High School Degrees and College Outcomes

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Motivation

- Return to college
  - Large (Kane and Rouse, 1995; Card (1995)
  - Increasing (Goldin and Katz, 2008)
- But college attainment rates have stagnated over the last 40 years
  - Enrollment has gone up
  - Offset by reductions in completion rates

Motivation

- Inadequate preparation in high school is one possible reason for slow growth in college attainment
- This perception has motivated high school reforms aimed at increasing “standards”
  - Strengthening graduation requirements
  - High school exit exams (or harder HSEE)

Motivation

- High school reforms have ambiguous effects on college outcomes
- Positive effects if they improve academic preparation
- Negative effect for students who do not graduate from HS because of reform
  - Depends on college admissions policies
  - Depends on college outcomes of “marginal” HS graduates

Motivation

- These considerations apply more generally to interventions aimed at improving college outcomes
- Enrollment could be an inadequate outcome measure
  - Likely to be most relevant for marginal students affected by interventions

This Paper

- **Goal**: estimate the causal effect of a HS diploma on college outcomes
- **Data**: TSP administrative data with information on enrollment and attainment
- **Research Design**: “Fuzzy” RDD based on high school exit exams

This Paper

- Strong effect of HSD on P(ever enroll)
  - About 10 ppts (or about 22% of the mean)
  - Concentrated almost entirely in 2-Yr. colleges
- No effect on college credits
- No effect on receipt of a college degree

This Paper

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-> HSD's affect enrollment, but for students who have very low college persistence

Outline

- Background
- Research Design
- Data
- Results
- Interpretation
- Conclusion

Background: Prior Literature

- Effect of HSEE on HS outcomes (Dee & Jacob, 2007; Warren et al., 2007; Reardon et al., 2009; Warren & Jenkins, 2005; Martorell, 2005; Papay et al., 2010; Ou, 2010)
  - Results are inconclusive and sensitive to empirical approach and data
- Effect of HSEE on post-HS outcomes
  - Dee & Jacob (2007) find little effect on college enrollment
  - Martorell & Clark (2010) find HSD status affected by exit exam has little effect on earnings
- Effect of GED on college enrollment
  - Tyler and Lofstrom (2010) find GED recipients less likely to enroll in college than comparable HS grads
  - Jepsen et al. (2010) use RD design and find GED increases college enrollment
- Many studies of programs aimed at college outcomes find enrollment effects but do not examine attainment outcomes
  - Kane (2003); Bettinger et al. (2009); Dynarski (2000); Cunha & Miller (2010); Jepsen et al (2010)

Background: College Admissions Standards in TX

- 4-Yr. colleges and universities require HSD or an equivalent credential (e.g., GED)
- Some 2-Yr. colleges also require HSD or GED
- Other 2-Yr. colleges admit non-graduates who score well on a placement test or who petition for admission
- Other 2-Yr. colleges admit all applicants
  - But informational barriers may prevent non-graduates from applying

Background: High School Exit Exams

- Standardized tests taken in HS
- Students must pass in order to graduate from HS
- Used in TX since the 1980's, now in about 50% of U.S. states

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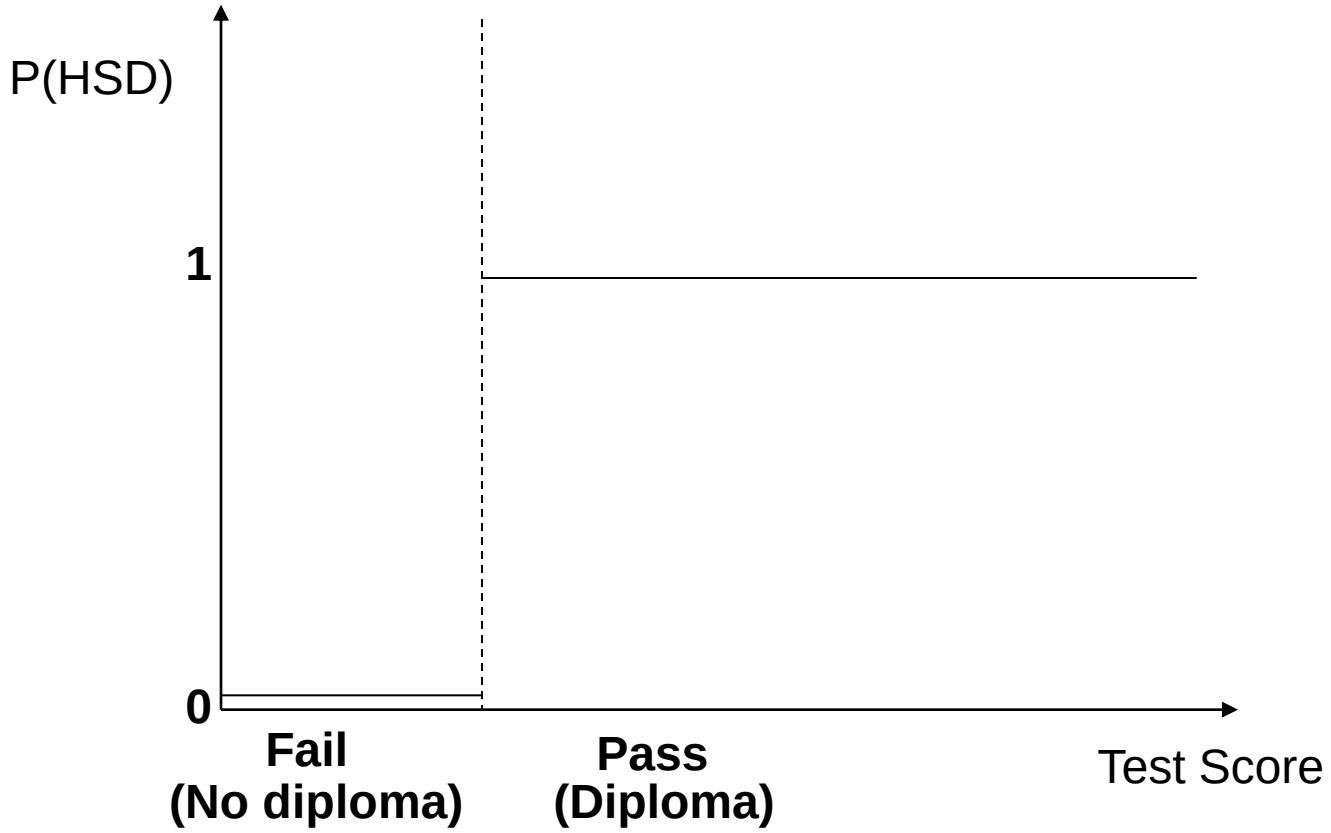
Research Design

- **Challenge**: HSD recipients would have better outcomes than non-HSD recipients irrespective of HSD status
- **Solution:** Regression discontinuity
  - Compare students “close” to exit exam passing cutoff

Research Design: High School Exit Exams

HS Exit Exams: stylized description

Single test taken by everyone at end of grade 12, perfect compliance



Research Design: High School Exit Exams

- HS exit exams in practice
  1. Multiple tests: math, reading, writing (must pass all 3 sections)
  2. Retaking: Initially taken in G10 or G11, multiple retake opportunities
  3. Imperfect compliance: can graduate if fail, not graduate if pass

