The Impact of School Tracking and Peer Quality on Student Achievement: Regression Discontinuity Evidence from Thailand

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Introduction

- Tracking: sorting students into classrooms based on ability
- Widely used around the world
- UK, AUS, NZ, Israel, Malaysia, Singapore: 95% [1]
- 75% of US schools track students for 8th-grade math [2]
- Could tracking harm students who are tracked into lower-ability class through exposure to lower quality peers?
- Little evidence on this
  - Vardardottir (2013): $+0.47\sigma$
  - Duflo, Dupas, and Kramer (2011): No significant effects

[1] OECD (2013), What Makes Schools Successful? Resources, Policies and Practices- Volume IV, Ch2, Page 81 https://www.oecd.org/pisa/keyfindings/Vol4Ch2.pdf

[2] NAEP (2013), The Resurgence of Ability Grouping and Persistence of Tracking https://www.brookings.edu/research/the-resurgence-of-ability-grouping-and-persistence-of-tracking/

Bottom Line

Question: What is the impact of being tracked into a classroom with higher-ability peers?

- Use data from public middle schools in Thailand
- Students tracked into classrooms based on ability
- Regression Discontinuity Design
- Higher-ability classrooms
  - $+0.94\sigma$ in peer quality
  - No statistically significant effects on GPA
  - Can rule out effects bigger than $+0.08\sigma$

School System In Thailand

Public Middle Schools (7th-9th grade)

- Once admitted $\rightarrow$ preliminary exam before the 7th grade
- Classrooms assigned based on preliminary exam score

Rank by prelim score	Class assigned
1-40	1
41-80	2
81-120	3

- Students **cannot manipulate** the cutoff because
  - Cutoff not known before taking exam
  - No retake
- Focus on schools where
  - same curriculum for every classroom
  - nearly identical set of teachers across classrooms
  - peer quality: different across classroom

Data

- Administrative data of 7th grade students
- From 4 public middle schools in Bangkok
- year2013-2014 to school year 2016-2017

Data set includes

- Preliminary exam score
- Class assignment
- Student characteristics (e.g. gender, height)
- Class timetable
- 7th grade cumulative GPA (main outcome)
  - Grades mostly based on exams (multiple-choice)
  - No grade curving
    (A:80-100, B:70-79, C:60-69, D:50-59, F:0-49)
  - same exams for every classroom in the same school

Normalizing cutoffs for Stack RDD

- Multiple cutoffs, each with different cutoff scores → Pop-Eleches and Urquiola (2013)
- Normalize cutoffs by recentering all cutoff scores to zero
- Use *distance to cutoff* instead of raw preliminary score

Normalizing prelim score

$$r_{ic} = prelim_i - cutoff\ score_c$$

$prelim_i$: student i's preliminary exam score
$cutoff\ score_c$: cutoff score at cutoff c
r_{ic}: i's normalized preliminary score (distance from i to cutoff c)

Empirical Approach: Fuzzy RDD

First Stage

$$I[\textit{higher ability class}]_{ic} = \alpha_1 + \beta_1 I[r_{ic} \geq 0] + \gamma_{11} r_{ic} + \gamma_{12} r_{ic} I[r_{ic} \geq 0] + \delta_c + u_{ic}$$

Reduced Form

$$GPA_i = \alpha_2 + \beta_2 I[r_{ic} \geq 0] + \gamma_{21} r_{ic} + \gamma_{22} r_{ic} I[r_{ic} \geq 0] + \delta_c + v_{ic}$$

