Kumon Up: The Effects of Private Tutoring Centers on Student Achievement

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What The Heck Is This?

The Boston Globe

The 'nuclear arms race' in extracurricular math

Private math classes outside school are more popular than ever. Do the rationales for them really add up?

By Kara Miller Globe Correspondent, Updated May 12, 2025, 3:00 a.m.

Several years ago, when Joshua Goodman was a graduate student at Columbia, he stumbled on an unusual storefront.

It was on the Upper West Side of Manhattan — in what he knew to be a very expensive real estate market — but it held little more than a bunch of desks. And he thought: "What the heck is this?"

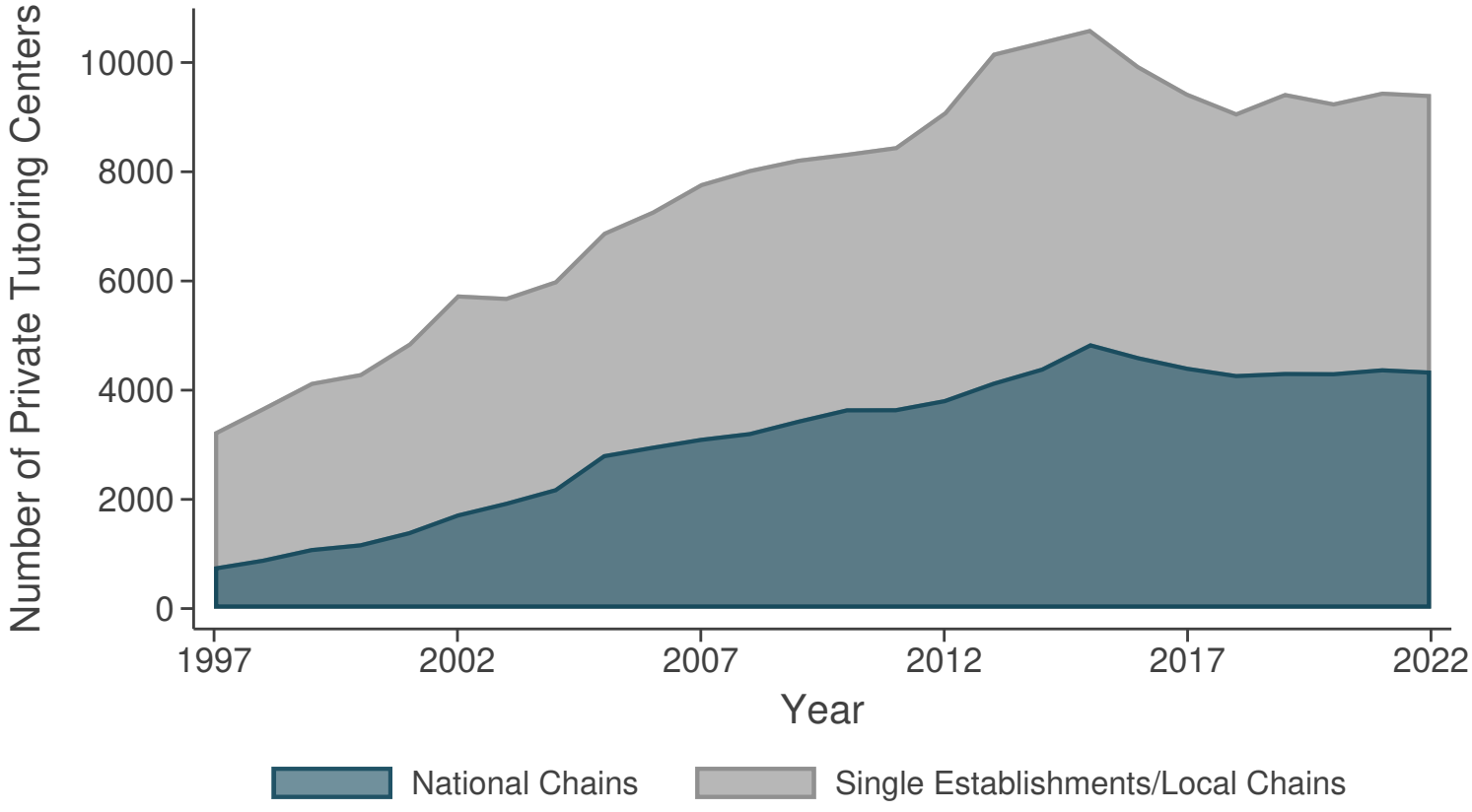
Goodman had discovered Kumon, a private tutoring center that began in Japan in the 1950s and opened its first American outpost in the 1970s.

Kumon In (Brooklyn edition)



Motivation: The Rapid Rise of Private Tutoring

- Over the last 25 years, **private tutoring centers** in U.S. have **tripled**, particularly in high income areas (Kim, Goodman, and West 2024)



- Yet little is understood about the impacts on **student achievement**

Research Questions

1. **Who** uses private tutoring centers?
   - ➔ Descriptive analysis using the Consumer Expenditure Survey

Research Questions

1. **Who** uses private tutoring centers?
   - ➔ Descriptive analysis using the Consumer Expenditure Survey
2. **What are the impacts** on student achievement?
   - ➔ Staggered difference-in-differences of tutoring center *openings* on district level achievement
   - ➔ Motivated by descriptive analysis, explore heterogeneity by race and income

Related literature

Speaks to literatures on:

- Tutoring (one-on-one and small group)
- Tracking students by ability
- Role of private parental investments in children

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2 Who Uses Tutoring Centers?

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What are Private Tutoring Centers?

- Supplemental, for-profit education services run outside of school
- Typically teach K-12 subjects and test preparation
- Kim, Goodman, and West (2024) document their prevalence in high-income and heavily Asian-American areas

- Focus on centers with *physical locations*:
  - ➔ **"Chains"**: National brands such as Kumon and Mathnasium
  - ➔ **"Non-Chains"**: Single establishments or local chains

Top 10 Tutoring Center Chains

Table 1. Top 10 Tutoring Chains

Company	Unique–Locations from 1997–2022	Unique Locations in 2022
Kumon	3,483	1,890
Sylvan	2,286	605
Club Z	972	182
Huntington	946	360
Mathnasium	922	619
Tutor Doctor	334	182
Eye Level	329	218
Kaplan	290	23
Tutoring Club	272	70
Princeton	163	8
Total of top 10	9,997	4,157
All centers	33,396	9,622

Data Sources

- **Data Axle**: Location and chars. of tutoring centers (1997–2022)
  - ➔ Business names and addresses
  - ➔ Identify firms with SIC codes for "Tutoring" and "Test Preparation Instruction"
  - ➔ Hand code chain vs. non-chain status

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- **Consumer Expenditure Survey**: Monthly household spending on tutoring (2009–2023)
  - ➔ HHs that report expenditures on "Test preparation, tutoring services"
  - ➔ Restrict to HHs with children ages 6-17, non-summer months
  - ➔ Demographics: race, income, state of residence

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- **Stanford Education Data Archive (SEDA)**: School district test score data (2009–2019)
  - → All US public school districts for grades 3-8
  - → District demographics and characteristics
  - → Yearly math and reading test scores by race, income, and gender
  - → Match tutoring center locations to school districts (point-in-polygon)

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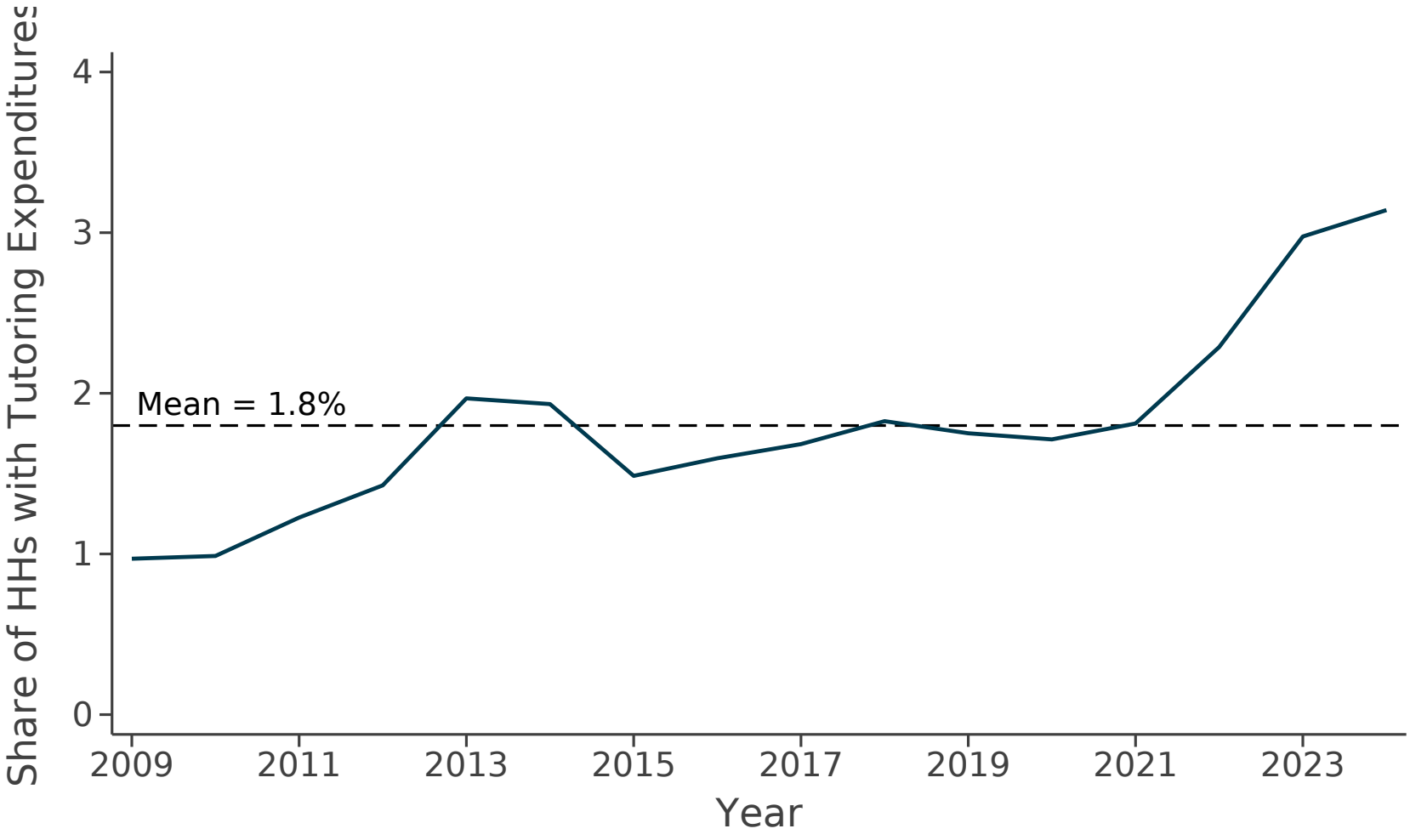
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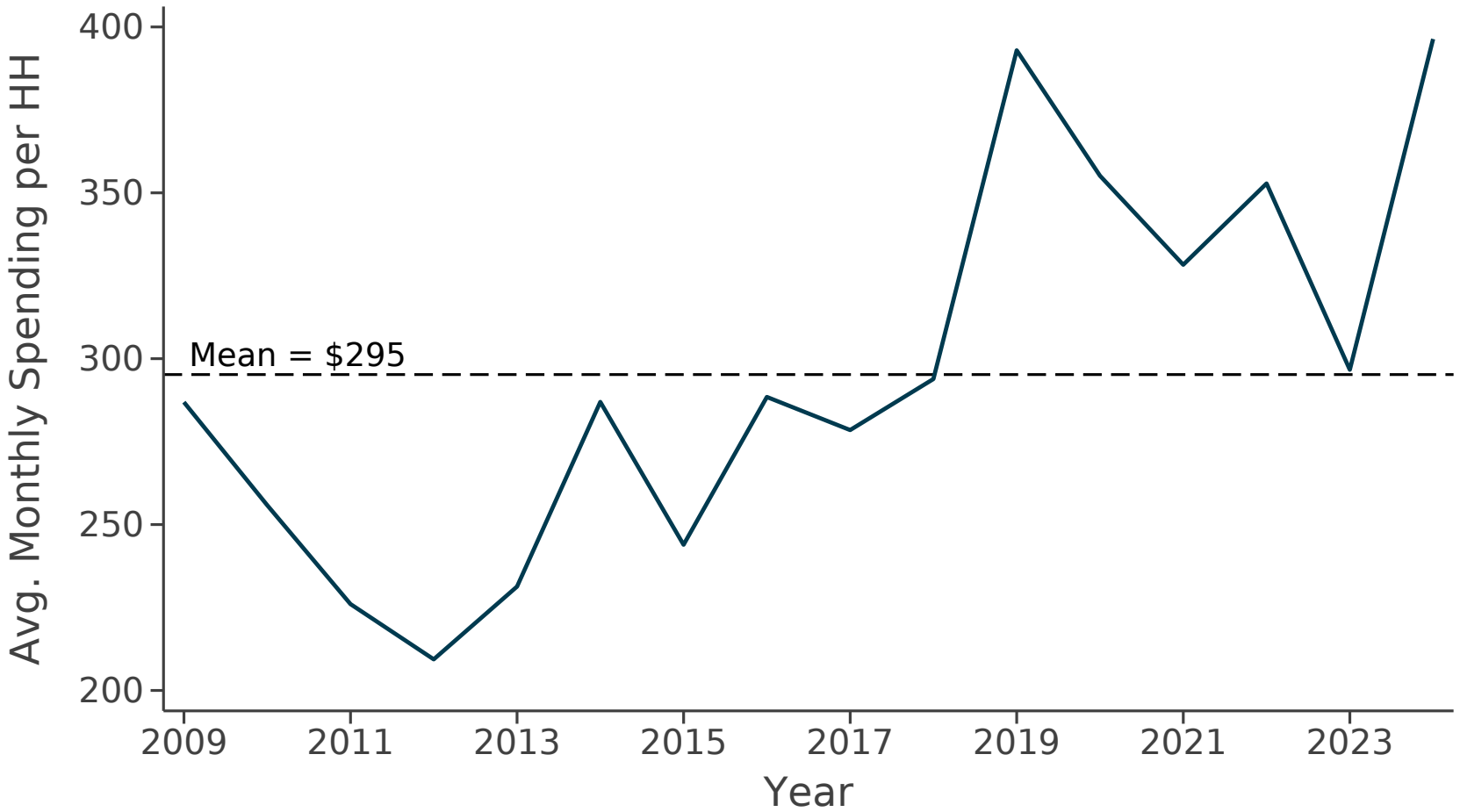
Growth of Tutoring Over Time

- Fraction of HHs spending on tutoring tripled (to 3%) from 2009-24



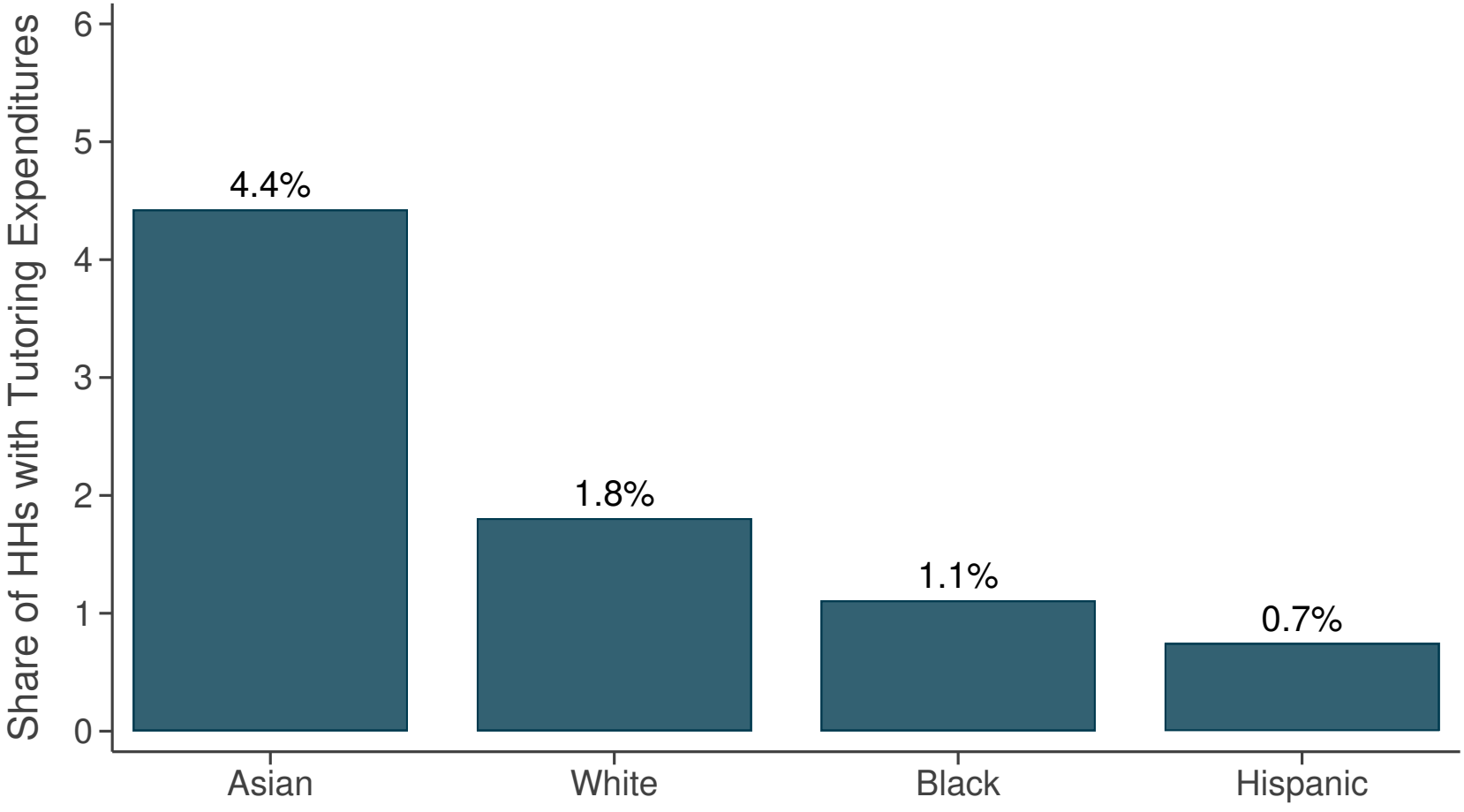
Growth of Tutoring Over Time

- HHs that spend on tutoring spend $300/month (upward trend)