Research Design: High School Exit Exams

- HS exit exams in practice

1. Multiple tests: math, reading, writing (must pass all 3 sections) with different scales

   - Recenter each score at passing cutoff

   - Redefine test score as min(M,R,W)

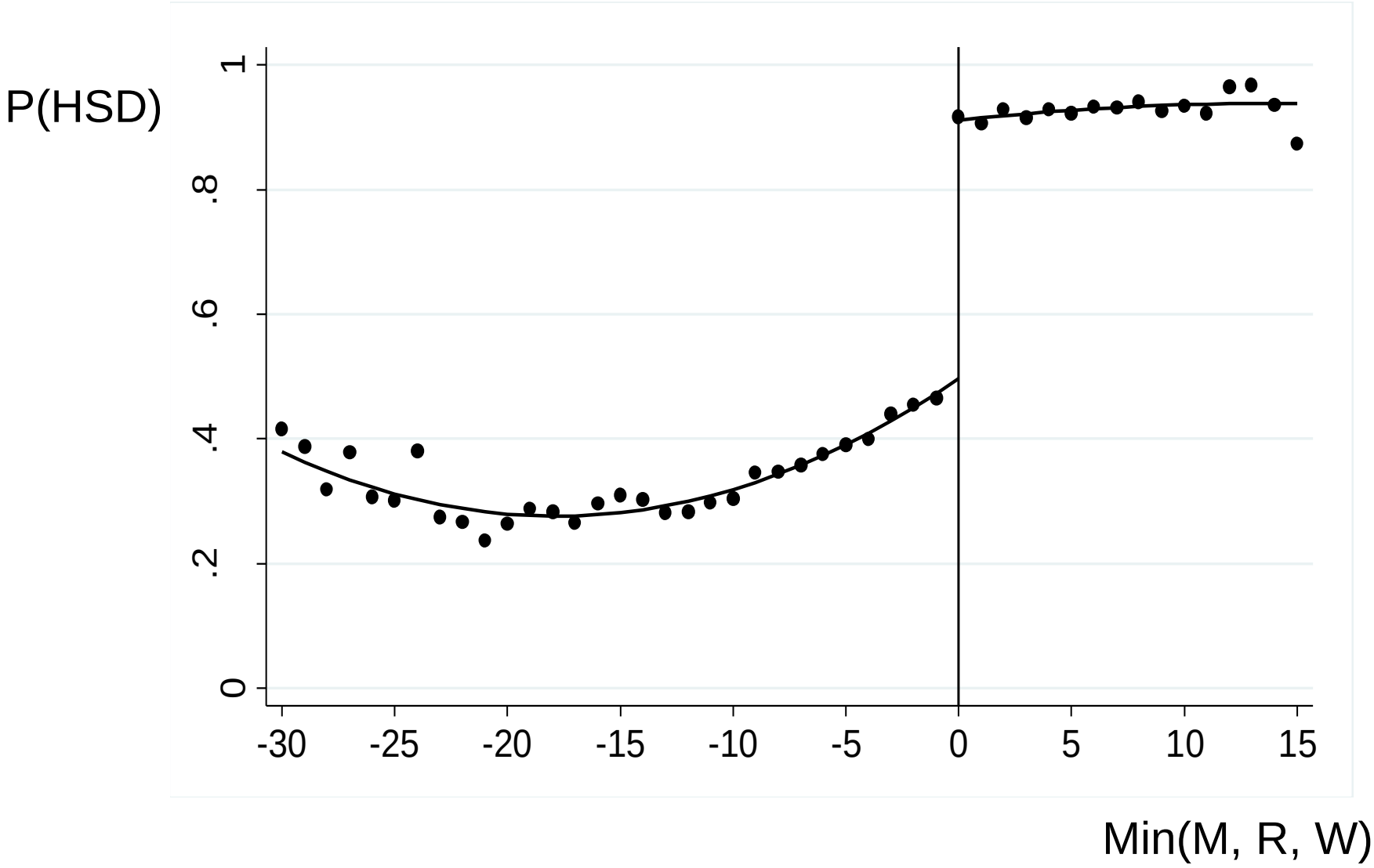
   - Fail if and only if min(M,R,W) < 0

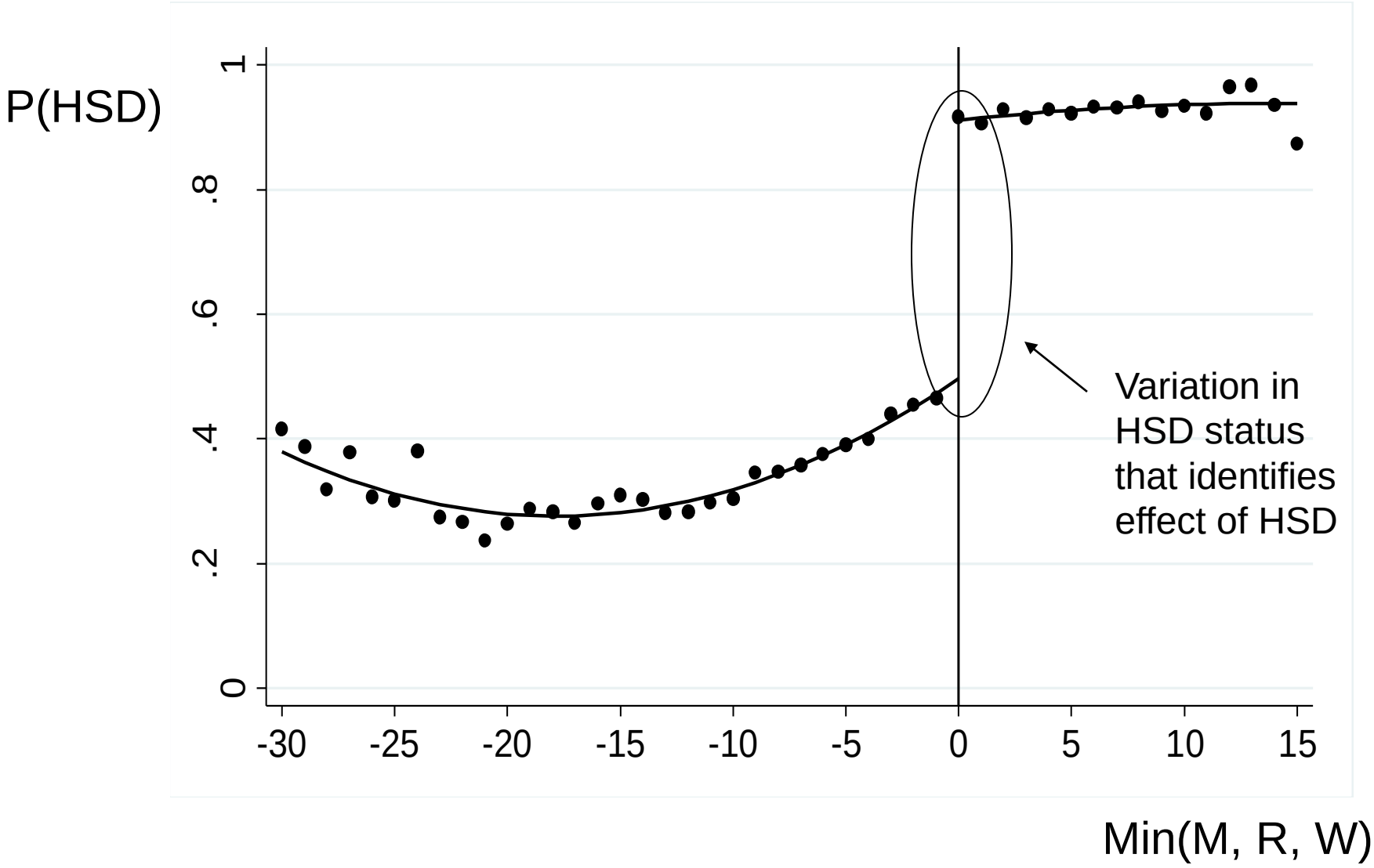
Research Design: High School Exit Exams

