$w(B, L)$	Relative wage of Black, low education	0.92	Mincer regressions
$w(B, H)$	Relative wage of Black, high education	1.58	Mincer regressions
$w(W, H)$	Relative wage of White, high education	1.71	Mincer regressions
ψ	Housing supply elasticity	2.36	Saiz (2010)
m	Moving cost, money	0.0033	Bergman et. al. (2019)

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Neighborhood Flows

- Cluster Census tracts at the national level
  - K–means clustering algorithm on race share, income, housing prices, and college share
- NLSY: See county, race, education $\rightarrow$ estimate the probability of being in each cluster
- Compute the probability of moving between clusters between age 17 and 35.
- Conclusion: take a midpoint of 35% move across clusters

	Sample Restriction	
	50%	75%
Neighborhood flows	.461	.253
Observations	16,364	3,173

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Dissimilarity Index

- Use dissimilarity index as in Ananat (2011)
- Dissimilarity index is defined as:

$$\text{seg} = \frac{1}{2}\sum_{i}^{N}\left|\frac{Black_i}{Black_{total}} - \frac{White_i}{White_{total}}\right|$$

  where N is the number of neighborhoods

- Measures (Ananat, 2011):

  "What percent of Blacks (or non-Blacks) would have to move to a different census tract in order for the proportion of Black households in each neighborhood to equal the proportion Black in the city as a whole?"

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Quantitative Results

Neighborhood Heterogeneity Matters

- Three GE neighborhood variables: Spillovers (X_n), race shares ($S_{r,n}$), and rents (p_n)
- What would happen if these are determined at the city, instead of neighborhood, level?

	College gap	Dissimilarity Index
Benchmark	0.22	0.65
Equal spillovers	0.08	0.57
Equal race shares	0.05	0.07
Equal rents	0.04	0.36

- Equal spillovers $\Longrightarrow$ lower college gap, but still high segregation
- Equal race shares or rents $\Longrightarrow$ lower segregation $\Longrightarrow$ lower college gap

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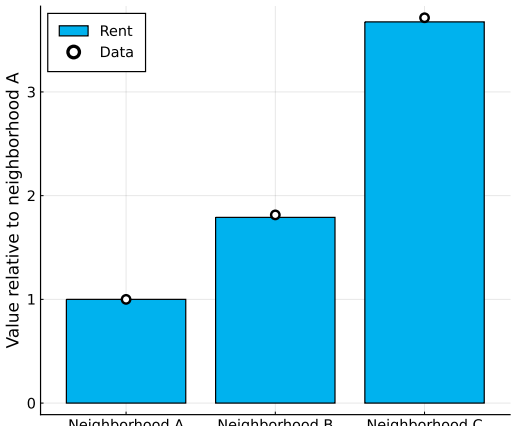
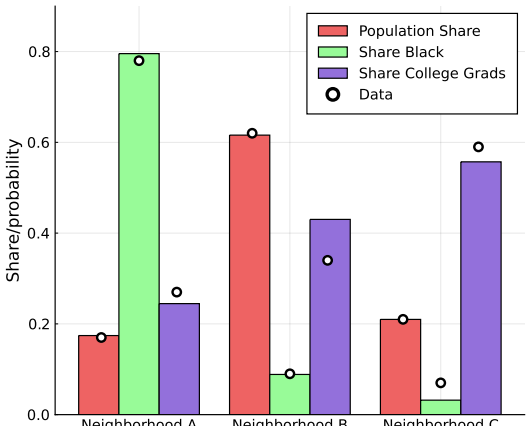
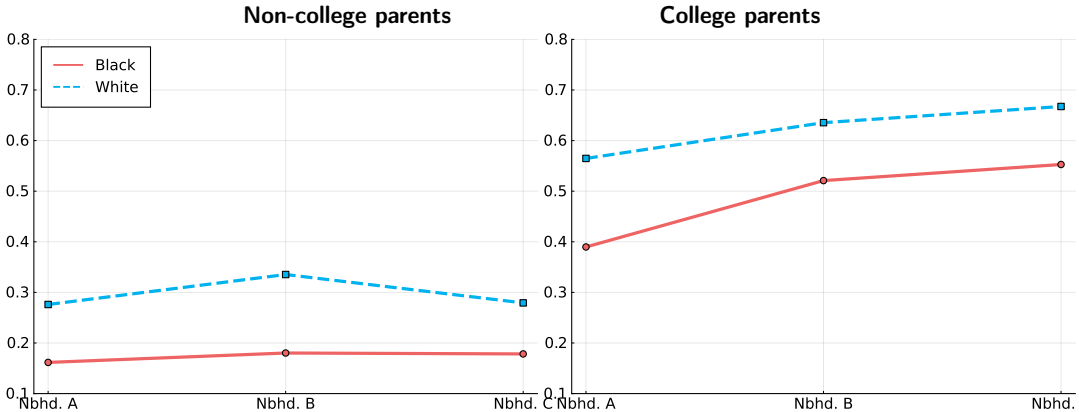
Baseline: Neighborhood Characteristics

