

# Housing Search Frictions: Evidence from Detailed Search Data and a Field Experiment

Peter Bergman   Eric Chan   Adam Kapor

Teachers College, Columbia University

October, 2018

# Housing Choice Vouchers and Neighborhood Quality

- Residential location important determinant of long-run outcomes  
(cf. Wilson, 1987; Sampson & Groves, 1989; Chetty, Hendren, Katz 2016)
- School quality matters  
(cf. Angrist et al., 2010; Deming et al., 2014; Dobbie & Fryer, 2011; Schwartz, 2010)
- Most school choice is residential choice

# Housing Choice Vouchers and Neighborhood Quality

- Residential location important determinant of long-run outcomes  
(cf. Wilson, 1987; Sampson & Groves, 1989; Chetty, Hendren, Katz 2016)
- School quality matters  
(cf. Angrist et al., 2010; Deming et al., 2014; Dobbie & Fryer, 2011; Schwartz, 2010)
- Most school choice is residential choice

## Housing Choice Voucher (HCV) Program

- <15% of families w/ children live in a low-poverty areas  
(Sard and Rice, 2016)
- Schools associated w/ HCV recipients worse compared to other low-income families  
(Ellen, Horn & Schwartz, 2016)

# Housing Choice Vouchers and Neighborhood Quality

- Residential location important determinant of long-run outcomes  
(cf. Wilson, 1987; Sampson & Groves, 1989; Chetty, Hendren, Katz 2016)
- School quality matters  
(cf. Angrist et al., 2010; Deming et al., 2014; Dobbie & Fryer, 2011; Schwartz, 2010)
- Most school choice is residential choice

## Housing Choice Voucher (HCV) Program

- <15% of families w/ children live in a low-poverty areas  
(Sard and Rice, 2016)
- Schools associated w/ HCV recipients worse compared to other low-income families  
(Ellen, Horn & Schwartz, 2016)

⇒ Why don't HCV families live in areas with better schools?

# This Paper: The Role of Information Problems

We ask

- ① Does additional school-quality information change families' search for housing?
- ② Does it affect where families choose to live?

# This Paper: The Role of Information Problems

We ask

- ① Does additional school-quality information change families' search for housing?
- ② Does it affect where families choose to live?
- ③ How much do HCV households value school quality?
- ④ How much would they appear to value it if we ignored information frictions?

# This Paper: The Role of Information Problems

We ask

- ① Does additional school-quality information change families' search for housing?
- ② Does it affect where families choose to live?
- ③ How much do HCV households value school quality?
- ④ How much would they appear to value it if we ignored information frictions?

Hard questions to answer...

- Questions (1) and (2) require multiple partnerships to implement
  - Need information on schools and attendance zones
  - Need a platform to deliver information; must be timely, actionable
  - Need to be able to track where families live
- Questions (3) & (4) require a model

# This Paper: The Role of Information Problems

To answer these questions, we combine:

- School quality data on near-universe of public schools
- Nationwide RCT adding school-quality info to online search platform
- Detailed search data
- Universe of residential data on voucher recipients
- Model of search for voucher housing (ongoing)

## ① Impacts of vouchers

- Lower neighborhood crime, poverty rates but not so much better schools

(Katz, Kling, Liebman 2001; Kling, Liebman, Katz 2007; Sanbonmatsu et al 2006)

- Positive long-run outcomes

(Chetty, Hendren, Katz 2016; Chyn, 2018)

- Not through schools (Jacob, 2004)

## ① Impacts of vouchers

- Lower neighborhood crime, poverty rates but not so much better schools

(Katz, Kling, Liebman 2001; Kling, Liebman, Katz 2007; Sanbonmatsu et al 2006)

- Positive long-run outcomes

(Chetty, Hendren, Katz 2016; Chyn, 2018)

- Not through schools (Jacob, 2004)

## ② School quality within centralized mechanism

- Families respond to school-quality information

(Hastings and Weinstein 2008; Corcoran et al., 2018; Allende, Gallego and Neilson, 2018)

- Distance & racial composition strong determinants of choice

(cf. Hastings et al. 2005; Glazerman & Dotter 2017)

- Demand responds to absolute test scores, not value added (Abdulkadirolu et al., 2017)

## ① Impacts of vouchers

- Lower neighborhood crime, poverty rates but not so much better schools

(Katz, Kling, Liebman 2001; Kling, Liebman, Katz 2007; Sanbonmatsu et al 2006)

- Positive long-run outcomes

(Chetty, Hendren, Katz 2016; Chyn, 2018)

- Not through schools (Jacob, 2004)

## ② School quality within centralized mechanism

- Families respond to school-quality information

(Hastings and Weinstein 2008; Corcoran et al., 2018; Allende, Gallego and Neilson, 2018)

- Distance & racial composition strong determinants of choice

(cf. Hastings et al. 2005; Glazerman & Dotter 2017)

- Demand responds to absolute test scores, not value added (Abdulkadirolu et al., 2017)

## ③ Wealthier families will to pay for school quality

- Test scores capitalized into housing prices

(e.g. Black 1999; Figlio and Lucas, 2004; Bayer, Ferreyra, McMillan 2007)

## Outline

- ① Background on HCV program
- ② Study partners
- ③ Intervention description
- ④ Descriptive results
- ⑤ RCT results
- ⑥ The model, ongoing and future work

# Housing Choice Vouchers

“Section 8” /Housing Choice Voucher program.

- $\approx$  2.2m families in U.S
- Administered by local housing authorities
- Typical features:
  - Income cutoff
  - Waitlist
  - Limited time to use voucher (typically 60-120 days)

Subsidizes tenant's rent:

- Tenant typically pays 30% of income toward rent and utilities
- Landlord receives rent based on “fair market rent”
- Rent capped at  $\approx$ 40th percentile of metro-area rent
- Landlord agrees to inspections

## Outline

- 1 Background on HCV program
- 2 **Study partners**
- 3 Intervention description
- 4 Descriptive results
- 5 RCT results
- 6 The model, ongoing and future work

# Study Partners and Data

## GoSection8.com

- Largest listings platform Housing Choice Voucher market
- $\approx$  400,000 unique users/month
- 11,000 – 13,000 tenants registered per month
- Partners w/ local housing authorities
- Host intake survey, provide properties viewed, inquiries, property characteristics

# Study Partners and Data

## GoSection8.com

- Largest listings platform Housing Choice Voucher market
- $\approx$  400,000 unique users/month
- 11,000 – 13,000 tenants registered per month
- Partners w/ local housing authorities
- Host intake survey, provide properties viewed, inquiries, property characteristics