- HS exit exams in practice

  2. Retaking: Initially taken in G10 or G11, multiple retake opportunities

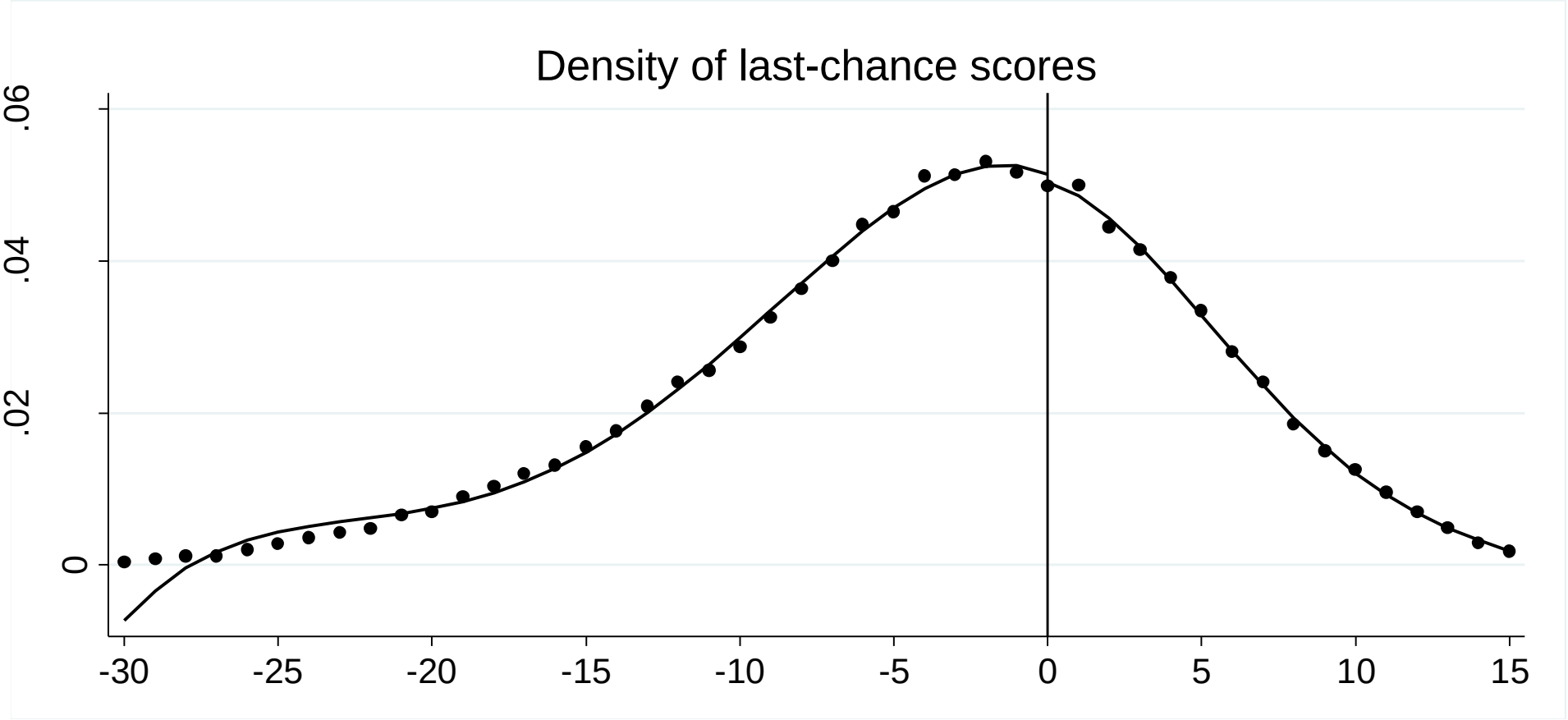
     - Focus on students taking final test at end of G12 (“last-chance sample)
     - Estimates specific to students in last-chance sample (policy relevant)


P(HSD)
0
.2
.4
.6
.8
1
-30
-25
-20
-15
-10
-5
0
5
10
15
Min(M, R, W)

