BANK ACCESS ACROSS AMERICA

JUNG SAKONG & ALEX ZENTEFIS

The views expressed herein are those of the authors and do not necessarily reflect those of the Federal Reserve Bank of Chicago or the Federal Reserve System.

DISCLOSURE STATEMENT

Jung Sakong has nothing to disclose.
Alexander Zentefis has nothing to disclose.

MOTIVATION

There are clear benefits to bank account ownership and use:

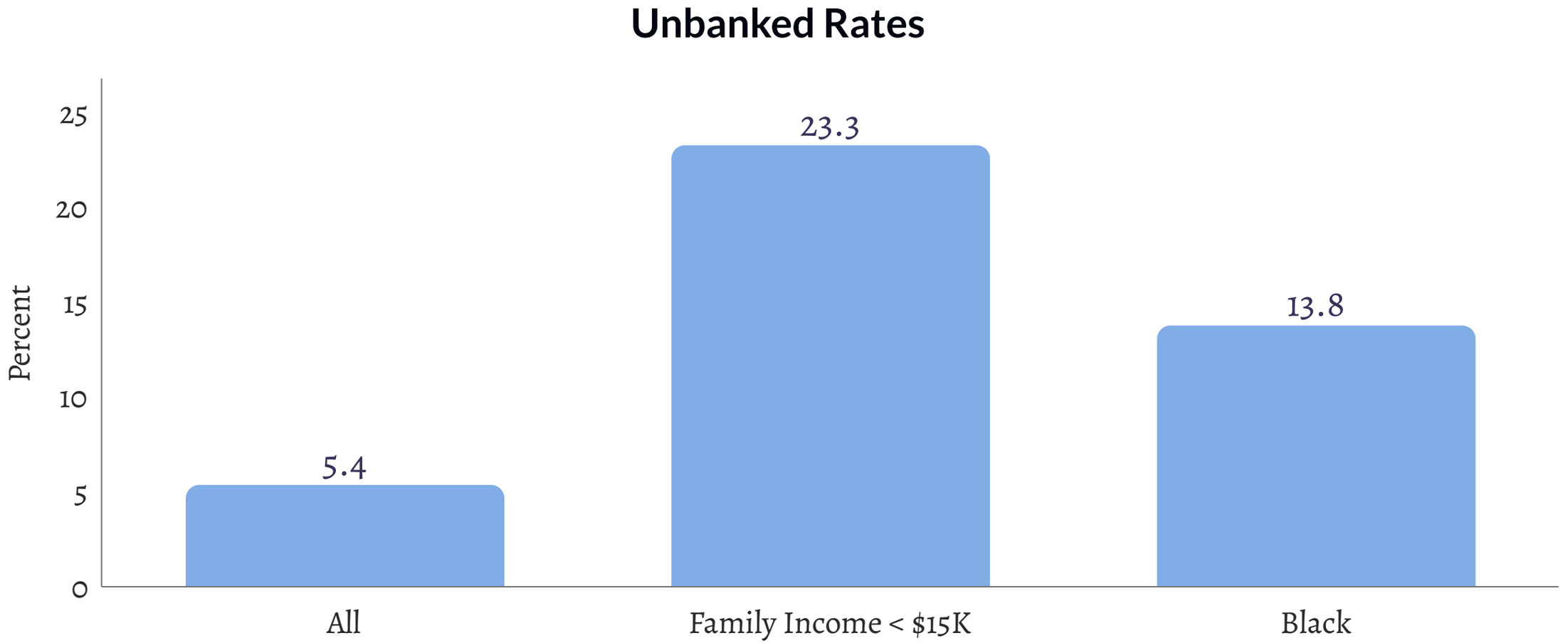
Improved access to credit
Higher subjective well being
Greater wealth accumulation
Improved financial literacy

But persistent disparities remain:

Low-income and Black households are less likely to own bank accounts and visit bank branches

BANK ACCOUNT OWNERSHIP

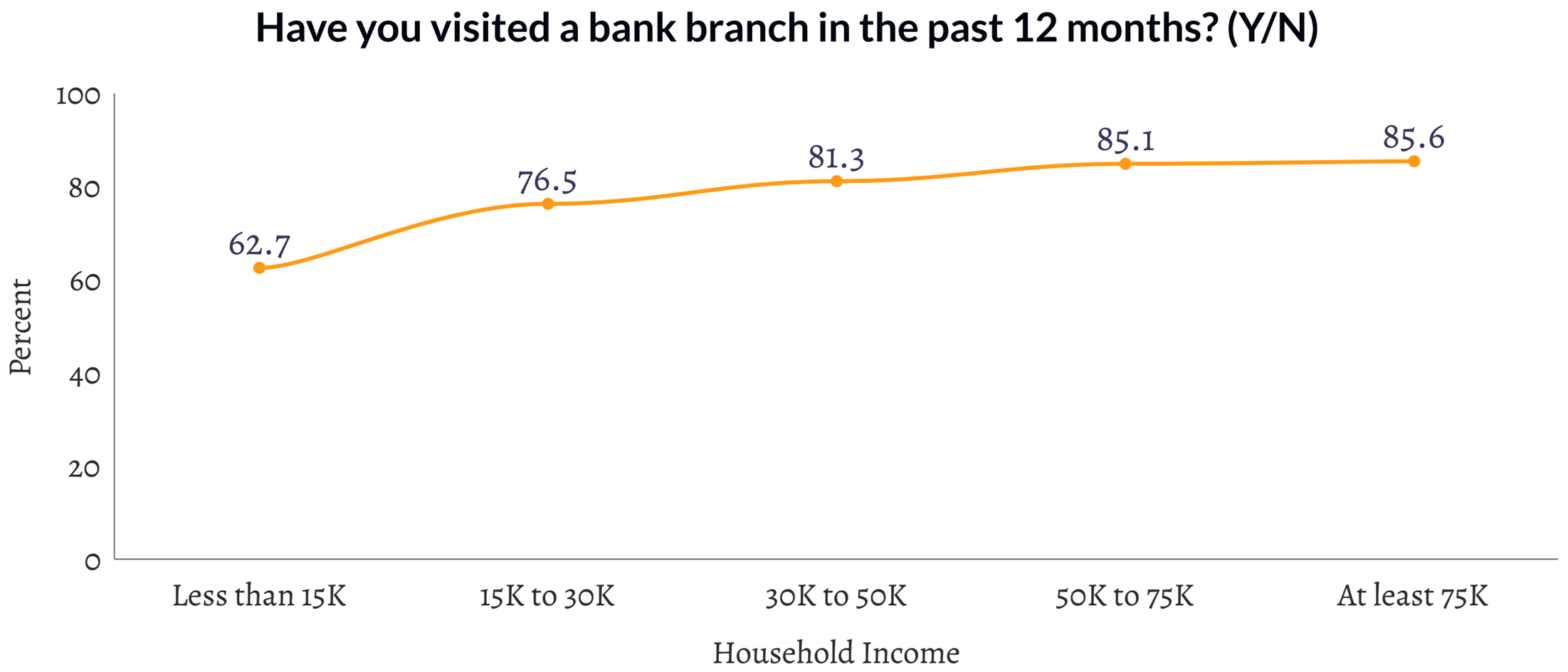
2019 FDIC Survey of Household Use of Banking and Financial Services



BRANCH VISITATION

2019 FDIC Survey of Household Use of Banking and Financial Services

(Includes banked and unbanked)

