# Social Interactions and Preferences for Schools: Experimental Evidence from Los Angeles

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# Motivation

- Parents' choices govern the success of school choice initiatives

  → Evidence is mixed about parents' valuation of school effectiveness
  (Rothstein 2006, Abdulkadiroglu et al. 2020, Beurmann et al. 2021, Campos and Kearns 2022)

# Motivation

- Parents' choices govern the success of school choice initiatives

- Imperfect information makes it challenging to infer preferences from observed choices

  - $\rightarrow$ Some families are informed while others are not
    ( Hastings and Weinstein 2008, Andrabi et al. 2017, Corcoran et al. 2018, Ainsworth et al. 2022)

  - $\rightarrow$ Heuristics may distort choices
    ( Rothstein 2006, Abdulkadiroglu et al. 2020)

  - $\rightarrow$ **Open Question:** What do parents value?

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- Parents' choices govern the success of school choice initiatives

- Imperfect information makes it challenging to infer preferences from observed choices

- We know very little about what families actually know
  - $\rightarrow$ Are they aware of school and peer quality?

  - $\rightarrow$ Are their beliefs biased?

  - $\rightarrow$ **Open Question:** What do parents know?

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- We know even less about factors mediating choices and their implications

  → Social interactions and networks potentially mediate school quality gaps

  → Group differences in information diffusion can contribute to observed heterogeneity in preferences (Hastings et al. 2006, Breza 2019, DiMaggio and Garip 2011)

  → Social learning is important to consider in value-added-oriented campaigns

  → **Open Question:** Do social interactions matter in the school choice process?

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- **This paper:** Jointly study the role of information, preferences, and social interactions in education markets and provide evidence on open questions

# This paper

- Questions/objectives:
  1. Are parents' beliefs about school and peer quality systematically biased?
  2. What do parents value when informed about *both* peer and school quality?
  3. Do social interactions matter in the school choice process?
  4. What do information interventions really identify? Salience vs. information updating

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- Setting: Los Angeles Zones of Choice (ZOC) markets
  - $\rightarrow$ 53 middle schools feed into 16 separate high school markets
  - $\rightarrow$ Families all participate in application cycle and submit rank-ordered lists
  - $\rightarrow$ Intervention occurs during pre-established application cycle

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- Setting: Los Angeles Zones of Choice (ZOC) markets

- Design: Information provision experiment with a few additional features

  $\rightarrow$ Elicit beliefs about peer and school quality at baseline

  $\rightarrow$ Distribute information about peer quality and school quality

  $\rightarrow$ Spillover design allows us to infer the empirical relevance of social interactions

▶ Related Literature

# Preview of Results

**Evidence on Biases**

1. Parents underestimate school quality (pessimistic) and overestimate peer quality (optimistic)

2. Substantial variation in school and peer quality bias

**Changes in Demand**

3. Families systematically shift their choices toward school quality

4. Decomposition: Salience impacts account for most of the changes in choices

**Social Interactions and Implications**

5. Indirectly treated families react in the same way as treated families (evidence of social interactions shaping demand)

6. Treatment effects (direct and spillover) depend on critical mass of parents receiving information

# Related Literature

1. **Parents' Preferences**
   *Rothstein 2006, Harris 2015, Burgess et al. 2015, Abdulkadiroglu et al. 2020, Ainsworth et al. 2022, Beuermann et al. 2022*
   Contribution:  Use information provision to isolate *changes* in relative preferences

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2. **Information (or lacktherof) in education markets**
   *Hastings and Weinstein 2008, Andrabi et al. 2017, Allende et al. 2019, Corcoran et al. 2018, Haaland et al. 2021, Arteaga et al. 2022, Cohodes et al. 2022*
   Contributions:
   - → Collect information about beliefs and randomize *two* measures of quality
   - → Decompose treatment effects into salience and information updating channels

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3. **Social interactions**
   *Allende 2019, Becker 1974, Banerjee 1992, Bertrand et al. 2000, Manski 2000, Brock and Durlauf 2002, Durlauf 2004, Brock and Durlauf 2007, Ioonnides and Loury 2004, Breza and Chandrasekhar 2019, Golub et al. 2020, Banerjee et al. 2021*
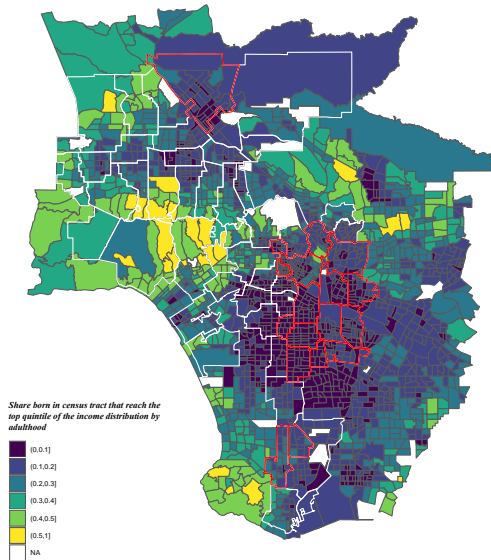   Contribution: Empirical relevance of externality occurring at the preference formation stage

# Roadmap

1. Setting and Experiment Design

2. Reduced Form Evidence

3. Survey Evidence: AG and IA Bias

4. Utility Weight Impacts

   $\rightarrow$ Simple school choice model with beliefs

   $\rightarrow$ Decomposition of utility weight impacts

5. Implications

# Setting: Zones of Choice

- ZOC is a neighborhood-based public school choice program

- Sixteen mutually exclusive high school markets within Los Angeles

  - $\rightarrow$ Catchment areas combined to create neighborhood-based markets

  - $\rightarrow$ Segregated in terms of race/ethnicity and SES

  - $\rightarrow$ ZOC led to decreases in educational inequality (Campos and Kearns 2022)

- Middle schools feed into different markets

  - $\rightarrow$ Students enrolled in a feeder middle school apply to a particular ZOC market

  - $\rightarrow$ Most families and students first learn about the program in eighth grade

  - $\rightarrow$ Useful stage to intervene with information before families submit applications

- Applications contain a rank-ordered list and assignments are centralized

Share born in census tract that reach the top quintile of the income distribution by adulthood

- (0,0.1]
- (0.1,0.2]
- (0.2,0.3]
- (0.3,0.4]
- (0.4,0.5]
- (0.5,1]
- NA

ZOC neighborhoods are mostly low mobility as measured by Chetty et al. (2018)

# Design: Timeline

1. Baseline Survey: Early September

   $\rightarrow$ Distributed in the classroom and via text message

   $\rightarrow$ Include a video that teaches families about the differences between school and peer quality

   $\rightarrow$ Baseline beliefs

   $\rightarrow$ Baseline preferences

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2. Information provision: Late September

   $\rightarrow$ Cross-randomize school *and* peer quality

   $\rightarrow$ Spillover design (e.g., Crepon et al. 2013, Andrabi et al. 2020)

   $\rightarrow$ Treatment-specific videos that help families understand the information

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3. Applications cycle: October-November

# School and Peer Quality Definition

$$Y_{ij} = \mu_j + a_i$$

- $\mu_j$ is school $j$ mean potential outcome

- $a_i$ is mean-zero student ability

**Estimation and Validation:**

$$Y_i = \mu_0 + \sum_j \beta_j D_{ij} + \gamma' X_i + u_i$$

- $D_{ij}$ are school $j$ enrollment indicators

- $a_i = \gamma' X_i + u_i$ with $X_i$ containing baseline covariates and lagged test scores

- Model parameters estimated via OLS; use lotteries to validate OLS estimates ▸ Evidence

# School and Peer Quality Definition

**Peer and School Quality Definition:**

$$\bar{Y}_j = \underbrace{\mu_j}_{School\ Quality\ Component} + \underbrace{\theta' \bar{X}_j}_{Peer\ Quality\ Component} \tag{1}$$

- School Quality is referred to as **Achievement Growth** and is defined as

$$Q_j^S = \text{int}\left( \frac{\text{rank}(\hat{\mu}_j)}{J} \times 100 \right)$$

- Peer Quality is referred to as **Incoming Achievement** and is defined as

$$Q_j^P = \text{int}\left( \frac{\text{rank}(\hat{\theta}' \bar{X}_j)}{J} \times 100 \right)$$

- Peer and school quality are positively correlated ▸ Evidence

# Baseline Survey

**Goals of the survey:**

- Collect information about families' beliefs about Incoming Achievement (IA) and Achievement Growth (AG)

- Obtain a baseline preference ordering

- Ask families' about their opinions for different school attributes

**Challenges:**

- How do you elicit beliefs?