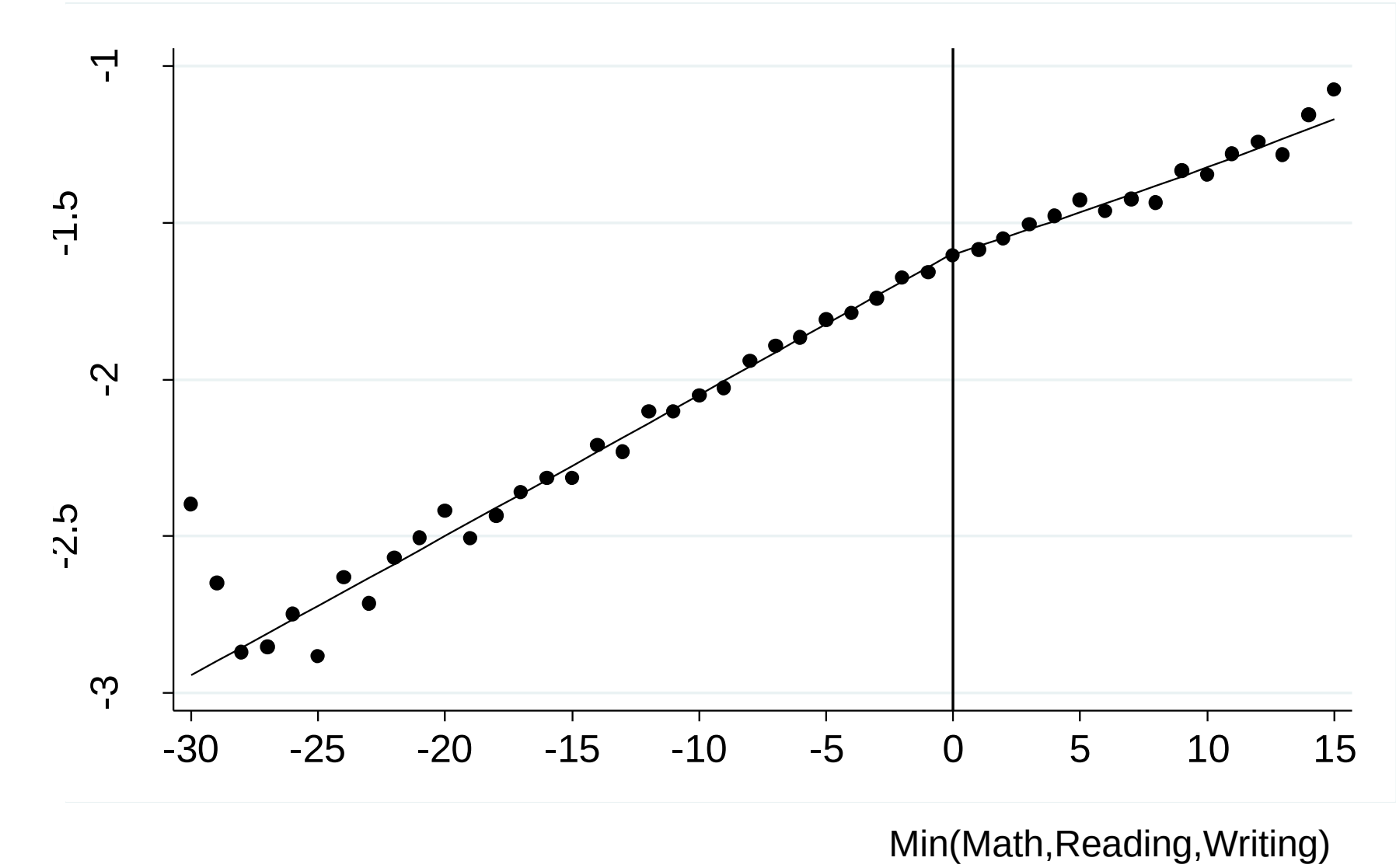

P(HSD)
1
.8
.6
.4
.2
0
-30
-25
-20
-15
-10
-5
0
5
10
15
Variation in HSD status that identifies effect of HSD
Min(M, R, W)

Research Design

- Exit exam passing status close to random near passing cutoff
  - Variation in HSD status near passing cutoff unrelated to other determinants of college outcomes



Cannot reject continuous density using McCrary (2008) test


Average Initial Attempt Math z-score
-1
-1.5
-2
-2.5
-3
-30
-25
-20
-15
-10
-5
0
5
10
15
Min(Math,Reading,Writing)

Research Design

$Y_i = \beta_0 + \beta_1 HSD_i + \beta_2 X_i^s + \varepsilon_i$ **[Structural Eqn, CONSTANT Effects]**

$Y_i = \theta_0 + \theta_1 PASS_i + f(p_i) + u_i$ **[REDUCED-FORM]**

$D_i = \kappa_0 + \kappa_1 PASS_i + g(p_i) + v_i$ **[FIRST-STAGE]**

⇨ $[\hat{\beta}_1 = \hat{\theta}_1 / \hat{\kappa}_1]$

⇨ **Standard RD (Imbens and Lemieux (2008), Lee and Lemieux (2009)**

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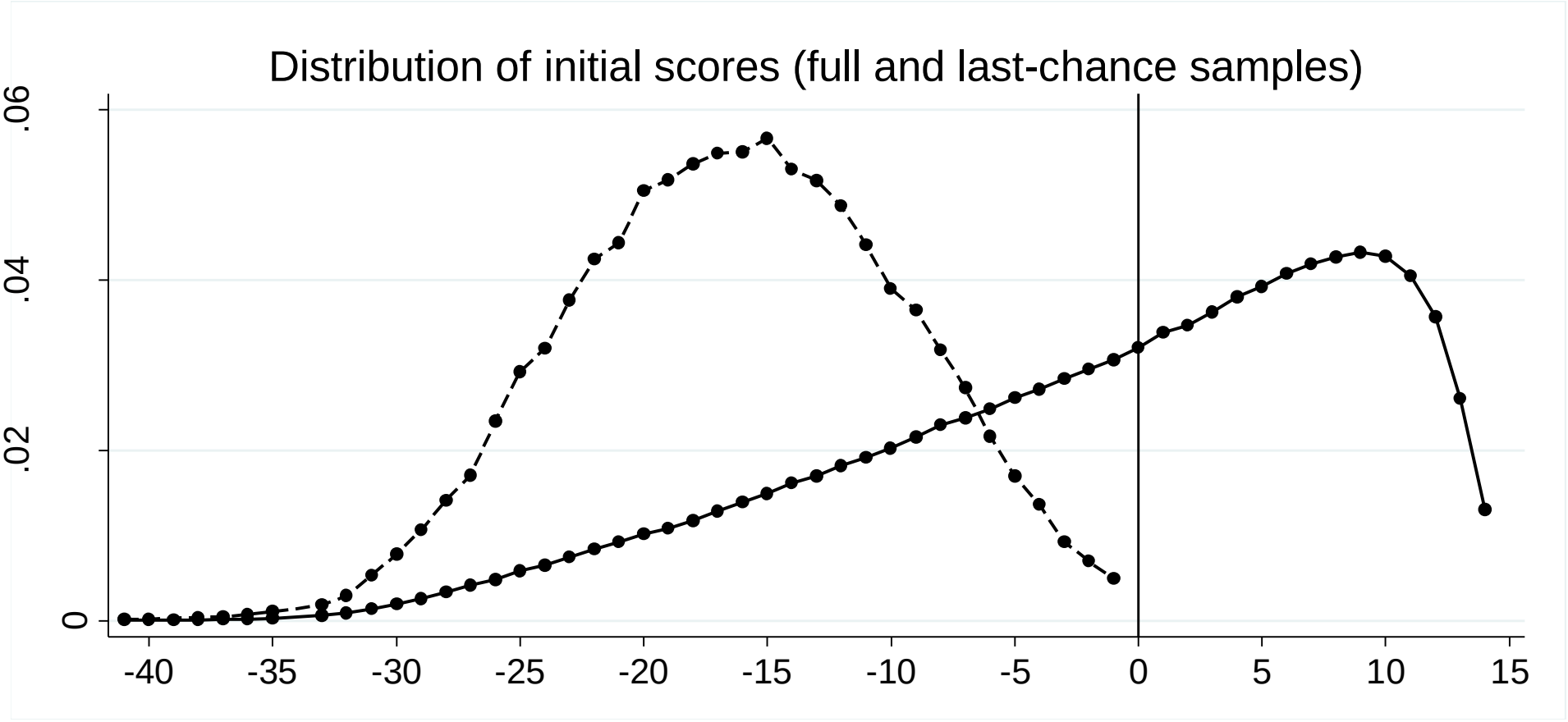
Data: Sources

- Administrative data from TSP
- High school (TEA)
  - 5 cohorts: G10 in 1991-1995)
  - Exit exam scores (all attempts)
  - HS graduation status
  - Baseline covariates
  - GED
- Post-secondary (THECB)
  - THECB data on public 2yr and 4yr colleges through 2005
  - 8 Year follow up for all cohorts
  - Enrollment
  - Credits (attempted academic, total enrolled)
  - Degree completion (BA, AA)

Data: Sample

- Analysis sample
  - Students who took the “last-chance” test (final 12th grade retest)
  - Took exam for the first time with their cohort (i.e., fall 11th grade for first 2 cohorts; spring 10th grade for last 3 cohorts)
  - N=37,571