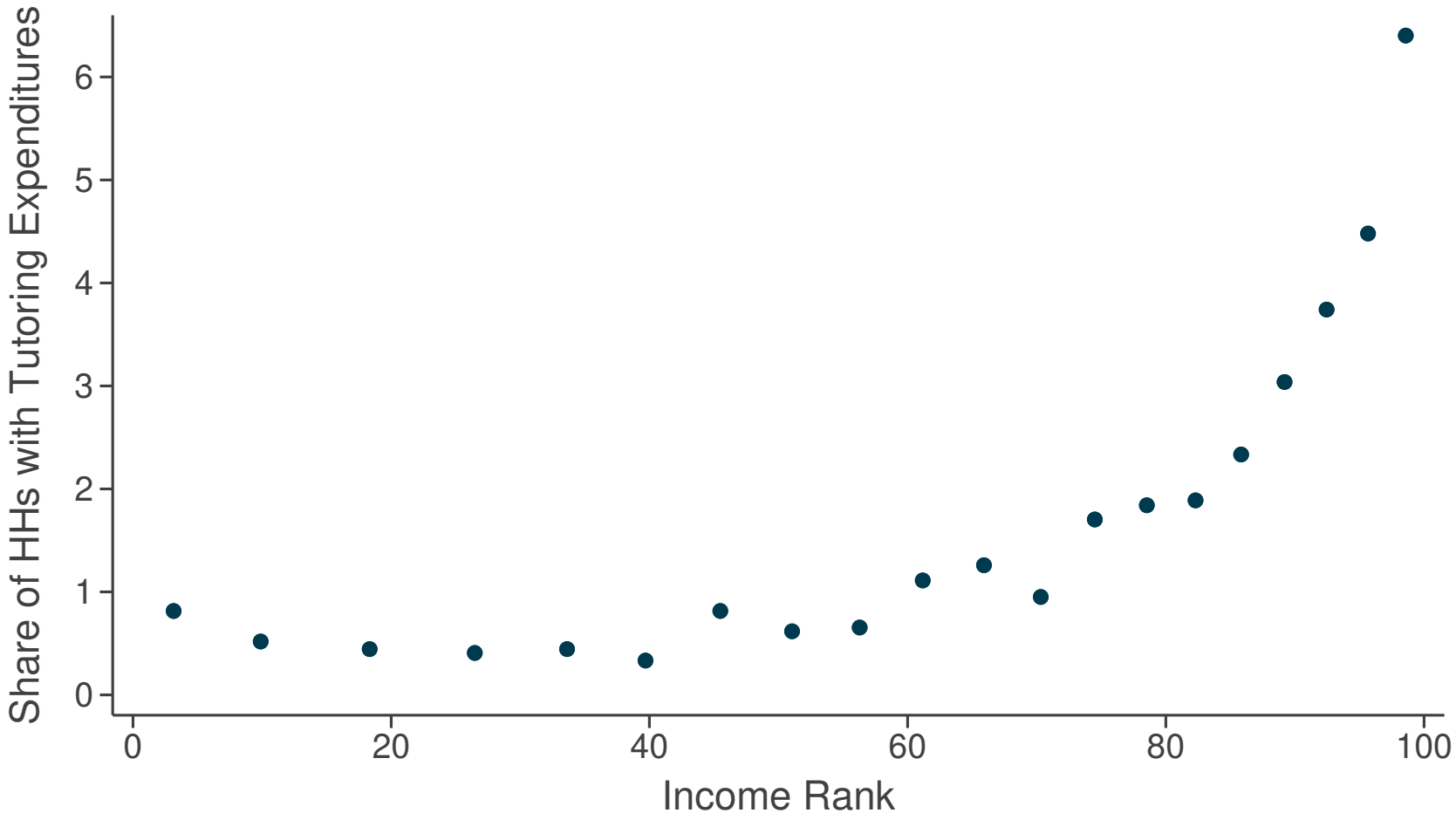
Heterogeneity by Race/Ethnicity

- Highest usage among Asian and White families
- Less usage among Black and Hispanic families



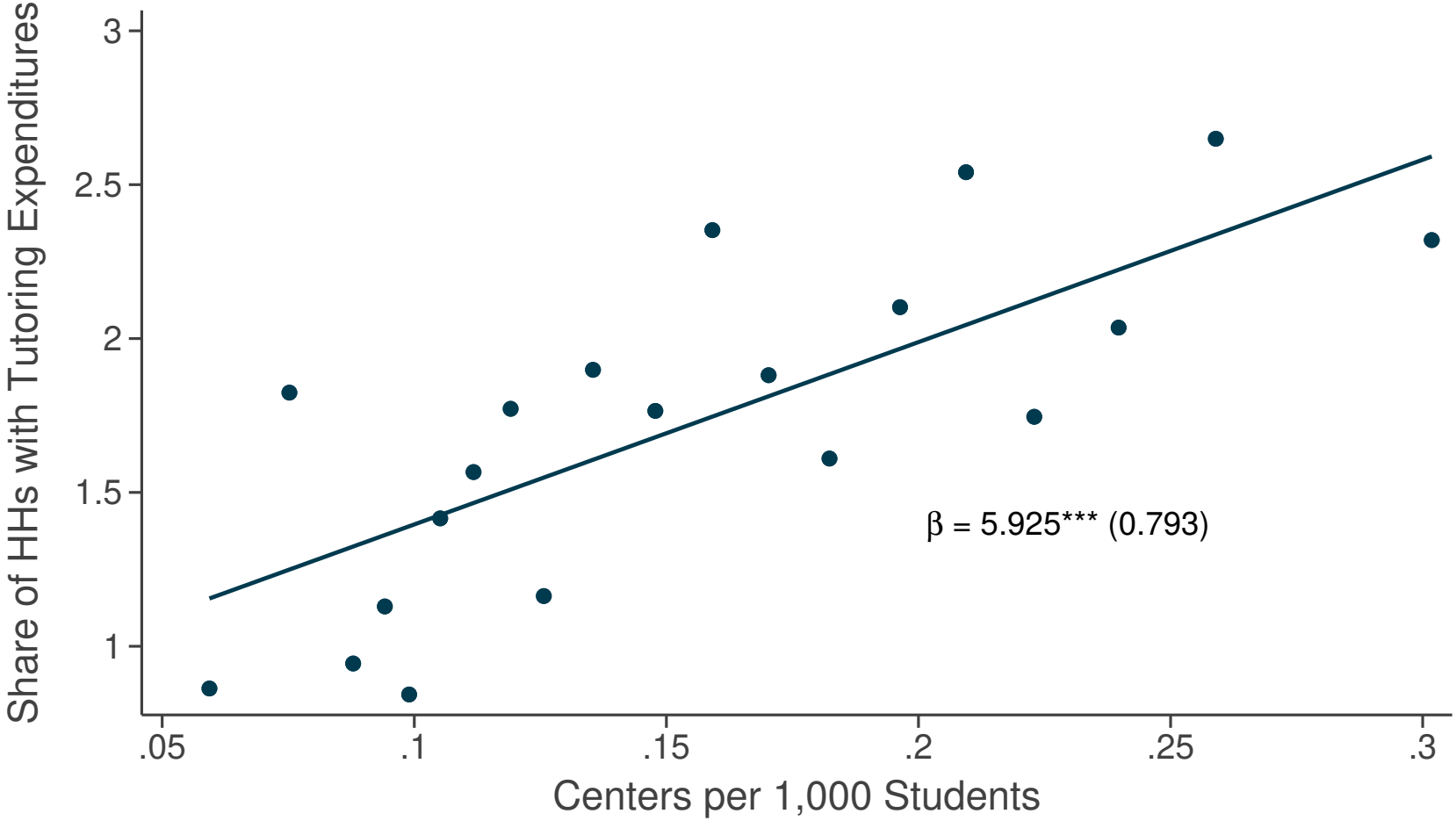
Heterogeneity by Income

- Usage is concentrated among 10-20% of highest income families



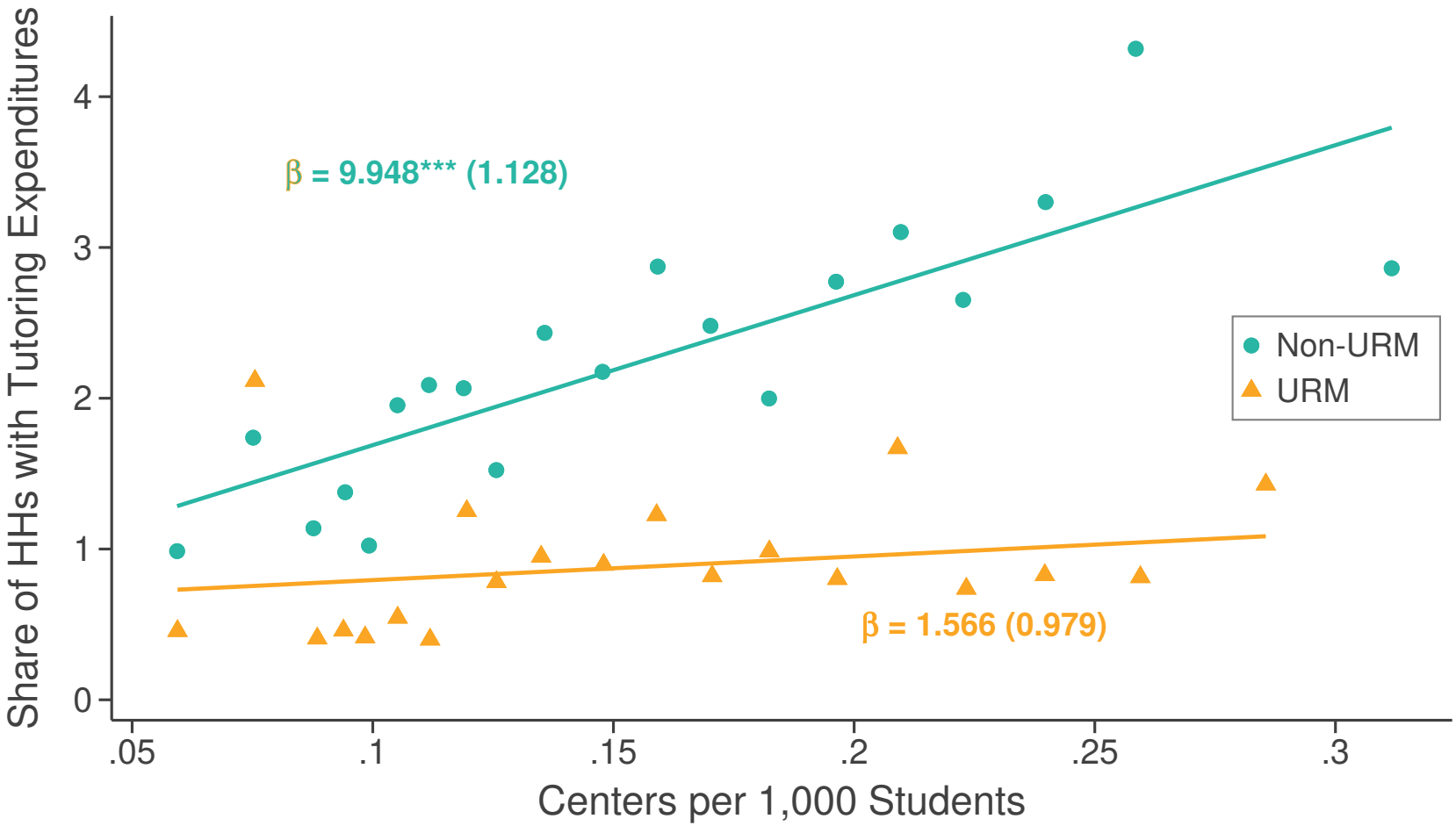
Connecting Spending Data to Tutoring Center Data

- At state-year level, strong relationship between tutoring centers per 1,000 children (5-17) and tutoring spending



Spending/Center Relationship by Race

- Spending/center relationship is driven by White/Asian families
- Less relationship for Black/Hispanic families (non-center tutoring?)



Spending/Center Relationship by Income

- Spending/center relationship is driven by higher income families
- Less relationship for lower income families

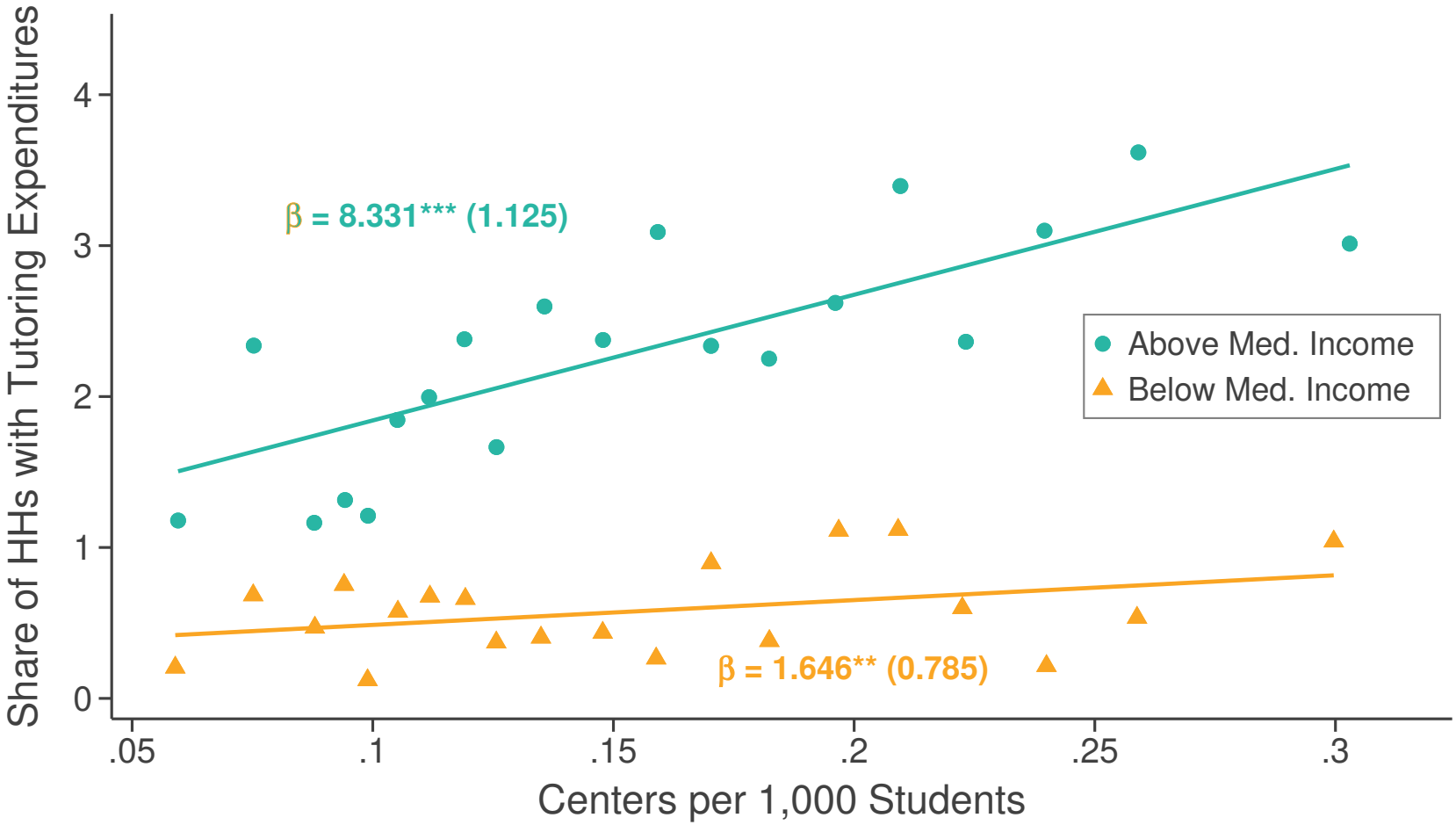


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Empirical Strategy

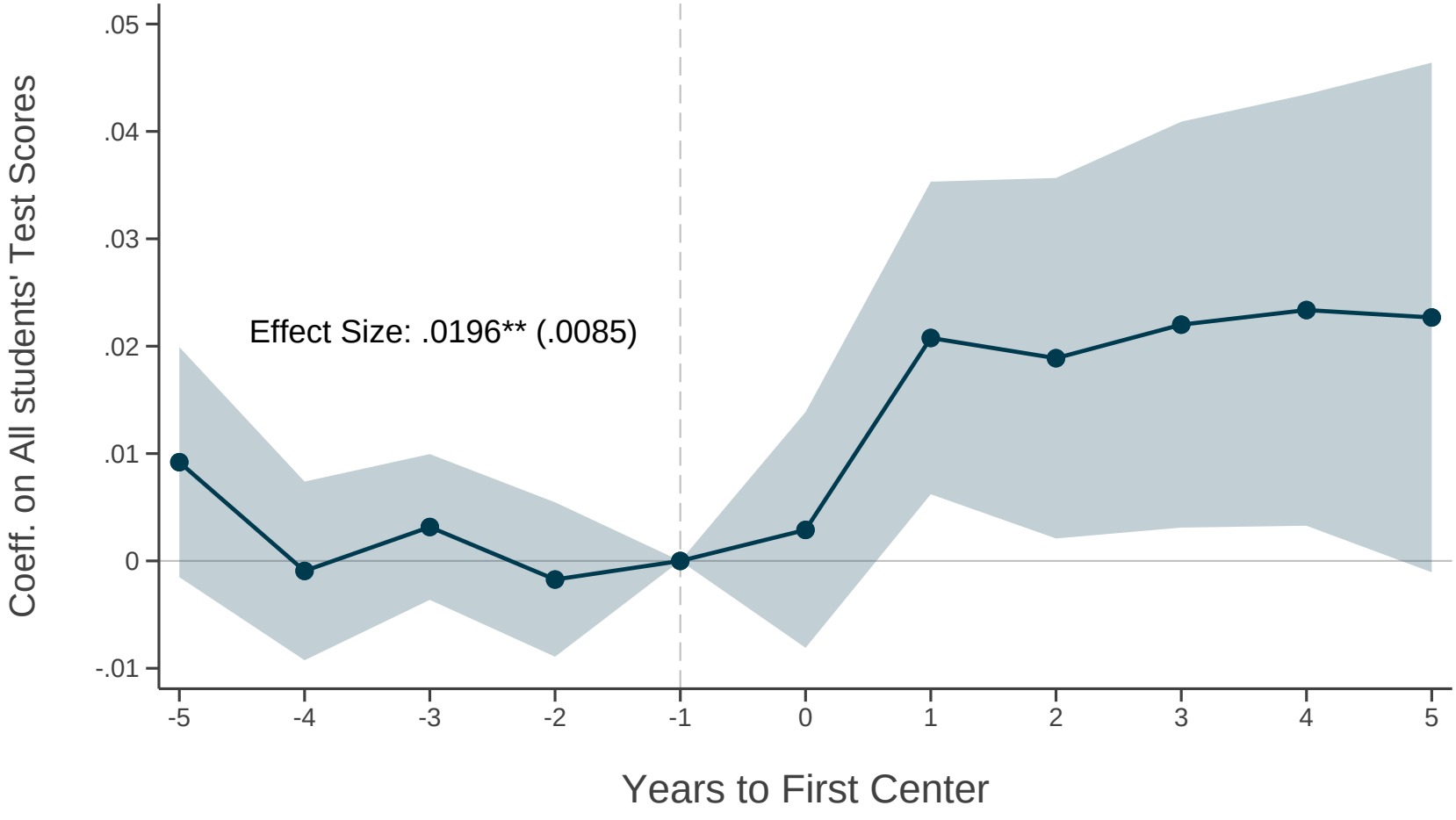
- **Staggered Difference-in-Difference**: School districts that **gain** their *first* tutoring center between 2010–2019 Histogram of Center Openings
  - ➔ Seperately for Chains and Non-Chains, look at impact on balanced sample of district-grade-level math test scores
- **Method**: Gardner (2022) two-stage difference-in-differences
  - ➔ First stage: Estimate district and year fixed effects on never-treated and not-yet-treated observations
  - ➔ Second stage: Regress residualized outcomes on relative year indicators
  - ➔ Robust to staggered treatment timing and heterogeneous treatment effects
  - ➔ Unit of observation is a district-grade-year, bootstrap standard errors clustered at district level
- **Identification**: relies on the **parallel trends assumption**
  - ➔ Absent the opening of a tutoring center, test scores in treated districts would have followed the same trends as test scores in control districts

