

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

Christopher Campos

University of Chicago Booth School of Business

April 2023

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
 - Some families are informed while others are not
(Hastings and Weinstein 2008, Andrabi et al. 2017, Corcoran et al. 2018, Ainsworth et al. 2022)
 - Heuristics may distort choices
(Rothstein 2006, Abdulkadiroglu et al. 2020)
 - **Open Question:** What do parents value?

Motivation

- 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
 - Are they aware of school and peer quality?
 - Are their beliefs biased?
 - **Open Question:** What do parents know?

Motivation

- 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
- 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?

Motivation

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

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

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
- Setting: Los Angeles Zones of Choice (ZOC) markets
- Design: Information provision experiment with a few additional features
 - Elicit beliefs about peer and school quality at baseline
 - Distribute information about peer quality and school quality
 - Spillover design allows us to infer the empirical relevance of social interactions

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

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

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

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

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

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, Ioannides and Loury 2004, Breza and Chandrasekhar 2019, Golub et al. 2020, Banerjee et al. 2021

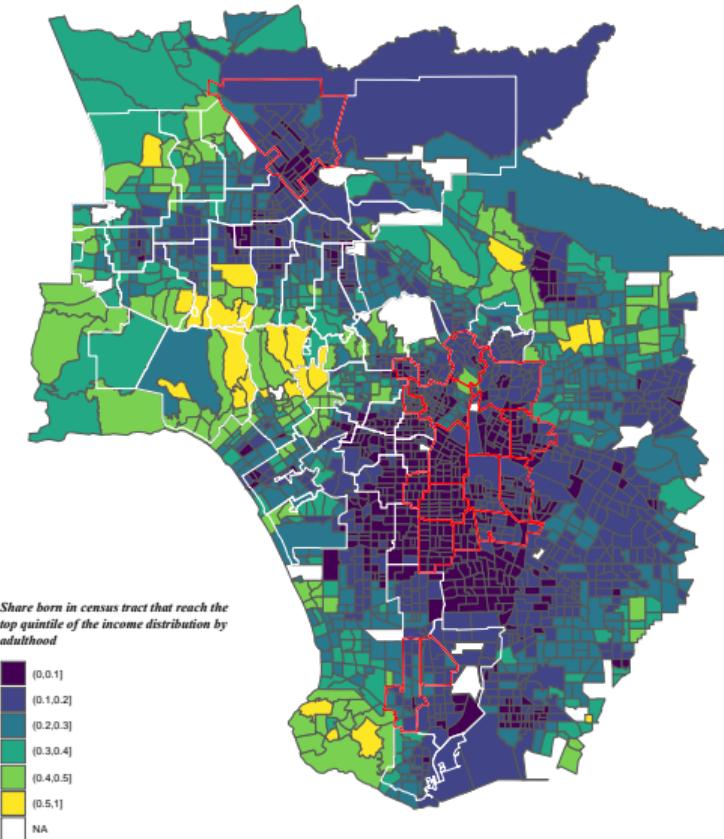
Contribution: Empirical relevance of externality occurring at the preference formation stage

Roadmap

1. Setting and Experiment Design
2. Reduced Form Evidence
3. Survey Evidence: AG and IA Bias
4. Utility Weight Impacts
 - Simple school choice model with beliefs
 - 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
 - Catchment areas combined to create neighborhood-based markets
 - Segregated in terms of race/ethnicity and SES
 - ZOC led to decreases in educational inequality (Campos and Kearns 2022)
- Middle schools feed into different markets
 - Students enrolled in a feeder middle school apply to a particular ZOC market
 - Most families and students first learn about the program in eighth grade
 - Useful stage to intervene with information before families submit applications
- Applications contain a rank-ordered list and assignments are centralized



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

Design: Timeline

1. Baseline Survey: Early September

- Distributed in the classroom and via text message
- Include a video that teaches families about the differences between school and peer quality
- Baseline beliefs
- Baseline preferences

Design: Timeline

1. Baseline Survey: Early September
 - Distributed in the classroom and via text message
 - Include a video that teaches families about the differences between school and peer quality
 - Baseline beliefs
 - Baseline preferences
2. Information provision: Late September
 - Cross-randomize school *and* peer quality
 - Spillover design (e.g., Crepon et al. 2013, Andrabí et al. 2020)
 - Treatment-specific videos that help families understand the information

Design: Timeline

1. Baseline Survey: Early September
 - Distributed in the classroom and via text message
 - Include a video that teaches families about the differences between school and peer quality
 - Baseline beliefs
 - Baseline preferences
2. Information provision: Late September
 - Cross-randomize school *and* peer quality
 - Spillover design (e.g., Crepon et al. 2013, Andrabí et al. 2020)
 - Treatment-specific videos that help families understand the information
3. Applications cycle: October-November

School and Peer Quality Definition

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

- μ_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:

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

- 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

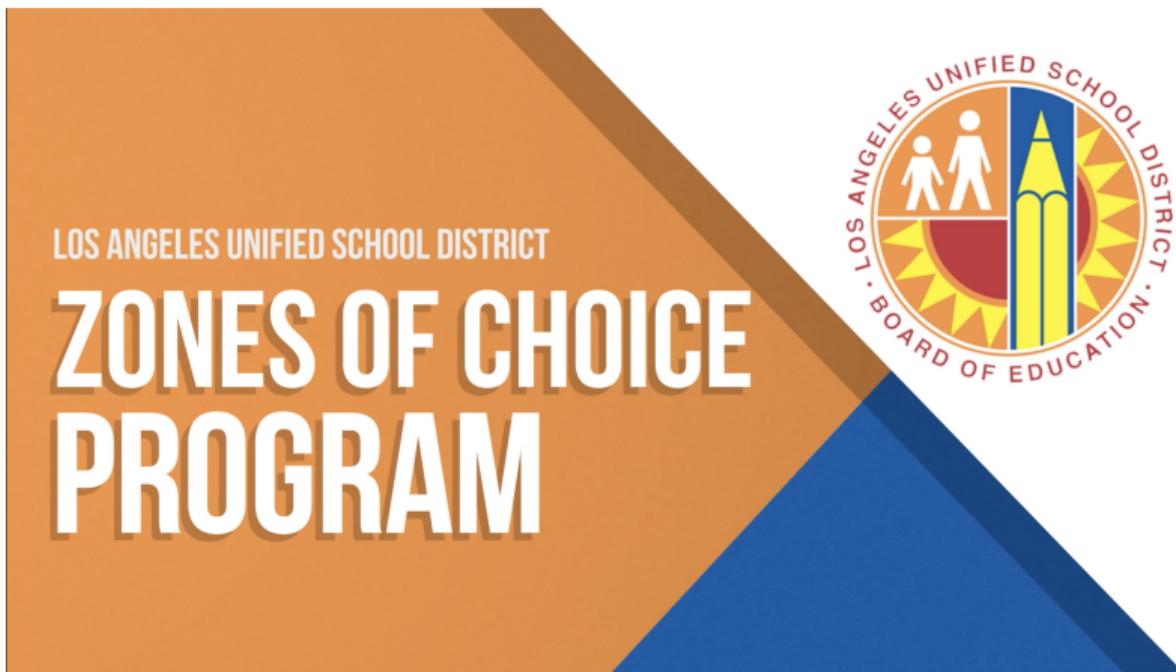
Companion Video

Watch Video

[English](#)

[Spanish](#)