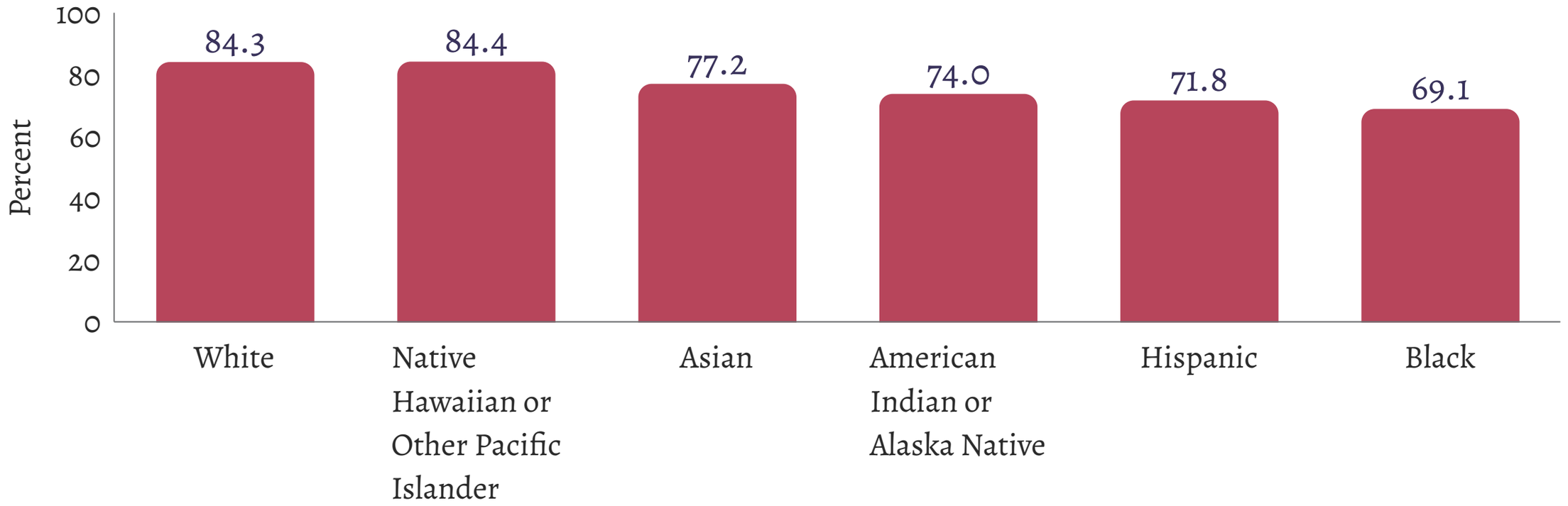


BRANCH VISITATION

2019 FDIC Survey of Household Use of Banking and Financial Services

(Includes banked and unbanked)

Have you visited a bank branch in the past 12 months? (Y/N)



THIS PAPER

Question: Does lower demand or lower access explain the disparities?

We use a **gravity model** + **travel patterns from mobile devices** to find out

FINDINGS

Distance from branches discourages use substantially, with an elasticity between -1.45 and -1.25

Bank access varies significantly even within local areas, and it correlates with block group demographics

Low-income communities:
higher access + lower demand = lower branch use

Black communities:
lower access + equal/higher demand = lower branch use

METHODOLOGICAL CONTRIBUTIONS

1

Local measure of bank access

- Based on gravity model
- Applicable to general consumer access

2

Econometric method

- Thousands of fixed effects +
- Non-standard estimation (e.g., differential privacy)

YES, PEOPLE STILL VISIT BANK BRANCHES

2019 FDIC Survey of Household Use of Banking and Financial Services

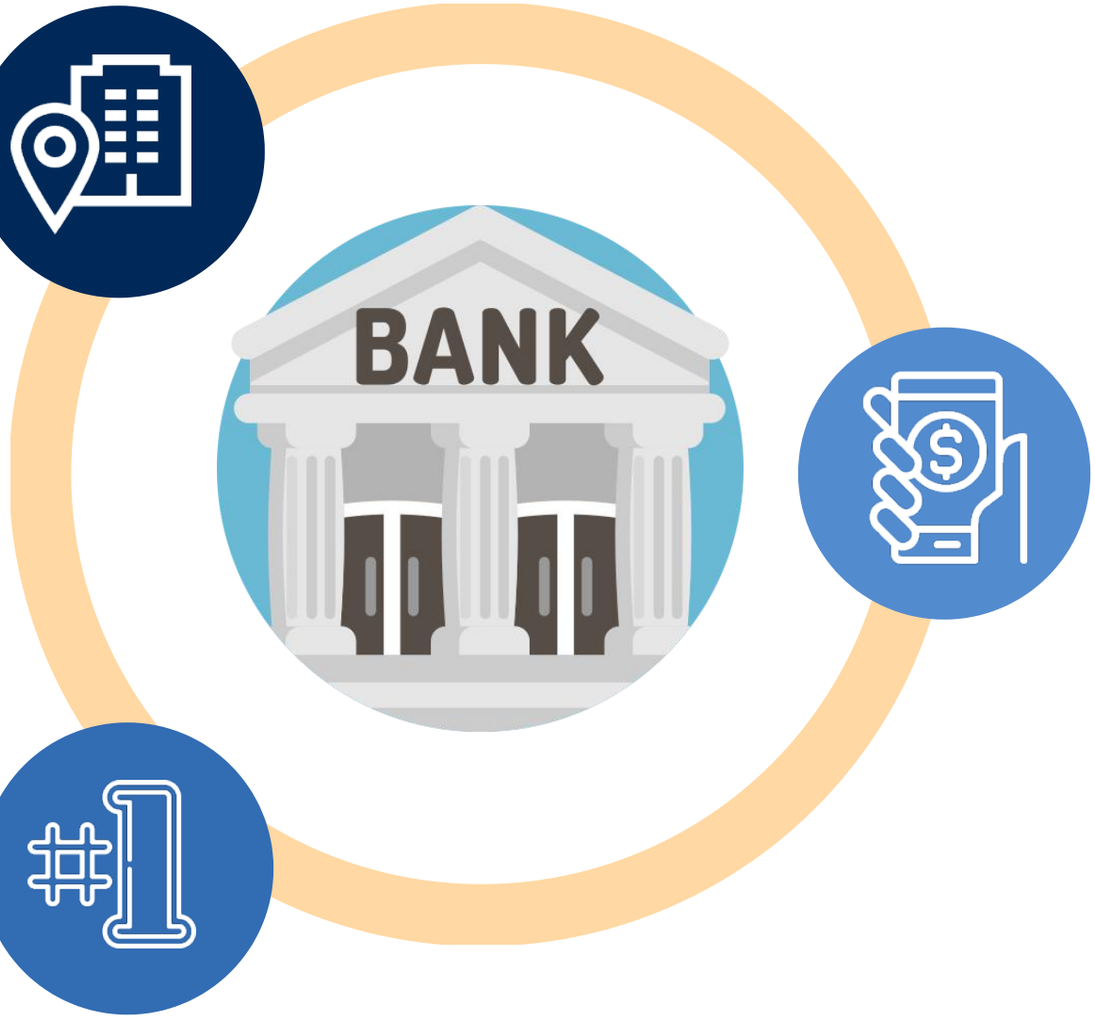
VISITS:

81% visited a bank branch within the past twelve months

30% visited ten or more times

MOST COMMON METHOD:

23% say visiting a branch is their most common use method



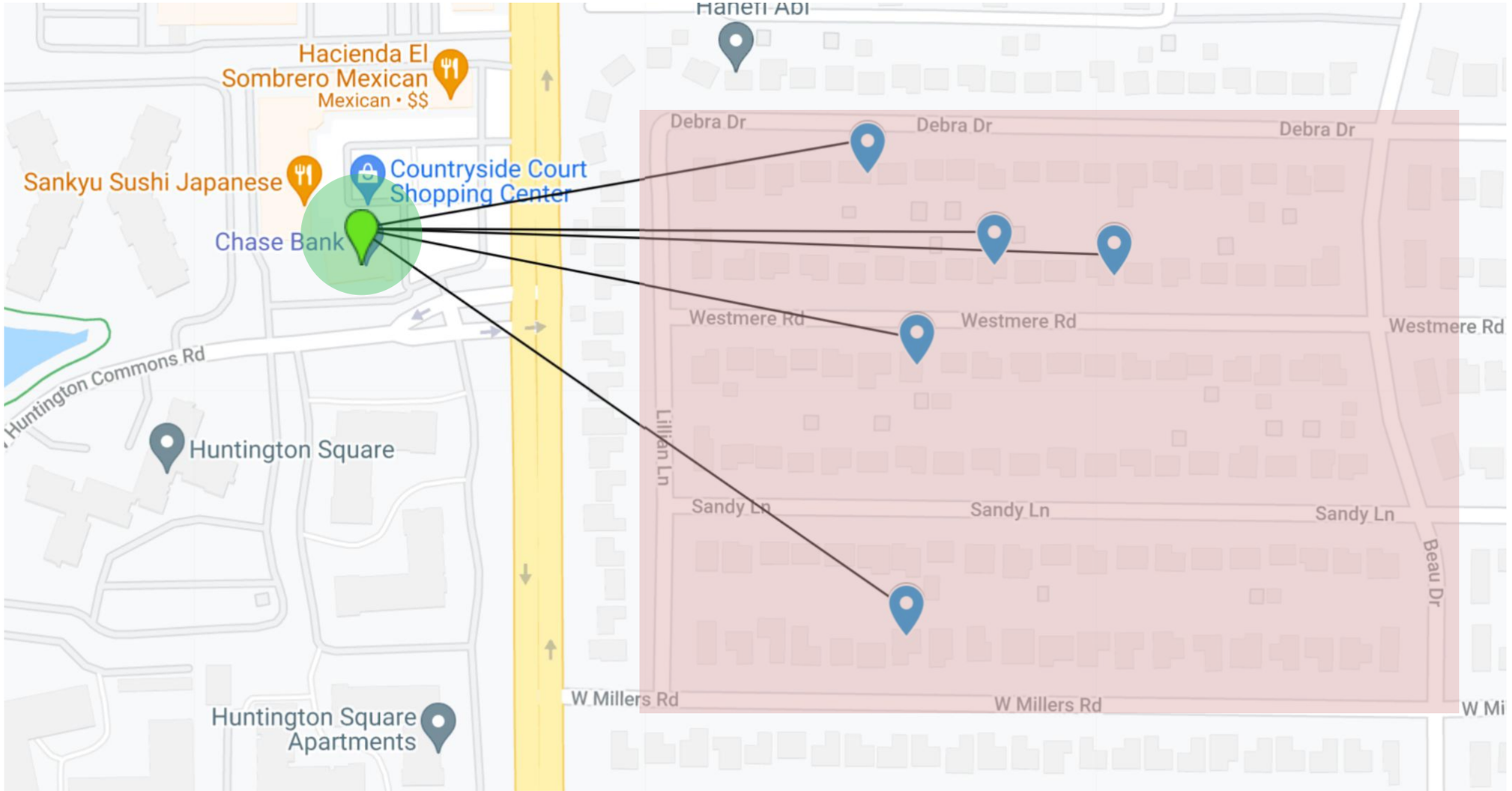
MOBILE USERS:

Among those using mobile banking as their most common method:

81% visited a branch within the past twelve months

20% visited ten or more times

VISITOR FLOWS: BLOCK GROUPS ⟶ BRANCHES



VISITOR FLOWS: BLOCK GROUPS ⇢ BRANCHES

Gravity Model

$$\log(\text{No. of visitors}_{ijt}) = \gamma_{it} + \lambda_{jt} - \beta \log(\text{Distance}_{ij}) + \epsilon_{ijt}$$

block-group x year-month fixed effect

(captures all characteristics of block group that contribute to residents visiting any branch in the month)

bank-branch x year-month fixed effect

(captures all characteristics of branch that make it a destination for residents of any block group in the month)

BLOCK GROUP EXPECTED VISITOR COUNT

$$\log\left(\text{No. of visitors}_{ijt}\right) = \gamma_{it} + \lambda_{jt} - \beta \log\left(\text{Distance}_{ij}\right) + \epsilon_{ijt}$$

Exponentiate
Take expectations
Sum across branches

$$\hat{V}_{it} = \exp\left(\hat{\gamma}_{it}\right) \hat{\Phi}_{it}$$

Block Group "Demand"

Bank Access

BANK ACCESS

$$\hat{\Phi}_{it} \equiv \sum_{j \in B_t} \exp\left(\hat{\lambda}_{jt}\right) d_{ij}^{-\hat{\beta}}$$

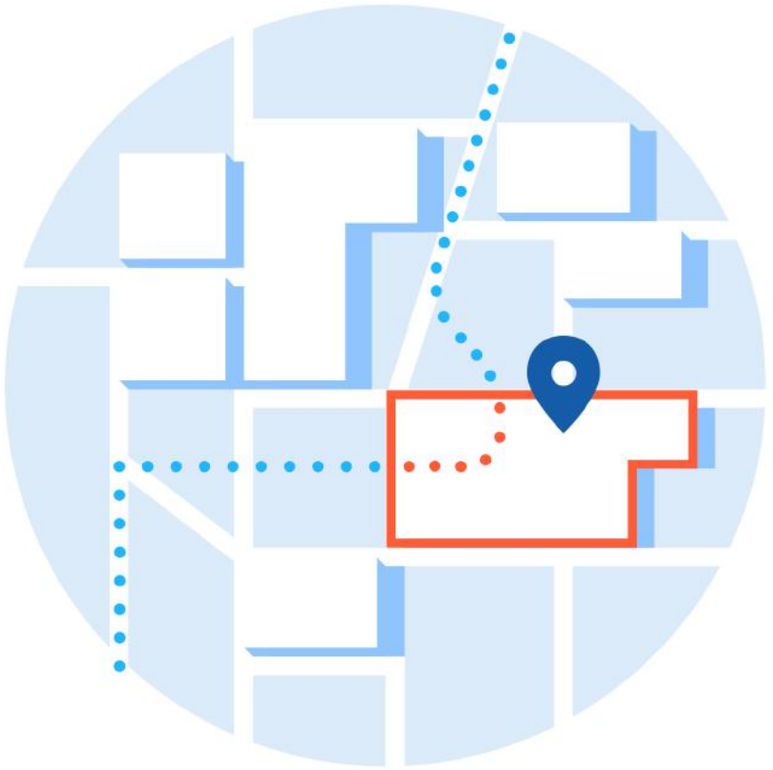
Attribute-adjusted Branch Index per Block Group

Better Access...

- Higher "quality" branches
- Closer branches
- Lower traveling costs / lower elasticity of substitution $(\beta = \kappa \times \varepsilon)$

Related to exporting country's "access" to importing markets (Harris 1954)

MOBILE DEVICE DATA



SAFEGRAPH

We use monthly mobile device data from SafeGraph over 2018-2019

Data include information about bank branches and their visitors

A device must spend at least 4 minutes at a branch to qualify as a visitor

We identify a location as a branch if its brand is part of the 2019 FDIC Summary of Deposits

VISITOR HOME CENSUS BLOCK GROUPS

`visitor_home_cbgs`	The number of visitors to the POI from each census block group based on the visitor's home location. See visitor_home_cbgs.	JSON {String: Integer}	<pre>{"360610112021": 603,
			"460610112021": 243,
			"560610112021": 106,
			"660610112021": 87,
			"660610112021": 51}</pre>

