Impact of Free Community College: Evidence from Chicago

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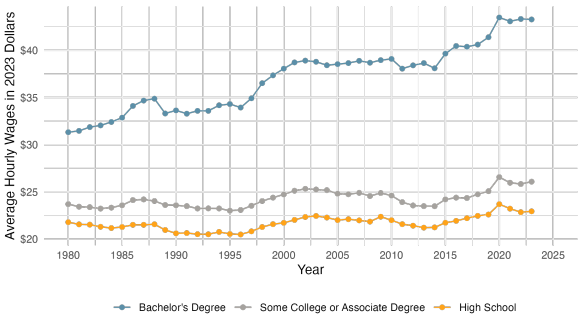
Brief Introduction

- In my research:
  - Explore the causes and consequences of inequality in education
  - Assess the effectiveness of education policies in improving labor market outcomes
- Focus on non-traditional and informal educational contexts
  - community colleges, religious private schools, children's books, etc
- Apply and improve upon machine learning and artificial intelligence tools to convert text and images into data
  - Face detection in illustrations
  - Word embedding placebo test to measure extent of gender bias
  - Measuring skin color in images

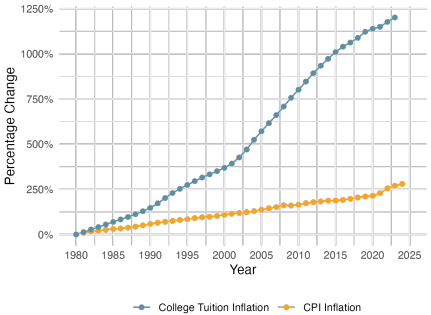
Free Community College Could Have Unintended Consequences

- College has large monetary and non-monetary returns (Card, 1999; Oreopoulos and Petronijevic, 2013; Heckman et al., 2018)
- Only 22% of Americans believe college is worth the cost if you have to take out loans (Pew Research Center, 2024)
- Recent policy has focused making the first two years of college free through free community college, but could have unintended consequences if it deters students from attending 4-year universities (Cohodes and Goodman, 2014; Mountjoy, 2019)
- This study uses a regression discontinuity design to assess if free community college improves or worsens college outcomes for students in Chicago

Wage Gap Between Those with a Bachelor's Degree and Those Without is Large and Growing, While Cost of College is Increasing



Source: Economic Policy Institute, State of Working America Data Library, Wages by Education, 2024. Wages adjusted into 2023 dollars.

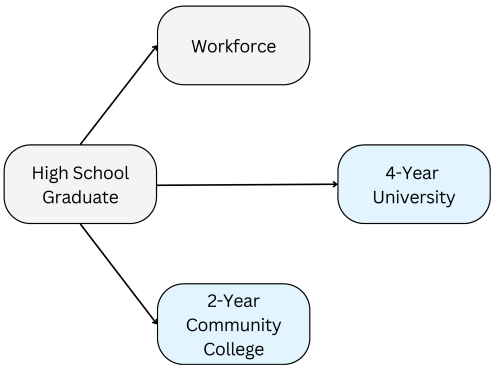


Source: U.S. Bureau of Labor Statistics, CPI for all items and college tuition, all urban consumers, not seasonally adjusted.

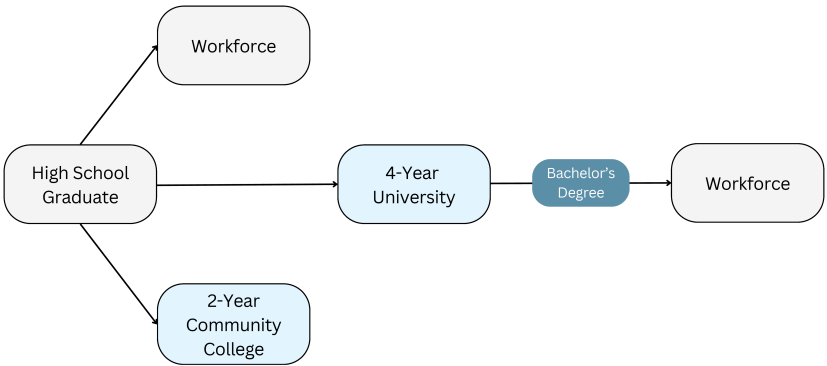
Recent Policy Has Focused on Making the First 2 Years of College Free

With the goal of decreasing the cost of college and increasing the supply of college educated workers, recent policy has focused making the first two years of college free through free community college

Undergraduate Enrollment Decision Tree



Undergraduate Enrollment Decision Tree



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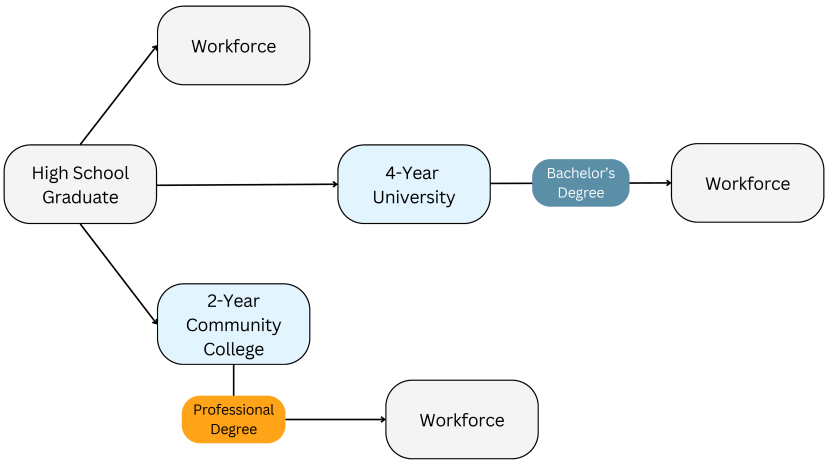

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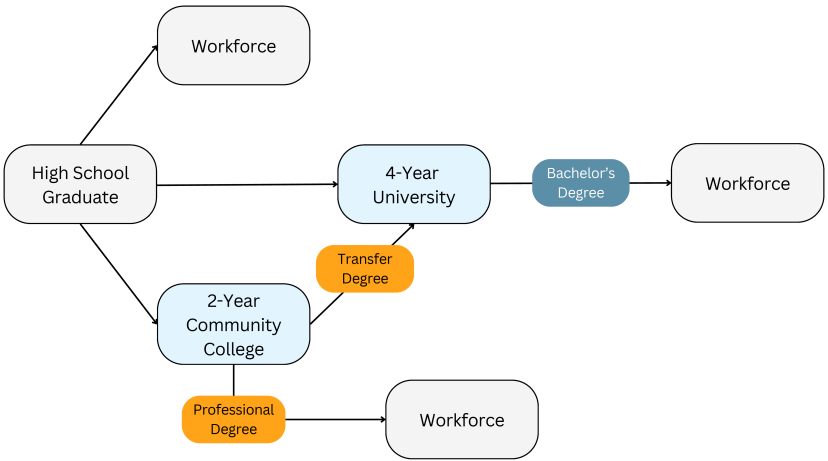


The Community College Route to a Bachelor's Degree is Uncommon

81% of community college students begin with the intention to earn a bachelor's degree, 33% transfer to a 4-year university within 6 years, and 14% complete a bachelor's degree (Jenkins and Fink 2016)

Students diverted from a 4-year university complete fewer years of education, are less likely to earn a Bachelor's degree, and have lower earnings (Mountjoy, 2019; Rouse, 1995).

This Study

Does Free Community College Serve as a Lower-Cost Pathway to a Bachelor's Degree or a Costly Detour that Decreases Bachelor Degree Attainment?