- Explaining the difference between test score value-added and test score levels is challenging

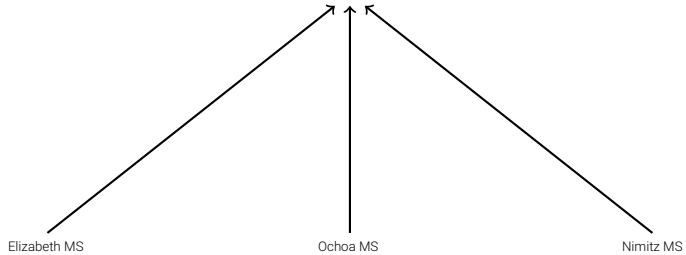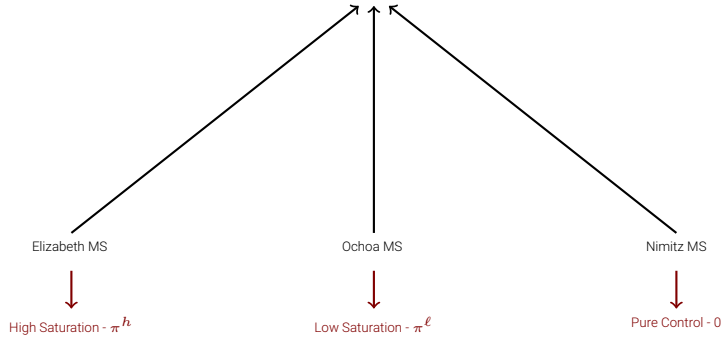# Companion Video

Watch Video
English
Spanish

# Experiment Design

**Goals:**

1. Identify parents' relative valuation for peer and school quality

   $\rightarrow$ Cross-randomize peer and school quality

2. Identify social interactions

   $\rightarrow$ Two-stage randomization

   $\rightarrow$ Effects on untreated parents in treated schools identify social interactions

# Bell Zone of Choice

Elizabeth MS       Ochoa MS       Nimitz MS

# Bell Zone of Choice

Elizabeth MS

Ochoa MS

Nimitz MS

High Saturation - $\pi^h$

Low Saturation - $\pi^\ell$

Pure Control - 0
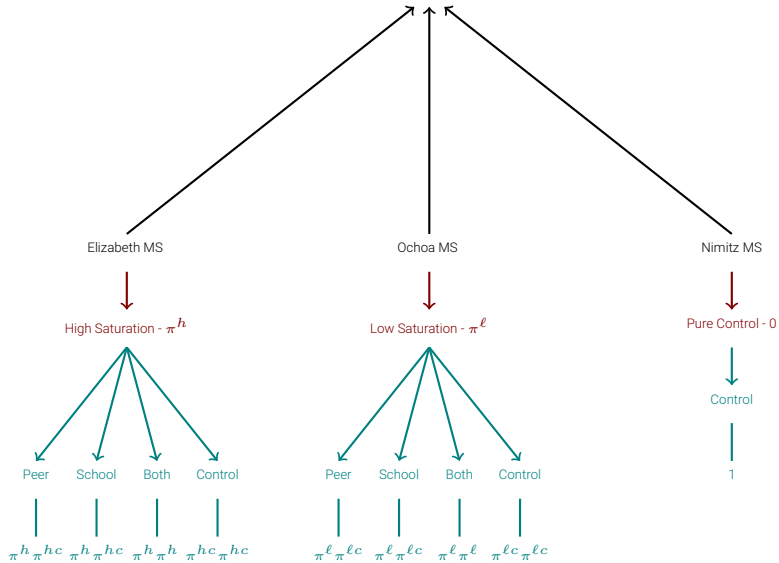
# Treatment Letters in English and Spanish

We are providing information about schools within your Zone of Choice to ensure you have the best information available prior to your upcoming decision.

## Bell Zone of Choice

### We determine the quality of a school based on students' average scores on state exams

This measure has two parts you should consider, one which measures the school's ability of attracting high scoring students, and the second is the school's impact on test score growth.

Therefore, a school's observed quality is a combination of both their students' **incoming achievement** and the **achievement growth** they obtain while at the school. Some parents may prefer schools with high incoming achievement, and others may prefer schools with high achievement growth. The table below provides each school's district-wide ranking.

We hope you use this information when choosing the right school for your student.

### Incoming Achievement

Incoming achievement is the average test scores of school's incoming students at the time they enter school.

### Achievement Growth

We measure a school's ability improve test scores by measuring the growth of their students' test scores between entry into the school and eleventh grade.

| School | Incoming Achievement* | Achievement Growth* | Campus Location | Type of School |
|---|---|---|---|---|
| Science, Technology, Engineering, Arts & Math (STEAM) High School | 76 | 94 | Legacy HS | Small School |
| Visual & Performing Arts (VAPA) High School | 74 | 67 | Legacy HS | Small School |
| Health Academy | 58 | 58 | Elizabeth LC | Small Learning Community |
| Multilingual Teacher Academy | 63 | 50 | Bell HS | Linked Learning Academy |
| STEAM | 47 | 82 | Maywood Academy | Small Learning Community |
| Information Technology Academy | 49 | 53 | Elizabeth LC | Small Learning Community |
| Arts Language & Performance Humanities Academy | 63 | 50 | Bell HS | Linked Learning Academy |
| 9thGrade Academy | 47 | 82 | Maywood Academy | Small Learning Community |
| Bell Global Studies | 63 | 50 | Bell HS | Small Learning Community |

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Estamos proporcionando información sobre las escuelas dentro de su Zona de Opción, para asegurarnos de que tenga la mejor información disponible antes de su próxima decisión.

## Zona de Opción Bell

### Determinamos la calidad de una escuela en función de los puntajes promedio de los estudiantes en los exámenes estatales

Esta medida tiene dos partes que debe considerar, una que mide la capacidad de la escuela para atraer a estudiantes con altas calificaciones, y la segunda es el impacto de la escuela en el crecimiento de las calificaciones de las pruebas.

Por lo tanto, la calidad observada de una escuela es una combinación tanto del **rendimiento entrante** de sus estudiantes como del **crecimiento de logros** o **crecimiento del rendimiento** que obtienen mientras están en la escuela. Algunos padres pueden preferir escuelas con alto rendimiento entrante, y otros pueden preferir escuelas con alto crecimiento de logros. A continuación, proporcionamos la clasificación de cada escuela comparada a todas escuelas en el distrito.

Esperamos que utilice esta información al elegir la escuela adecuada para su estudiante.

### Rendimiento Entrante

El rendimiento entrante de una escuela es el puntaje promedio de los estudiantes que ingresan a la escuela.