Signal this information is on behalf of the school district



Introduce the two concepts



Use visual aid to describe IA



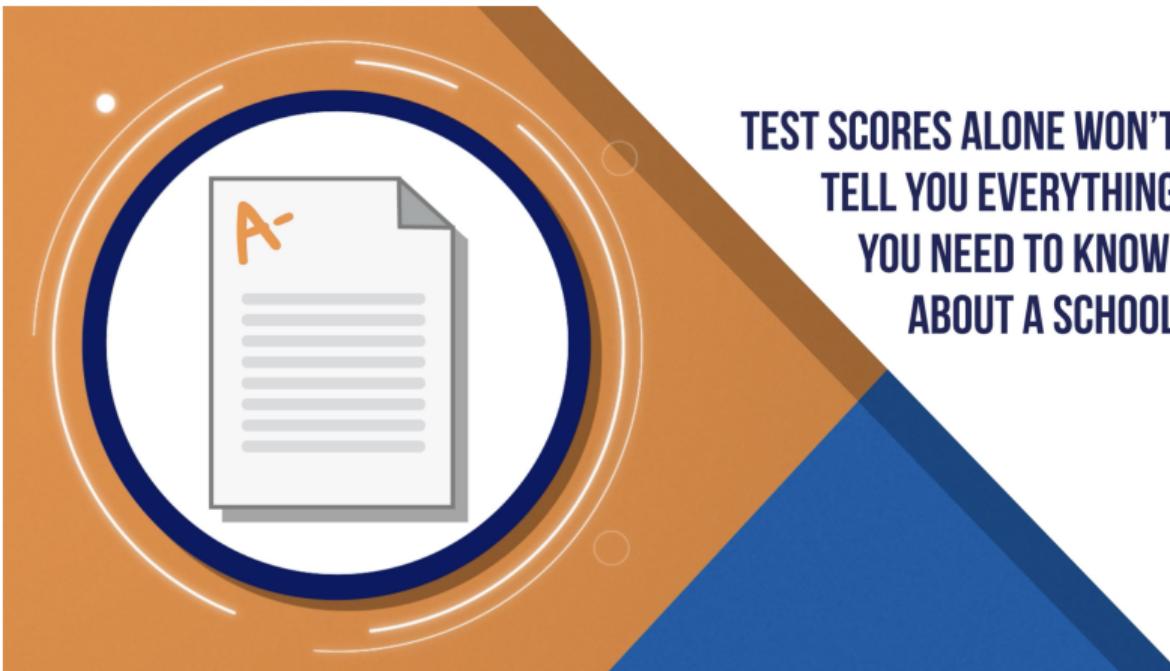
Use visual aid to describe AG



Describe some differences but remain agnostic about which is better



Remind parents that test scores are not all they should consider

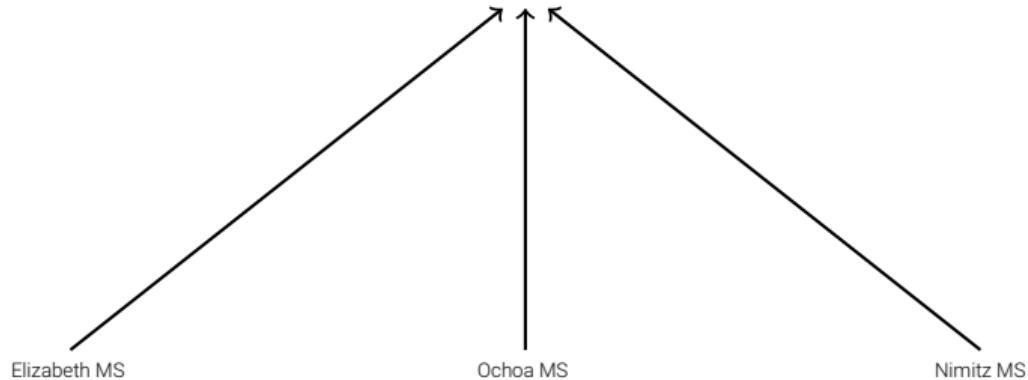


Experiment Design

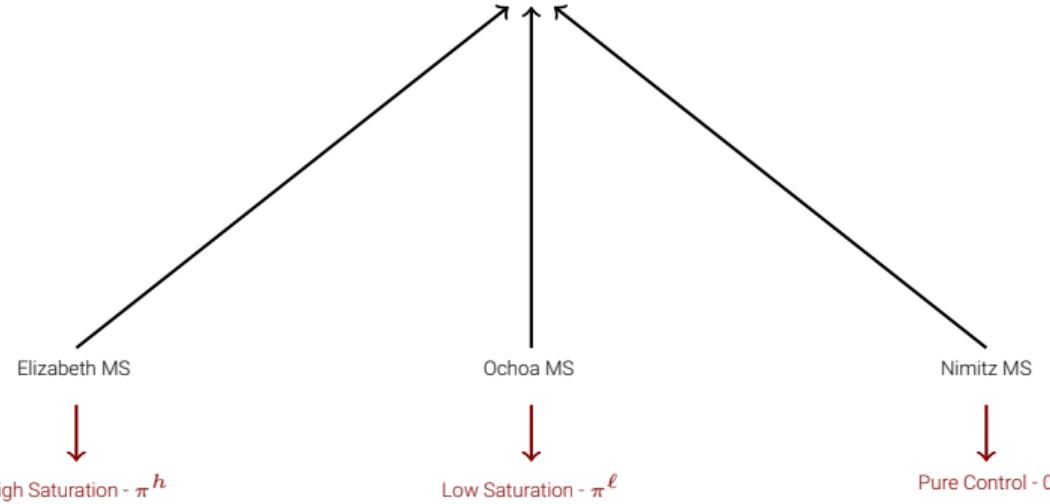
Goals:

1. Identify parents' relative valuation for peer and school quality
 - Cross-randomize peer and school quality
2. Identify social interactions
 - Two-stage randomization
 - Effects on untreated parents in treated schools identify social interactions

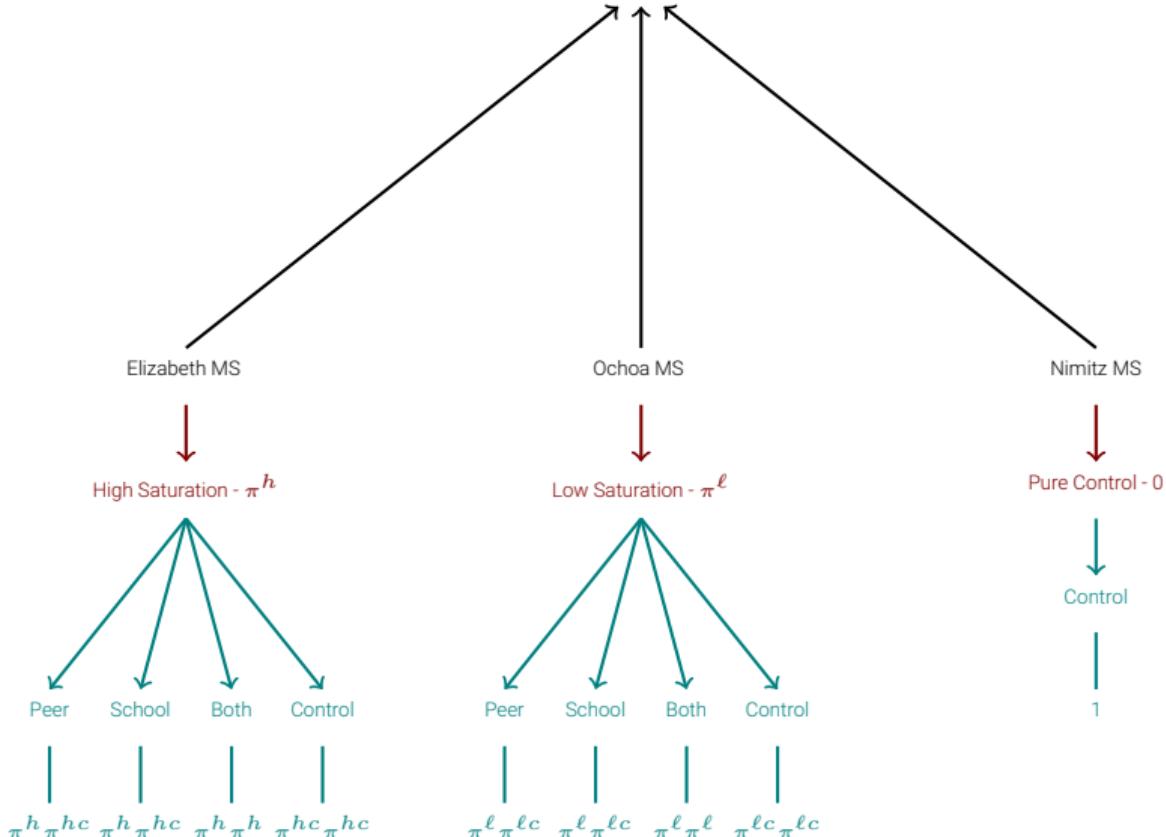
Bell Zone of Choice



Bell Zone of Choice



Bell Zone of Choice



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.

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
9th Grade Academy	47	82	Maywood Academy	Small Learning Community
Bell Global Studies	63	50	Bell HS	Small Learning Community

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 to improve test scores by measuring the growth of their students' test scores between entry into the school and eleventh grade.



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

Determinaremos 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.

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 Técnologica	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 9º 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
 - Demographics
 - Test scores
 - Addresses
- Zones of Choice data 2015-2021
 - Applications containing rank-ordered lists
 - Centralized assignments

Descriptive Statistics

	Non-ZOC (1)	ZOC (2)	Difference (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	

Descriptive Statistics

	Non-ZOC (1)	ZOC (2)	Difference (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	

Descriptive Statistics

	Non-ZOC (1)	ZOC (2)	Difference (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	

Descriptive Statistics

	Non-ZOC (1)	ZOC (2)	Difference (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	

School-level Balance

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

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	

Reduced Form Approach

$$Y_i = \alpha_{zb} + \underbrace{\beta_{Ph} T_i^P \times D_{s(i)}^h + \beta_{Sh} T_i^S \times D_{s(i)}^h + \beta_{Bh} T_i^B \times D_{s(i)}^h}_{\text{High Saturation Effects}} \\ + \underbrace{\beta_{Pl} T_i^P \times D_{s(i)}^\ell + \beta_{Sl} T_i^S \times D_{s(i)}^\ell + \beta_{Bl} T_i^B \times D_{s(i)}^\ell}_{\text{Low Saturation Effects}} \\ + \underbrace{\beta_h C_i \times D_{s(i)}^h + \beta_\ell C_i \times D_{s(i)}^\ell}_{\text{Spillover Effects}} + u_i$$

- T_i^x : Student-level treatment x indicator
- $D_{s(i)}^\ell$: Saturation ℓ specific school-level treatment indicator
- C_i : Student-level untreated indicator
- Eight parameters in the full design ▶ Experiment Design

Reduced Form Approach

$$Y_i = \alpha_{zb} + \underbrace{\beta_{Ph} T_i^P \times D_{s(i)}^h + \beta_{Sh} T_i^S \times D_{s(i)}^h + \beta_{Bh} T_i^B \times D_{s(i)}^h}_{\text{High Saturation Effects}} \\ + \underbrace{\beta_{Pl} T_i^P \times D_{s(i)}^\ell + \beta_{Sl} T_i^S \times D_{s(i)}^\ell + \beta_{Bl} T_i^B \times D_{s(i)}^\ell}_{\text{Low Saturation Effects}} \\ + \underbrace{\beta_h C_i \times D_{s(i)}^h + \beta_\ell C_i \times D_{s(i)}^\ell}_{\text{Spillover Effects}} + u_i$$

- T_i^x : Student-level treatment x indicator
- $D_{s(i)}^\ell$: Saturation ℓ specific school-level treatment indicator
- C_i : Student-level untreated indicator
- Eight parameters in the full design ▶ Experiment Design

Reduced Form Approach

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

- T_i^x : Student-level treatment x indicator
- $D_{s(i)}^\ell$: Saturation ℓ specific school-level treatment indicator
- C_i : Student-level untreated indicator
- Eight parameters in the full design ▶ Experiment Design

Reduced Form Approach

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

- T_i^x : Student-level treatment x indicator
- $D_{s(i)}^\ell$: Saturation ℓ specific school-level treatment indicator
- C_i : Student-level untreated indicator
- Eight parameters in the full design ▶ Experiment Design

Reduced Form Approach

$$Y_i = \alpha_{zb} + \underbrace{\beta_{Ph} T_i^P \times D_{s(i)}^h + \beta_{Sh} T_i^S \times D_{s(i)}^h + \beta_{Bh} T_i^B \times D_{s(i)}^h}_{\text{High Saturation Effects}} \\ + \underbrace{\beta_{Pl} T_i^P \times D_{s(i)}^\ell + \beta_{Sl} T_i^S \times D_{s(i)}^\ell + \beta_{Bl} T_i^B \times D_{s(i)}^\ell}_{\text{Low Saturation Effects}} \\ + \underbrace{\beta_h C_i \times D_{s(i)}^h + \beta_\ell C_i \times D_{s(i)}^\ell}_{\text{Spillover Effects}} + u_i$$

- T_i^x : Student-level treatment x indicator
- $D_{s(i)}^\ell$: Saturation ℓ specific school-level treatment indicator
- C_i : Student-level untreated indicator
- Eight parameters in the full design ► Experiment Design