By leveraging a 3.0 GPA eligibility cutoff for free community college in Chicago, we use a regression discontinuity design to measure the causal effect of access to free community college on:

- College enrollment
- College quality
- Degree completion
- Major choice

Summary of Findings

Offering free community college on the basis of academic merit:

- Does not affect **whether** students attend college
- Does affect **where** they attend with a noticeable shift from starting at 4-year universities to community colleges
- Increases **degree attainment**, *without leading students to substitute 2-year degrees for 4-year degrees* on average

We Provide New Evidence on Free Community College and Degree Outcomes

- First paper to comprehensively assess the **long-term effects** of free community college on measures of college quality, major selection, and degree completion across the U.S.
  - Prior research found decreases initial 4-year enrollment, increases college enrollment, (Carruthers and Fox, 2016; Nguyen, 2020) and decreases student loans (Odle et al., 2021)
- **Research-Practice partnership** with Chicago community colleges & public schools allow us to combine multiple administrative datasets to measure a rich set of student outcomes
  - Prior research has only been able to examine degree attainment for a subset of colleges (Carruthers et al., 2023) or a subset of students (Bell, 2021)
- Our identification strategy allows us to compare similar treated and control students **within the same high school** instead of students in different schools over time
  - Prior research examining all eligible high school students has relied on DiD/PSM
- **Urban setting** provides insights into the policy's impact on a diverse population
  - Prior research focused on smaller samples in more rural areas

Outline

- ✓ Introduction
- Context
- Empirical Strategy
- Main Results
- Heterogeneity
- External Validity
- Conclusion

Context

Free Community College Policy Landscape

There are currently over 30 publicly funded free community college promise programs in the U.S. implemented at the state and local level (Miller-Adams et al., 2024)

- Eligibility is determined by location (and sometimes merit)
- Often limited to recent high school graduates
- Almost always last-dollar (covers remaining tuition costs after other financial aid)
- Simplifies the financial aid process and provides information about aid amounts before applying to college

Our Policy Context: Star Scholarship

In Fall of 2014, the city of Chicago launched a free community college scholarship offering free tuition for the City Colleges of Chicago (CCC) called the Star Scholarship.

This scholarship was available to all Chicago Public School (CPS) graduates who met the following eligibility requirements:

- Graduate from a Chicago public high school with a 3.0 GPA
- Enroll in one of CCC's pathways (e.g. degree seeking)
- Place into CCC completion-level Math and English courses

But only up to three years after graduating high school.
Students who graduated before 2015 were not eligible.

Data

Data includes almost a quarter of a million students who graduated from a CPS high school between 2009 and 2020 (6 years of pre-policy data, 6 years of post-policy data)

- Student demographics and high school outcomes from **Chicago Public Schools**:
  - *Race, gender, home address, language spoken at home, GPA, courses attempted, etc*
- College outcomes from **City Colleges of Chicago**/**National Student Clearing House**:
  - *Enrollment patterns, persistence, degree completion, degree field, etc*

Empirical Strategy

Empirical Strategy – Sharp Regression Discontinuity Design

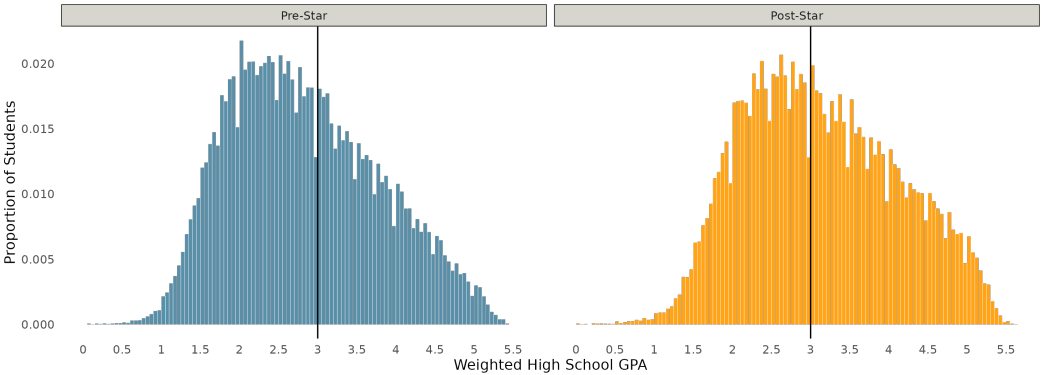
$$Y_{ijt} = \beta_0 + \beta_1 Eligible_{ijt} + \beta_2 GPA_{ijt} + \beta_3 GPA_{ijt} \times Eligible_{ijt} + \delta_t + \gamma_j + \varepsilon_{ijt}$$

- β_1 identifies the **causal effect of eligibility for free community college** on outcome Y_{ijt}
- Includes high school fixed effects (γ_j) and graduation year fixed effects (δ_t)
- First order polynomial with a triangular kernel
- MSE optimal bandwidth selection procedure (Calonico et al., 2020)
- Robust bias-corrected standard errors clustered at the school level (Calonico et al., 2014a)

Identifying Assumption

Potential outcomes are continuous at the 3.0 GPA threshold (e.g. access to Star Scholarship changes sharply at the threshold and nothing else that effects potential outcomes changes)

Testing for Manipulation at the Cutoff



▸ Estimated Discontinuity ▸ Grade Inflation

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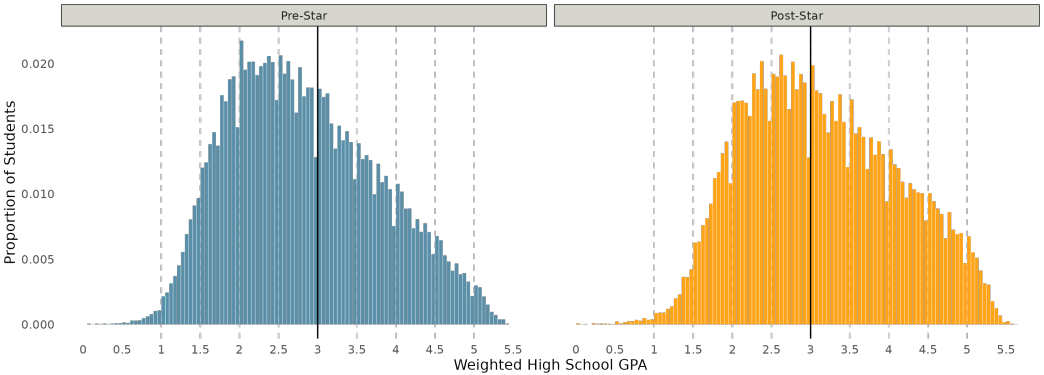

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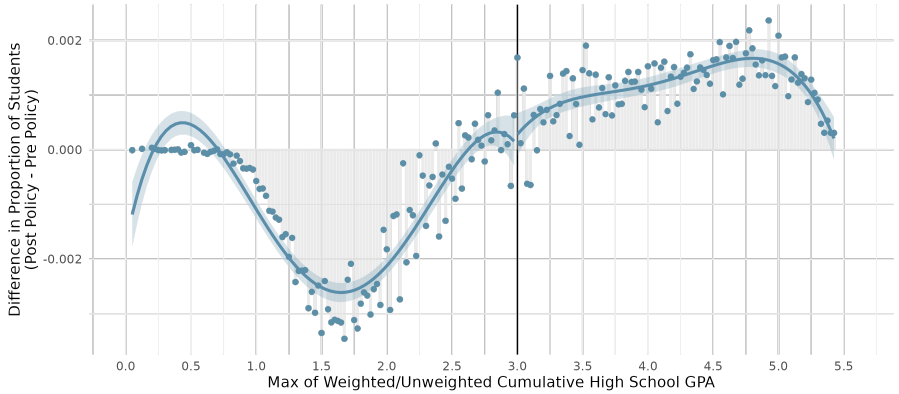
Extending the McCrary Density Test to a Difference-in-RD Framework



▸ Estimated Discontinuity ▸ Grade Inflation

Testing the Validity of Our Identifying Assumptions

Further Evidence of No Manipulation

- No discontinuity in demographics at the cutoff ▸ Regression Table
- Qualitative interviews indicate CCC was not many Star Scholar's first choice

Testing for Differences Above the Cutoff Unrelated to the Policy

- Some small differences in pre-policy college quality measures ▸ Coefficient Plot
- No difference in pre-policy college enrollment and degree attainment ▸ Regression Table