### Crecimiento de logros

Medimos la capacidad de una escuela para mejorar los puntajes de los exámenes midiendo el crecimiento de los puntajes de los exámenes de los estudiantes entre el ingreso a la escuela y el onceavo grado.

| Escuela | Rendimiento Entrante* | Crecimiento de logros* | Ubicación del campus | Tipo de escuela |
|---|---|---|---|---|
| Preparatoria de Ciencia, Tecnología, Ingeniería, Artes y Matemáticas (STEAM) | 76 | 94 | Legacy HS | Escuela Pequeña |
| Preparatoria de Artes Visuales y Técnicas (VAPA) | 74 | 67 | Legacy HS | Escuela Pequeña |
| Academia de Salud | 58 | 58 | Elizabeth LC | Comunidad Educativa Pequeña (SLC) |
| Academia de Aprendizaje Enlazado/ Carrera de Profesores Multilingües | 63 | 50 | Bell HS | Academia de Aprendizaje Enlazado |
| Academia de Ciencia, Tecnología, Ingeniería, Artes y Matemáticas (STEAM) | 47 | 82 | Maywood Academy | Comunidad Educativa Pequeña (SLC) |
| Academia de Información Tecnológica | 49 | 53 | Elizabeth LC | Comunidad Educativa Pequeña (SLC) |
| Academia de Artes, Idiomas, Artes Escénicas y Humanidades | 63 | 50 | Bell HS | Academia de Aprendizaje Enlazado |
| Academia del 9° Grado | 47 | 82 | Maywood Academy | Comunidad Educativa Pequeña (SLC) |
| Estudios Globales | 63 | 50 | Bell HS | Comunidad Educativa Pequeña (SLC) |

# Data

- LAUSD administrative student data 2015-2021

  - $\rightarrow$ Demographics

  - $\rightarrow$ Test scores

  - $\rightarrow$ Addresses

- Zones of Choice data 2015-2021
  - $\rightarrow$ Applications containing rank-ordered lists

  - $\rightarrow$ Centralized assignments

# Descriptive Statistics

| | Non-ZOC | ZOC | Difference |
|---|---|---|---|
| | (1) | (2) | (3) |
| Reading Scores | 0.135 | -0.117 | -0.252 |
| | | | (0.081) |
| Math Scores | 0.099 | -0.114 | -0.213 |
| | | | (0.081) |
| College | 0.1 | 0.065 | -0.036 |
| | | | (0.017) |
| Migrant | 0.036 | 0.054 | 0.018 |
| | | | (0.007) |
| Female | 0.513 | 0.481 | -0.032 |
| | | | (0.016) |
| Poverty | 0.909 | 0.967 | 0.058 |
| | | | (0.024) |
| Special Education | 0.148 | 0.141 | -0.007 |
| | | | (0.022) |
| English Learners | 0.076 | 0.134 | 0.058 |
| | | | (0.017) |
| Black | 0.107 | 0.03 | -0.077 |
| | | | (0.027) |
| Hispanic | 0.683 | 0.862 | 0.179 |
| | | | (0.075) |
| White | 0.038 | 0.015 | -0.024 |
| | | | (0.009) |
| N | 26,517 | 13,015 | |

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# School-level Balance

| | Control (1) | Low - Control (2) | High - Control (3) |
|---|---|---|---|
| ELA | -.116 | .021 | .028 |
| | | (.102) | (.103) |
| Math | -.109 | -.005 | .029 |
| | | (.1) | (.116) |
| College | .081 | .006 | -.005 |
| | | (.022) | (.024) |
| Migrants | .063 | -.009 | -.005 |
| | | (.008) | (.008) |
| Female | .486 | 0 | .015 |
| | | (.014) | (.01) |
| Poverty | .947 | .011 | .005 |
| | | (.026) | (.027) |
| Special Education | .126 | .016 | .008 |
| | | (.011) | (.009) |
| English Learner | .121 | .005 | .022 |
| | | (.015) | (.02) |
| Black | .04 | -.009 | -.011 |
| | | (.015) | (.014) |
| Hispanic | .846 | .008 | -.014 |
| | | (.037) | (.024) |
| White | .017 | 0 | -.002 |
| | | (.007) | (.008) |
| Size of Cohort | 239.639 | 16.212 | 18.399 |
| | | (44.856) | (42.92) |
| Number of Schools | 20 | 16 | 16 |
| Number Treated | 0 | 2633 | 3780 |

# Student-level Balance (within treated schools)

| | Control (1) | Peer - Control (2) | School - Control (3) | Both - Control (4) | P-value (5) |
|---|---|---|---|---|---|
| ELA Scores | -.101 | .016 (.039) | -.05 (.021) | 0 (.038) | .144 |
| Math Scores | -.114 | .027 (.031) | -.004 (.024) | -.025 (.037) | .794 |
| Parents College | .065 | .002 (.011) | -.005 (.008) | 0 (.014) | .856 |
| Migrant | .047 | .01 (.007) | 0 (.008) | .004 (.01) | .156 |
| Female | .477 | .001 (.017) | .003 (.018) | -.002 (.025) | .998 |
| Poverty | .968 | .006 (.004) | .003 (.006) | -.01 (.006) | .263 |
| Special Education | .135 | .007 (.011) | .018 (.01) | -.012 (.013) | .35 |
| English Learners | .128 | .007 (.01) | .009 (.009) | .001 (.013) | .5 |
| Black | .024 | .006 (.005) | .002 (.005) | -.007 (.007) | .646 |
| Hispanic | .864 | -.012 (.009) | .007 (.011) | .003 (.014) | .121 |
| White | .014 | .001 (.004) | .001 (.004) | -.002 (.005) | .949 |
| Joint Test P-value | | .757 | .607 | .905 | |
| N | 1836 | 1906 | 1906 | 2641 | |

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# Reduced Form Approach

$$Y_i = \alpha_{zb} + \underbrace{\beta_{Ph} T_i^P \times D_{s(i)}^h + \beta_{Sh} T_i^S \times D_{s(i)}^h + \beta_{Bh} T_i^B \times D_{s(i)}^h}_{High\ Saturation\ Effects}$$

$$+ \underbrace{\beta_{P\ell} T_i^P \times D_{s(i)}^\ell + \beta_{S\ell} T_i^S \times D_{s(i)}^\ell + \beta_{B\ell} T_i^B \times D_{s(i)}^\ell}_{Low\ Saturation\ Effects}$$

$$+ \underbrace{\beta_h C_i \times D_{s(i)}^h + \beta_\ell C_i \times D_{s(i)}^\ell}_{Spillover\ Effects} + u_i$$

- $T_i^x$ : Student-level treatment $x$ indicator

- $D_{s(i)}^\ell$ : Saturation $\ell$ specific school-level treatment indicator

- $C_i$: Student-level untreated indicator

# Reduced Form Approach

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- $T_i^x$ : Student-level treatment $x$ indicator

- $D_{s(i)}^\ell$ : Saturation $\ell$ specific school-level treatment indicator

- $C_i$: Student-level untreated indicator

# Reduced Form Approach

$$Y_i = \alpha_{zb} + \underbrace{\beta_{Ph}T_i^P \times D_{s(i)}^h + \beta_{Sh}T_i^S \times D_{s(i)}^h + \beta_{Bh}T_i^B \times D_{s(i)}^h}_{High\ Saturation\ Effects}$$

$$+ \underbrace{\beta_{P\ell}T_i^P \times D_{s(i)}^\ell + \beta_{S\ell}T_i^S \times D_{s(i)}^\ell + \beta_{B\ell}T_i^B \times D_{s(i)}^\ell}_{Low\ Saturation\ Effects}$$

$$+ \underbrace{\beta_h C_i \times D_{s(i)}^h + \beta_\ell C_i \times D_{s(i)}^\ell}_{Spillover\ Effects} + u_i$$

- $T_i^x$ : Student-level treatment $x$ indicator

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# Reduced Form Approach

$$Y_i = \alpha_{z(i)t(i)} + \alpha_{g(i)} + \sum_{k \neq -1} \left( \beta_{Lk} D_{L(i)} \times Post_{k(i)} + \beta_{Hk} D_{H(i)} \times Post_{k(i)} \right) + u_i$$