# Study Partners and Data

## GoSection8.com

- Largest listings platform Housing Choice Voucher market
- $\approx$  400,000 unique users/month
- 11,000 – 13,000 tenants registered per month
- Partners w/ local housing authorities
- **Host intake survey, provide properties viewed, inquiries, property characteristics**

## GreatShools.org

- Nonprofit organization rating  $\approx$  200,000 PK-12 schools nationwide
- Ratings 1-10, based on test scores; 5 median within each state
- NCES data on school characteristics; Demographics, FRPL, FTEs
- Assign each GoSection8 property to E, M, H; construct mean rating

# Study Partners and Data

## GoSection8.com

- Largest listings platform Housing Choice Voucher market
- $\approx 400,000$  unique users/month
- 11,000 – 13,000 tenants registered per month
- Partners w/ local housing authorities
- Host intake survey, provide properties viewed, inquiries, property characteristics

## GreatShools.org

- Nonprofit organization rating  $\approx 200,000$  PK-12 schools nationwide
- Ratings 1-10, based on test scores; 5 median within each state
- NCES data on school characteristics; Demographics, FRPL, FTEs
- Assign each GoSection8 property to E, M, H; construct mean rating

# Study Partners and Data

## GoSection8.com

- Largest listings platform Housing Choice Voucher market
- $\approx$  400,000 unique users/month
- 11,000 – 13,000 tenants registered per month
- Partners w/ local housing authorities
- Host intake survey, provide properties viewed, inquiries, property characteristics

## GreatShools.org

- Nonprofit organization rating  $\approx$  200,000 PK-12 schools nationwide
- Ratings 1-10, based on test scores; 5 median within each state
- NCES data on school characteristics; Demographics, FRPL, FTEs
- Assign each GoSection8 property to E, M, H; construct mean rating

## US Department of Housing and Urban Development

- Location of HCV recipients, income, HH members and ages, rent, bedrooms
- Assign endline living location to E, M, H; construct mean rating

# Study Partners and Data

## GoSection8.com

- Largest listings platform Housing Choice Voucher market
- $\approx$  400,000 unique users/month
- 11,000 – 13,000 tenants registered per month
- Partners w/ local housing authorities
- Host intake survey, provide properties viewed, inquiries, property characteristics

## GreatShools.org

- Nonprofit organization rating  $\approx$  200,000 PK-12 schools nationwide
- Ratings 1-10, based on test scores; 5 median within each state
- NCES data on school characteristics; Demographics, FRPL, FTEs
- Assign each GoSection8 property to E, M, H; construct mean rating

## US Department of Housing and Urban Development

- Location of HCV recipients, income, HH members and ages, rent, bedrooms
- Assign endline living location to E, M, H; construct mean rating

# Study Partners and Data

## GoSection8.com

- Largest listings platform Housing Choice Voucher market
- $\approx$  400,000 unique users/month
- 11,000 – 13,000 tenants registered per month
- Partners w/ local housing authorities
- Host intake survey, provide properties viewed, inquiries, property characteristics

## GreatShools.org

- Nonprofit organization rating  $\approx$  200,000 PK-12 schools nationwide
- Ratings 1-10, based on test scores; 5 median within each state
- NCES data on school characteristics; Demographics, FRPL, FTEs
- Assign each GoSection8 property to E, M, H; construct mean rating

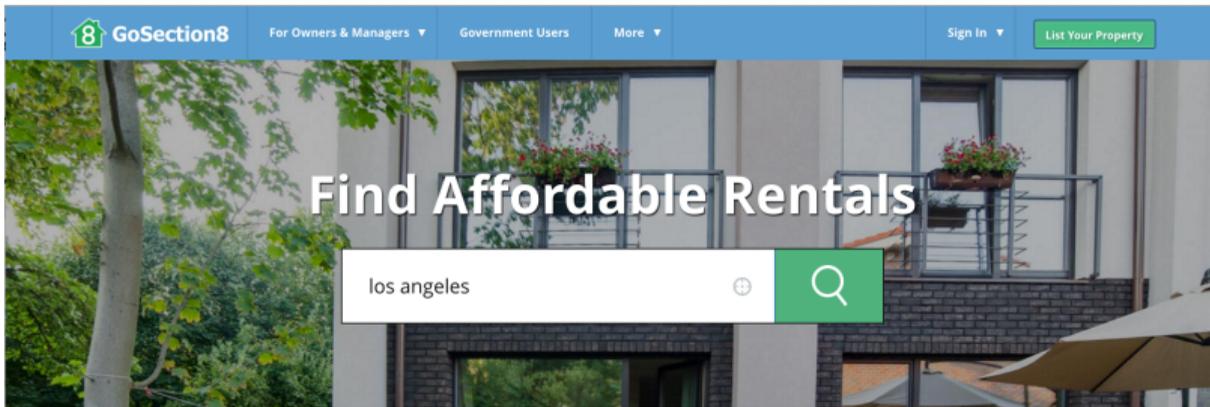
## US Department of Housing and Urban Development

- Location of HCV recipients, income, HH members and ages, rent, bedrooms
- Assign endline living location to E, M, H; construct mean rating

## Outline

- 1 Background on HCV program
- 2 Study partners
- 3 **Intervention description**
- 4 Descriptive results
- 5 RCT results
- 6 The model, ongoing and future work

# Search is geographic



The screenshot shows the GoSection8 website interface. At the top, there is a blue navigation bar with the GoSection8 logo on the left, followed by links for 'For Owners & Managers', 'Government Users', and 'More'. On the right side of the navigation bar, there are links for 'Sign In' and a green button labeled 'List Your Property'. Below the navigation bar is a large banner image of a modern apartment building with a balcony. Overlaid on the banner is a search bar containing the text 'los angeles' and a green search button with a magnifying glass icon. The main content area below the banner has a white background and contains the following text:

## About GoSection8

Find a great place to live with the largest affordable housing listing service in the nation - whether you have a section 8 voucher or are just looking for a good deal.

Our close relationship with hundreds of municipalities and government agencies has made it possible for us to help millions of families with their housing needs. Search GoSection8 and you'll find that we offer more affordable rental listings than any other housing website.

You'll be able to find your next home on GoSection8 for free and we never charge landlords to post their vacancies.

“Yes”  $\implies$  randomly assigned to treatment/control

**Columbia University Teachers College Research Study** X



**Are you willing to participate in a research study by Columbia University Teachers College that tests new features of GoSection8?**

All participants are entered into a raffle to receive a \$100 dollar gift card.