Estimated Discontinuities in Demographics at the Eligibility Cutoff

	SAT Total	Female	Latinx	AP Course	FRPL Every Year	Household Income
	(1)	(2)	(3)	(4)	(5)	(6)
RD Estimate	5.545*	0.019	0.010	0.001	0.0129	96.584
P-value	0.053	0.124	0.184	0.881	0.197	0.832
MSE-Optimal Bandwidth	[2.56, 3.44]	[2.59, 3.6]	[2.53, 3.42]	[2.51, 3.53]	[2.49, 3.51]	[2.52, 3.53]
Sample Size	28,510	34,013	30,604	34,660	34,774	34,173
Controls						
CPS Grad Year	X	X	X	X	X	X
CPS High School	X	X	X	X	X	X

Testing the Validity of Our Identifying Assumptions

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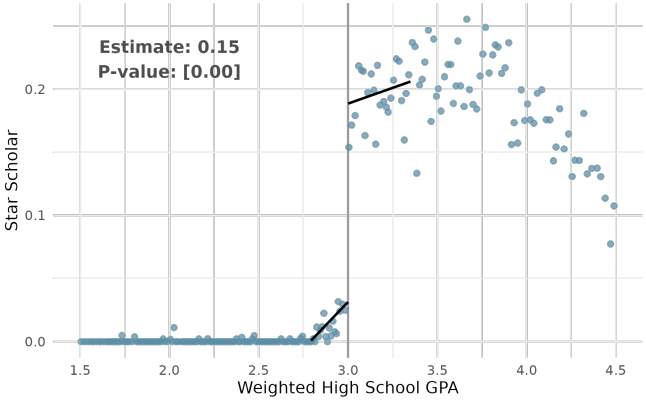
We Implement a Variety of Robustness Checks to Provide Further Evidence of the Validity of Our RD Design

- Donut RD (Drop values $\in [2.95, 3.05]$) (Barreca et al., 2011)
- Drop heaping values in running variable (multiples of 0.25) (Barreca et al., 2016)
- Diff-in-RD design (Grembi et al., 2016)
- Variety of different bandwidth choices

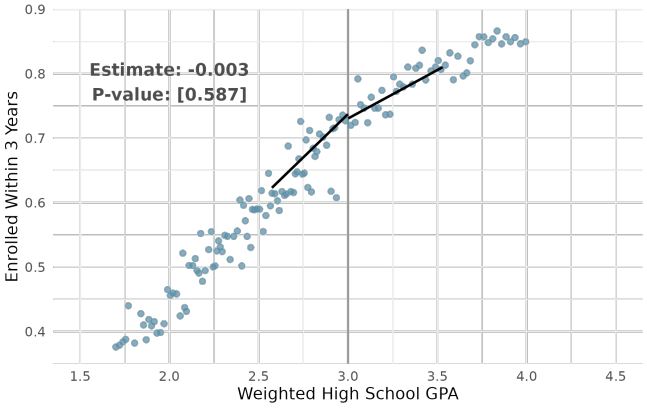
Main Results

Did the Eligibility Threshold Matter for Access to Free Community College?

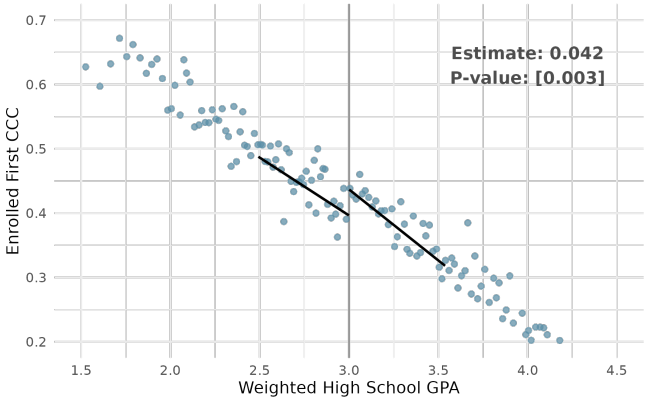


▸ 7th Semester GPA

Eligibility For The Star Scholarship Did Not Increase Overall College Enrollment

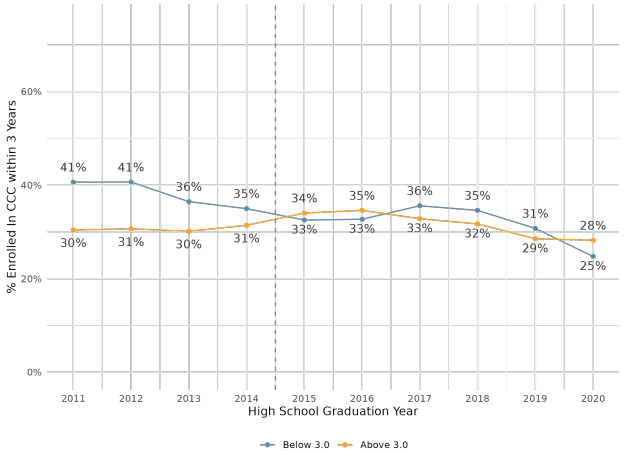


The Star Scholarship Increases the Probability that the First College a Student Enrolls in is at CCC



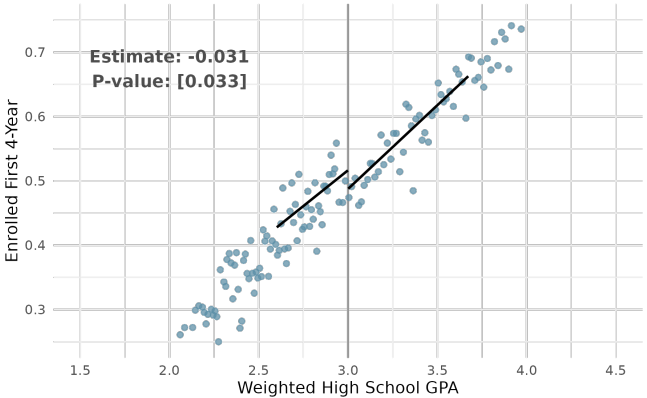
CCC Enrollment by High School GPA Over Time

Before the policy, low-GPA students were more likely to attend CCC than their higher-GPA peers. After the policy, these two groups attend CCC at similar rates.



Where Are Students Being Diverted From?

Eligibility for the Star Scholarship decreases the probability of first enrolling in a 4-year university by 3pp, which makes up 75% of the increase in community college enrollment

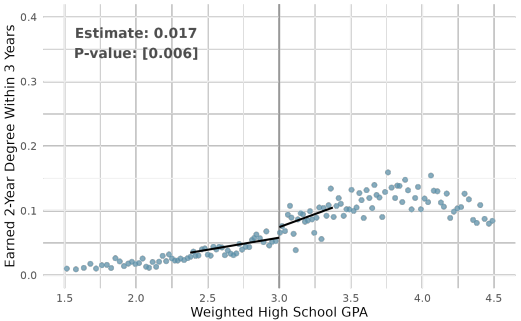


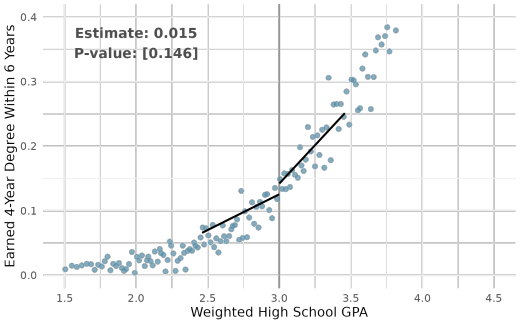
Short-Term Outcomes Paint a Narrow Picture

Given low completion rates at community colleges and barriers to transferring to a 4-year degree, impacts on short-term outcomes suggest that free community college might **decrease degree attainment** for students.

What do long-term outcomes look like?

