Qualitative research for the use of "big" data to understand spatial inequality

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Motivation

- Issue
  - Substance: **Access to banking services in minority neighborhoods**
  - Methods: **Approaching large-scale data as fieldworker**

Motivation

- Neighborhood conditions matter
  - Subjective well-being, physical health, earnings, college attendance, childbearing, marriage, upward mobility

- But how----what makes disadvantaged neighborhoods difficult places to live?
  - One answer: Limited resource access
  - **"Banking deserts"**

TOP: Wilson 1987; Ludwig et al 2012; Sampson 2012; Chetty and Hendren 2018; BOTTOM: Small and Newman 2001; Moore and Diez Roux 2006; Small and McDermott 2006; Walker et al. 2010; Small and Feldman 2012; Sharkey and Faber 2014; Hegerty 2016

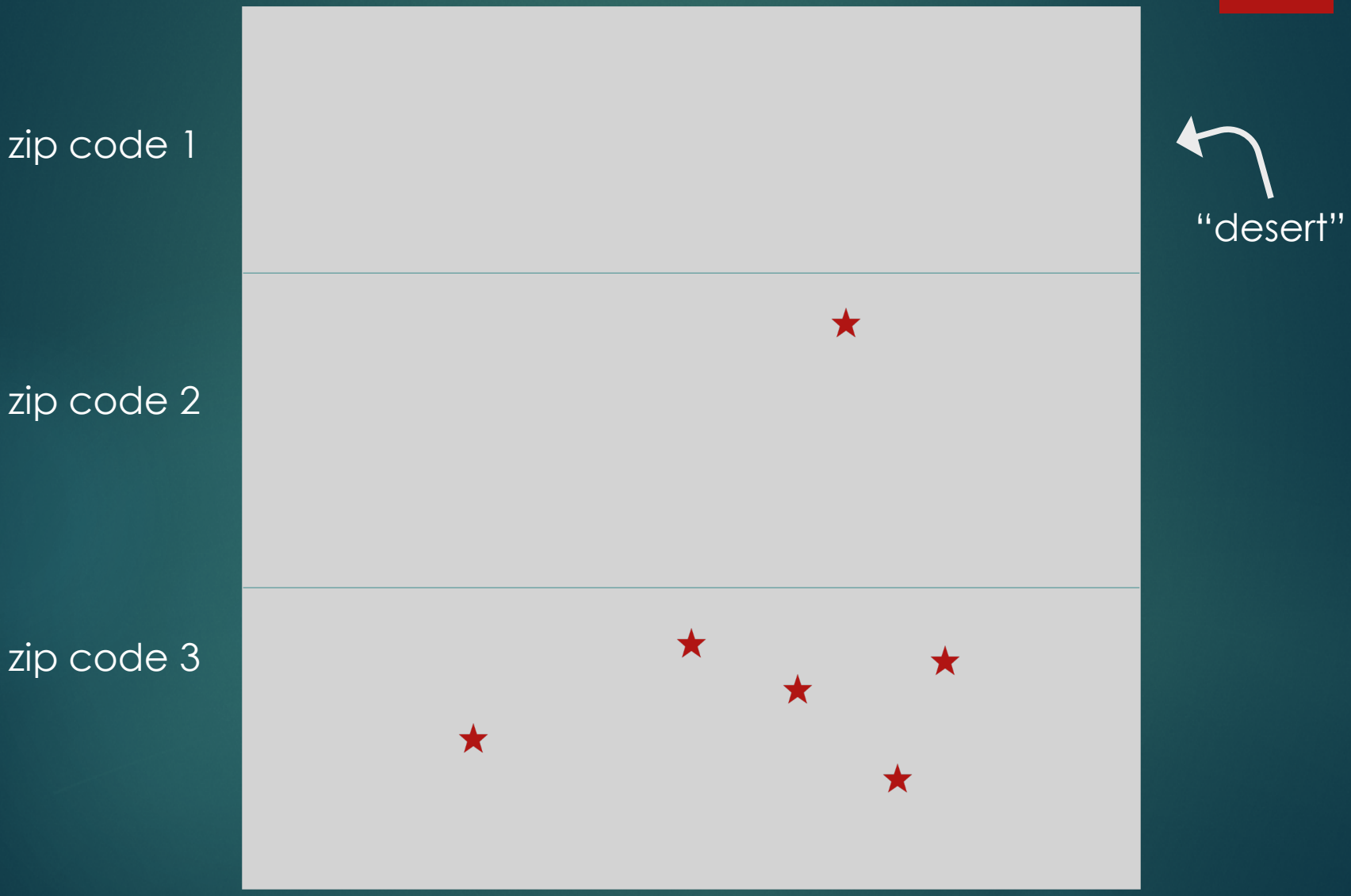
Banking deserts

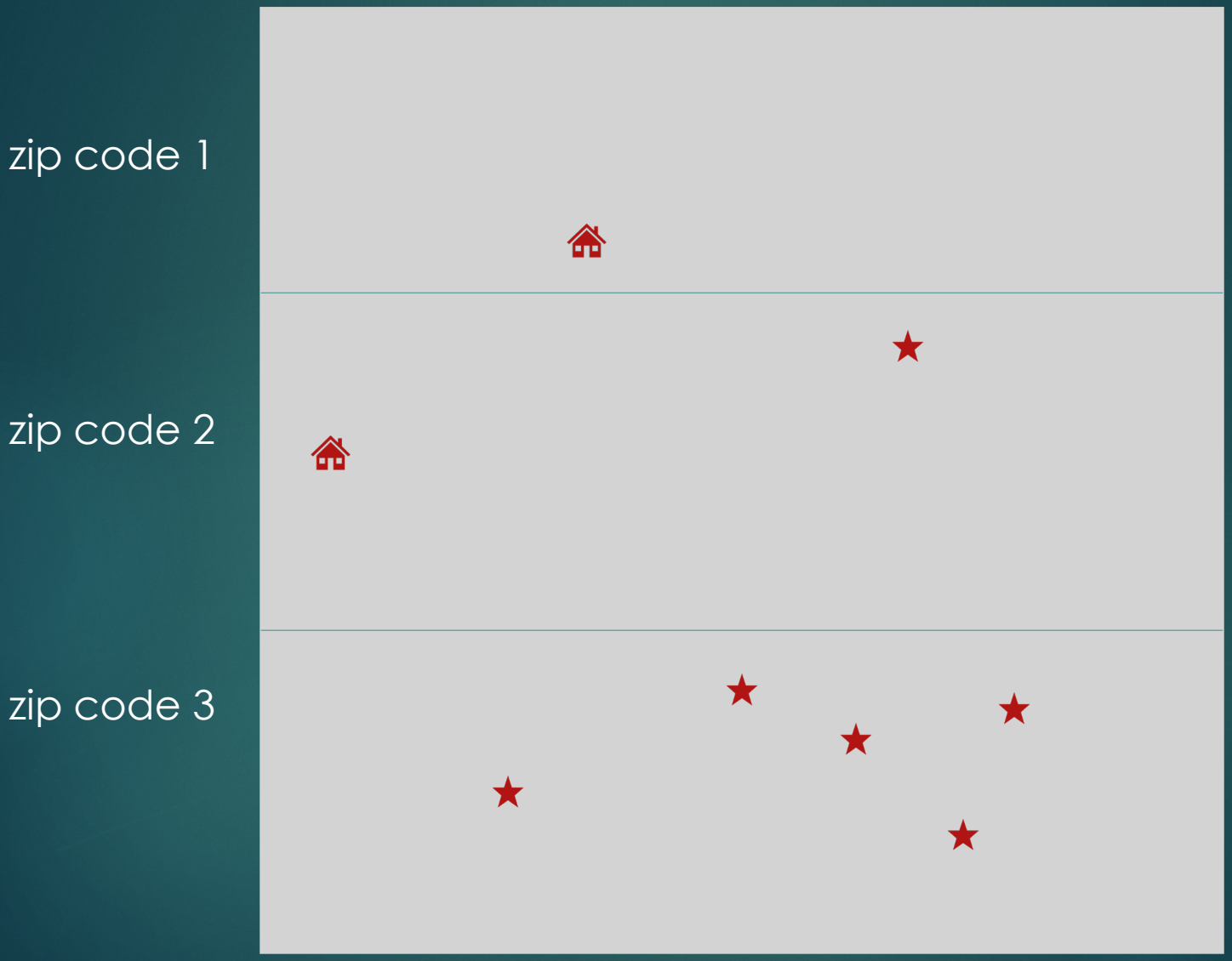
- Access to banking important (school, home, credit, etc.)
- Brick-and-mortar persists (as of 2019)
  - Eg, 17k new branches 2009-19
  - Most common way people use bank (2016)
- Proximity matters
  - Eg, no bank < 3mi or < 5mi ⬆ pr(no bank account)

Federal Reserve Bank 2013; 2016; Goodstein and Rhine 2017

Fieldworker's approach

- Two reasons term "banking desert" imperfect
- **1 Implies area**
  - Accessible ~= in area
  - Accessible = easy to get to


zip code 1
zip code 2
zip code 3
“desert”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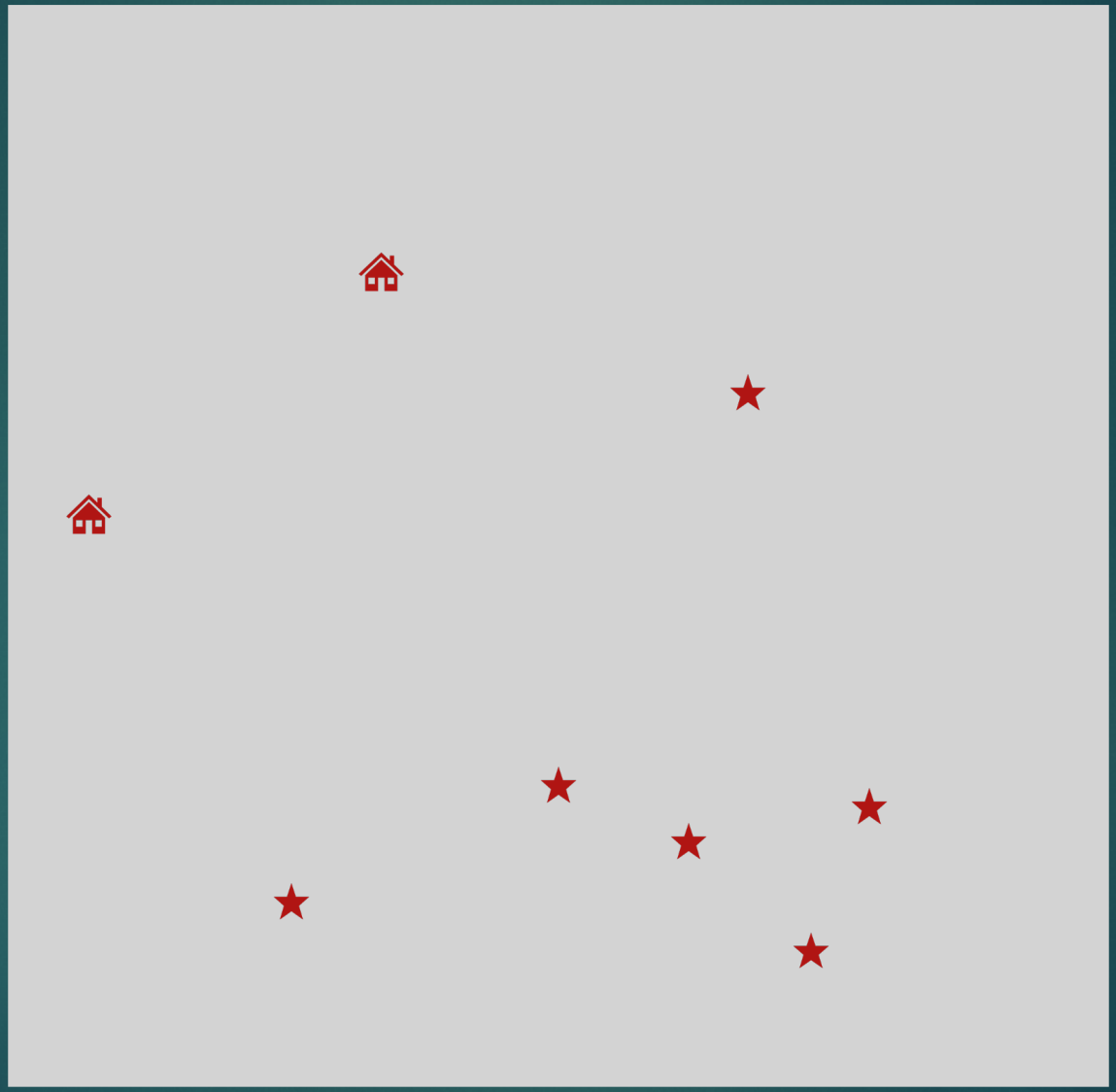