**GoSection8** For Owners & Managers Government Users More Sign In List Your Property

## Columbia University Teachers College Research Study Registration

**Understanding your participation in the research study:**

**Study Purpose.** This study is separate and independent from GoSection8. It is a partnership between Columbia University Teachers College, GoSection8, and Great Schools. With funding from the Arnold Foundation, researchers from Columbia University Teachers College are studying whether offering school information alongside rental housing listings on GoSection8.com causes families to move to neighborhoods with higher performing public schools. Results will be used to provide GoSection8, Public Housing Authorities, and the Department of Housing and Urban Development information about how and whether to offer school information alongside rental housing listings.

Do you already have a Tenant account? [Sign In](#)

**Personal Information**

First Name:  Last Name:

Email:  Phone:

**Head of Household**

First Name:  Last Name:

Voucher Status:  Date of Birth:

Name of Housing Agency that issued Voucher:

What is the main reason you wish to move?

Do you have children in the following age groups? Please check all that apply

0-4  5-10  11-13  14-18

When would you like to move by?  Current ZIP Code:

I want landlords to contact me with move-in specials & lease incentives.  
 I Agree to the [Terms and Conditions](#)

Sign Up

8 Favorites 6 Saved Searches 1 More Account Sign Out

## 2 Bed, 1.5 Bath Apt for \$1,500/Month

1451 W 105TH ST., LOS ANGELES, LOS ANGELES COUNTY 90047  
4 hours ago

Home Landlord Flag

1 / 10



**Contact this Landlord**

**Don't Get Scammed!** Wire transfers & long-distance inquiries are often scams. [Learn More >](#)

**Nancy Wilson**  
(323) 206-6339

First Name Last Name  
Eric Chan

Email  
ewc2130@tc.columbia.edu

Phone

Your Message to this Landlord

Send Message

**Property Details**

- Type: Apt
- Rent: \$1,500.00
- Deposit: \$1,500.00
- Is Negotiable: No
- Beds / Baths: 2 / 1.5
- Square Feet: 1100
- Year Built: N/A
- Pets Allowed?: No
- Date Available: 3/21/2016
- SS+ Only: No
- Listed: Immediately

**Property Description**

Los Angeles County Section 8 accepted. Spacious rooms, underground parking, laundry on premises. GOT LA COUNTY SECTION 8 ??? I HAVE APARTMENTS...NICE ONES TOO!!! Very nice 2 bed room 1.5 bath town house apartment. Security deposit can be accepted in two installments.

**Resources**

- [Avoid Scams and Fraud!](#)
- [Housing Authority Search](#)
- [FAQs](#)

# Treatment group only

## 4 Bed, 2 Bath Duplex for \$1,200.00

### GreatSchools Ratings

#### Filter Schools:

Pre  K-5  Middle  High

Above Average  
8-10

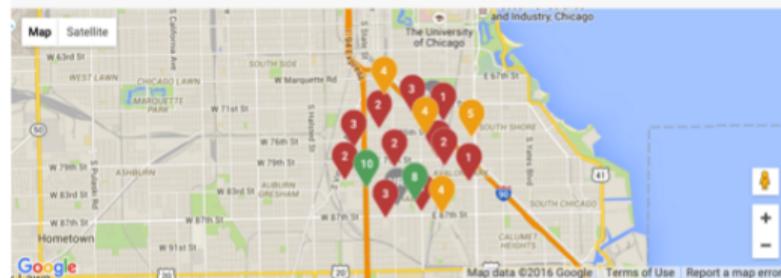
Average  
4-7

Below Average  
1-3

No Rating  
NP

Click any marker to view its School Zone.

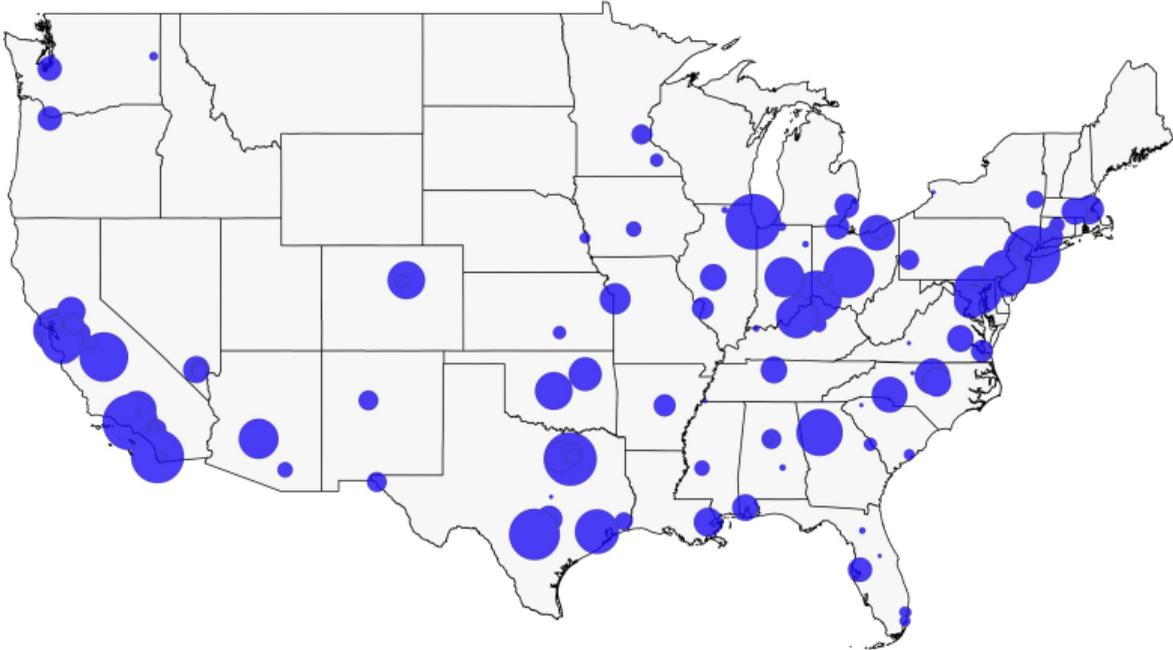
Note: Not all schools have a School Zone.