Data: Descriptive Statistics



Data: Descriptive Statistics

	Full Sample	Last-chance sample		
		All	Fail	Pass
Demographics				
Male	0.487	0.421	0.416	0.430
Black	0.117	0.246	0.256	0.230
Hispanic	0.289	0.478	0.505	0.434
Econ. Disadvantaged	0.213	0.409	0.442	0.354
Special Education	0.034	0.034	0.040	0.024
Limited English proficient	0.040	0.147	0.177	0.099
At grade level (initial attempt)	0.770	0.541	0.494	0.617
Cohort 1	0.177	0.356	0.296	0.453
Cohort 2	0.174	0.156	0.179	0.120
Cohort 3	0.214	0.185	0.189	0.179
Cohort 4	0.211	0.157	0.180	0.120
Initial Exam				
Took all Sections	0.949	0.956	0.956	0.955
Math (mean,sd)	0.9 (11.7)	-14.9 (7.9)	-16.4 (7.7)	-12.4 (7.4)
Reading (mean, sd)	3.8 (7.5)	-5.7 (6.8)	-7.0 (6.9)	-3.7 (6.2)
Writing (mean, sd)	9.0 (13.6)	-2.7 (11.4)	-4.4 (11.4)	-0.0 (10.8)
Pass all sections (%)	0.514	0	0	0
Total exam attempts in HS	2.05 (1.54)	5.7 (1.3)	5.8 (1.2)	5.6 (1.3)
Number of Observations	777892	37571	0.051	0.220

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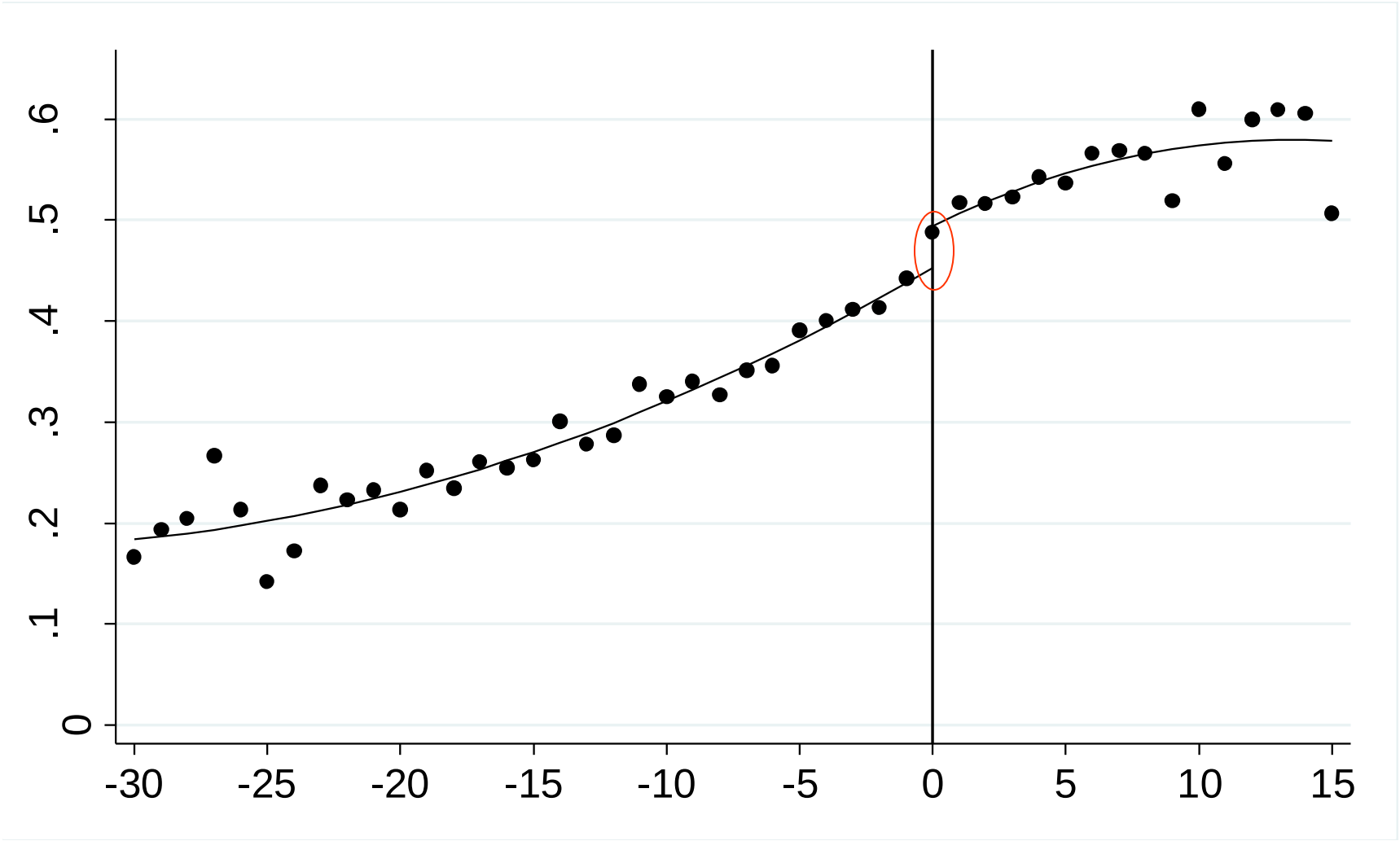
Results: First Stage

	Reduced Form				
First Stage	0.444**	0.415**	0.419**	0.417**	0.417**
	(0.007)	(0.009)	(0.012)	(0.016)	(0.009)
Baseline X's?	N	N	N	N	Y
Test score specification	Local Linear	Quad.	Cubic	Quartic	Quad.