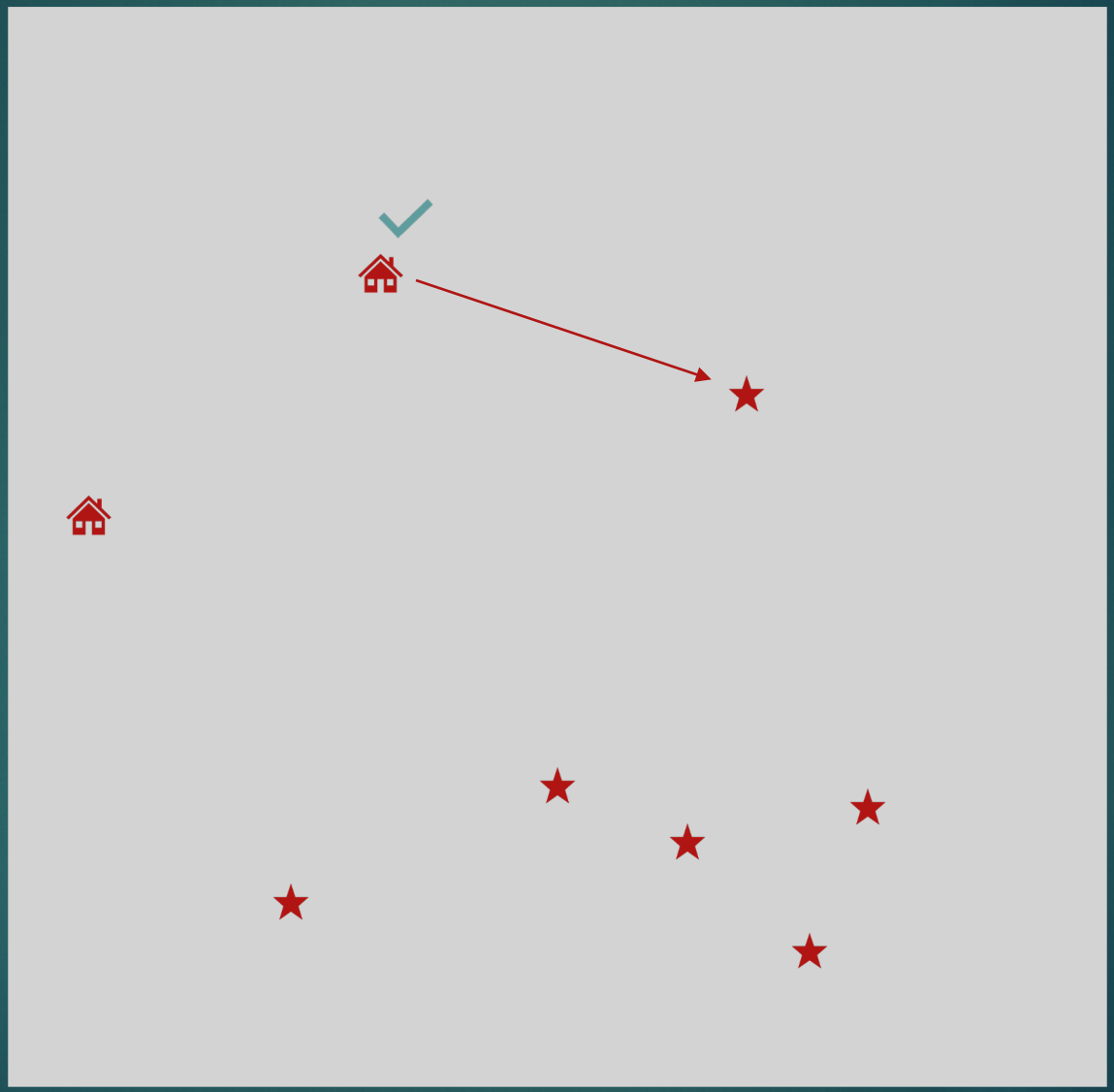

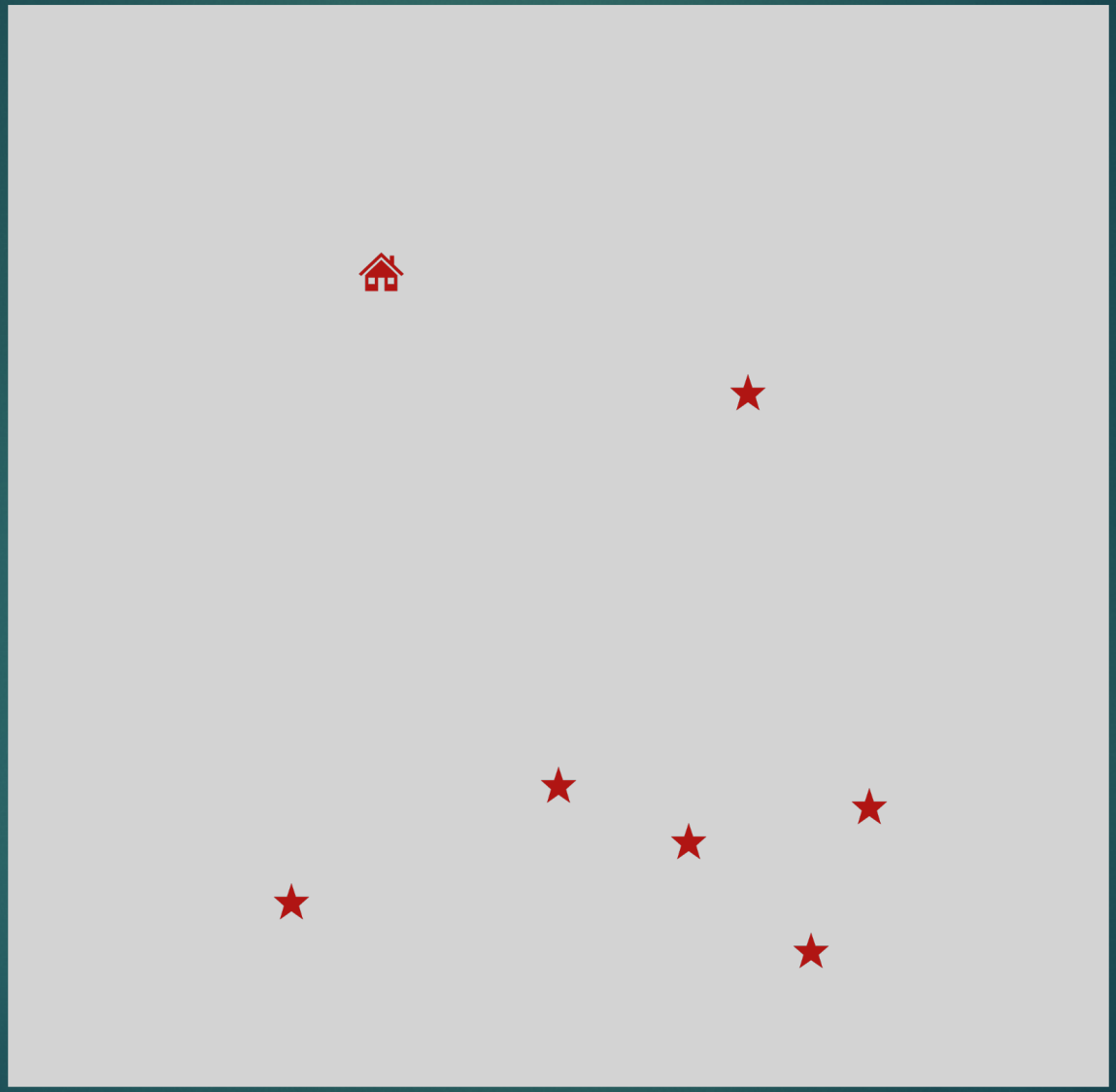

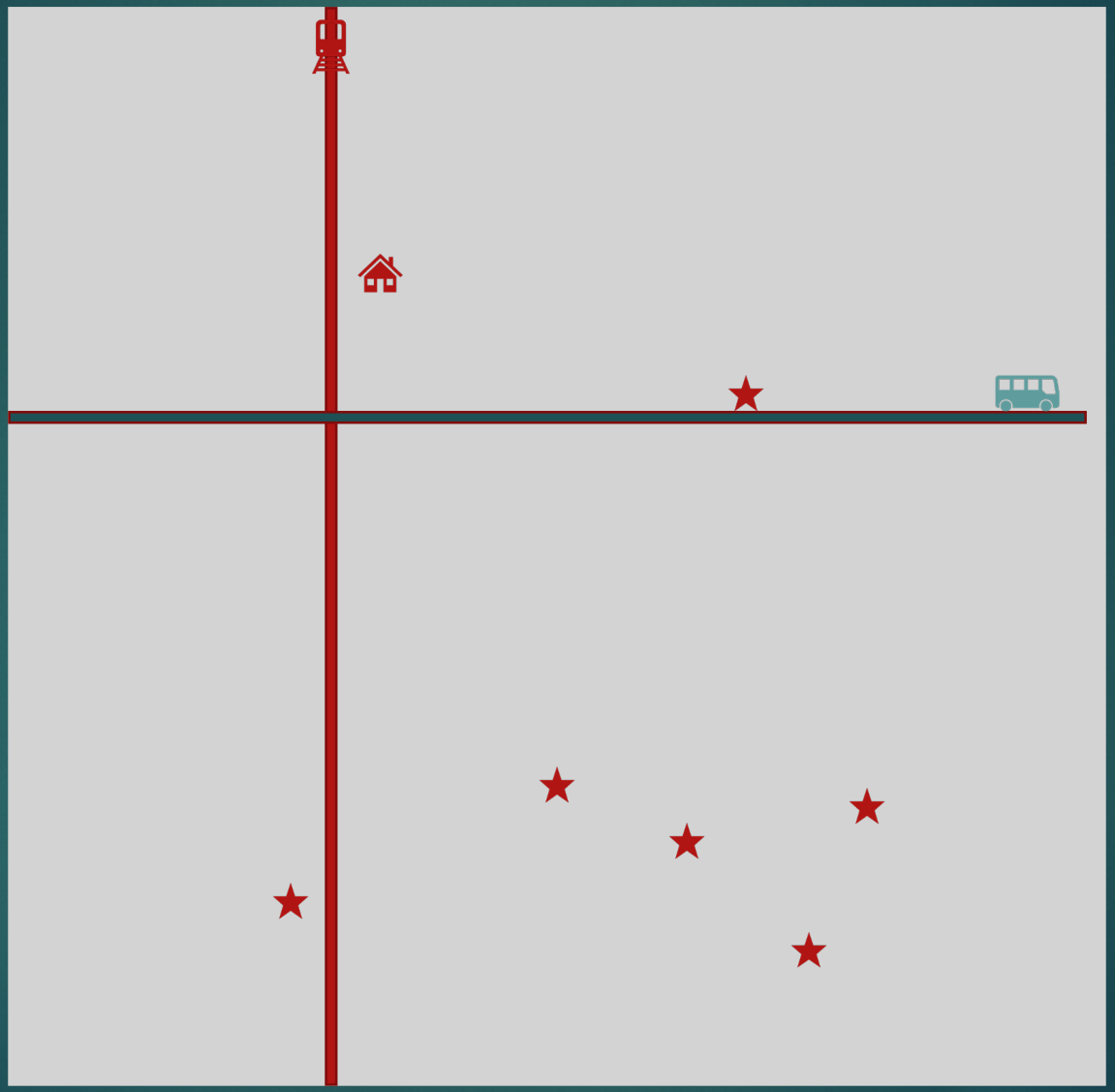

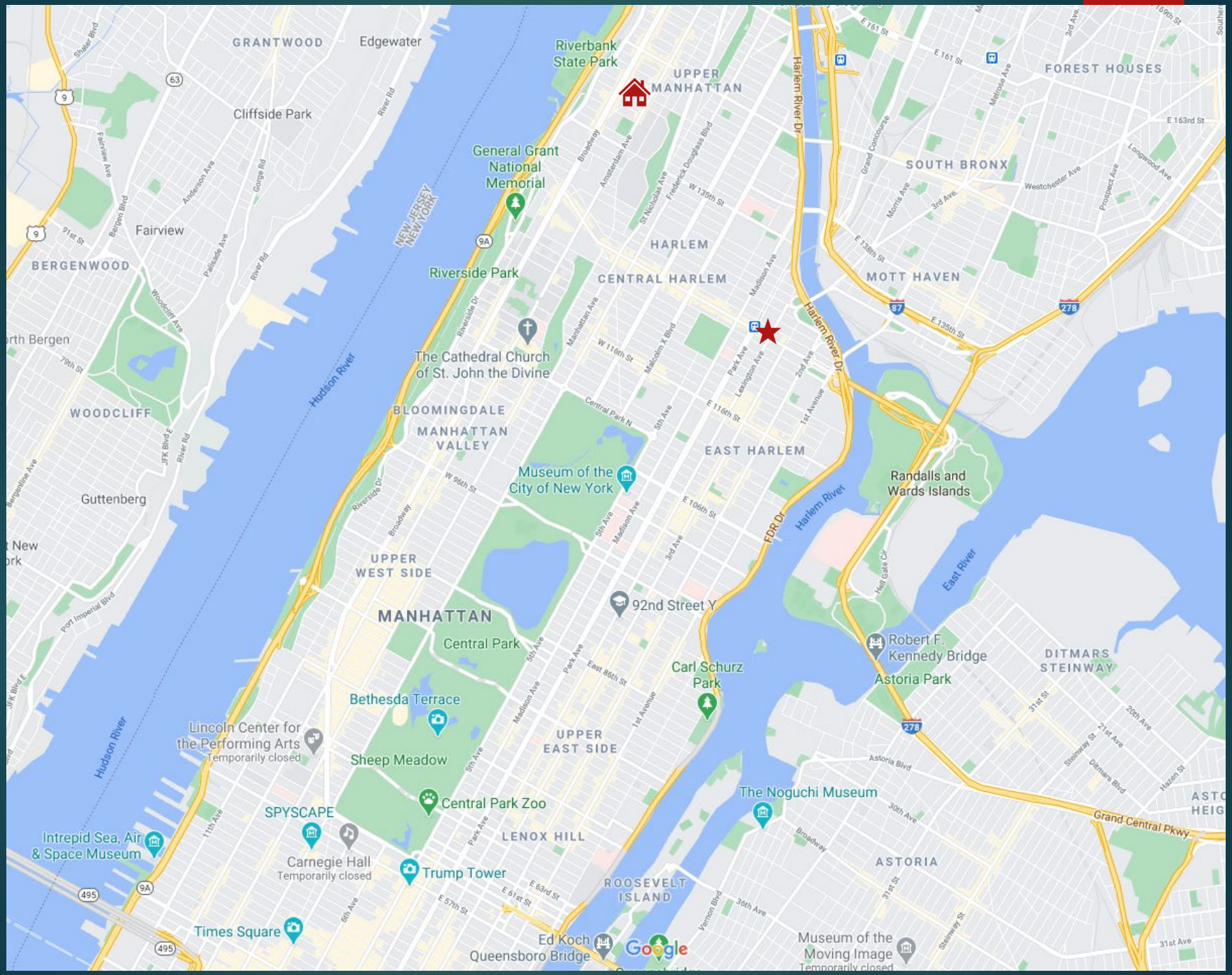
GRANTWOOD
Edgewater
Riverbank State Park
UPPER MANHATTAN
FOREST HOUSES
Cliffside Park
General Grant National Memorial
SOUTH BRONX
Fairview
HARLEM
BERGENWOOD
Riverside Park
CENTRAL HARLEM
MOTT HAVEN
The Cathedral Church of St. John the Divine
WOODCLIFF
BLOOMINGDALE
MANHATTAN VALLEY
EAST HARLEM
Museum of the City of New York
Randalls and Wards Islands
Guttenberg
UPPER WEST SIDE
92nd Street Y
MANHATTAN
Central Park
Robert F. Kennedy Bridge
DITMARS STEINWAY
Carl Schurz Park
Astoria Park
Bethesda Terrace
Lincoln Center for the Performing Arts
Temporarily closed
UPPER EAST SIDE
Sheep Meadow
Central Park Zoo
The Noguchi Museum
SPYSCAPE
LENOX HILL
Intrepid Sea, Air & Space Museum
Carnegie Hall
Temporarily closed
Trump Tower
ASTORIA
ROOSEVELT ISLAND
Times Square
Ed Koch Queensboro Bridge
Museum of the Moving Image
Temporarily closed
Hudson River
Harlem River
East River
Harlem River Dr
FDR Dr
NEW JERSEY
NEW YORK
Google

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Fieldworker's approach

- Two reasons term "banking desert" imperfect
- **1 Implies area**
  - Accessible ~= in area
  - Accessible = easy to get to
- **2 Implies barren**
  - Difficulty ~= no services
  - Difficulty = desirable less accessible than undesirable

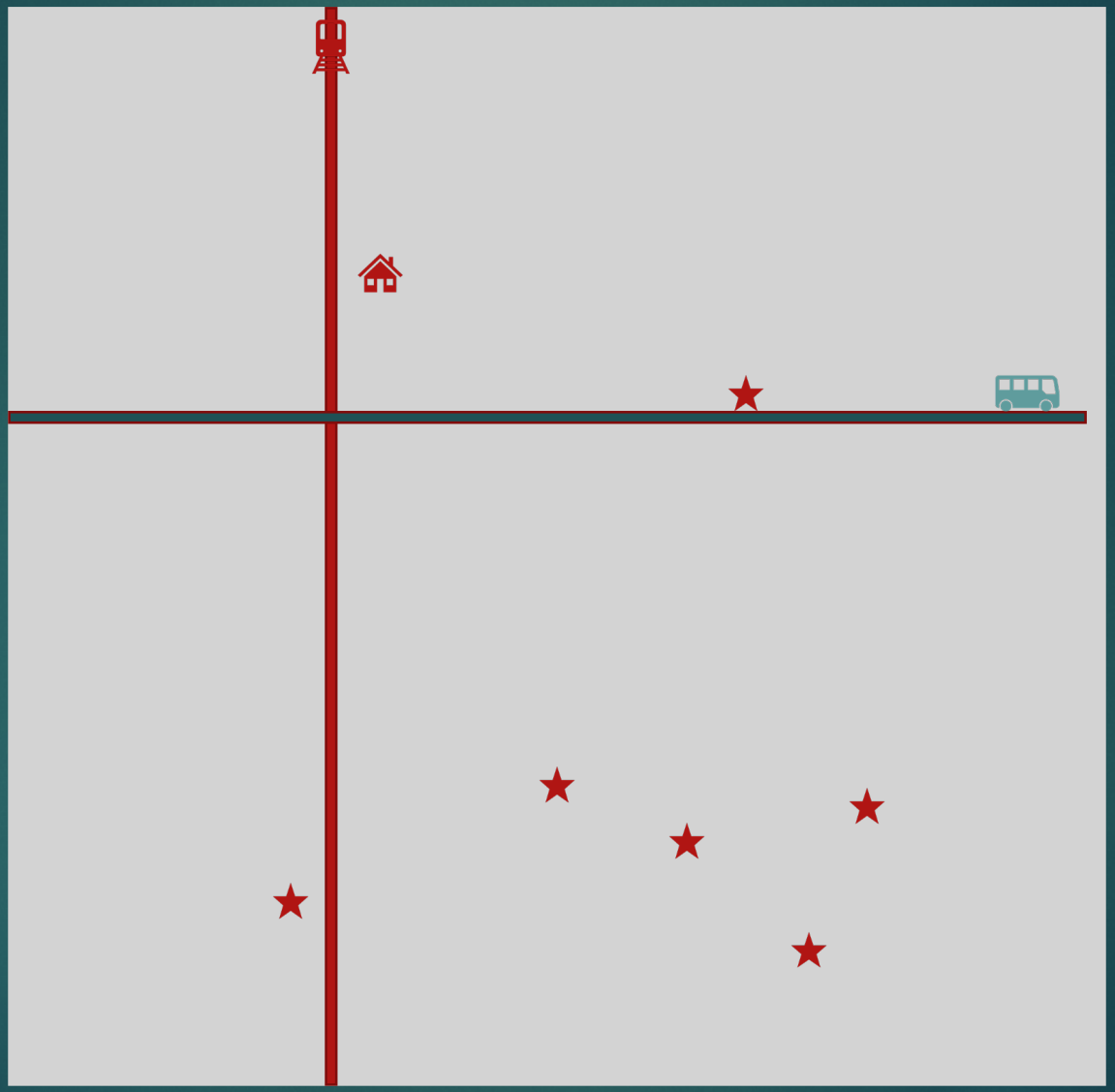
Fieldworker's approach

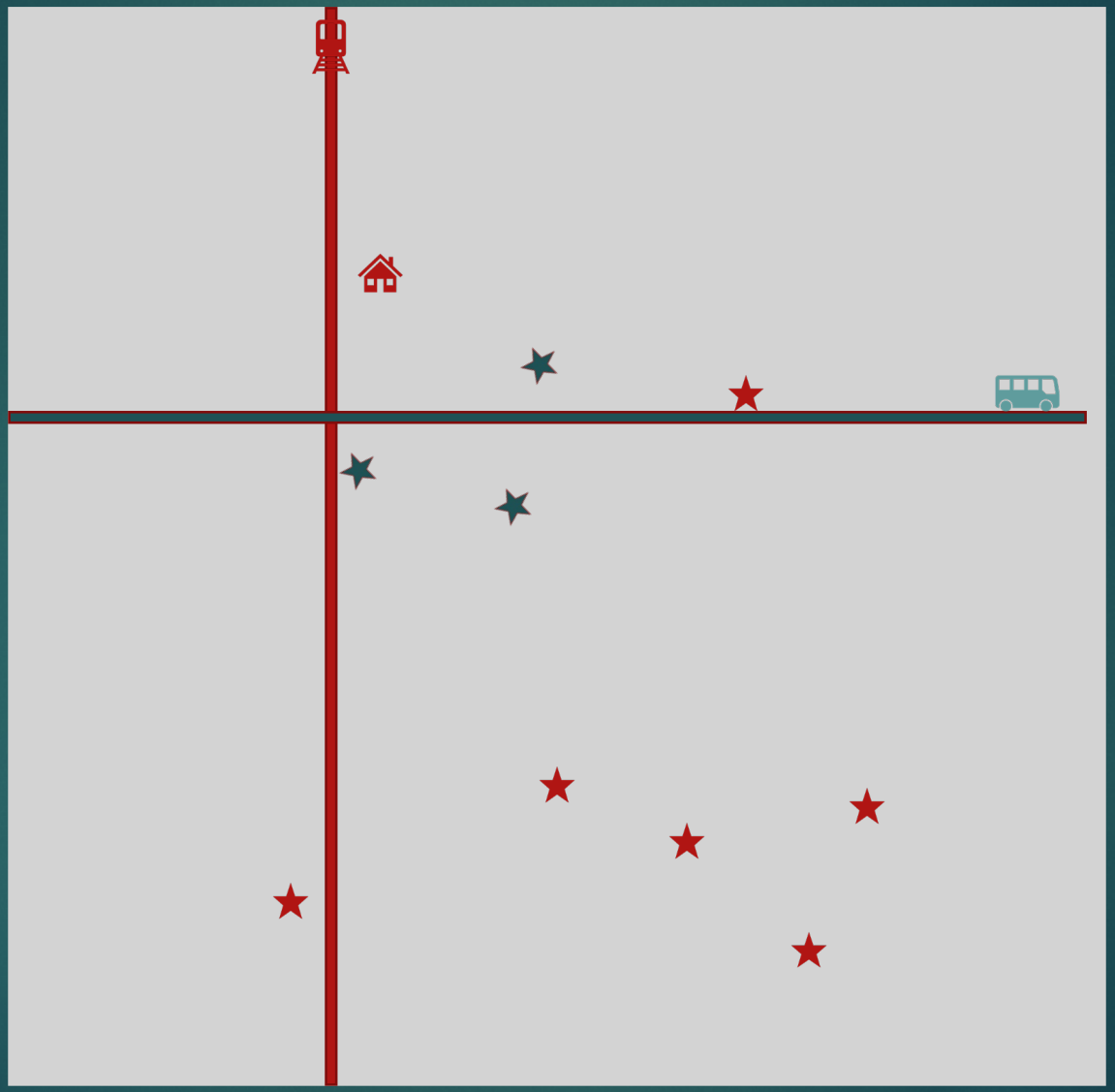
Vice.com; salon.com. Pressdemocrat.org; urbanmilwauke.com

Fieldworker's approach

- AFIs (check cashers/payday lenders)
  - High fees (eg, $70 for $400 loan, 2 weeks (450% APR))
  - High risk of rollover
  - Increases debt burden, especially <$50k
- Proximity also matters (# in zip predicts frequency of use)

Gross et al. 2012; Metlzer 2011; Friedline and Kepple 2016





Approach

- Q: Is the probability that “nearest” AFI < “nearest” bank higher in minority neighborhoods?