Name	Type	Grades	Distance	Assigned
<b>2</b> <b>Ruggles Elementary School</b> <a href="#">Details &gt;</a>	public	PK-8	0.41	<input checked="" type="checkbox"/>
<b>1</b> <b>Hirsch Metropolitan High School</b> <a href="#">Details &gt;</a>	public	9-12	0.43	<input type="checkbox"/>
<b>4</b> <b>Tanner Elementary School</b> <a href="#">Details &gt;</a>	public	PK-8	0.45	<input type="checkbox"/>

Data provided by GreatSchools.org

# Geography of the study sample



# Voucher holders attend lower-quality schools

## US Primary Schools vs. HUD vs. Study Sample

	US Elem Schools	HUD (5%)	Study Sample
GreatSchools Rating	5.78	4.71	3.27
Share Black	0.15	0.20	0.44
Share Hispanic	0.26	0.48	0.38
Share White	0.49	0.22	0.12
Share Asian	0.05	0.06	0.03
Share FRPL	0.52	0.71	0.84
Pupil-FTE Ratio	17.67	18.5	18.35
Observations	125,346	85,301	1,932

## Sample characteristics

Variable	Control Mean	T-C Difference	P-value	N
Female	0.88	-0.02	0.31	1,921
Hispanic	0.15	-0.03**	0.03	1,921
Black	0.62	0.01	0.71	1,918
White	0.38	-0.02	0.40	1,915
Annual income	14,513	104.00	0.84	1,921
<18 children in	1.84	-0.06	0.43	1,932
Intend to move within 3 months	0.66	0.01	0.65	1,928

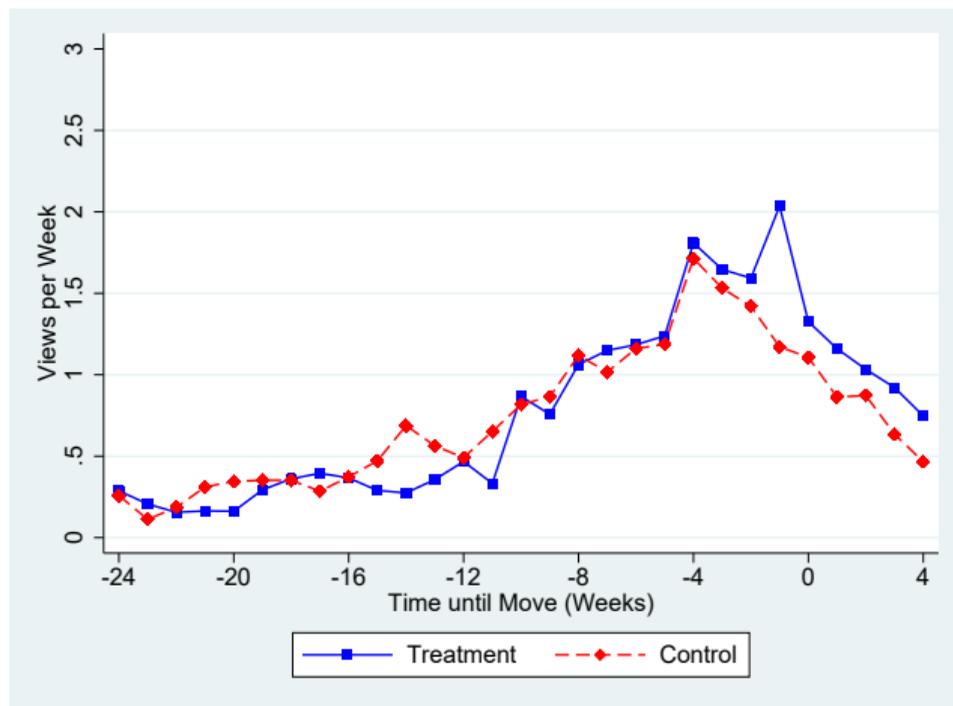
Omnibus Test P-value: 0.20

## Outline

- ① Background on HCV program
- ② Study partners
- ③ Intervention description
- ④ Descriptive results
- ⑤ RCT results
- ⑥ The model, ongoing and future work

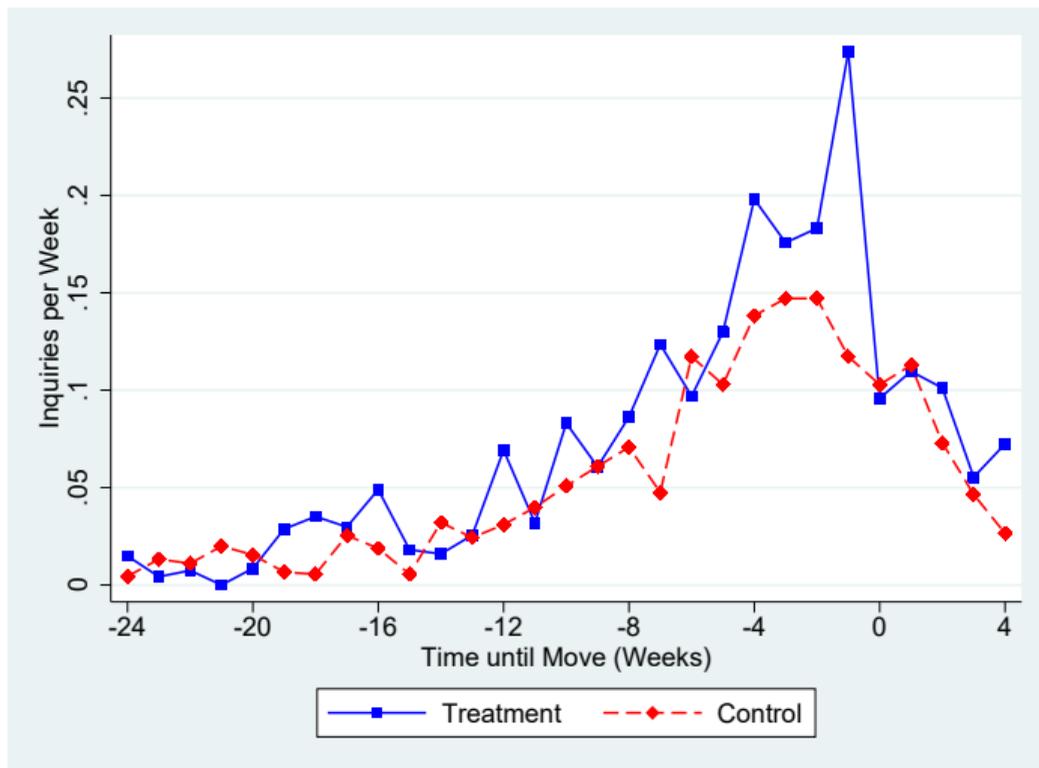
# Search Behaviors: Small/no effects on number of views

