How to enrich our gifted students?

Evidence from a talented program in secondary education

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Bored in class....

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Gifted and Talented programs

Education systems seem focused on improving the bottom of the distribution (Neal & Whitmore, RES '10)

Therefore, growing interest in educational programs focused on the *Gifted and Talented*.

High diversity in implementation:

- *Grouping*
  - special (magnet) schools
  - special classes (GT tracking)
  - special hours/projects ("Taken from class")
- *Content*: compacting, speeding, enriching (depth or breadth)

This paper: **taken from class for enrichment project**

Treatment: Nijmegen Enrichment program

Combined academic Junior - Senior high school in NL

A gifted student receives an *enrichment* "passport"

- Valid grade 7 - 12 (exam year)
- "*Taken from class*": Freely exchange lessons for project time (3-4 hours per week, minimum 2 lessons)
- Choose the program subject
- Coached by selected and trained teachers

V-market end of year where students present projects

Extra grade on school report (O, V, G, P)

Most of the *enrichment* activity in the first four years

Many students trade *enrichment* activities for extra subjects, or colleges in University

Treatment: Nijmegen Enrichment program

Gifted and Talented research

International evidence is scarce and does not credibly deal with selection (Matthews *et al.*, 2012)

Notable exceptions are

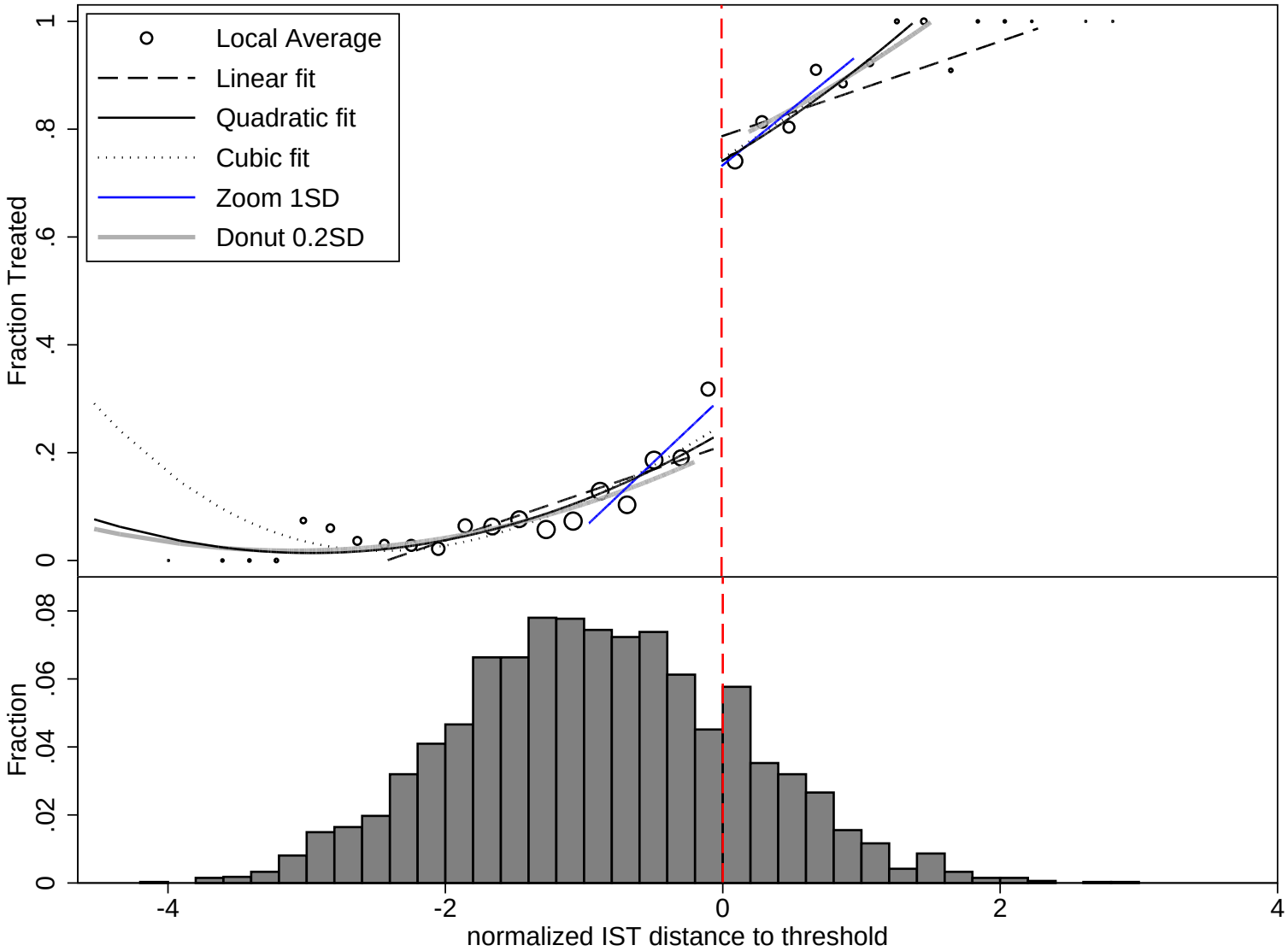
- School: Abdulkadiroglu *et al.* (RCT,Ectrca '14), Pop-Eleches & Urquiola (RD,AER '13); contradictory effects
- Classes: Epple *et al.* (RD,NBER '10) retention effect; Card & Giuliano (RD, WP'13), Bui *et al.* (RD&RCT, AEJ *forth*): no effect testscores
- Hours/Projects: Bhatt (IV, SSRN '09): positive effects testscores