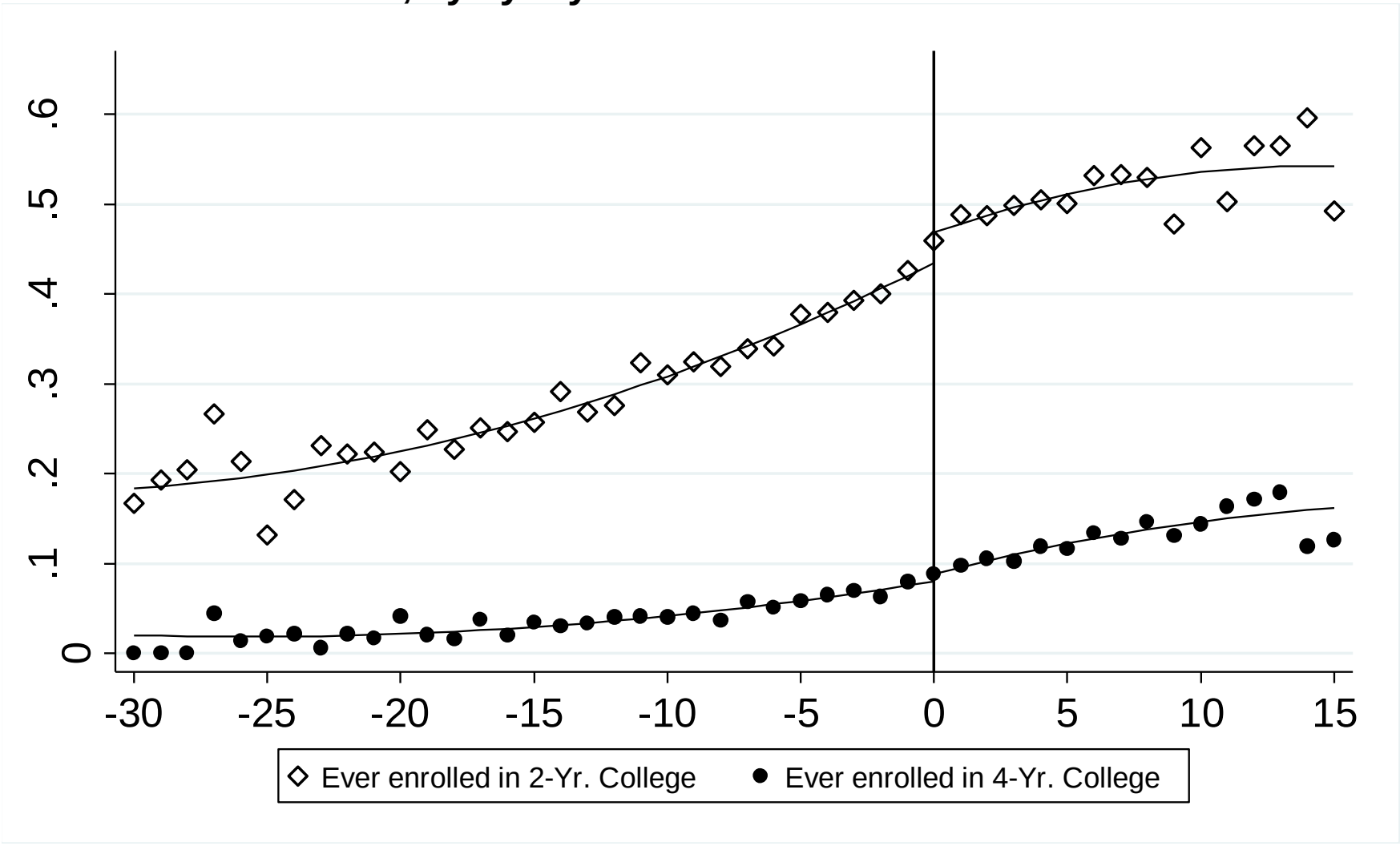
Results: College Enrollment

Fraction Ever Enrolled in College



Results: College Enrollment

Fraction Ever Enrolled, by 2yr/4yr

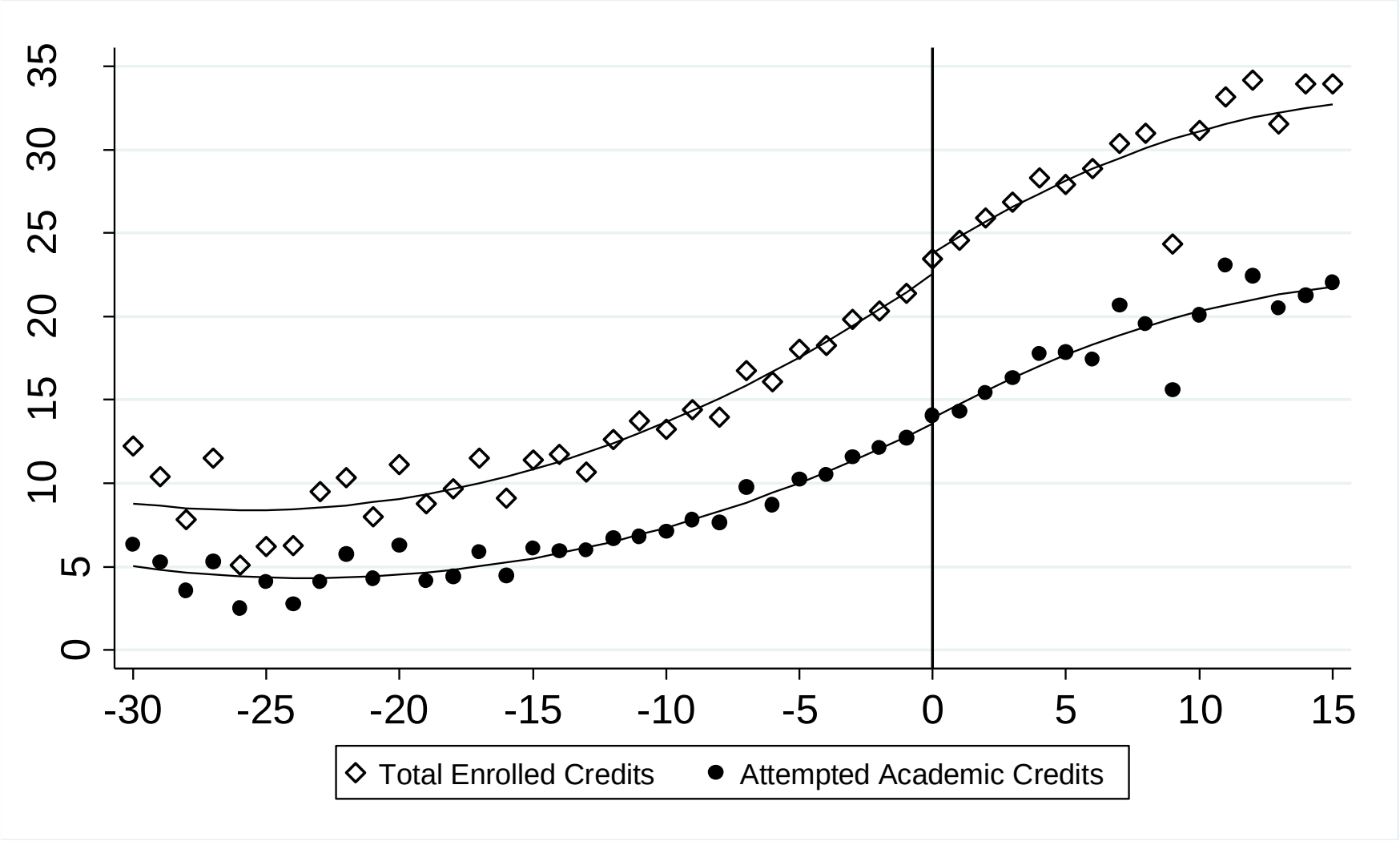


Results: Enrollment Outcomes

	Reduced Form					IV
Ever enroll	0.059**	0.042**	0.040**	0.032	0.043**	0.103**
	(0.009)	(0.012)	(0.015)	(0.018)	(0.011)	(0.027)
Ever enroll - 4yr	0.015**	0.008	0.008	0.005	0.009	0.021
	(0.005)	(0.006)	(0.008)	(0.010)	(0.006)	(0.015)
Ever enroll - 2yr	0.049**	0.034**	0.028	0.020	0.034**	0.083**
	(0.009)	(0.012)	(0.015)	(0.018)	(0.011)	(0.027)
Attempt any acad cred	0.056**	0.042**	0.040**	0.042*	0.044**	0.105**
	(0.009)	(0.011)	(0.014)	(0.018)	(0.011)	(0.027)
Baseline X's?	N	N	N	N	Y	Y
Test score specification	Local Linear	Quad.	Cubic	Quartic	Quad.	Quad