SAMPLING BIAS

1

Sample Selection

Bank Coverage
+
Visitor Coverage

2

Differential Privacy

Noise +
Truncation +
Censoring

SAMPLING BIAS

1

Sample Selection

Bank Coverage
+
Visitor Coverage

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Differential Privacy

Noise +
Truncation +
Censoring

DIFFERENTIAL PRIVACY

01 Laplace Noise

Add Laplace noise to each positive visitor count from home block group to branch

02 Floor Rounding

Round each visitor count down to nearest integer

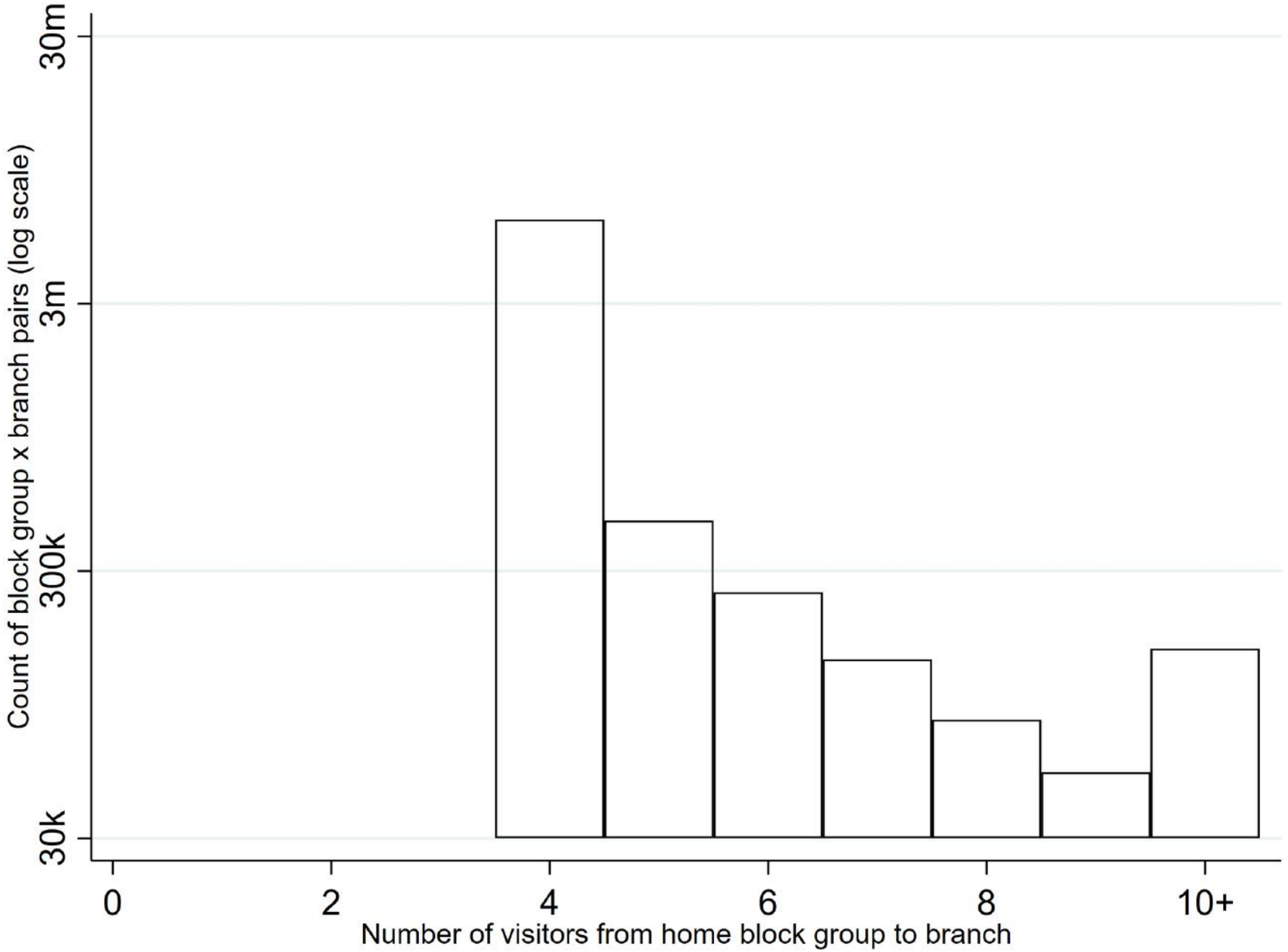
03 Truncation

Drop all visitor counts less than 2

04 Censoring

If rounded visitor count equals 2 or 3, set to 4

OBSERVED VISITOR COUNTS



ESTIMATION

METHOD OF SIMULATED MOMENTS

$$\log\left(\text{No. of visitors}_{ijt}\right) = \gamma_{it} + \lambda_{jt} - \beta \log\left(\text{Distance}_{ij}\right) + \epsilon_{ijt}$$

MSM instead of OLS

OLS would produce biased estimates. Instead we use the Method of Simulated Moments (MSM) (McFadden 1989)

Monthly Estimation

Estimate parameters month-by-month (Jan 2018 - Dec 2019)

Parameters

$$\left\{\hat{\gamma}_{it}, \hat{\lambda}_{jt}, \hat{\beta}\right\}$$

Spherical Distance

We measure distance using haversine formula, which accounts for curvature of the Earth

SIMULATION STEPS

STEP 01

Draw "True" Visitor Counts

$$V^*_{ijt} \sim \text{Pois}\left(\exp\left(\gamma_{it} + \lambda_{jt} - \beta \log \text{Distance}_{ij}\right)\right)$$

STEP 02

Add Laplace Noise if $V^*_{ijt} > 0$

$$V^+_{ijt} = V^*_{ijt} + L_{ijt}$$

STEP 03

Floor + Truncate

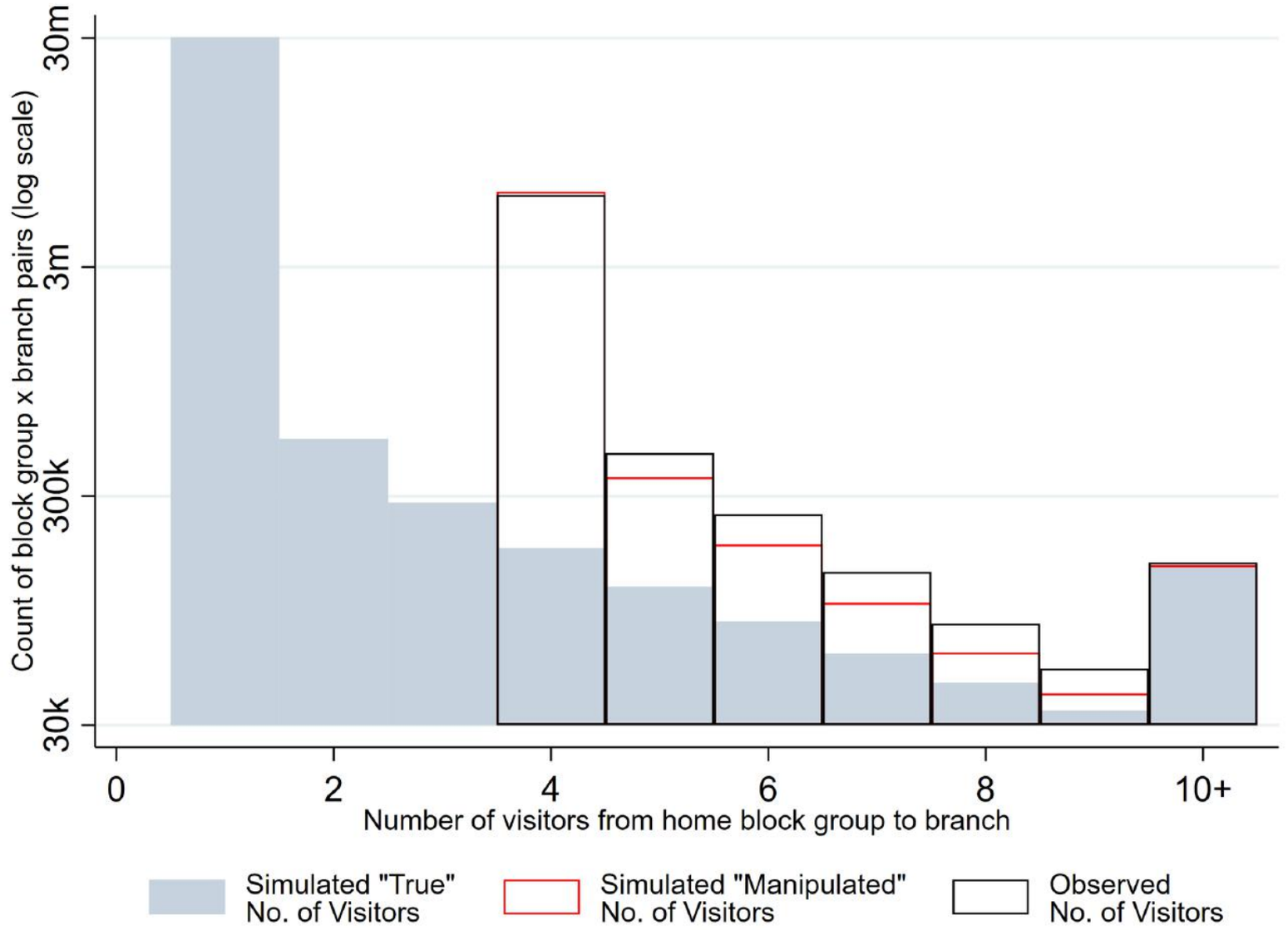
$$z_{ijt} = \begin{cases} 1 & \text{if } \lfloor V^+_{ijt} \rfloor \geq 2, \\ 0 & \text{otherwise.} \end{cases}$$