Number of Views Made Relative to Move Date

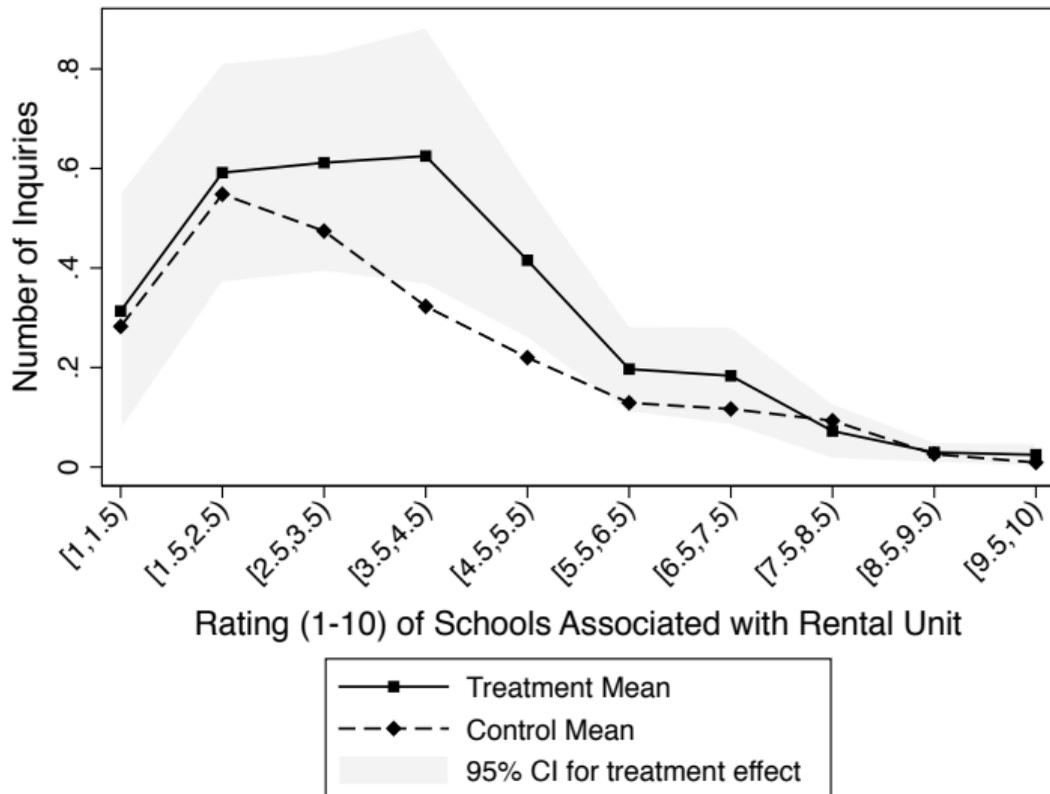


# Search behaviors: Positive impacts on number inquiries

Number of Inquires Made Relative to Move Date



# More and better inquiries if treated



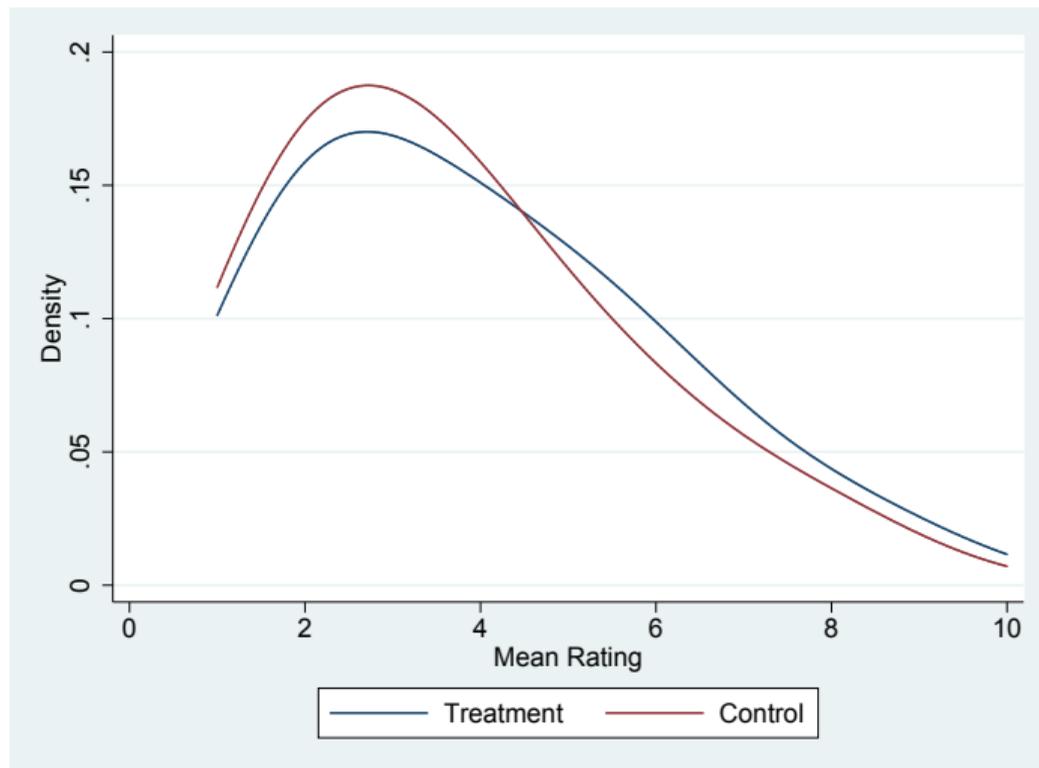
# Search and Endline School Choice

Variable	Control Mean	Treatment Effect	Std Error	P-value	N
<u>Search</u>					
Total views	33.57	1.80	4.21	0.67	1,932
Total inquiries	2.32	0.80*	0.45	0.07	1,932
<u>Schools Assigned to Where Families Live</u>					
Average School Quality	3.69	0.28***	0.09	0.00	1,918
Maximum School Quality	4.85	0.32***	0.12	0.01	1,918
Minimum School Quality	2.67	0.19**	0.09	0.03	1,918
High School Rating	3.88	0.33***	0.12	0.00	1,731
Middle School Rating	3.70	0.30***	0.12	0.01	1,845
Primary School Rating	3.56	0.23**	0.11	0.05	1,812
Mean share FRPL	0.72	-0.02**	0.01	0.05	1,866
Fraction Black or Hispanic	0.66	-0.02*	0.01	0.07	1,866

Notes: All outcome data from HUD merged to school quality data.

