The problem has existed over endless years: Racialized difference in commuting, 1980–2019

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"The problem has existed over endless years"

- Plessy v. Ferguson (1896), which legitimized doctrine of 'separate but equal', was about segregation on trains

- Quote from Dr. Martin Luther King Jr. about discrimination faced by Black bus riders, made during the Montgomery Bus Boycott (1955)

- LA Bus Riders Union vs. LA MTA (1990s) about bus vs. rail service quality

Photo of LA BRU supporters from
https://www.impactfund.org/social-justice-blog/bus-riders

⇒ Racialized difference in transportation is a pervasive component of US history

"The problem has existed over endless years"

Are commuting outcomes in American cities today equitable by race?

How has racialized difference in commutes evolved over the last 40 years?

This paper: Comprehensive accounting of racialized difference in commuting in the US

- ▶ Update prior literature in economics and sociology, study trends 1980–2019
- ▶ Consider role of both individual and aggregate (city-level) factors

Short Answer: Commuting outcomes not equitable, despite some improvement

Data and Definitions

Census/ACS, 1980–2019; sample consists of all *commuters*

- ▶ Journey to Work questions ask about race and commute time/mode
- ▶ We assign to consistent commuting zones (CZs) (Autor & Dorn '13)
  - • Lightly modify to bring together large markets, e.g., DFW, NYC/Newark
- ▶ Often focus on year bins: 1980, 1990, 2000, 2005–11, 2012–19
- ▶ Extend back to 1960 for aggregate mode share

Race: Focus on differential outcomes between Black and White commuters

- ▶ Black – identify as "Black" either alone or in combination with another race
- ▶ White – identify as "White" only
- ▶ Before 2000, race in the Census was *univariate*
  - • In 2000 and later, race could be multi-dimensional
  - • Selection of multiple races increase substantially in 2010s

# Aggregate Differences in Commute Time
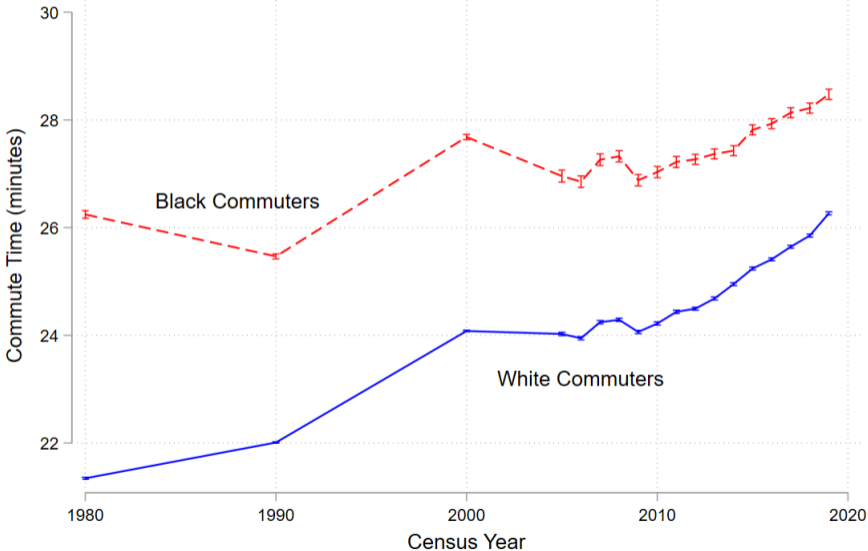
Not Just a Story of Mode Choice
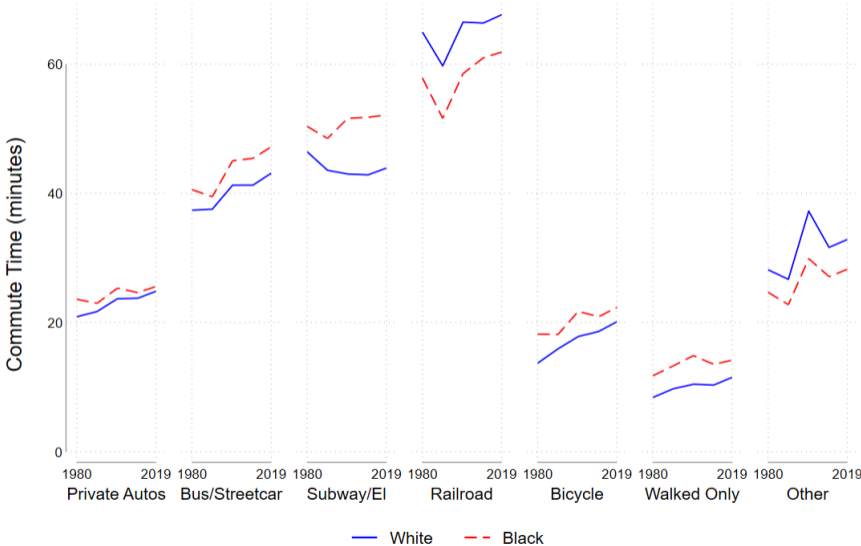
Aggregate Differences in Mode Share