STEP 04

Censor

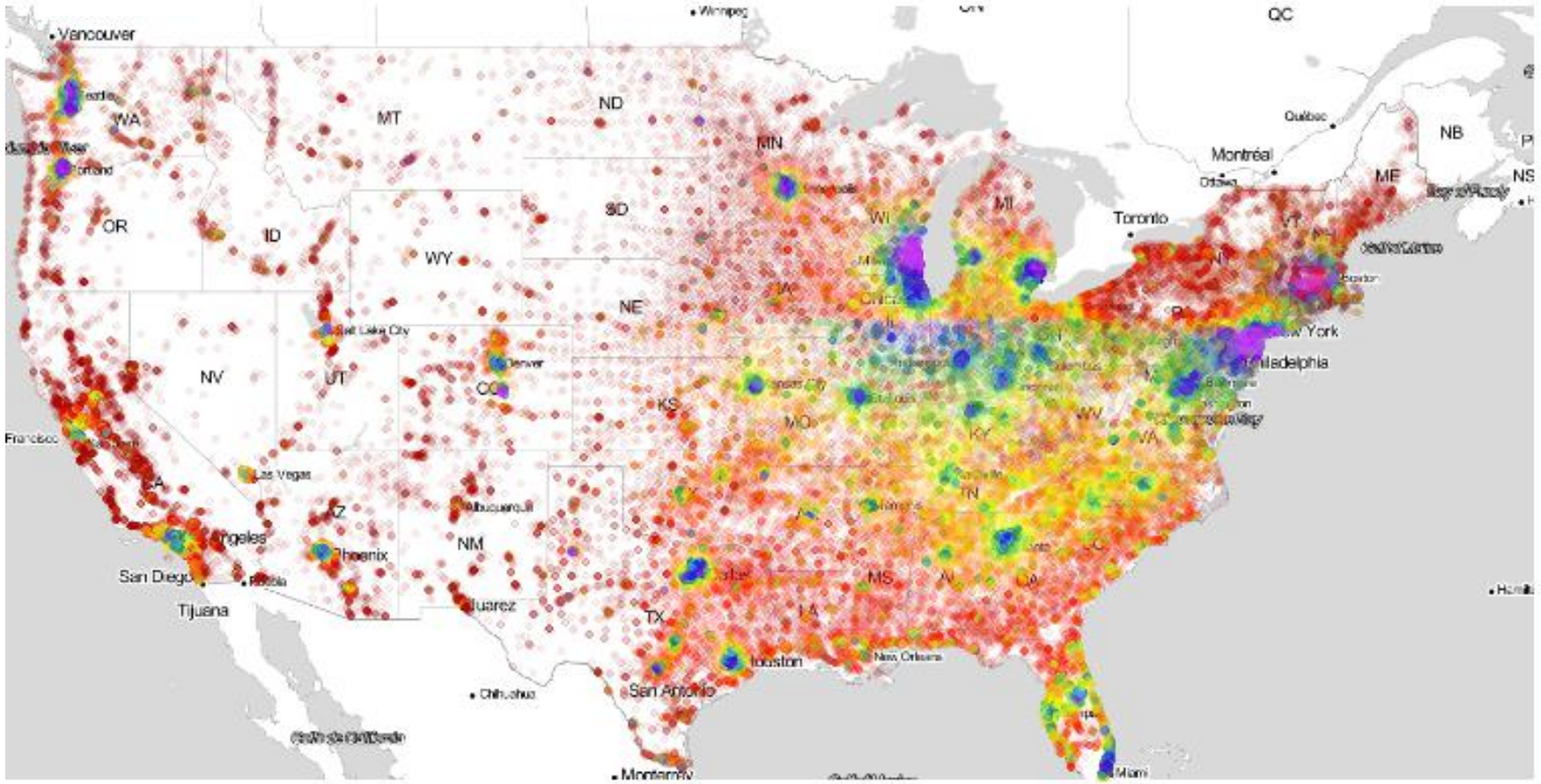
$$V_{ijt} = \max\left\{4, \lfloor V^+_{ijt} \rfloor\right\}$$

SIMULATED "TRUE" VISITOR COUNTS



BANK ACCESS

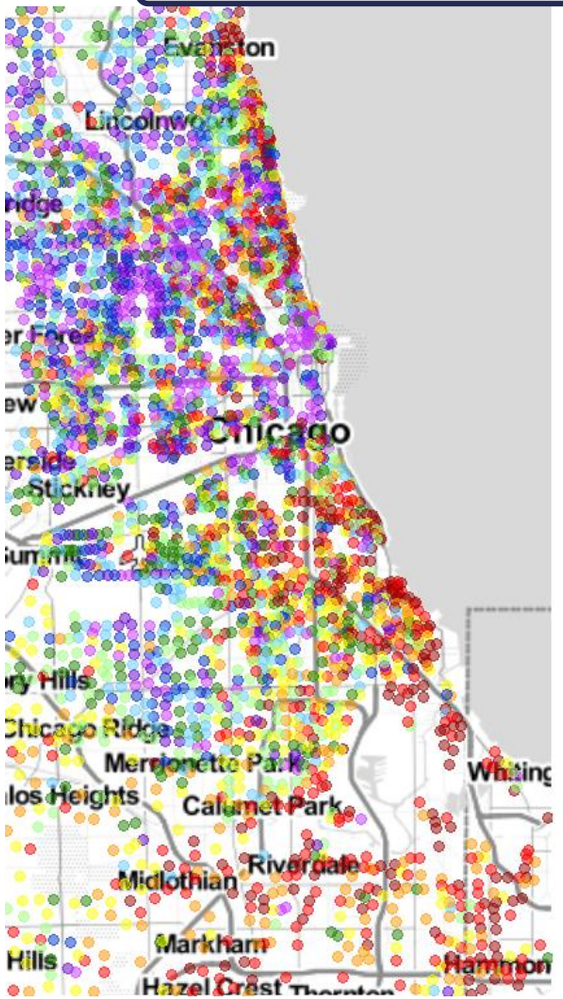
NATIONAL GEOGRAPHY OF BANK ACCESS



- 0.6 to 13
- 13 to 17
- 17 to 20
- 20 to 24
- 24 to 28
- 28 to 33
- 33 to 38
- 38 to 46
- 46 to 63
- 63+

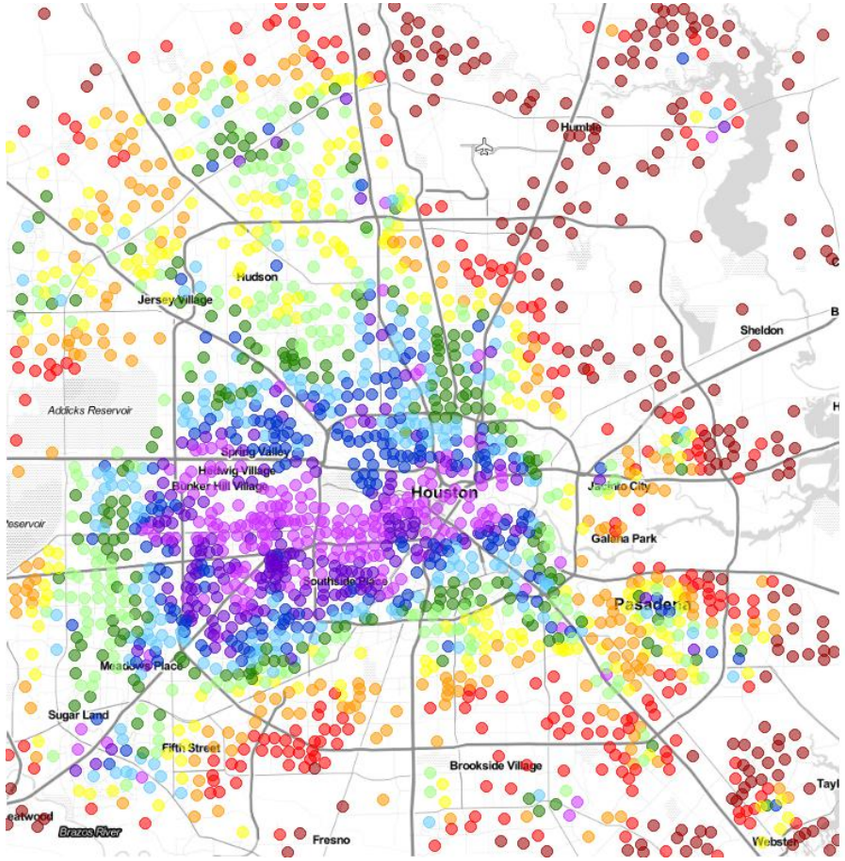
LOCAL GEOGRAPHY OF BANK ACCESS

Chicago, IL



- 0 to 16
- 16 to 18
- 18 to 19
- 19 to 22
- 22 to 24
- 24 to 27
- 27 to 31
- 31 to 34
- 34 to 39
- 39+

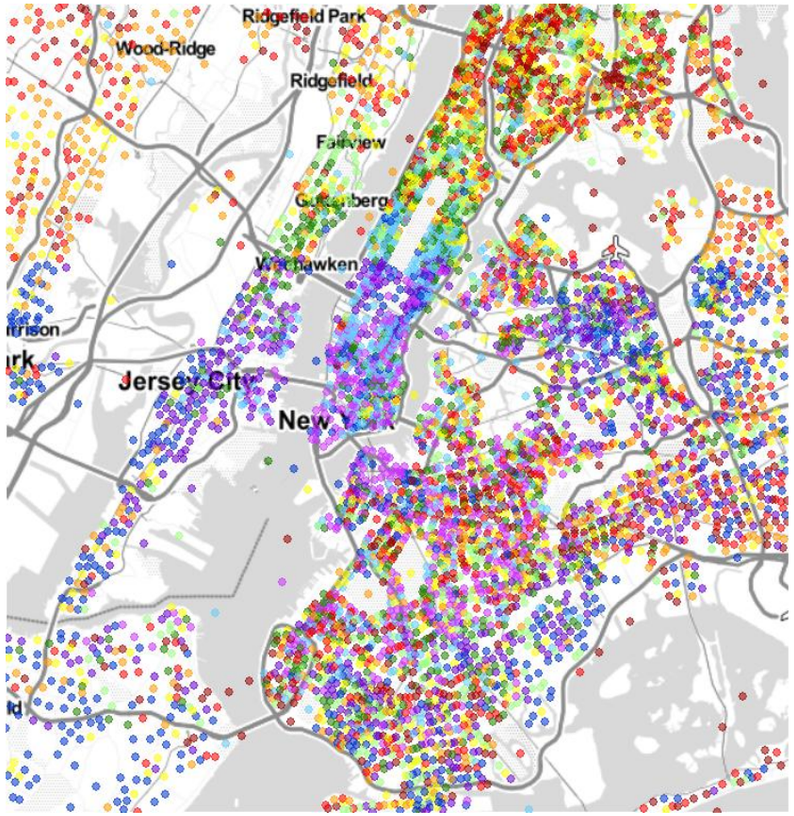
Houston, TX



- 0 to 34
- 34 to 38
- 38 to 40
- 40 to 43
- 43 to 46
- 46 to 49
- 49 to 53
- 53 to 59
- 59 to 67
- 67+

