Color and Credit

Race, Regulation, and the Quality of Financial Services

Taylor Begley[1] Amiyatosh Purnanandam[2]

[1]Washington University in St. Louis

[2]University of Michigan

November 2017

Motivation

Consumer protection is important and is a focus of regulators across many areas in the economy.

- e.g., FTC, FDA, DoJ.

Banking and financial services have drawn a great deal of attention.

- debates on the fiduciary rule for financial advisors.
- recent Wells Fargo scandal.

Little is known about who bears the brunt of this misbehavior.

Motivation

Consumer protection is important and is a focus of regulators across many areas in the economy.

- e.g., FTC, FDA, DoJ.

Banking and financial services have drawn a great deal of attention.

- debates on the fiduciary rule for financial advisors.
- recent Wells Fargo scandal.

Little is known about who bears the brunt of this misbehavior.

Motivation

Consumer protection is important and is a focus of regulators across many areas in the economy.

- e.g., FTC, FDA, DoJ.

Banking and financial services have drawn a great deal of attention.

- debates on the fiduciary rule for financial advisors.
- recent Wells Fargo scandal.

Little is known about who bears the brunt of this misbehavior.

Motivation

Our setting: mortgage lending.

Benchmark case: a frictionless world (e.g., no market power, no info asymmetry, no regulatory distortions)

In a world with frictions, distortions will be present.

- subpopulations may receive differential treatment.
- products may have restricted *quantities*, higher *prices*.

In particular, existing work indicates that minorities receive:

- lower access to credit (e.g., Munnell et al, 1996)
- higher costs of credit (Bayer, Ferreira, and Ross, 2017).

We provide a first step to focus on product *quality* in banking.

Motivation

Our setting: mortgage lending.

Benchmark case: a frictionless world (e.g., no market power, no info asymmetry, no regulatory distortions)

In a world with frictions, distortions will be present.

- subpopulations may receive differential treatment.
- products may have restricted *quantities*, higher *prices*.

In particular, existing work indicates that minorities receive:

- lower access to credit (e.g., Munnell et al, 1996)
- higher costs of credit (Bayer, Ferreira, and Ross, 2017).

We provide a first step to focus on product *quality* in banking.

Motivation

Our setting: mortgage lending.

Benchmark case: a frictionless world (e.g., no market power, no info asymmetry, no regulatory distortions)

In a world with frictions, distortions will be present.

- subpopulations may receive differential treatment.
- products may have restricted *quantities*, higher *prices*.

In particular, existing work indicates that minorities receive:

- lower access to credit (e.g., Munnell et al, 1996)
- higher costs of credit (Bayer, Ferreira, and Ross, 2017).

We provide a first step to focus on product *quality* in banking.

Motivation

Our setting: mortgage lending.

Benchmark case: a frictionless world (e.g., no market power, no info asymmetry, no regulatory distortions)

In a world with frictions, distortions will be present.

- subpopulations may receive differential treatment.
- products may have restricted *quantities*, higher *prices*.

In particular, existing work indicates that minorities receive:

- lower access to credit (e.g., Munnell et al, 1996)
- higher costs of credit (Bayer, Ferreira, and Ross, 2017).

We provide a first step to focus on product *quality* in banking.

This Paper: Questions and Main Findings

1. What are the key characteristics of areas that receive poor-quality financial products and services?

This Paper: Questions and Main Findings

1. What are the key characteristics of areas that receive poor-quality financial products and services?
   - Low income.
   - Low education.
   - High-minority areas, even after controlling for income and education.

This Paper: Questions and Main Findings

1. What are the key characteristics of areas that receive poor-quality financial products and services?
   - Low income.
   - Low education.
   - High-minority areas, even after controlling for income and education.

2. Does current regulation dampen this relationship?

This Paper: Questions and Main Findings

1. What are the key characteristics of areas that receive poor-quality financial products and services?
   - Low income.
   - Low education.
   - High-minority areas, even after controlling for income and education.

2. Does current regulation dampen this relationship?
   - No – just the opposite.
   - CRA-designated focus areas report *lower* quality.
   - The effect is substantially larger for high-minority areas.

Plan of attack

Examining mortgage quality dilution (complaints):

1. Data & Research Design
   - CFPB: "protect consumers from unfair, deceptive, or abusive practices and take action against companies that break the law."
   - We study mortgage complaints from 2012-2016:
     - about 175k complaints
     - 16k zip codes (covers $\sim$ 282m people as of 2010 census)

2. Income, Education, & Race

3. The Role of Regulation

Example Complaint Narrative

Date	8/9/2016
Product	Mortgage; Conventional fixed mortgage
Narrative	
Company	Wells Fargo & Company
State & Zip	ND, 580XX
Response	Closed with monetary relief

Example Complaint Narrative

Date	8/9/2016
Product	Mortgage; Conventional fixed mortgage
Narrative	I contacted Wells Fargo Home Mortgage to refinance my current mortgage... My credit score was XXXX which they said was good.
Company	Wells Fargo & Company
State & Zip	ND, 580XX
Response	Closed with monetary relief

Example Complaint Narrative

Date	8/9/2016
Product	Mortgage; Conventional fixed mortgage
Narrative	I contacted Wells Fargo Home Mortgage to refinance my current mortgage... My credit score was XXXX which they said was good. I never received the appraisal on my home...
Company	Wells Fargo & Company
State & Zip	ND, 580XX
Response	Closed with monetary relief

Example Complaint Narrative

Date	8/9/2016
Product	Mortgage; Conventional fixed mortgage
Narrative	I contacted Wells Fargo Home Mortgage to refinance my current mortgage... My credit score was XXXX which they said was good. I never received the appraisal on my home... They denied my application...
Company	Wells Fargo & Company
State & Zip	ND, 580XX
Response	Closed with monetary relief

Example Complaint Narrative

Date	8/9/2016
Product	Mortgage; Conventional fixed mortgage
Narrative	I contacted Wells Fargo Home Mortgage to refinance my current mortgage... My credit score was XXXX which they said was good. I never received the appraisal on my home... They denied my application... I would like my {$530.00} back for the appraisal the I never received.
Company	Wells Fargo & Company
State & Zip	ND, 580XX
Response	Closed with monetary relief

Example Complaint Narrative

Date	8/9/2016
Product	Mortgage; Conventional fixed mortgage
Narrative	I contacted Wells Fargo Home Mortgage to refinance my current mortgage... My credit score was XXXX which they said was good. I never received the appraisal on my home... They denied my application... I would like my {$530.00} back for the appraisal the I never received. I have called several times and left messages and no one has returned my calls.
Company	Wells Fargo & Company
State & Zip	ND, 580XX
Response	Closed with monetary relief

Example Complaint Narrative

Date	8/9/2016
Product	Mortgage; Conventional fixed mortgage
Narrative	I contacted Wells Fargo Home Mortgage to refinance my current mortgage... My credit score was XXXX which they said was good. I never received the appraisal on my home... They denied my application... I would like my {$530.00} back for the appraisal the I never received. I have called several times and left messages and no one has returned my calls. What does Wells Fargo do with all the money they get from people that don't qualify for refinance?
Company	Wells Fargo & Company
State & Zip	ND, 580XX
Response	Closed with monetary relief