Large increase in auto
commutes, 1960–2019

- ▶ Primarily at the expense
  of Bus/Streetcar use by
  Black commuters
- ▶ Also substantial
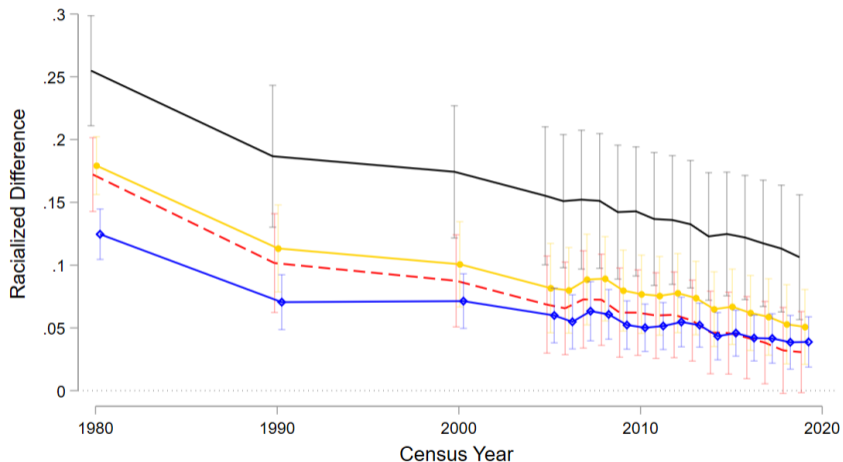 reduction of Walking for
  all commuters

Transit (White Commuters)   Transit (Black Commuters)
Walk/Other (White Commuters)   Walk/Other (Black Commuters)
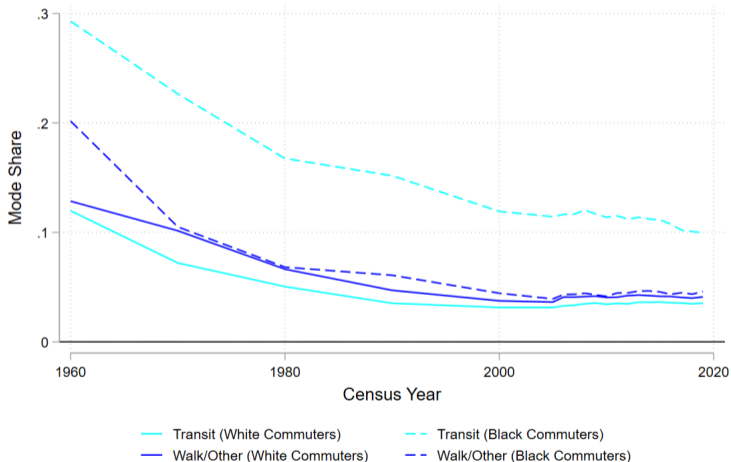
Data – Channels

What can we explain with observable covariates in the Census/ACS?

$$\ln(\tau_{ict}) = \beta_t^* \, 1[\text{Black}_{ict}] + x'_{ict}\mu_t + \lambda_{ct} + \epsilon_{ict}$$

- ▶ *Commuting Zone*: fixed effects for CZ

- ▶ *Demographics & Education*:
  - sex, age education
  - marital status, head of household
  - number of children

- ▶ *Car & Group Quarters*:
  - car in HH
  - no car in HH
  - in group quarters

- ▶ *Transportation Mode* indicators:
  - car (+pool), motorcycle, taxi
  - bus or streetcar
  - subway or elevated
  - railroad (commuter rail)
  - bicycle; walked only; and other