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):

- $\beta_{Px} = \beta_{Sx} = \beta_{Bx} = \beta_x$ for $x \in \{h, \ell\}$
- Will report saturation-specific effects; school-level experiment
- Difference-in-difference analog improves precision and provides placebo checks

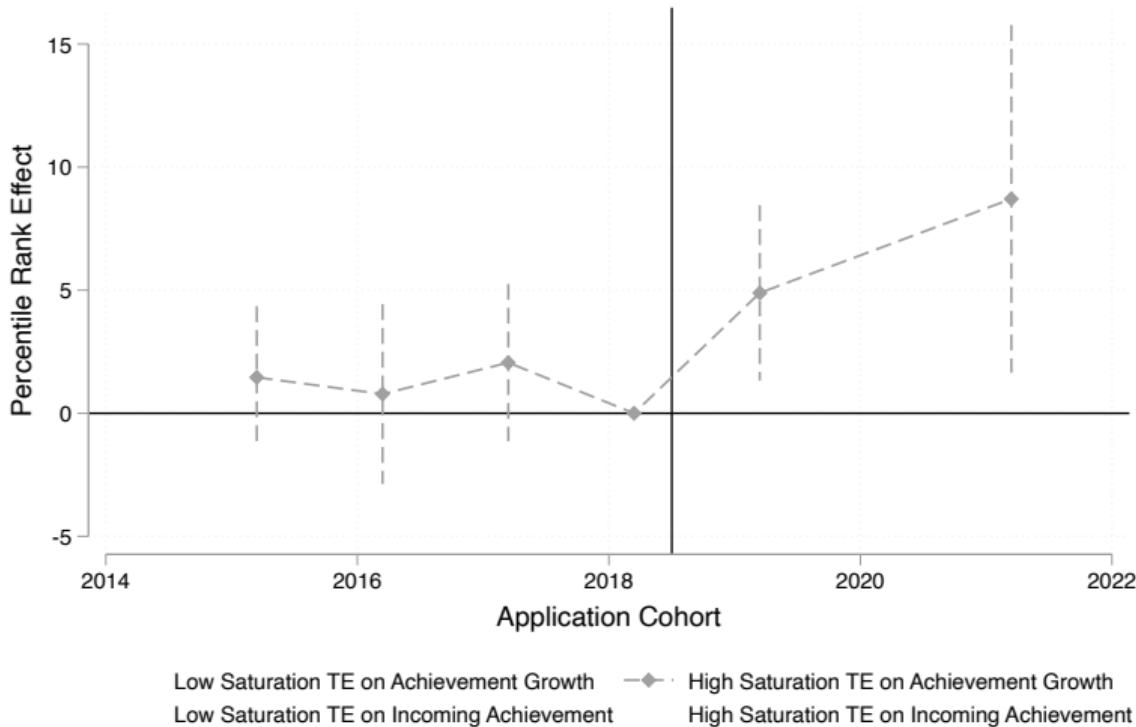
Reduced Form Approach

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

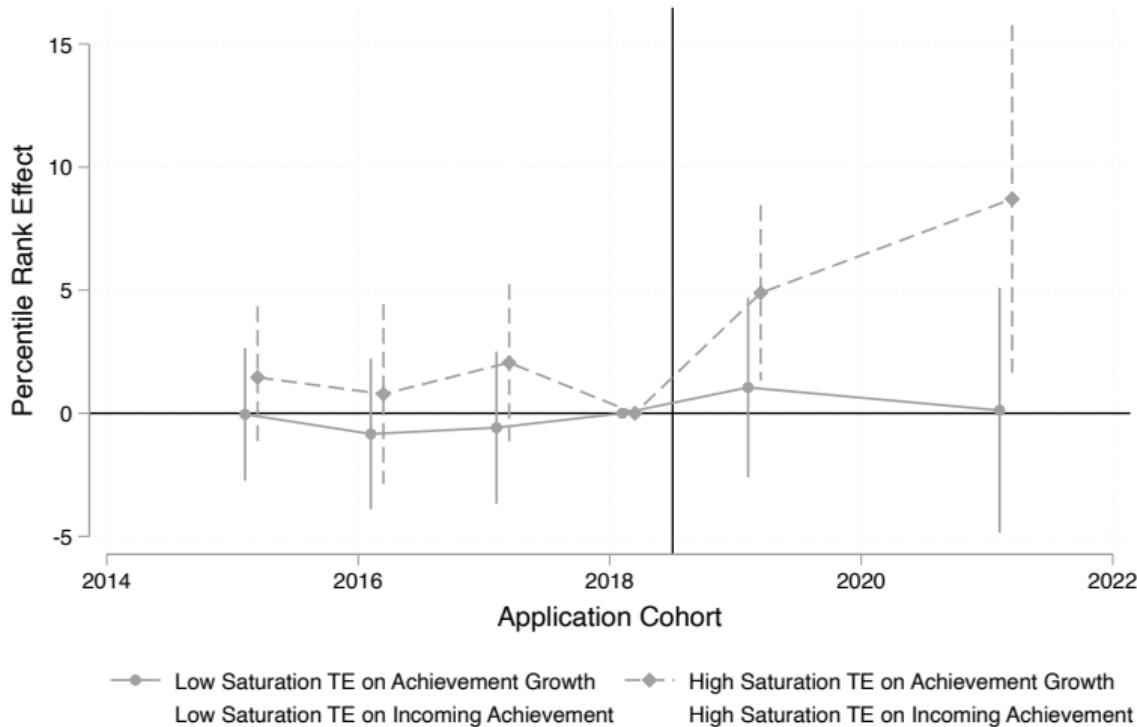
For today (detecting direct spillovers):

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

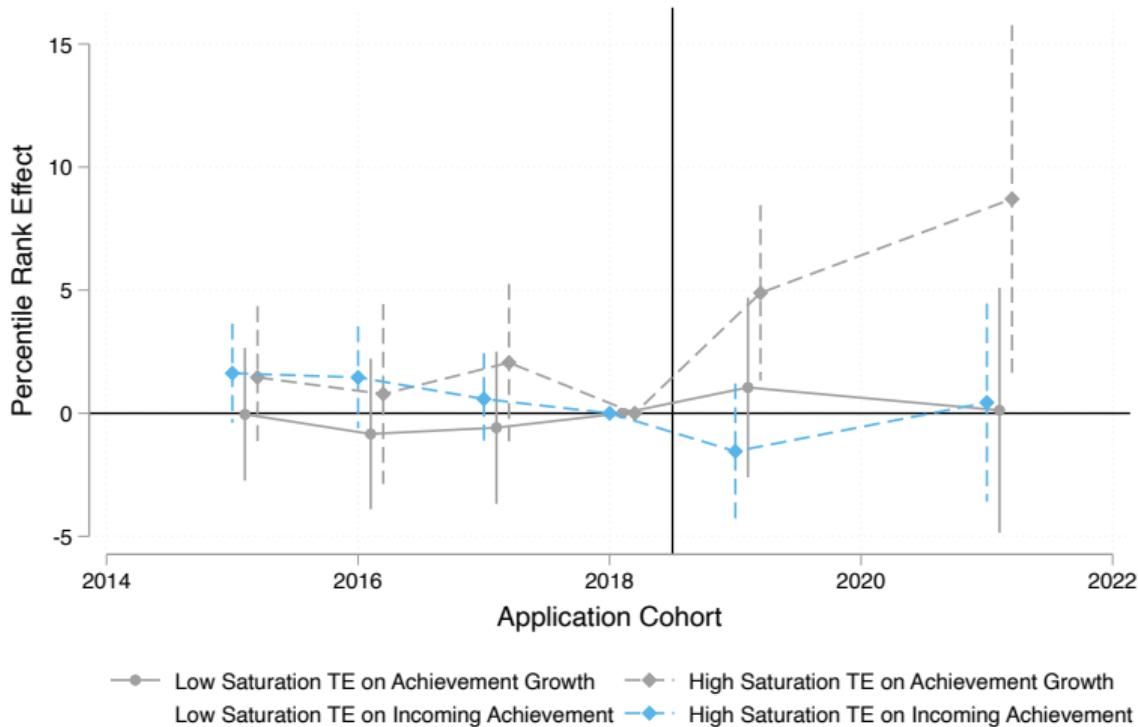
Increased demand for AG; depends on saturation status



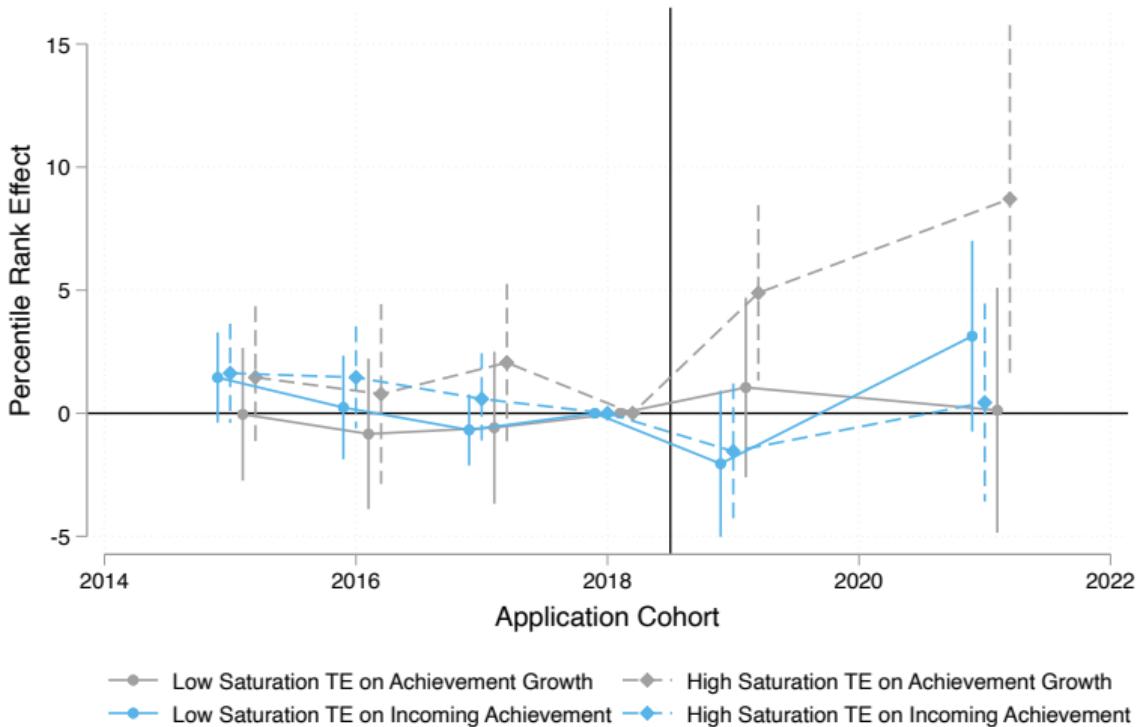
Increased demand for AG; depends on saturation status