Sample Summary Statistics

i=five-digit zip code from 2012 to 2016

variable	mean	sd	min	p25	p50	p75	max	N
Complaints (w)	10.33	13.25	1.00	2.00	5.00	13.00	71.00	16,309
lnComplaints	1.63	1.22	0.00	0.69	1.61	2.56	4.26	16,309
AGI Income (000)	64.06	52.97	18.65	42.05	51.23	67.61	1464.53	16,309
lnAGI	10.93	0.44	10.12	10.65	10.84	11.12	12.54	16,309
College Education	0.27	0.16	0.05	0.15	0.22	0.35	0.76	16,309
Nonwhite	0.21	0.21	0.01	0.05	0.13	0.30	0.90	16,309
LMI	0.19	0.39	0.00	0.00	0.00	0.00	1.00	16,309
Mortgages (000)	1.97	2.07	0.04	0.41	1.19	2.92	9.54	16,309
Population (000)	17.20	15.18	0.62	4.78	12.66	26.11	67.05	16,309
$\%\Delta HP_{2007-2012}$	-17.73	15.07	-58.3	-26.75	-15.5	-6.35	8.99	15,867
$\%\Delta HP_{2010-2015}$	7.05	14.22	-16.54	-2.62	3.55	13.41	53.69	15,867
$Foreclosures_{2012-2016}$	254.69	253.92	0.00	59.08	182.04	368.37	1241.18	9740
lnFCC	2.97	1.3	0	2.08	3.14	3.99	5.32	15,806

Data sources:

- CFPB, IRS, Census, ACS, Federal Housing Finance Agency, Zillow, FCC.

Sample Summary Statistics

i=five-digit zip code from 2012 to 2016

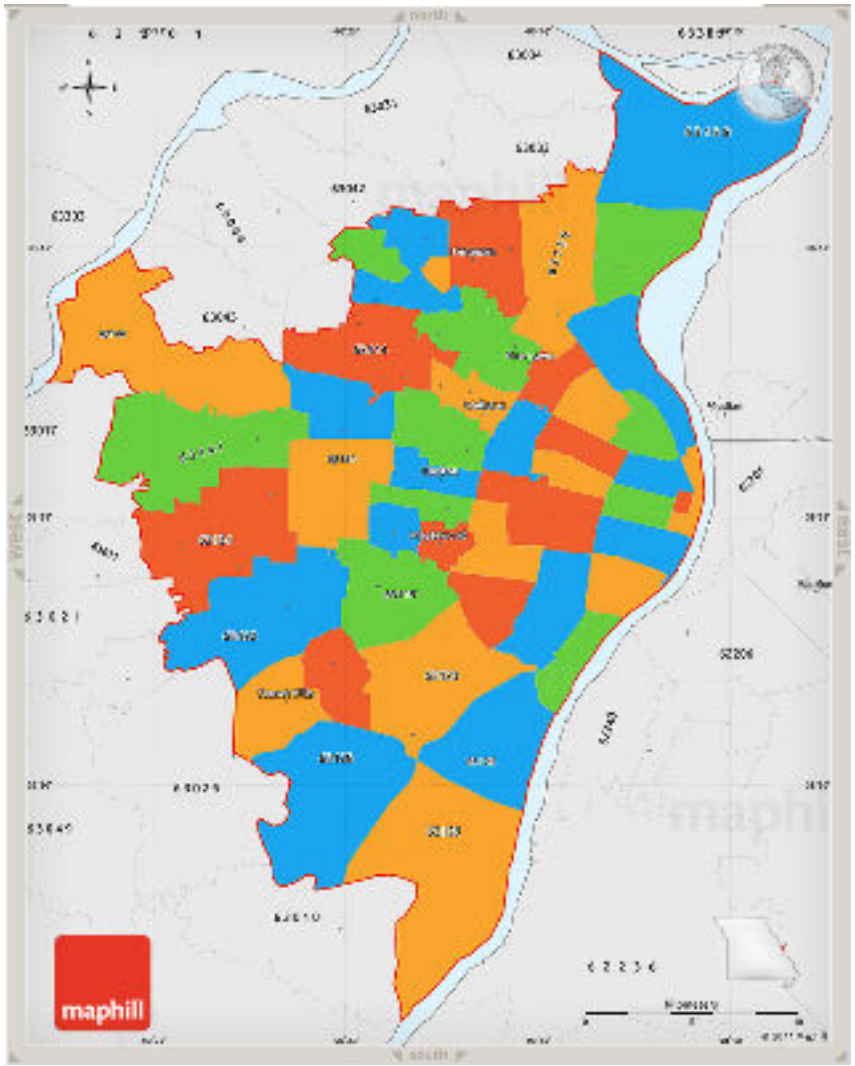
variable	mean	sd	min	p25	p50	p75	max	N
Complaints (w)	10.33	13.25	1.00	2.00	5.00	13.00	71.00	16,309
lnComplaints	1.63	1.22	0.00	0.69	1.61	2.56	4.26	16,309
AGI Income (000)	64.06	52.97	18.65	42.05	51.23	67.61	1464.53	16,309
lnAGI	10.93	0.44	10.12	10.65	10.84	11.12	12.54	16,309
College Education	0.27	0.16	0.05	0.15	0.22	0.35	0.76	16,309
Nonwhite	0.21	0.21	0.01	0.05	0.13	0.30	0.90	16,309
LMI	0.19	0.39	0.00	0.00	0.00	0.00	1.00	16,309
Mortgages (000)	1.97	2.07	0.04	0.41	1.19	2.92	9.54	16,309
Population (000)	17.20	15.18	0.62	4.78	12.66	26.11	67.05	16,309
$\%\Delta HP_{2007-2012}$	-17.73	15.07	-58.3	-26.75	-15.5	-6.35	8.99	15,867
$\%\Delta HP_{2010-2015}$	7.05	14.22	-16.54	-2.62	3.55	13.41	53.69	15,867
$Foreclosures_{2012-2016}$	254.69	253.92	0.00	59.08	182.04	368.37	1241.18	9740
lnFCC	2.97	1.3	0	2.08	3.14	3.99	5.32	15,806

Data sources:

- CFPB, IRS, Census, ACS, Federal Housing Finance Agency, Zillow, FCC.

Within 3-digit Zip Variation

Within 3-digit Zip Variation



Three-digit zip codes

- 876.
- Mean five-digit zips:
  - 19.
- Mean Area:
  - 1343 sq miles

Five-digit zip codes

- 16,309.
- Mean Area:
  - 72 sq miles

Income, Education, & Race: Regression

$$lnComplaints_i = \rho(IER_i) + \sum_{b=1}^{50} \left(Mort_{b,i} + Pop_{b,i}\right) + \zeta_{zip3} + \nu_i$$

Income, Education, & Race: Regression

$$lnComplaints_i = \rho(IER_i) + \sum_{b=1}^{50} \left(Mort_{b,i} + Pop_{b,i}\right) + \zeta_{zip3} + \nu_i$$

	(1)	(2)	(3)
lnAGI			-0.10***
			(<0.01)
CollEd			
NonWhite			
MortBucket50 FE	No	Yes	Yes
PopBucket50 FE	No	No	Yes
zip3 FE	Yes	Yes	Yes
Observations	16309	16309	16309
R^2	0.47	0.80	0.81

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Income, Education, & Race: Regression

$$lnComplaints_i = \rho(IER_i) + \sum_{b=1}^{50} \left(Mort_{b,i} + Pop_{b,i}\right) + \zeta_{zip3} + \nu_i$$

	(1)	(2)	(3)	(4)
lnAGI			-0.10***	
			(<0.01)	
CollEd				-0.08***
				(<0.01)
NonWhite				
MortBucket50 FE	No	Yes	Yes	Yes
PopBucket50 FE	No	No	Yes	Yes
zip3 FE	Yes	Yes	Yes	Yes
Observations	16309	16309	16309	16309
R^2	0.47	0.80	0.81	0.81