Empirical Approach: Checking the validity of RDD

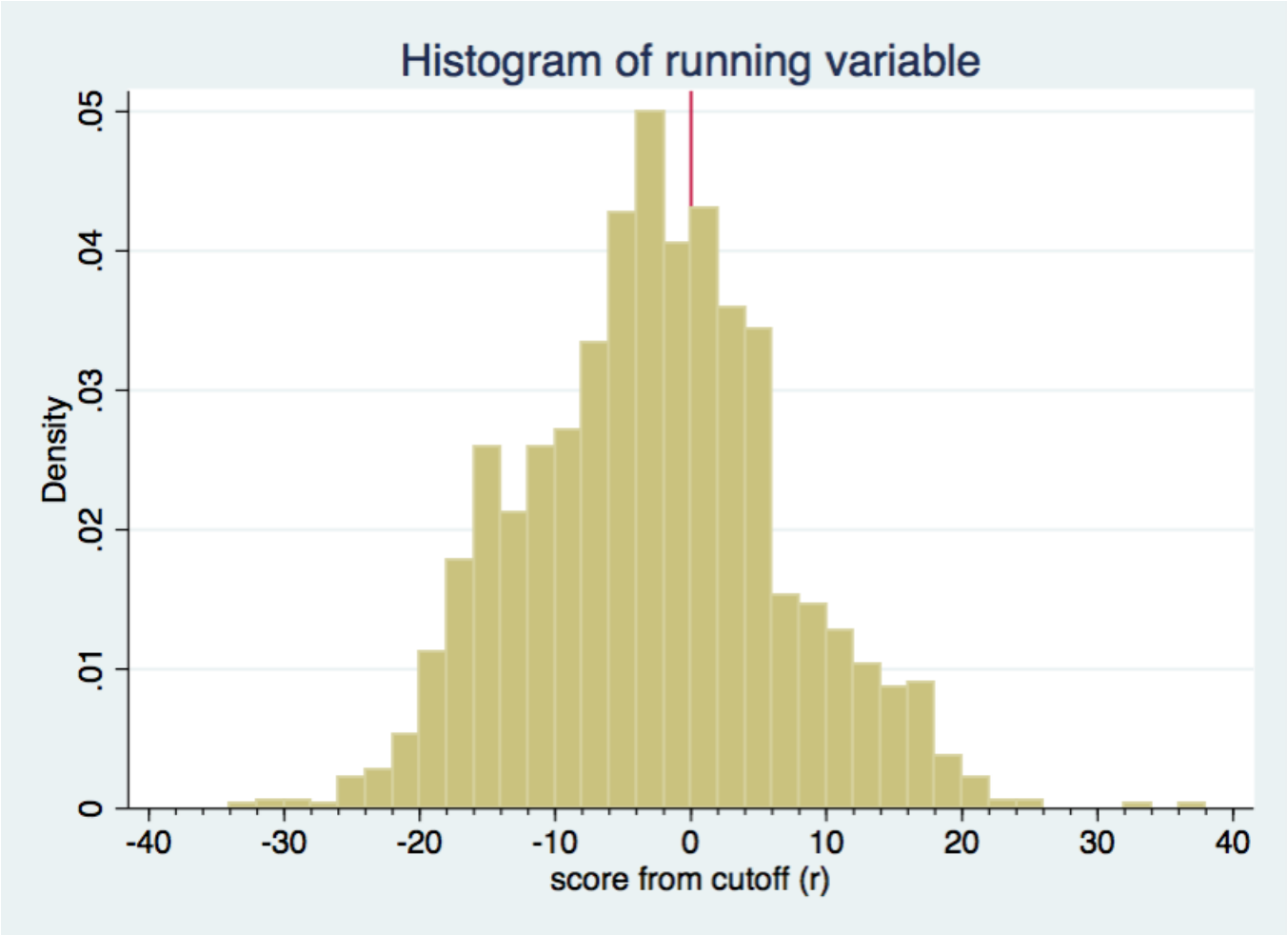


Figure 1: Histogram of running variable

Empirical Approach: Checking the validity of RDD