Treated vs. Control Districts

- Treated districts are higher income, much more suburban, more Asian

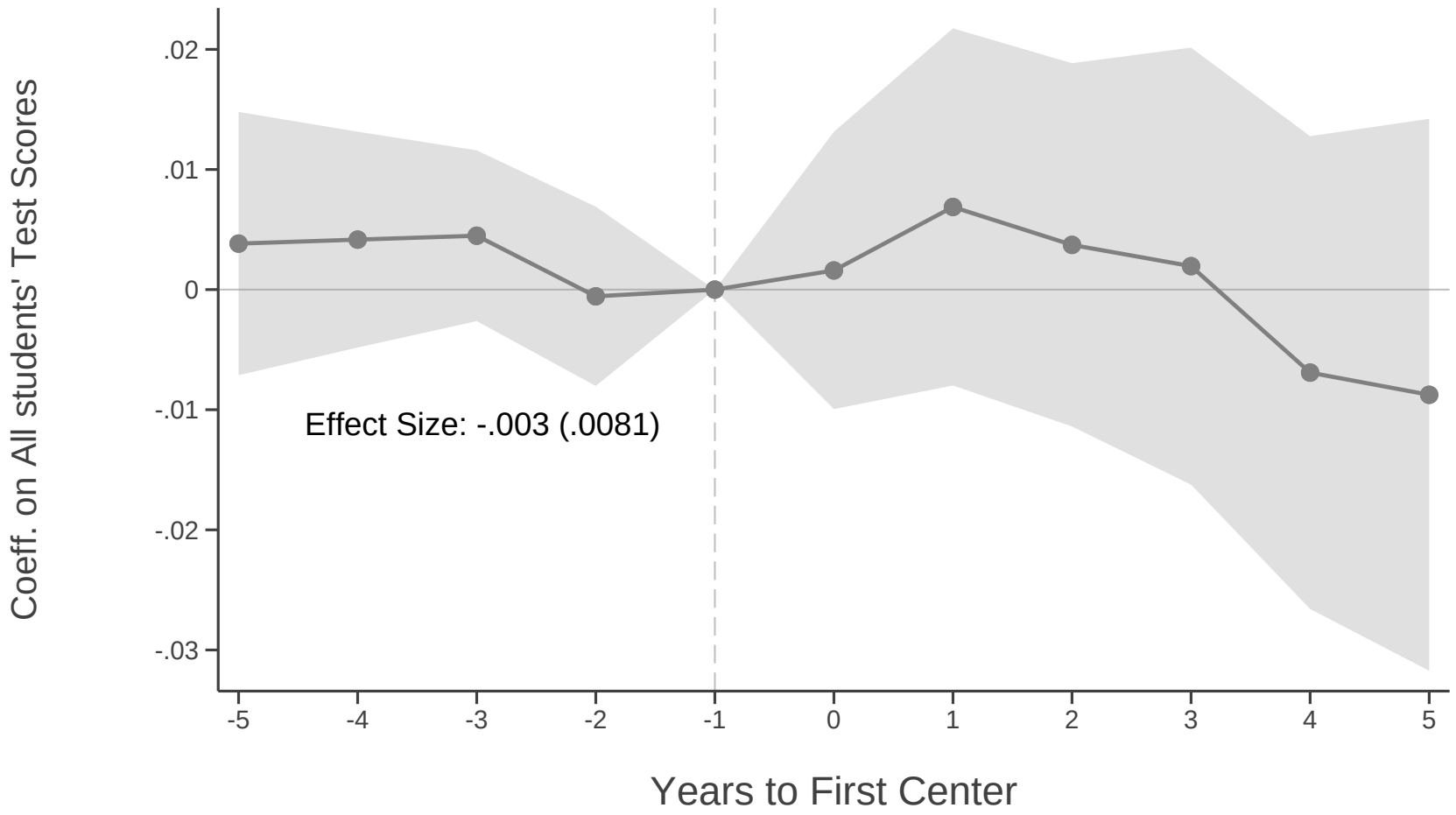
	Mean Characteristics of School Districts in 2009				
	All Centers	Treated Districts		Control Districts	
		Chain	Non-Chain	Chain	Non-Chain
	(1)	(2)	(3)	(4)	(5)
Enrollment & Achievement					
Number of Children Ages 5-17	4888	5720	4965	2129	1866
Enrollment per Grade	346	421	375	157	139
Math Test Score (Std.)	0.009	0.117	0.055	-0.028	-0.013
Tutoring Centers					
Number of Chains	0.321	0	0.304	0	0.041
Number of Non-Chains	0.409	0.488	0	0.063	0
Demographics					
Percent White	75.0%	69.5%	69.9%	77.9%	80.0%
Percent Asian	2.1%	3.9%	2.9%	1.1%	1.1%
Percent URM	22.6%	26.1%	26.8%	20.8%	18.8%
Percent Econ. Disadvantaged	44.2%	37.1%	40.6%	46.5%	45.2%
Share in Suburban Schools	23.1%	45.9%	39.9%	14.9%	13.5%
Segregation					
White-Black Information Index	0.056	0.063	0.056	0.042	0.037
White-Hispanic Information Index	0.045	0.053	0.045	0.032	0.028
Economic Information Index	0.029	0.044	0.035	0.016	0.014
District-Grade Observations	42,412	2,041	2,318	32,165	28,859

First Chains Raise Math Achievement by 0.02 SD



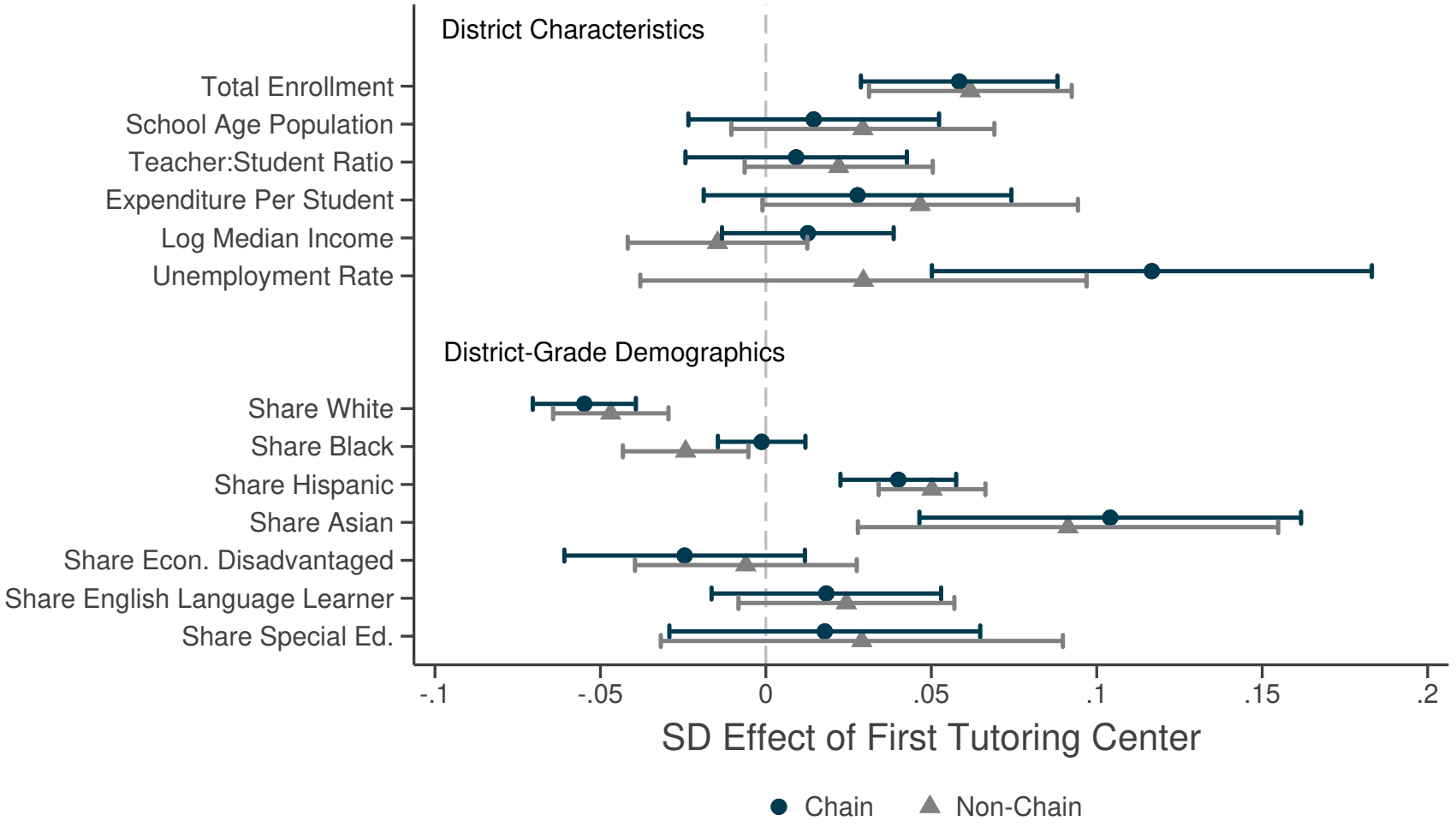
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First Non-Chains Have No Clear Impact

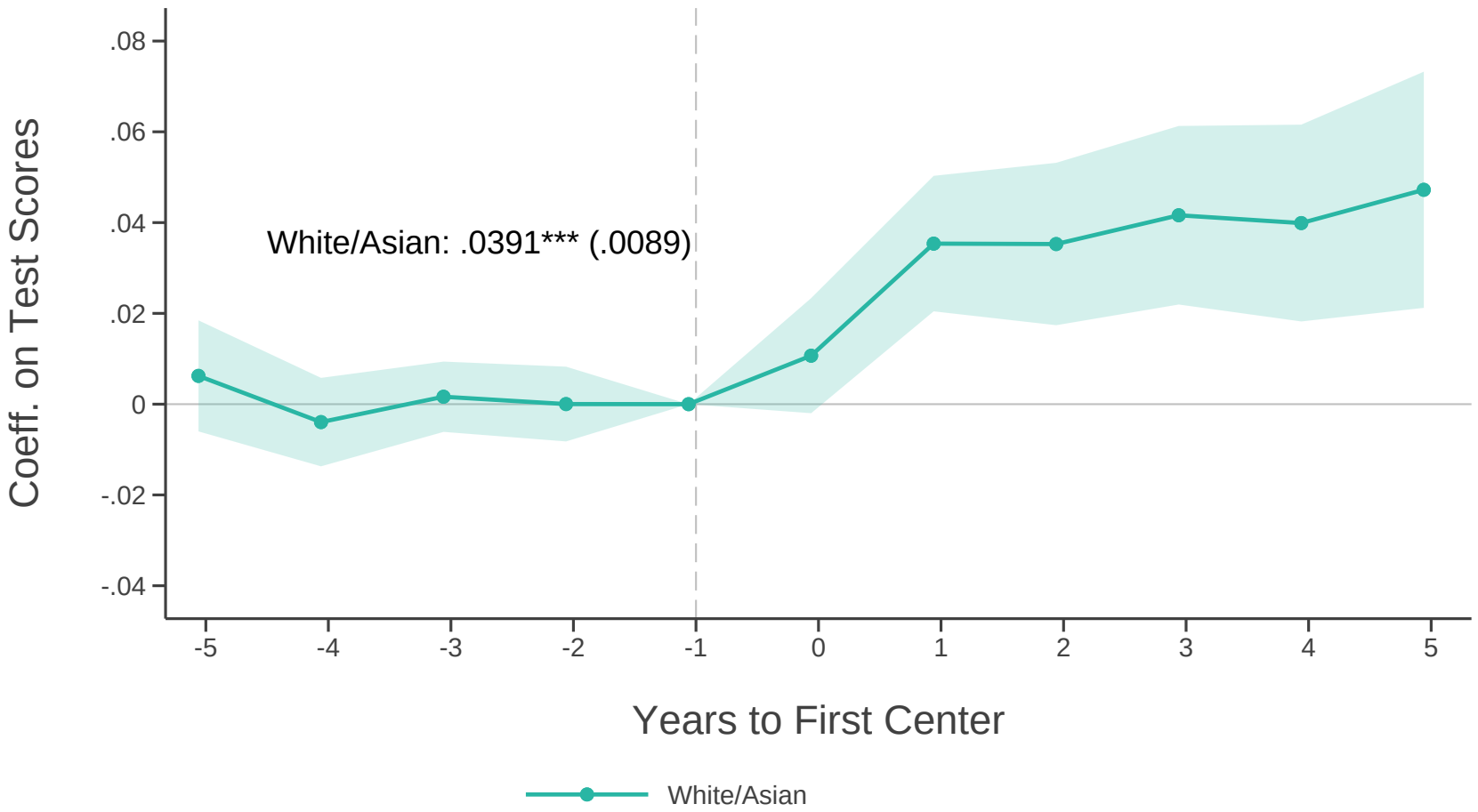


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District Characteristics Are Fairly Stable After 1st Center

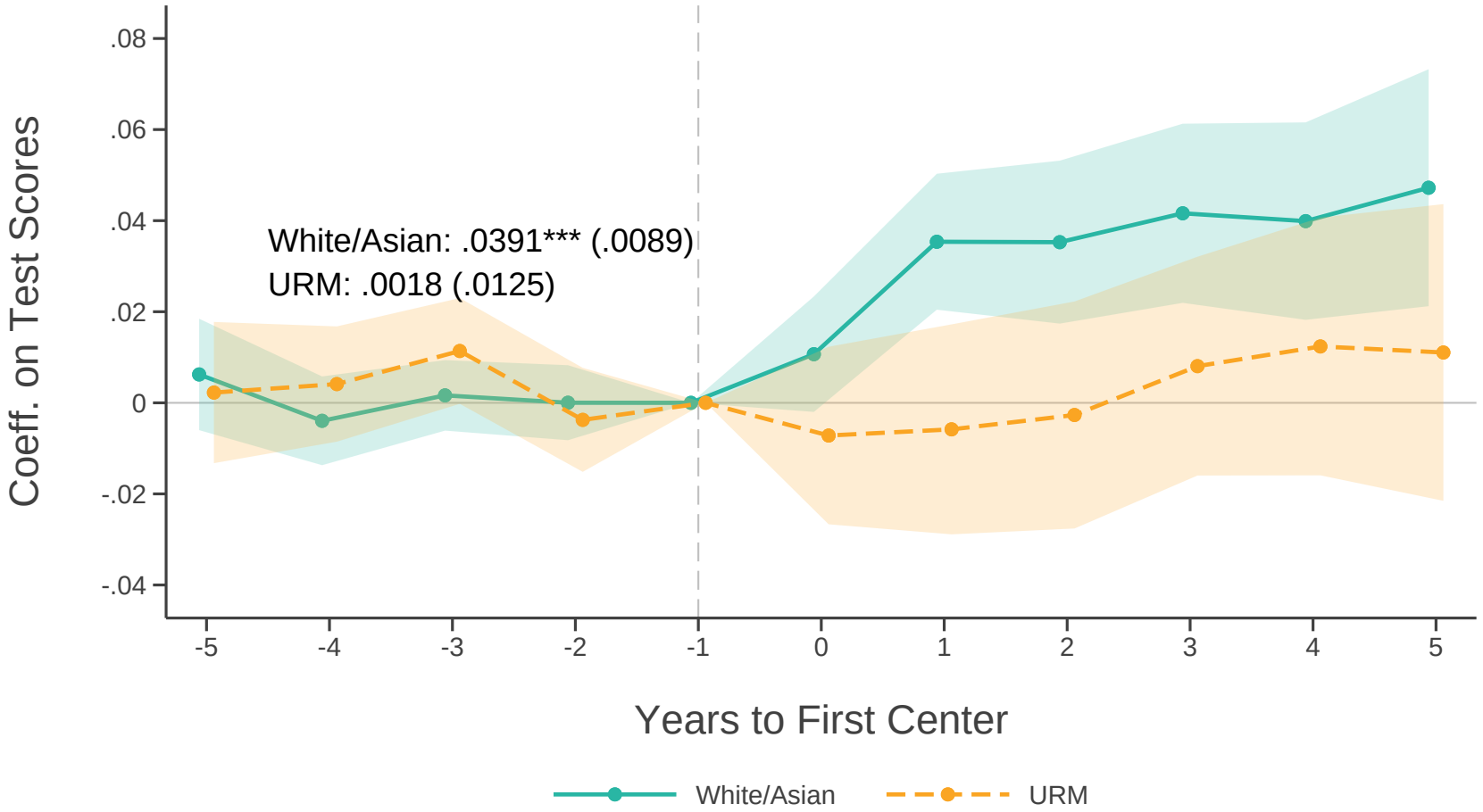


White/Asian Students See Math Increase by 0.04 SD



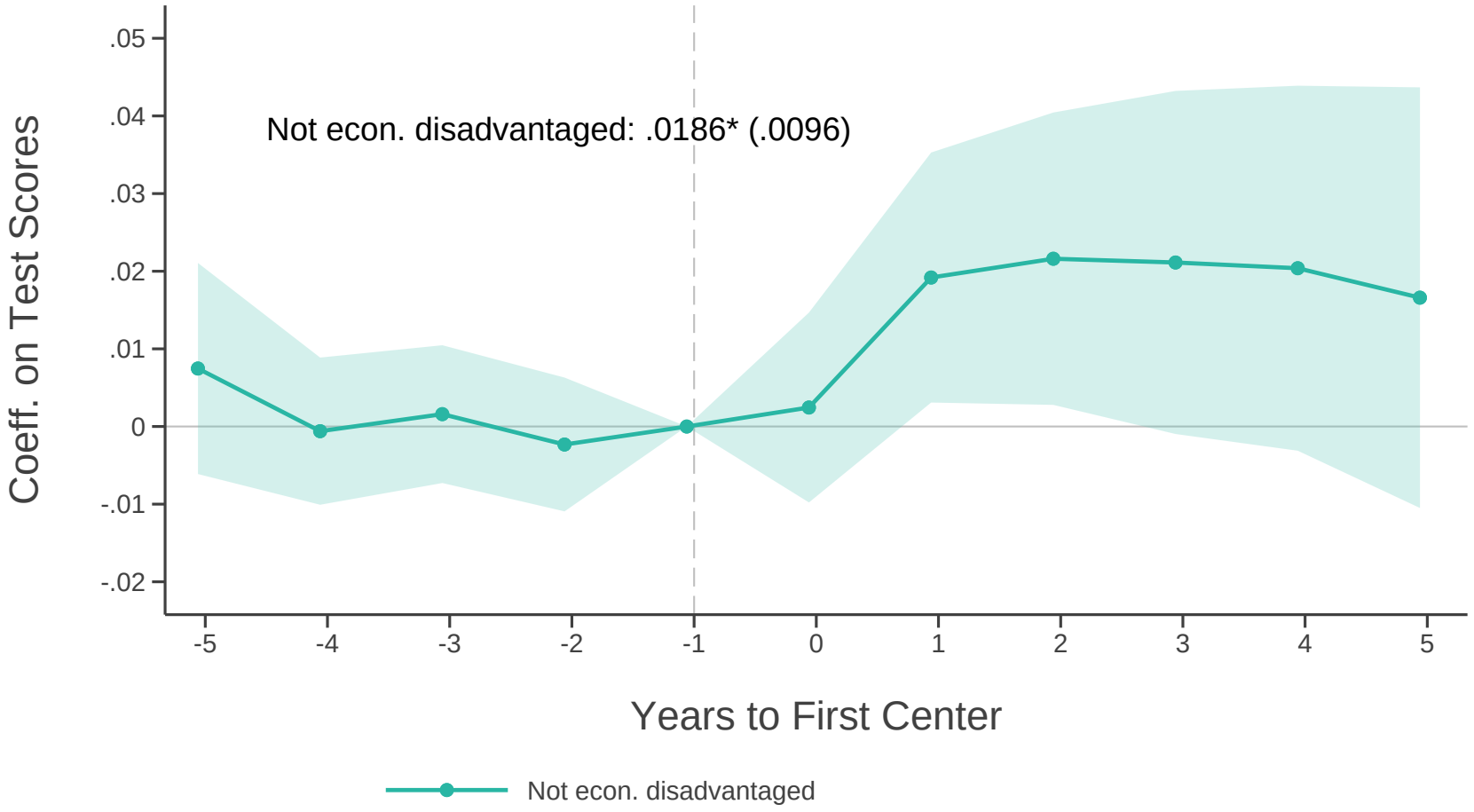
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Black/Hispanic Students See No Clear Math Increase