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Income, Education, & Race: Regression

$$lnComplaints_i = \rho(IER_i) + \sum_{b=1}^{50} \left(Mort_{b,i} + Pop_{b,i}\right) + \zeta_{zip3} + \nu_i$$

	(1)	(2)	(3)	(4)	(5)
lnAGI			-0.10***		
			(<0.01)		
CollEd				-0.08***	
				(<0.01)	
NonWhite					0.17***
					(<0.01)
MortBucket50 FE	No	Yes	Yes	Yes	Yes
PopBucket50 FE	No	No	Yes	Yes	Yes
zip3 FE	Yes	Yes	Yes	Yes	Yes
Observations	16309	16309	16309	16309	16309
R^2	0.47	0.80	0.81	0.81	0.82

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Income, Education, & Race: Regression

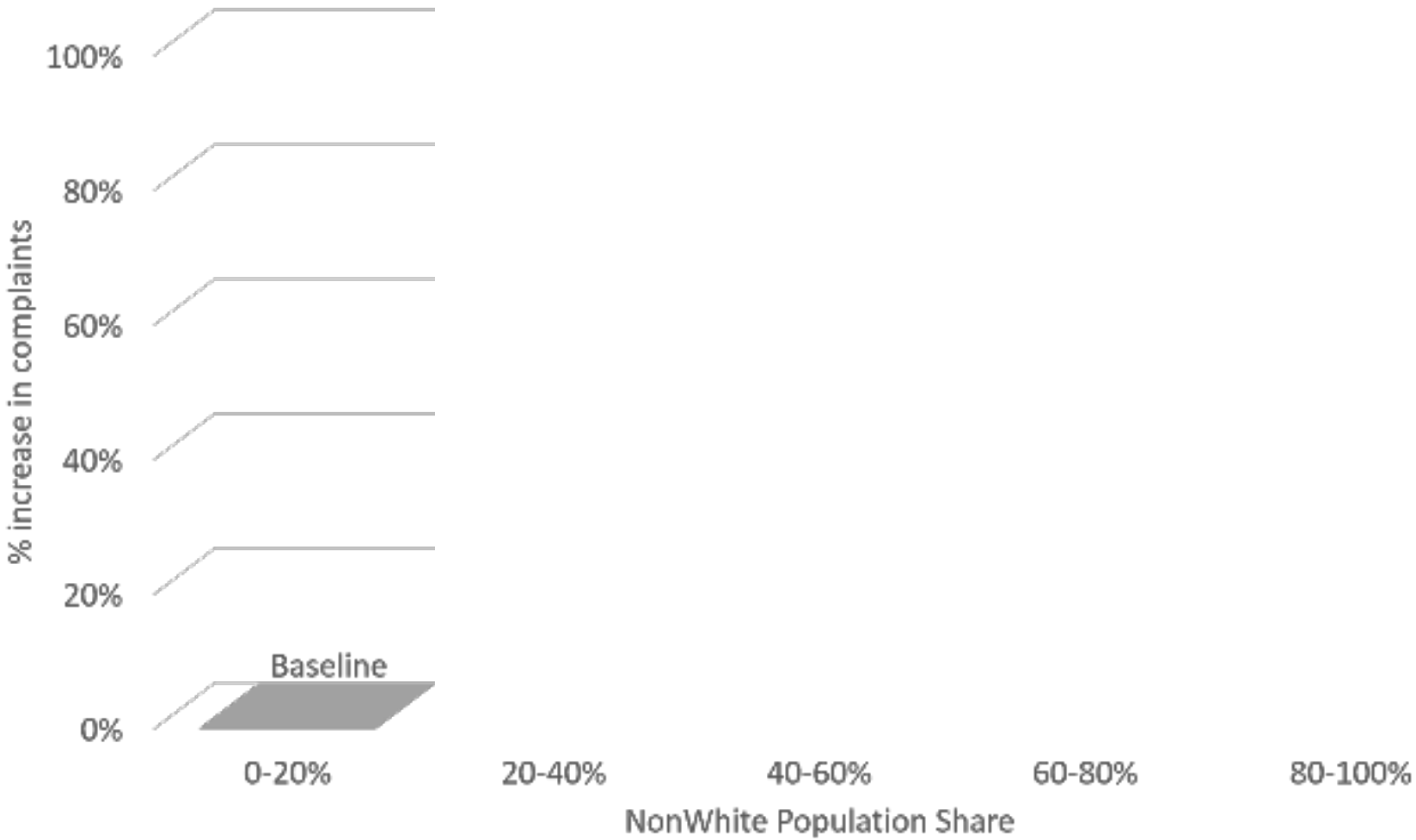
$$lnComplaints_i = \rho(IER_i) + \sum_{b=1}^{50} \left(Mort_{b,i} + Pop_{b,i}\right) + \zeta_{zip3} + \nu_i$$

	(1)	(2)	(3)	(4)	(5)	(6)
lnAGI			-0.10***			-0.02*
			(<0.01)			(0.10)
CollEd				-0.08***		-0.06***
				(<0.01)		(<0.01)
NonWhite					0.17***	0.16***
					(<0.01)	(<0.01)
MortBucket50 FE	No	Yes	Yes	Yes	Yes	Yes
PopBucket50 FE	No	No	Yes	Yes	Yes	Yes
zip3 FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	16309	16309	16309	16309	16309	16309
R^2	0.47	0.80	0.81	0.81	0.82	0.82