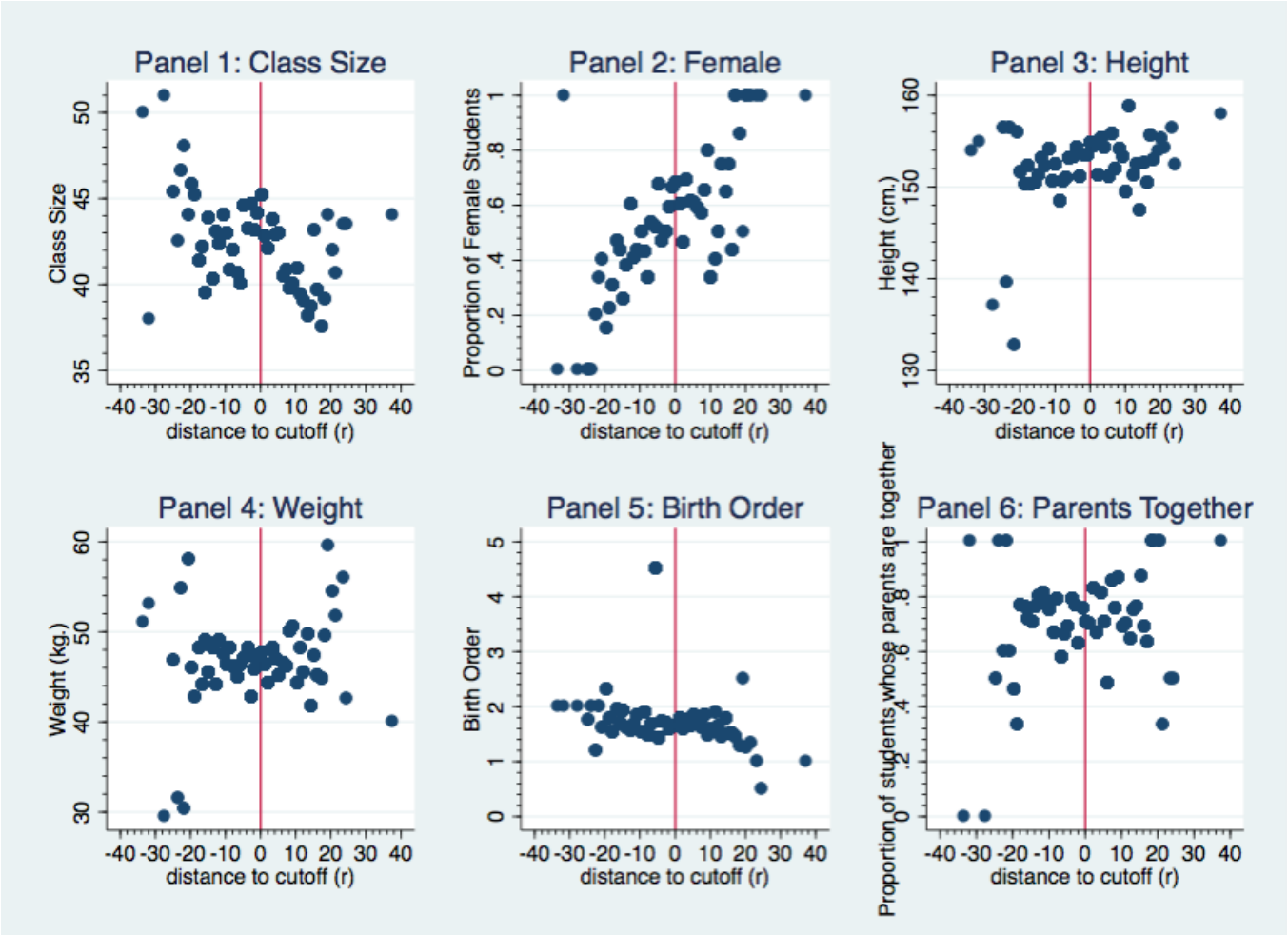


Figure 2: Student characteristics across running variable

Checking the identification strategy

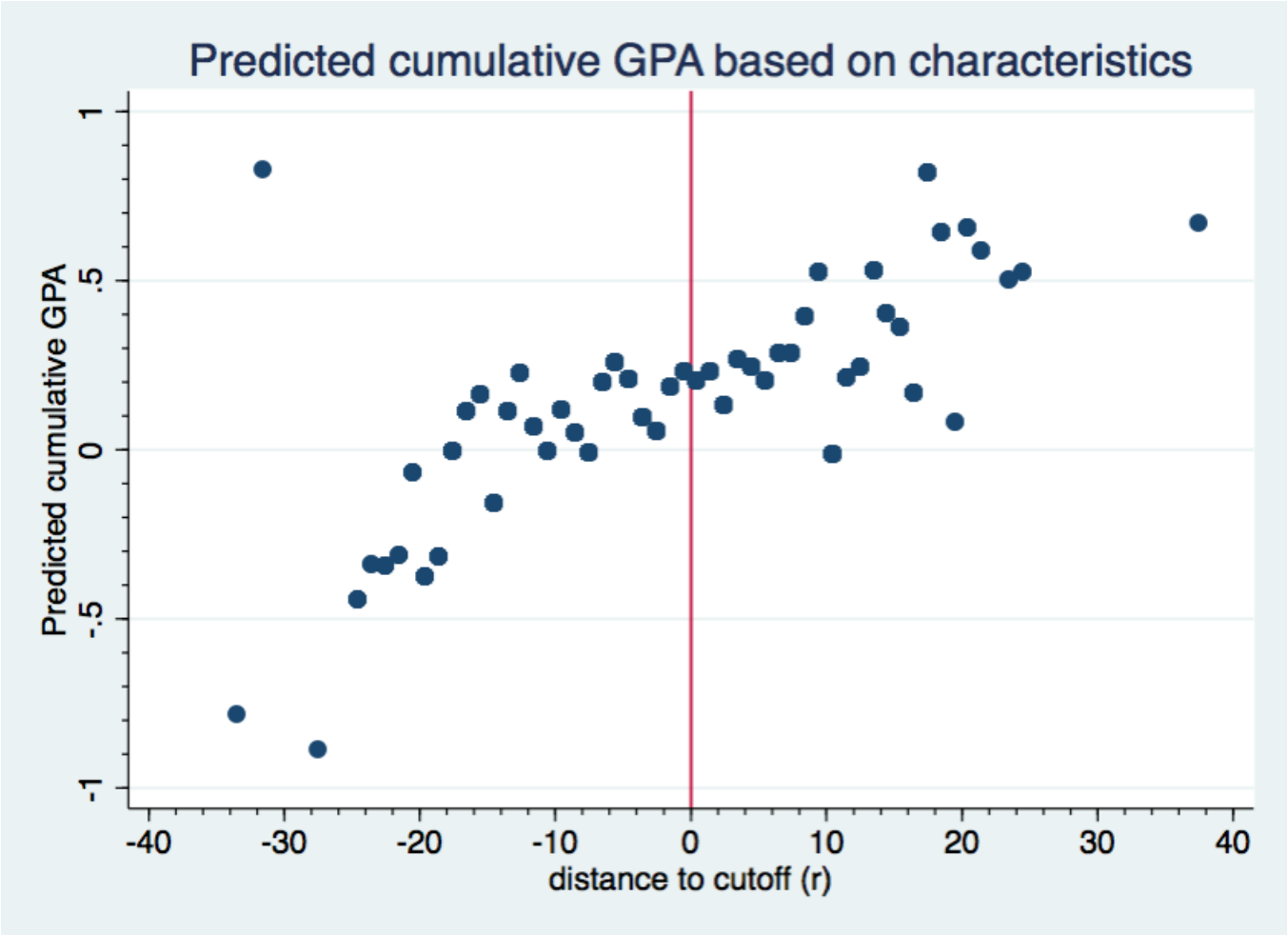


Figure 3: Predicted cumulative GPA