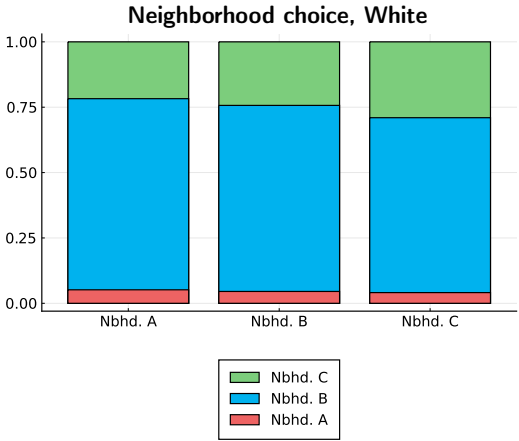


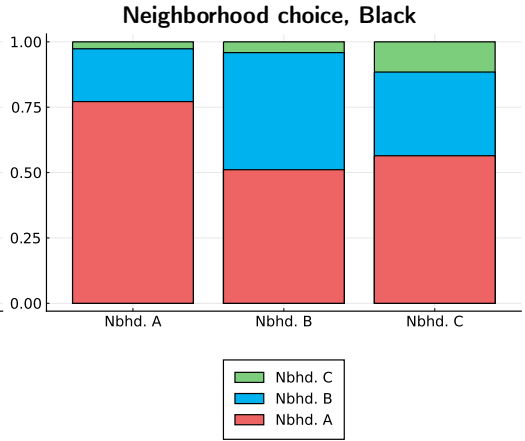


Benchmark: Probability of Going to College



Benchmark: Policy Rules, Neighborhood Choice





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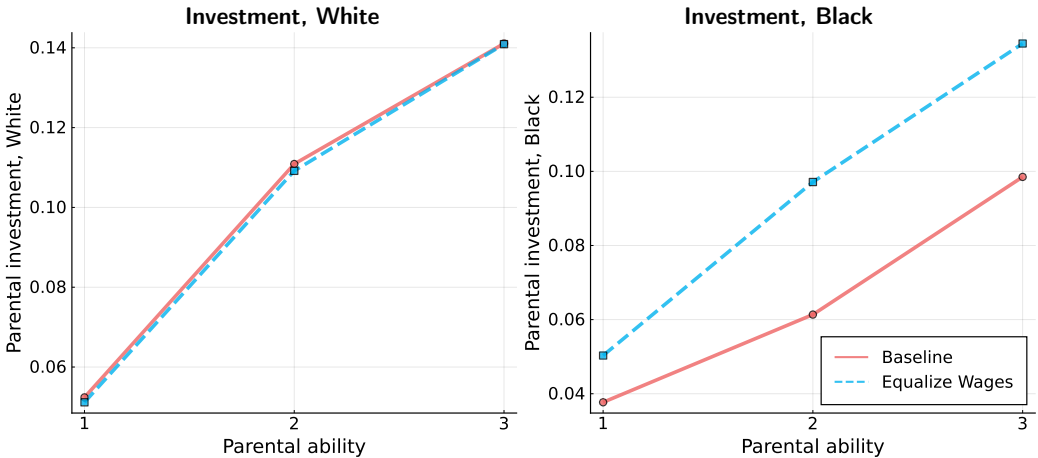
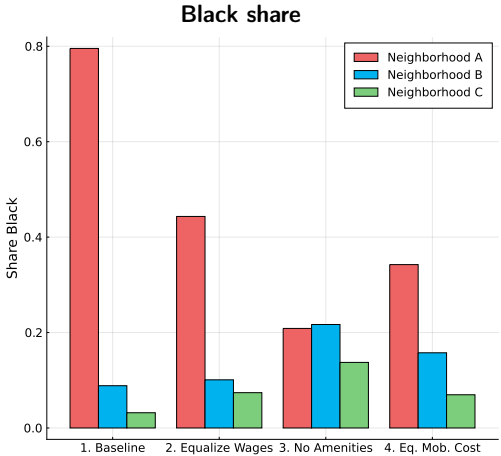
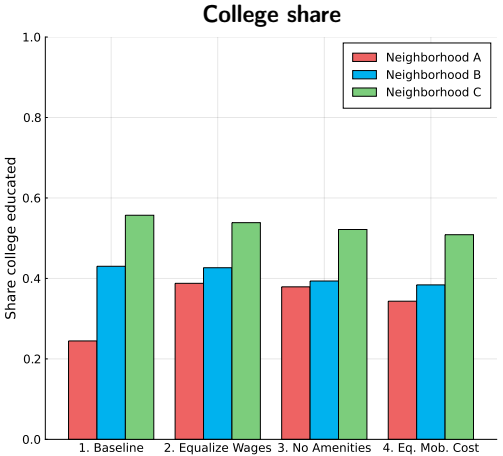
Equalizing Wages: Investment is the Primary Driver of the Closing Education Gap



Neighborhood Characteristics Equalization





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Improvements in intergenerational mobility among Black children

	Education Probability			
	Benchmark	No wage gap	Race blind	Equal mobility cost
Non-college parent, White	0.32	0.30	0.29	0.28
Non-college parent, Black	0.17	0.26	0.25	0.20
Gap	0.14	0.04	0.04	0.08
College parent, White	0.64	0.63	0.61	0.61
College parent, Black	0.48	0.58	0.58	0.52
Gap	0.17	0.04	0.03	0.09