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

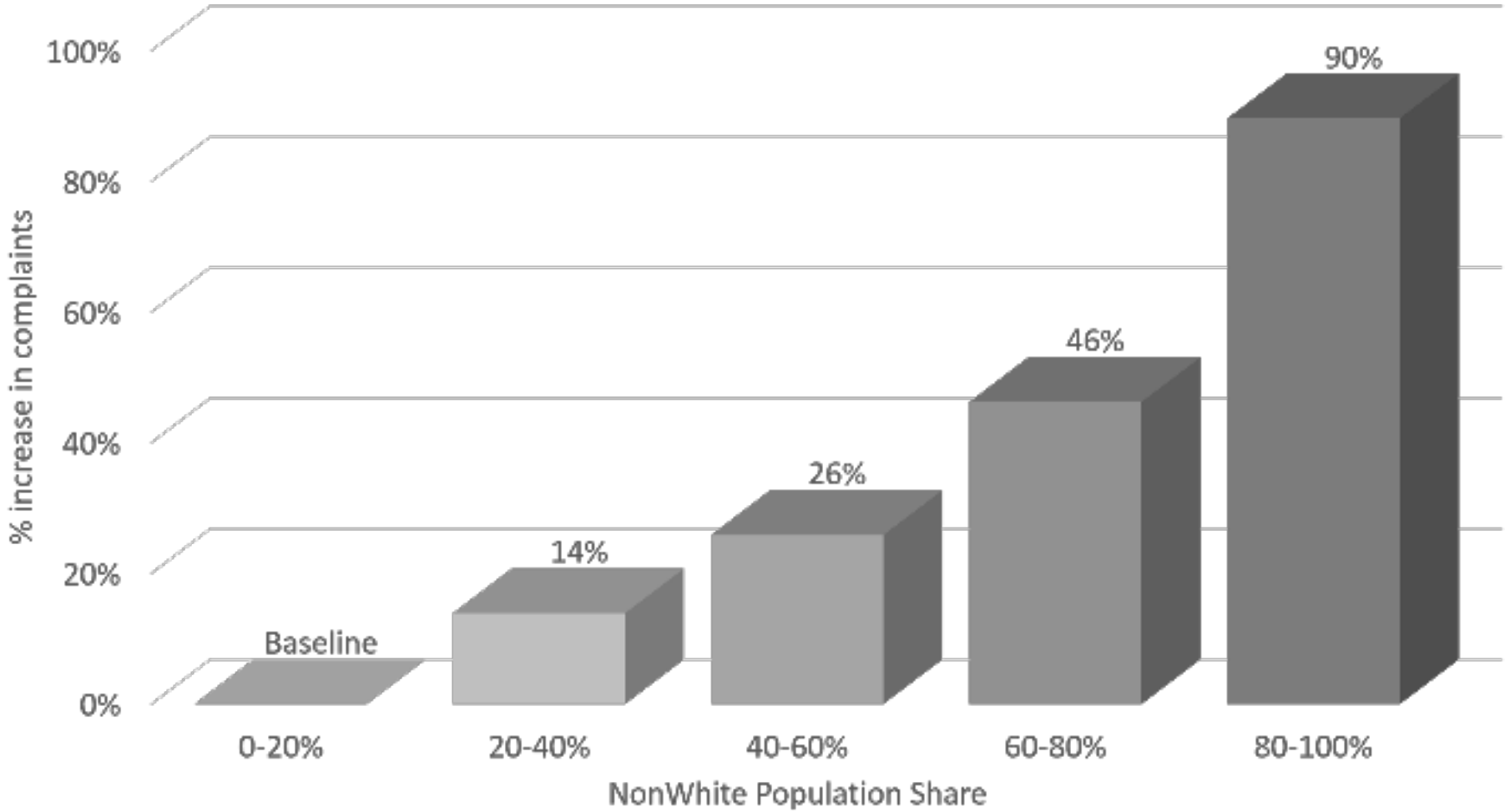
Race controlling for income and education

$$InComplaints_i = \sum_{r=2}^{5} \psi_r NonWhite_{b,i} + \sum_{b=2}^{50} \left(Inc_{b,i}; CollEd_{b,i}; Mort_{b,i}; Pop_{b,i}\right) + \zeta_{zip3} + \nu_i$$



Race controlling for income and education

$$InComplaints_i = \sum_{r=2}^{5} \psi_r NonWhite_{b,i} + \sum_{b=2}^{50} \left(Inc_{b,i}; CollEd_{b,i}; Mort_{b,i}; Pop_{b,i} \right) + \zeta_{zip3} + \nu_i$$



Summary so far

Lower quality (i.e., more complaints) in areas with

- lower income
- lower education
- higher minority population

Challenges for interpreting these results:

- true quality is unobserved.
- consumer preferences are unobserved.
- **Are residents of minority areas simply "complainers,"** regardless of the quality provided to them?

Summary so far

Lower quality (i.e., more complaints) in areas with

- lower income
- lower education
- higher minority population

Challenges for interpreting these results:

- true quality is unobserved.
- consumer preferences are unobserved.
- **Are residents of minority areas simply "complainers,"** regardless of the quality provided to them?

Summary so far

Lower quality (i.e., more complaints) in areas with

- lower income
- lower education
- higher minority population

Challenges for interpreting these results:

- true quality is unobserved.
- consumer preferences are unobserved.
- **Are residents of minority areas simply "complainers,"** regardless of the quality provided to them?

Are residents of minority areas simply "complainers"?

Are residents of minority areas simply "complainers"?

	All	NoServicers
	(1)	
NonWhite	0.14***	
	(<0.01)	
lnFCC		
$\%\Delta HP_{2007-2012}$		
$Foreclosures_{2012-2016}$		
MortBucket50 FE	Yes	
PopBucket50 FE	Yes	
IncomeBucket50 FE	Yes	
CollEdBucket50 FE	Yes	
zip3 FE	Yes	
Observations	9504	
R^2	0.81	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Are residents of minority areas simply "complainers"?

	All		NoServicers
	(1)	(2)	
NonWhite	0.14***	0.15***	
	(<0.01)	(<0.01)	
lnFCC		0.09***	
		(<0.01)	
$\%\Delta HP_{2007-2012}$			
$Foreclosures_{2012-2016}$			
MortBucket50 FE	Yes	Yes	
PopBucket50 FE	Yes	Yes	
IncomeBucket50 FE	Yes	Yes	
CollEdBucket50 FE	Yes	Yes	
zip3 FE	Yes	Yes	
Observations	9504	9504	
R^2	0.81	0.81	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Are residents of minority areas simply "complainers"?

	All			NoServicers
	(1)	(2)	(3)	
NonWhite	0.14***	0.15***	0.14***	
	(<0.01)	(<0.01)	(<0.01)	
lnFCC		0.09***		
		(<0.01)		
$\%\Delta HP_{2007-2012}$			-0.14***	
			(<0.01)	
$Foreclosures_{2012-2016}$				
MortBucket50 FE	Yes	Yes	Yes	
PopBucket50 FE	Yes	Yes	Yes	
IncomeBucket50 FE	Yes	Yes	Yes	
CollEdBucket50 FE	Yes	Yes	Yes	
zip3 FE	Yes	Yes	Yes	
Observations	9504	9504	9504	
R^2	0.81	0.81	0.81	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Are residents of minority areas simply "complainers"?

	All				NoServicers
	(1)	(2)	(3)	(4)	
NonWhite	0.14***	0.15***	0.14***	0.13***	
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	
lnFCC		0.09***			
		(<0.01)			
$\%\Delta HP_{2007-2012}$			-0.14***		
			(<0.01)		
$Foreclosures_{2012-2016}$				0.06***	
				(<0.01)	
MortBucket50 FE	Yes	Yes	Yes	Yes	
PopBucket50 FE	Yes	Yes	Yes	Yes	
IncomeBucket50 FE	Yes	Yes	Yes	Yes	
CollEdBucket50 FE	Yes	Yes	Yes	Yes	
zip3 FE	Yes	Yes	Yes	Yes	
Observations	9504	9504	9504	9504	
R^2	0.81	0.81	0.81	0.81	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Are residents of minority areas simply "complainers"?

	All					NoServicers
	(1)	(2)	(3)	(4)	(5)	
NonWhite	0.14***	0.15***	0.14***	0.13***	0.13***	
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	
lnFCC		0.09***			0.09***	
		(<0.01)			(<0.01)	
$\%\Delta HP_{2007-2012}$			-0.14***		-0.12***	
			(<0.01)		(<0.01)	
$Foreclosures_{2012-2016}$				0.06***	0.05***	
				(<0.01)	(<0.01)	
MortBucket50 FE	Yes	Yes	Yes	Yes	Yes	
PopBucket50 FE	Yes	Yes	Yes	Yes	Yes	
IncomeBucket50 FE	Yes	Yes	Yes	Yes	Yes	
CollEdBucket50 FE	Yes	Yes	Yes	Yes	Yes	
zip3 FE	Yes	Yes	Yes	Yes	Yes	
Observations	9504	9504	9504	9504	9504	
R^2	0.81	0.81	0.81	0.81	0.81	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Are residents of minority areas simply "complainers"?