based on student characteristics

First-Stage Relationship

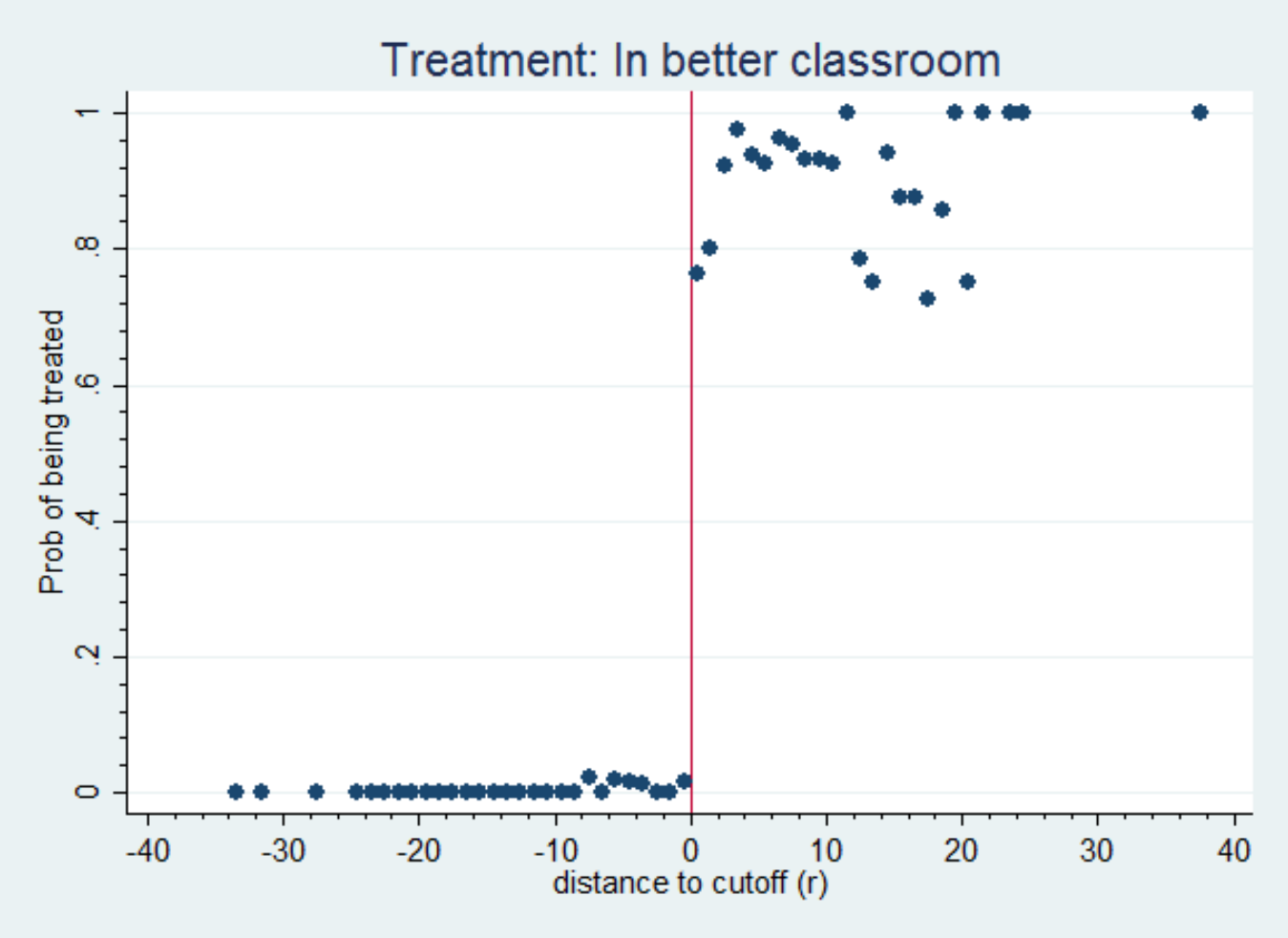


Figure 4: Probability of being in the better classroom i.e. in class with higher-ability peers