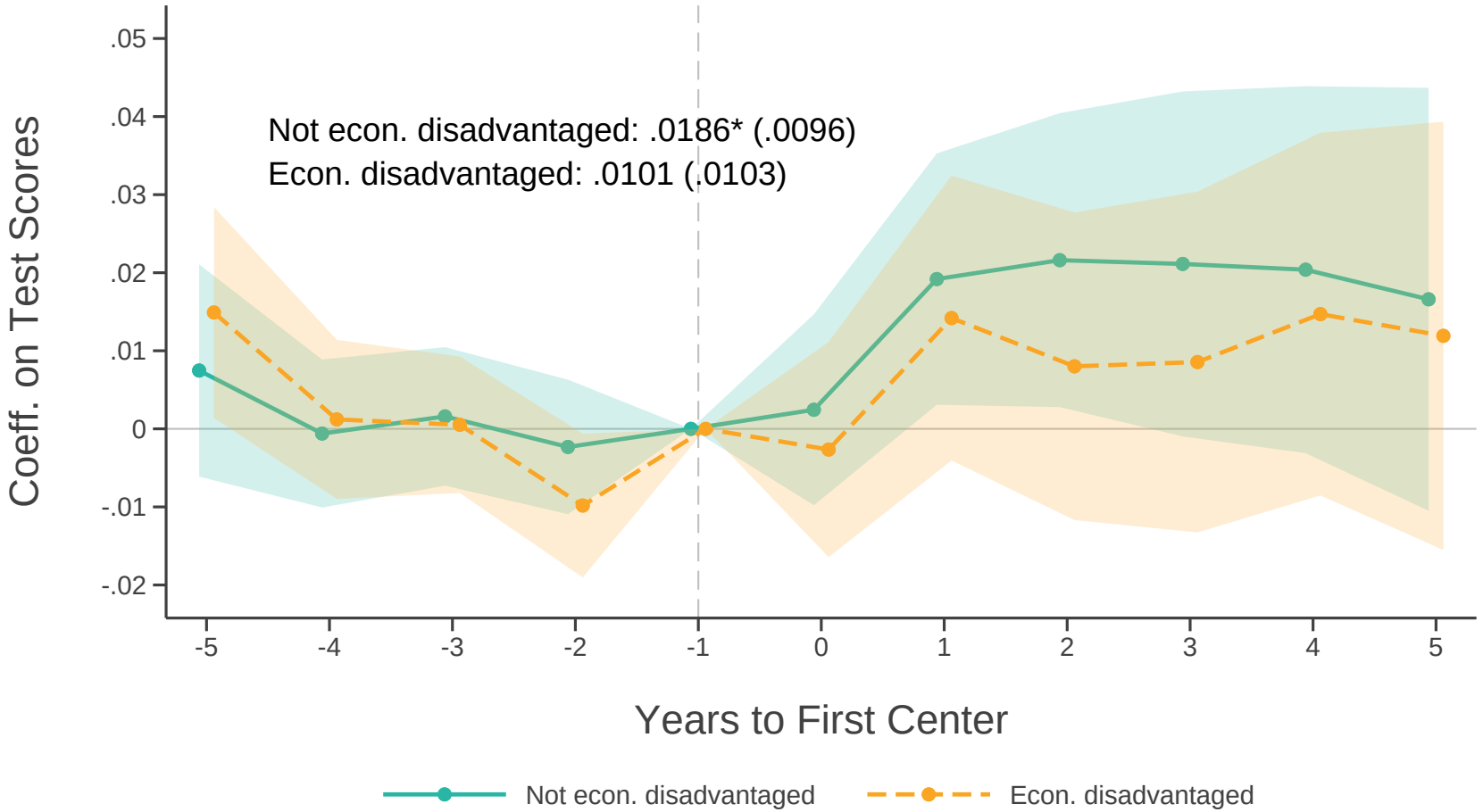
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Heterogeneity by Income is Less Clear (?)



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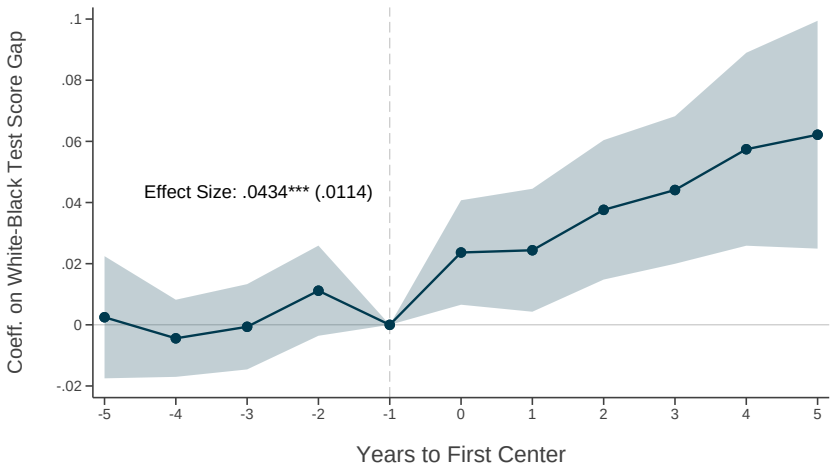
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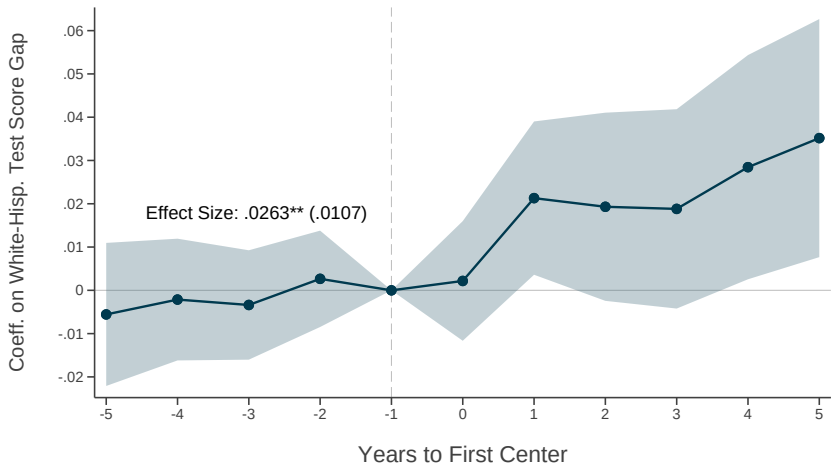
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Impact of First Chain on Test Score Gaps

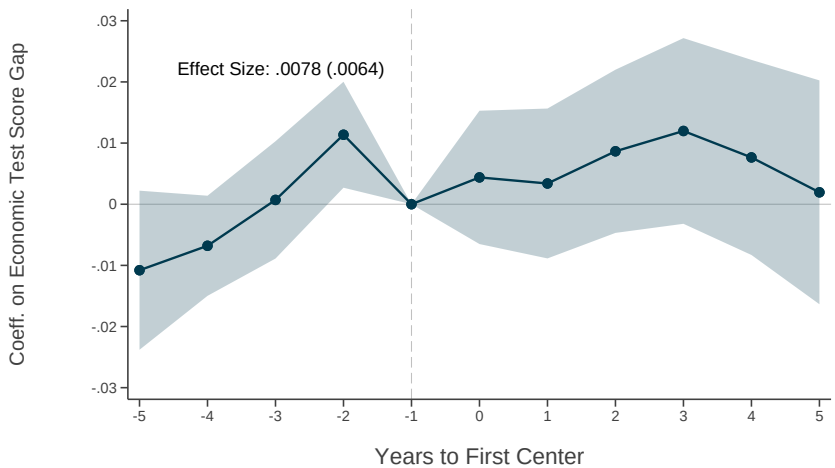
(a) White-Black Gap



(b) White-Hispanic Gap



(c) Economic Gap



First Chain Centers vs. All Chain Centers

	Chains			
Model	2-Stage DiD	TWFE	TWFE per 1,000	TWFE per 1,000
All Students	0.0196**	0.0248***	0.0262**	0.0219***
	(0.0085)	(0.0092)	(0.0129)	(0.0076)
District-Grade Observations	33,203	33,204	32,807	40,620
Sample	First Center	First Center	First Center	All Centers

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Grade Level				
Grades 3-5	0.0214**	0.0290***	0.0295**	0.0312***
	(0.0095)	(0.0104)	(0.0150)	(0.0091)
Grades 6-8	0.0162*	0.0183*	0.0199	0.0095
	(0.0088)	(0.0105)	(0.0154)	(0.0091)
Gender				
Male	0.0195**	0.0244**	0.0402***	0.0258***
	(0.0092)	(0.0099)	(0.0147)	(0.0088)
Female	0.0188**	0.0246**	0.0421**	0.0330***
	(0.0088)	(0.0096)	(0.0176)	(0.0092)
Race/Ethnicity				
White	0.0308***	0.0352***	0.0372**	0.0190**
	(0.0097)	(0.0097)	(0.0148)	(0.0083)
Black	-0.0162	-0.0094	-0.0051	-0.0016
	(0.0160)	(0.0184)	(0.0428)	(0.0225)
Hispanic	0.0008	0.0038	0.0280	0.0174
	(0.0125)	(0.0146)	(0.0422)	(0.0205)
Asian	0.0451	0.0834**	0.0680	0.0248
	(0.0328)	(0.0403)	(0.0781)	(0.0247)
Economic Status				
Non-Econ. Disadvantaged	0.0186*	0.0225**	0.0195	0.0195**
	(0.0096)	(0.0101)	(0.0136)	(0.0079)
Econ. Disadvantaged	0.0101	0.0077	0.0322	0.0246*
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Sample	First Center	First Center	First Center	All Centers

Find no impacts across groups and models for Non-Chains & Reading Test Scores

Thoughts and Next Steps

- No literacy effects is consistent with centers' primary focus on math
- Are magnitudes reasonable?
  - Tutoring effects $\approx$ 0.4 SD (Nickow, Oreopoulos, and Quan 2020)
  - $0.02/0.4 = 0.05 \rightarrow 5\%$ of students treated
  - Per 1000 students = 50 students per center
  - May also be spillovers onto students not using tutoring centers (peer effects; freeing teacher time)
- Working on
  - Defining exposure by distance to school district center (not within boundaries)
  - Understanding lack of heterogeneity by income
  - Estimating contribution to national test score trends and race/income gaps

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- 0.04 SD effect on White/Asian student's math scores
  - ➔ On the order of magnitude of a $1,000 increase in per-pupil spending (Jackson and Mackevicius 2024)
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  - ➔ Widens racial achievement gaps

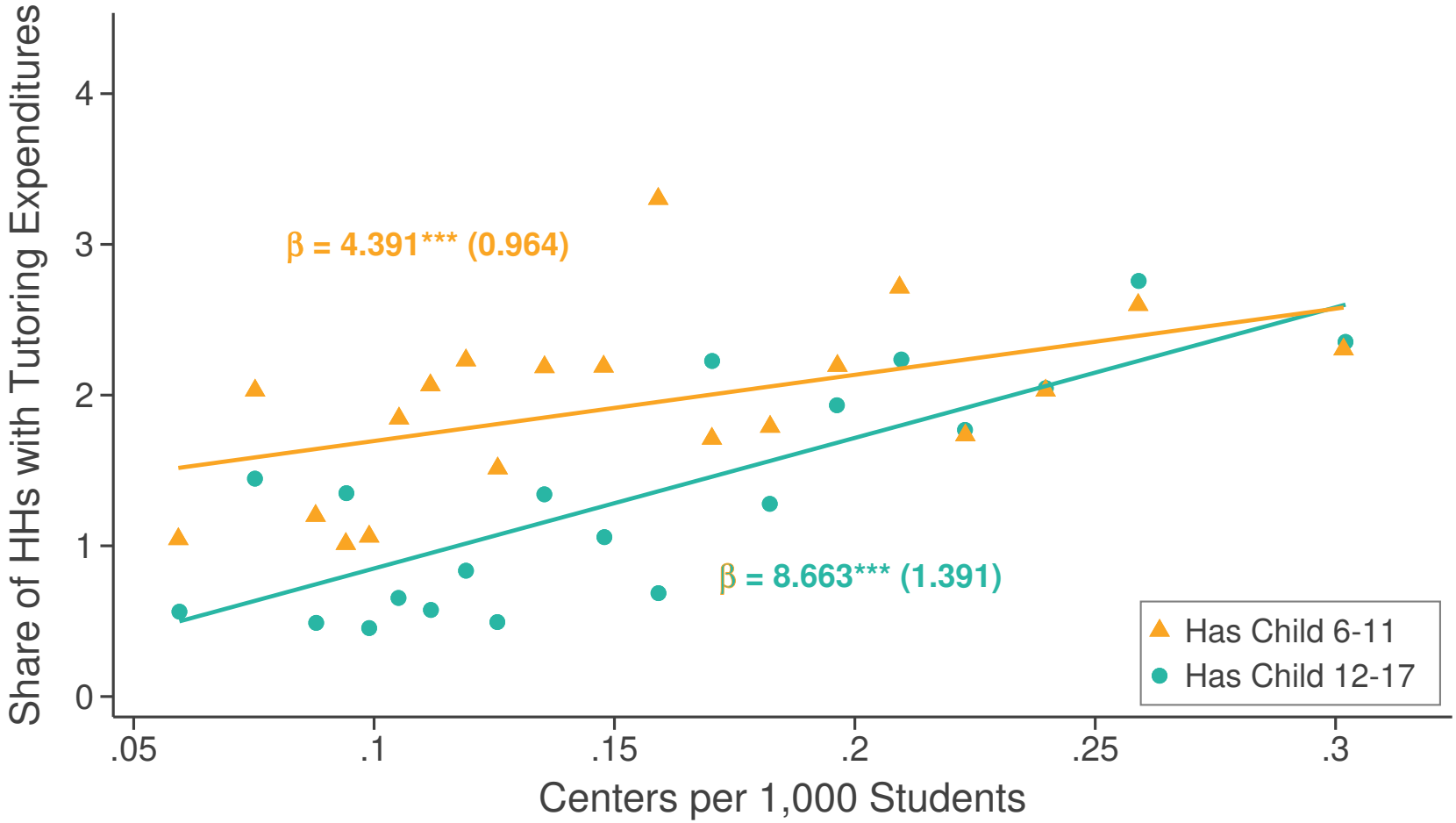
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- Thank you! Please be in touch: edecjosh@bu.edu / snitkin@bu.edu