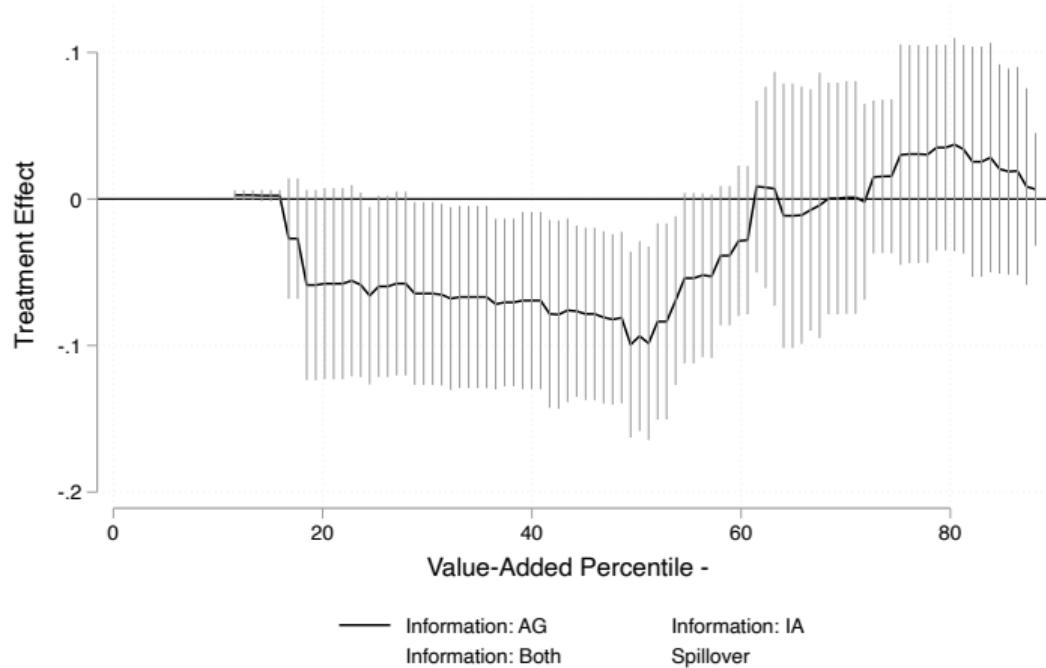
Increased demand for AG ; depends on saturation status



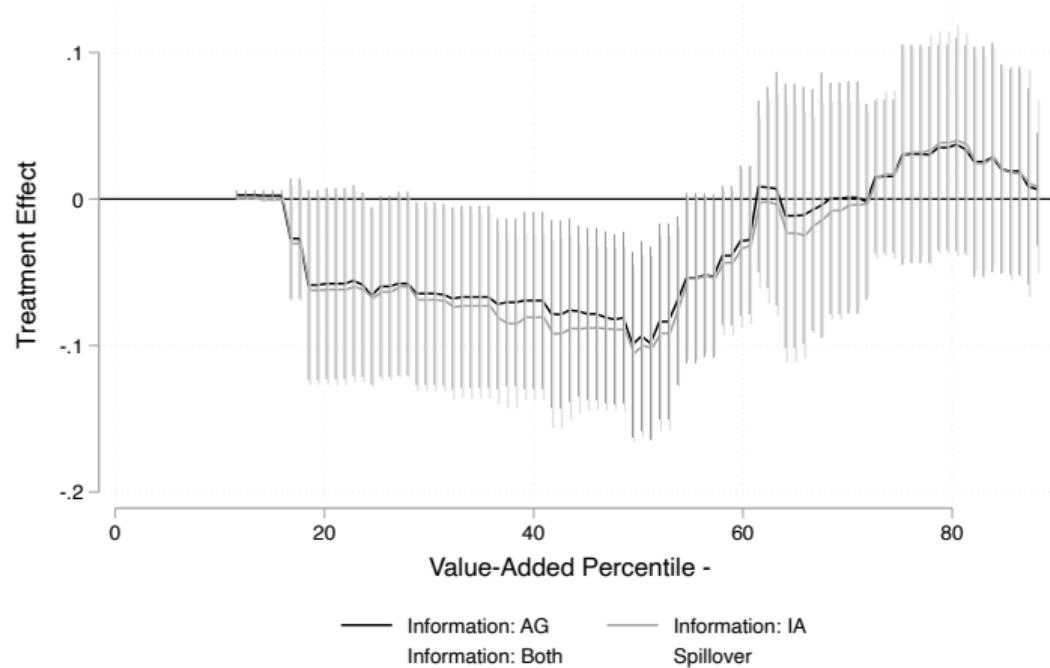
Increased demand for AG ; depends on saturation status



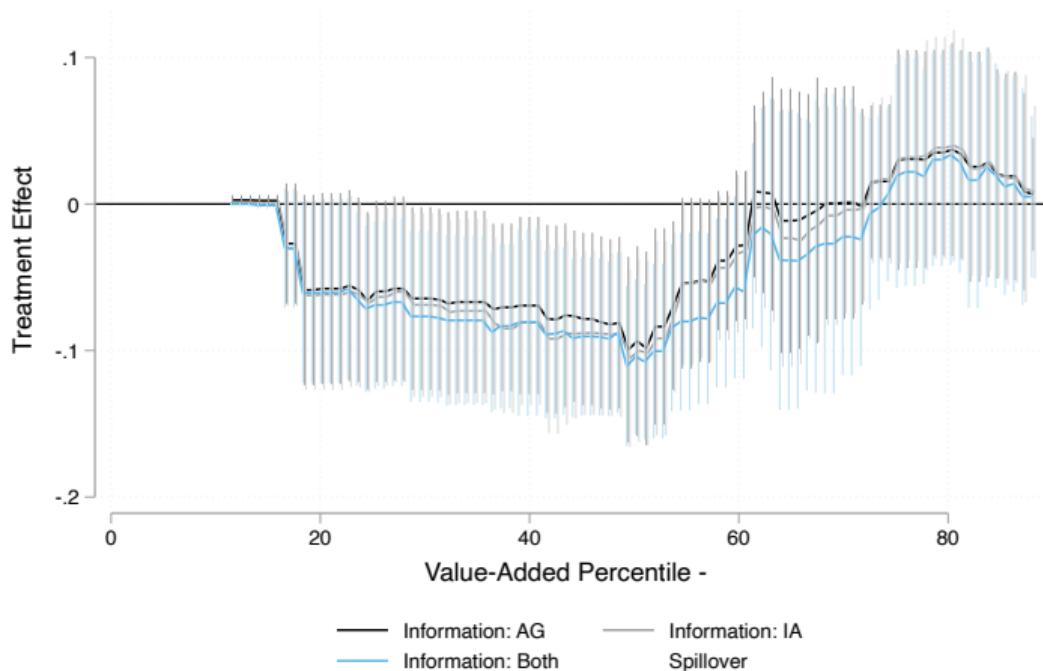
Large spillover effects; increased demand for higher AG schools



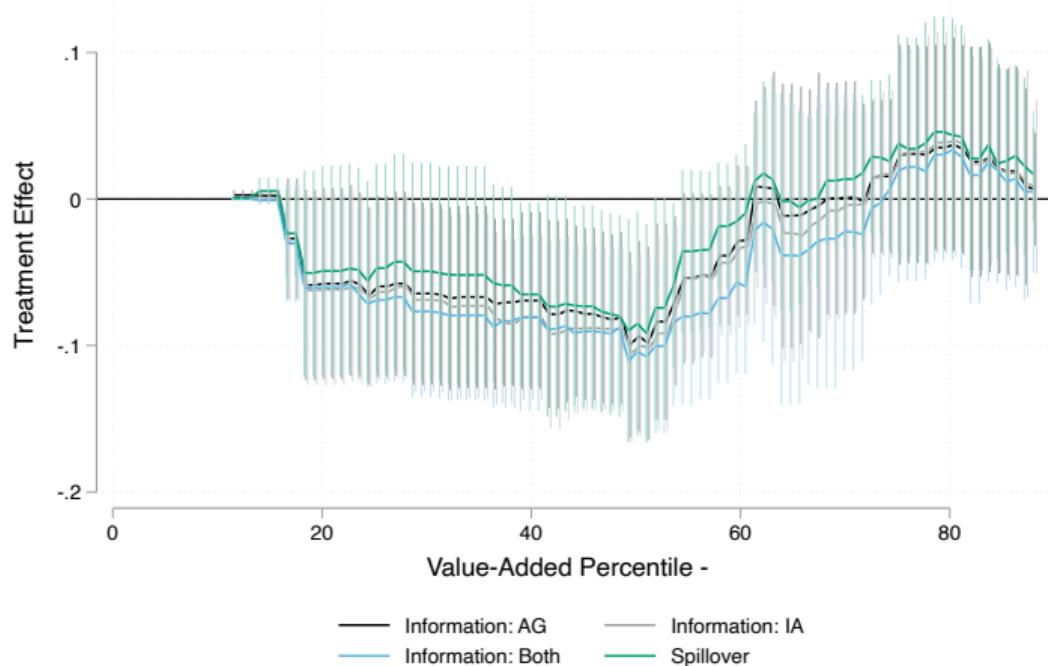
Large spillover effects; increased demand for higher AG schools