Eligibility for the Star Scholarship Increases Degree Attainment

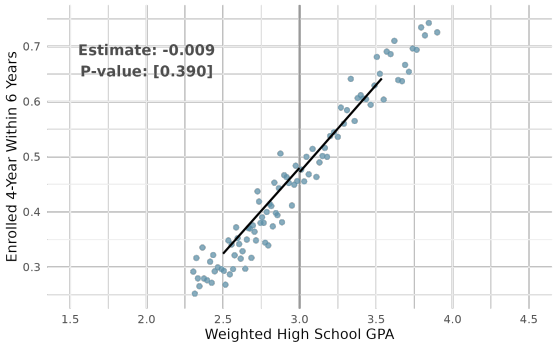




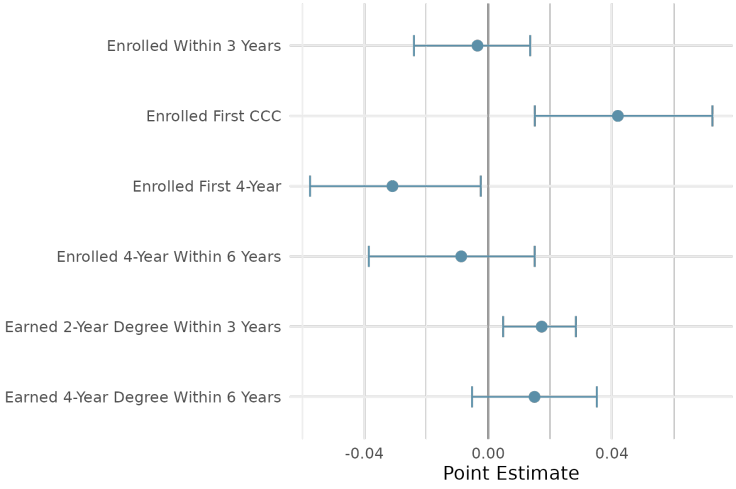
▸ Associate/Bachelor/Overall Degree Completion

Most Students who are Diverted, Eventually Transfer to a 4-Year

Eligibility for the Star Scholarship does not significantly decrease the probability that students enroll in a 4-year university in the long-run



Summary of Main Results

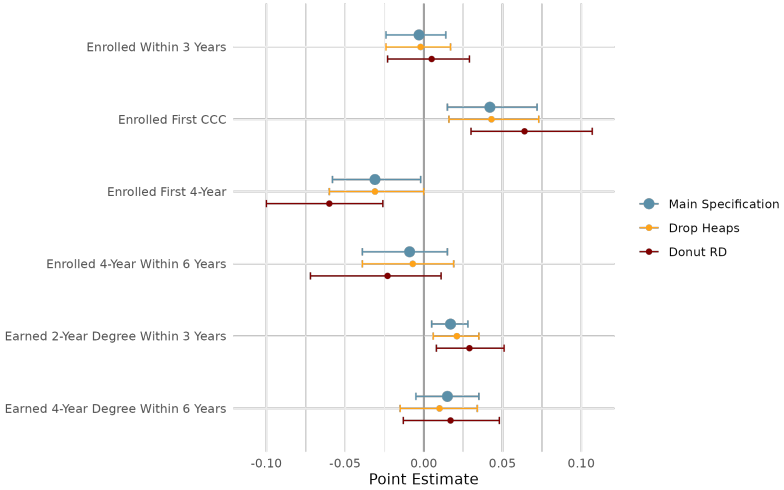


Robustness To Alternative Specifications

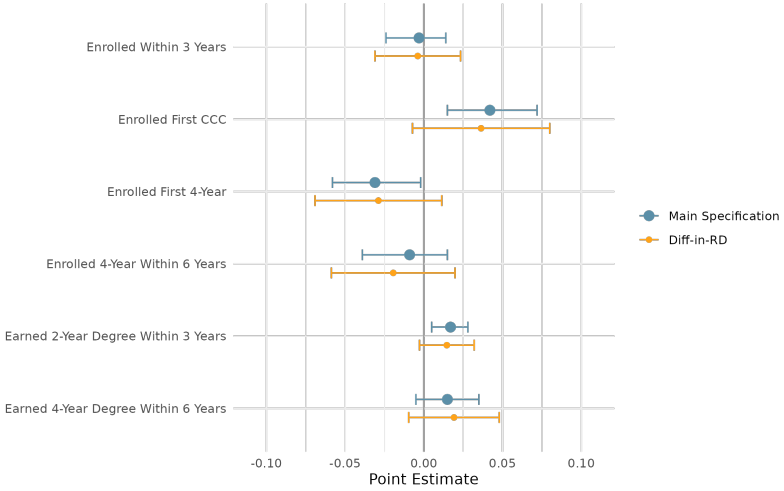
We find similar results using the following alternative specifications

- Drop heaping values in the running variable ▸ Density Plot
- Donut RD ▸ Density Plot
- Diff-in-RD ▸ Pre-Policy RD
- Different bandwidth specifications ▸ Coefficient Plot

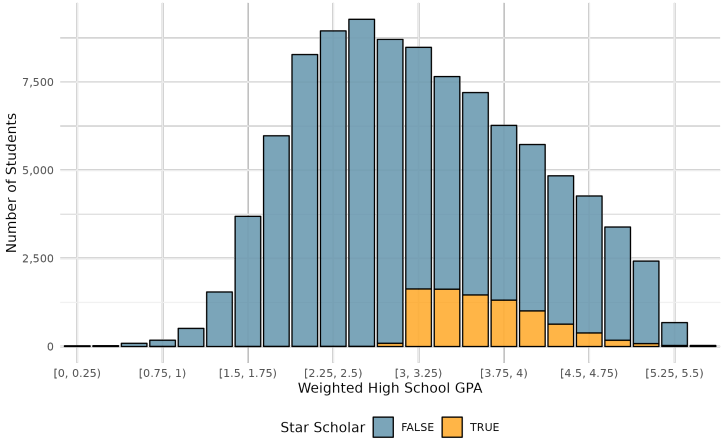
Donut RD Specification & Drop Heaps



Diff-In-RD Specification



What About Students Away From the Cutoff?



The majority of students are near the cutoff, but we can use a difference in differences design to estimate the effect for students farther above the cutoff and find similar effects for high GPA students.

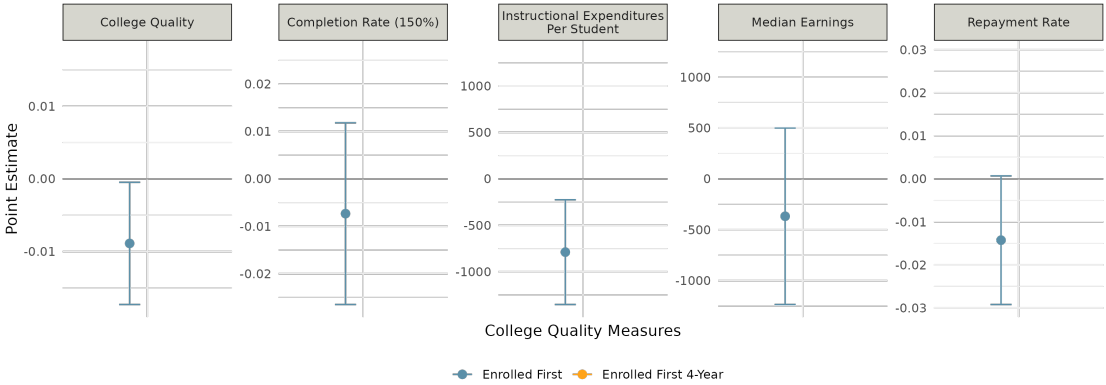
▸ Difference-in-Differences Specification

How Does Free Community College Impact College Quality?

- 2-year colleges tend to have much lower quality measures including lower completion rates and median earnings for graduates than 4-year universities
- Not all 4-year universities are higher quality than 2-year colleges
- Impact of free community college on quality of first college enrolled depends on the quality of the colleges students are being diverted from.

We use a difference-in-discontinuity specification to estimate the effect of eligibility for the Star Scholarship on the quality of the first college and first 4-year college a student enrolls in.