	All					NoServicers
	(1)	(2)	(3)	(4)	(5)	(6)
NonWhite	0.14***	0.15***	0.14***	0.13***	0.13***	0.12***
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
lnFCC		0.09***			0.09***	0.09***
		(<0.01)			(<0.01)	(<0.01)
$\%\Delta HP_{2007-2012}$			-0.14***		-0.12***	-0.12***
			(<0.01)		(<0.01)	(<0.01)
$Foreclosures_{2012-2016}$				0.06***	0.05***	0.05***
				(<0.01)	(<0.01)	(<0.01)
MortBucket50 FE	Yes	Yes	Yes	Yes	Yes	Yes
PopBucket50 FE	Yes	Yes	Yes	Yes	Yes	Yes
IncomeBucket50 FE	Yes	Yes	Yes	Yes	Yes	Yes
CollEdBucket50 FE	Yes	Yes	Yes	Yes	Yes	Yes
zip3 FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9504	9504	9504	9504	9504	9234
R^2	0.81	0.81	0.81	0.81	0.81	0.80

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Summary so far

Lower quality (i.e., more complaints) in areas with

- lower income
- lower education
- higher minority population

The results are not likely driven by

- regional economic conditions (zip3)
- baseline propensity to complain (lnFCC)
- house price changes
- foreclosure rates

What might be the underlying drivers? How to tease out the supply side effects?

- Regulation: shock to supply of capital.

Summary so far

Lower quality (i.e., more complaints) in areas with

- lower income
- lower education
- higher minority population

The results are not likely driven by

- regional economic conditions (zip3)
- baseline propensity to complain (lnFCC)
- house price changes
- foreclosure rates

What might be the underlying drivers? How to tease out the supply side effects?

- Regulation: shock to supply of capital.

Summary so far

Lower quality (i.e., more complaints) in areas with

- lower income
- lower education
- higher minority population

The results are not likely driven by

- regional economic conditions (zip3)
- baseline propensity to complain (lnFCC)
- house price changes
- foreclosure rates

What might be the underlying drivers? How to tease out the supply side effects?

- Regulation: shock to supply of capital.

Regulation: The Community Reinvestment Act

> *The CRA regulations establish the framework and criteria by which the Agencies assess an institution's record of helping to meet the credit needs of its community, including low- and moderate-income neighborhoods.*

- Goals include
  - "promote the availability of credit and other banking services in low- and moderate-income communities."
- Banks are typically evaluated every 2-3 year or more frequently if there is "reasonable cause" or when they apply for expansion.
  - Violations can result in fines, denial of approvals of bank M&A, branch openings, reputational harm, etc.

Regulation: The Community Reinvestment Act

> *The CRA regulations establish the framework and criteria by which the Agencies assess an institution's record of helping to meet the credit needs of its community, including low- and moderate-income neighborhoods.*

- Goals include
  - "promote the availability of credit and other banking services in low- and moderate-income communities."
- Banks are typically evaluated every 2-3 year or more frequently if there is "reasonable cause" or when they apply for expansion.
  - Violations can result in fines, denial of approvals of bank M&A, branch openings, reputational harm, etc.

Regulation: The Community Reinvestment Act

> *The CRA regulations establish the framework and criteria by which the Agencies assess an institution's record of helping to meet the credit needs of its community, including low- and moderate-income neighborhoods.*

- Goals include
  - "promote the availability of credit and other banking services in low- and moderate-income communities."
- Banks are typically evaluated every 2-3 year or more frequently if there is "reasonable cause" or when they apply for expansion.
  - Violations can result in fines, denial of approvals of bank M&A, branch openings, reputational harm, etc.

Areas of Regulatory Focus

The CRA encourages lending that may otherwise have been absent.

- i.e., shock the pressure on the supply side of mortgage lending.

Underserved census-tract level classifications as defined in the Federal Housing Enterprises Financial Safety and Soundness Act, and used by the HMDA and CRA regulations:

- Low-to-moderate-income (LMI) tract:
  - median family income (MFI) $\leq$ 80% of MSA-level MFI.
- Observably *identical* areas, including on income, can have *different* regulation-induced pressures to lend.

Areas of Regulatory Focus

The CRA encourages lending that may otherwise have been absent.

- i.e., shock the pressure on the supply side of mortgage lending.

Underserved census-tract level classifications as defined in the Federal Housing Enterprises Financial Safety and Soundness Act, and used by the HMDA and CRA regulations:

- Low-to-moderate-income (LMI) tract:
  - median family income (MFI) $\leq$ 80% of MSA-level MFI.
- Observably *identical* areas, including on income, can have *different* regulation-induced pressures to lend.

Areas of Regulatory Focus

The CRA encourages lending that may otherwise have been absent.

- i.e., shock the pressure on the supply side of mortgage lending.

Underserved census-tract level classifications as defined in the Federal Housing Enterprises Financial Safety and Soundness Act, and used by the HMDA and CRA regulations:

- Low-to-moderate-income (LMI) tract:
  - median family income (MFI) $\leq$ 80% of MSA-level MFI.
- Observably *identical* areas, including on income, can have *different* regulation-induced pressures to lend.

Areas of Regulatory Focus

The CRA encourages lending that may otherwise have been absent.

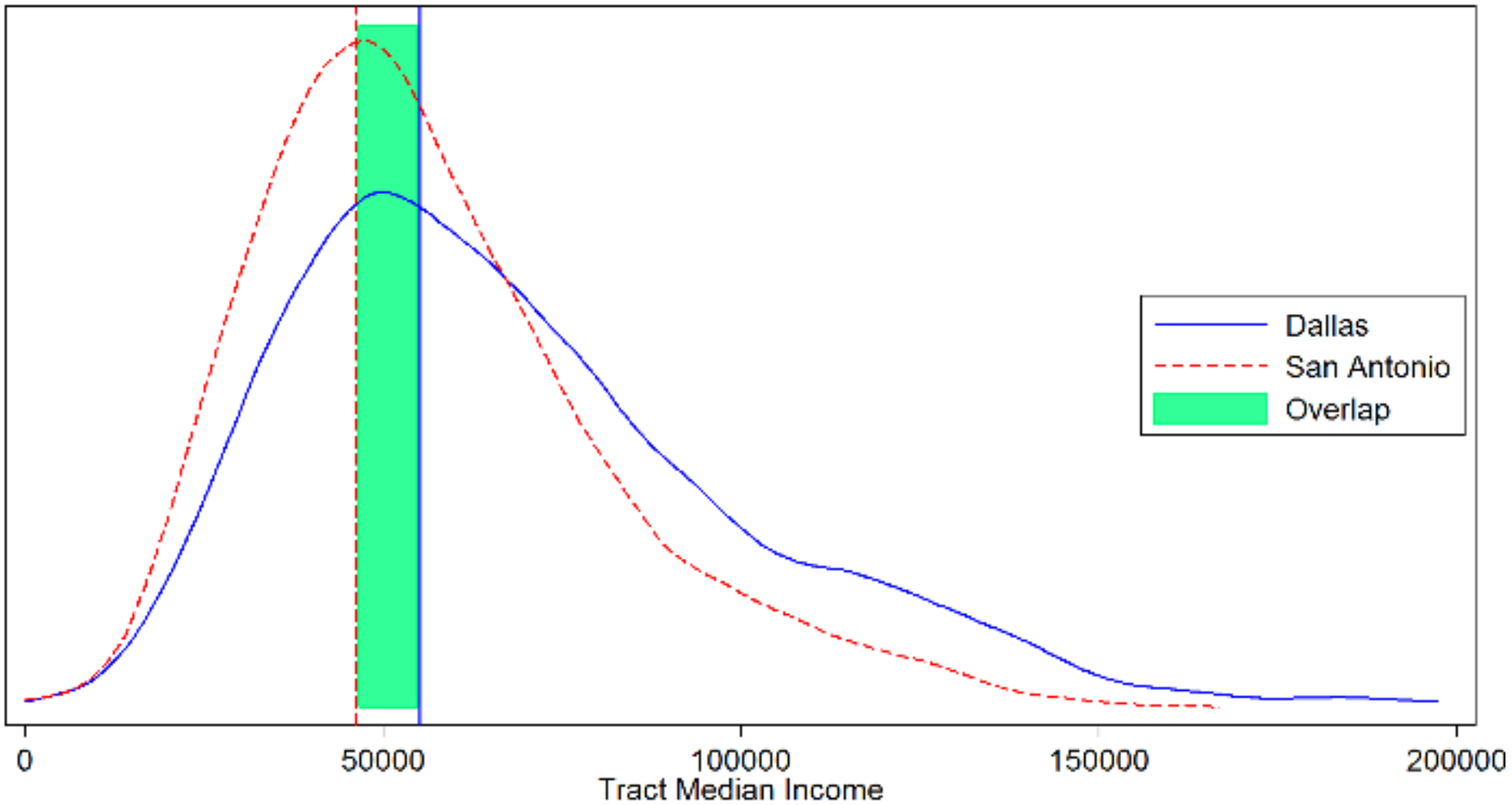
- i.e., shock the pressure on the supply side of mortgage lending.