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Third Equilibrium

- Almost everyone lives in C (except a few moves due to the EV shocks)
- As a result, the racial composition of C is close to 80% white, 20% black
- The racial composition of A and B is close to 100
- The value of the amenities of both A and B are very low for White and Blacks.
- As a result, they choose to stay in C, justifying the equilibrium.
- In other words, the housing supply elasticity, which pin down rents, is not enough to make everyone living in C not that attractive.
- But living in C is too expensive, so they do not become educated (education probability 1% due to EV shocks)

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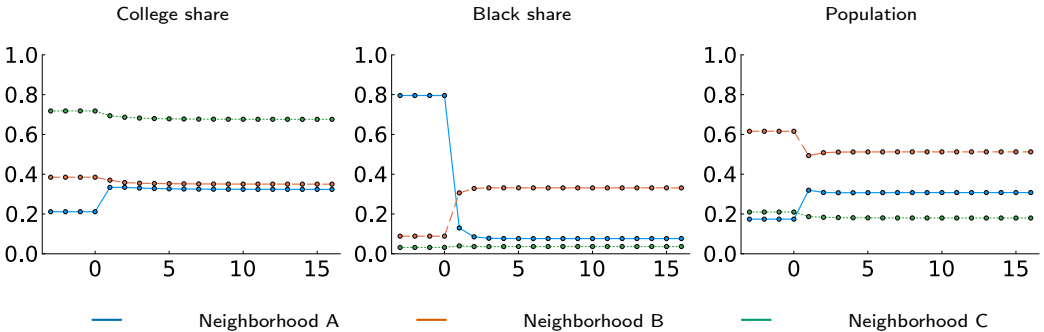
Escaping the Segregation Trap



- Fast coordination to equilibrium 2, robust for different values of τ

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