Large spillover effects; increased demand for higher AG schools



Large spillover effects; increased demand for higher AG schools



▶ IA and AG Support

▶ Results at other ROL ranks

▶ Impacts on Other Attributes

▶ Other Specifications

Large spillover effects; decreased demand for IA



▶ IA and AG Support

▶ Results at other ROL ranks

▶ Impacts on Other Attributes

▶ Other Specifications

Large spillover effects; decreased demand for IA



▶ IA and AG Support

▶ Results at other ROL ranks

▶ Impacts on Other Attributes

▶ Other Specifications

Large spillover effects; decreased demand for IA



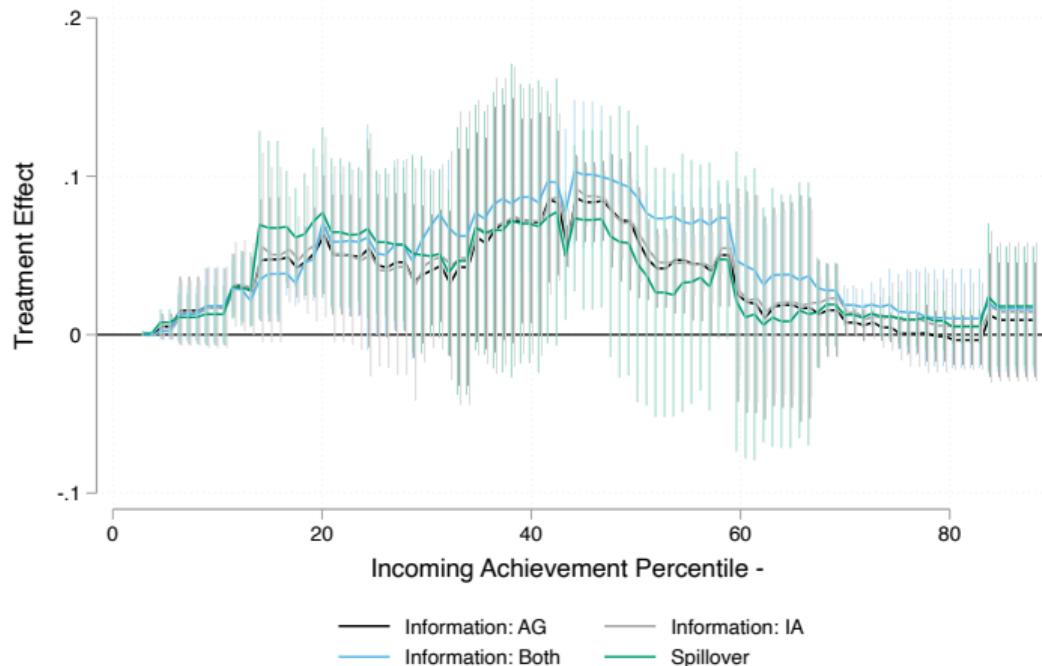
▶ IA and AG Support

▶ Results at other ROL ranks

▶ Impacts on Other Attributes

▶ Other Specifications

Large spillover effects; decreased demand for IA



▶ IA and AG Support

▶ Results at other ROL ranks

▶ Impacts on Other Attributes

▶ Other Specifications

Survey Evidence

- Survey evidence for the 2021 cohort
- Response rate is roughly 50 percent

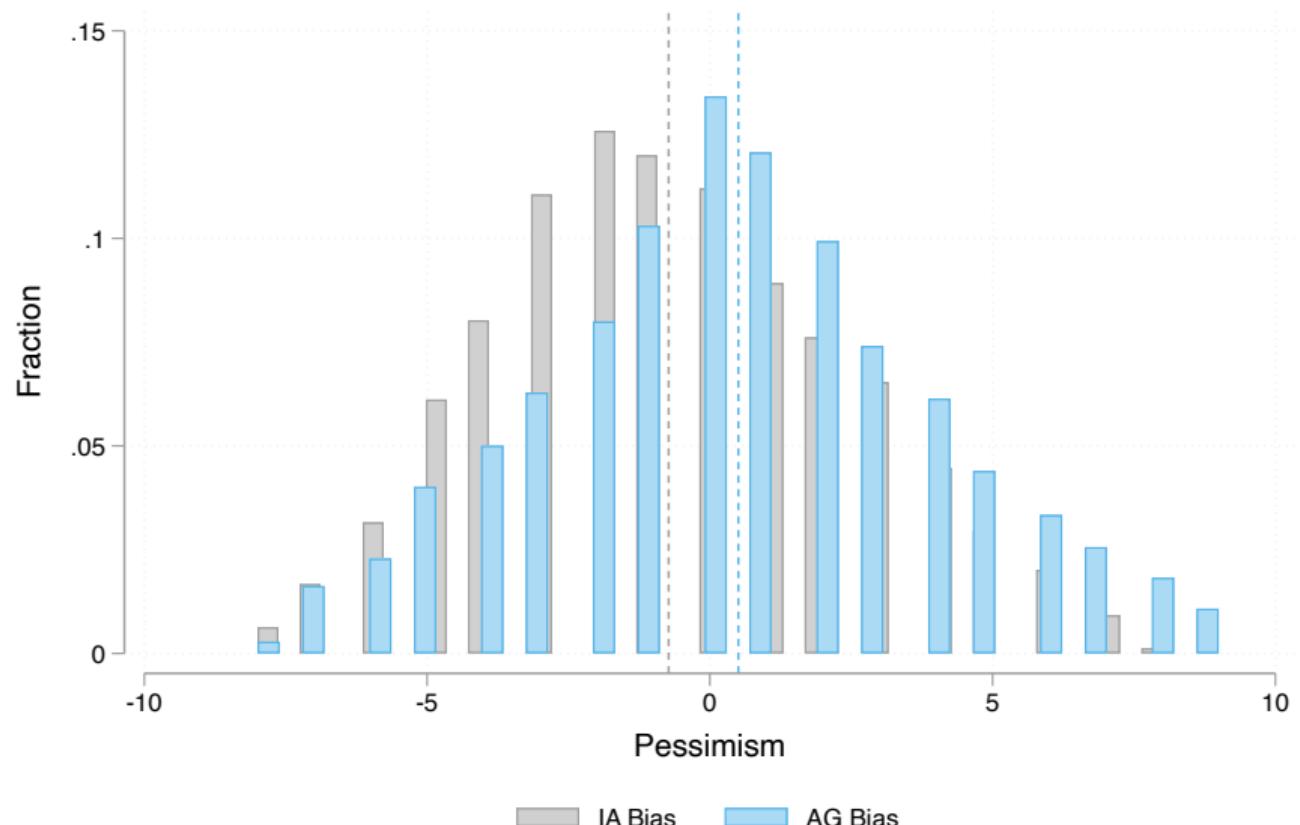
Today:

- First evidence on joint distribution of school and peer quality beliefs
- Predictors and correlates of biases
- Bias in terms of pessimism:

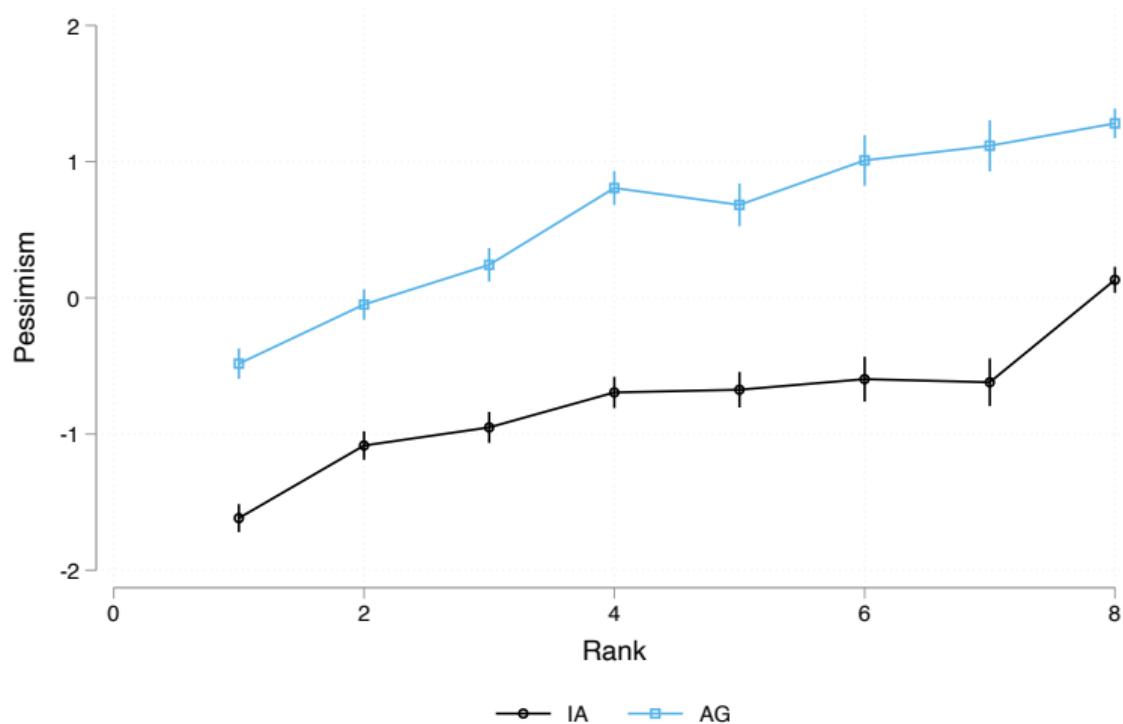
$$b_{ji}^x \equiv Q_j^x - \tilde{Q}_{ji}^x \quad x \in \{IA, AG\}$$

with Q_j^x referring to researcher-generated quality and \tilde{Q}_{ji}^x referring to beliefs