- ▶ *Work & Income*:
  - income
  - indicators for industry
  - indicators for occupation

Baseline Results

Can difference in commute be explained by observables? …Only partially:

Decomposition

| | Δ_t | Δ_t^{Unexp} | $\Delta_t^{\text{Explained}}$ | | | | |
| | | | Δ_t^{CZ} | Δ_t^{Demo} | Δ_t^{CarGQ} | Δ_t^{Mode} | Δ_t^{Work} |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Decomposition							
$1[\text{Black}] \times t_{1980}$	0.255	0.125	0.063	-0.007	0.009	0.068	-0.002
		48.9%	24.6%	-2.7%	3.4%	26.6%	-0.8%
$1[\text{Black}] \times t_{1990}$	0.187	0.070	0.065	-0.009	0.007	0.060	-0.007
		37.8%	34.7%	-4.6%	3.7%	31.9%	-3.5%
$1[\text{Black}] \times t_{2000}$	0.174	0.071	0.069	-0.008	0.005	0.048	-0.011
		40.9%	39.8%	-4.4%	2.8%	27.4%	-6.4%
$1[\text{Black}] \times t_{2005\text{-}11}$	0.147	0.056	0.063	-0.009	0.005	0.047	-0.015
		38.0%	42.8%	-6.2%	3.5%	31.9%	-10.0%
$1[\text{Black}] \times t_{2012\text{-}19}$	0.123	0.046	0.063	-0.008	0.003	0.039	-0.019
		37.2%	51.0%	-6.5%	2.2%	31.8%	-15.7%
Components of Change							
$\frac{\Delta_{1980}^{k} - \Delta_{2012\text{-}19}^{k}}{\Delta_{1980} - \Delta_{2012\text{-}19}}$	-	59.8%	0.0%	1.2%	4.5%	22.0%	12.9%

- ▶ CZ is important but constant

- ▶ Mode is important, plays a big role in convergence

- ▶ Work matters a bit

- ▶ Most convergence not explained!

Competing Stories

1. Labor Market Selection cannot explain the difference
   - Manski & Horowitz extreme bounding exercise $\rightarrow$ larger differences than baseline

2. Finer geographies only partially accounts for differences
   - Limited geographic resolution: PUMAs and POWPUMAs $\rightarrow$ only a bit smaller
   - Tract-level data with tract FEs: differences by race share persist

3. Black households are not being "compensated" with lower housing prices …

- ► Differences in travel time *conditional on house price*
  - (similar relationship when using rents)
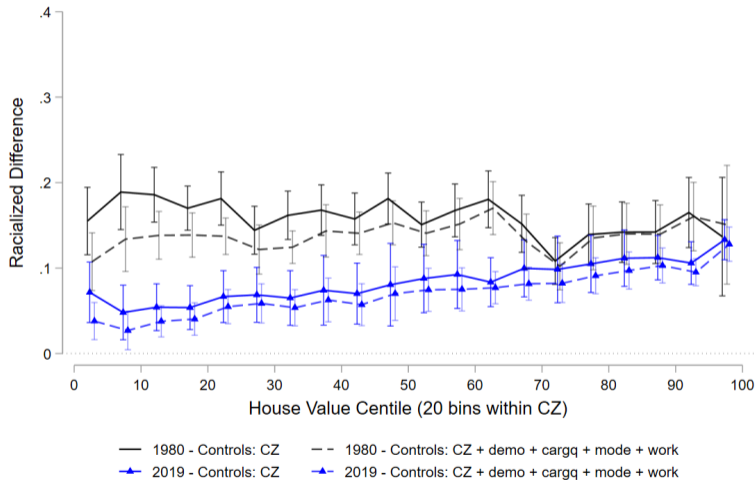
▶ *Positive* association between housing prices and travel time for Black commuters

$$\ln(\tilde{P}_{ict}) = \xi^W \ln(\tau_{ict}) + \xi^\Delta \ln(\tau_{ict}) \mathbf{1}[\text{Black}_{ict}] + x'_{ict}\mu_t + (\lambda_{ct} + \alpha_{ct}\mathbf{1}[\text{Black}_{ict}]) + \epsilon_{ict}$$