**For today (school-level experiment):**

- $\beta_{Px} = \beta_{Sx} = \beta_{Bx} = \beta_x = \beta_x$ for $x \in \{h, \ell\}$

- Will report saturation-specific effects; school-level experiment

- Difference-in-difference analog improves precision and provides placebo checks

# Reduced Form Approach

$$1\{Y_i \leq a\} = \alpha_{zb} + \beta_P T_i^P + \beta_S T_i^S + \beta_B + T_i^B + \beta_{Spill} C_i + u_i; \quad \text{for } a = 1, \cdots, 100$$

**For today (detecting direct spillovers):**

- $\beta_{Ph} = \beta_{P\ell} = \beta_P, \beta_{Sh} = \beta_{S\ell} = \beta_S, \beta_{Bh} = \beta_{B\ell} = \beta_B, \beta_h = \beta_\ell = \beta_{Spill}$
- Will report information-specific effects; individual-level treatments
- Distributional estimates demonstrate how demand moved uniformly, regardless of treatment status

# Increased demand for AG; depends on saturation status
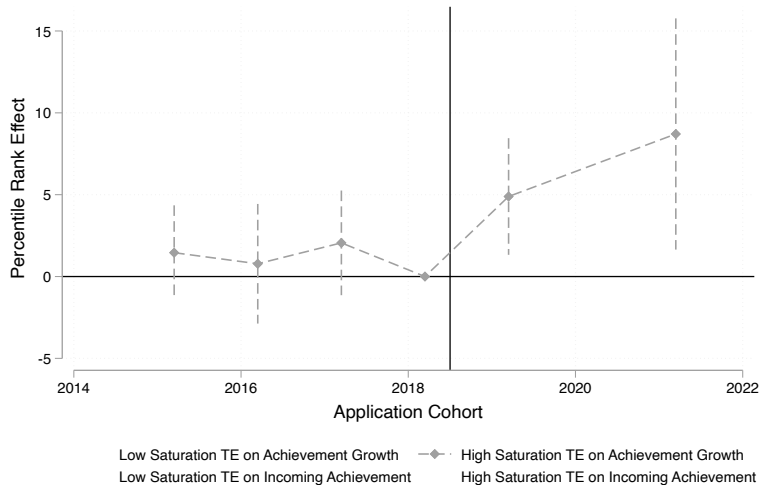


Low Saturation TE on Achievement Growth     High Saturation TE on Achievement Growth

Low Saturation TE on Incoming Achievement     High Saturation TE on Incoming Achievement

# Increased demand for AG; depends on saturation status
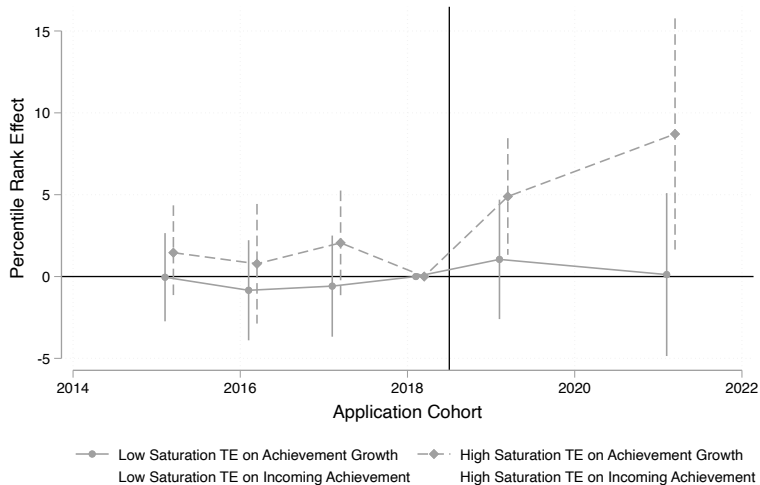
# Increased demand for AG ; depends on saturation status
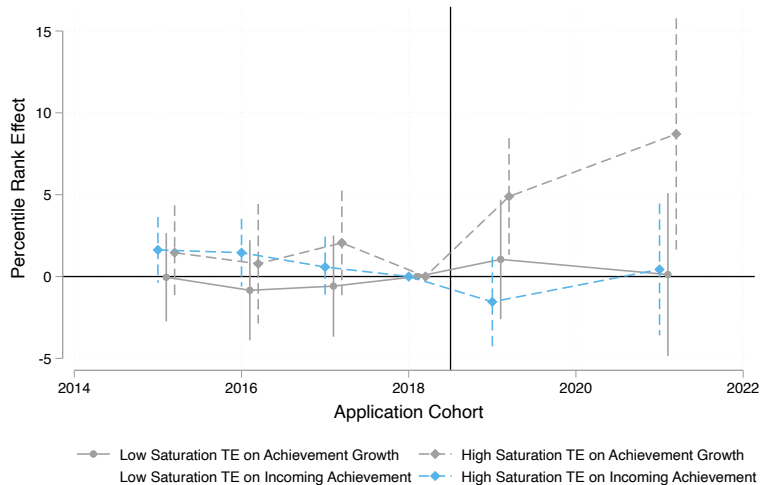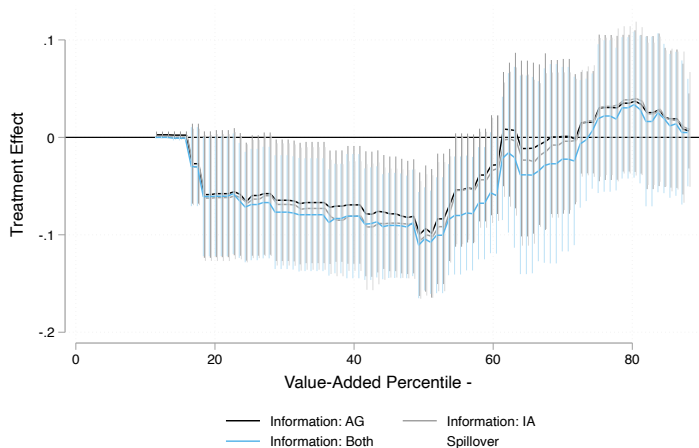
# Increased demand for AG ; depends on saturation status

# Large spillover effects; increased demand for higher AG schools

# Large spillover effects; increased demand for higher AG schools

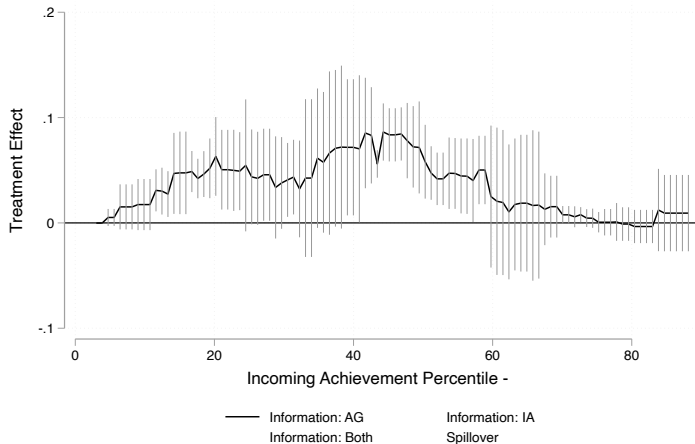# Large spillover effects; increased demand for higher AG schools

# Large spillover effects; increased demand for higher AG schools

# Large spillover effects; decreased demand for IA



Figure axes: Treatment Effect (y-axis, from -.1 to .2) vs Incoming Achievement Percentile - (x-axis, 0 to 80)

Legend:
— Information: AG
Information: Both
Information: IA
Spillover

▶ IA and AG Support   ▶ Results at other ROL ranks   ▶ Impacts on Other Attributes   ▶ Other Specifications

# Large spillover effects; decreased demand for IA



**X-axis:** Incoming Achievement Percentile -
**Y-axis:** Treatment Effect

Legend:
— Information: AG    Information: IA
Information: Both    Spillover

▶ IA and AG Support    ▶ Results at other ROL ranks    ▶ Impacts on Other Attributes    ▶ Other Specifications