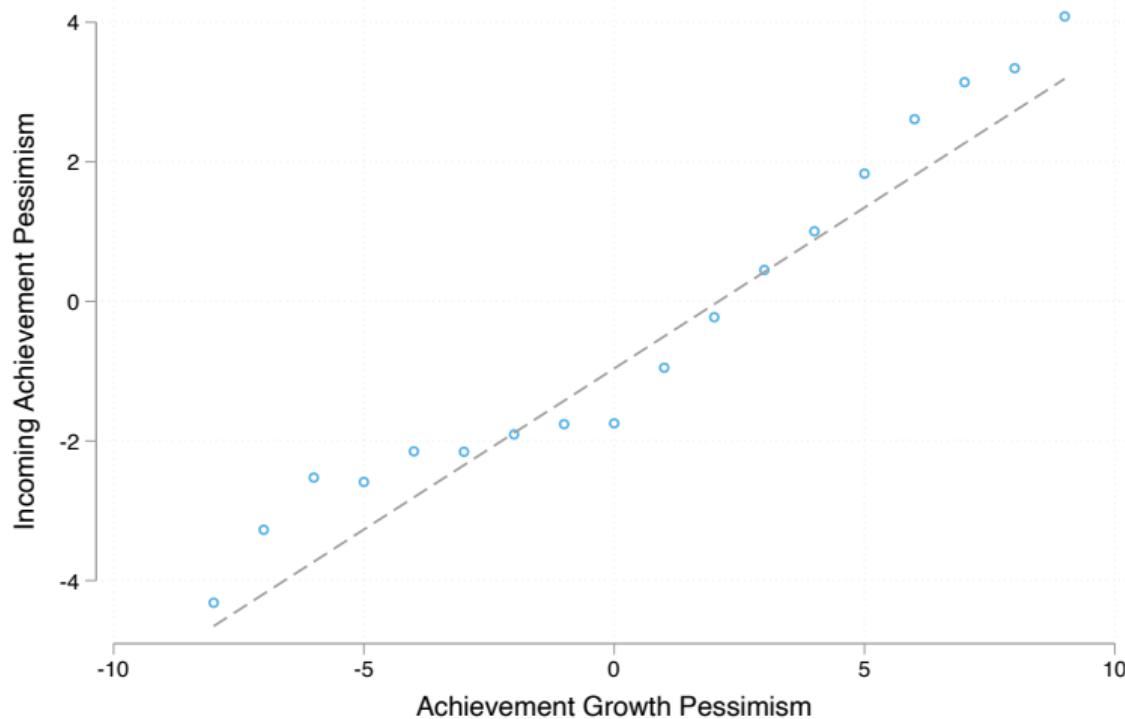
IA and AG Pessimism Distribution



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

Pessimism Correlates

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

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

$$U_{ij} = \delta_j - \lambda d_{ij} + \varepsilon_{ij}$$

$$\delta_j = \gamma_P \tilde{Q}_{ji}^P + \gamma_S \tilde{Q}_{ji}^S$$

- δ_j : mean utility at school j
- $\tilde{Q}_{ji}^P, \tilde{Q}_{ji}^S$: peer and school quality *beliefs*, respectively
- d_{ij} : distance to school j for family i
- ε_{ij} : unobserved preference heterogeneity

Quality and beliefs

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

$$\tilde{Q}_{ji}^P = (1 + b_{Pji})Q_j^P \quad \tilde{Q}_{ji}^S = (1 + b_{Sji})Q_j^S$$

Quality and biases are jointly normal

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

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

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
- β_P and β_S are changes in utility weights
- $\frac{\beta_P}{\lambda}$ and $\frac{\beta_S}{\lambda}$ are changes in WTT

What is identified?

Denote Δ^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:

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

What is identified?

Denote Δ^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, treatment effects when receiving both treatments are:

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

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) IA	(2) AG	(3) IA	(4) AG
Treatment				
Untreated	0.392*** (0.093)	0.658*** (0.078)		
Information: IA	-0.972*** (0.174)	0.474*** (0.104)	-0.812*** (0.209)	0.272** (0.131)
Information: AG	-0.865 (0.171)	0.424*** (0.101)	-0.594 (0.199)	0.181 (0.127)
Information: Both	-0.815*** (0.154)	0.565*** (0.100)	-0.393** (0.160)	0.455*** (0.126)
Spillover	-0.947*** (0.172)	0.336*** (0.100)	-0.688*** (0.204)	0.097 (0.129)
Distance		-0.068*** (0.006)		-0.051*** (0.007)
Number of Choices				
Number of Students	142,589			
	21,774			

Preference Impact Estimates

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

Preference Impact Estimates

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

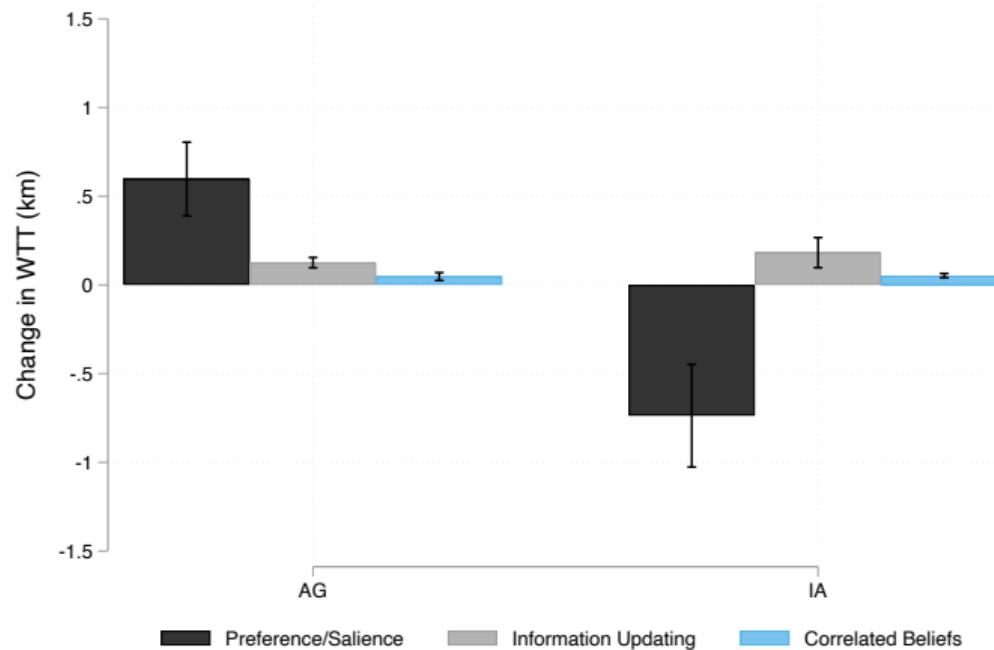
Preference Impact Estimates

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

Preference Impact Estimates

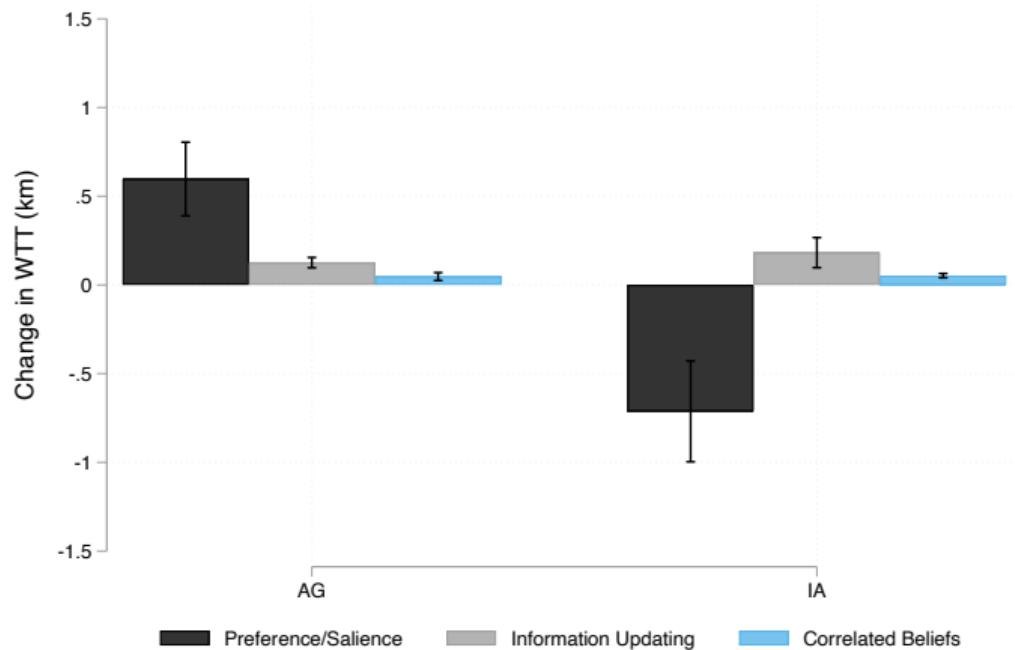
	Without School Effects		With School Effects	
	(1) IA	(2) AG	(3) IA	(4) AG
Treatment				
Untreated	0.392*** (0.093)	0.658*** (0.078)		
Information: IA	-0.972*** (0.174)	0.474*** (0.104)	-0.812*** (0.209)	0.272** (0.131)
Information: AG	-0.865 (0.171)	0.424*** (0.101)	-0.594 (0.199)	0.181 (0.127)
Information: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

Utility Weight Impact Decomposition: Treatment Effects



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

Utility Weight Impact Decomposition: Spillover Effects



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

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)

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)

Social interactions and their implications

- 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

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)

Social interactions and their implications

- 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

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!