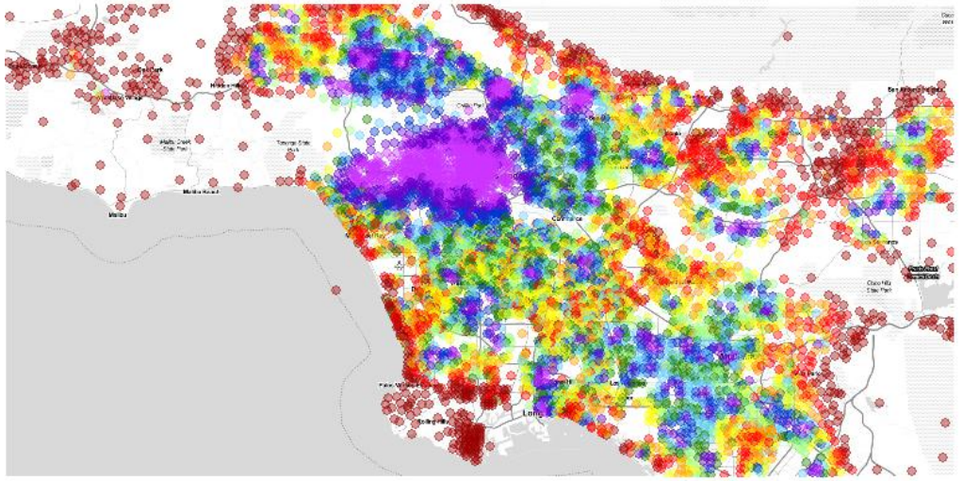
LOCAL GEOGRAPHY OF BANK ACCESS

New York City, NY



- 0 to 35
- 35 to 44
- 44 to 71
- 71 to 86
- 86 to 102
- 102 to 129
- 129 to 148
- 148 to 180
- 180 to 280
- 280+

Los Angeles, CA



- 0 to 18
- 18 to 21
- 21 to 24
- 24 to 26
- 26 to 27
- 27 to 29
- 29 to 30
- 30 to 32
- 32 to 37
- 37+

DEMOGRAPHIC ATTRIBUTES

(1) Independent Variables

Population-based demographic shares from 5-yr 2019 American Community Survey

(2) Omitted Groups

Non-Hispanic Whites
Age 15-34

(3) Standard Errors

Clustered at Census block group

Median Household Income

log(Income)

Black

Asian

Other

Hispanic

Age <15

Age 35-54

Age 55-64

Age 65+

BANK ACCESS

Dep. var.:	log(Bank access of block groups)

$$\hat{\Phi}_{it} \equiv \sum_{j \in B_t} \exp\left(\hat{\lambda}_{jt}\right) d_{ij}^{-\hat{\beta}}$$

Level of Observation

Block group/month/year (panel)

Observations weighted by block-group population (5-yr ACS)

NATIONWIDE BANK ACCESS

Dep. var.:	log(Bank access of block groups)	
	(1)	(2)
log(Income)	-0.110	-0.076
	(0.003)	(0.003)
Black	-0.082	-0.053
	(0.005)	(0.005)
Asian	0.470	0.438
	(0.014)	(0.013)
Other	0.023	0.020
	(0.023)	(0.023)
Hispanic	0.046	0.081
	(0.007)	(0.007)
Age <15		-0.721
		(0.017)
Age 35-54		-0.238
		(0.017)
Age 55-64		-0.551
		(0.019)
Age 65+		-0.245
		(0.013)
log(No. of devices)	-0.050	-0.053
	(0.002)	(0.002)
Observations	2,549,020	2,549,020
Adjusted R^2	0.704	0.708
Sample	Core	Core
Year-month FE	O	O
County FE	O	O
RUCA FE	O	O

7.6 percent
weaker access for every doubling in median income

5.3 percent
weaker access for block groups with higher Black population shares

Coefficients are **% change in expected number of branch goers/month**, holding constant block group fixed effects

Rural/Urban Commuting Area Fixed Effects

BLOCK GROUP FIXED EFFECTS

Dep. var.:	Block group fixed effects

$$\log\left(\hat{V}_{it}^{*}\right) = \hat{\gamma}_{it} + \log\left(\hat{\Phi}_{it}\right)$$

Level of Observation

Block group/month/year (panel)

Observations weighted by population of block group (5-yr ACS)

NATIONWIDE BLOCK GROUP FIXED EFFECTS

23.0 percent more "demand" for bank branches for every doubling in median income

Identical "demand" in Black and White communities

Dep. var.:	Block group fixed effects	
	(5)	(6)
log(Income)	0.296 (0.004)	0.230 (0.004)
Black	0.041 (0.010)	-0.003 (0.010)
Asian	-0.232 (0.023)	-0.197 (0.022)
Other	0.010 (0.033)	0.020 (0.033)
Hispanic	-0.038 (0.010)	-0.097 (0.011)
Age <15		1.061 (0.026)
Age 35-54		0.724 (0.025)
Age 55-64		0.651 (0.029)
Age 65+		0.494 (0.021)
log(No. of devices)	0.656 (0.005)	0.659 (0.005)
Observations	2,549,020	2,549,020
Adjusted R^2	0.310	0.314
Sample	Core	Core
Year-month FE	O	O
County FE	O	O
RUCA FE	O	O

BANK BRANCH USE

Dep. var.:	log(Expected no. of visitors)

$$\log\left(\hat{V}_{it}^{*}\right) = \hat{\gamma}_{it} + \log\left(\hat{\Phi}_{it}\right)$$

Level of Observation

Block group/month/year (panel)

Observations weighted by population of block group (5-yr ACS)

NATIONWIDE BRANCH USE

Dep. var.:	log(Expected no. of visitors)	
	(1)	(2)
log(Income)	0.186	0.155
	(0.004)	(0.004)
Black	-0.041	-0.056
	(0.009)	(0.009)
Asian	0.238	0.241
	(0.020)	(0.020)
Other	0.034	0.041
	(0.028)	(0.029)
Hispanic	0.008	-0.016
	(0.009)	(0.010)
Age <15		0.341
		(0.022)
Age 35-54		0.486
		(0.023)
Age 55-64		0.101
		(0.025)
Age 65+		0.248
		(0.018)
log(No. of devices)	0.606	0.606
	(0.004)	(0.004)
Observations	2,549,020	2,549,020
Adjusted R^2	0.380	0.381
Sample	Core	Core
Year-month FE	O	O
County FE	O	O
RUCA FE	O	O

15.5 percent more branch goers for every doubling in income

5.6 percent Black-White gap in branch use

EXPLAINING BRANCH USE WITH BANK ACCESS

OLS projection of log expected number of branch goers on matrix **X** of block-group attributes

$$\log \hat{V}_{it}^{*} = X_i \theta_V + \varepsilon_{V,it}$$

Similar OLS projections of estimated **block group fixed effects** and **bank access** on **X**