| | Log Adjusted Housing Value | | | | |
	1980 (1)	1990 (2)	2000 (3)	2005–11 (4)	2012–19 (5)
$\ln(\tau_{ict})$ (ξ^W)	-0.025*** (0.003)	-0.014*** (0.002)	-0.012*** (0.002)	-0.016*** (0.002)	-0.010*** (0.002)
$\mathbf{1}[\text{Black}] \times \ln(\tau_{ict})$ (ξ^Δ)	0.008+ (0.004)	0.011* (0.005)	0.017*** (0.003)	0.019*** (0.003)	0.017*** (0.003)
$\xi^B = \xi^W + \xi^\Delta$	-0.017*** (0.004)	-0.003 (0.005)	0.005* (0.003)	0.003 (0.003)	0.007** (0.003)
Year Bin $\times$ CZ $\times$ $\mathbf{1}[\text{Black}]$ FEs	Y	Y	Y	Y	Y
Year Bin $\times$ CZ $\times$ Transit Mode FEs	Y	Y	Y	Y	Y
N	1817823	5662646	6038066	9138148	12701532

Explanations and Heterogeneity

1. Differences exist across the income spectrum, but biggest for lower incomes

2. Differences largest for transit users

3. Larger differences in 'big cities'—especially those with legacy transit

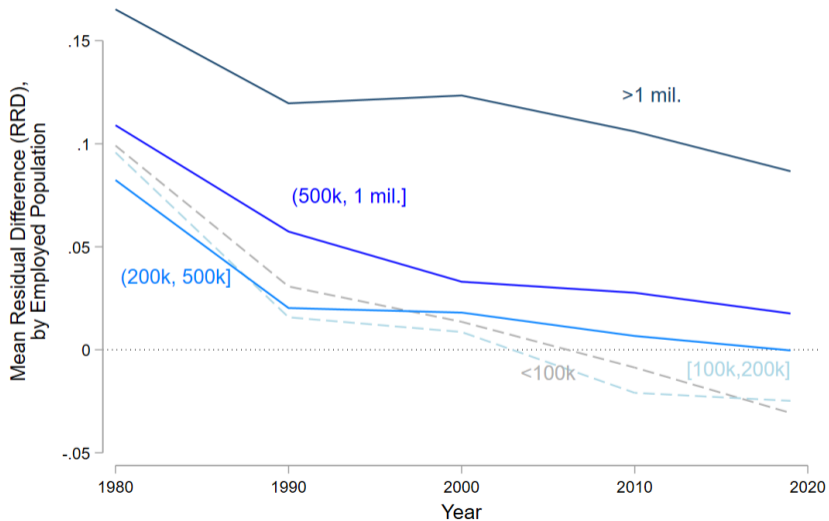… Complete convergence in commute times for car users in smaller cities

Explanations and Heterogeneity

Differences by Income
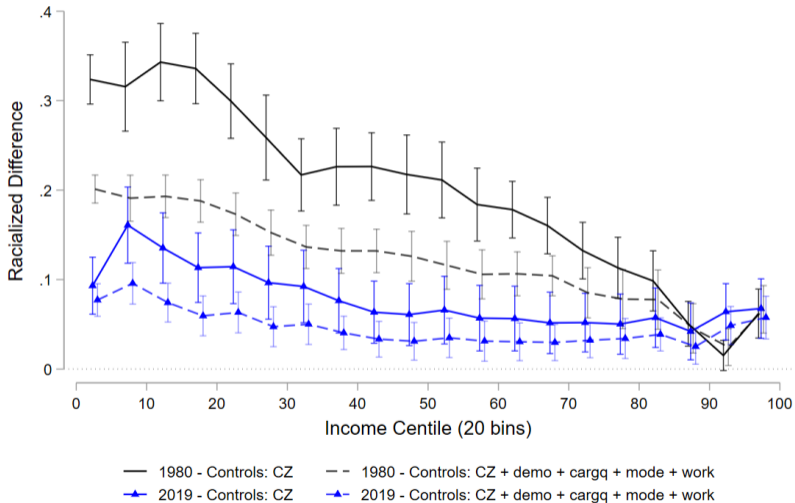
Explanations and Heterogeneity

Differences by City Size

City-Level Differences in RRD

<center>Is there systematic, *city-level* variation in commuting difference?</center>