Underserved census-tract level classifications as defined in the Federal Housing Enterprises Financial Safety and Soundness Act, and used by the HMDA and CRA regulations:

- Low-to-moderate-income (LMI) tract:
  - median family income (MFI) $\leq$ 80% of MSA-level MFI.
- Observably *identical* areas, including on income, can have *different* regulation-induced pressures to lend.

LMI Designation: Dallas and San Antonio

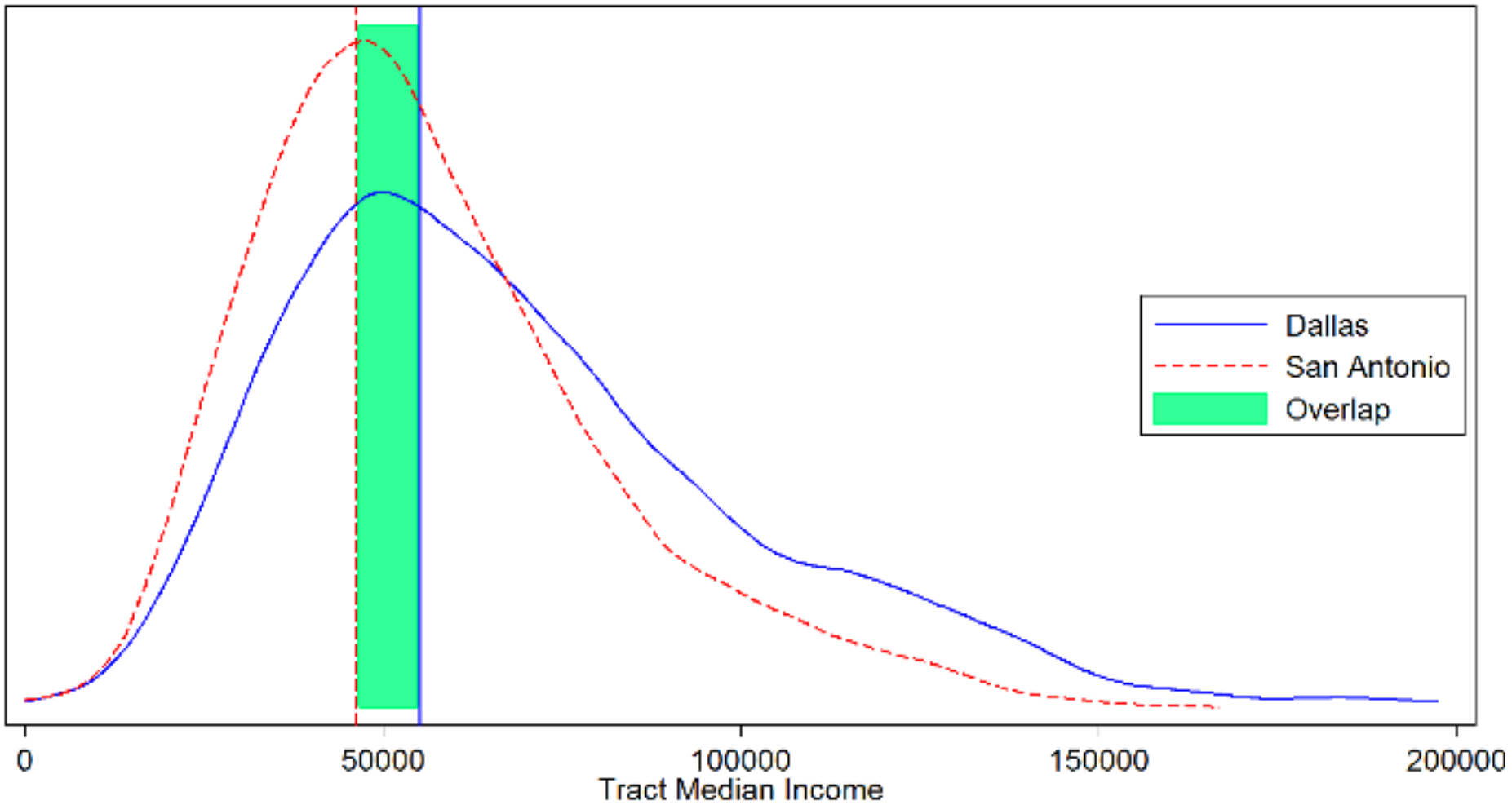
Dallas median income: \$68,900 $\rightarrow$ LMI for tracts below \$55,120.



LMI Designation: Dallas and San Antonio

Dallas median income: \$68,900 $\rightarrow$ LMI for tracts below \$55,120.

San Antonio median income: \$57,800 $\rightarrow$ LMI for tracts below \$46,240.