$$\hat{\gamma}_{it} = X\theta_\gamma + \varepsilon_{\gamma,it}$$

$$\log \hat{\Phi}_{it} = X\theta_\Phi + \varepsilon_{\Phi,it}$$

Estimated coefficients **satisfy identity**

$$\hat{\theta}_V \equiv \hat{\theta}_\gamma + \hat{\theta}_\Phi$$

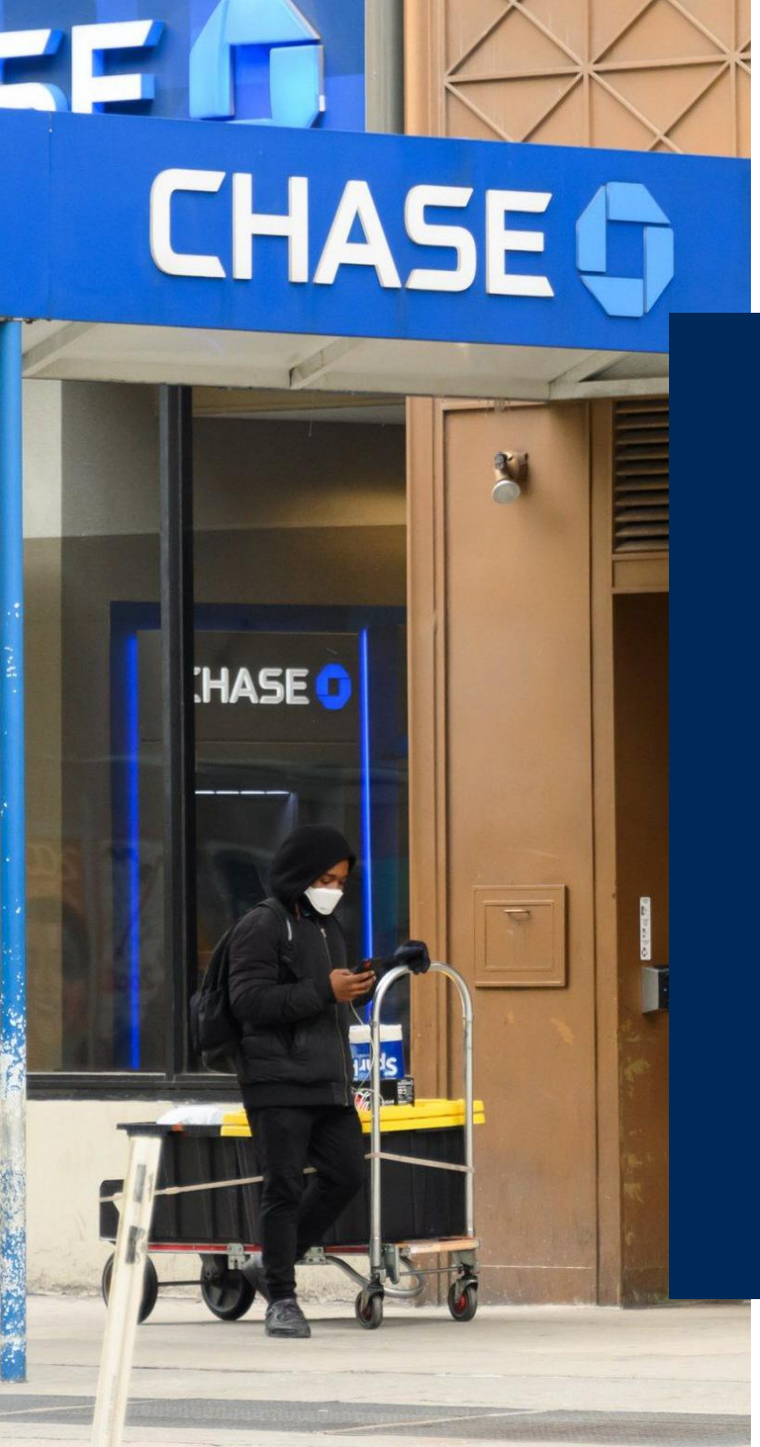
BRANCH USE AND BANK ACCESS: NATIONWIDE

Income Gradient

$\hat{\theta}_{\text{Income},\Phi}$	**-0.075**
$\hat{\theta}_{\text{Income},\gamma}$	**0.230**
$\hat{\theta}_{\text{Income},V}$	**0.155**

Black-White Gap

$\hat{\theta}_{\text{Black share},\Phi}$	**-0.053**
$\hat{\theta}_{\text{Black share},\gamma}$	**-0.003**
$\hat{\theta}_{\text{Black share},V}$	**-0.056**



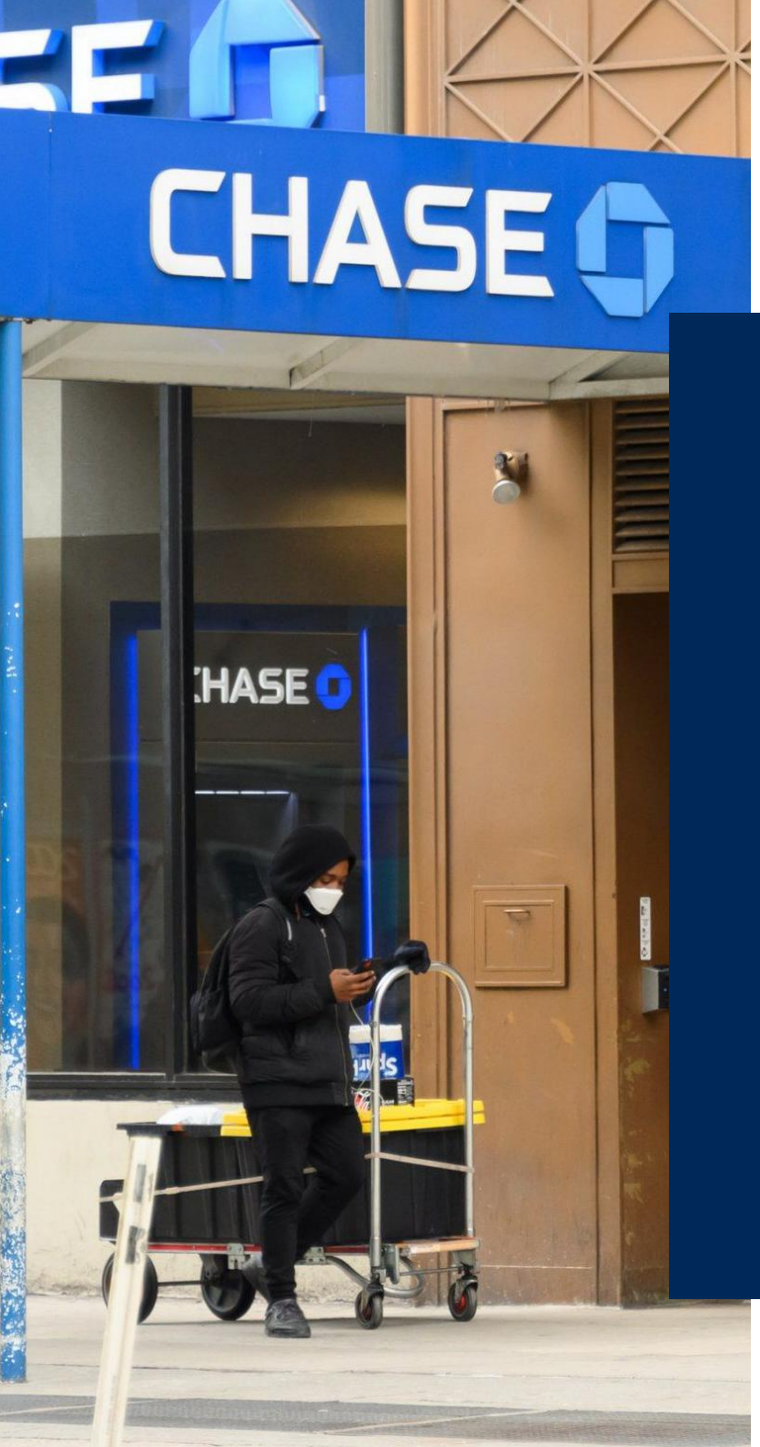
CONCLUSION

Distance from branches discourages use substantially, with an elasticity between -1.45 and -1.25

Bank access varies significantly even within local areas, and it correlates with block group demographics

Low-income communities:
higher access + lower demand = lower branch use

Black communities:
lower access + equal/higher demand = lower branch use



CONCLUSION

1

Local measure of bank access

- Based on gravity model
- Applicable to general consumer access

2

Econometric method

- Thousands of fixed effects +
- Non-standard estimation (e.g., differential privacy)

APPENDIX

CONCEPTUAL FRAMEWORK

Residents

Continuum of residents, each living in a block group $(i \in G)$, picks **one** bank branch to visit

Bank Branches

Each branch $(j \in B_t)$ belongs to a set whose size can vary over time from store openings/closings. Outside point-of-interest $(j = 0)$

Indirect Utility

$$U_{rjt} = \frac{z_{rjt}\Lambda_{jt}}{\delta_{ij}}$$

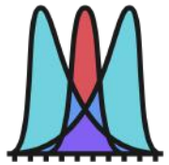
Idiosyncratic taste shock

Index of branch attributes

Resident *r* living in block group *i*, visiting branch *j* at time *t*

Iceberg traveling cost $\left(\delta_{ij} = d_{ij}^{\kappa}\right)$

CONCEPTUAL FRAMEWORK



Fréchet Distribution

$$F\left(z_{rjt}\right) = e^{-H_{jt} z_{rjt}^{-\varepsilon}}$$

(McFadden 1974; Ahfeldt et. al. 2015)

Parameters

Larger H_{jt} means high utility draw more likely for branch ***j***

Smaller ε means more heterogeneous preferences (akin to branches being less substitutable)