Peer Quality

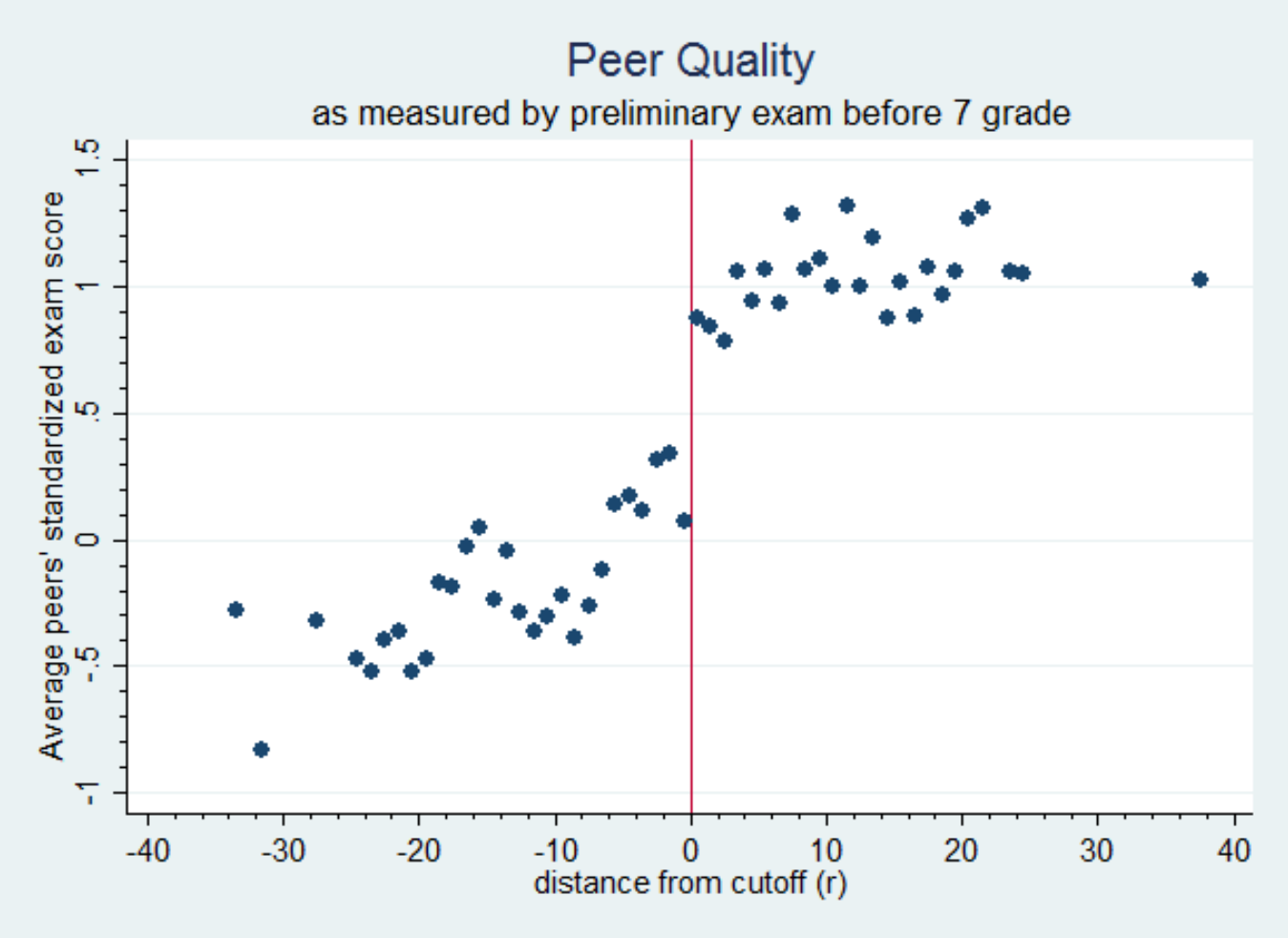