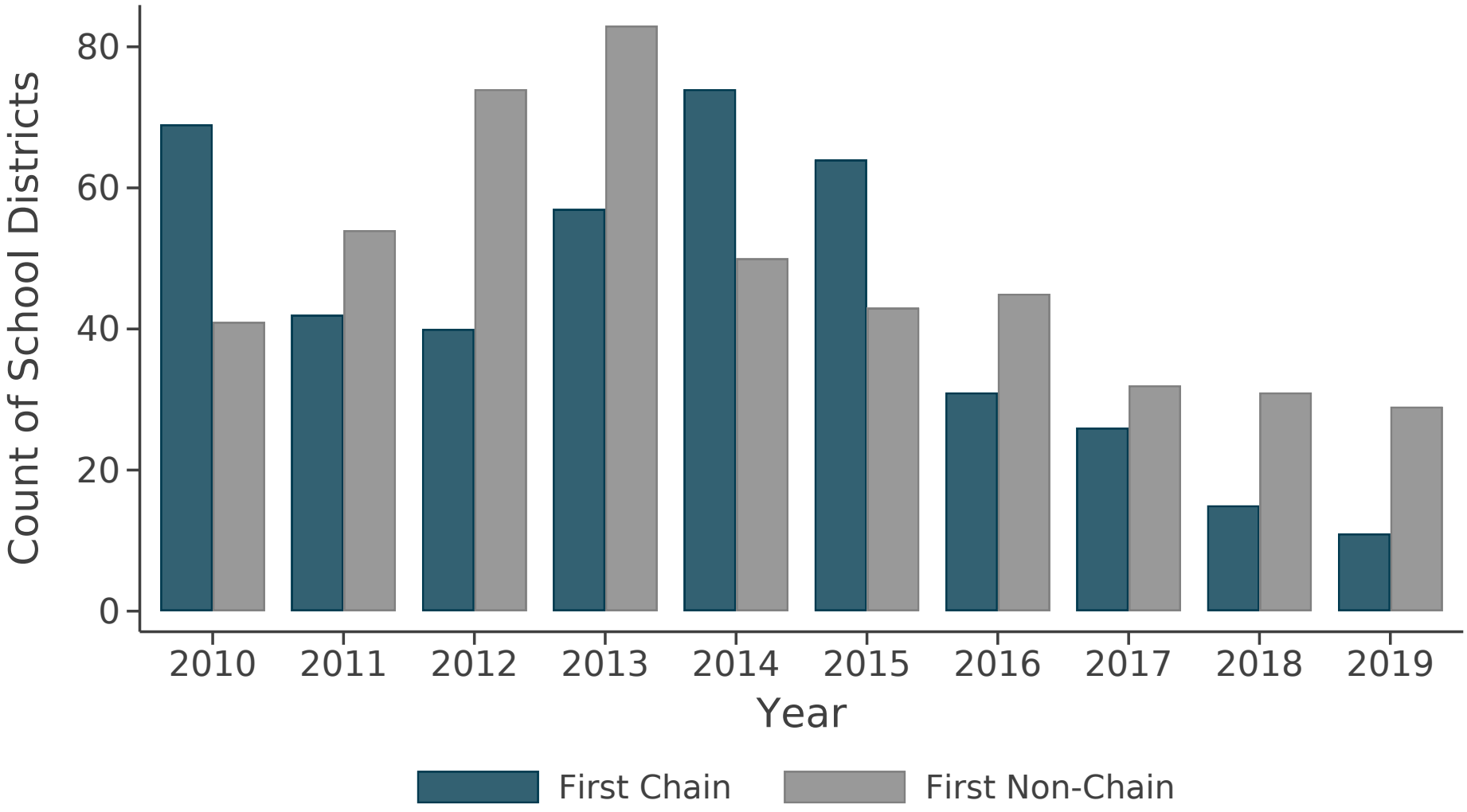
Appendix

Binscatter: Center Density per State-Year vs. Tutoring Use

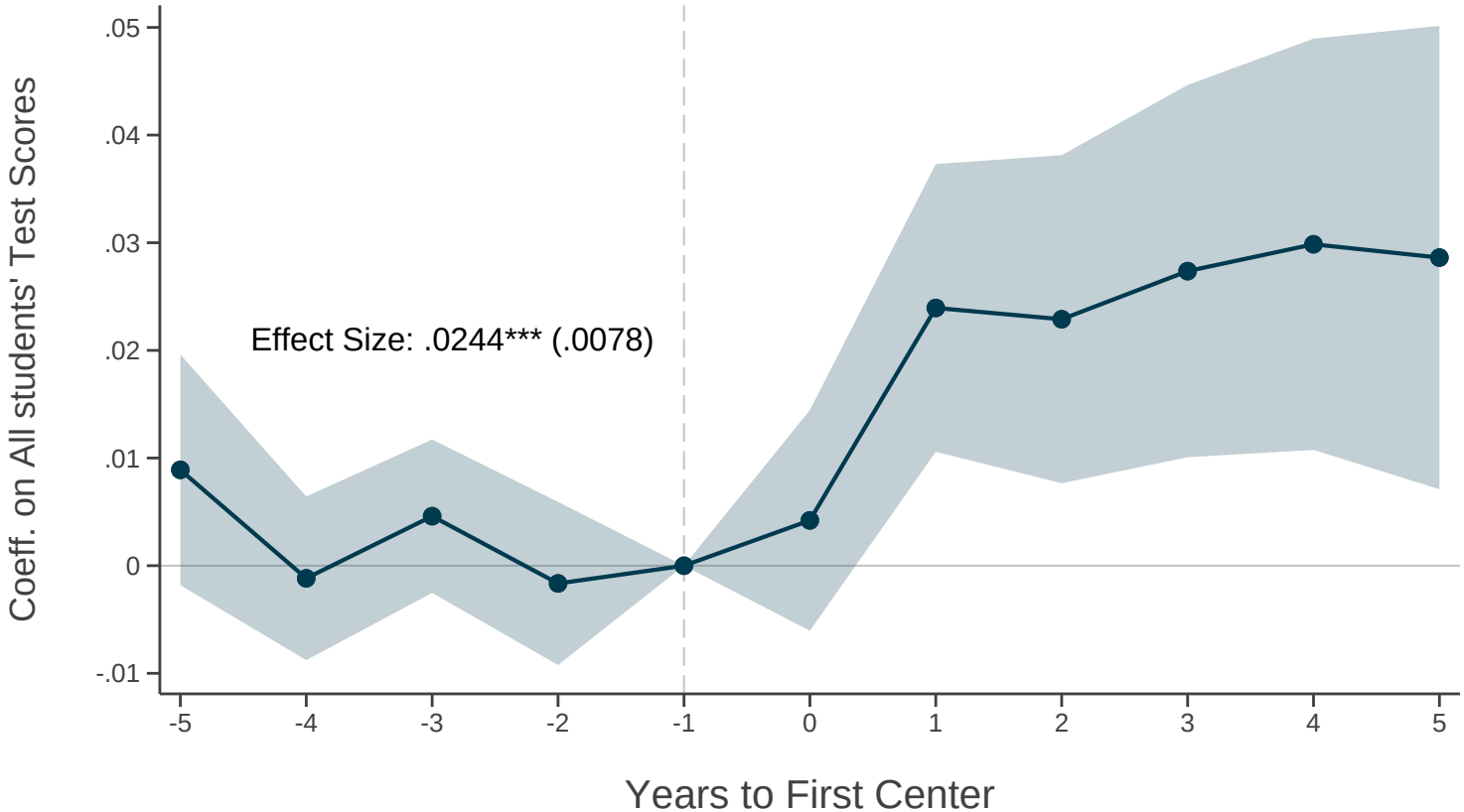
(c) By Age



First Chain and Non-Chain Openings by Year



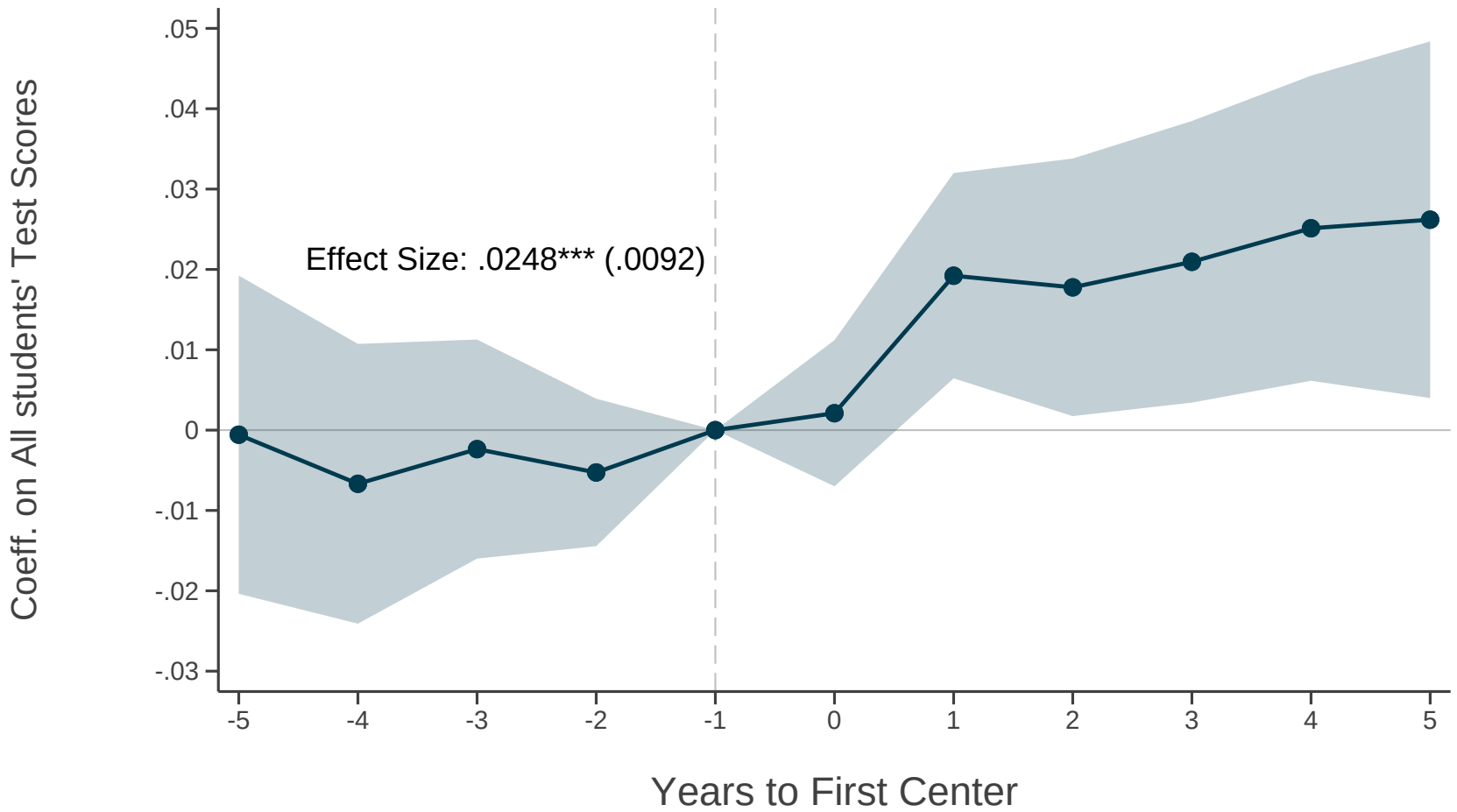
First Chains Raise Math Achievement by 0.02 SD – With Controls



Additionally controlling for racial shares, log total enrollment, unemployment, and log median income.

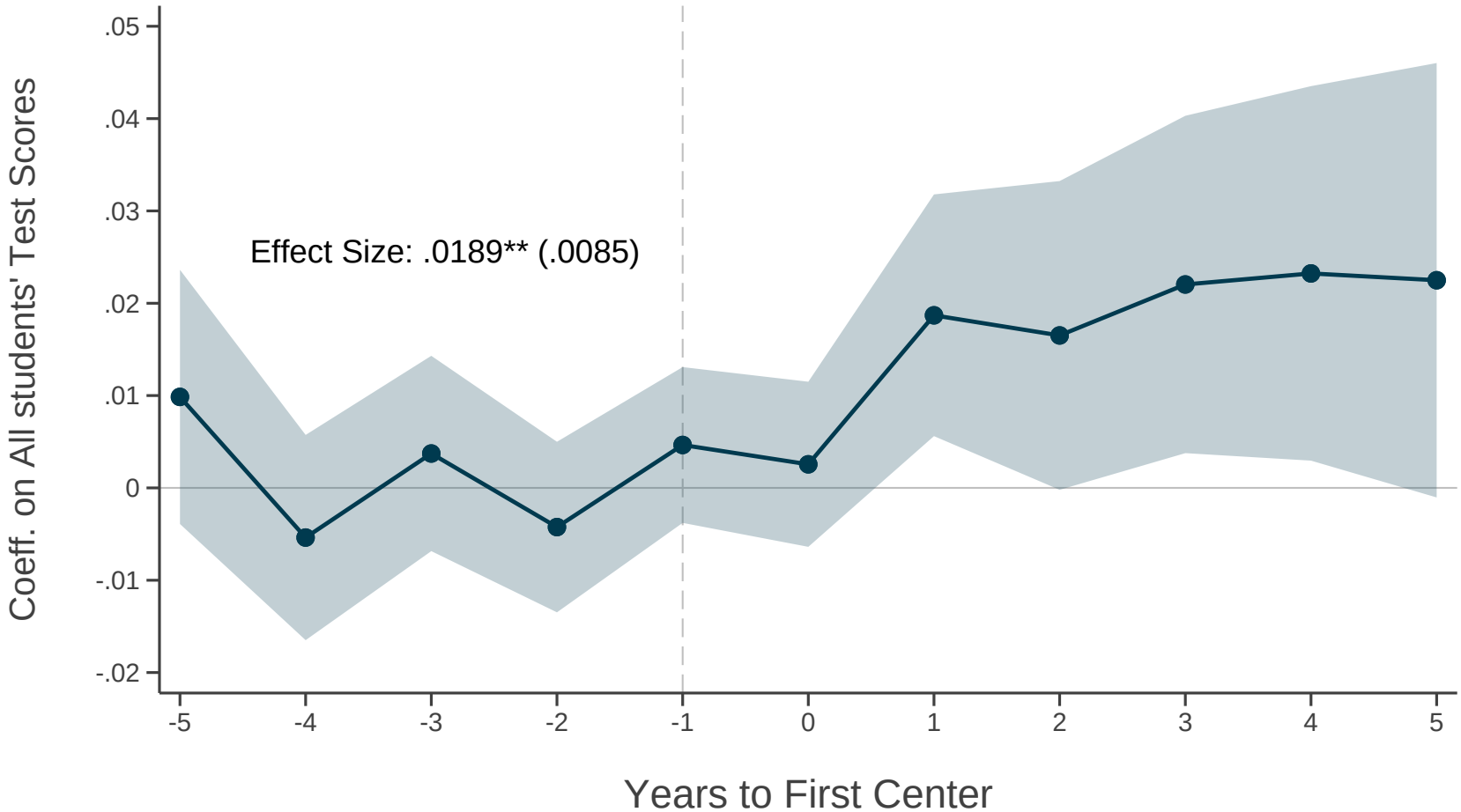
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First Chains Raise Math Achievement by 0.02 SD – TWFE



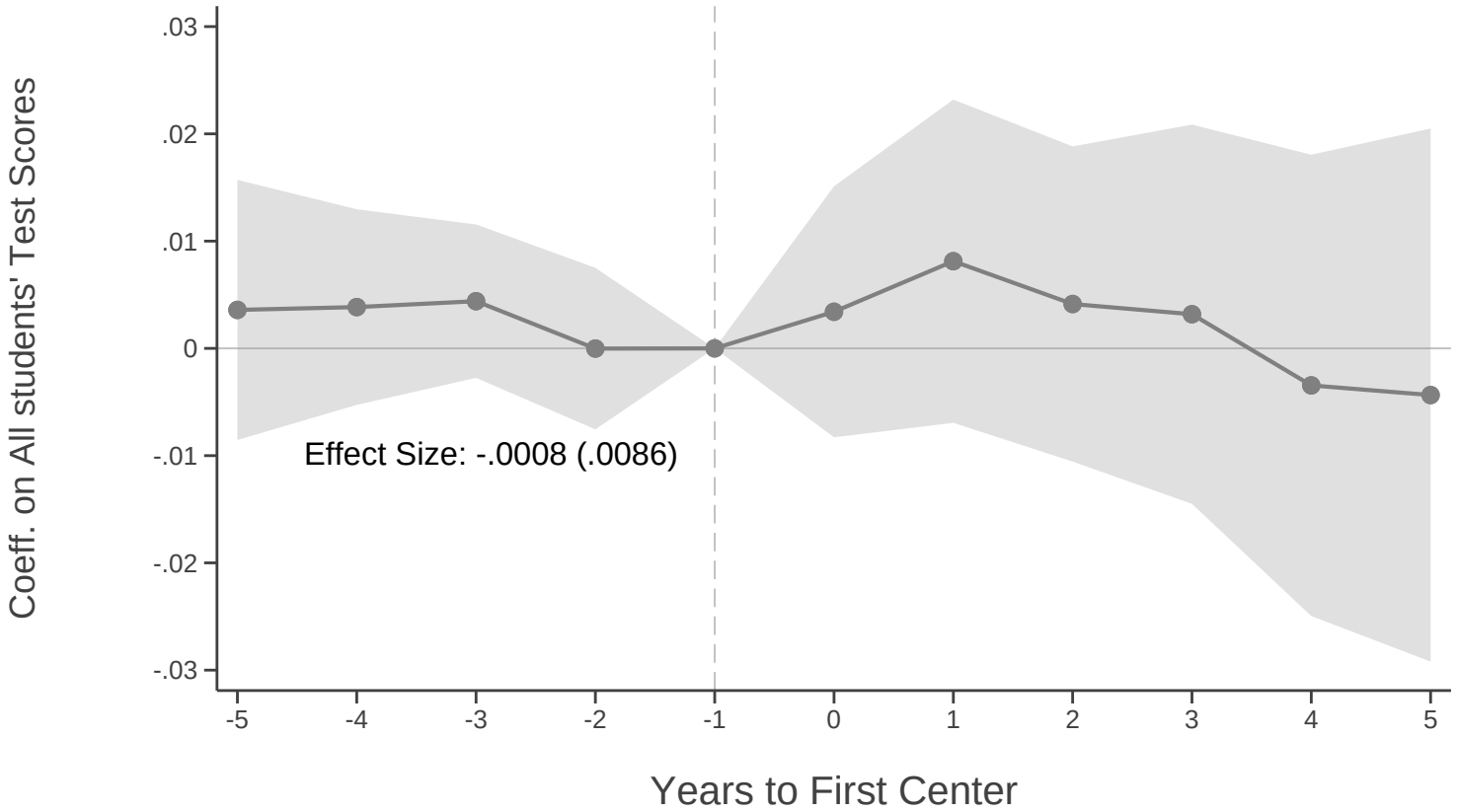
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First Chains Raise Math Achievement by 0.02 SD – Callaway & Sant'Anna



Back to Main With Controls TWFE

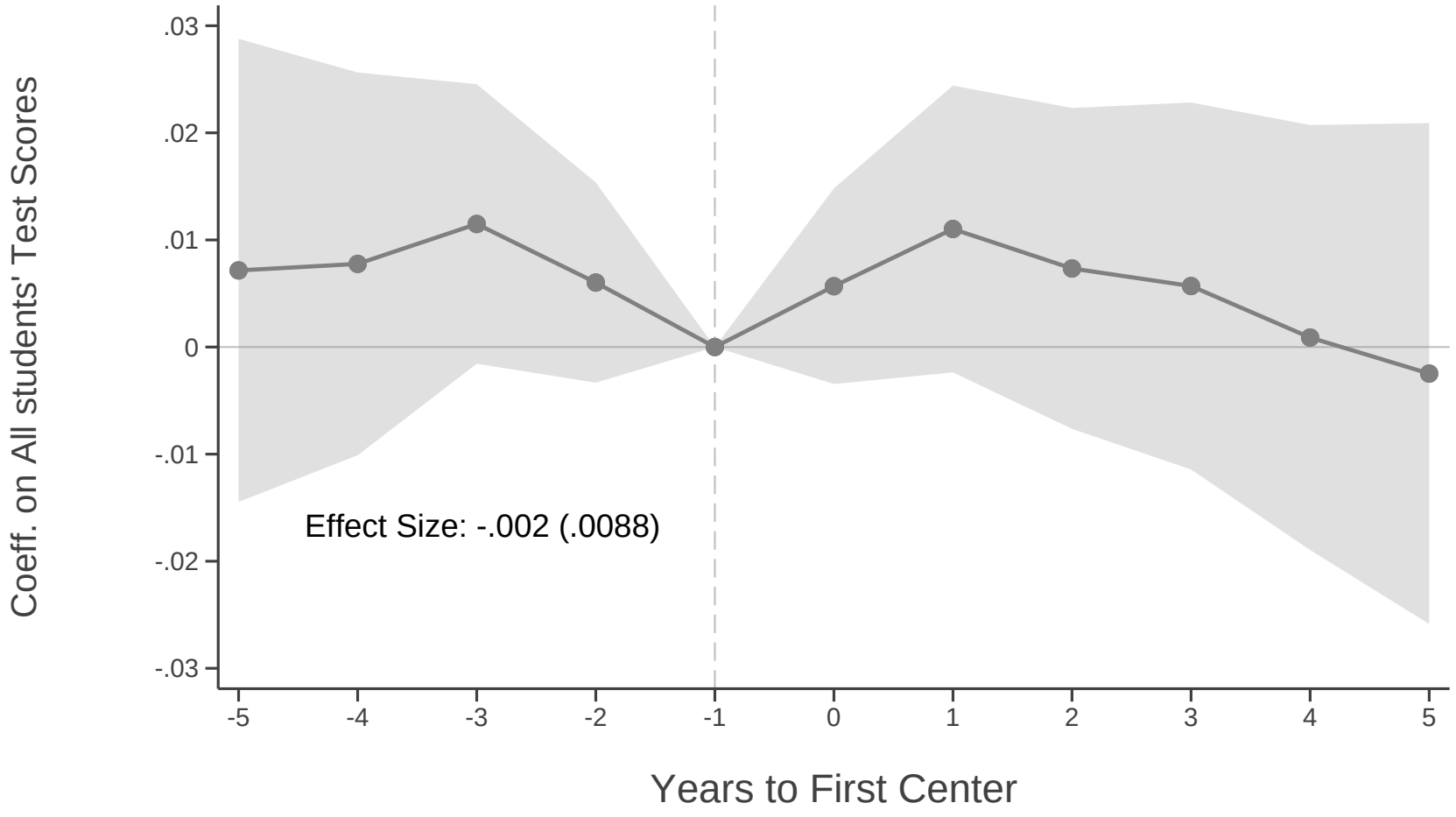
First Non-Chains Have No Clear Impact – With Controls



Additionally controlling for racial shares, log total enrollment, unemployment, and log median income.