Distribution of Utility Across Branches

$$G_{ijt}\left(u\right) = e^{-\left[H_{jt}\left(\frac{\Lambda_{jt}}{\delta_{ij}}\right)^{\varepsilon}\right]u^{-\varepsilon}}$$

CONCEPTUAL FRAMEWORK

Maximal Utility Distribution

$$G_{it}(u) = \Pi_{j=0}^{J_t} G_{ijt}(u)$$

Substitute Functional Form

$$G_{it}(u) = e^{-(1+\Phi_{it})u^{-\varepsilon}}$$

Theoretical Bank Access

$$\Phi_{it} = \sum_{j \in B_t} H_{jt} \Lambda_{jt}^{\varepsilon} d_{ij}^{-\kappa\varepsilon}$$

CONCEPTUAL FRAMEWORK

Gravity Relation

$$\pi_{ijt} = \frac{H_{jt}\Lambda_{jt}^{\varepsilon} d_{ij}^{-\kappa\varepsilon}}{1 + \Phi_{it}}$$

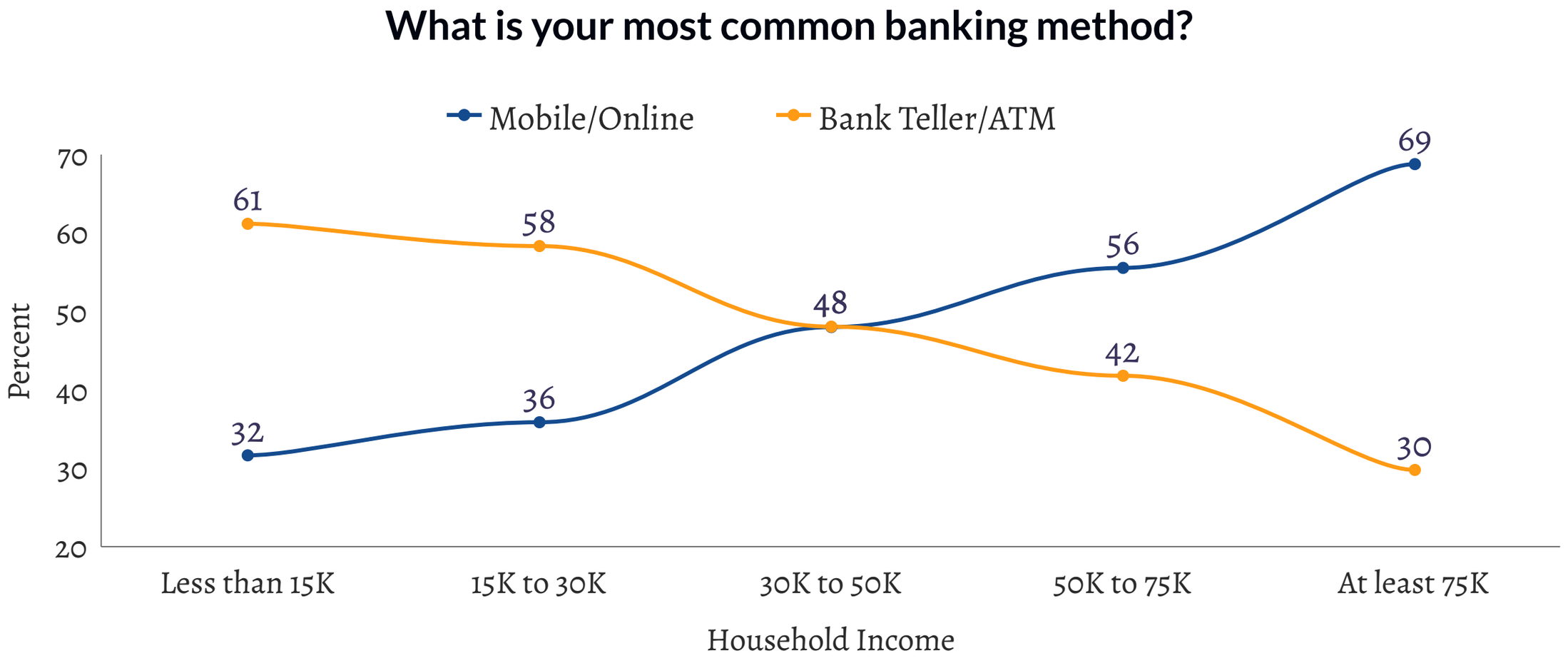
Share of residents of block group ***i*** who visit branch ***j*** at time ***t***

BRANCH VISITS BY DEMOGRAPHIC ATTRIBUTES

Dep. var.:	Visited a Bank Branch in the Past 12 months (Y=1, N= 0)					
Model:	OLS			Probit		
	(1)	(2)	(3)	(4)	(5)	(6)
$15,000 to $30,000		0.128	0.127		0.362	0.363
		(0.012)	(0.012)		(0.034)	(0.035)
$30,000 to $50,000		0.178	0.183		0.527	0.552
		(0.011)	(0.011)		(0.033)	(0.034)
$50,000 to $75,000		0.206	0.214		0.636	0.673
		(0.011)	(0.011)		(0.035)	(0.035)
At least $75,000		0.207	0.218		0.643	0.693
		(0.010)	(0.010)		(0.030)	(0.031)
Black	-0.144	-0.111	-0.100	-0.476	-0.370	-0.331
	(0.009)	(0.009)	(0.009)	(0.028)	(0.028)	(0.028)
Hispanic	-0.121	-0.101	-0.084	-0.409	-0.345	-0.285
	(0.009)	(0.009)	(0.009)	(0.028)	(0.028)	(0.029)
Asian	-0.072	-0.074	-0.060	-0.259	-0.274	-0.225
	(0.013)	(0.013)	(0.013)	(0.042)	(0.042)	(0.042)
Other	-0.077	-0.056	-0.048	-0.274	-0.203	-0.176
	(0.023)	(0.023)	(0.022)	(0.074)	(0.075)	(0.075)
Age 35-54			0.016			0.048
			(0.008)			(0.027)
Age 55-64			0.064			0.236
			(0.008)			(0.031)
Age 65+			0.074			0.275
			(0.008)			(0.028)
Constant	0.836	0.660	0.612	0.977	0.457	0.283
	(0.003)	(0.010)	(0.012)	(0.011)	(0.027)	(0.034)
Observations	32,904	32,904	32,904	32,904	32,904	32,904
Adjusted R^2	0.021	0.045	0.051			
Pseudo R^2				0.020	0.041	0.047

THE INCOME GRADIENT IS NOT OFFSET BY MOBILE/ONLINE

2019 FDIC Survey of Household Use of Banking and Financial Services



THE BLACK-WHITE GAP IS NOT OFFSET BY MOBILE/ONLINE

2019 FDIC Survey of Household Use of Banking and Financial Services

What is your most common banking method?

Bank Teller/ATM

Black (50%)

White (41%)

Mobile/Online

Black (46%)

White (56%)

LINEAR PROBABILITY: PRIMARY ACCESS METHOD

Dep. var.:	Binary Indicator for Primary Method Used to Access Bank Accounts					
Access Method:	Bank Teller or ATM/Kiosk			Mobile or Online		
	(1)	(2)	(3)	(4)	(5)	(6)
$15,000 to $30,000		-0.032	-0.040		0.052	0.061
		(0.015)	(0.014)		(0.014)	(0.013)
$30,000 to $50,000		-0.130	-0.108		0.169	0.144
		(0.014)	(0.013)		(0.014)	(0.013)
$50,000 to $75,000		-0.186	-0.150		0.235	0.195
		(0.014)	(0.013)		(0.014)	(0.013)
At least $75,000		-0.302	-0.252		0.364	0.308
		(0.013)	(0.012)		(0.012)	(0.012)
Black	0.068	0.018	0.064	-0.074	-0.015	-0.066
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)
Hispanic	0.066	0.025	0.096	-0.060	-0.013	-0.091
	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Asian	-0.061	-0.045	0.013	0.077	0.058	-0.005
	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)	(0.013)
Other	0.057	0.025	0.063	-0.060	-0.023	-0.064
	(0.029)	(0.029)	(0.028)	(0.029)	(0.029)	(0.028)
Age 35-54			0.113			-0.121
			(0.008)			(0.009)
Age 55-64			0.244			-0.265
			(0.010)			(0.010)
Age 65+			0.361			-0.397
			(0.009)			(0.009)
Constant	0.391	0.589	0.363	0.581	0.337	0.585
	(0.004)	(0.012)	(0.013)	(0.004)	(0.012)	(0.013)
Observations	30,425	30,425	30,425	30,425	30,425	30,425
Adjusted R^2	0.005	0.053	0.121	0.005	0.070	0.152

BRANCH VISITOR SHARE BY INCOME