Approach

- Q: Is the probability that "nearest" AFI < "nearest" bank higher in minority neighborhoods?
  - 19 largest cities*
  - Every block in city
  - Foot, car, public transit

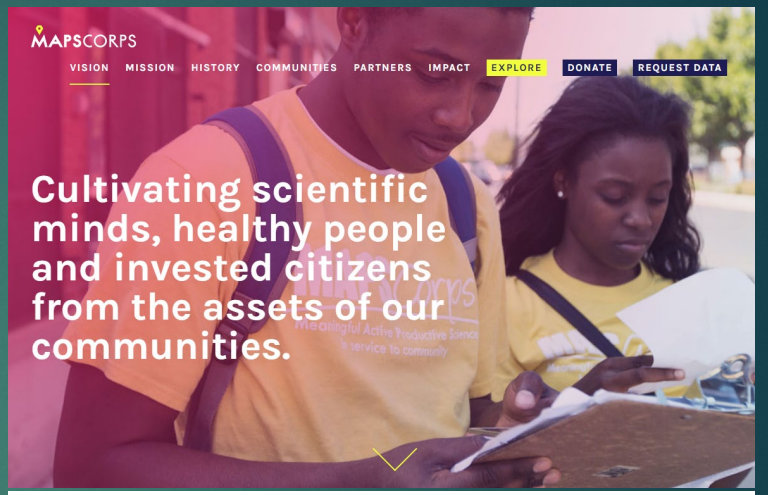
* 18 largest + Boston

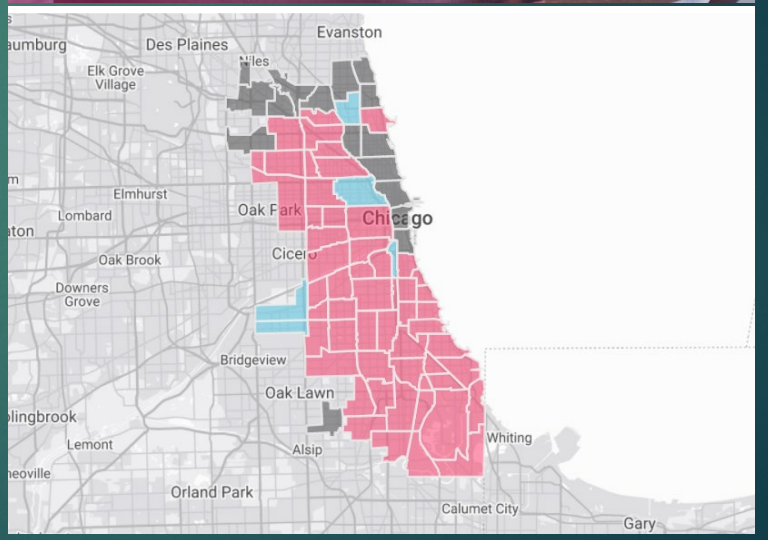
Data

- **Bank/AFI location**
  - Google Maps Database

Data

- **Google Maps**
- Data
  - Trustworthy?

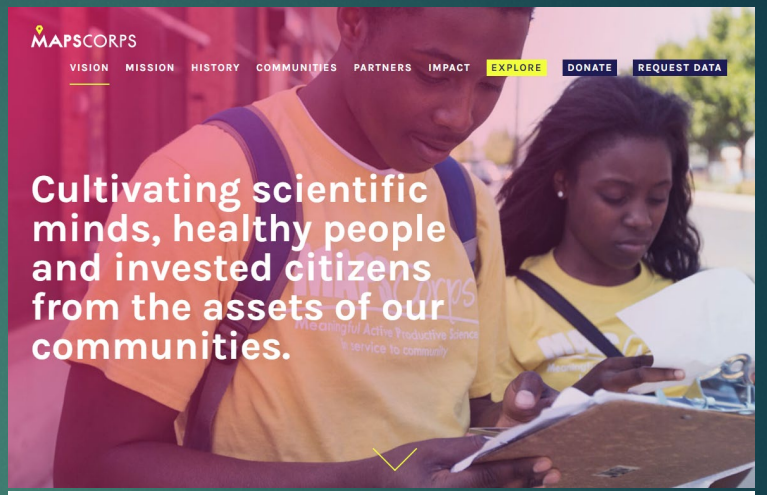


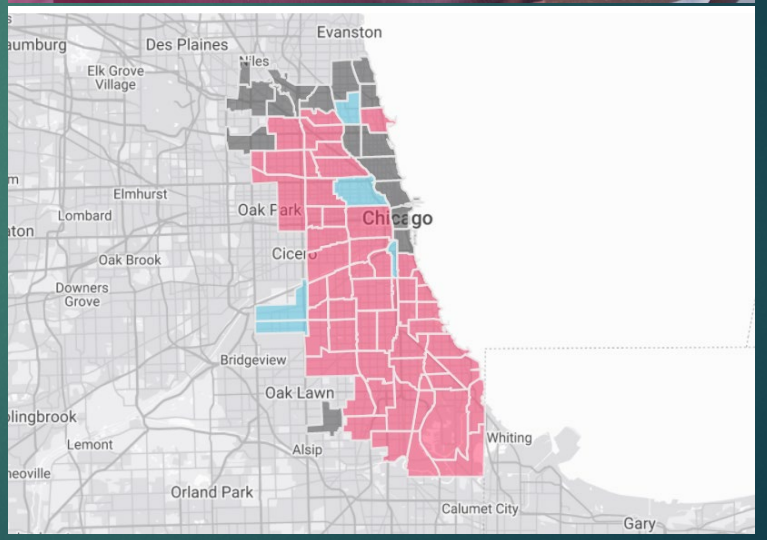


Mapscorps.org

Data

- **Google Maps**
- Data
  - Trustworthy?
- **Fieldwork** (Stacy Lindau and team, 2008)
- **Highly inaccurate**
- MAPS Corps
- See also, Makelarski et al. (2013 *J Urb Health*); Lindau et al. (2016, *Am J Pub Health)*

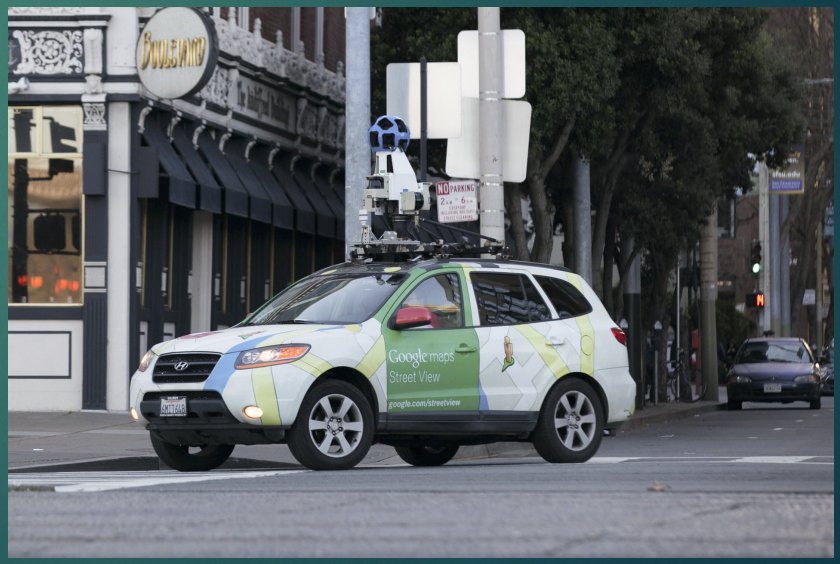




Mapscorps.org

Data

- **Google Maps**
- Data
  - Official and private administrative data
  - Google Street View imagery
  - Crowdsourcing (Local Guides and Google My Business)
- Google Places API + browser



searchengineland.com; digitaltrends.com

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Points, levels, and badging

Local Guides points

Earn points by contributing content to Google Maps. Score a place with ratings, describe your experience with reviews, share photographs and videos, provide insights with answers, respond to questions about a place, update information with place edits, add missing places, or verify information by checking facts.

Maps contribution	Points earned
Review	10 points per review
Review with more than 200 characters	10 bonus points per review
Rating	1 point per rating
Photo	5 points per photo
Photo tags	3 points per tag
Video	7 points per video
Answer	1 point per answer
Respond to Q&As	3 points per response
Edit	5 points per edit
Place added	15 points per place added
Road added	15 points per road added
Fact checked	1 point per fact checked
Eligible list published	10 points per published list
Description (in list)	5 points per description added

Local Guides levels

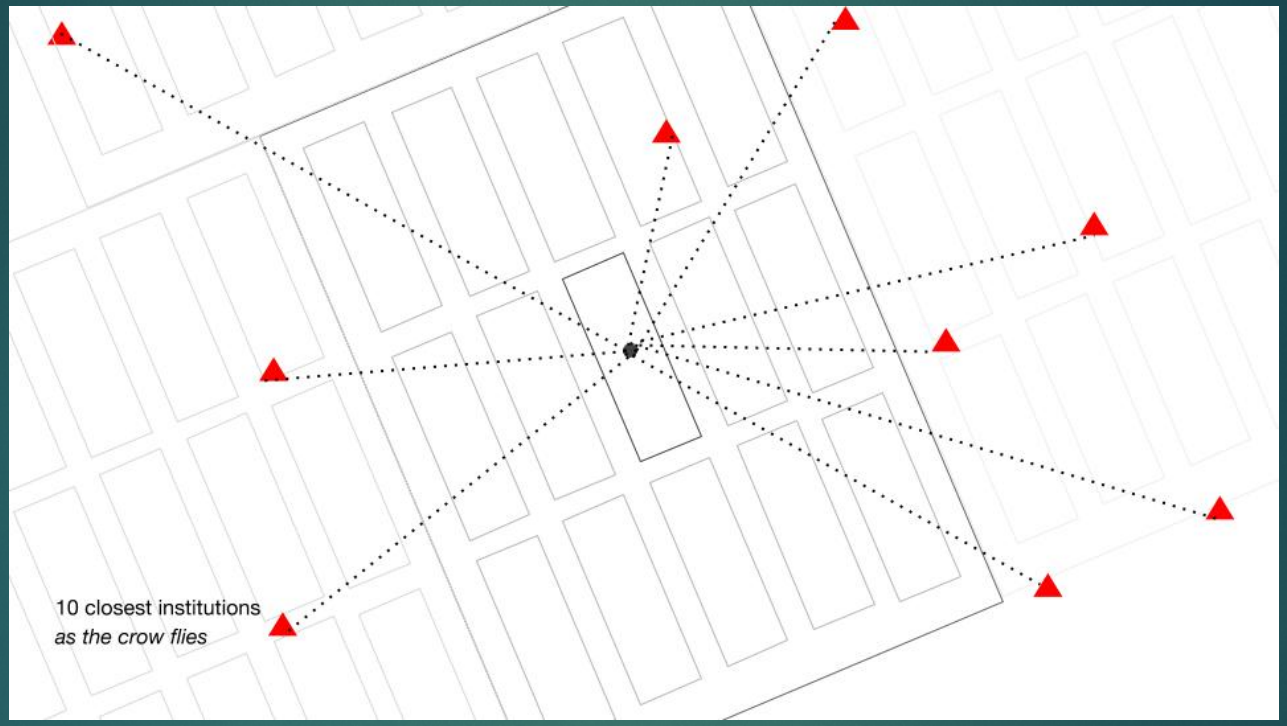
searchengineland.com; digitaltrends.com

Data

- **Bank/AFI location**
  - Google Maps Database
- **Street infrastructure** (streets, directions, speed limits, etc.)
  - Open Street Maps
- **Public transit schedules** (schedules, station location, etc.)
  - Local GTFS for each metro (except Memphis)

Data

Data



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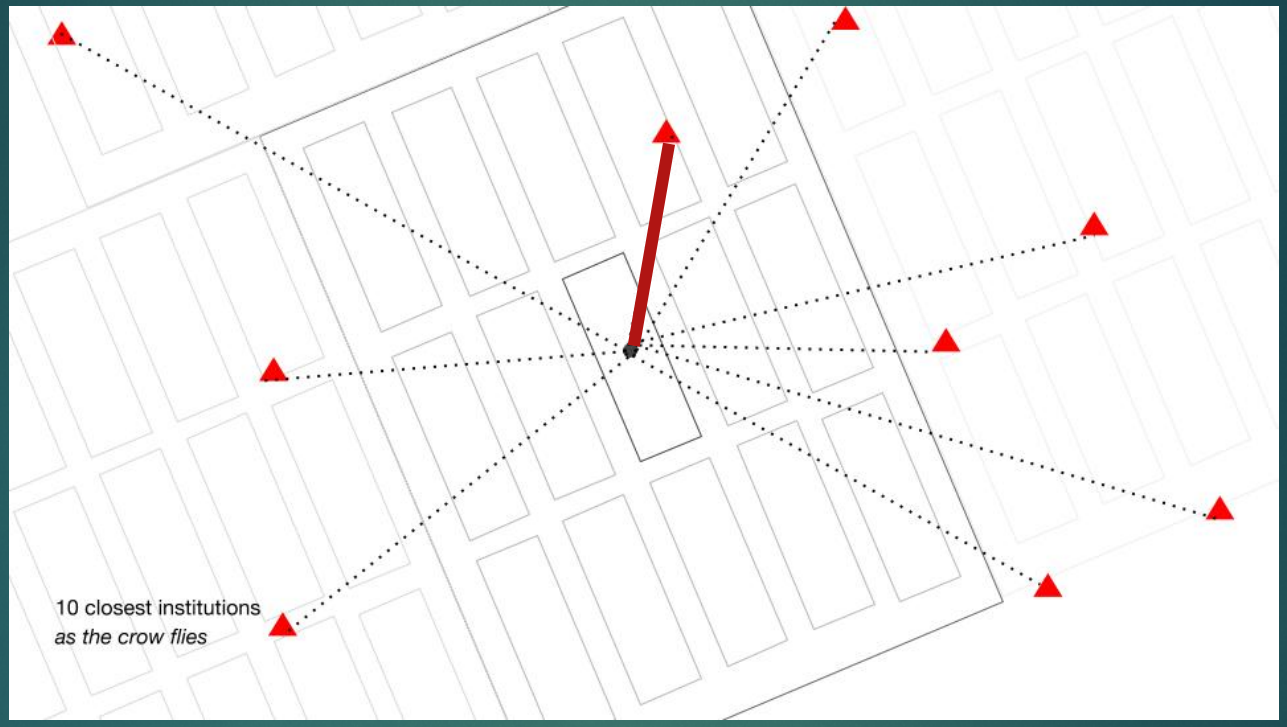

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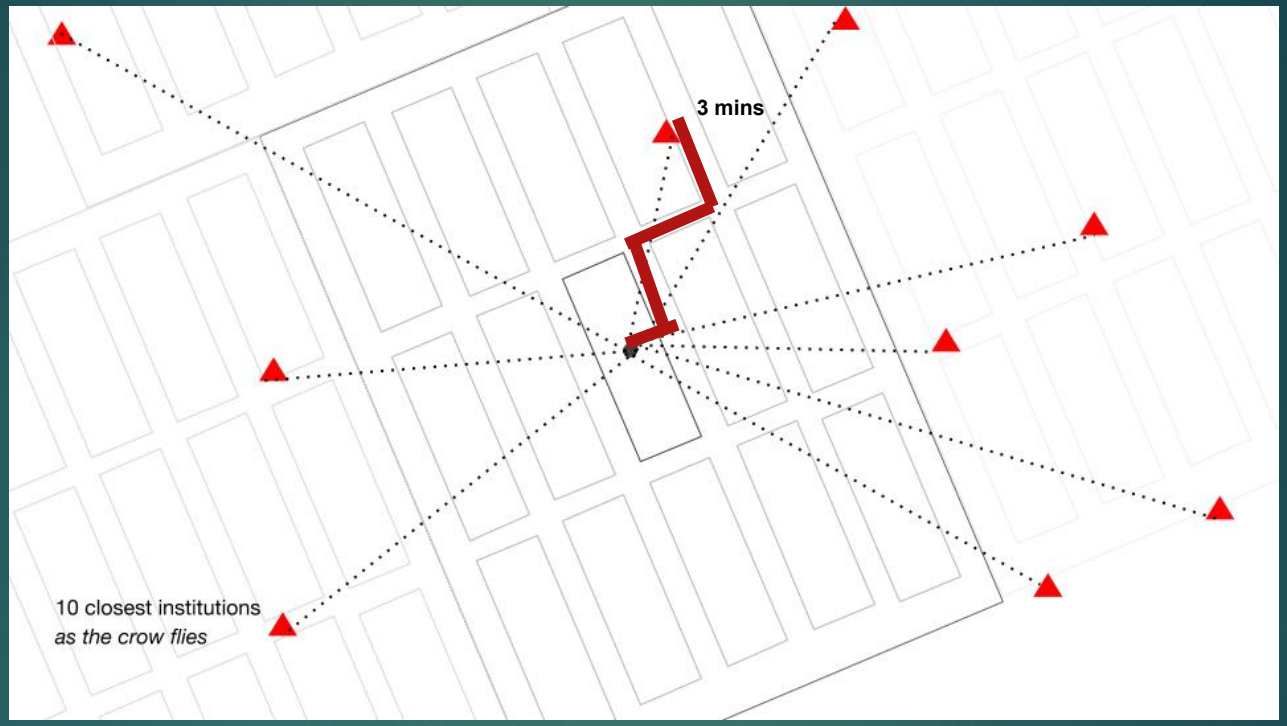