# Large spillover effects; decreased demand for IA



Information: AG
Information: Both
Information: IA
Spillover

▶ IA and AG Support      ▶ Results at other ROL ranks      ▶ Impacts on Other Attributes      ▶ Other Specifications

# Large spillover effects; decreased demand for IA

# Survey Evidence

- Survey evidence for the 2021 cohort

- Response rate is roughly 50 percent

**Today:**

- First evidence on joint distribution of school and peer quality beliefs

- Predictors and correlates of biases
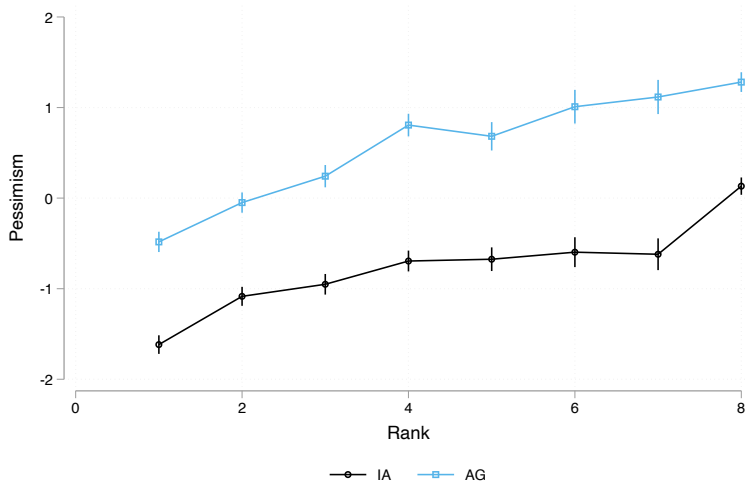
- Bias in terms of pessimism:

$$b_{ji}^x \equiv Q_j^x - \tilde{Q}_{ji}^x \quad x \in \{IA, AG\}$$

with $Q_j^x$ referring to researcher-generated quality and $\tilde{Q}_{ji}^x$ referring to beliefs
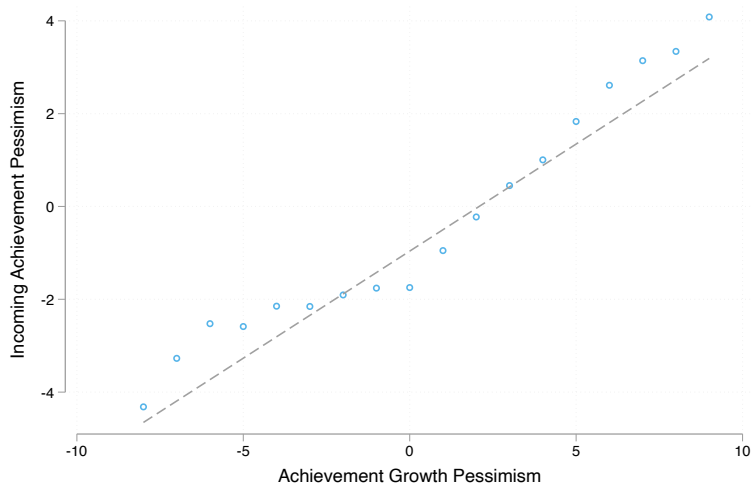
# IA and AG Pessimism Distribution
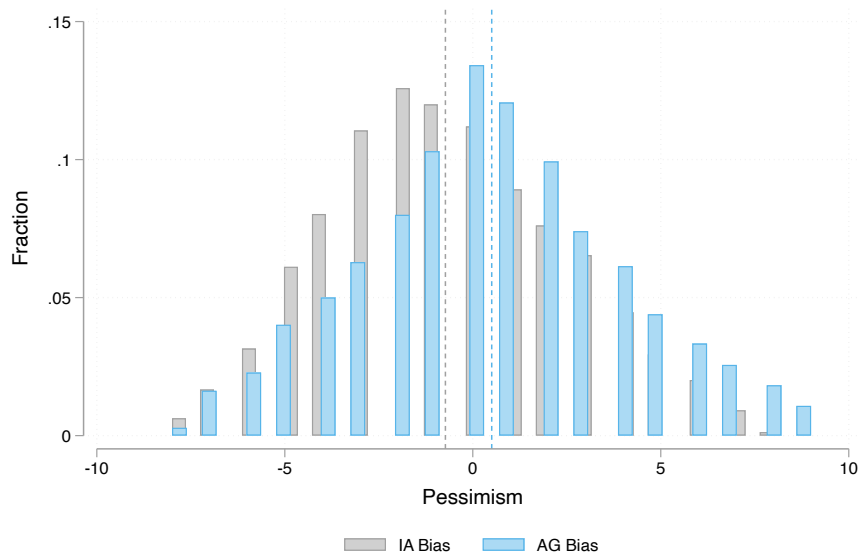
# Bias by Rank

# Bias is positively correlated ($\rho \approx 0.45$)

# Pessimism Correlates

| | IA Pessimism | | AG Pessimism | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | Bivariate | Multivariate | Bivariate | Multivariate |
| Parents College + | 1.085 *** | 0.627 *** | -0.009 | 0.126 |
| | (0.179) | (0.197) | (0.197) | (0.220) |
| Hispanic | -0.883 *** | -0.243 | 0.844 *** | 1.045 *** |
| | (0.178) | (0.196) | (0.258) | (0.288) |
| English Learner | -0.365 ** | -0.146 | -0.064 | -0.247 |
| | (0.152) | (0.167) | (0.189) | (0.210) |
| Special Education | 0.202 | 0.354 * | 0.202 | 0.211 |
| | (0.157) | (0.171) | (0.182) | (0.201) |
| Black | 0.723 ** | 0.499 | -0.882 ** | 0.288 |
| | (0.323) | (0.359) | (0.437) | (0.490) |
| White | 0.924 ** | 0.279 | -0.024 | 0.781 |
| | (0.410) | (0.449) | (0.525) | (0.584) |
| Female | -0.091 | -0.141 | -0.094 | -0.091 |
| | (0.107) | (0.118) | (0.114) | (0.127) |
| Poverty | -1.708 *** | -1.572 *** | 0.086 | -0.154 |
| | (0.171) | (0.190) | (0.197) | (0.220) |
| Math Z-Score | 0.161 *** | -0.043 | -0.040 | -0.043 |
| | (0.060) | (0.066) | (0.098) | (0.110) |
| Reading Z-Score | 0.194 *** | 0.158 | -0.026 | 0.010 |
| | (0.061) | (0.067) | (0.102) | (0.114) |
| Migrant | -1.265 | -1.019 | -1.484 | -1.533 |
| | (1.026) | (1.123) | (1.006) | (1.118) |
| Mean | -1.63 | | -0.52 | |
| SD | 3.07 | | 3.36 | |

# Pessimism Correlates

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# Taking Stock of Results

**Survey Evidence Reveals:**

- Families are pessimistic about achievement growth and optimistic about incoming achievement

- Few observables predict AG bias, more so for IA bias

**Reduced Form Evidence:**

- School-level experiment: families systematically choose higher VA schools but TEs depend on saturation

- Social Interactions: untreated families in treated schools respond similarly to treated families; type of information does not matter as all prefer higher VA schools

- Reduced-form evidence does not leverage all information on ROL and reports TEs on correlated attributes

**Next steps:**

- Modest structure allows us to leverage all information and decompose TEs

# School Choice Model

Family $i$'s perceived indirect utility of enrolling in school $j$ is

$$U_{ij} = \delta_j - \lambda d_{ij} + \varepsilon_{ij}$$
$$\delta_j = \gamma_P \tilde{Q}_{ji}^P + \gamma_S \tilde{Q}_{ji}^S$$