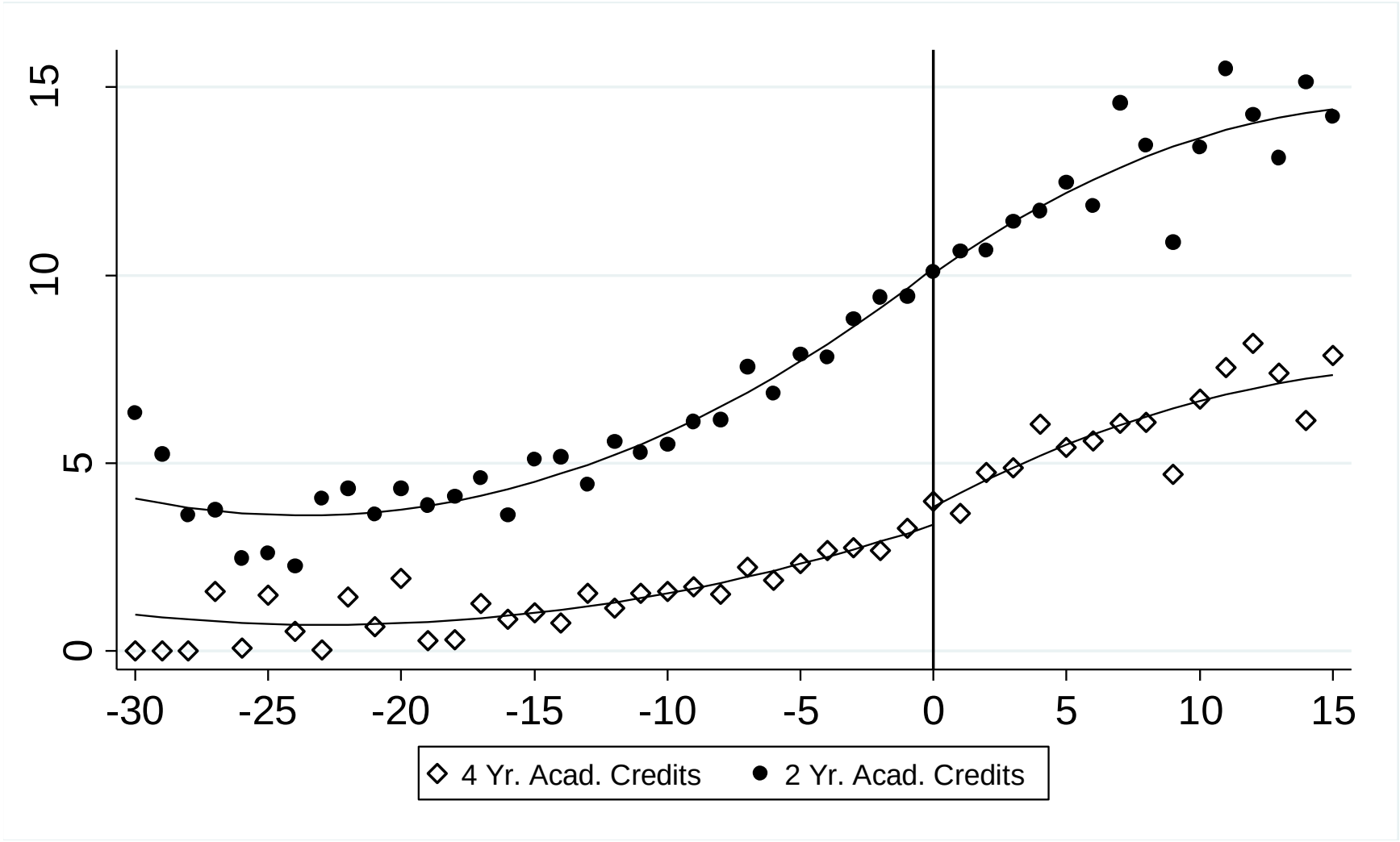
Results: Attainment Outcomes

College Credits



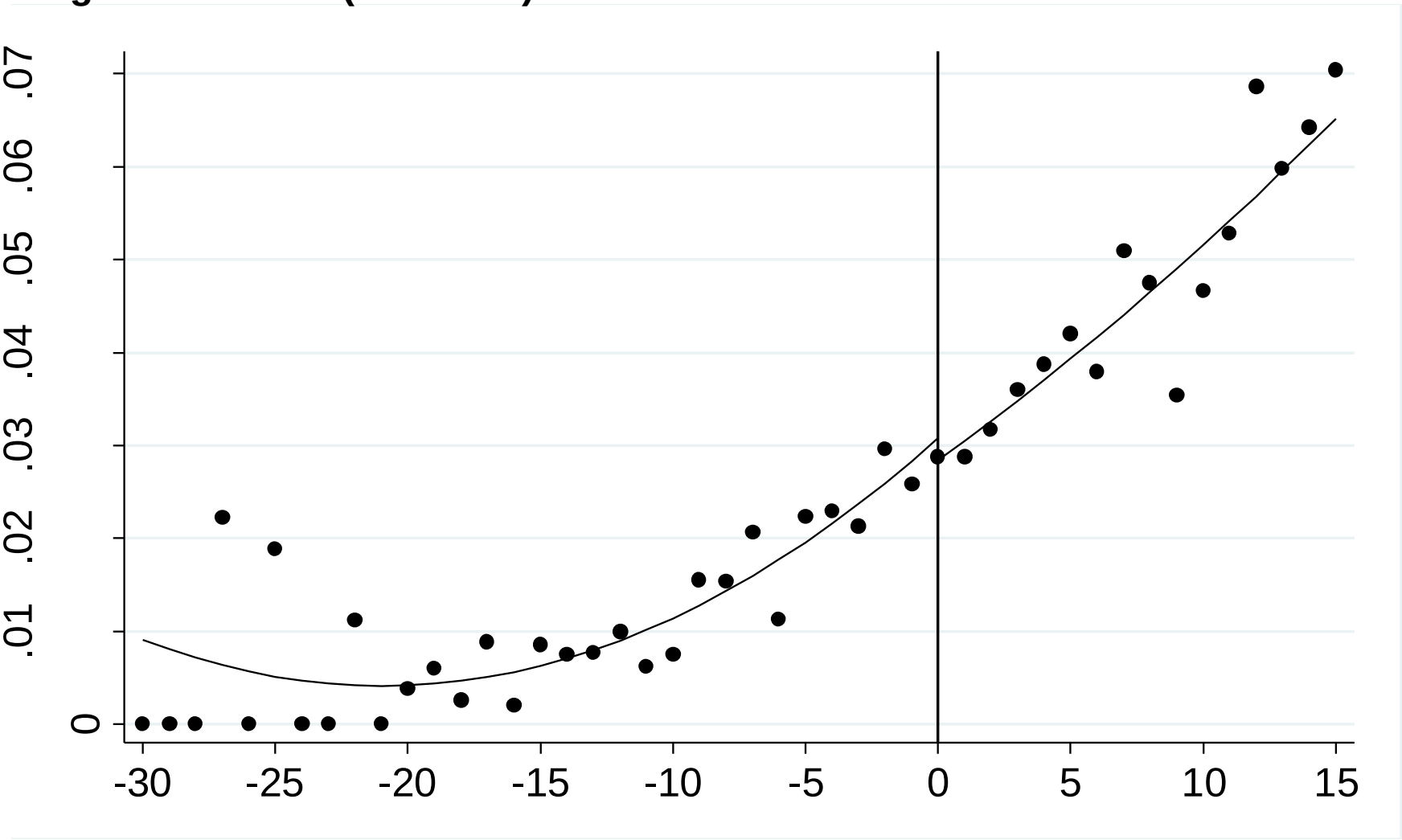
Results: Attainment Outcomes

College Credits



Results: Attainment Outcomes

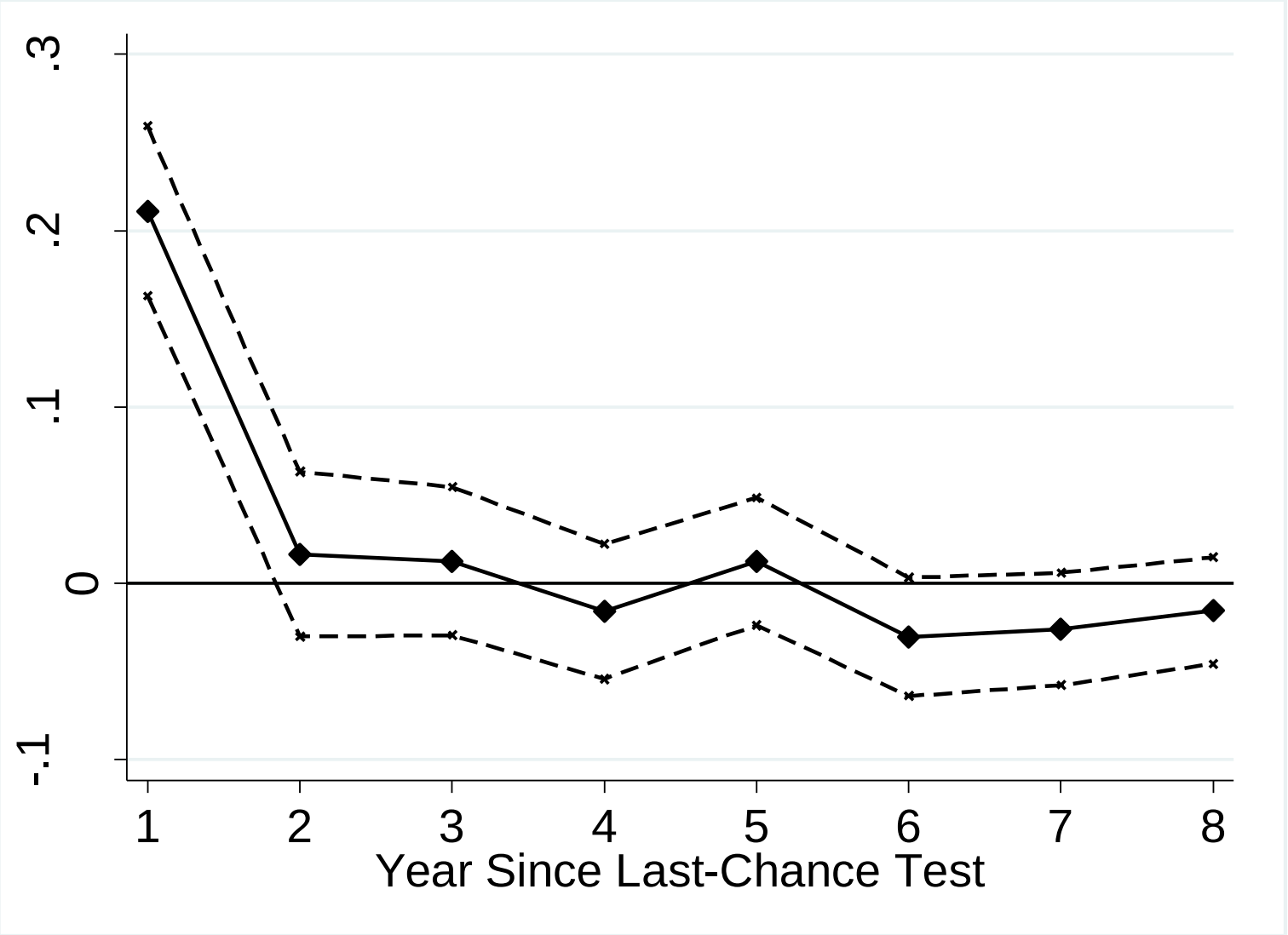
College Graduation (BA or AA)



Results: Attainment Outcomes

	Reduced Form				IV
Total credits enrolled	2.563**	1.266	0.645	0.650	3.301
	(0.751)	(0.931)	(1.175)	(1.445)	(2.175)
Acad Credits	1.398*	0.332	0.023	0.139	1.016
	(0.546)	(0.677)	(0.848)	(1.041)	(1.593)
Earn BA or AA	-0.001	-0.002	-0.003	-0.001	-0.005
	(0.003)	(0.004)	(0.005)	(0.006)	(0.009)
Earn BA	0.003	0.002	0.002	0.003	0.005
	(0.002)	(0.003)	(0.004)	(0.004)	(0.007)
Earn AA	-0.003	-0.005	-0.005	-0.003	-0.012
	(0.002)	(0.003)	(0.004)	(0.004)	(0.007)
Baseline X's?	N	N	N	N	Y
Test score specification	Local Linear	Quad.	Cubic	Quartic	Quad

Results: Enrollment Effects Over Time



Results: Subgroups

	Men	Women	p-value for Men = Women	Whites	Nonwhite	p-value for Whites = Nonwhites
Enrollment Outcomes						
Ever enrolled in college	0.051	0.140**	0.120	0.070	0.113**	0.485
	(0.046)	(0.034)		(0.052)	(0.032)	
Ever enrolled in 4yr college	0.022	0.020	0.938	-0.006	0.030	0.252
	(0.025)	(0.019)		(0.025)	(0.019)	
Ever enrolled in 2yr college	0.019	0.127**	0.058	0.054	0.091**	0.551
	(0.046)	(0.034)		(0.052)	(0.032)	
Attainment Outcomes						
Total credits enrolled	3.580	3.262	0.943	0.914	4.195	0.486
	(3.387)	(2.827)		(3.935)	(2.592)	
Attempted academic credits	2.516	0.133	0.463	-0.337	1.486	0.601
	(2.512)	(2.052)		(2.936)	(1.888)	
Earn BA or AA	0.015	-0.017	0.076	-0.012	-0.003	0.656
	(0.013)	(0.012)		(0.018)	(0.011)	