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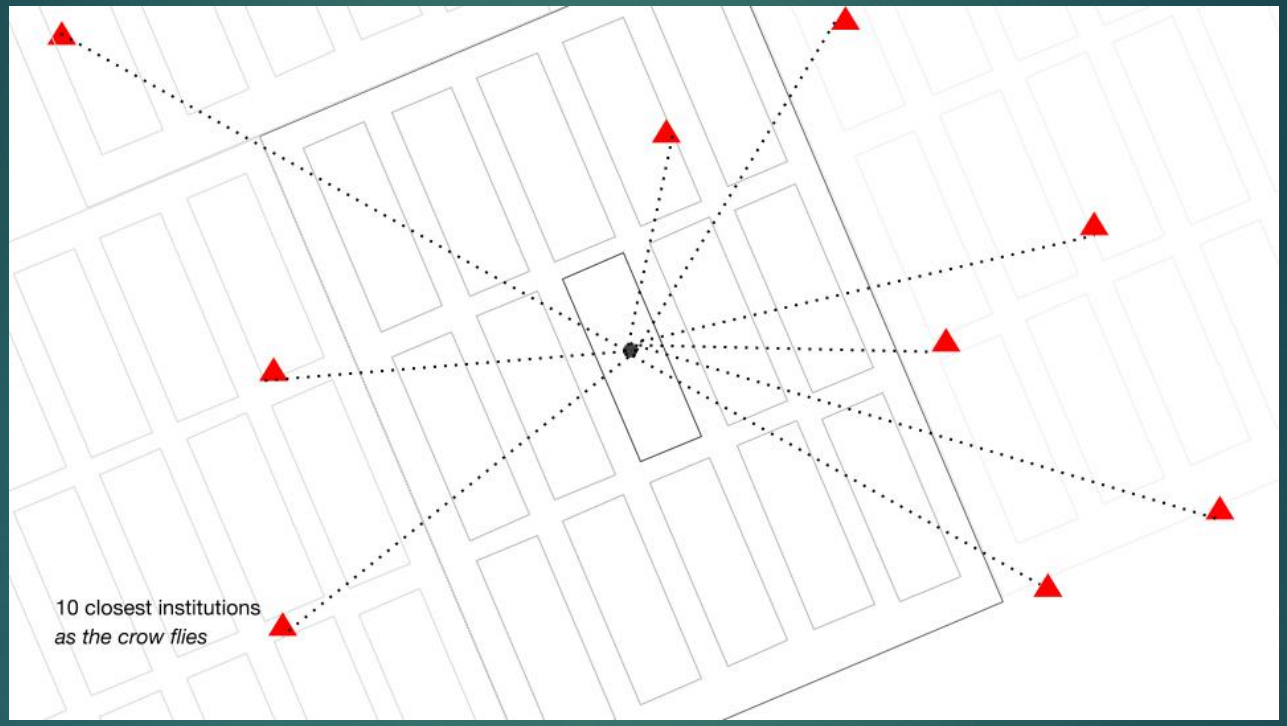

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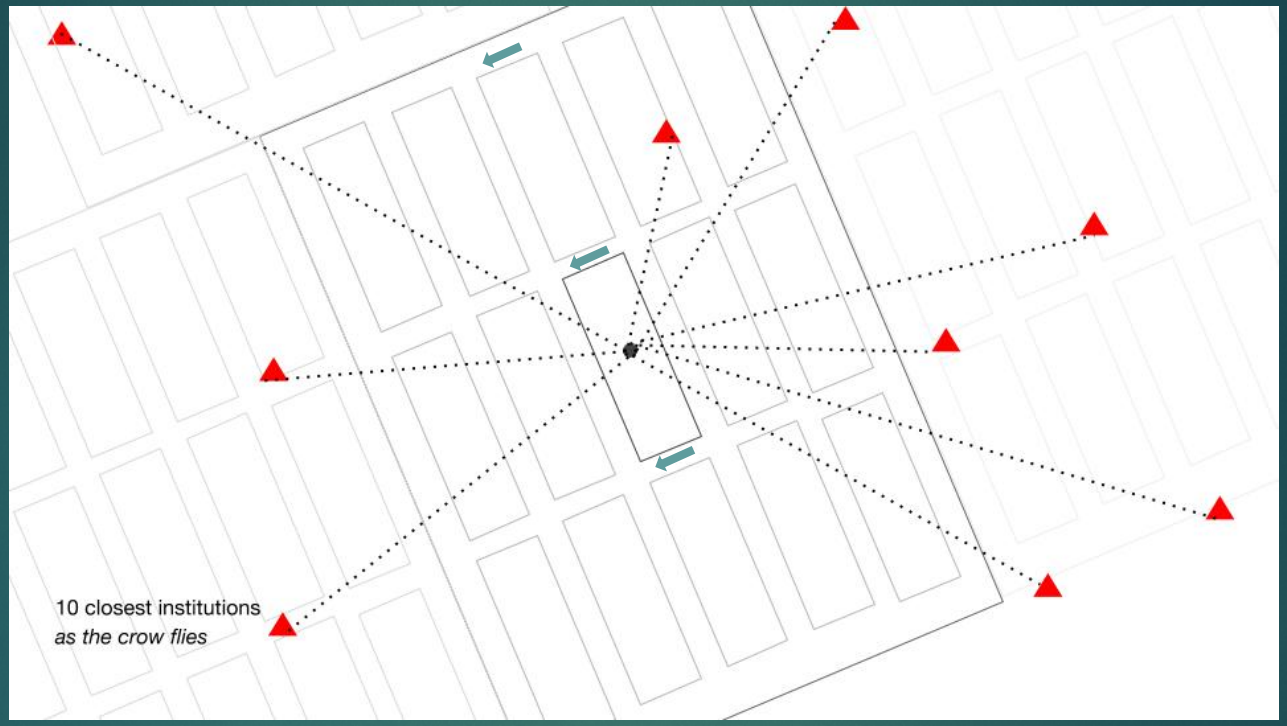

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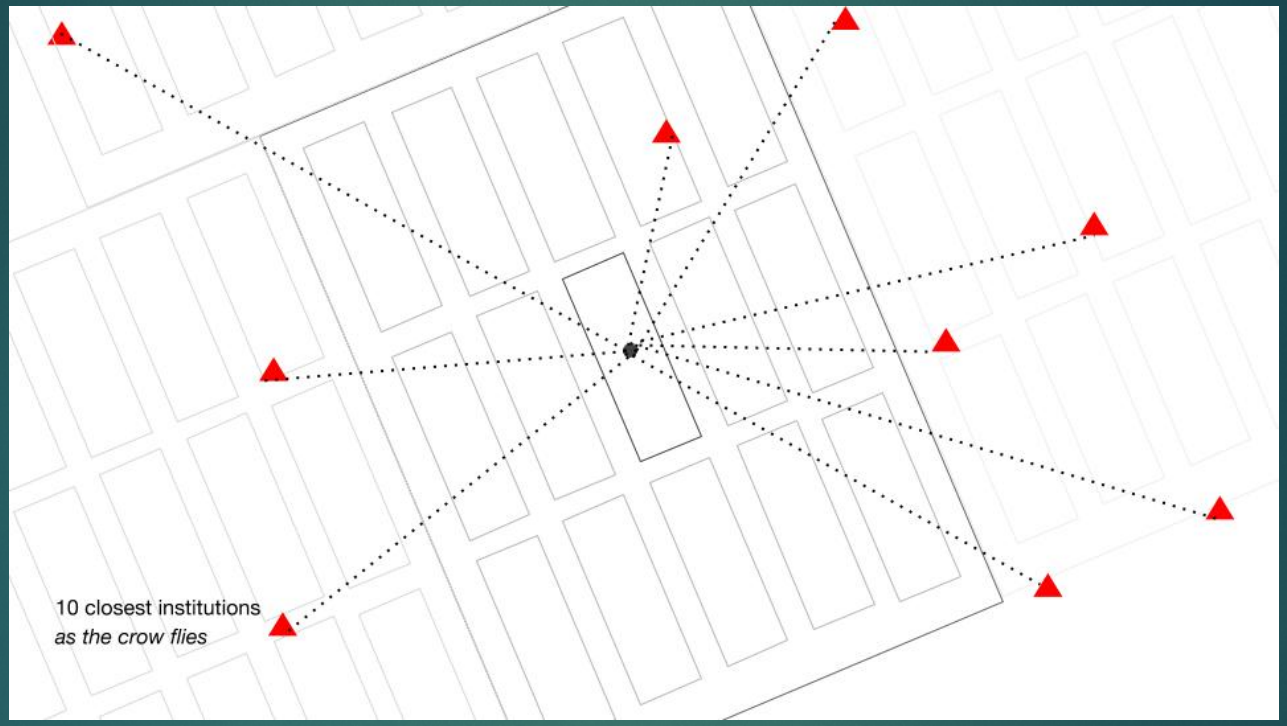

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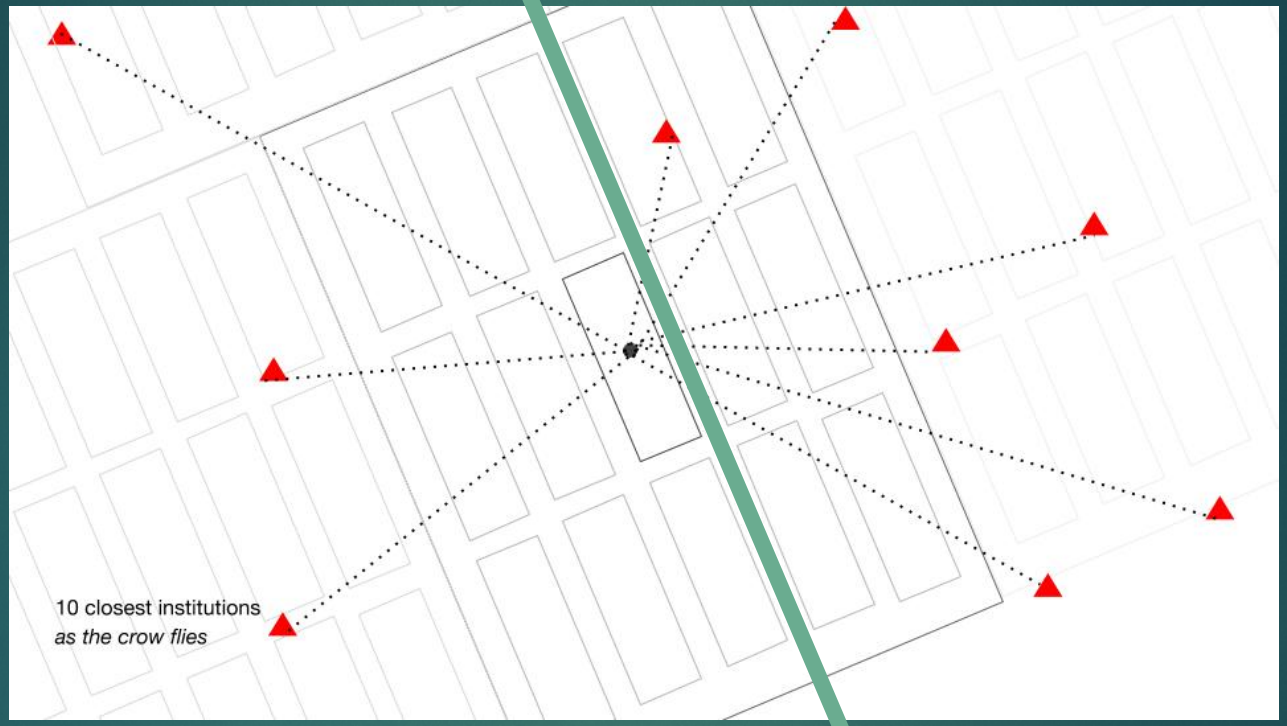

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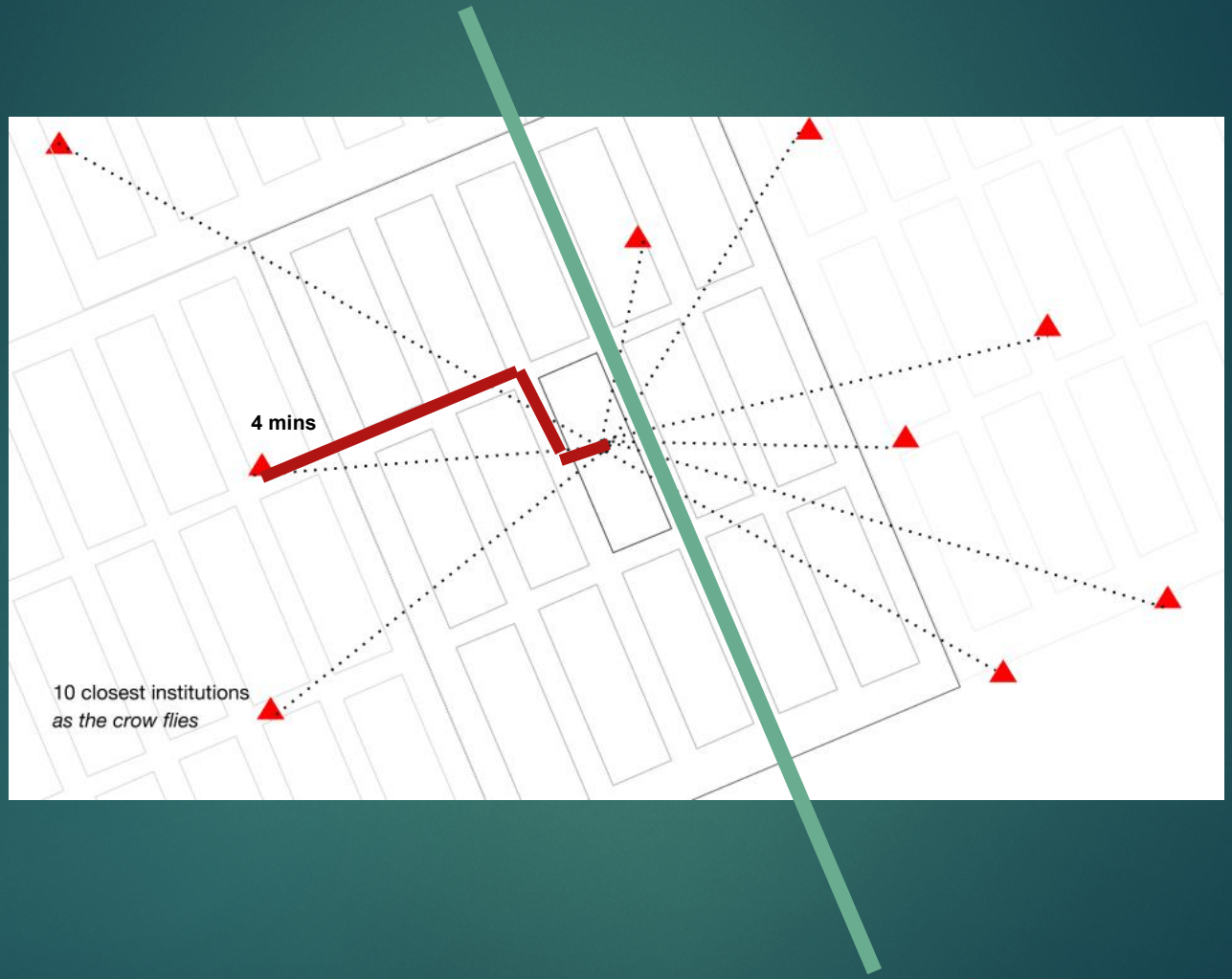

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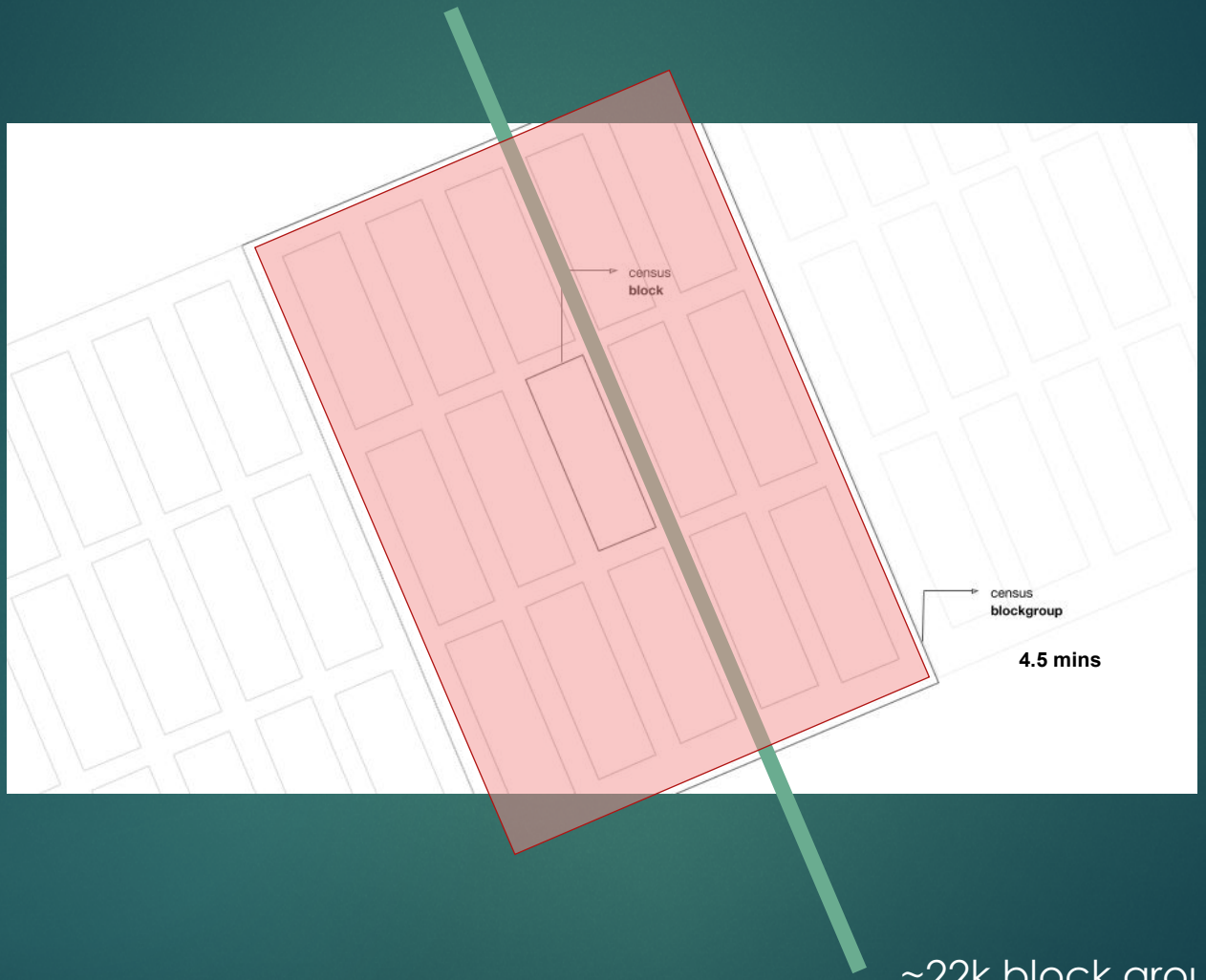