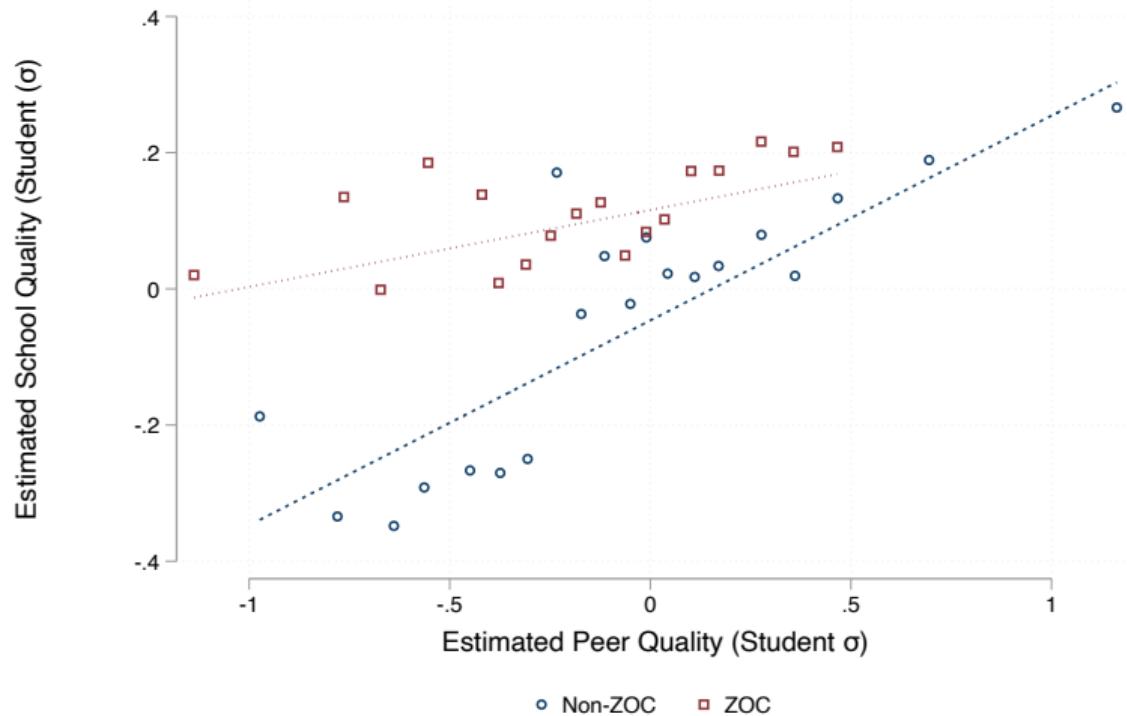
Christopher.Campos@chicagobooth.edu

VAM Validation

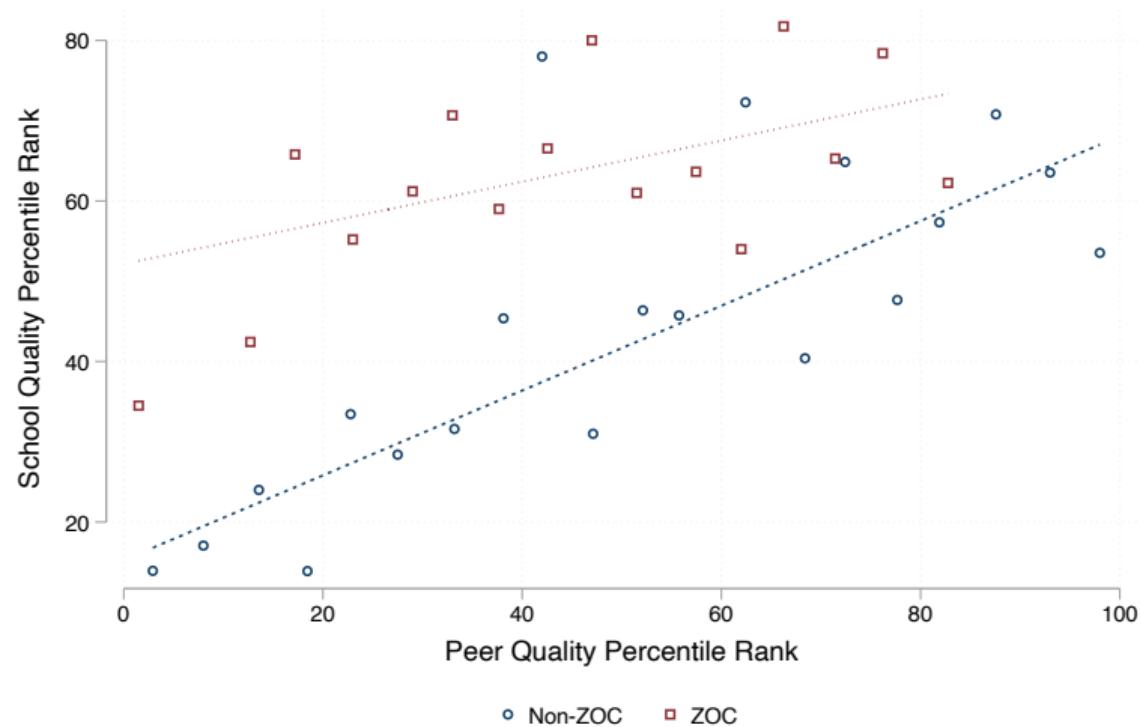
	(1)	(2)
	Uncontrolled	Constant Effect
Forecast Coefficient	.63 (.105) [0]	1.111 (.134) [.41]
First-Stage F	277.507	37.016
Bias Tests:		
Forecast Bias (1 d.f.)	12.528 [0]	.683 [.409]
Overidentification (180 d.f)	172.281 [.647]	187.744 [.331]