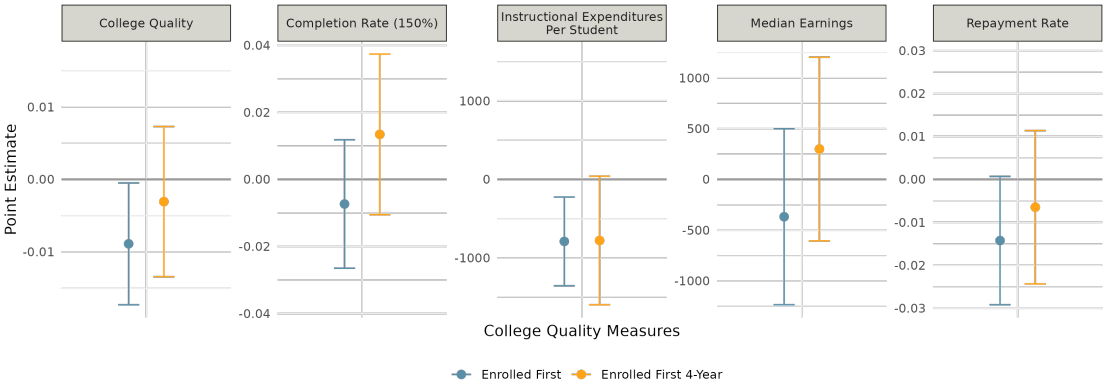
Effect on Quality of First College Enrolled



Eligibility for the Star Scholarship slightly decreases quality of the first college a student enrolls in

▸ Pre & Post Discontinuities

Effect on Quality of First 4-Year University Enrolled



We don't see a similar decrease in the quality of the first 4-year university

▸ Pre & Post Discontinuities

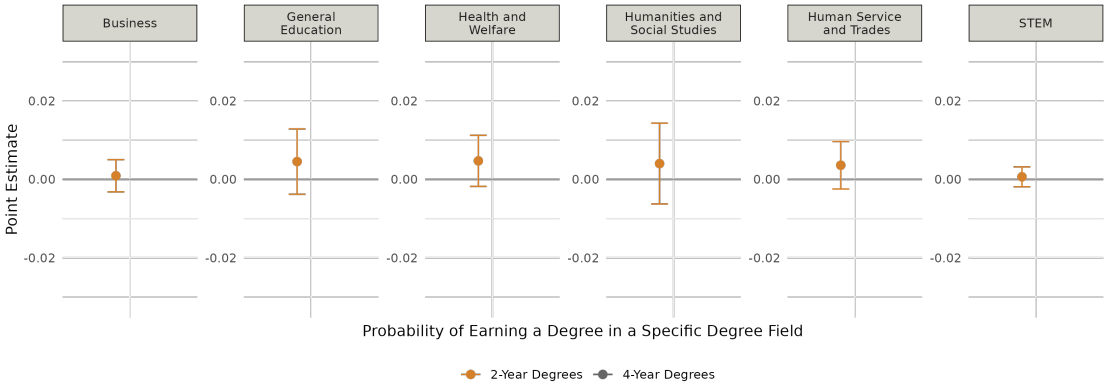
How Does Free Community College Impact College Degree Fields?

Eligibility for the Star Scholarship could influence composition of degree fields through:

- Changing the sample of students who earn a degree
- Changing the type of degrees students choose (through changes in course offerings and/or peers if they attend community college first)

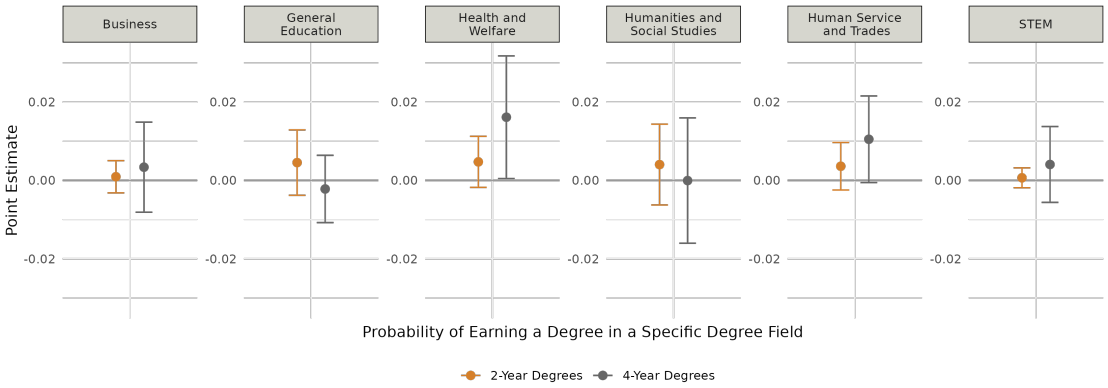
We use a difference-in-RD specification to estimate the effect of eligibility for the Star Scholarship on the probability of getting a degree in a specific degree field.

Effect on 2-Year Degree Fields



We find similar noisy increases across all 2-year degree fields, indicating that the increases in 2-year degrees are not concentrated in a specific field or degree

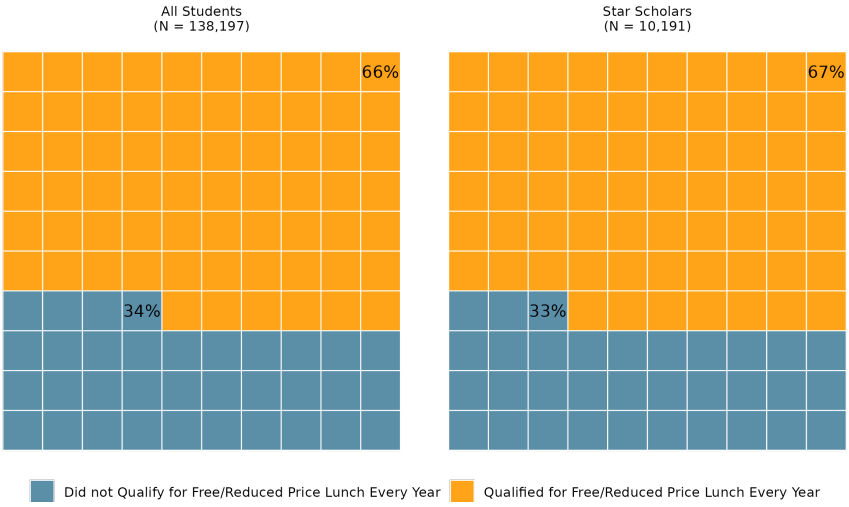
Effect on 4-Year Degree Fields



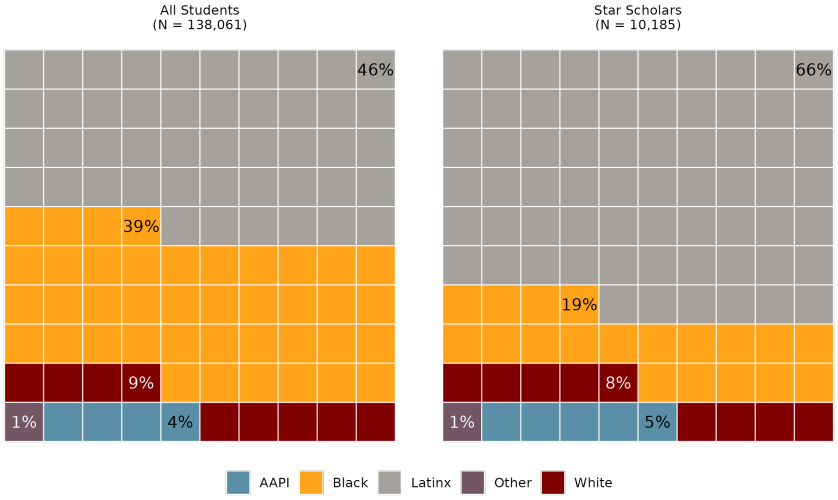
Largest increase in Health-related 4-year degrees, smaller increase in Human Services, and no significant changes in other 4-year degree fields (including STEM degrees)