~22k block groups

Data

- **Bank/AFI location**
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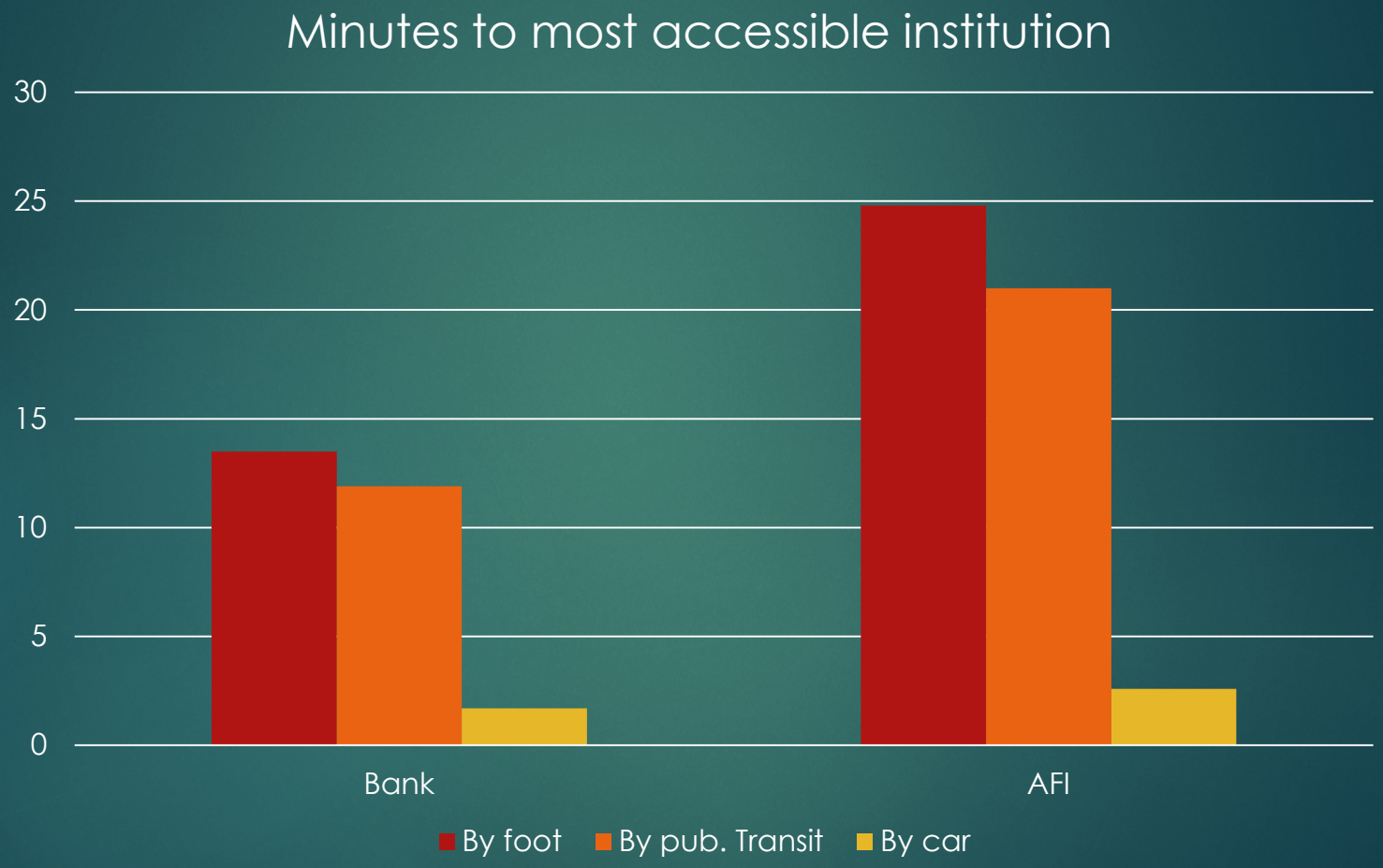
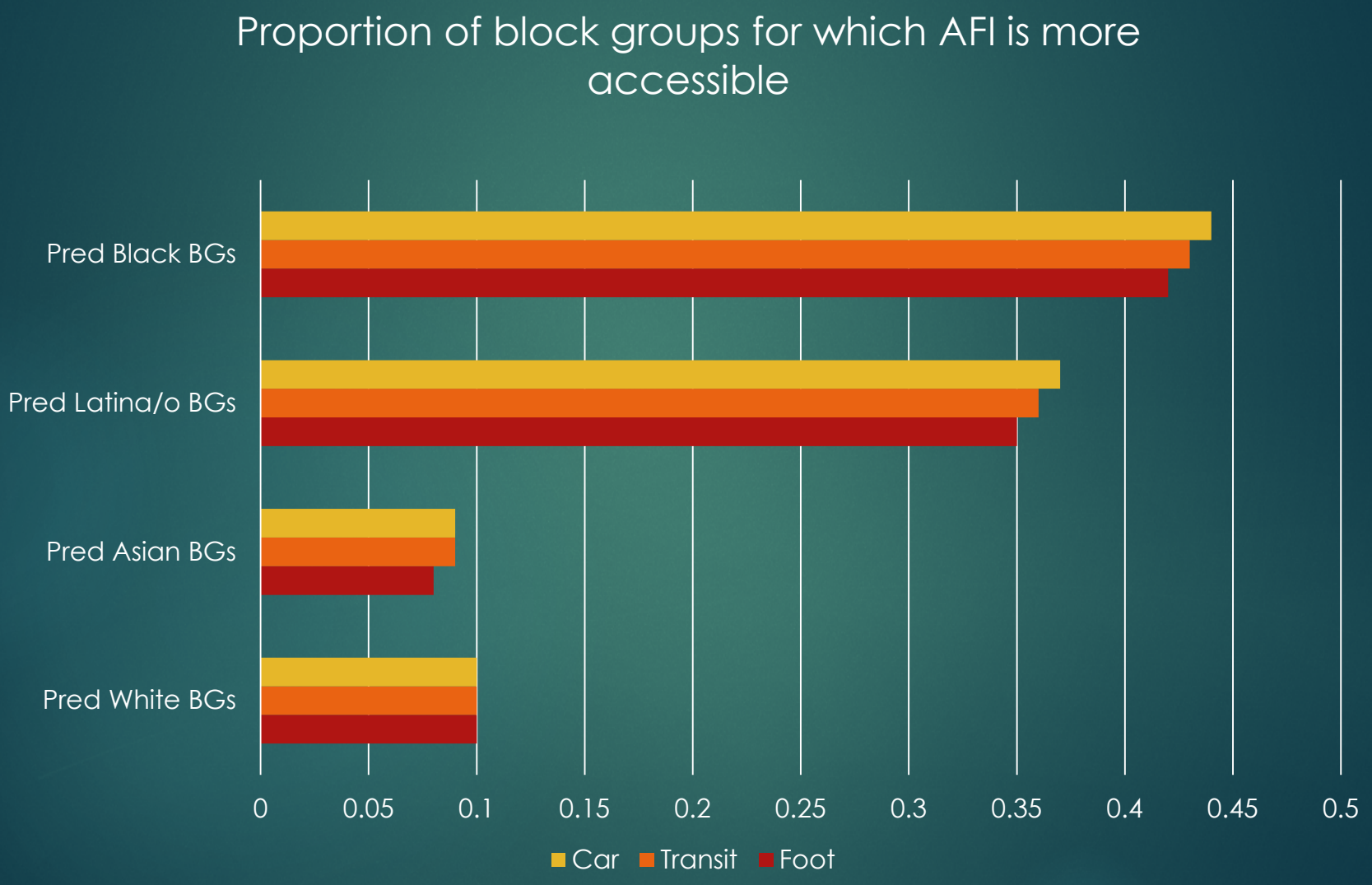
- **Street infrastructure** (streets, directions, speed limits, etc.)
  - Open Street Maps
- **Public transit schedules** (schedules, station location, etc.)
  - Local GTFS for each metro (except Memphis)
- **Neighborhood characteristics**
  - U.S. Census (2015 ACS)

Findings



There are far more banks than AFIs; thus, banks faster to get to on average

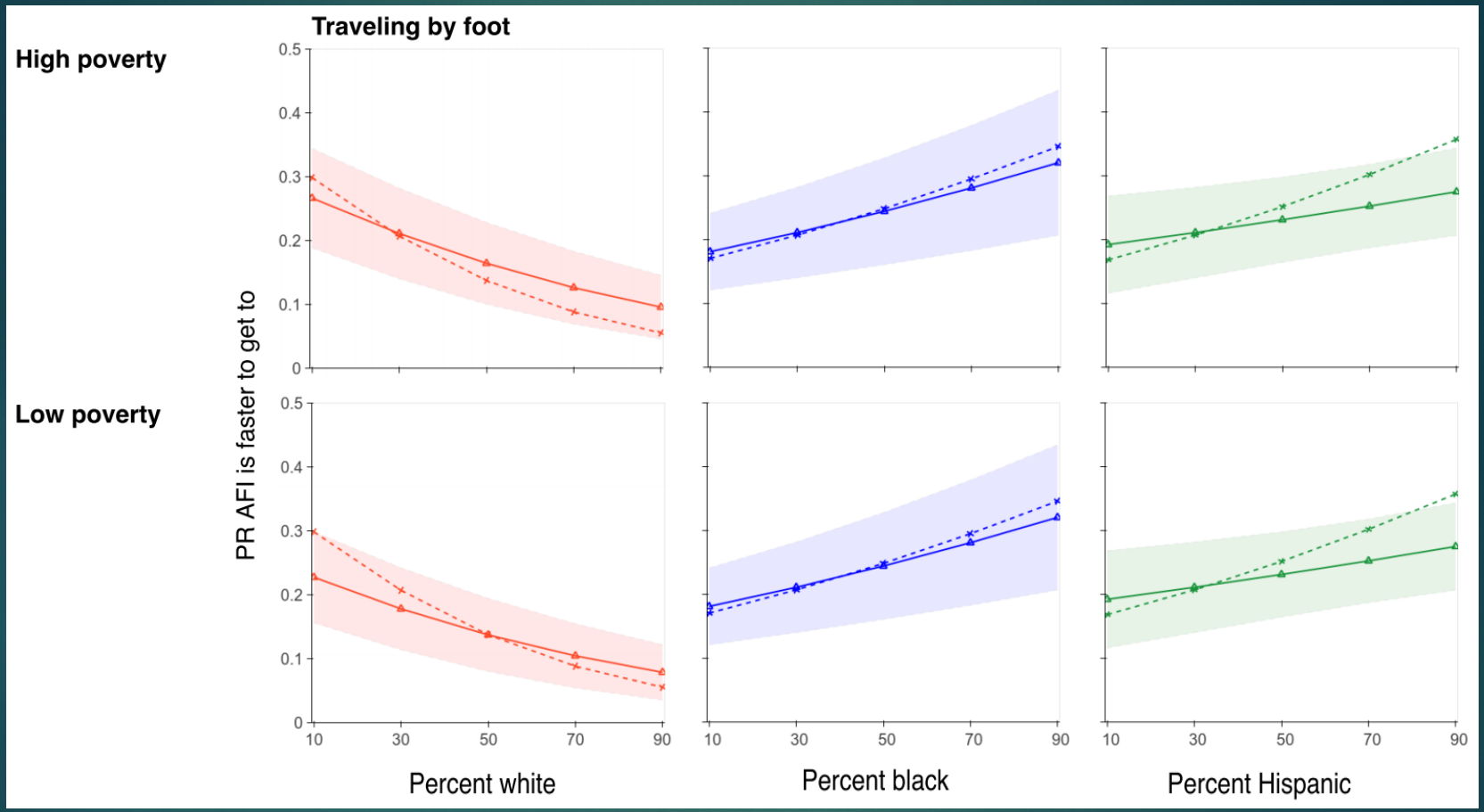
Findings


Proportion of block groups for which AFI is more accessible
Pred Black BGs
Pred Latina/o BGs
Pred Asian BGs
Pred White BGs
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
Car
Transit
Foot

Findings

- Covariates (*X*)
  - Proportion of each race
  - Proportion poor
  - Population density; proportion foreign born, unemployed, college educated, homeowner
  - Housing density, vacancy rate, proportion of units built before 2000, commercial density

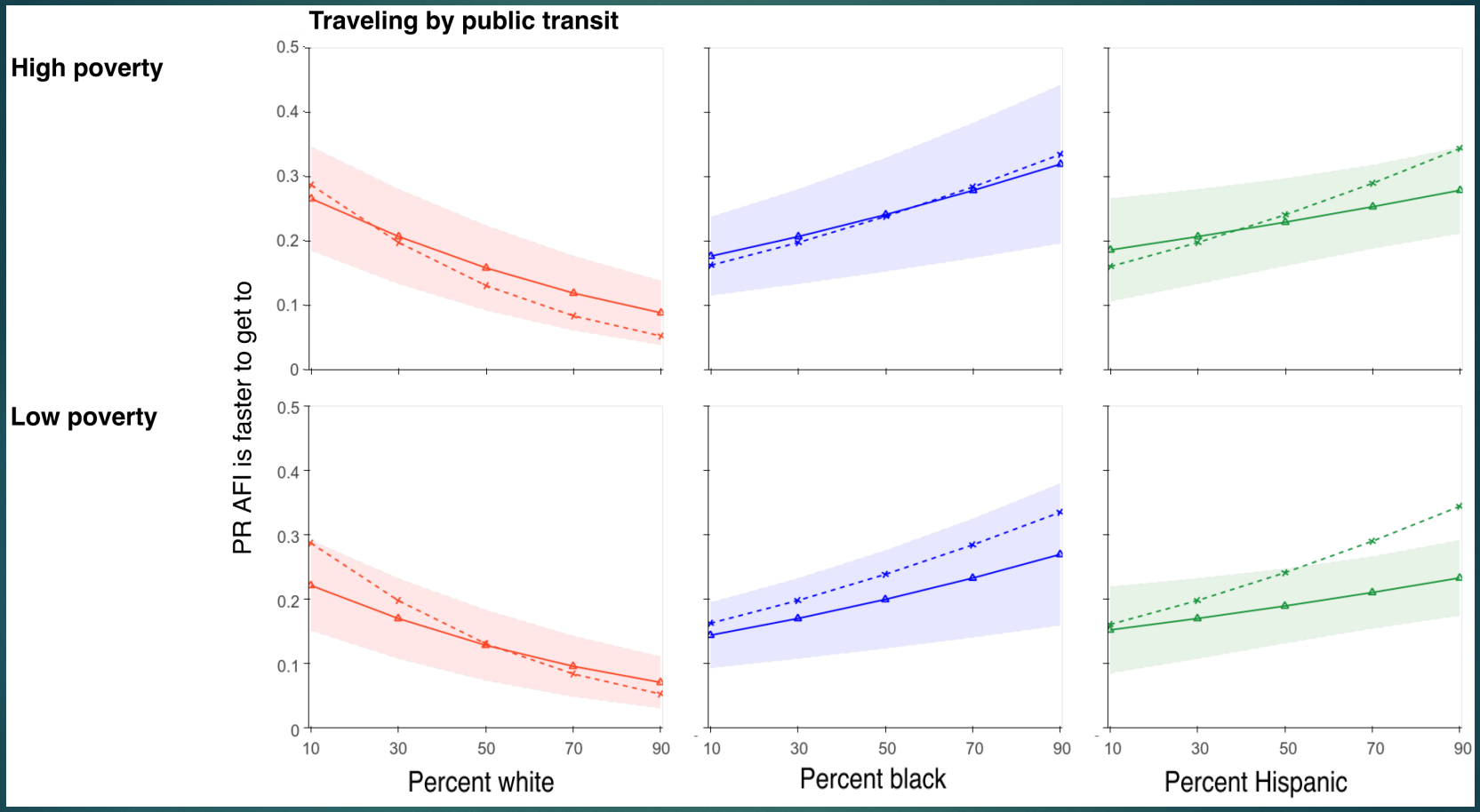
Findings



Predicted probability that AFI is faster to get to, by racial composition and poverty level of block group

Small et al. (2021, *Nature Human Behaviour*)

Findings



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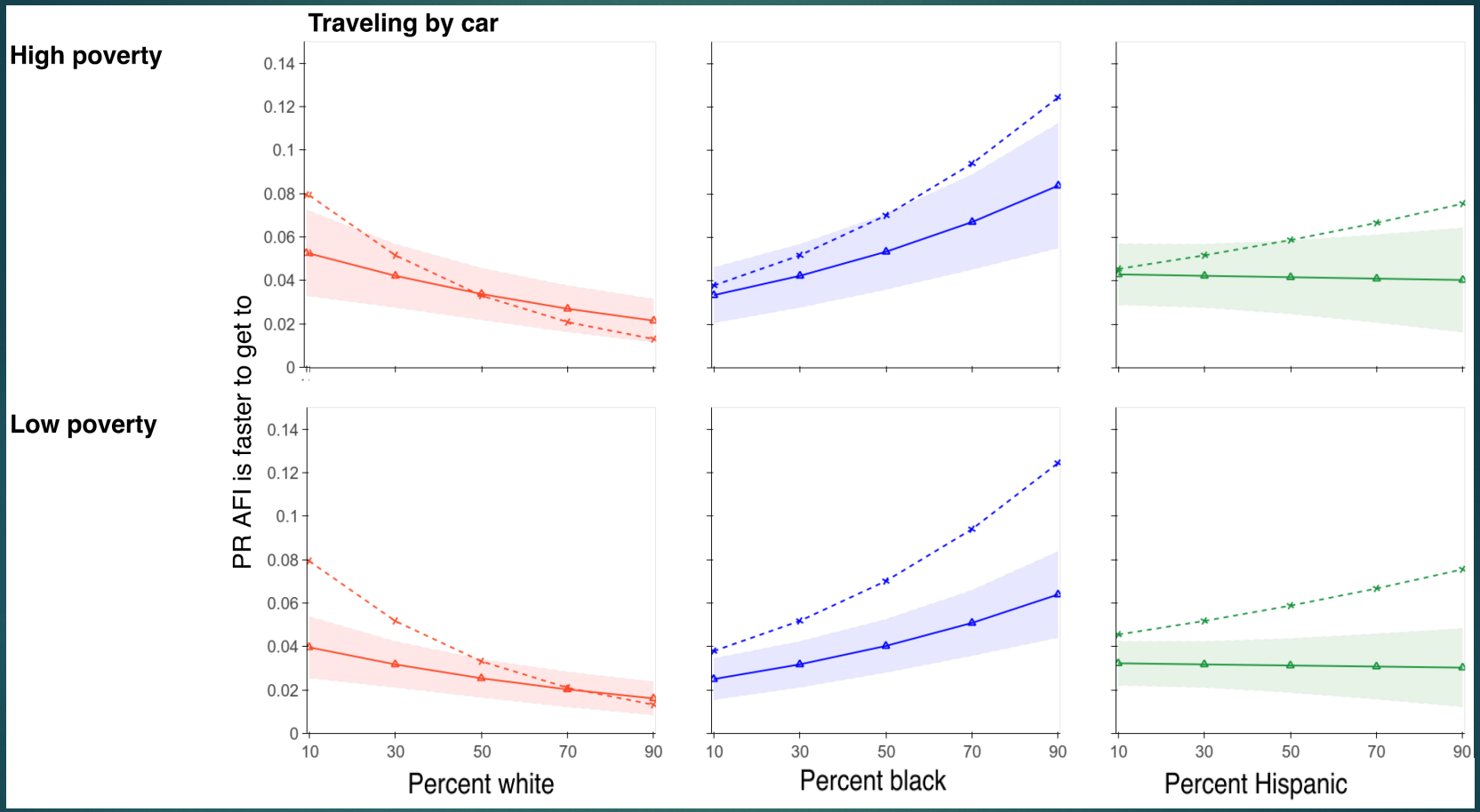