Earn BA	0.004	0.006	0.903	-0.000	0.007	0.626
	(0.008)	(0.010)		(0.013)	(0.008)	
Earn AA	0.011	-0.025**	0.008	-0.014	-0.011	0.829
	(0.010)	(0.009)		(0.013)	(0.008)	

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Interpretation: Why are Attainment Effects Small?

- College going in the last-chance sample low across the board
- “LATE” might be unusually small relative to other students in last-chance sample
- Data issues (no private, out of state schools)
- GED replaces regular high school diploma

Interpretation: Policy Implications

- Policies that affect HS graduation unlikely to directly affect college attainment
  - HSEE, course completion requirements, etc. may reduce graduation, but probably not college attainment
  - Potential positive effects on college outcomes if quality of high school instruction improves

Interpretation: Policy Implications

- Examining attainment effects critical for evaluations of programs that seek to improve college outcomes
  - Interventions have largest effects on “marginal” students; persistence might be lowest among these students
- Relevant for evaluations of
  - Scholarships (Kane, 2003; Dynarski, 2000)
  - Financial aid information (Bettinger et al., 2009)
  - General college informational campaign (Cunha & Miller, 2010)

Conclusion

- High school diplomas “matter” for college enrollment but not attainment
  - Enrollment effects large, but short-lived
  - Persistence among “marginal” students very low
- Policies that change HS graduation rates unlikely to have large effects on college outcomes
- Evaluations of programs that target college outcomes need to consider attainment and not just enrollment