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

# Residential Choice: Neighborhood School Quality Density



# Households target the “next” school

Variable	Control Mean	Treatment Effect	Std Error	P-value	N
<u>Has Child 0-4</u>					
Primary School Rating	3.31	0.44**	0.20	0.03	563
Middle School Rating	3.63	0.22	0.21	0.29	565
High School Rating	3.95	0.18	0.22	0.41	538
<u>Has Child 5-10</u>					
Primary School Rating	3.72	0.07	0.26	0.78	378
Middle School Rating	3.65	0.65***	0.26	0.01	372
High School Rating	3.78	0.68***	0.25	0.01	360
<u>Has Child 11-13</u>					
Primary School Rating	3.62	-0.13	0.31	0.67	233
Middle School Rating	3.80	-0.19	0.32	0.55	242
High School Rating	3.79	0.38	0.30	0.21	228
<u>Has Child 14-18</u>					
Primary School Rating	3.54	0.26	0.25	0.28	368
Middle School Rating	3.63	0.27	0.24	0.27	385
High School Rating	4.03	0.18	0.26	0.49	346

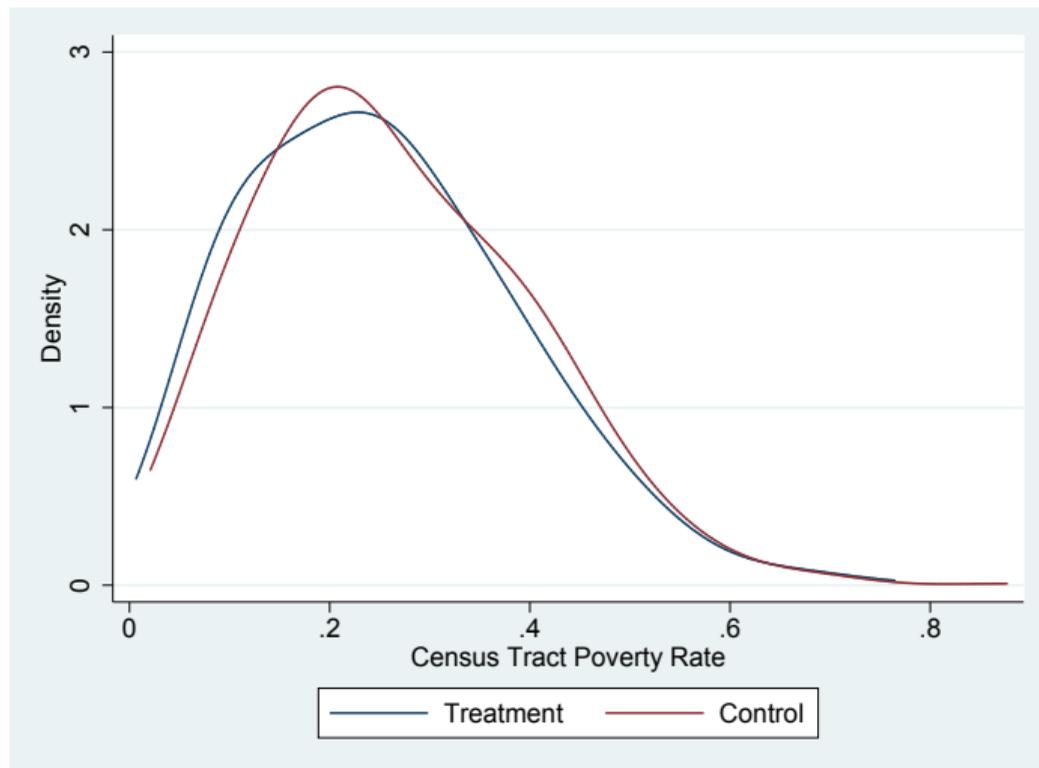
## Moving farther from downtown for better schools?

Variable	Control Mean	Treatment Effect	Std Error	P-value	N
Percent Hispanic	0.23	-0.00	0.01	0.68	1,907
Percent White	0.50	0.01	0.01	0.36	1,907
Percent Black	0.34	-0.02	0.01	0.20	1,907
Percent Asian	0.04	0.00	0.00	0.24	1,907
Percent H.S. Graduates	0.79	0.01	0.00	0.18	1,907
Percent B.A. Graduates	0.19	0.00	0.01	0.41	1,907
Percent in Poverty	0.26	-0.01*	0.01	0.08	1,907
Percent on SNAP	0.56	-0.00	0.01	0.83	1,906
Walkscore	50.02	-3.40***	1.14	0.00	1,929
Commute to dwtm	15.36	1.97***	0.70	0.00	1,913

Notes: All outcome data from HUD merged to school quality data.

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

# Residential Choice: Neighborhood Poverty-Rate Density



## No impacts on unit characteristics

Variable	Control Mean	Treatment Effect	Std Error	P-value	N
Rent	1151.08	-4.98	19.35	0.80	1,921
Bedrooms	2.47	-0.04	0.04	0.38	1,921
Beds per HH Member	0.90	0.01	0.02	0.72	1,907

Notes: All outcome data from HUD.

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

## Outline

- ① Background on HCV program
- ② Study partners
- ③ Intervention description
- ④ Descriptive results
- ⑤ RCT results
- ⑥ The model, ongoing and future work

- Structural model of residential choice
  - Dynamic search model
  - Noisy signal of school quality v. known school quality
  - Estimate preferences under treatment/known school quality
  - Show that, under uncertainty,  $\exists$  equivalent full-information model
  - Compare: if we ignore uncertainty, how much does it **appear** families value school quality?
  - Do families infer quality based on neighborhood characteristics?

## Continuing recruitment

- Continue GS school-quality treatment
- Improved interface
- More users

# Sort by school quality

The screenshot shows a web browser window displaying a real estate search results page. The browser's address bar shows the URL: `https://listing.stage.gosection8.local/Tenant/tn_Results.aspx?Address=60623&minRent=0&maxRent=5000&propertyTypeList=All%20Prope...`. The page features a navigation bar with a home icon, a search bar containing the zip code "60623", and filters for price range (\$0 to \$5,000+), property types, and bedrooms/baths. A "Sort By:" dropdown menu is open, showing options: "Last Updated", "Price: Low to High", "Price: High to Low", "Bedroom: Low to High", "Bedroom: High to Low", "Square Feet: Low to High", "Square Feet: High to Low", and "School Rating: High to Low". The "School Rating: High to Low" option is highlighted. The search results list two properties, both in Chicago, IL. The first property is at 1231 S AVERS AVE 3, CHICAGO, IL 60623, with a price of \$1,490 / Month. The second property is at 1818 S SAINT LOUIS AVE 2, CHICAGO, IL 60623. The page also includes a "Local Sponsors" section for "www.justsection8chicago.com" and a "KIA West Palm Beach" advertisement.