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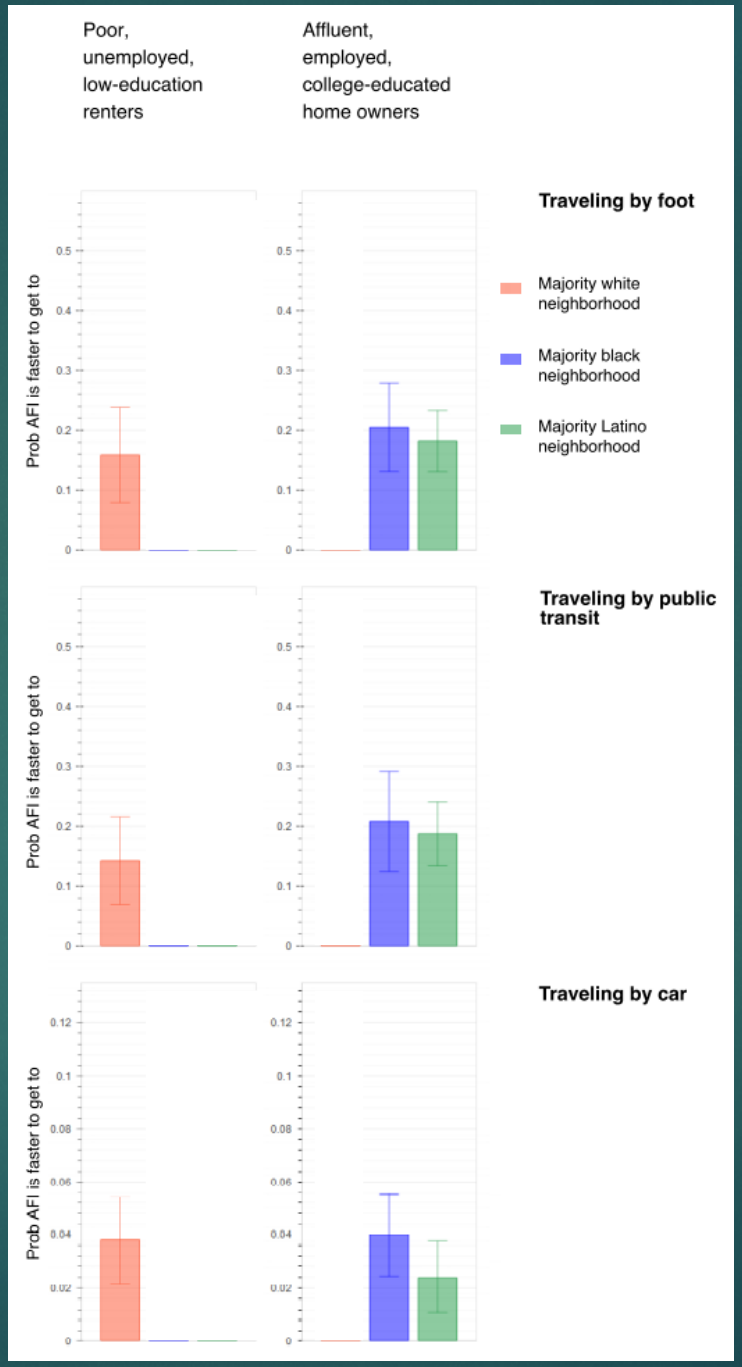
Small et al. (2021, *Nature Human Behaviour*)

Findings

- Comparing opposite ends

- **70% *white* and poor:**
  - 50% poor
  - 75pctl unemployment
  - 25pctl college educated
  - 25 pctl home ownership
- **70% *black/Latina/o and* affluent:**
  - 10% poor
  - 25pctl unemployment
  - 75pctl college educated
  - 75 pctl home ownership



Small et al. (2021, *Nature Human Behaviour*)

Conclusions

- Substantive: AFIs more accessible as proportion minority increases

- Methodological: Qualitative fieldwork…
  - encourages science rather than dataset to drive approach
  - provides essential quality check given seduction of large numbers

Thank you

Mariosmall.com

Current work

- Probing further
- Do minorities prefer AFIs over banks? We asked
  - New survey
  - Nationally representative data (n~3k)
  - Banks vs check cashers; banks vs payday lenders

We want to learn about your preferences for different financial institutions. Suppose you had a **$100 check** you needed to cash in person.

Regular bank refers to places such as Chase, Wells Fargo, or Bank of America.

Check cashing establishment refers to places such as ACE Cash Express, United Check Cashing, or Moneytree.

Where would you cash the check?

- ○ Check cashing establishment
- ○ Regular bank

Now suppose you needed to **borrow $500**.

Regular bank refers to places such as Chase, Wells Fargo, or Bank of America.

Payday lender refers to places such as Check Into Cash, Advance America, or ACE Cash Express.

Where would you go for the loan?

- ○ Payday lender
- ○ Regular bank

Banks vs AFIS

- For all four racial groups, average person preferred banks over either AFI
- However:

Banks over CC, no attributes

	Race only	+Demo	+B_flngs	+C_flngs	+Network	+State_FE
bc_noatt						
black	-1.445***	-0.916**	-0.566	-0.330	-0.339	-0.136
	(-5.65)	(-3.26)	(-1.92)	(-1.10)	(-1.13)	(-0.38)
other/mult	-0.297	0.113	0.190	0.406	0.421	0.283
	(-0.63)	(0.22)	(0.33)	(0.65)	(0.68)	(0.41)
latino	-0.855**	0.129	0.392	0.493	0.474	0.391
	(-2.91)	(0.37)	(1.10)	(1.38)	(1.35)	(1.05)
asian	0.565	1.332	1.529	1.936	1.847	1.499
	(0.75)	(1.13)	(1.33)	(1.61)	(1.52)	(1.16)

Banks over PDL, no attributes

	Race only	+Demo	+B_flngs	+P_flngs	+Network	+State_FE
bp_noatt						
black	-1.629***	-1.285***	-1.147***	-1.069***	-0.988***	-1.158***
	(-10.19)	(-7.05)	(-5.70)	(-5.00)	(-4.66)	(-5.31)
other/mult	-0.777*	-0.558	-0.592	-0.920**	-0.862*	-0.773*
	(-2.52)	(-1.78)	(-1.91)	(-2.68)	(-2.41)	(-1.97)
latino	-1.255***	-0.821***	-0.799***	-0.784***	-0.799***	-0.589*
	(-7.19)	(-3.94)	(-3.64)	(-3.54)	(-3.57)	(-2.47)
asian	-0.835*	-1.396**	-1.446**	-1.368**	-1.481**	-1.313**
	(-1.98)	(-2.92)	(-2.87)	(-2.85)	(-2.97)	(-2.68)

Work in progress

- Probing further
- Do minorities prefer AFIs over banks? We asked
- We need more
  - We are asking people why
  - We are asking *managers* how they locate

"Nearest" AFI

Table 2a. Coefficients predicting travel time to **nearest AFI**, by form of travel.

	Car		Foot		Public Transit	
	(1)	(2)	(1)	(2)	(1)	(2)
blc15	-0.0149***	-0.0124***	-0.160***	-0.137***	-0.142***	-0.119***
	(0.000550)	(0.000690)	(0.00660)	(0.00830)	(0.00647)	(0.00815)
lat15	-0.0247***	-0.0164***	-0.274***	-0.191***	-0.237***	-0.172***
	(0.000581)	(0.000882)	(0.00697)	(0.0106)	(0.00671)	(0.0103)
asi15	-0.00441***	0.00157	-0.0383**	0.00924	-0.0689***	-0.0471**
	(0.00116)	(0.00136)	(0.0139)	(0.0164)	(0.0134)	(0.0159)
oth15	-0.0115**	-0.0110**	-0.0969*	-0.102*	-0.134**	-0.147***
	(0.00353)	(0.00334)	(0.0422)	(0.0400)	(0.0407)	(0.0389)
pov15		-0.00621***		-0.0777***		-0.0700***
		(0.00113)		(0.0136)		(0.0133)
frn15		-0.0115***		-0.102***		-0.0568***
		(0.00122)		(0.0147)		(0.0143)
ppdnl15		0.369***		3.768***		3.375***
		(0.0274)		(0.329)		(0.322)
edu15		-0.00369***		-0.0468***		-0.0371***
		(0.000931)		(0.0112)		(0.0109)
ump15		0.00578**		0.0782***		0.0667**
		(0.00182)		(0.0219)		(0.0216)
own15		0.0156***		0.170***		0.144***
		(0.000603)		(0.00724)		(0.00706)
hu15sqk		-0.0000366***		-0.000451***		-0.000204***
		(0.00000406)		(0.0000488)		(0.0000474)
vacrat15		0.00204		0.0187		-0.00807
		(0.00156)		(0.0187)		(0.0185)
blb00		-0.0248***		-0.318***		-0.308***
		(0.000891)		(0.0107)		(0.0104)
cmdnpcpt		-1.105**		-12.94*		-18.21***
		(0.429)		(5.149)		(5.024)
_cons	4.301***	3.132***	43.55***	37.25***	39.05***	35.48***
	(0.260)	(0.324)	(3.190)	(3.976)	(3.362)	(4.180)
sigma_u _cons	1.121***	0.888***	13.79***	11.21***	14.16***	12.51***
	(0.183)	(0.145)	(2.247)	(1.831)	(2.369)	(2.095)
sigma_e _cons	1.979***	1.860***	23.75***	22.35***	22.84***	21.69***
	(0.00949)	(0.00893)	(0.114)	(0.107)	(0.111)	(0.105)
N	21760	21711	21756	21707	21362	21313

(Standard errors in parentheses) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

"Nearest" bank

Table 2b. Coefficients predicting travel time to **nearest bank**, by form of travel.

	Car		Foot		Public Transit	
	(1)	(2)	(1)	(2)	(1)	(2)
blc15	0.00222***	-0.0000978	0.0299***	0.00137	0.0153***	-0.00609
	(0.000356)	(0.000453)	(0.00336)	(0.00419)	(0.00323)	(0.00403)
lat15	-0.00196***	-0.00235***	-0.00770*	-0.0185***	-0.0204***	-0.0288***
	(0.000376)	(0.000578)	(0.00355)	(0.00535)	(0.00335)	(0.00510)
asi15	-0.00407***	-0.00216*	-0.0358***	-0.0170*	-0.0312***	-0.0189*
	(0.000750)	(0.000894)	(0.00708)	(0.00827)	(0.00668)	(0.00787)
oth15	-0.000577	-0.000482	-0.00993	-0.0128	-0.0152	-0.0215
	(0.00228)	(0.00218)	(0.0215)	(0.0202)	(0.0203)	(0.0193)
pov15		-0.000365		0.000866		-0.00722
		(0.000742)		(0.00687)		(0.00660)
frn15		-0.00657***		-0.0644***		-0.0477***
		(0.000801)		(0.00741)		(0.00706)
ppdnl15		0.170***		1.374***		1.160***
		(0.0179)		(0.166)		(0.159)
edu15		-0.00928***		-0.101***		-0.0838***
		(0.000611)		(0.00565)		(0.00541)
ump15		0.00244*		0.0271*		0.0212*
		(0.00120)		(0.0111)		(0.0107)
own15		0.0104***		0.102***		0.0823***
		(0.000394)		(0.00365)		(0.00350)
hu15sqk		-0.0000111***		-0.0000583*		-0.0000438
		(0.00000267)		(0.0000247)		(0.0000235)
vacrat15		0.00108		0.00938		-0.00488
		(0.00102)		(0.00947)		(0.00917)
blb00		-0.0119***		-0.122***		-0.114***
		(0.000582)		(0.00539)		(0.00516)
cmdnpcpt		-1.695***		-15.79***		-14.47***
		(0.281)		(2.604)		(2.488)
_cons	2.103***	1.849***	17.24***	17.72***	16.06***	17.73***
	(0.153)	(0.203)	(1.590)	(1.989)	(1.534)	(1.930)
sigma_u						
_cons	0.659***	0.515***	6.868***	5.539***	6.449***	5.325***
	(0.108)	(0.0843)	(1.119)	(0.905)	(1.080)	(0.894)
sigma_e						
_cons	1.284***	1.223***	12.12***	11.32***	11.42***	10.74***
	(0.00615)	(0.00586)	(0.0580)	(0.0542)	(0.0553)	(0.0520)
N	21852	21800	21852	21800	21362	21313

(Standard errors in parentheses) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Commercial density

'accounting',
'amusement_park',
'aquarium',
'art_gallery',
'atm',
'bakery',
'bank',
'bar',
'beauty_salon',
'bicycle_store',
'book_store',
'bowling_alley',
'cafe',
'campground',
'car_dealer',
'car_rental',
'car_repair',
'car_wash',
'casino',
'cemetery',
'church',
'city_hall',
'clothing_store',
'convenience_store',
'courthouse',
'dentist',
'department_store',
'doctor',
'electrician',
'electronics_store',
'embassy',
'fire_station',
'florist',
'funeral_home',
'furniture_store',
'gas_station',
'gym',
'hair_care',
'hardware_store',
'hindu_temple',
'home_goods_store',
'hospital',
'insurance_agency',
'jewelry_store',
'laundry',
'lawyer',
'library',
'liquor_store',
'local_government_office',
'locksmith',
'lodging',
'meal_delivery',
'meal_takeaway',
'mosque',
'movie_rental',
'movie_theater',
'moving_company',
'museum',
'night_club',
'painter',
'park',
'parking',
'pet_store',
'pharmacy',
'physiotherapist',
'plumber',
'police',
'post_office',
'real_estate_agency',
'restaurant',
'roofing_contractor',
'rv_park',
'school',
'shoe_store',
'shopping_mall',
'spa',
'stadium',
'storage',
'store',
'supermarket',
'synagogue',
'travel_agency',
'veterinary_care',
'zoo'

Coefficients predicting log odds that AFI is closer

	Phoenix, NYC, Philadelphia, Boston			Remaining Cities (n=15)		
	Car	Walk	Transit	Car	Walk	Transit
blc15	0.016***	0.020***	0.020***	0.015***	0.014***	0.016***
	(0.005)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)
lat15	0.003	0.021***	0.021***	0.009*	0.011**	0.012**
	(0.007)	(0.004)	(0.003)	(0.004)	(0.003)	(0.004)
N	7993	7993	7993	13807	13807	13320

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Coefficients predicting log odds that AFI is closer

	California and Texas cities only (n=9)			Remaining cities (n=10)		
	Car	Walk	Transit	Car	Walk	Transit
blc15	0.019***	0.017***	0.019***	0.015***	0.017***	0.017***
	(0.006)	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)
lat15	0.015**	0.016**	0.017***	0.001	0.015***	0.015***
	(0.005)	(0.005)	(0.005)	(0.004)	(0.003)	(0.004)
N	8729	8729	8729	13071	13071	12584

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Pairwise correlation, all predictor variables

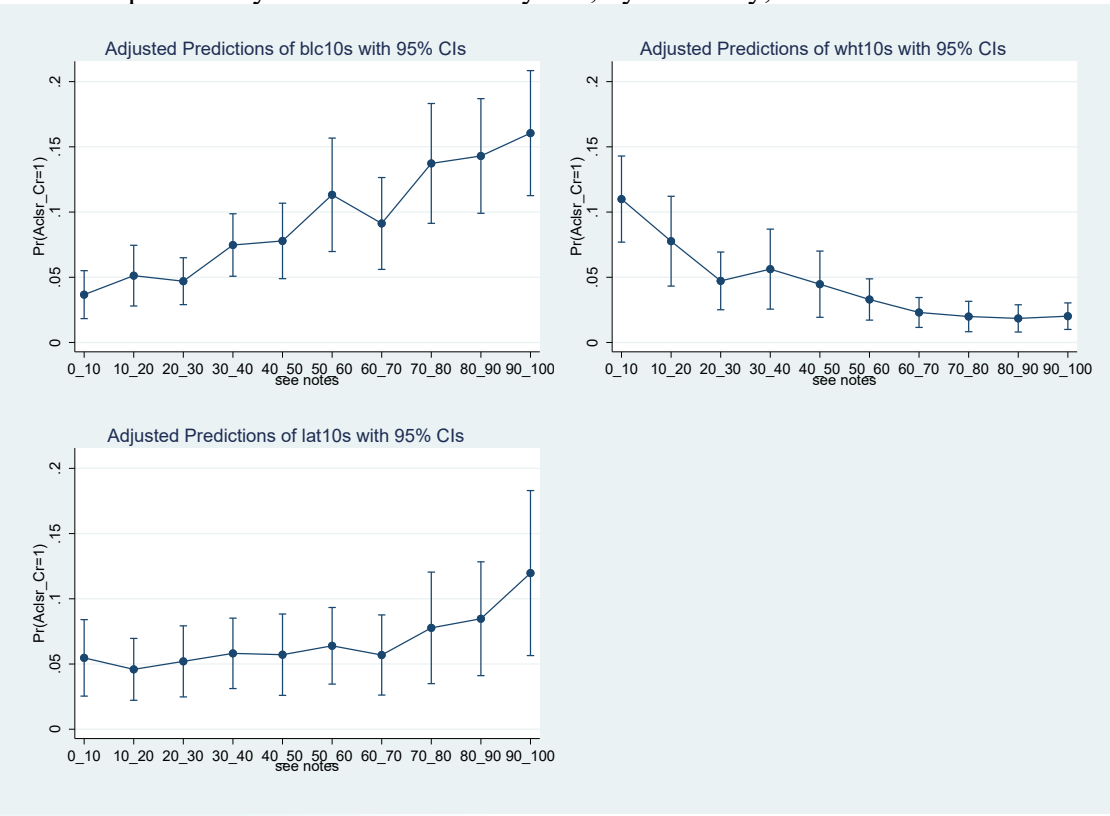
	pov15	ln_inc	blc15	lat15	asi15	oth15	frn15	ppdnl15	edu15	ump15	own15	hu15sqk	vacrat15	blb00	cmdnpcpt
pov15	1														
ln_inc	-0.8017	1													
blc15	0.3461	-0.4198	1												
lat15	0.2392	-0.2726	-0.3581	1											
asi15	-0.1595	0.2022	-0.2935	-0.1619	1										
oth15	-0.0833	0.1161	-0.0549	-0.1741	0.1088	1									
frn15	0.009	-0.0174	-0.3251	0.4017	0.5109	0.0268	1								
ppdnl15	-0.0711	0.123	-0.2019	0.1777	0.1197	0.0082	0.1741	1							
edu15	-0.5332	0.6939	-0.3679	-0.4553	0.2174	0.1192	-0.1158	0.011	1						
ump15	0.4896	-0.4968	0.4876	-0.0129	-0.1571	-0.0347	-0.149	-0.1551	-0.4201	1					
own15	-0.4794	0.4991	-0.1053	-0.1678	-0.0238	0.0013	-0.2491	-0.0536	0.1415	-0.154	1				
hu15sqk	-0.017	0.0553	-0.0744	-0.0493	0.1147	0.0038	0.2057	0.0616	0.2606	-0.0717	-0.3527	1			
vacrat15	0.3008	-0.2914	0.3767	-0.1738	-0.1687	-0.0384	-0.2568	-0.326	-0.147	0.2972	-0.1176	-0.0097	1		
blb00	0.088	-0.1266	0.0678	0.0138	-0.0039	-0.0306	0.0972	-0.3036	-0.1223	0.1274	-0.0322	0.1199	0.0298	1	
cmdnpcpt	-0.0561	0.0724	-0.0864	-0.0065	0.0516	0.0256	0.0202	-0.0563	0.0547	-0.0507	0.0187	-0.0258	-0.2249	0.0047	1