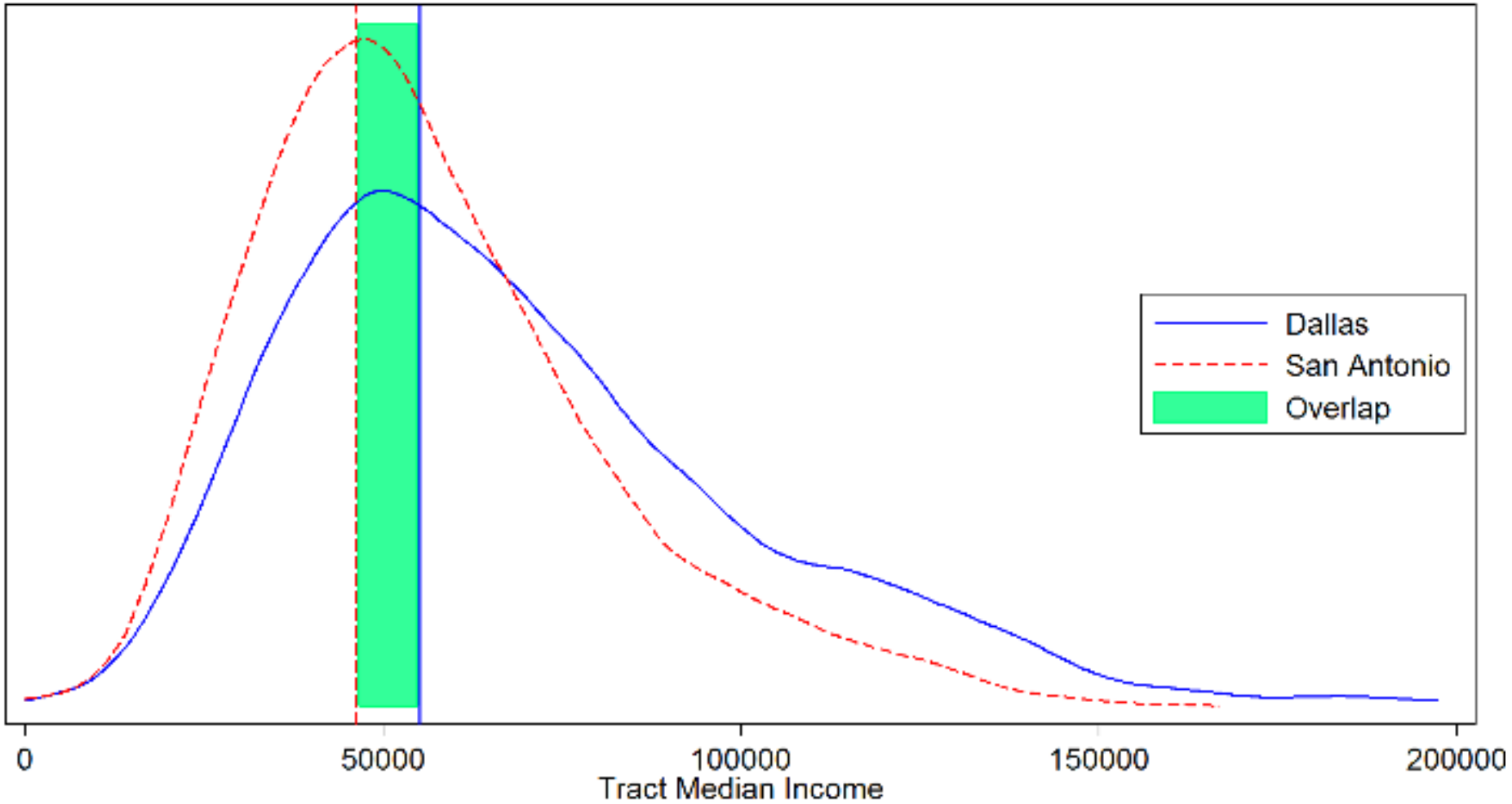


LMI Designation: Dallas and San Antonio

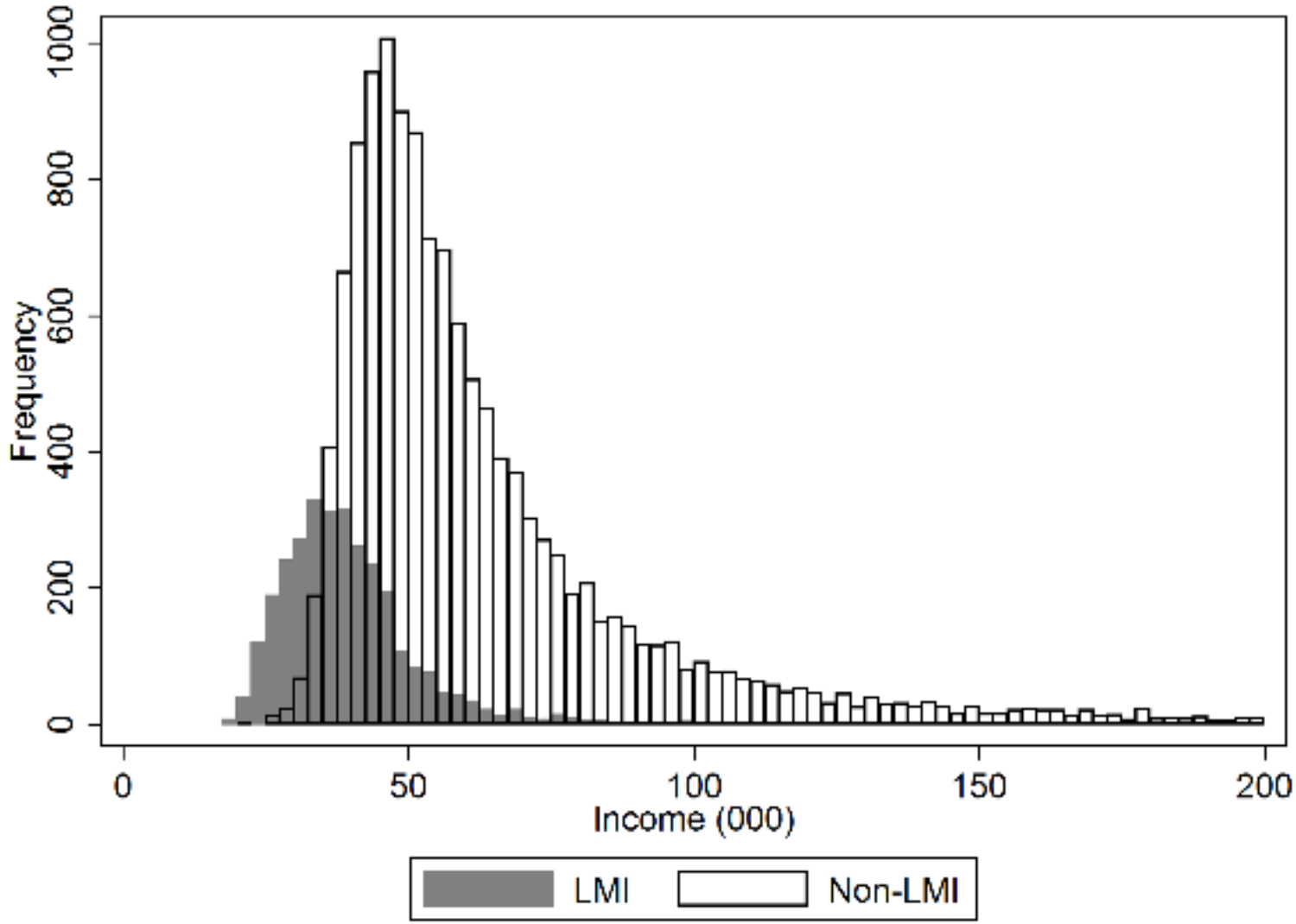
Dallas median income: \$68,900 $\rightarrow$ LMI for tracts below \$55,120.

San Antonio median income: \$57,800 $\rightarrow$ LMI for tracts below \$46,240.

$\Rightarrow$ \$50,000 tract is LMI for Dallas, but not LMI for San Antonio.