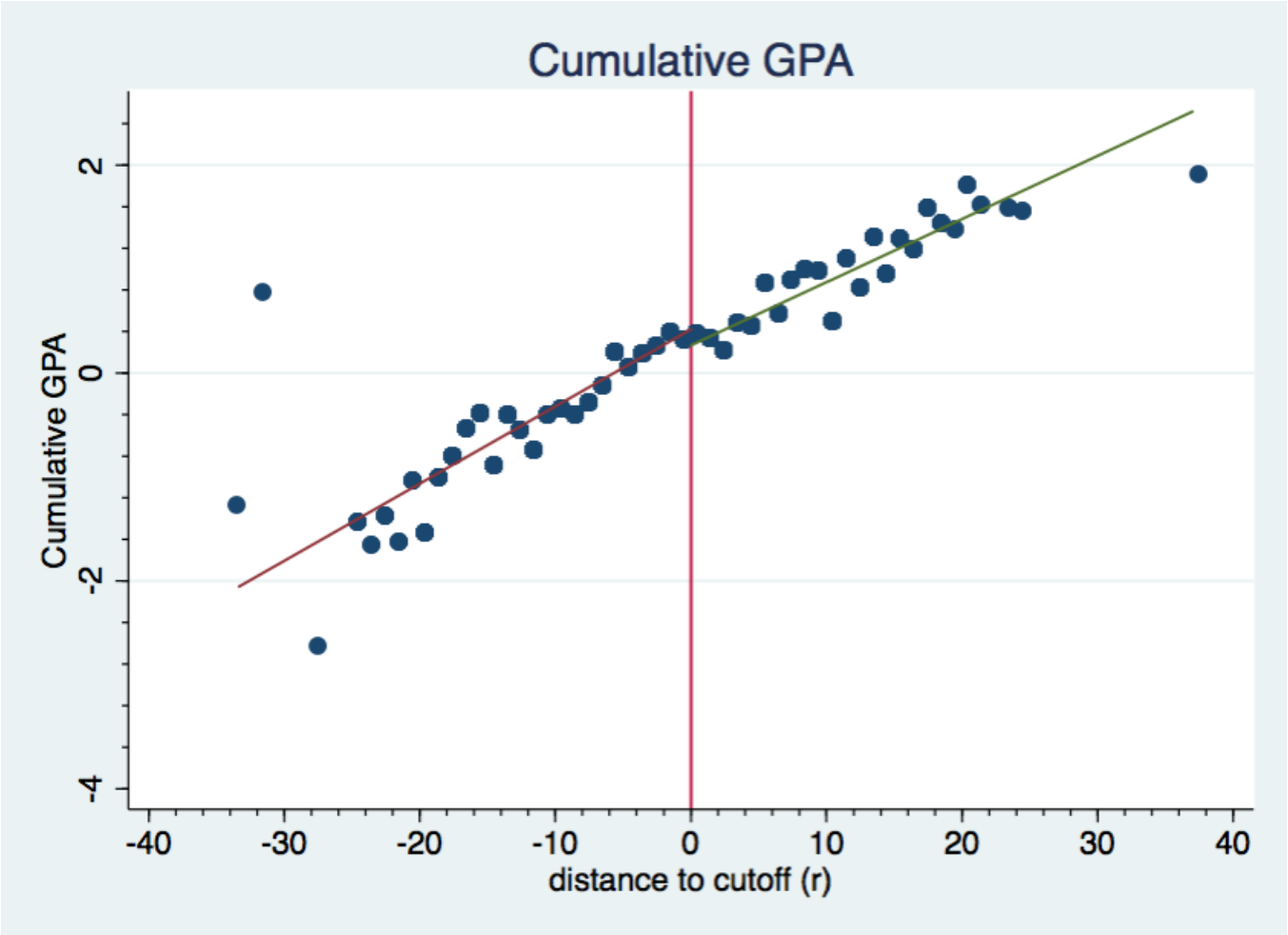