Coefficients predicting log odds that AFI is closer, percent poor vs income

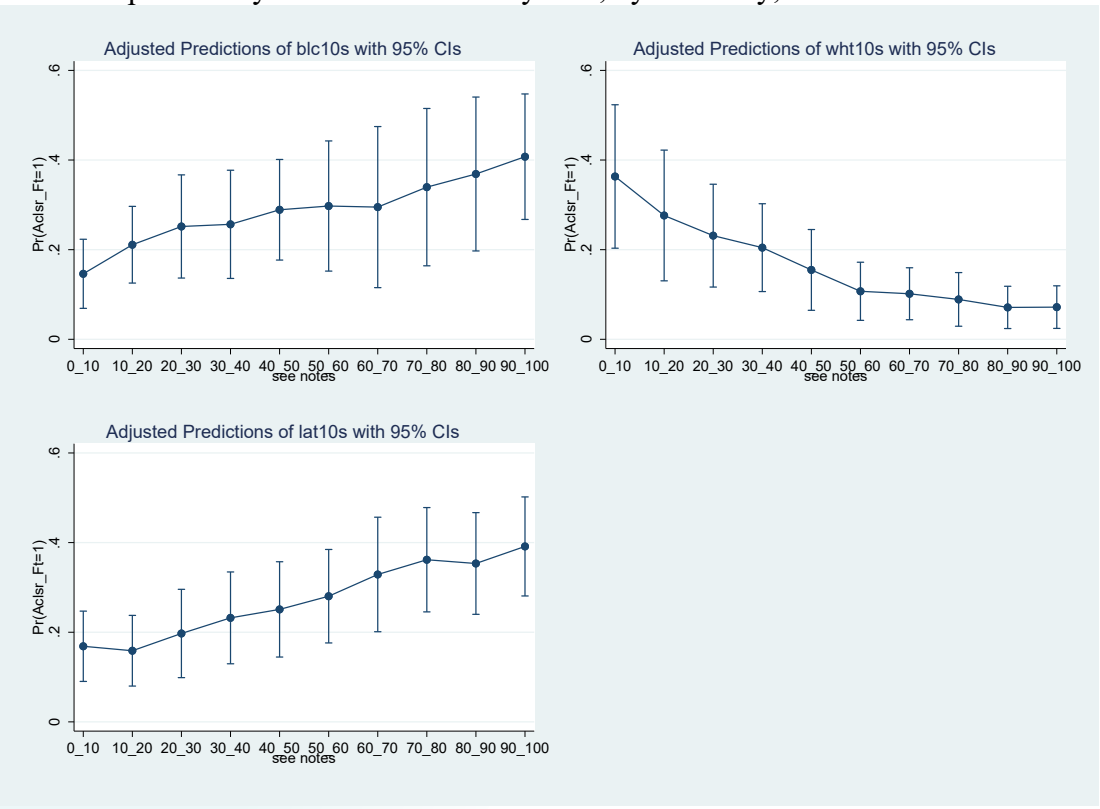
	(1) Car	(2) Car	(3) Foot	(4) Foot	(5) Pub. transit	(6) Pub. transit
main						
blc15	**0.0162*** **	**0.0157*** **	**0.0171*** **	**0.0164*** **	**0.0179*** **	**0.0172*** **
	(0.00278)	**(0.00298)**	**(0.00178)**	**(0.00183)**	**(0.00175)**	**(0.00165)**
lat15	**0.00727**	**0.00821**	**0.0146*** **	**0.0145*** **	**0.0157*** **	**0.0158*** **
	(0.00413)	**(0.00462)**	**(0.00294)**	**(0.00275)**	**(0.00318)**	**(0.00279)**
asi15	-0.00532	-0.00542	-0.00298	-0.00380	-0.00304	-0.00298
	(0.0105)	(0.0105)	(0.00306)	(0.00330)	(0.00324)	(0.00355)
oth15	0.00805	0.00858	0.00765	0.00728	0.00622	0.00651
	(0.0152)	(0.0135)	(0.00450)	(0.00480)	(0.00541)	(0.00543)
pov15	**0.00762***		**0.00546*** **		**0.00622*** **	
	(0.00332)		**(0.00106)**		**(0.00118)**	
ln_inc		**-0.222***		**-0.176***		**-0.167** **
		(0.0872)		**(0.0705)**		**(0.0613)**
frn15	0.000104	0.000517	0.00246	0.00289	0.00126	0.000938
	(0.00573)	(0.00701)	(0.00350)	(0.00356)	(0.00371)	(0.00349)
ppdnl15	-0.0745	-0.104	-0.0842	-0.103	-0.0622	-0.0908
	(0.0867)	(0.0968)	(0.0858)	(0.0804)	(0.0688)	(0.0666)
edu15	-0.0211***	-0.0184*	-0.0141***	-0.0132***	-0.0135***	-0.0126***
	(0.00633)	(0.00717)	(0.00332)	(0.00394)	(0.00302)	(0.00349)
ump15	-0.00307	-0.00186	-0.00130	-0.000773	-0.00323	-0.000831
	(0.00387)	(0.00373)	(0.00317)	(0.00288)	(0.00326)	(0.00333)
own15	0.00233	0.00236	0.0000984	0.0000608	0.00210	0.00128
	(0.00254)	(0.00250)	(0.00116)	(0.00127)	(0.00121)	(0.00109)
hu15sqk	-0.000122***	-0.000116***	-0.0000162	-0.0000160	-0.00000811	-0.0000115
	(0.0000249)	(0.0000238)	(0.0000389)	(0.0000409)	(0.0000343)	(0.0000356)
vacrat15	0.00688	0.00790	0.00283	0.00264	0.00141	0.000397
	(0.00403)	(0.00498)	(0.00215)	(0.00255)	(0.00202)	(0.00242)
blb00	-0.00322	-0.00449	0.00760***	0.00637***	0.00437*	0.00310
	(0.00331)	(0.00391)	(0.00167)	(0.00166)	(0.00188)	(0.00190)
cmdnpcpt	-1.110	-3.235	-1.885*	-2.434*	-1.970**	-2.662***
	(1.855)	(2.459)	(0.861)	(1.105)	(0.741)	(0.798)
_cons	-2.774***		-2.264**		-2.291**	
	(0.721)		(0.855)		(0.776)	
/						
lnsig2u	-0.588	-0.614	-1.610*	-1.671**	-1.991**	-2.177**
	(0.320)	(0.345)	(0.629)	(0.640)	(0.722)	(0.784)
N	21800	19826	21800	19826	21313	19372

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

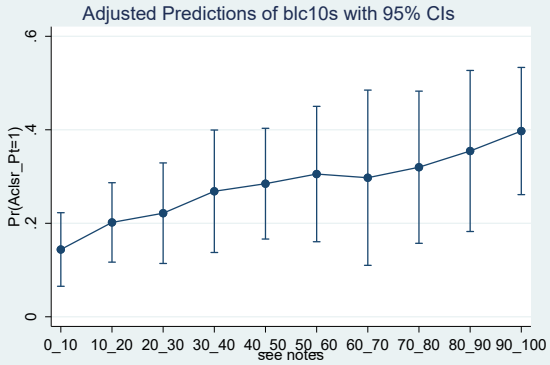
Predicted probability that AFI is closer by **car**, by race only, bivariate relation

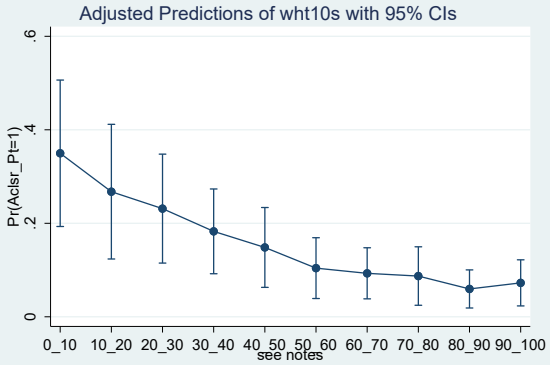


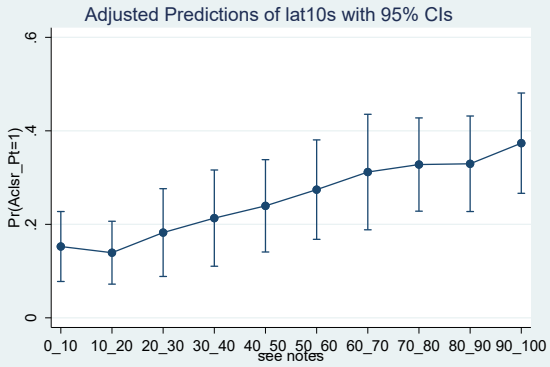
Predicted probability that AFI is closer by **foot**, by race only, bivariate relation



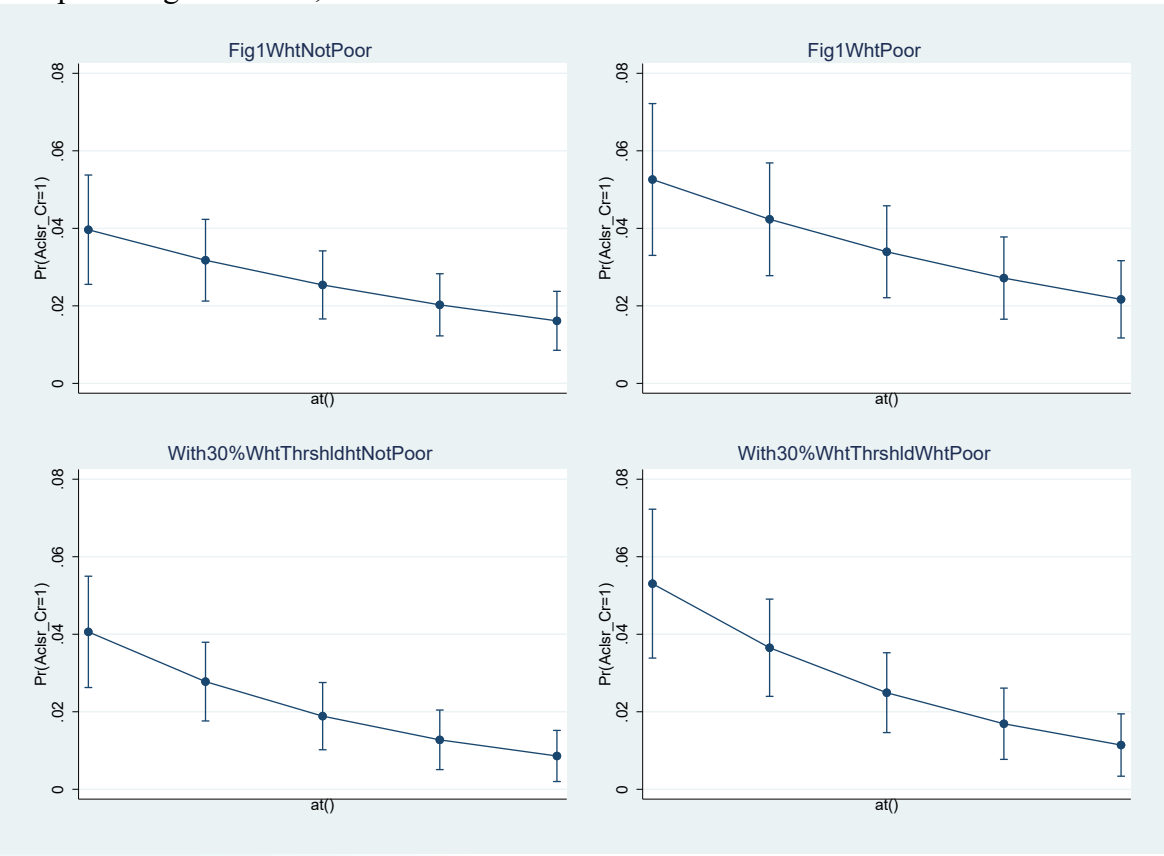
Predicted probability that AFI is closer by **public transit**, by race only, bivariate relation







Predicted probability that AFI is closer by car by proportion white, after controls, for poor and non-poor neighborhoods, with and without 30% threshold interaction



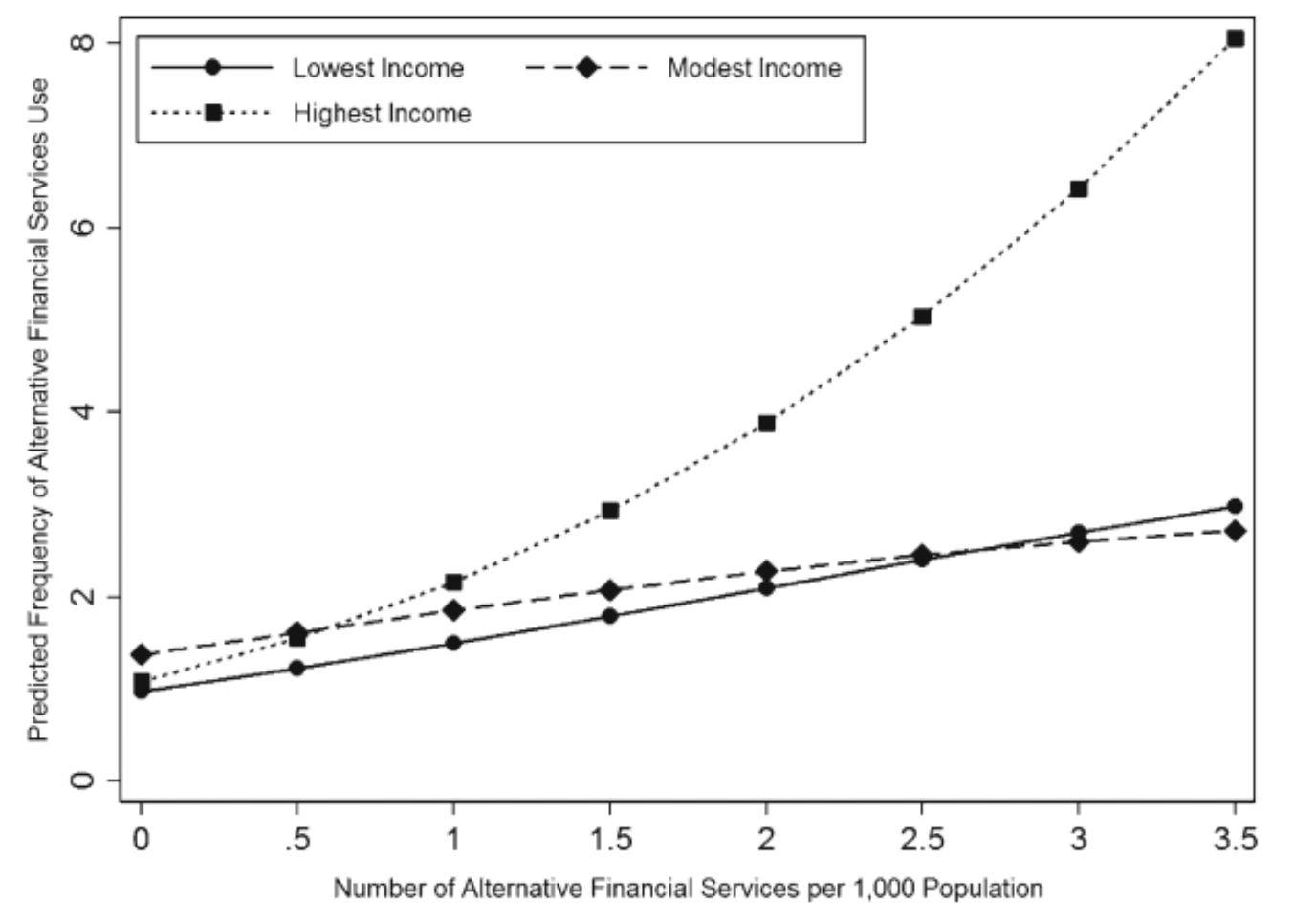
Coefficients predicting log odds that AFI is closer by, by mode of travel, before and after including interaction terms, after controls

	(1) Car	(2) Car	(3) Foot	(4) Foot	(5) Publ. transit	(6) Publ. tran
blc15	0.0162***	0.0187***	0.0171***	0.0212***	0.0179***	0.0210**
	(0.00278)	(0.00303)	(0.00178)	(0.00178)	(0.00175)	(0.00180
lat15	0.00727	0.00511	0.0146***	0.0144**	0.0157***	0.0171**
	(0.00413)	(0.00414)	(0.00294)	(0.00444)	(0.00318)	(0.00473
pov15*blc15		-0.000109		-0.000198**		-0.00015
		(0.000113)		(0.0000739)		(0.000071
pov15*lat15		0.0000438		-0.0000427		-0.000094
		(0.000118)		(0.0000924)		(0.000089

Note: Includes all controls used to produce Figure 1; random effects with robust standard errors that account for city clustering.