- $\delta_j$ : mean utility at school $j$

- $\tilde{Q}_{ji}^P$, $\tilde{Q}_{ji}^S$: peer and school quality *beliefs*, respectively

- $d_{ij}$: distant to school $j$ for family $i$

- $\varepsilon_{ij}$ : unobserved preference heterogeneity

# Quality and beliefs

Families have beliefs about *true* $Q_j^P$ and $Q_j^S$

$$\tilde{Q}_{ji}^P = (1 + b_{Pi})Q_j^p \qquad \tilde{Q}_{ji}^S = (1 + b_{Si})Q_j^S$$

Quality and biases are jointly normal

$$\begin{pmatrix} Q_j^P \\ Q_j^S \end{pmatrix} \sim \mathcal{N}\left( \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_P^2 & \rho_Q\sigma_P\sigma_S \\ \rho_Q\sigma_P\sigma_S & \sigma_S^2 \end{pmatrix} \right)$$

$$\begin{pmatrix} b_{Pi} \\ b_{Si} \end{pmatrix} \sim \mathcal{N}\left( \begin{pmatrix} \mu_P \\ \mu_S \end{pmatrix}, \begin{pmatrix} \sigma_{Pb}^2 & \rho_b\sigma_{Pb}\sigma_{Sb} \\ \rho_b\sigma_{Pb}\sigma_{Sb} & \sigma_{Sb}^2 \end{pmatrix} \right)$$

# Modeling treatment

Information treatments potentially cause families to change the weights they assign to school and peer quality:

$$U_{ij} = \gamma_P \tilde{Q}_{ji}^P + \gamma_S \tilde{Q}_{ji}^S + \beta_P Q_j^P \times 1\{i \in \mathcal{I}_P\} + \beta_S Q_j^S \times 1\{i \in \mathcal{I}_S\} - \lambda d_{ij} + \varepsilon_{ij}$$

- $1\{i \in \mathcal{I}_P\}$: indicator for receiving peer quality treatment

- $1\{i \in \mathcal{I}_S\}$: indicator for receiving school quality treatment

- $\beta_P$ and $\beta_S$ are changes in utility weights

- $\frac{\beta_P}{\lambda}$ and $\frac{\beta_S}{\lambda}$ are changes in WTT

# What is identified?

Denote $\Delta^X$ as the difference in expected utility between those receiving treatment $X$ and those not receiving any treatment, so that:

$$\Delta^P = (\beta_P - \mu_P \gamma_P)Q_j^P - \rho_B \frac{\sigma_{Sb}}{\sigma_{Pb}}\mu_S \gamma_S Q_j^S$$

$$\Delta^S = (\beta_S - \mu_S \gamma_S)Q_j^S - \rho_B \frac{\sigma_{Pb}}{\sigma_{Sb}}\mu_P \gamma_P Q_j^P$$

$$\Delta^B = (\beta_S - \mu_S \gamma_S)Q_j^S + (\beta_P - \mu_P \gamma_P)Q_j^P$$

Given the structural assumptions, we have that single-information treatment effects are:

$$E[\Delta^P | Q_j^P] = (\underbrace{\underbrace{\beta_P}_{Salience\ or\ Preference} - \underbrace{\mu_P \gamma_P}_{Information\ Updating} - \underbrace{\rho_B \frac{\sigma_{Sb}}{\sigma_{Pb}}\mu_S \rho_Q \frac{\sigma_S}{\sigma_P}\gamma_S}_{Correlated\ Beliefs}}_{\hat{\beta}_P})Q_j^P \qquad (2)$$

# What is identified?

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$$\Delta^S = (\beta_S - \mu_S \gamma_S) Q_j^S - \rho_B \frac{\sigma_{Pb}}{\sigma_{Sb}} \mu_P \gamma_P Q_j^P$$

$$\Delta^B = (\beta_S - \mu_S \gamma_S) Q_j^S + (\beta_P - \mu_P \gamma_P) Q_j^P$$

Given the structural assumptions, treatment effects when receiving both treatments are:

$$E[\Delta^B | Q_j^B] = \underbrace{(\beta_S - \mu_S \gamma_S)}_{\hat{\beta}_S} Q_j^S + \underbrace{(\beta_P - \mu_P \gamma_P)}_{\hat{\beta}_S} Q_j^P \tag{2}$$

# Embedded Assumptions and Estimation

**Assumptions:**

1. Perfect Compliance: families use the information and perfectly update if they receive information

2. Constant treatment effects: rules out variation in treatment effect with respect to initial biases

3. Omits uncertainty in beliefs

4. Any effects from the last two assumptions load into salience term

**Estimation**

- Rank-ordered logit model estimated via MLE

- Key assumption: truthful reports

# Preference Impact Estimates

| | Without School Effects | | With School Effects | |
| --- | --- | --- | --- | --- |
| | (1) | (2) | (3) | (4) |
| | IA | AG | IA | AG |
| Treatment | | | | |
| Untreated | 0.392*** | 0.658*** | | |
| | (0.093) | (0.078) | | |
| Information: IA | -0.972*** | 0.474*** | -0.812*** | 0.272** |
| | (0.174) | (0.104) | (0.209) | (0.131) |
| Information: AG | -0.865 | 0.424*** | -0.594 | 0.181 |
| | (0.171) | (0.101) | (0.199) | (0.127) |
| Information: Both | -0.815*** | 0.565*** | -0.393** | 0.455*** |
| | (0.154) | (0.100) | (0.160) | (0.126) |
| Spillover | -0.947*** | 0.336*** | -0.688*** | 0.097 |
| | (0.172) | (0.100) | (0.204) | (0.129) |
| Distance | -0.068*** | | -0.051*** | |
| | (0.006) | | (0.007) | |
| Number of Choices | 142,589 | | | |
| Number of Students | 21,774 | | | |

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# Utility Weight Impact Decomposition: Treatment Effects
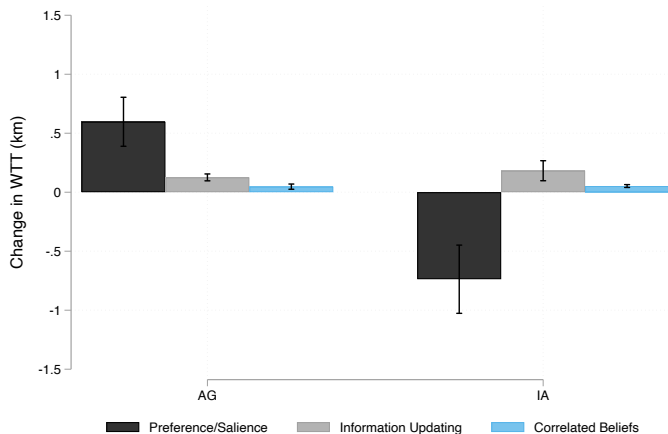


- Majority of changes in choices due to salience/preference updating
- Spillover effects mostly equal to treatment effects

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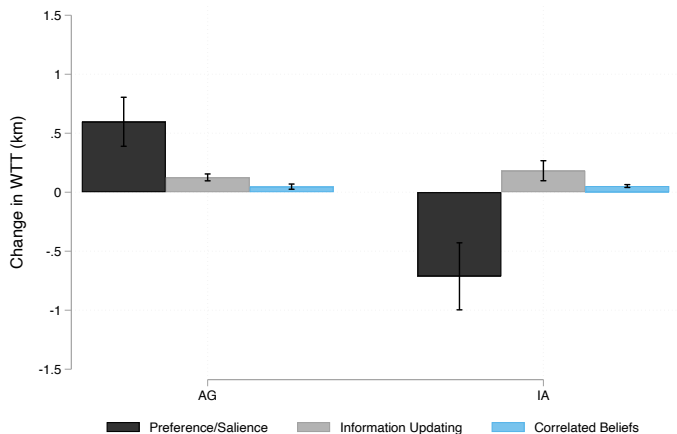