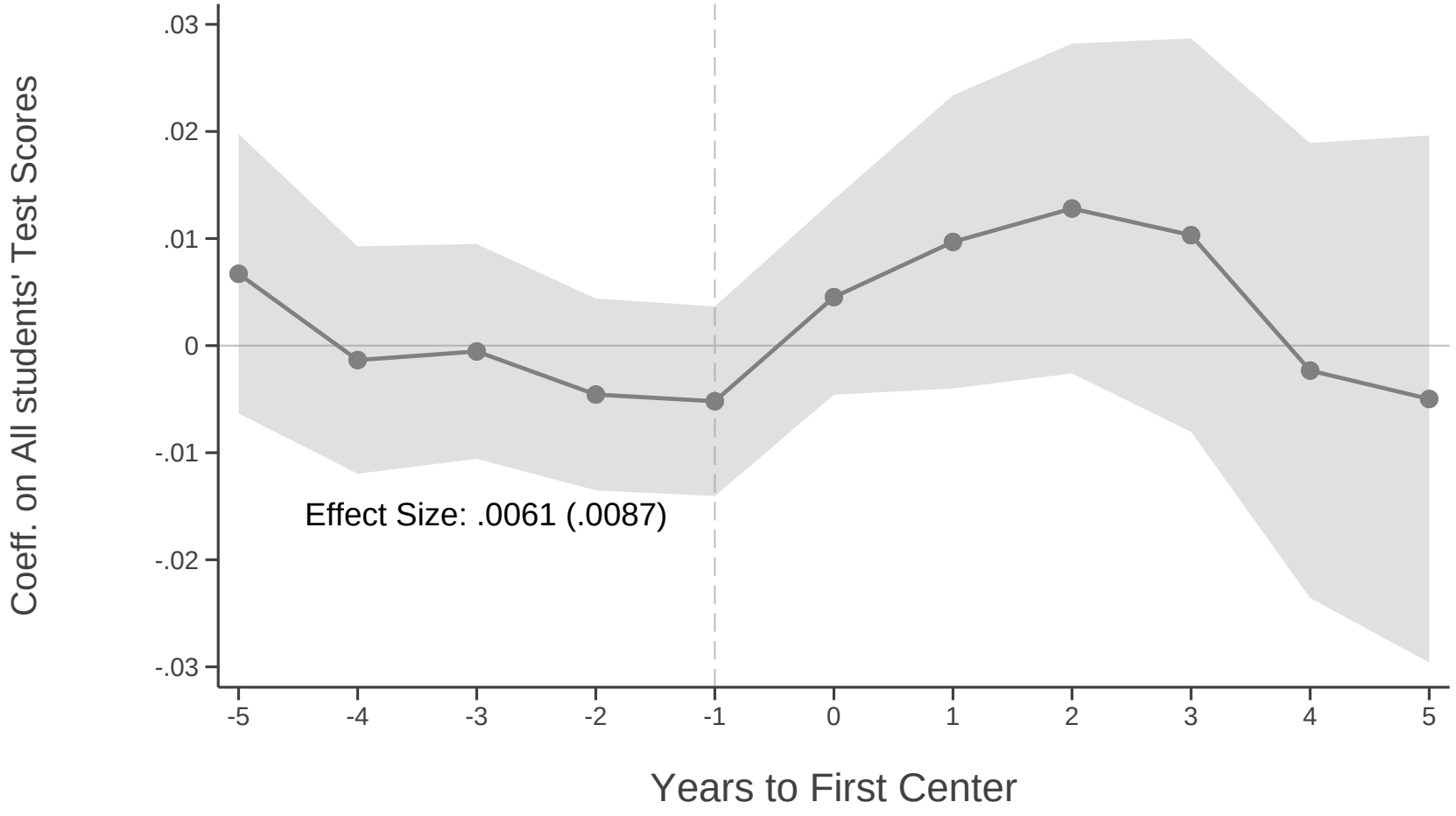
Back to Main TWFE Callaway & Sant'Anna

First Non-Chains Have No Clear Impact – TWFE



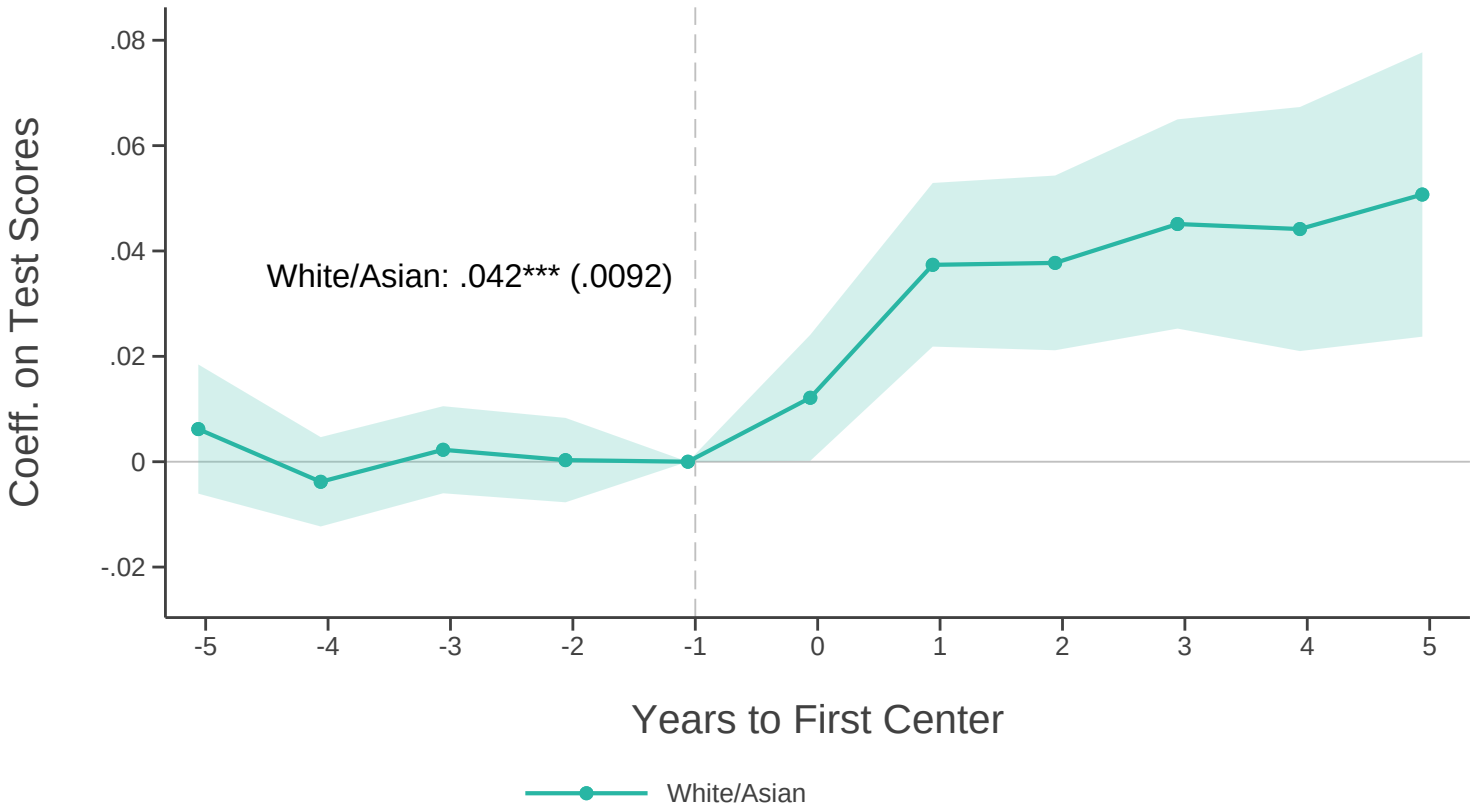
Back to Main With Controls Callaway & Sant'Anna

First Non-Chains Have No Clear Impact – Callaway & Sant'Anna



Back to Main With Controls TWFE

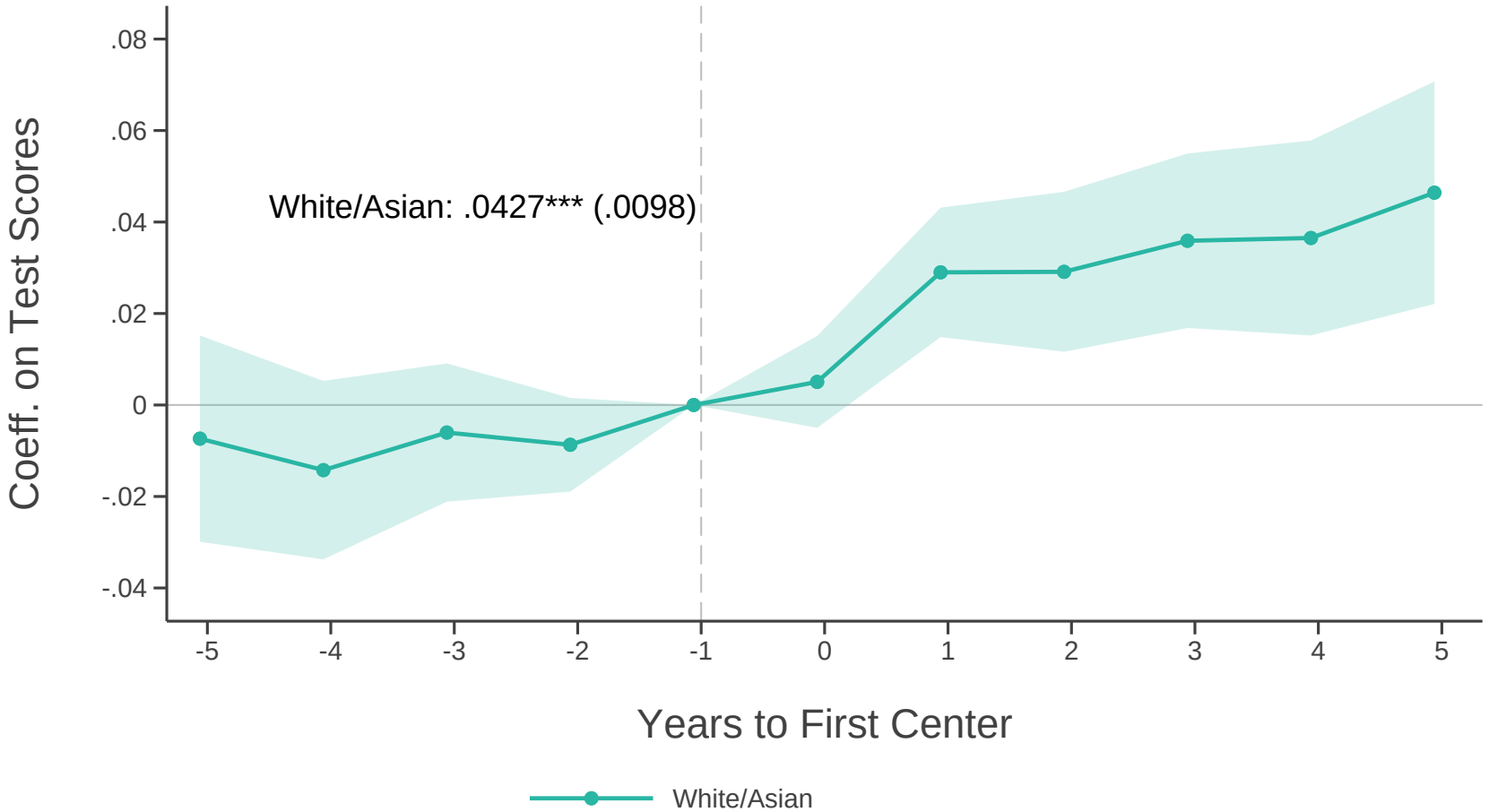
White/Asian Students See Math Increase by 0.04 SD – With Controls



Additionally controlling for racial shares, log total enrollment, unemployment, and log median income.

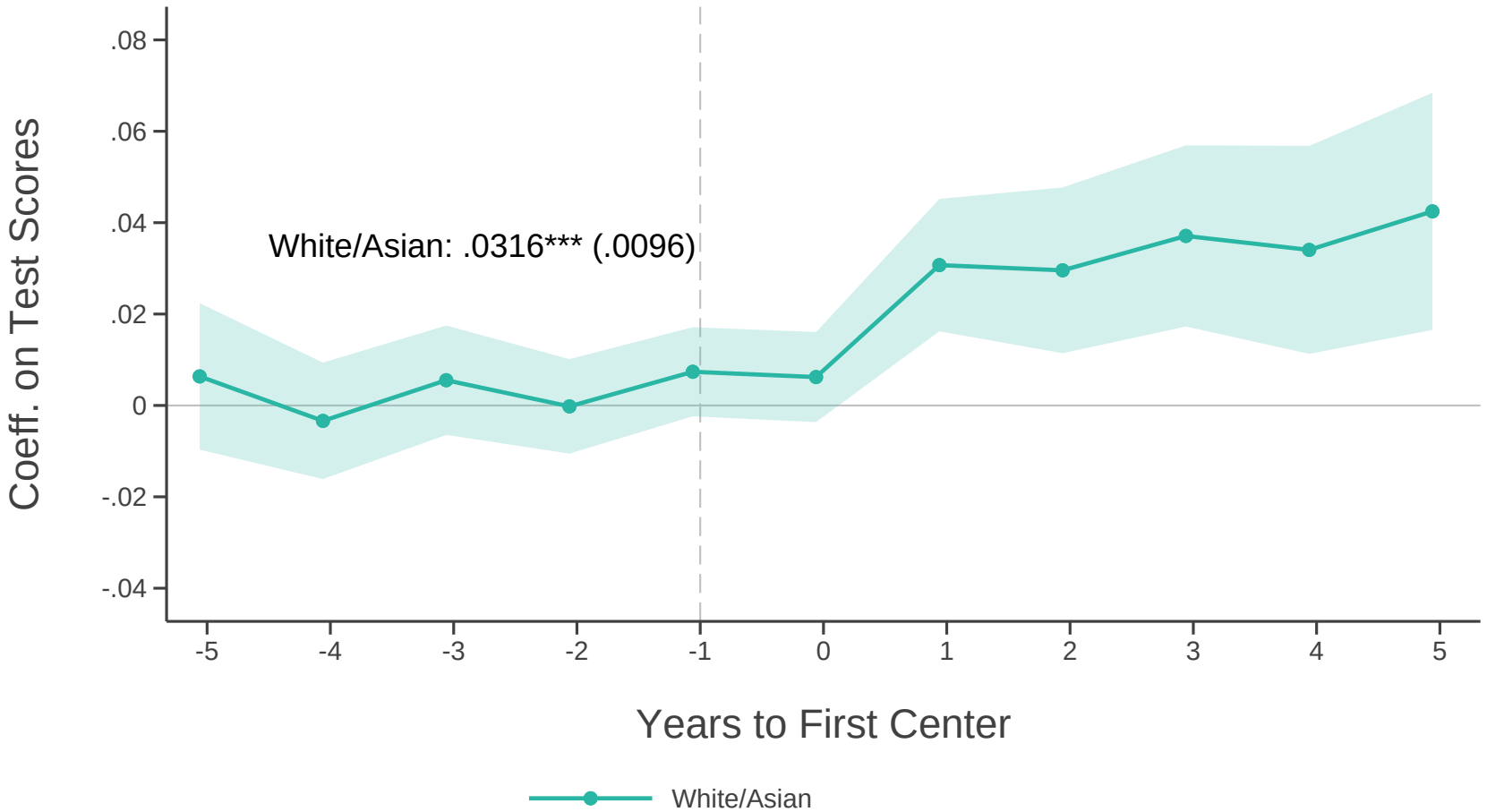
Back to Main TWFE Callaway & Sant'Anna

White/Asian Students See Math Increase by 0.04 SD – TWFE



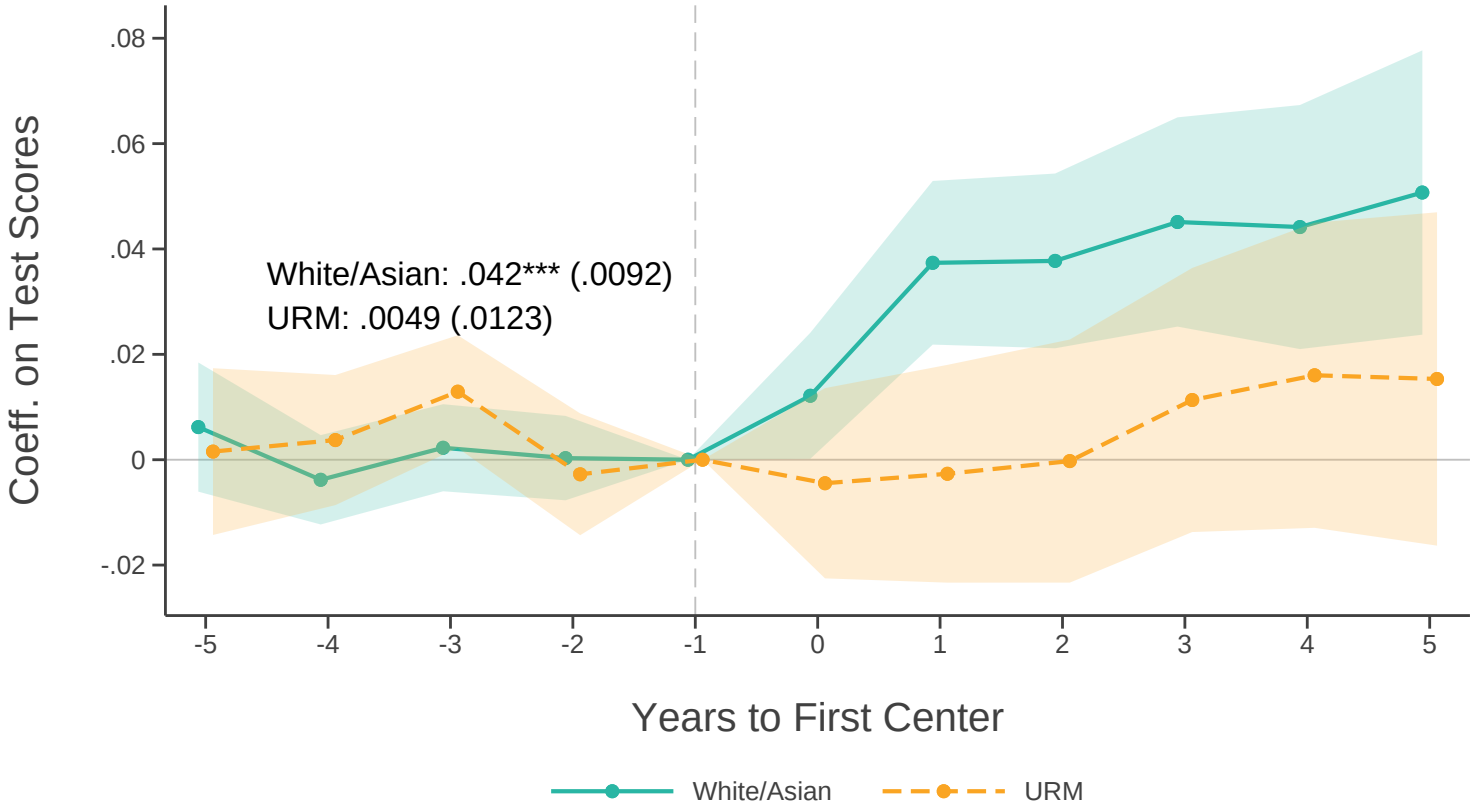
Back to Main | With Controls | Callaway & Sant'Anna