Step 1: Estimate $\hat{\beta}_{ct}$: the **residual racialized difference** (RRD) for each CZ c

$$\ln(\tau_{ict}) = \beta_{ct}\mathbf{1}[\text{Black}_{ict}] + x'_{ict}\mu_{ct} + \lambda_{ct} + u_{ict}$$

Step 2: Estimate city-level correlates of RRD (e.g., urban form, segregation)

$$\hat{\beta}_{ct} = z'_{ct}\gamma + D_c + T_t + e_{ct}$$

- ▶ Focus on cities with more than 200k workers
- ▶ Use time-invariant CZ fixed effects; study *changes* …

City-Level RRD – Some Comparisons

87 cities with at least 200k workers since 1980

Largest City in CZ	RRD in 2019	2019 Rank	RRD in 1980	1980 Rank	Change in RRD (2019-1980)	Rank of Change
Chicago, IL	0.137	87	0.291	87	−0.154	4
New York City, NY—Newark, NJ	0.133	86	0.150	79	−0.017	69
Washington, DC—Arlington, VA	0.126	85	0.129	70	−0.002	74
Philadelphia, PA—Wilmington, DE	0.122	84	0.192	85	−0.070	45
Boston, MA	0.111	83	0.147	78	−0.036	63
Sacramento, CA	0.111	82	0.074	33	0.037	81
San Francisco, CA	0.105	81	0.082	39	0.023	79
Atlanta, GA	0.100	80	0.134	72	−0.034	64
Los Angeles, CA	0.098	79	0.183	84	−0.084	37
New Orleans, LA	0.091	78	0.134	73	−0.043	59
Dallas, TX—Forth Worth, TX	0.084	77	0.170	82	−0.086	34
⋮						
Baton Rouge, LA	−0.063	5	0.048	25	−0.110	17
Grand Rapids, MI	−0.063	4	−0.016	5	−0.047	57
South Bend, IN	−0.067	3	0.027	15	−0.094	26
Syracuse, NY	−0.084	2	0.036	20	−0.120	12
Little Rock, AR	−0.094	1	0.072	32	−0.166	3

City-Level Drivers (Potential Stories)

- *Market access* – how close are jobs and residences
  - A measure of spatial mismatch
  - Adapt Donaldson & Hornbeck 2014, Tsivinidas 2022, to study racialized difference:
    - Find fixed points: $\phi_{Ri} = \sum_s d_{is}^{-\kappa\theta} \frac{L_{Fs}}{\Phi_{Fs}}$ and $\phi_{Fj} = \sum_r d_{rj}^{-\kappa\theta} \frac{L_{Rr}}{\Phi_{Rr}}$ using full population
    - Create race-specific summary of access $\Phi_c^{Race} = \sum_{i \in c} \pi_i^{Race} \phi_{Ri}$
    - Take ratio to make comparable across places $\Phi_c^{Black} / \Phi_c^{White}$

- *Segregation* – Dissimilarity index captures residential segration

- *Urban form* – Centrality: how concentrated is residential population

- *Transportation* variables – Transit share and drive time

- *Housing* – Prices and correlation with travel time

City-Level Drivers

|	Mark. Acc. Φ_{ct}^{Black} / Φ_{ct}^{White} (1)	Dis-simi-larity (2)	Cen-tral-ity (3)	Ln Hwy Miles (4)	Transit Mode Share (5)	Ave. Car Time (6)	Ln Hous. Value (7)	$\rho_{ct}(P,\tau)$ (8)
Panel A. No Controls								
Measure	-0.0960*	0.2123+	-0.0008	-0.0786**	0.4457*	0.0058+	0.0592***	-0.0774
	(0.0375)	(0.1151)	(0.0818)	(0.0281)	(0.1909)	(0.0032)	(0.0150)	(0.0534)
Panel B. Controlling for Log Population								
Measure	-0.1052***	0.2602*	0.0374	-0.0726**	0.4473*	0.0044	0.0570***	-0.0679
	(0.0301)	(0.1152)	(0.0723)	(0.0248)	(0.1699)	(0.0033)	(0.0165)	(0.0488)
N	348	435	435	255	435	435	435	435
Sample Years	'90-'19	'80-'19	'80-'19	'80-'00	'80-'19	'80-'19	'80-'19	'80-'19
Mean of Measure (earliest)	1.1910	0.7455	-0.0442	5.55	0.1034	23.3	12.0	-0.0561
Mean of Measure (most recent)	1.0874	0.6201	-0.0468	5.65	0.0805	27.1	12.5	-0.0953

- ▶ 1pp increase in RRD due to reduced relative market access (spatial mismatch)
- ▶ 2.7pp decrease in RRD due to reduced segregation
- ▶ Higher transit use and more expensive housing increase RRD
- → Workplace relative to residential location still playing a big role!