Heterogeneity

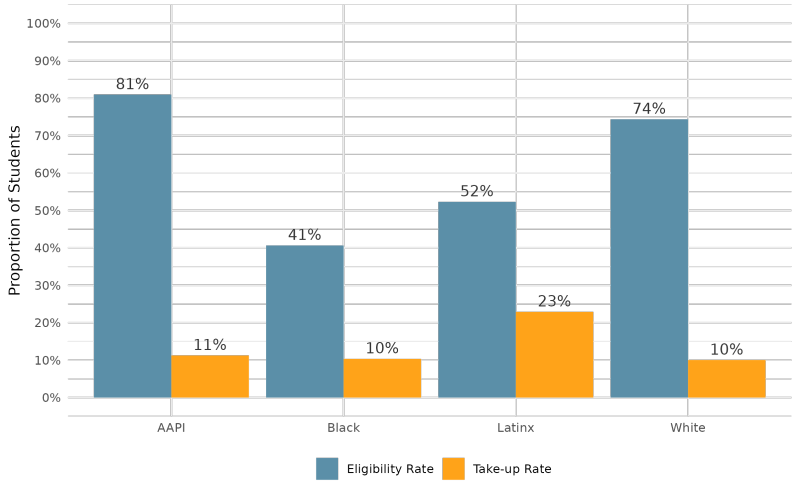
Similar Proportion of Low-Income Star Scholars Compared to CPS Population



Black students are Under-represented among Star Scholars, Latinx Students are Over-represented



Latinx Students are Twice as Likely Take-up the Star Scholarship



Latinx Students are More Likely to Be Low-Income and/or From Immigrant Families

Latinx students are more likely to be low income than other racial groups in our setting

- 75% of Latinx students qualified for FRPL every year in CPS

Many Latinx students are also from immigrant families

- 81% of Latinx students speak a language other than English at home

Immigrant Students Have Potentially Higher Benefits from the Star Scholarship

- Immigrant students, particularly those from families less familiar with the U.S. education system, may find the simplified aid process especially beneficial as it reduces administrative barriers often linked with need-based aid
- Undocumented immigrant students, who do not qualify for federal aid regardless of income, could see the largest financial benefits from this scholarship.

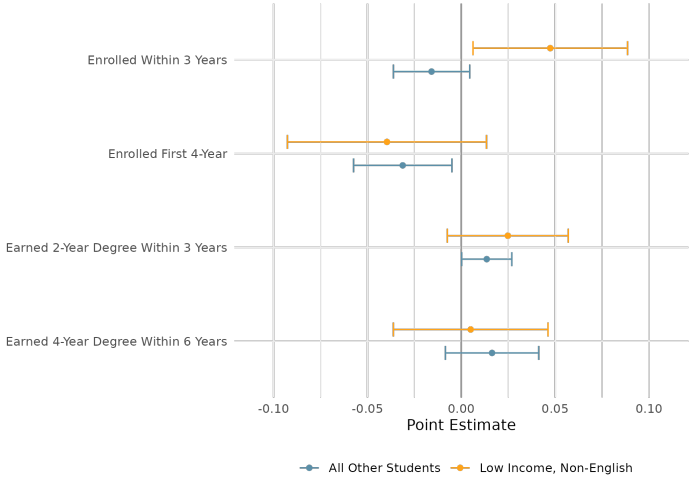
Estimating the Impact of the Star Scholarship Separately for Low-Income Students Who Are Likely to Be From Immigrant Families

- We cannot observe which students are from immigrant families nor which students are undocumented, however we use language spoken at home as an imperfect proxy of immigrant status
- We will use estimated household income and examine students above and below the median income in our sample ($39,000)

No Large Differences by Household Income or Home Language

- Students below median household income ($39,000) **are affected similarly** to students above ▸ Coefficient Plot
- Students who speak another language at home **are affected similarly** to students who speak English at home ▸ Coefficient Plot
- Students who are **BOTH** below median income **AND** speak a language other than English at home are affected differently ▸ Coefficient Plot

Low Income Students Who Speak Another Language at Home are More Likely to Attend College As a Result of Access to Free Community College



Conclusion

Summary of Findings

- Previous work looking at the short-run effects of access to free community college has suggested that many students are diverted from 4-year colleges and are potentially worse off as a result
- By looking at long-run outcomes, we find that students who have access to free community college are not less likely to complete a bachelor's degree on average
- They also do not attend lower quality 4-year universities and are not less likely to earn a STEM degree on average

Policy Implications

- Subsidizing community college tuition can increase overall degree completion without causing students to substitute 2-year degrees for 4-year degrees
- Important since community college tuition is often cheaper than 4-year tuition and students can often live at home, saving both policymakers and students money
- NOT saying that all students are better off by attending community college first
- Providing access to free community college increases degree attainment for students who choose to attend

Next Steps

- Students earn more degrees but are they better off? Received a grant continue this work by assessing how free community college affects a variety of financial outcomes
  - Student Loans
  - Financial Health (Credit Score)
  - Home Ownership
  - Mobility

Thank You

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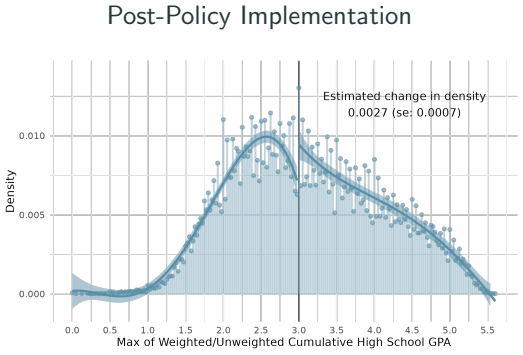
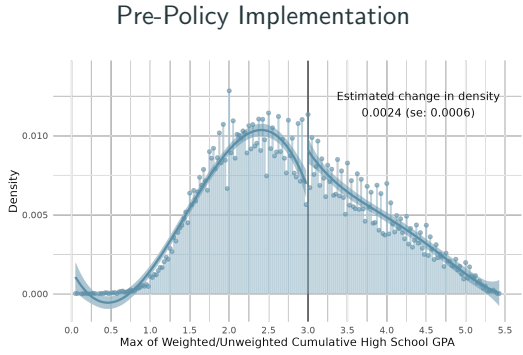
Appendix

Discontinuities not Statistically Different Pre/Post Policy





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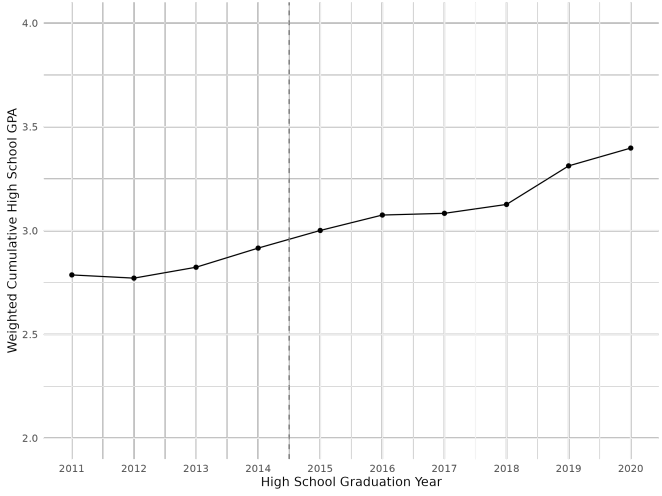
Grade Inflation at CPS Over Time