GoSection8.com - Section 8

Not secure | `https://listing.stage.gosection8.local/Tenant/tn_Results.aspx?Address=60623&minRent=0&maxRent=5000&propertyTypeList=All%20Prope...`

Apps Personal Tech prods Restaurant PIO Countries College wet api Vacation GoSection8 resale cert Invest Car leasing

8 Favorites Saved Searches More Account Sign Out

60623 \$0 to \$5,000+ All Property Types All Beds All Baths More Save Search

Sort By: Last Updated 1-14 of 193 Listings List Map Print Listings

FEATURED

-- Please Select --  
Last Updated  
Price: Low to High  
Price: High to Low  
Bedroom: Low to High  
Bedroom: High to Low  
Square Feet: Low to High  
Square Feet: High to Low  
School Rating: High to Low

Month  
th Apt  
Available Now

1231 S AVERS AVE 3, CHICAGO, IL 60623

LOADING... \$1,490 / Month  
4 Bed, 1 Bath Apt  
Available Now  
No Voucher Necessary  
GREAT GREYSTONE

1818 S SAINT LOUIS AVE 2, CHICAGO, IL 60623

Local Sponsors

www.justsection8chicago.com  
1-844-333-9700  
CHICAGO, IL

LET US HELP YOU FIND YOUR NEW HOME!!! CALL TODAY! VISIT OUR WEBSITE!  
1-877-530-8824 x-3333

Ads by Google

# School quality treatment

w.gosection8.com/Section-8-housing-in-Miramar-FL/3-bedroom-2-bathroom-rental-Townhouse-Villa/4748425

## 3 Bed, 2 Bath Townhouse/Villa for \$1,850.00

APPROVAL \*\*\*NO PETS \*\*\*NO SMOKING !!!

Send Mes

### Nearby Schools

Rating	Grades	School Name	Distance
3 out of 10	K - 5 Elementary School	<b>ANNABEL C. PERRY ELEMENTARY SCHOOL</b> 6850 SW 34TH ST, MIRAMAR, FL 33023 Assigned School	0.36 mi
N/A out of 10	6 - 8 Middle School	<b>HENRY D. PERRY MIDDLE SCHOOL</b> 3400 SW 69 AVENUE, MIRAMAR, FL 33023 Assigned School	0.39 mi
4 out of 10	9 - 12 High School	<b>MIRAMAR HIGH SCHOOL</b> 3601 SW 89TH AVE, MIRAMAR, FL 33025 Assigned School	2.19 mi



Send me Rental Alerts for the best schools with a rating of 5+

### Miramar

### Get Alerts

Elementary School



Middle School



High School



Data by Greatschools.org



Disney

Offer De

Resources

osection8.com/Section-8-housing-in-Chicago-IL/2-bedroom-1-bathroom-rental-Apt/4643041

## 2 Bed, 1 Bath Apt for \$850.00

### Nearby Schools

Rating	Grades	School Name	Distance
 2 out of 10	<b>K - 5</b> Elementary School	<b>ELLINGTON ELEMENTARY SCHOOL</b> 243 N PARKSIDE AVE, CHICAGO, IL 60644 <b>Assigned School</b>	0.66 mi
 2 out of 10	<b>6 - 8</b> Middle School	<b>ELLINGTON ELEMENTARY SCHOOL</b> 243 N PARKSIDE AVE, CHICAGO, IL 60644 <b>Assigned School</b>	0.66 mi
 1 out of 10	<b>9 - 12</b> High School	<b>DOUGLASS ACADEMY HIGH SCHOOL</b> 543 N WALLER AVE, CHICAGO, IL 60644 <b>Assigned School</b>	0.42 mi



Subscribed to **Rental Alerts** for **Elementary school** rated **5+**. (Text Alerts)

Subscribed 



Phone Verified

Your SMS Alerts will be sent to: (854) 708-7749

### Chicago

### Get Alerts

Elementary School



Middle School



High School



Re

# Ongoing work

Demand side

Demand side

⇒ Add Opportunity Atlas mobility measures (Chetty et al., 2018)

## Demand side

- ⇒ Add Opportunity Atlas mobility measures (Chetty et al., 2018)
- ⇒ Deposit subsidies/reduce liquidity constraints

## Demand side

- ⇒ Add Opportunity Atlas mobility measures (Chetty et al., 2018)
- ⇒ Deposit subsidies/reduce liquidity constraints
- ⇒ High cost, intensive search assistance to create moves to opportunity (Bergman, Chetty, DeLuca, Hendren, Katz, Palmer, ongoing)

## Demand side

- ⇒ Add Opportunity Atlas mobility measures (Chetty et al., 2018)
- ⇒ Deposit subsidies/reduce liquidity constraints
- ⇒ High cost, intensive search assistance to create moves to opportunity (Bergman, Chetty, DeLuca, Hendren, Katz, Palmer, ongoing)

## Supply side

## Demand side

- ⇒ Add Opportunity Atlas mobility measures (Chetty et al., 2018)
- ⇒ Deposit subsidies/reduce liquidity constraints
- ⇒ High cost, intensive search assistance to create moves to opportunity (Bergman, Chetty, DeLuca, Hendren, Katz, Palmer, ongoing)

## Supply side

- ⇒ Landlord recruitment (Here in Austin!)

# Demand for voucher housing

- Use model of households' views, inquiries/apartment visits, residence choice.
- Estimate welfare impacts, quantify information frictions.
- Key features:
  - ① Finite horizon:  $t = 1, \dots, T$ . (Must use voucher before deadline.)
  - ② In each period, choice of platform use, inquiries, whether to move.
  - ③ Simultaneous search within a period. (Timing of inquiries, apartment visits)
  - ④ No recall. (Vacancies are short-lived.)

# Markets, Households, Apartments

- Markets  $m = 1, \dots, M$ .
- Households  $i = 1, \dots, N_m$ .
- Apartments  $j \in \mathcal{J}_m$ .
- Time is discrete:  $t = 1, \dots, T < \infty$ .
- Household  $i$  becomes active at  $t = 1$ , has until  $T$  to find an apartment.
- $i$  receives payoff 0 if it fails to match by  $T$ .
- No discounting.

- 1 At beginning of period  $t$ ,  $i$  receives a cost draw

$$c_i^{search} \sim F_{c^{search}}(\cdot)$$

iid across periods.  $i$  observes cost, chooses whether to use platform.

- 2 If so,  $i$  pays  $c_i^{search}$ , draws  $J_{it}$  according to

$$\{x_{ij}, q_{ij}, \hat{q}_{ij}, \epsilon_{ij}\}_{j \in J_{it}} \sim F_{go8}(\cdot)$$

.

- 3 Regardless of search,  $i$  draws off-platform options  $J_{it}^0$  for free as

$$\{x_{ij}, q_{ij}, \hat{q}_{ij}, \epsilon_{ij}\}_{j \in J_{it}^0} \sim F_0(\cdot),$$

where  $x$  = observed characteristics,  $\hat{q}$  = perceived school quality,  $q$  = true quality,  $\epsilon$  = unobservable.