White/Asian Students See Math Increase by 0.04 SD – Callaway & Sant'Anna



Back to Main With Controls TWFE

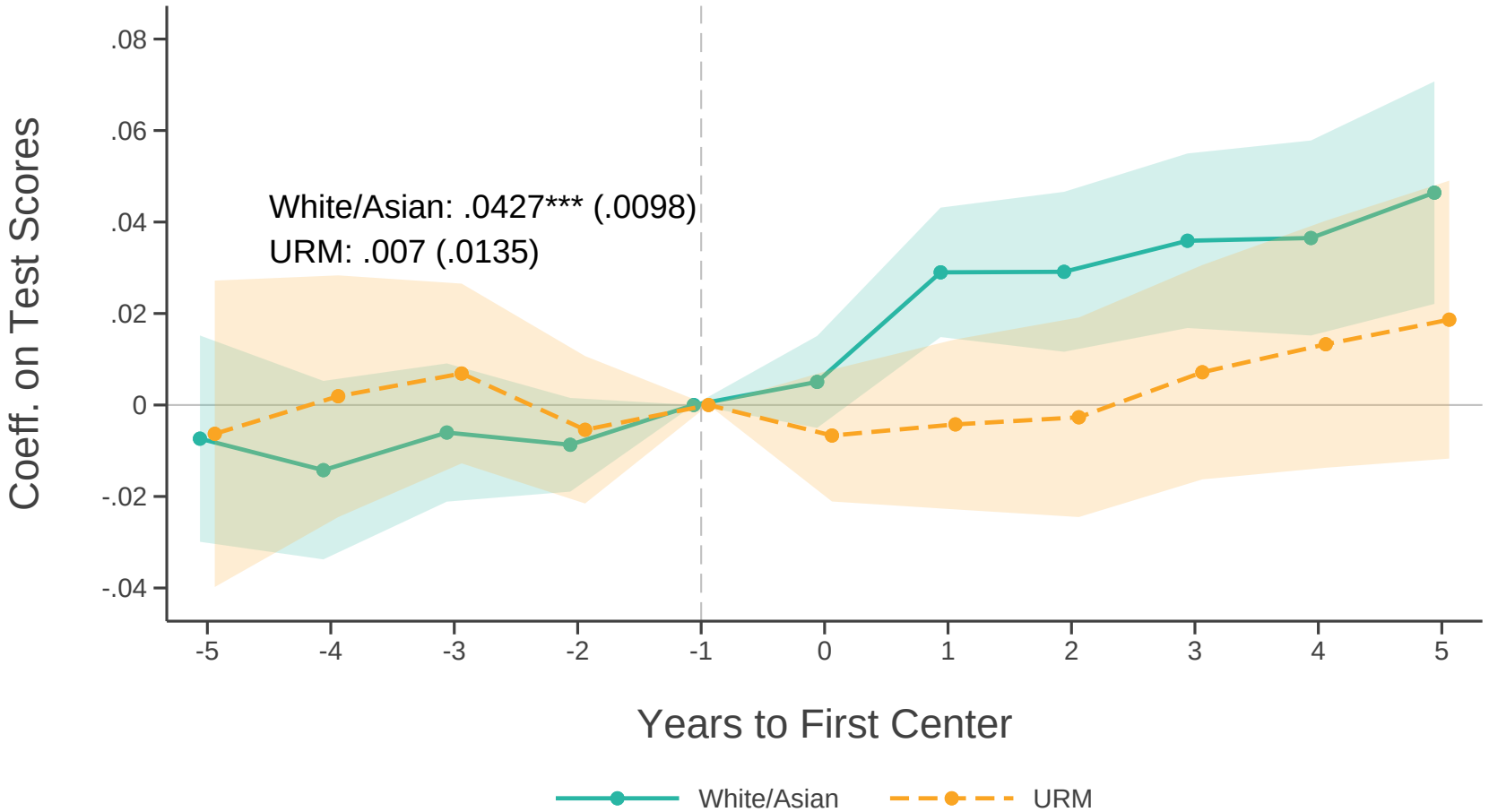
Black/Hispanic Students See No Clear Math Increase – With Controls



Additionally controlling for racial shares, log total enrollment, unemployment, and log median income.

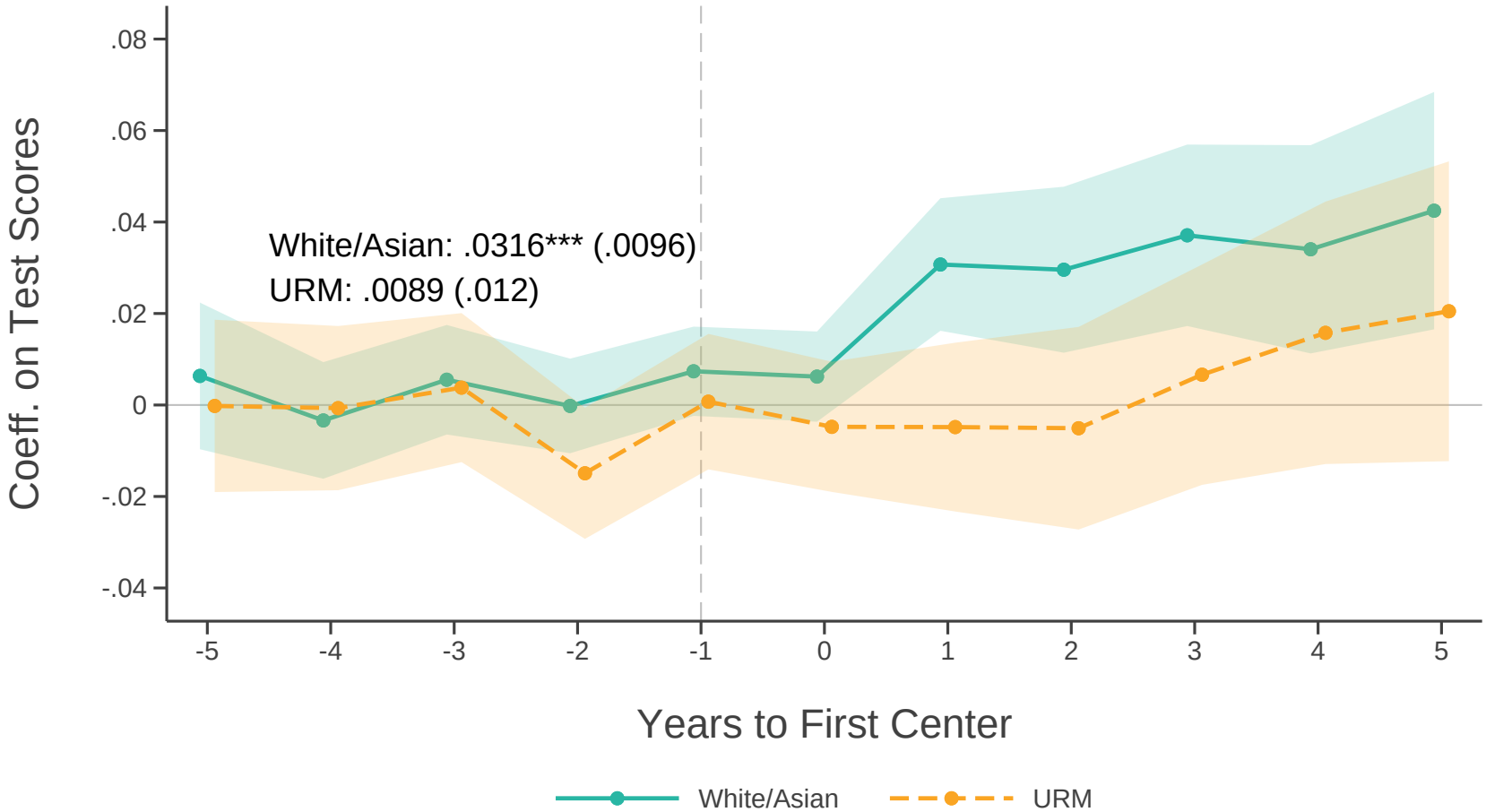
Back to Main TWFE Callaway & Sant'Anna

Black/Hispanic Students See No Clear Math Increase – TWFE



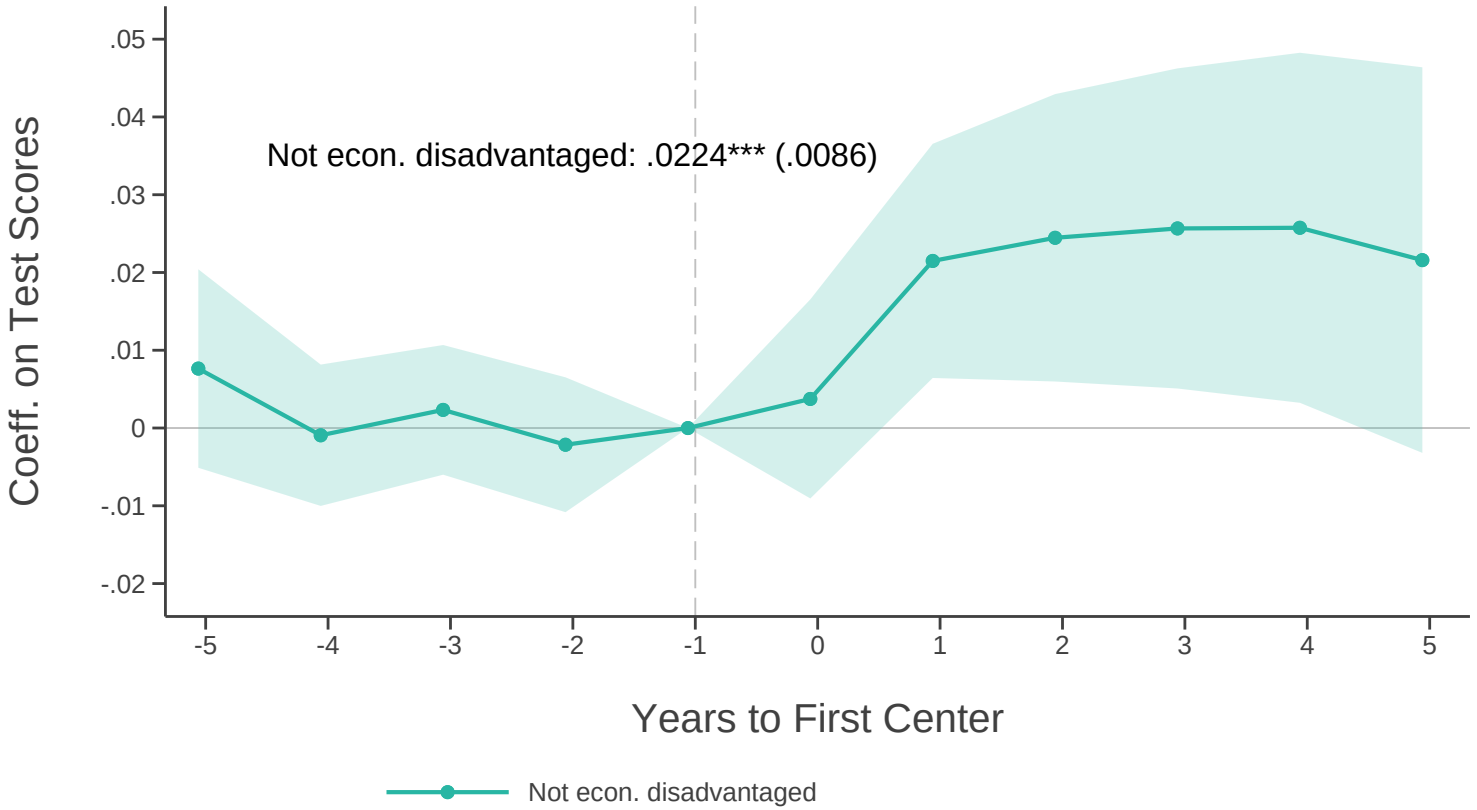
Back to Main | With Controls | Callaway & Sant'Anna

Black/Hispanic Students See No Clear Math Increase – Callaway & Sant'Anna



Back to Main With Controls TWFE

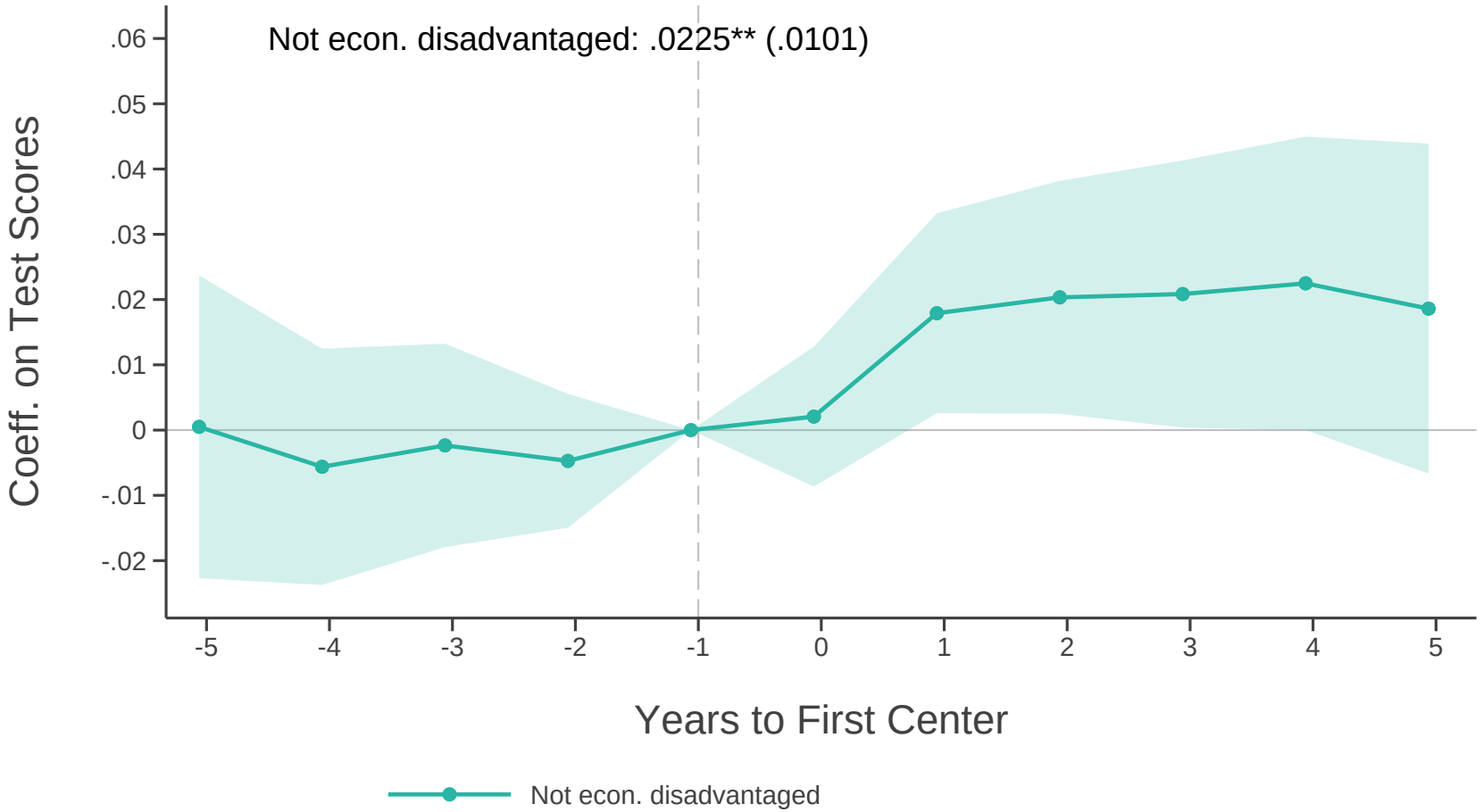
Heterogeneity by Income is Less Clear (?) – With Controls



Additionally controlling for racial shares, log total enrollment, unemployment, and log median income.