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# Discussion

**What did we learn and what did we not learn from the information campaign?**

- Parents may systematically prefer school over peer quality

- VA-oriented information campaigns may reorient demand in a way to improve student outcomes

- Parents may still consider other attributes and not "max" out on VA (Ainsworth et al. 2022)

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- First empirical evidence of an externality at the preference formation stage

- Information diffusion differences across networks potentially explain differences in prefs. for school quality

- Information interventions that encourage social interactions can address these network-based disparities

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- Information interventions that encourage social interactions can address these network-based disparities

**The role of salience**

- Information campaigns potentially operate by addressing information disparities but also re-orienting demand

- Policymaker objectives potentially achieved through information campaigns, for better or worse

# Concluding Thoughts

**What parents know, do, and mediating factors:**

1. Biases are prevalent; families pessimistic about school quality and optimistic about peer quality

2. Parents systematically shift demand to higher quality schools regardless of treatment

3. Social interactions are key to generate any measurable changes in demand

**Information provision more generally:**

4. Decomposition suggests impacts on choices mostly due to preference updating (salience) instead of information updating

5. Value-added oriented campaigns can lead to substantial reallocative changes in public education markets and influence competition

**Future Research:**

# Concluding Thoughts

**What parents know, do, and mediating factors:**

1. Biases are prevalent; families pessimistic about school quality and optimistic about peer quality

2. Parents systematically shift demand to higher quality schools regardless of treatment

3. Social interactions are key to generate any measurable changes in demand

**Information provision more generally:**

4. Decomposition suggests impacts on choices mostly due to preference updating (salience) instead of information updating

5. Value-added oriented campaigns can lead to substantial reallocative changes in public education markets and influence competition

**Future Research:**

- Implications with capacity constraints
- Implications for segregation

# Thank you!

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# VAM Validation

|  | (1) Uncontrolled | (2) Constant Effect |
|---|---|---|
| Forecast Coefficient | .63 | 1.111 |
|  | (.105) | (.134) |
|  | [0] | [.41] |
| First-Stage F | 277.507 | 37.016 |
| Bias Tests: |  |  |
| Forecast Bias (1 d.f.) | 12.528 | .683 |
|  | [0] | [.409] |
| Overidentification (180 d.f) | 172.281 | 187.744 |
|  | [.647] | [.331] |

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# IA-AG Correlation
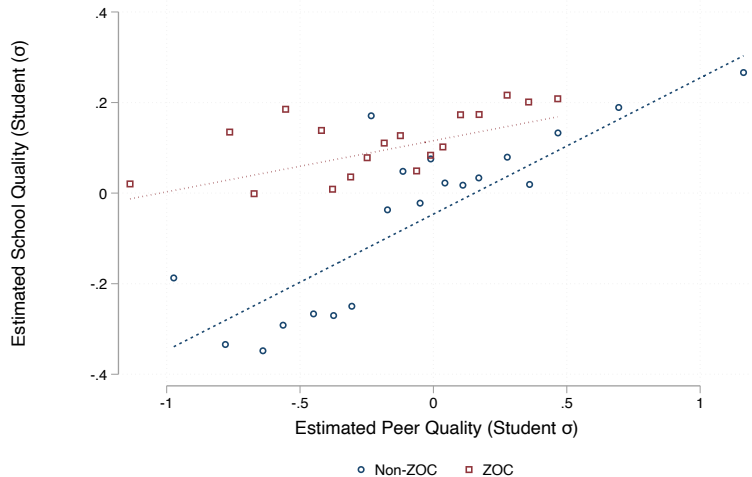
# IA-AG Correlation
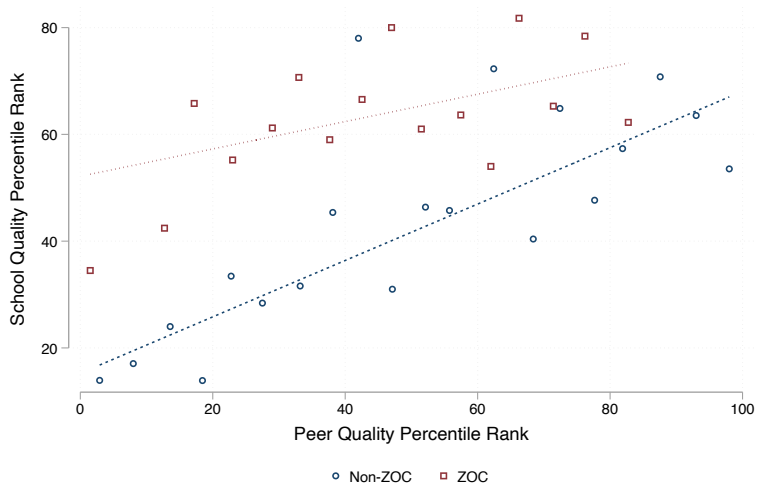
# AG Support

# IA Support

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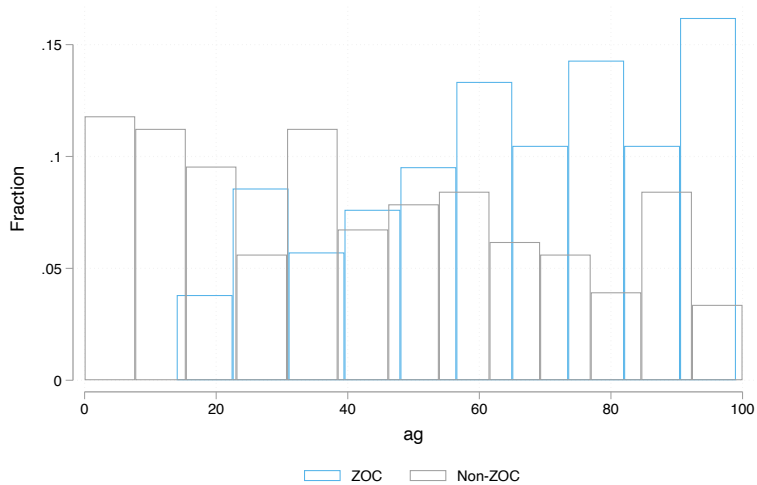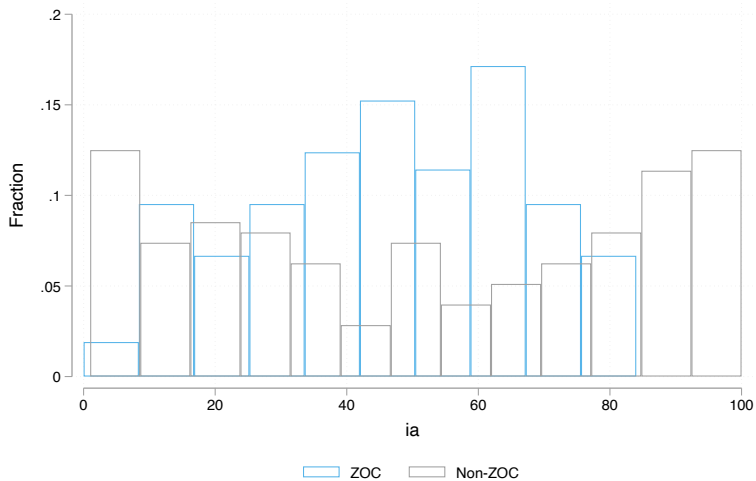
# Treatment effects on other school attributes