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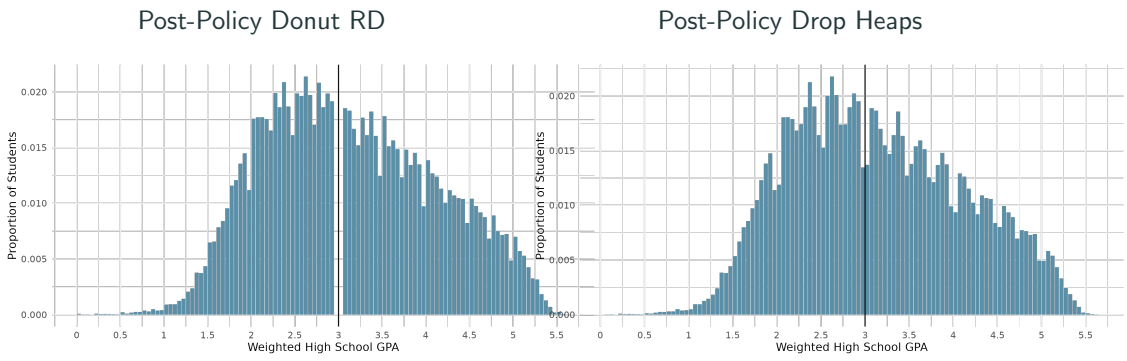
Alternative Specifications: Donut RD & Drop Heaps



Following Barreca et al., 2011, we implement a Donut RD (Drop values $\in [2.95, 3.05]$)

Following Barreca et al., 2016, we drop heaping values in running variable (Drop multiples of 0.25)

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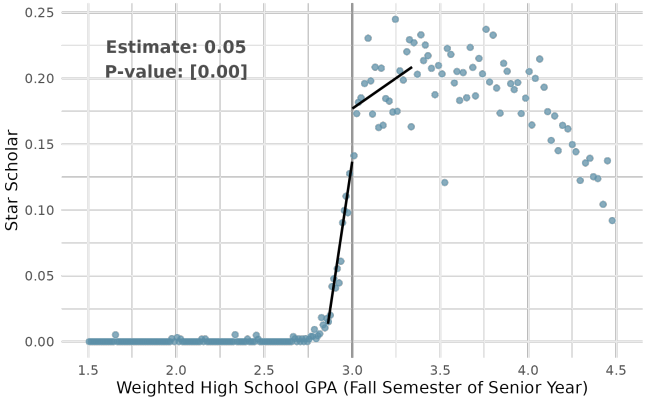
Estimated Pre-Policy Discontinuities

	Enrolled Within 3 Years (1)	Enrolled 4-Year Within 6 Years (2)	Earned 2-Year Degree Within 3 Years (3)	Earned 4-Year Degree Within 6 Years (4)
RD Estimate	-0.001	0.015	0.004	-0.006
P-value	0.909	0.208	0.658	0.484
MSE-Optimal Bandwidth	[2.52, 3.55]	[2.62, 3.49]	[2.45, 3.45]	[2.53, 3.41]
Sample Size	24,436	20,372	24,394	21,472
Controls				
CPS Grad Year	X	X	X	X
CPS High School	X	X	X	X

Note: This figure shows the estimated discontinuity in college enrollment and college completion for students just above the 3.0 GPA Star Scholarship eligibility cutoff who graduated between 2011 and 2014 before the policy was implemented. *p<0.1; **p<0.05; ***p<0.01 Back

Did the Eligibility Threshold Matter for Access to Free Community College?



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Eligibility for the Star Scholarship Increased Degree Attainment

	Earned Associate Degree Within 3 Years (1)	Earned Bachelor's Degree Within 6 Years (2)	Earned Any Degree Within 6 Years (3)
RD Estimate	0.0193***	0.0167*	0.0157
P-value	0.000	0.075	0.230
MSE-Optimal Bandwidth	[2.39, 3.33]	[2.43, 3.47]	[2.47, 3.59]
Sample Size	32,608	18,526	19,583
Controls			
CPS Grad Year	X	X	X
CPS High School	X	X	X

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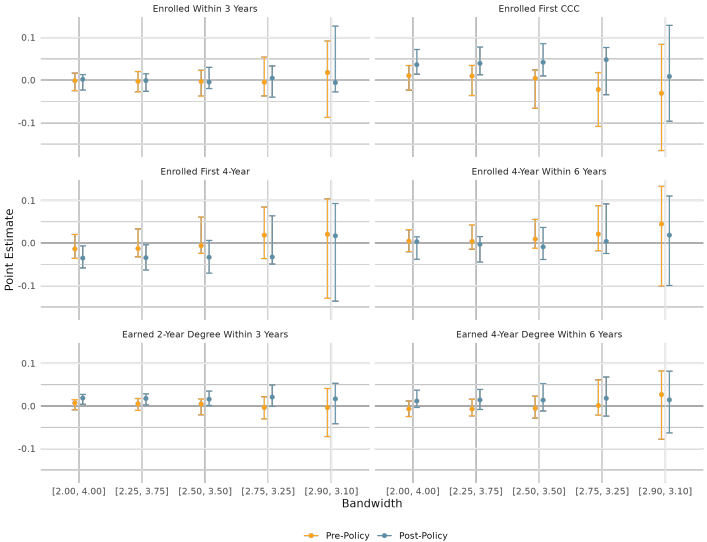
Robustness to Bandwidth Selection



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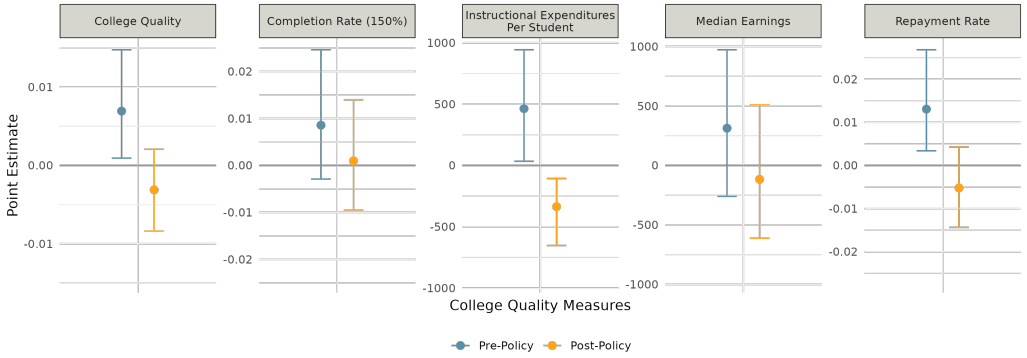
On Average, Eligibility for the Star Scholarship Decreases Quality of First College Enrolled



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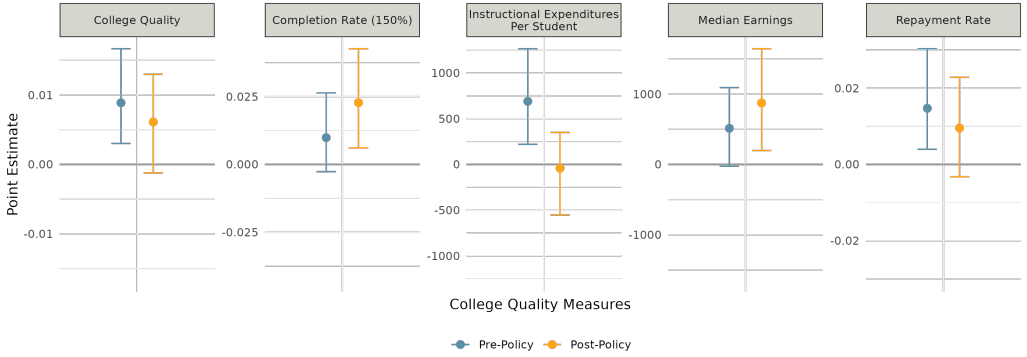
We Don't See A Similar Decrease in the Quality of the First 4-Year College a Student Attends