Figure 5: Peer Quality

Reduced-Form Relationship

Figure 6: Cumulative GPA



Reduced-Form Estimations

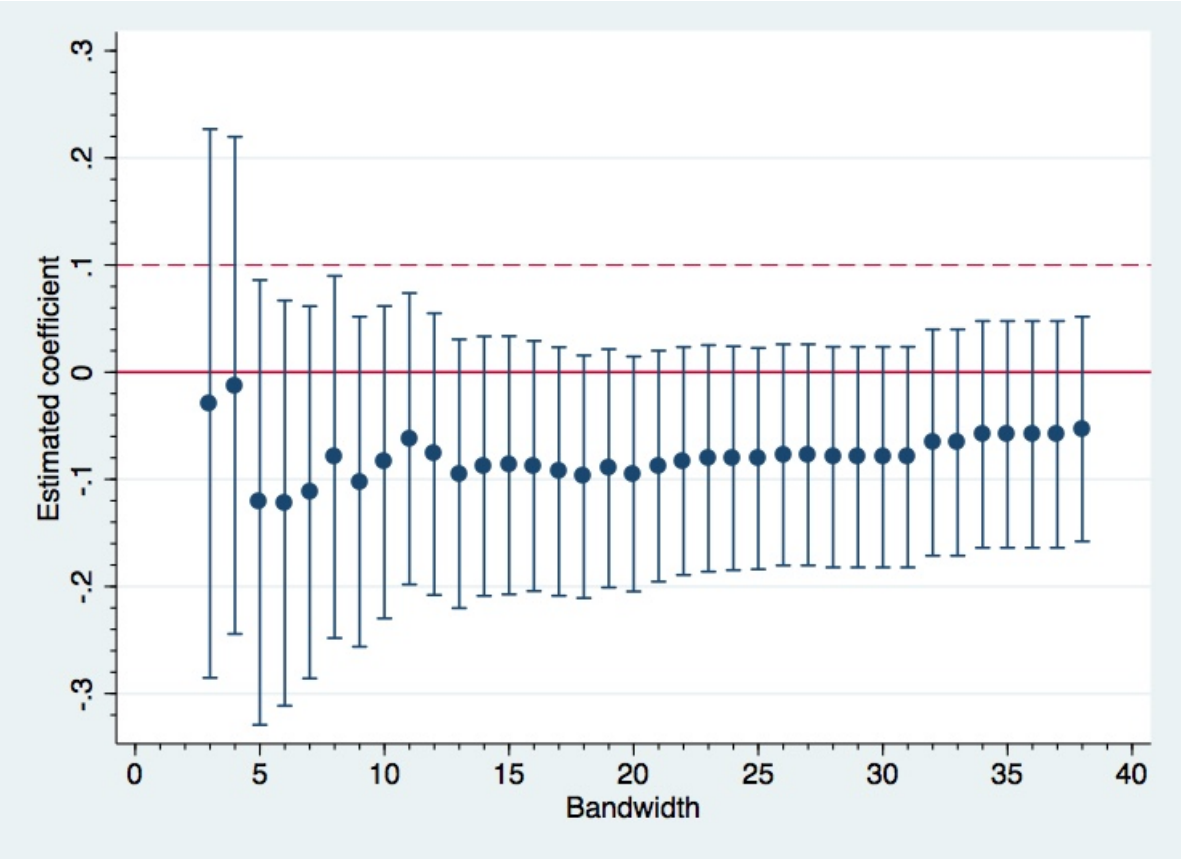


Figure 7: Estimates by bandwidth
(control for student characteristics, no teacher fixed effects)

Table 1: 2SLS estimates

	(1) $-30 < r < 30$	(2) $-20 < r < 20$	(3) $-10 < r < 10$	(4) $-5 < r < 5$
Panel 1. Peer quality				
Being tracked into higher-ability classroom	0.9496***	0.9406***	0.9246***	0.9439***
	(0.02131)	(0.02199)	(0.02933)	(0.04030)
N	1536	1489	1023	643
Panel 2. Standardized 7th grade cumulative GPA				
Being tracked into higher-ability classroom	-0.09562	-0.1155	-0.1091	-0.1645
	(0.06291)	(0.06756)	(0.09570)	(0.1415)
N	1362	1328	947	597
Controls				
Cutoff fixed effects	Y	Y	Y	Y
Student characteristics	Y	Y	Y	Y

Student characteristics include classsize, gender, height, weight, birth order, parents' relationship status.