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Pure Control Mean | High Saturation 2019 | Low Saturation 2019 | High Saturation 2021 | Low Saturation 2021 |
| Achievement Growth | 65.587 | 4.896** | 1.033 | 8.775** | 0.097 |
| | | (2.120) | (2.175) | (4.186) | (2.962) |
| Incoming Achievement | 34.517 | -1.540 | -2.061 | 0.482 | 3.122 |
| | | (1.646) | (1.774) | (2.397) | (2.313) |
| Female | 0.487 | 0.003 | -0.001 | 0.006 | -0.001 |
| | | (0.002) | (0.002) | (0.005) | (0.003) |
| Migrant | 0.082 | 0.000 | 0.002* | -0.002 | -0.001 |
| | | (0.001) | (0.001) | (0.003) | (0.002) |
| Poverty | 0.979 | 0.000 | 0.003* | 0.005 | 0.002 |
| | | (0.002) | (0.002) | (0.006) | (0.004) |
| Special Education | 0.119 | 0.003** | 0.001 | 0.004 | 0.000 |
| | | (0.001) | (0.001) | (0.004) | (0.002) |
| English Learner | 0.146 | 0.002 | 0.004** | -0.010 | 0.000 |
| | | (0.003) | (0.002) | (0.009) | (0.005) |
| College | 0.054 | 0.001 | -0.002 | 0.002 | 0.000 |
| | | (0.002) | (0.002) | (0.006) | (0.003) |
| Black | 0.044 | 0.000 | 0.000 | -0.014 | -0.003 |
| | | (0.002) | (0.001) | (0.013) | (0.004) |
| Hispanic | 0.908 | -0.002 | 0.002 | 0.008 | 0.002 |
| | | (0.003) | (0.003) | (0.014) | (0.007) |
| White | 0.019 | 0.002* | -0.002 | 0.005 | 0.001 |
| | | (0.001) | (0.001) | (0.004) | (0.002) |
| Suspension Days | 12.310 | -0.572 | 0.162 | -1.485 | -0.582 |
| | | (0.605) | (0.545) | (3.517) | (2.832) |
| Suspension Incidents | 0.007 | 0.000 | 0.000 | -0.001 | 0.000 |
| | | (0.000) | (0.000) | (0.001) | (0.001) |
| N | | | 69,054 | | |

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# Treatment Effects across the Rank-Ordered List



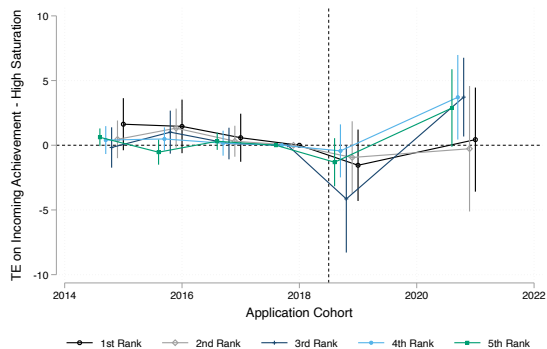*Figure:* Effects on IA: High Saturation

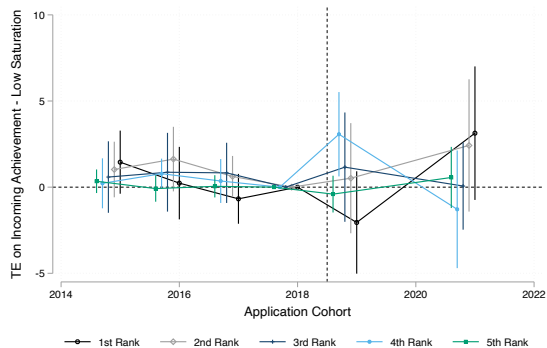▶ Go back

# Treatment Effects across the Rank-Ordered List



*Figure:* Effects on IA: Low Saturation

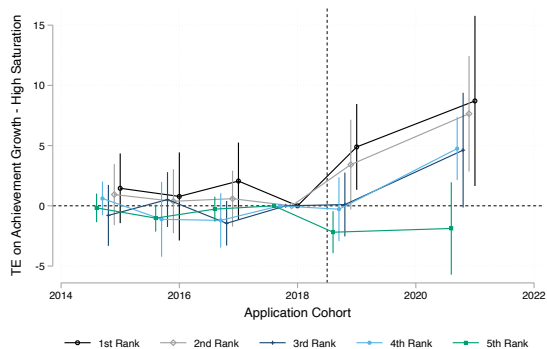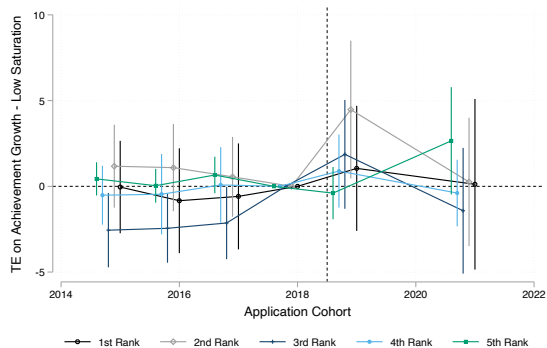▶ Go back

# Treatment Effects across the Rank-Ordered List



*Figure:* Effects on AG: High Saturation

▶ Go back

# Treatment Effects across the Rank-Ordered List



*Figure:* Effects on AG: Low Saturation

▸ Go back

# Other Spillover Specifications
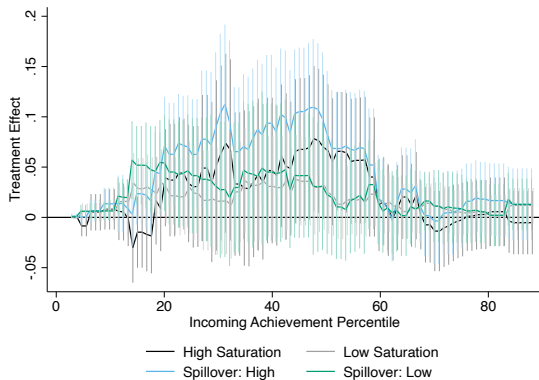


*Figure:* Impacts on IA Distribution

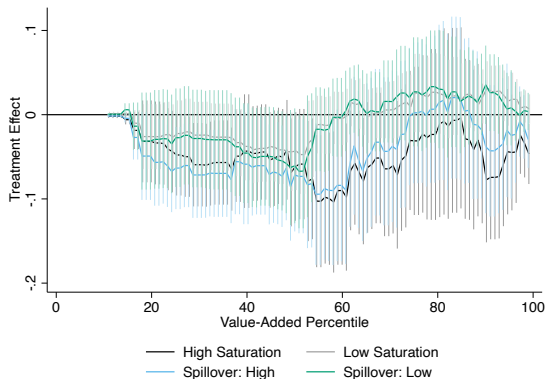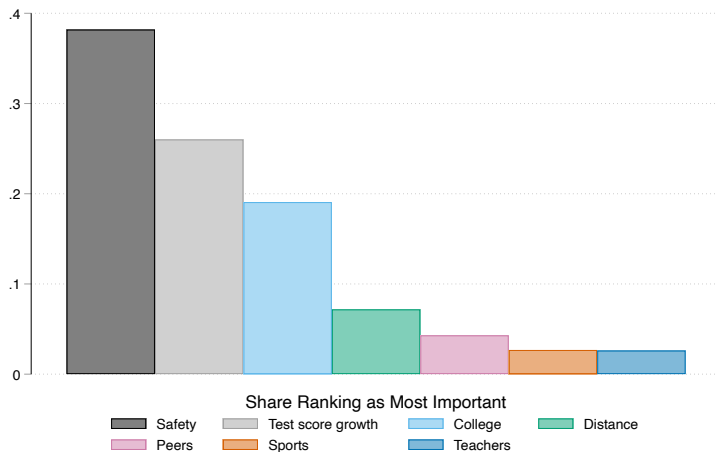# Other Spillover Specifications



*Figure:* Impacts on AG Distribution

▶ Go back

# Survey Summary Statistics - Rankings of desired shcool characteristics

# AG-IA Bias Correlation Across Space



Legend:
- 0.720 – 0.990
- 0.606 – 0.720
- 0.552 – 0.606
- 0.498 – 0.552
- 0.455 – 0.498
- 0.310 – 0.455
- No data