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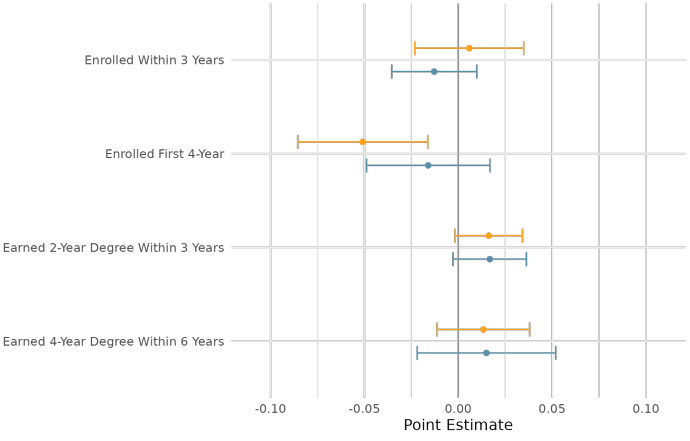
Students Below Median Household Income Are Affected Similarly to Students Above



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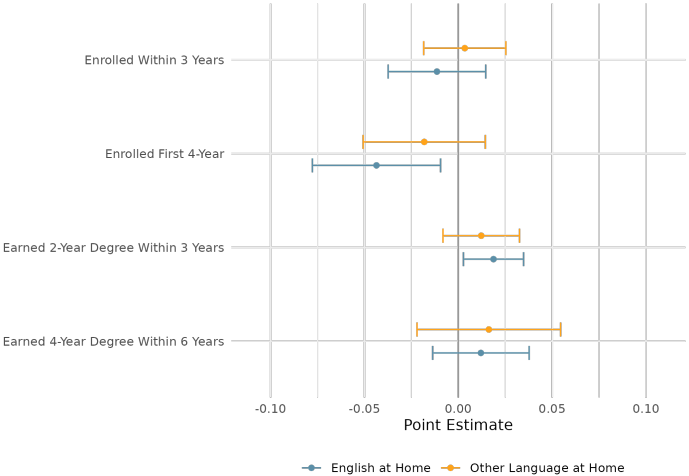
Students Who Speak Another Language at Home Are Affected Similarly to Students Who Speak English At Home



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Empirical Strategy – Difference-in-Differences

$$Y_{ijt} = \tau \left(Post_t \times Eligible_i \right) + \beta_0 Eligible_i + \beta_1 GPA_i + \beta_2 GPA_i^2 + \delta_t + \gamma_j + \varepsilon_{ijt}$$

- τ identifies the causal effect of eligibility for free community college on outcome Y_{ijt}
- $Eligible_i$ indicates whether a student i has a GPA $\geq$ 3.0
- $Post_t$ indicates whether a student graduated after the policy was implemented
- GPA_i represents a student's weighted cumulative high school GPA
- Includes high school fixed effects (γ_j) and graduation year fixed effects (δ_t)

Identifying Assumption

Student above and below the 3.0 GPA cutoff would have had similar trends in outcomes during the sample period had the Star Scholarship never been implemented

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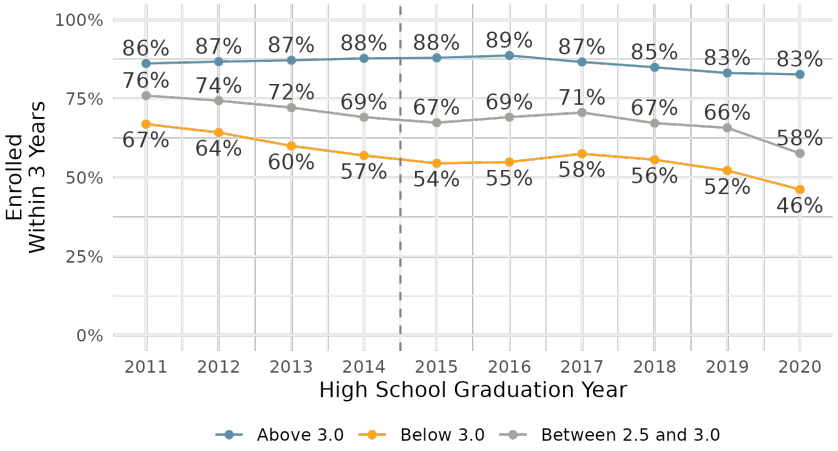
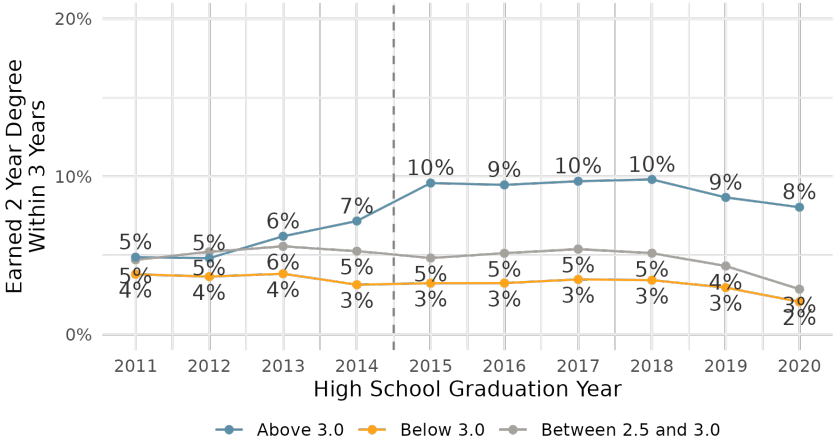
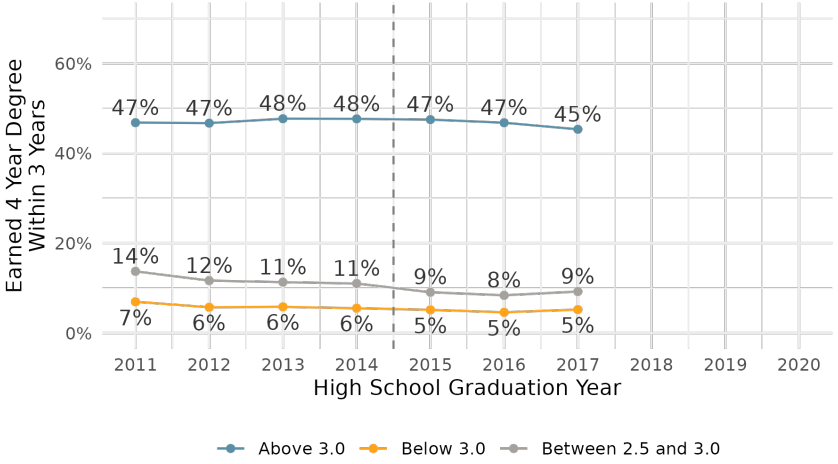
Probability of Enrolling in College Over Time



Probability of Earning 2-year Degree Over Time



Probability of Earning 4-year Degree Over Time



We See Similar Results on Degree Attainment Using DiD

	Enrolled Within 3 Years		Earned 2-Year Degree Within 3 Years		Earned 4-Year Degree Within 6 Years	
	(1)	(2)	(3)	(4)	(5)	(6)
Post-Policy × GPA $\geq$ 3.0	0.033***		0.037***		0.0010	
	(0.009)		(0.005)		(0.009)	
Post-Policy × GPA $\in$ [3.0, 3.1)		0.040***		0.018**		0.010
		(0.013)		(0.008)		(0.012)
Post-Policy × GPA $\in$ [3.1, 4.0)		0.030***		0.040***		-0.007
		(0.008)		(0.005)		(0.010)
Post-Policy × GPA $\in$ [4.0, 6.0]		0.035***		0.036***		0.011
		(0.011)		(0.008)		(0.011)
Weighted High School GPA	0.460***	0.460***	0.224***	0.202***	0.367***	0.360***
	(0.034)	(0.036)	(0.026)	(0.028)	(0.052)	(0.050)
Weighted High School GPA^2	-0.050***	-0.050***	-0.031***	-0.027***	-0.007	-0.011*
	(0.004)	(0.004)	(0.003)	(0.003)	(0.007)	(0.007)
Fixed Effects						
CPS Grad Year	Yes	Yes	Yes	Yes	Yes	Yes
CPS High School	Yes	Yes	Yes	Yes	Yes	Yes
Observations	78,419	78,419	78,419	78,419	78,402	78,402
Within R^2	0.00989	0.00436	0.00383	0.00250	0.11339	0.02799

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