Income and LMI Designation



Matching: Regulation-targeted Tracts

Propensity score match "CRA-focus" zip codes to nonfocus zips using

- number of mortgages, population (size of the market)
- education, income (information and sophistication)
- house price changes (wealth change, home equity)
- state (regulation)

Assumption:

- After the matching on observables, the LMI regulatory designation is not systematically related to other unobserved factors that drive complaints, notably:
  - the mapping from quality to complaints
  - consumer preference for complaints

Matching: Regulation-targeted Tracts

Propensity score match "CRA-focus" zip codes to nonfocus zips using

- number of mortgages, population (size of the market)
- education, income (information and sophistication)
- house price changes (wealth change, home equity)
- state (regulation)

Assumption:

- After the matching on observables, the LMI regulatory designation is not systematically related to other unobserved factors that drive complaints, notably:
  - the mapping from quality to complaints
  - consumer preference for complaints

Results: Regulation-targeted Areas

		MSA Strata		Income Strata	
	Base	10k	5k	10k	5k
	(1)	(2)	(3)	(4)	(5)
LMI (atet)	0.28				
SE	0.04				
T	6.69				
N	13713				
Ntreat	1987				
Ncontrol	11726				

Results: Regulation-targeted Areas

		MSA Strata		Income Strata	
	Base	10k	5k	10k	5k
	(1)	(2)	(3)	(4)	(5)
LMI (atet)	0.28	0.31	0.22		
SE	0.04	0.07	0.07		
T	6.69	4.28	3.08		
N	13713	13083	12521		
Ntreat	1987	1864	1823		
Ncontrol	11726	11219	10698		

Results: Regulation-targeted Areas

		MSA Strata		Income Strata	
	Base	10k	5k	10k	5k
	(1)	(2)	(3)	(4)	(5)
LMI (atet)	0.28	0.31	0.22	0.21	0.21
SE	0.04	0.07	0.07	0.04	0.05
T	6.69	4.28	3.08	4.69	4.55
N	13713	13083	12521	11337	10151
Ntreat	1987	1864	1823	1891	1888
Ncontrol	11726	11219	10698	9446	8263

Matching: Race

(1) Base case.

(2) Match on race.

Matching: Race

(1) Base case.

(2) Match on race.

	Base (1)	Match on NonWhite (2)
LMI (atet)	0.28	0.18
SE	0.04	0.05
T	6.69	3.91
N	13713	13713
Ntreat	1987	1987
Ncontrol	11726	11726

Matching: Race

(1) Base case.

(2) Match on race.

(3-6) Split the sample into below/above median NonWhite share (12%)

		Match on	Base
	Base	NonWhite	Low NW
	(1)	(2)	(3)
LMI (atet)	0.28	0.18	0.09
SE	0.04	0.05	0.05
T	6.69	3.91	1.78
N	13713	13713	6666
Ntreat	1987	1987	469
Ncontrol	11726	11726	6197

Matching: Race

(1) Base case.

(2) Match on race.

(3-6) Split the sample into below/above median NonWhite share (12%)

		Match on	Base	
	Base	NonWhite	Low NW	High NW
	(1)	(2)	(3)	(4)
LMI (atet)	0.28	0.18	0.09	0.34
SE	0.04	0.05	0.05	0.05
T	6.69	3.91	1.78	6.46
N	13713	13713	6666	6873
Ntreat	1987	1987	469	1518
Ncontrol	11726	11726	6197	5355

Matching: Race

(1) Base case.

(2) Match on race.

(3-6) Split the sample into below/above median NonWhite share (12%)

		Match on	Base		MSA Strata	
	Base	NonWhite	Low NW	High NW	Low NW	High NW
	(1)	(2)	(3)	(4)	(5)	(6)
LMI (atet)	0.28	0.18	0.09	0.34	0.05	0.40
SE	0.04	0.05	0.05	0.05	0.05	0.11
T	6.69	3.91	1.78	6.46	0.96	3.53
N	13713	13713	6666	6873	5110	6255
Ntreat	1987	1987	469	1518	436	1392
Ncontrol	11726	11726	6197	5355	4674	4863

Matching: Placebo

Concern: the tests still compare borrowers at different points in the relative income distribution (e.g., 78% vs. 82% of MSA-median income).

- Are the results really driven by the 80% LMI threshold?

Matching: Placebo

Concern: the tests still compare borrowers at different points in the relative income distribution (e.g., 78% vs. 82% of MSA-median income).

- Are the results really driven by the 80% LMI threshold?

We want to examine other placebo thresholds (70% and 90%), but ensuring not using variation across the *true* (80%) LMI threshold.

70%: Keep all observation that are in actual LMI group (<80%).

- control: income $\in$ [70%, 80%]
- treatment: income <70%

Matching: Placebo

Concern: the tests still compare borrowers at different points in the relative income distribution (e.g., 78% vs. 82% of MSA-median income).

- Are the results really driven by the 80% LMI threshold?

We want to examine other placebo thresholds (70% and 90%), but ensuring not using variation across the *true* (80%) LMI threshold.

70%: Keep all observation that are in actual LMI group (<80%).
- control: income $\in$ [70%, 80%]
- treatment: income <70%

90%: Keep all observation that are *not* in actual LMI group (>80%).
- control: income >90%
- treatment: income $\in$ [70%, 80%]

Matching: Placebo

Are the results really driven by the 80% LMI threshold?

	Base		Within 10k MSA		Within 5k MSA	
Threshold	ATET	Nt / Nc	ATET	Nt / Nc	ATET	Nt / Nc
70%	0.09 (0.19)	883 / 1102	0.09 (0.39)	784 / 993	0.01 (0.94)	784 / 993
80% (LMI)	0.28*** (<0.01)	1987 / 11726	0.31*** (<0.01)	1864 / 11219	0.22*** (<0.01)	1823 / 10698
90%	0.09** (0.01)	2085 / 9641	0.03 (0.48)	2048 / 9186	0.01 (0.78)	2018 / 8807

p-values in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Alternative Matching Schemes

	Kernel Bandwidth	
Desc	bw=0.01	bw=0.05
	(1)	(2)
LMI (atet)	0.28***	0.28***
	(<0.01)	(<0.01)
N	13713	13713
Ntreat	1987	1987
Ncontrol	11726	11726

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results are also robust to changing the particular matching scheme:

- Vary the bandwidth

Alternative Matching Schemes

	Kernel Bandwidth		PS Nearest Neighbor	
Desc	bw=0.01	bw=0.05	PS-1NN	PS-3NN
	(1)	(2)	(3)	(4)
LMI (atet)	0.28***	0.28***	0.33***	0.27***
	(<0.01)	(<0.01)	(<0.01)	(<0.01)
N	13713	13713	13668	13663
Ntreat	1987	1987	1946	1941
Ncontrol	11726	11726	11722	11722

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results are also robust to changing the particular matching scheme:

- Vary the bandwidth
- Nearest neighbor rather than kernel-weighted

Alternative Matching Schemes

	Kernel Bandwidth		PS Nearest Neighbor		Mahalanobis	
Desc	bw=0.01	bw=0.05	PS-1NN	PS-3NN	NN	NN, 5k strata
	(1)	(2)	(3)	(4)	(5)	(6)
LMI (atet)	0.28^{***}	0.28^{***}	0.33^{***}	0.27^{***}	0.16^{***}	0.17^{***}
	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)
N	13713	13713	13668	13663	13713	13650
Ntreat	1987	1987	1946	1941	1987	1986
Ncontrol	11726	11726	11722	11722	11726	11664

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results are also robust to changing the particular matching scheme:

- Vary the bandwidth
- Nearest neighbor rather than kernel-weighted
- Mahalanobis matching

Summary

Consumer protection and equality is a paramount concern for policy-makers and regulators.

We show substantial differences in retail bank service quality in areas of

- low income,
- low education,
- most prominently, high minority population.

Regulation-targeted LMI areas (focusing on quantity and price) experience poorer quality service.

- This relationship is much larger for high-minority areas.

Color and Credit

Race, Regulation, and the Quality of Financial Services

Taylor Begley[1] Amiyatosh Purnanandam[2]

[1]Washington University in St. Louis

[2]University of Michigan

November 2017