4  $i$  draws a cost shock

$$c_{it}^{accept} \sim F_{c^{accept}}(\cdot | c_{it}^{search}).$$

5  $i$  observes  $x, \hat{q}, \epsilon$  for all  $j \in J_{it} \cup J_{it}^0$ , chooses

$$J_{it}^{inquiry} \subseteq J_{it} \cup J_{it}^0,$$

makes inquiries for free.

6 Inquiries succeed with probability  $p(x_j, q_j)$ .

7  $i$  chooses whether to accept a listing with a successful inquiry (if any) or continue to the next period. If  $i$  accepts  $j$ ,  $i$  pays  $c_{it}^{accept}$  and withdraws from the market.

## Information and indirect utility

- $i$  receives  $u(x, q, \epsilon) = x\beta_x + q\beta_q + \epsilon$ , with  $\epsilon \sim N(0, 1)$ .
- Households observe noisy signal on platform:  $\hat{q} = q + \eta$ :
  - If treated,  $\hat{q} = q$ .
  - Otherwise:

$$\begin{pmatrix} q \\ q + \eta \end{pmatrix} | x \sim N \left( \begin{pmatrix} x'\gamma \\ x'\gamma \end{pmatrix}, \begin{pmatrix} \sigma_q^2 & \\ \sigma_q^2 & \sigma_q^2 + \sigma_\eta^2 \end{pmatrix} \right).$$

- Expected quality:

$$E(q|q + \eta) = s \cdot (q + \eta) + (1 - s) \cdot \mu_q,$$

$$\text{where } s \equiv \frac{\sigma_q^2}{\sigma_q^2 + \sigma_\eta^2}.$$

- Expected utility given  $i$ 's information:

$$\hat{u} = x\beta + (s\hat{q} + (1 - s)x'\gamma) \beta_q + \epsilon$$

- Off-platform: analogous, but with  $\sigma_0^\eta$ .

Off-platform search serves two purposes:

- 1 Explain users who match to voucher housing they didn't view/inquire about on platform.
- 2 Match timing of views.

- Econometrician observes  $q, x$ . Not  $\hat{q}$  or  $\epsilon$ .
- $\hat{u} = x'((1-s)\beta_q + \beta_x) + qs\beta_q + (s\beta_q\eta + \epsilon)$
- From econometrician's point of view, household's expected utility is a r.v. with

$$\hat{u}|x, q \sim N(q(s\beta_q) + x(\beta + (1-s)\beta_q\gamma), \sigma_\epsilon^2 + s^2\beta_q^2\sigma_\eta^2)$$

# Equivalent model

- Define  $\tilde{\beta}$ ,  $\tilde{c}$ ,  $\tilde{\epsilon}$  as

$$\tilde{\beta}_x = \frac{1}{\sqrt{1 + s^2 \beta_q^2 \sigma_\eta^2}} (\beta_x + (1 - s) \beta_q \gamma)$$

$$\tilde{\beta}_q = \frac{s}{\sqrt{1 + s^2 \beta_q^2 \sigma_\eta^2}} \beta_q$$

$$\tilde{c} = \frac{1}{\sqrt{1 + s^2 \beta_q^2 \sigma_\eta^2}} c$$

$$\tilde{\epsilon} = \frac{\epsilon + s \beta_q \eta}{\sqrt{1 + s^2 \beta_q^2 \sigma_\eta^2}}.$$

- Then

$$\hat{u} = (x \tilde{\beta} + q \tilde{\beta}_q + \tilde{\epsilon}) \cdot \sqrt{1 + s^2 \beta_q^2 \sigma_\eta^2}.$$

- Scale is irrelevant in discrete choice. Multiply all terms by a factor  $\frac{1}{\sqrt{1 + s^2 \beta_q^2 \sigma_\eta^2}}$ . Obtain:

$$\tilde{u} = x \tilde{\beta} + q \tilde{\beta}_q + \tilde{\epsilon}, \quad \tilde{\epsilon} \sim N(0, 1). \quad (1)$$

# Testable implications

- Previous result: for each market and error variance, there is always an equivalent model with full information about quality.
- Can estimate “equivalent model” separately by market and treatment status, obtain “As if” WTP for quality.
- Can also estimate jointly over treatment, imposing restrictions, recover  $\sigma_\eta$ .
- If  $\gamma$  is known (e.g. is “rational expectations”) can test hypothesis of Bayesian updating under maintained assumptions (parametric forms, treatment operates only via information channel) (via LRT).
- Can always find unique  $\gamma$  (“subjective prior”) to perfectly reconcile estimates from treatment and control groups.
  - Pick  $\sigma_\eta, \beta_q$  to match error variance and quality coefficient. Choose  $\gamma$  to match remaining coefficients.

- “on-platform” listings sampled from empirical distribution of  $\{J_{it}\}_{i \in I_m, t=1, \dots, T}$  by market and treatment status.
- “off-platform” listings: characteristics as on-platform, number  $\sim Poisson(\lambda)$ .
- Probability of inquiry success:

$$p(x, q) = \frac{\exp((x, q)' \alpha)}{1 + \exp((x, q)' \alpha)}.$$

- Independent lognormal cost distributions

$$\begin{pmatrix} \log c_{view} \\ \log c_{accept} \end{pmatrix} \sim N \left( \begin{pmatrix} \mu_{view} \\ \mu_{accept} \end{pmatrix}, \begin{pmatrix} \sigma_{view}^2 & \\ 0 & \sigma_{accept}^2 \end{pmatrix} \right).$$

Can relax independence assumption.

# Moments and parameters

“Offline” parameters:

- $\gamma, \sigma_q$

Parameters to estimate:

- $\alpha, \beta_x, \beta_q, \mu_c, \sigma_c^2, \lambda, \sigma_\eta^2, \sigma_{\eta_0}^2$ .

Estimation via MSM. Match following moments:

- 1 P(search) in period  $t$ ,  $t = 1, \dots, T$ .
- 2 Number of inquiries in  $t$ ,  $t = 1, \dots, T$ .
- 3 Number of inquiries in  $t$  with quality above  $\bar{q}$ ,  $t = 1, \dots, T$ ,  $\bar{q} \in [2, 4, 6]$ .
- 4 1(match to any HUD)
- 5 1(match to on-platform listing)
- 6 mean inquiry characteristics.
- 7 mean match characteristics.
- 8 mean characteristics of on-platform matches.

# Users' neighborhoods roughly similar to HUD population

## Census Tract Characteristics

### HUD 5% Sample vs. Study Sample

	HUD 5%	Study Sample
Share White	0.57	0.49
Share Black	0.27	0.34
Share Asian	0.05	0.05
Share Hispanic	0.23	0.24
High School +	0.80	0.79
Bachelors +	0.20	0.19
Poverty	0.25	0.25
Food Stamps	0.55	0.57
Observations	85,301	1,932

[return](#)