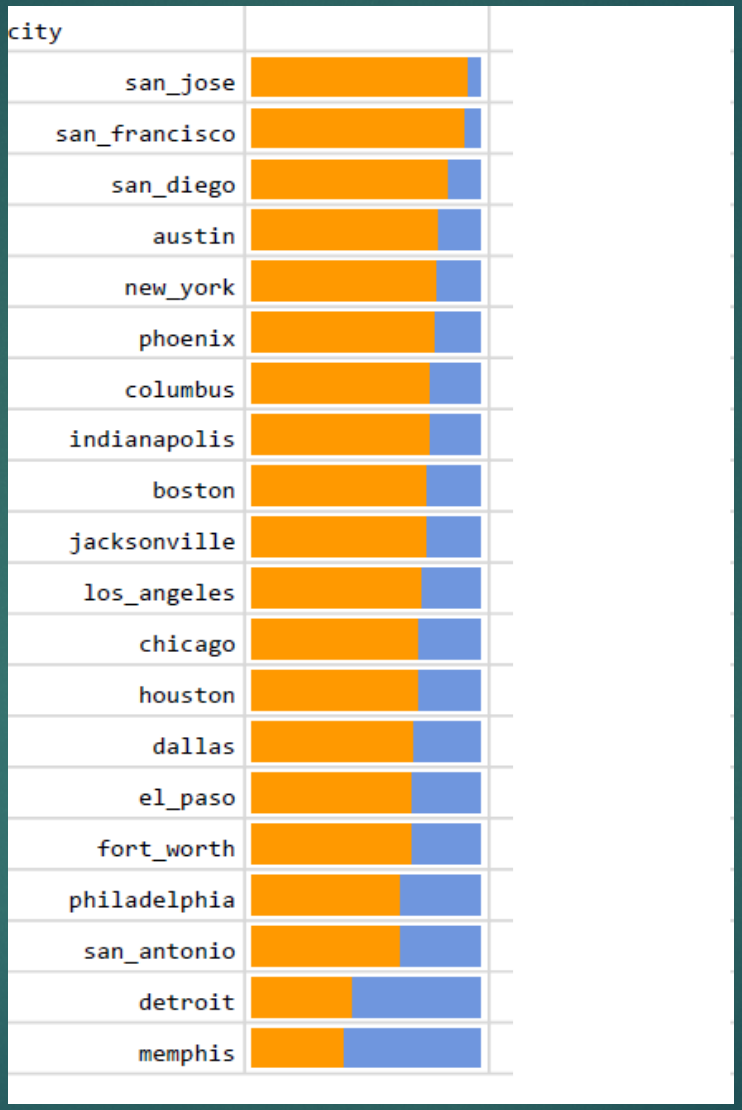
Alternative financial institutions

LI < $15k
HI > $50k



AFI density predicts frequency of use; Friedline and Kepple 2016. Also Gross et al 2012

Proportion of BGs in which bank/AFI is closer



Name	Description	Source
cityname	City name.	
wht15	White alone as proportion of total population.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B03002. (July 2019)
Proportion black	Black or African American alone as proportion of total population.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B03002. (July 2019)
Prop Latino/a	Hispanic or Latino/a American alone as proportion of total population.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B03002. (July 2019)
asi15	Asian alone as proportion of total population.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B03002. (July 2019)
oth15	Other as proportion of total population.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B03002. (July 2019)
pov15	Income in the Past 12 Months Below Poverty Level as proportion of total population for whom poverty status Is determined.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B17021. (July 2019)
frn15	Foreign born as proportion of total population.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B99051. (July 2019)
ump15	Employment rate as civilian labor force employed as proportion of total civilian labor force population.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B23025. (July 2019)
edu15	Education level as proportion of population 25 years and over with college degree.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B15003. (July 2019)
own15	Home owner ship as proportion of population in owner occupied housing, from the total population living in occupied housing units.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B25008. (July 2019)
blb00	Built before 2000 as proportion of total housing units built before 2000.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B25036. (July 2019)
hu15	Housing units.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B25001. (July 2019)
hu15sqk	Housing units per square kilometer.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B25001. (July 2019)
vacrat15	Proportion of housing units not occupied.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Tables B25004, B25001 . (July 2019)
ppdnl15	Population density; Total population, expressed as natural log.	U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B03002. (July 2019)
cmdnpcpt	Commercial density; Number of commercial establishments per 1,000 total population of occupied housings.	Google Places API, U.S. Census Bureau (2016). 2015-2011 American Community Survey 5 year estimate. Table B03002. (July 2019)

Table 1b. Coefficients predicting log odds that nearest AFI will be closer than nearest bank, **foot travel**.

	(1)	(2)	(3)	(4)	(5)
blc15	0.0253***	0.0231***	0.0229***	0.0172***	0.0171***
	(0.00169)	(0.00139)	(0.00138)	(0.00181)	(0.00178)
lat15	0.0259***	0.0231***	0.0220***	0.0147***	0.0146***
	(0.00136)	(0.00150)	(0.00231)	(0.00295)	(0.00294)
asi15	0.00145	0.000147	-0.00186	-0.00300	-0.00298
	(0.00408)	(0.00391)	(0.00279)	(0.00307)	(0.00306)
oth15	0.0128*	0.0112*	0.0105**	0.00769	0.00765
	(0.00504)	(0.00470)	(0.00400)	(0.00451)	(0.00450)
pov15		0.00815***	0.00809***	0.00539***	0.00546***
		(0.00125)	(0.00117)	(0.00108)	(0.00106)
frn15			0.00471	0.00248	0.00246
			(0.00602)	(0.00349)	(0.00350)
ppdnl15			-0.171**	-0.0744	-0.0842
			(0.0664)	(0.0855)	(0.0858)
edu15				-0.0141***	-0.0141***
				(0.00332)	(0.00332)
ump15				-0.00131	-0.00130
				(0.00317)	(0.00317)
own15				0.000191	0.0000984
				(0.00117)	(0.00116)
hu15sqk				-0.0000151	-0.0000162
				(0.0000389)	(0.0000389)
vacrat15				0.00396	0.00283
				(0.00230)	(0.00215)
blb00				0.00763***	0.00760***
				(0.00167)	(0.00167)
cmdnpcpt					-1.885*
					(0.861)
_cons	-2.989***	-3.025***	-1.838*	-2.371**	-2.264**
	(0.318)	(0.313)	(0.724)	(0.855)	(0.855)
lnsig2u	-1.343*	-1.482*	-1.425*	-1.607*	-1.610*
	(0.628)	(0.669)	(0.689)	(0.629)	(0.629)
N	21852	21824	21824	21800	21800

(Standard errors in parentheses) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1a. Coefficients predicting log odds that nearest AFI will be closer than nearest bank, **car travel**.

	(1)	(2)	(3)	(4)	(5)
blc15	0.0273***	0.0247***	0.0246***	0.0163***	0.0162***
	(0.00228)	(0.00212)	(0.00213)	(0.00278)	(0.00278)
lat15	0.0207***	0.0176***	0.0177***	0.00731	0.00727
	(0.00273)	(0.00277)	(0.00401)	(0.00417)	(0.00413)
asi15	-0.00451	-0.00573	-0.00466	-0.00534	-0.00532
	(0.00996)	(0.00953)	(0.0104)	(0.0105)	(0.0105)
oth15	0.0176	0.0147	0.0145	0.00809	0.00805
	(0.0147)	(0.0147)	(0.0145)	(0.0153)	(0.0152)
pov15		0.00880***	0.00832***	0.00758*	0.00762*
		(0.00253)	(0.00245)	(0.00331)	(0.00332)
frn15			0.00105	0.000116	0.000104
			(0.00667)	(0.00573)	(0.00573)
ppdnl15			-0.176*	-0.0696	-0.0745
			(0.0897)	(0.0857)	(0.0867)
edu15				-0.0211***	-0.0211***
				(0.00634)	(0.00633)
ump15				-0.00306	-0.00307
				(0.00386)	(0.00387)
own15				0.00239	0.00233
				(0.00255)	(0.00254)
hu15sqk				-0.000120***	-0.000122***
				(0.0000251)	(0.0000249)
vacrat15				0.00738	0.00688
				(0.00382)	(0.00403)
blb00				-0.00321	-0.00322
				(0.00332)	(0.00331)
cmdnpcpt					-1.110
					(1.855)
_cons	-4.671***	-4.696***	-3.451***	-2.830***	-2.774***
	(0.263)	(0.264)	(0.658)	(0.716)	(0.721)
lnsig2u	-0.293	-0.318	-0.295	-0.586	-0.588
	(0.307)	(0.313)	(0.336)	(0.319)	(0.320)
N	21852	21824	21824	21800	21800

(Standard errors in parentheses) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 1c. Coefficients predicting log odds that nearest AFI will be closer than nearest bank, **public transit travel**.

	(1)	(2)	(3)	(4)	(5)
blc15	0.0251***	0.0233***	0.0231***	0.0180***	0.0179***
	(0.00159)	(0.00144)	(0.00138)	(0.00175)	(0.00175)
lat15	0.0256***	0.0233***	0.0226***	0.0157***	0.0157***
	(0.00144)	(0.00154)	(0.00257)	(0.00318)	(0.00318)
asi15	0.000359	-0.000793	-0.00194	-0.00306	-0.00304
	(0.00403)	(0.00391)	(0.00309)	(0.00325)	(0.00324)
oth15	0.0104	0.00917	0.00878	0.00626	0.00622
	(0.00563)	(0.00553)	(0.00495)	(0.00542)	(0.00541)
pov15		0.00684***	0.00679***	0.00615***	0.00622***
		(0.00132)	(0.00132)	(0.00120)	(0.00118)
frn15			0.00296	0.00130	0.00126
			(0.00583)	(0.00370)	(0.00371)
ppdnl15			-0.122*	-0.0523	-0.0622
			(0.0548)	(0.0678)	(0.0688)
edu15				-0.0136***	-0.0135***
				(0.00303)	(0.00302)
ump15				-0.00325	-0.00323
				(0.00326)	(0.00326)
own15				0.00219	0.00210
				(0.00122)	(0.00121)
hu15sqk				-0.00000702	-0.00000811
				(0.0000343)	(0.0000343)
vacrat15				0.00261	0.00141
				(0.00184)	(0.00202)
blb00				0.00440*	0.00437*
				(0.00188)	(0.00188)
cmdnpcpt					-1.970**
					(0.741)
_cons	-3.003***	-3.031***	-2.186***	-2.400**	-2.291**
	(0.337)	(0.336)	(0.634)	(0.759)	(0.776)
lnsig2u	-1.664*	-1.802*	-1.760*	-1.983**	-1.991**
	(0.758)	(0.828)	(0.842)	(0.716)	(0.722)
N	21362	21336	21336	21313	21313

(Standard errors in parentheses) * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Findings

- Estimates

  Two level HGLM with logit link

$$\eta_{ij} = \ln\left(\frac{\varphi_{ij}}{1-\varphi_{ij}}\right)$$

  where φ= 1 if time to "nearest" AFI < time to "nearest" bank, and 0 otherwise.

Findings

- Estimates

Lev 1 $$\eta_{ij} = \pi_{0j} + \sum_{p=1}^{P} \pi_p X_{pij} + e_{ij}$$

Lev 2 $$\pi_{0j} = \beta_{00} + r_{0jk}$$

Thus $$\eta_{ij} = \beta_{00} + \sum_{p=1}^{P} \pi_p X_{pij} + e_{ij} + r_{0jk}$$

Findings

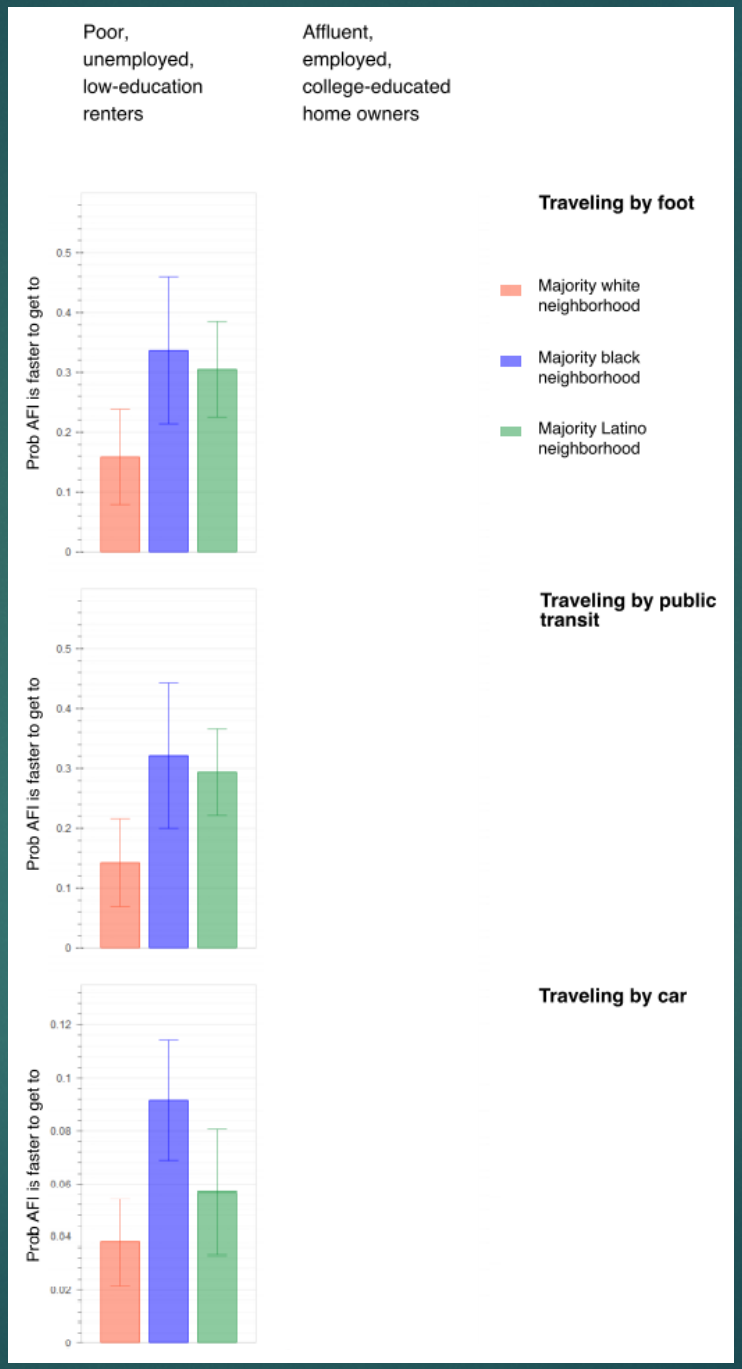
	(1)	(2)	(3)	(4)	(5)
FOOT					
Prop black	0.0253***	0.0231***	0.0229***	0.0172***	0.0171***
	(0.00169)	(0.00139)	(0.00138)	(0.00181)	(0.00178)
Prop Latino/a	0.0259***	0.0231***	0.0220***	0.0147***	0.0146***
	(0.00136)	(0.00150)	(0.00231)	(0.00295)	(0.00294)
PUBLIC TRANSIT					
Prop black	0.0251***	0.0233***	0.0231***	0.0180***	0.0179***
	(0.00159)	(0.00144)	(0.00138)	(0.00175)	(0.00175)
Prop Latino/a	0.0256***	0.0233***	0.0226***	0.0157***	0.0157***
	(0.00144)	(0.00154)	(0.00257)	(0.00318)	(0.00318)
CAR					
Prop black	0.0273***	0.0247***	0.0246***	0.0163***	0.0162***
	(0.00228)	(0.00212)	(0.00213)	(0.00278)	(0.00278)
Prop Latino/a	0.0207***	0.0176***	0.0177***	0.00731	0.00727
	(0.00273)	(0.00277)	(0.00401)	(0.00417)	(0.00413)
		+ % poor	+ % foreign b, population density	+ most other covariates	+ commercial density

Findings

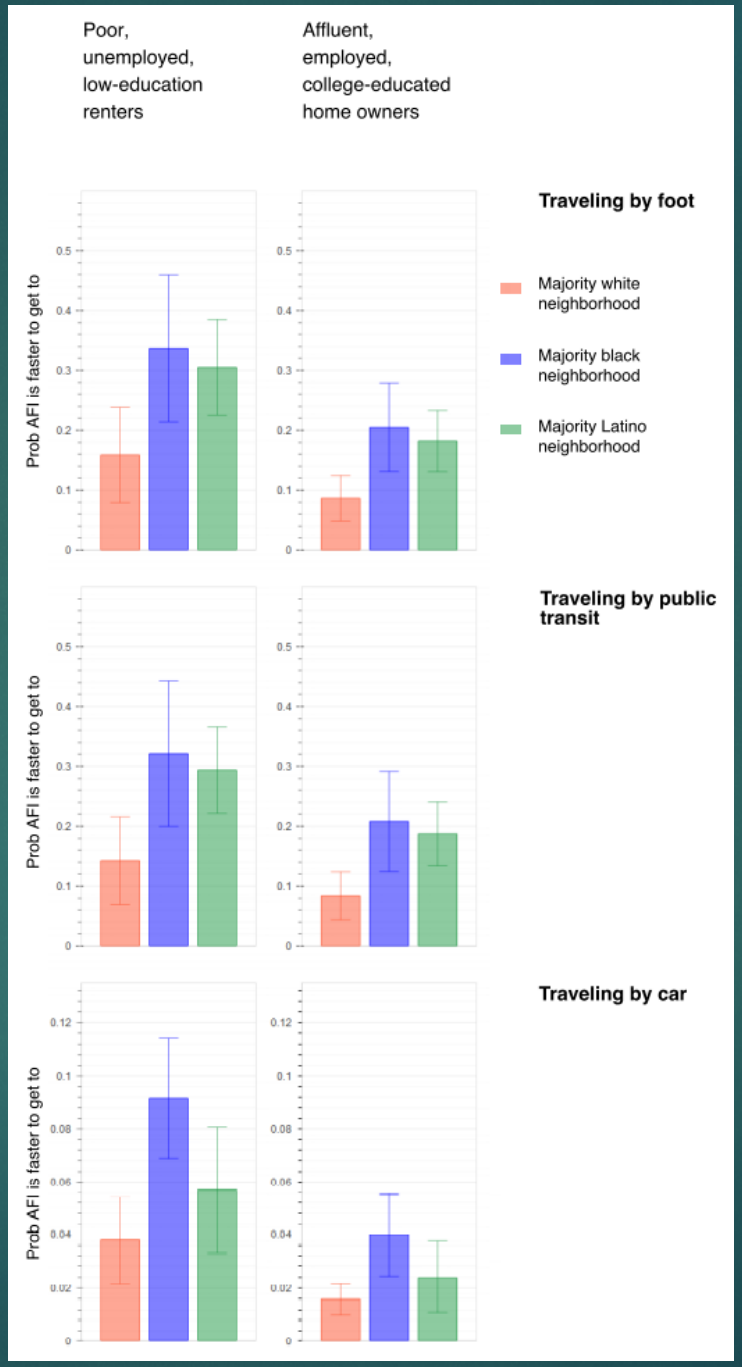
- Figure (margins)
  - Predicted pr AFI faster to get to
  - BG at grand mean of all variables *except*, poverty at 10% (low) or 50% (high), and racial composition at 10%, 30%, 50%, 70%, 90% for each group

Findings

- Robust to
  - Average income vs poverty rate, separating cities that restrict AFIs from others, separating CA and TX cities (large number), reliability of ACS estimates
- Driven more by AFIs than by banks



Small et al. (2021, *Nature Human Behaviour*)



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