▶ Go back

IA-AG Correlation

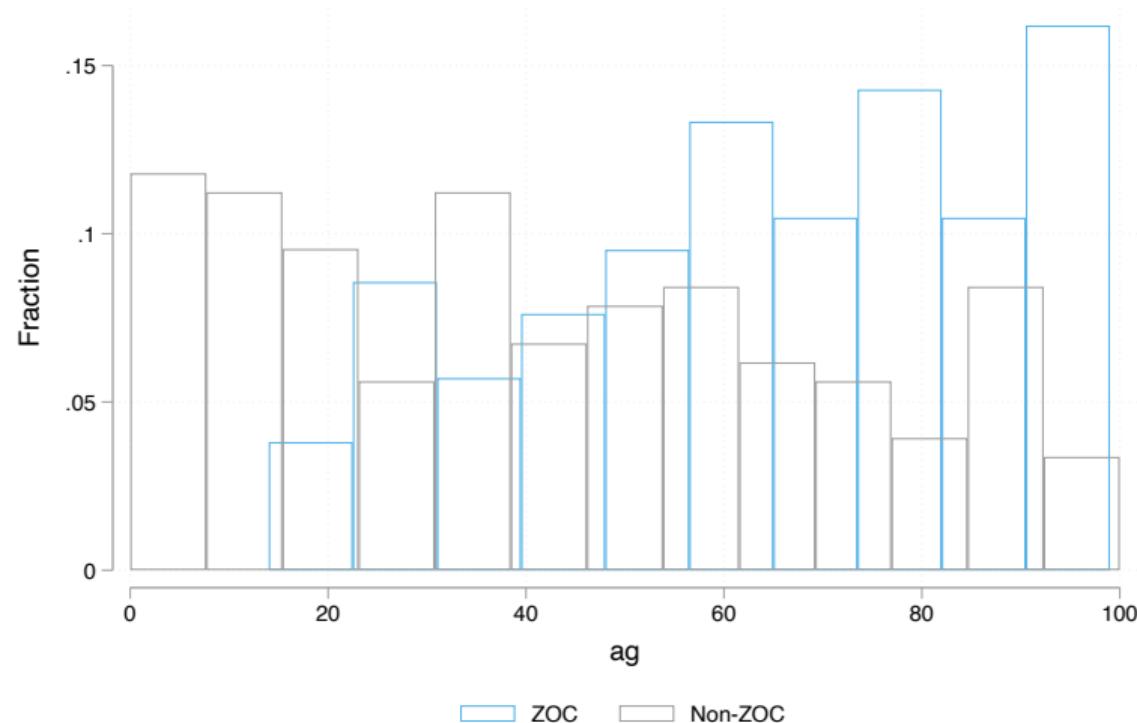


IA-AG Correlation

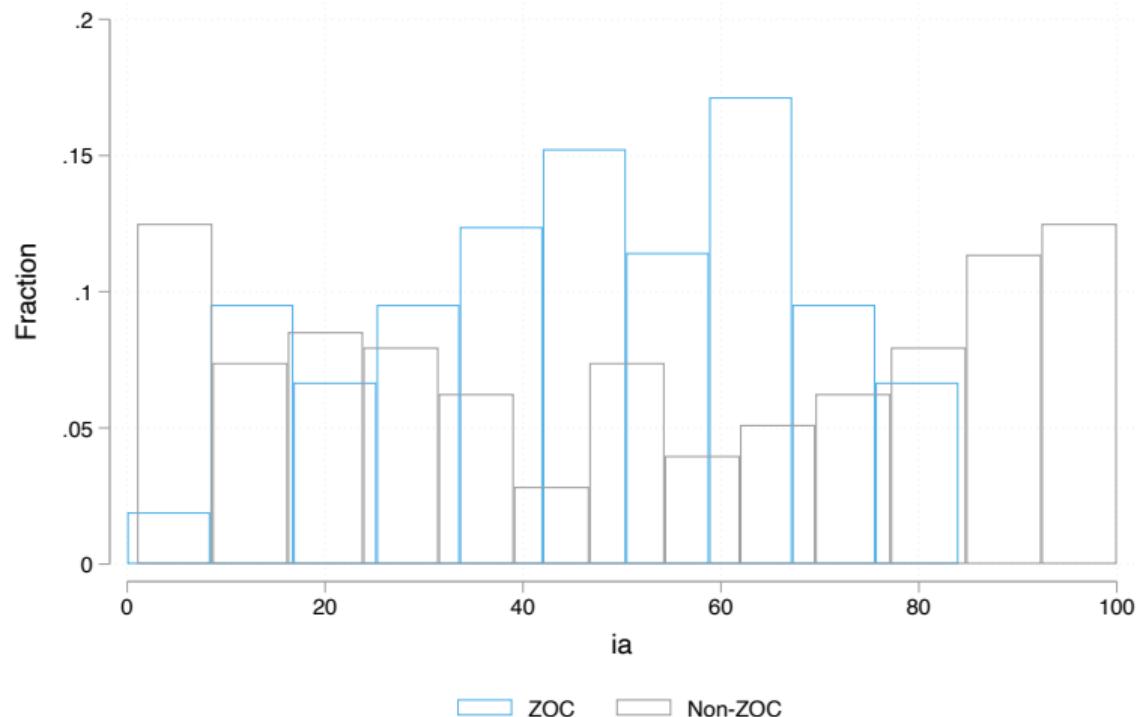


▶ Go back

AG Support



IA Support



▶ Go back

Treatment effects on other school attributes

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

▶ Go back

Treatment Effects across the Rank-Ordered List

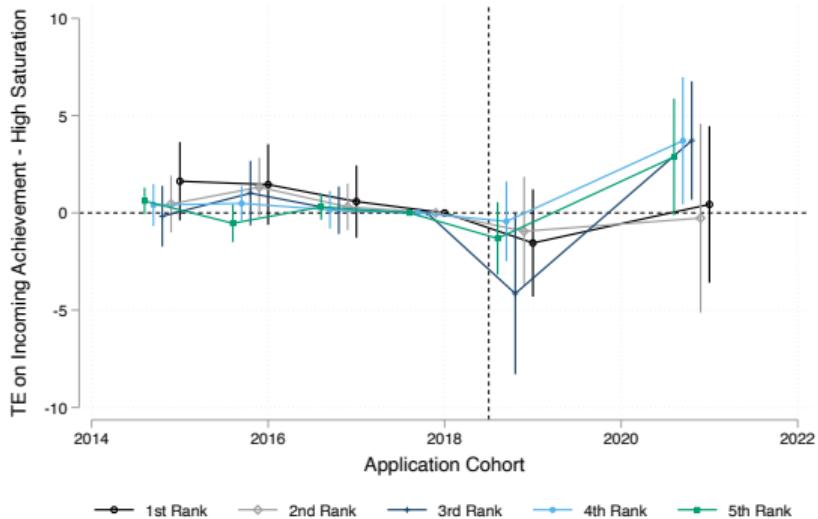


Figure: Effects on IA: High Saturation

Treatment Effects across the Rank-Ordered List

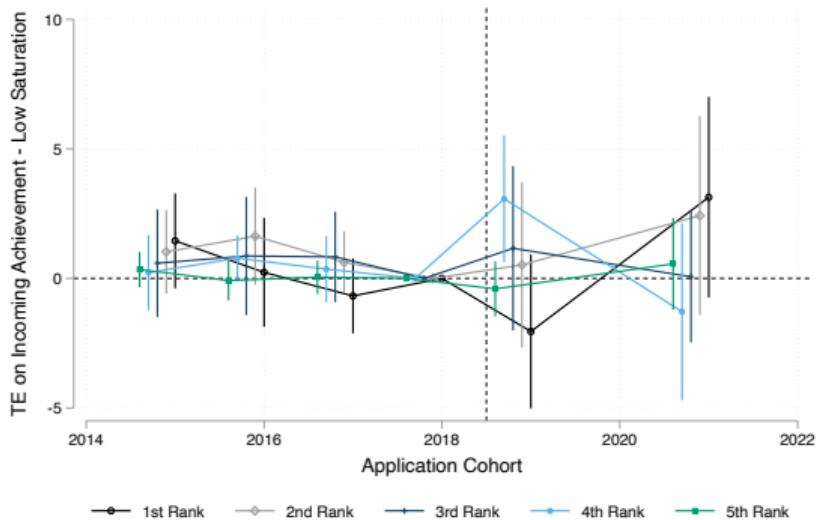


Figure: Effects on IA: Low Saturation

Treatment Effects across the Rank-Ordered List

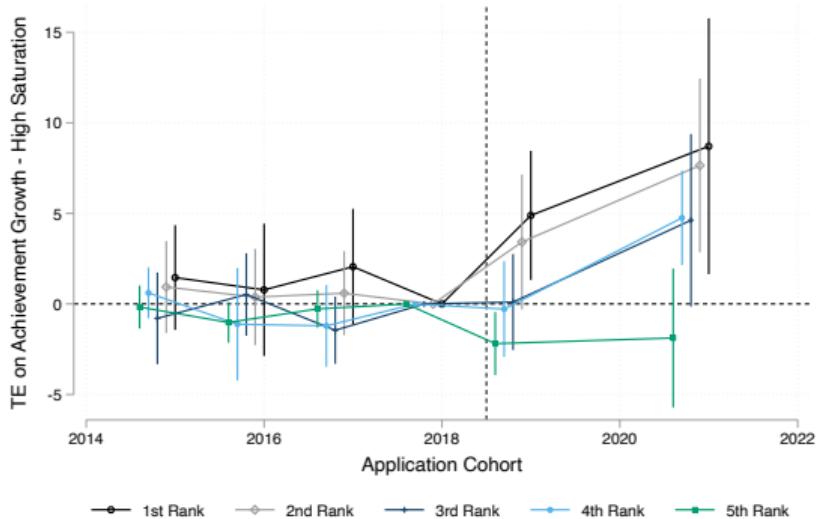


Figure: Effects on AG: High Saturation

Treatment Effects across the Rank-Ordered List

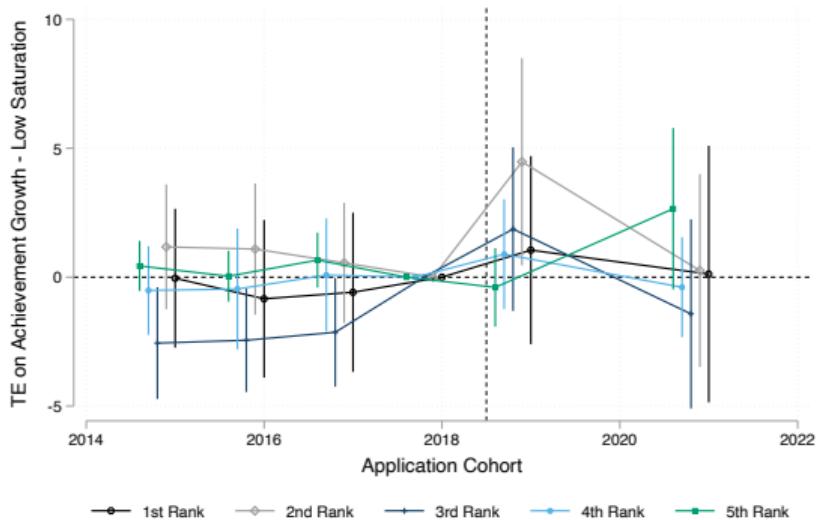


Figure: Effects on AG: Low Saturation

▶ Go back

Other Spillover Specifications

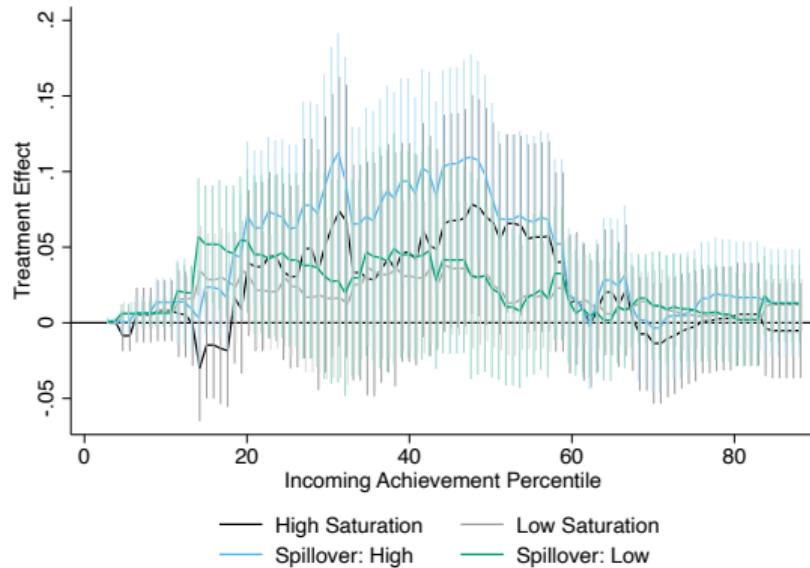


Figure: Impacts on IA Distribution

Other Spillover Specifications

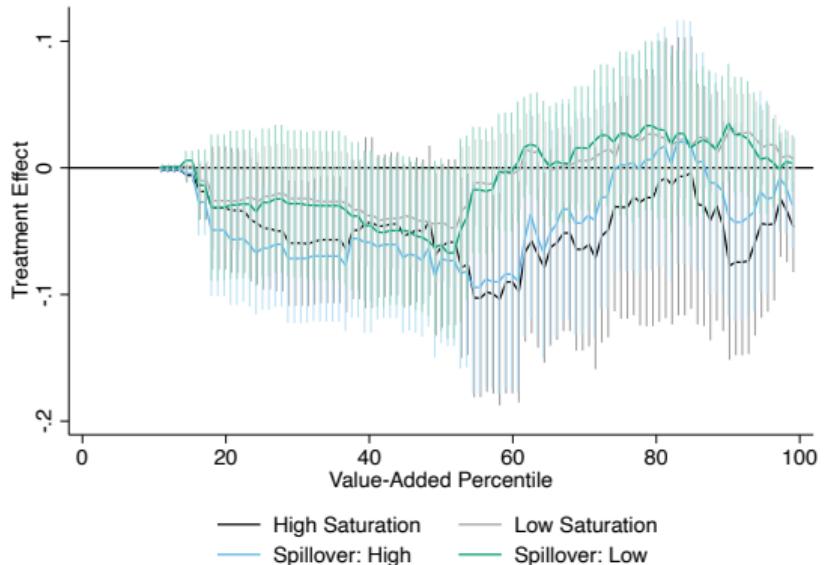
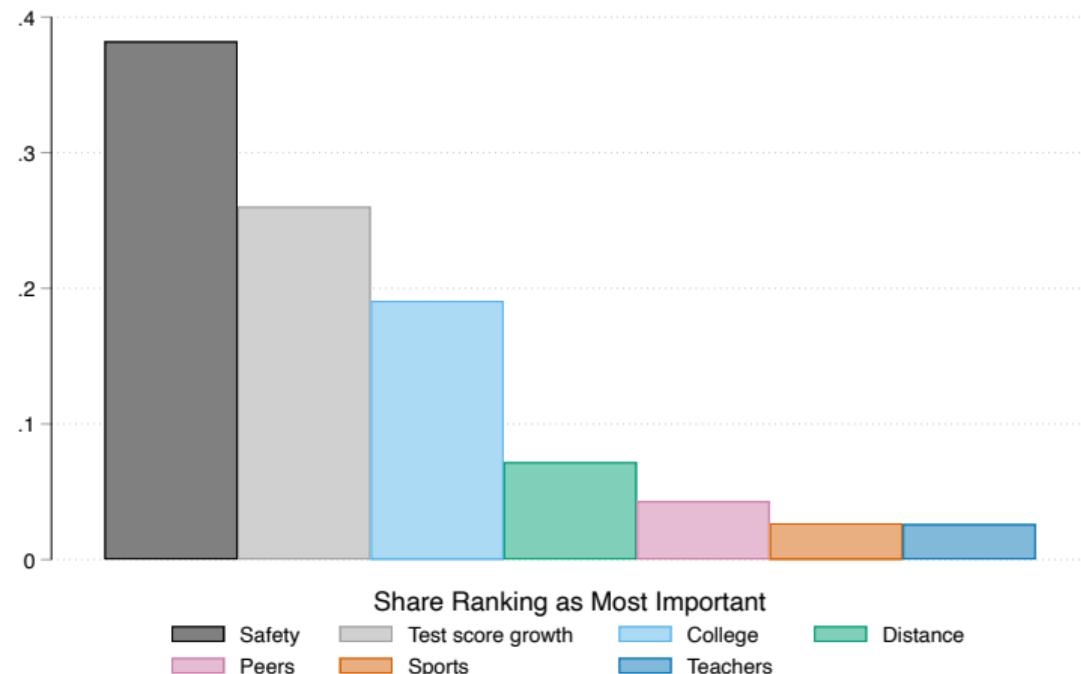


Figure: Impacts on AG Distribution

Survey Summary Statistics - Rankings of desired shcool characteristics



AG-IA Bias Correlation Across Space