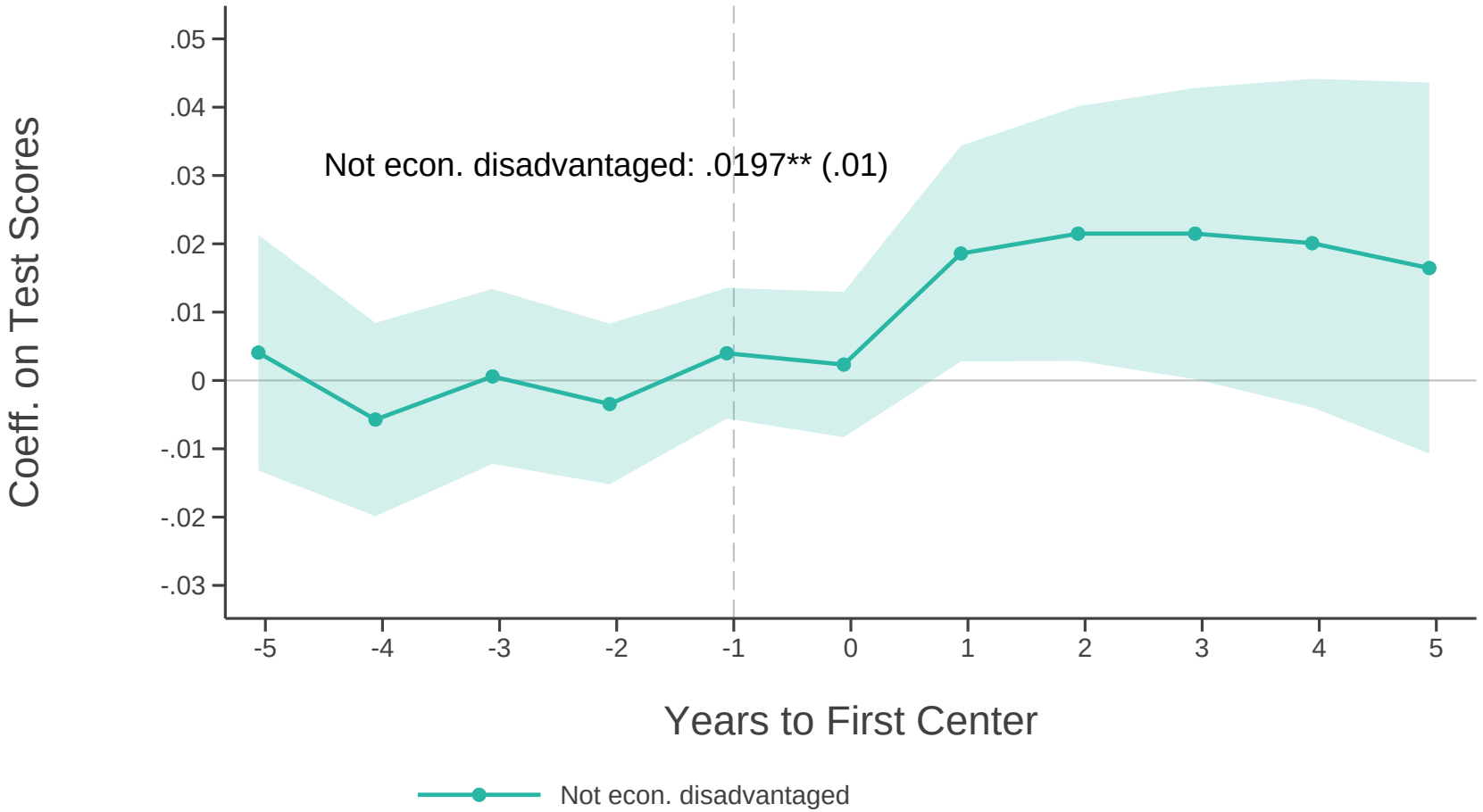
Back to Main TWFE Callaway & Sant'Anna

Heterogeneity by Income is Less Clear (?) – TWFE



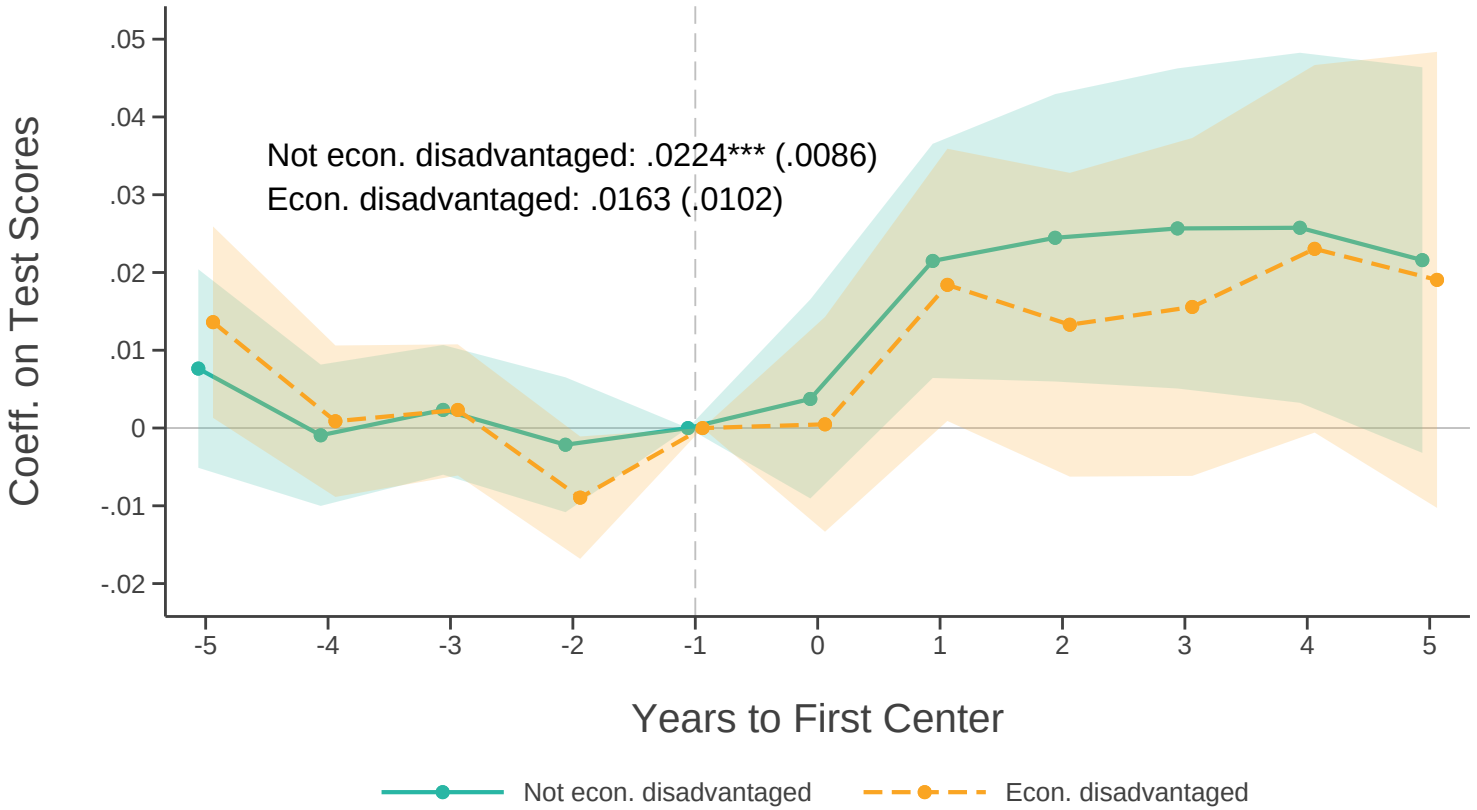
Back to Main | With Controls | Callaway & Sant'Anna

Heterogeneity by Income is Less Clear (?) – Callaway & Sant'Anna



Back to Main With Controls TWFE

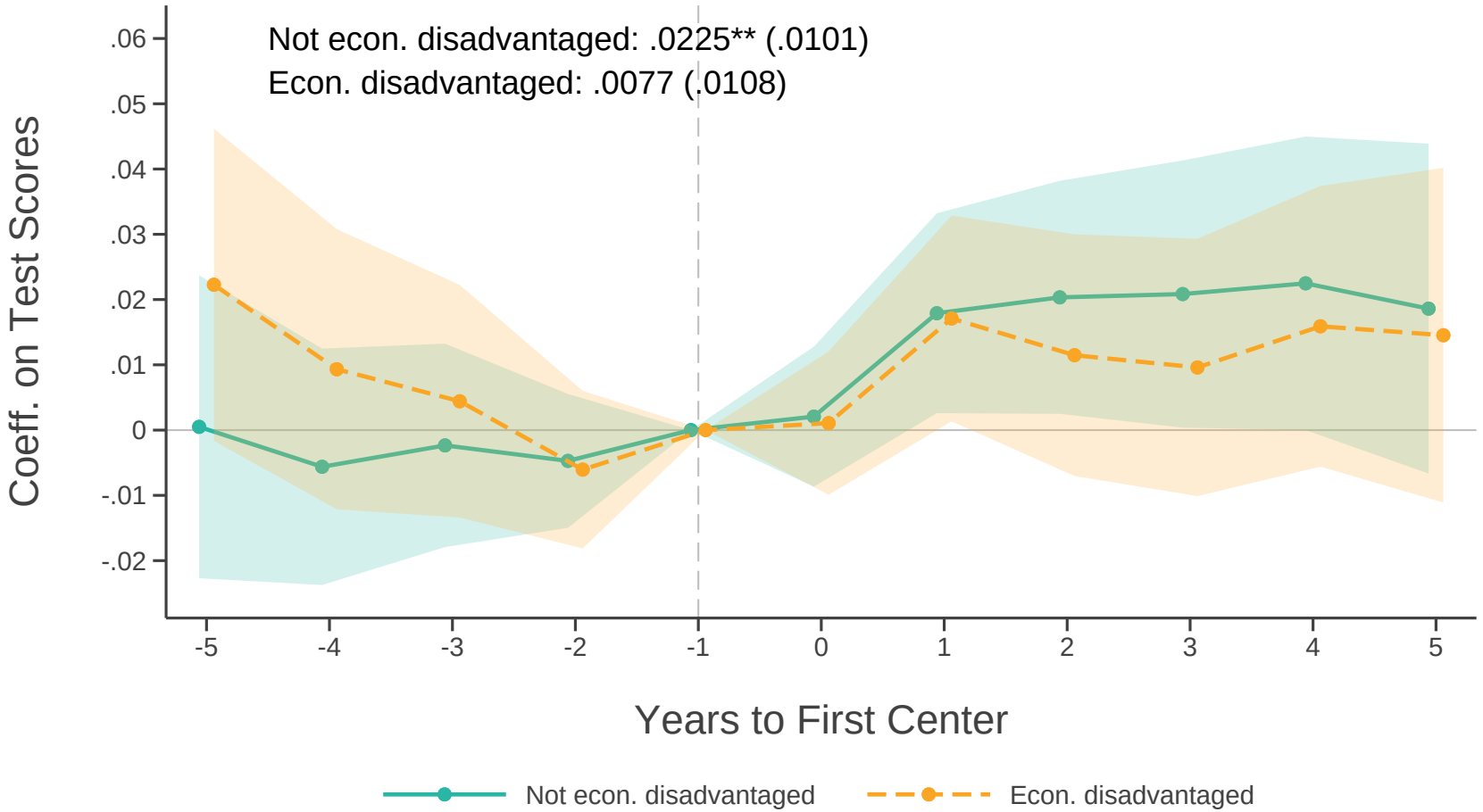
Heterogeneity by Income is Less Clear (?) – With Controls



Additionally controlling for racial shares, log total enrollment, unemployment, and log median income.

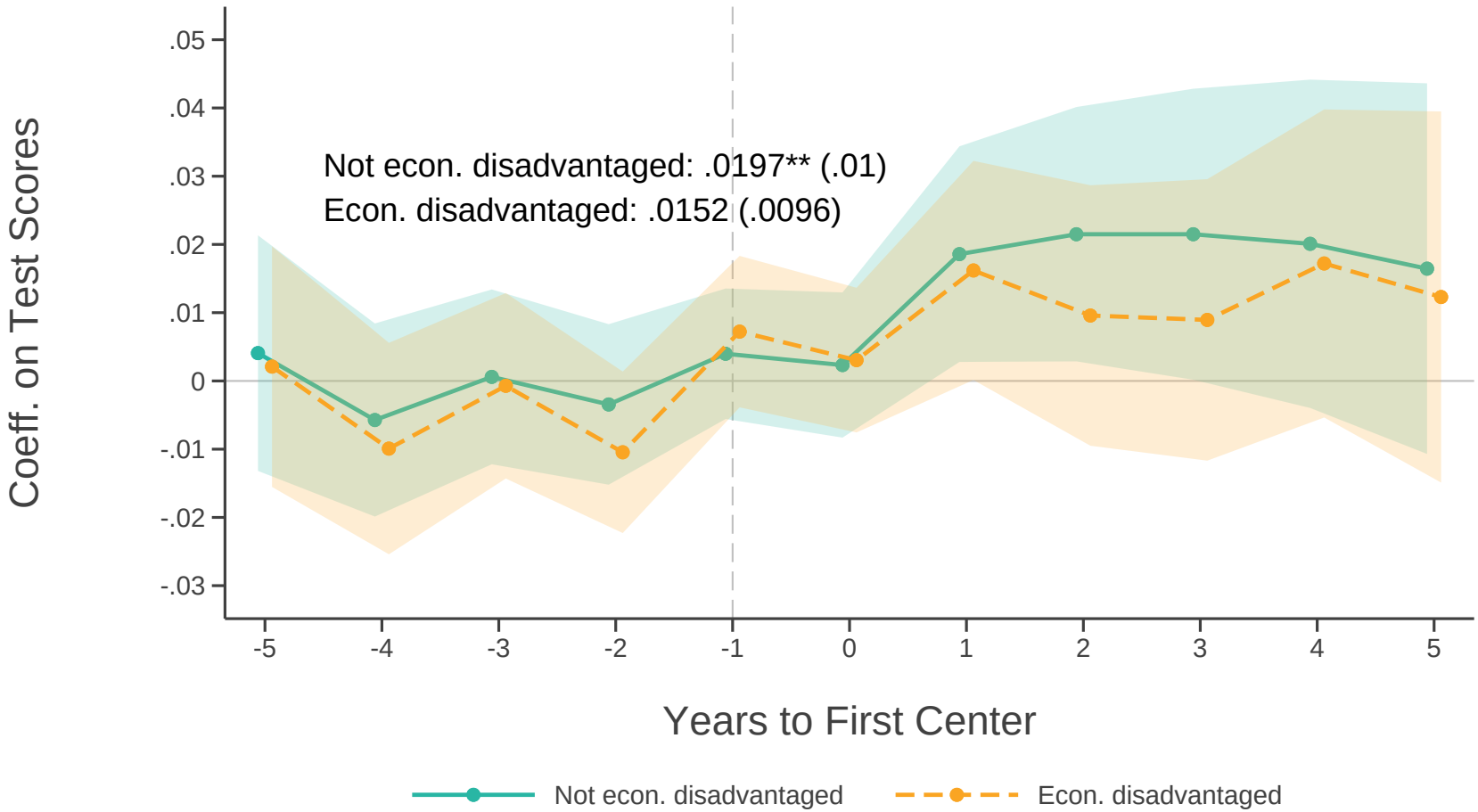
Back to Main TWFE Callaway & Sant'Anna

Heterogeneity by Income is Less Clear (?) – TWFE



Back to Main | With Controls | Callaway & Sant'Anna

Heterogeneity by Income is Less Clear (?) – Callaway & Sant'Anna



Back to Main With Controls TWFE

Comparing Models: Impacts on Math Test Scores

Model	Chains				Non-Chains			
	2-Stage DiD	TWFE	TWFE per 1,000	TWFE per 1,000	2-Stage DiD	TWFE	TWFE per 1,000	TWFE per 1,000
All Students	0.0196**	0.0248***	0.0262**	0.0219***	-0.0030	-0.0020	0.0136	0.0090
	(0.0085)	(0.0092)	(0.0129)	(0.0076)	(0.0081)	(0.0088)	(0.0116)	(0.0058)
Grade Level								
Grades 3-5	0.0214**	0.0290***	0.0295**	0.0312***	-0.0079	-0.0065	0.0086	0.0099
	(0.0095)	(0.0104)	(0.0150)	(0.0091)	(0.0101)	(0.0105)	(0.0153)	(0.0072)
Grades 6-8	0.0162*	0.0183*	0.0199	0.0095	0.0034	0.0039	0.0207	0.0076
	(0.0088)	(0.0105)	(0.0154)	(0.0091)	(0.0094)	(0.0094)	(0.0130)	(0.0071)
Gender								
Male	0.0195**	0.0244**	0.0402***	0.0258***	-0.0080	-0.0058	0.0198	0.0130*
	(0.0092)	(0.0099)	(0.0147)	(0.0088)	(0.0097)	(0.0094)	(0.0140)	(0.0075)
Female	0.0188**	0.0246**	0.0421**	0.0330***	-0.0077	-0.0070	0.0103	0.0086
	(0.0088)	(0.0096)	(0.0176)	(0.0092)	(0.0085)	(0.0090)	(0.0125)	(0.0066)
Race/Ethnicity								
White	0.0308***	0.0352***	0.0372**	0.0190**	-0.0055	-0.0039	0.0111	-0.0023
	(0.0097)	(0.0097)	(0.0148)	(0.0083)	(0.0097)	(0.0094)	(0.0147)	(0.0065)
Black	-0.0162	-0.0094	-0.0051	-0.0016	0.0089	0.0134	0.0679	0.0362
	(0.0160)	(0.0184)	(0.0428)	(0.0225)	(0.0178)	(0.0187)	(0.0651)	(0.0234)
Hispanic	0.0008	0.0038	0.0280	0.0174	0.0194	0.0090	0.0019	0.0004
	(0.0125)	(0.0146)	(0.0422)	(0.0205)	(0.0160)	(0.0158)	(0.0353)	(0.0183)
Asian	0.0451	0.0834**	0.0680	0.0248	-0.0064	-0.0469	-0.0538	-0.0429*
	(0.0328)	(0.0403)	(0.0781)	(0.0247)	(0.0370)	(0.0398)	(0.0769)	(0.0240)
Economic Status								
Non-Econ. Disadvantaged	0.0186*	0.0225**	0.0195	0.0195**	-0.0117	-0.0135	0.0143	0.0100
	(0.0096)	(0.0101)	(0.0136)	(0.0079)	(0.0102)	(0.0095)	(0.0117)	(0.0063)
Econ. Disadvantaged	0.0101	0.0077	0.0322	0.0246*	-0.0055	-0.0030	0.0161	0.0128
	(0.0103)	(0.0108)	(0.0282)	(0.0130)	(0.0100)	(0.0104)	(0.0230)	(0.0110)
District-Grade Observations	33,203	33,204	32,807	40,620	30,273	30,274	29,873	40,620
Sample	First Center	First Center	First Center	All Centers	First Center	First Center	First Center	All Centers

Back Reading Test Scores

Comparing Models: Impacts on Reading Test Scores

Model	Chains				Non-Chains			
	2-Stage DiD	TWFE	TWFE per 1,000	TWFE per 1,000	2-Stage DiD	TWFE	TWFE per 1,000	TWFE per 1,000
All Students	0.0099	0.0113	0.0070	0.0057	0.0035	0.0032	0.0118	0.0070
	(0.0072)	(0.0077)	(0.0145)	(0.0076)	(0.0064)	(0.0067)	(0.0093)	(0.0055)
Grade Level								
Grades 3-5	0.0073	0.0106	0.0010	0.0122	-0.0021	-0.0002	0.0104	0.0084
	(0.0078)	(0.0085)	(0.0157)	(0.0088)	(0.0076)	(0.0079)	(0.0117)	(0.0067)
Grades 6-8	0.0125	0.0117	0.0141	-0.0021	0.0085	0.0058	0.0121	0.0048
	(0.0079)	(0.0086)	(0.0171)	(0.0089)	(0.0078)	(0.0074)	(0.0107)	(0.0064)
Gender								
Male	0.0062	0.0054	0.0027	0.0009	-0.0026	-0.0030	0.0093	0.0073
	(0.0072)	(0.0080)	(0.0141)	(0.0076)	(0.0071)	(0.0074)	(0.0116)	(0.0065)
Female	0.0139*	0.0172**	0.0240	0.0185**	0.0078	0.0075	0.0103	0.0101*
	(0.0074)	(0.0085)	(0.0188)	(0.0093)	(0.0067)	(0.0071)	(0.0108)	(0.0057)
Race/Ethnicity								
White	0.0098	0.0088	0.0136	-0.0003	0.0010	0.0010	0.0105	0.0017
	(0.0069)	(0.0082)	(0.0165)	(0.0083)	(0.0075)	(0.0072)	(0.0103)	(0.0060)
Black	-0.0170	-0.0177	-0.0137	-0.0171	0.0180	0.0169	0.0568	0.0216
	(0.0127)	(0.0138)	(0.0377)	(0.0161)	(0.0125)	(0.0145)	(0.0421)	(0.0158)
Hispanic	0.0011	-0.0065	-0.0085	0.0000	0.0246**	0.0138	0.0002	0.0038
	(0.0120)	(0.0130)	(0.0419)	(0.0188)	(0.0123)	(0.0131)	(0.0389)	(0.0177)
Asian	-0.0512*	-0.0433	-0.2085**	-0.0101	-0.0356	-0.0512	-0.0776	-0.0285
	(0.0281)	(0.0315)	(0.0870)	(0.0231)	(0.0277)	(0.0313)	(0.0594)	(0.0207)
Economic Status								
Non-Econ. Disadvantaged	0.0076	0.0080	0.0128	0.0068	-0.0034	-0.0079	0.0119	0.0103*
	(0.0075)	(0.0084)	(0.0149)	(0.0081)	(0.0069)	(0.0072)	(0.0097)	(0.0059)
Econ. Disadvantaged	0.0058	0.0005	-0.0031	0.0029	0.0052	0.0046	0.0188	0.0110
	(0.0077)	(0.0086)	(0.0233)	(0.0116)	(0.0077)	(0.0078)	(0.0183)	(0.0086)
District-Grade Observations	36,311	36,321	35,895	44,653	33,148	33,150	32,723	44,653
Sample	First Center	First Center	First Center	All Centers	First Center	First Center	First Center	All Centers

Back Math Test Scores