Parentheses contain standard errors, clustered at individual level.

All regressions use rectangular kernel.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

2SLS Estimations

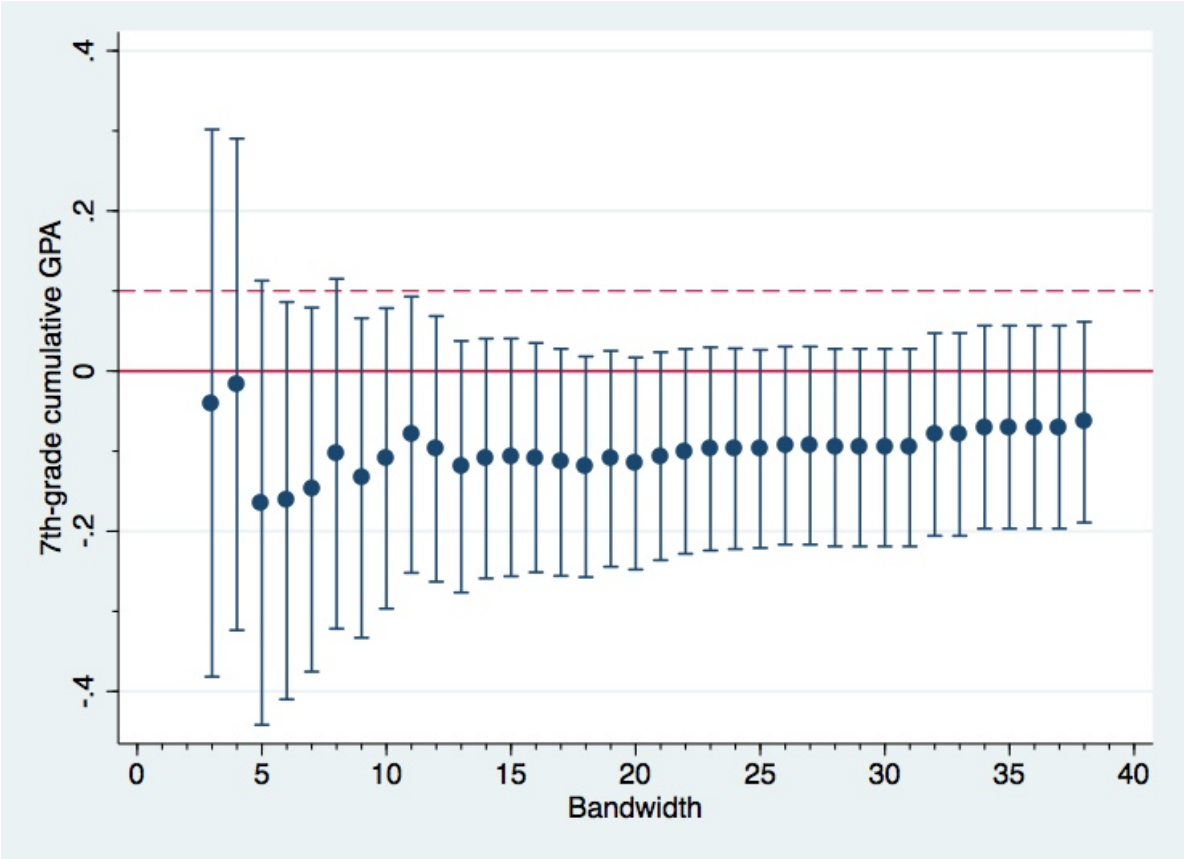


Figure 8: Estimates by bandwidth
(control for student characteristics, no teacher fixed effects)

Compare to the Literature

Authors	Treatment	Effects Size
Peer effects in tracking		
Vardardottir (2013)	Better peers (Iceland Upper Secondary)	+0.47 s.d.
Duflo, Dupas, and Kramer (2011)	Better peers (Kenya 1st grade students)	No statistically significant effects (Can rule out 0.21 s.d.+)
Effects of GT programs		
Booji et al.(2017)	Gifted and talented class (The Netherlands secondary schools)	+0.2 s.d. in GPA
Card and Giuliano(2016)	Gifted class on minority students (US 4th graders)	+0.5 s.d.

Conclusion

- Being tracked into high-ability classroom is associated with significant increase of 0.94σ in peer quality
- Does not translate to significant increase in GPA
- Upper bounds suggest effects of higher-quality peers could not be larger than 0.08σ
- Concerns over students being disproportionately exposed to low-ability peers are overblown
- Should focus more on the impact of tracking on teaching and curriculum