Summary

- Substantial—but incomplete—convergence in commute times by race since 1980

- Racialized difference, once systematic across the US, is now most present (i) in bigger cities for all commuters and (ii) for transit users and walkers everywhere
  - Accounting for job/income now increases difference.
  - Differences present across the income spectrum, but larger for lower-income workers

- Large cities contain ingredients of stratification associated with racialized difference
  - High housing prices
  - Spatial mismatch, i.e., trends of suburbanization of Black employment and residential location do not necessarily overlap spatially (Bartik & Mast '21; Kneebone & Holmes '15; Miller '18)

Thank you!

Map (1980)

RRD (1980)

Map (2012–19)

RRD
(2019)

0.50
0.25
0.00
-0.25
-0.50
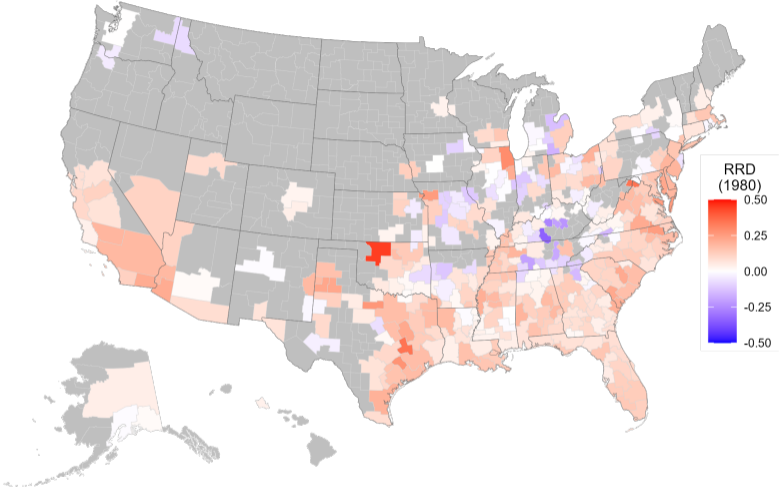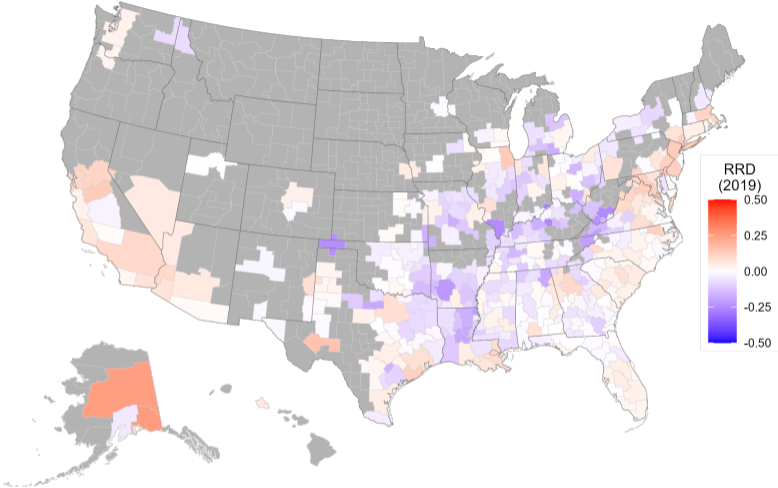
Data – Secondary Sources

- NHGIS for finer (census tract/ZCTA) geographic aggregates
  - Geonormalize to study average tract-level commuting time (+ tract FEs)
  - Use to create city-specific measures of urban form (segregation, centrality)
  - ... but not microdata

- Zip Code Business Patterns for spatial dist. of work locations
  - Colocation of jobs and housing, employment concentration

- Miles of highway (Baum-Snow 2007)

Changes

Residual Racialized Difference (RRD)
--- RRD with PUMA fixed effects