Selecting gifted students

Descriptive statistics: Selective assignment

Variable	Range	*Regular*		*Enrichment*			
		Mean	s.d.	Mean	s.d.	Diff	p-value
Background							
Boy	{0,1}	0.52	0.50	0.61	0.49	0.10	0.00
Age	[9.7, 14.8]	12.18	0.47	12.07	0.53	-0.11	0.00
Pretestscores							
IST score	[41, 148]	90.0	12.5	109.9	13.78	19.9	0.00
FES score	[5,40]	23.0	5.3	24.0	5.5	1.0	0.00
CITO score	[518,550]	546.9	2.6	548.3	1.7	1.3	0.00
Treatment	0	0		1		1	
N	3349	2514		835			

First stage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Quadratic fit
Cubic fit
Zoom 1SD
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Fraction Treated
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.8
1
Fraction
0
.02
.04
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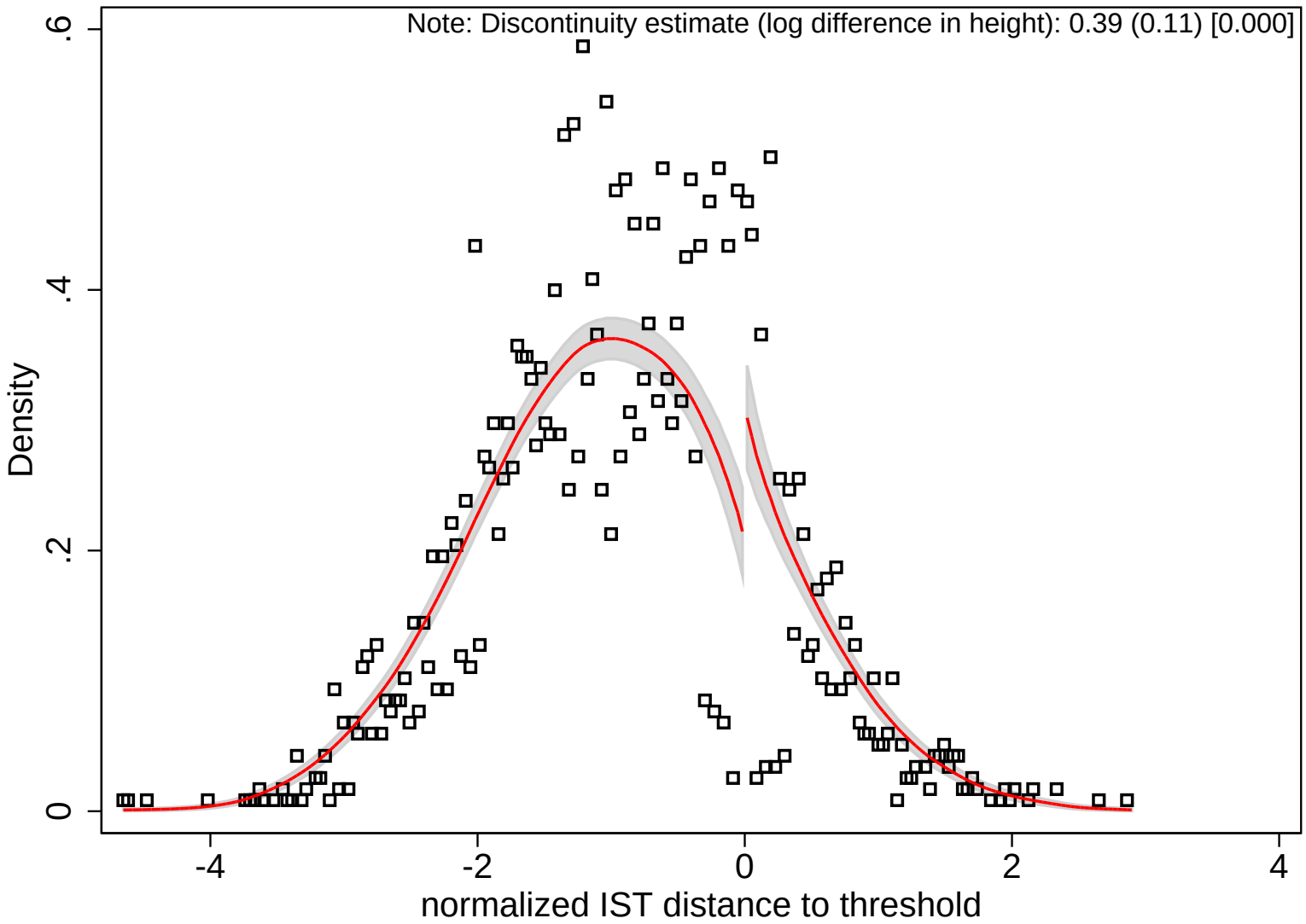
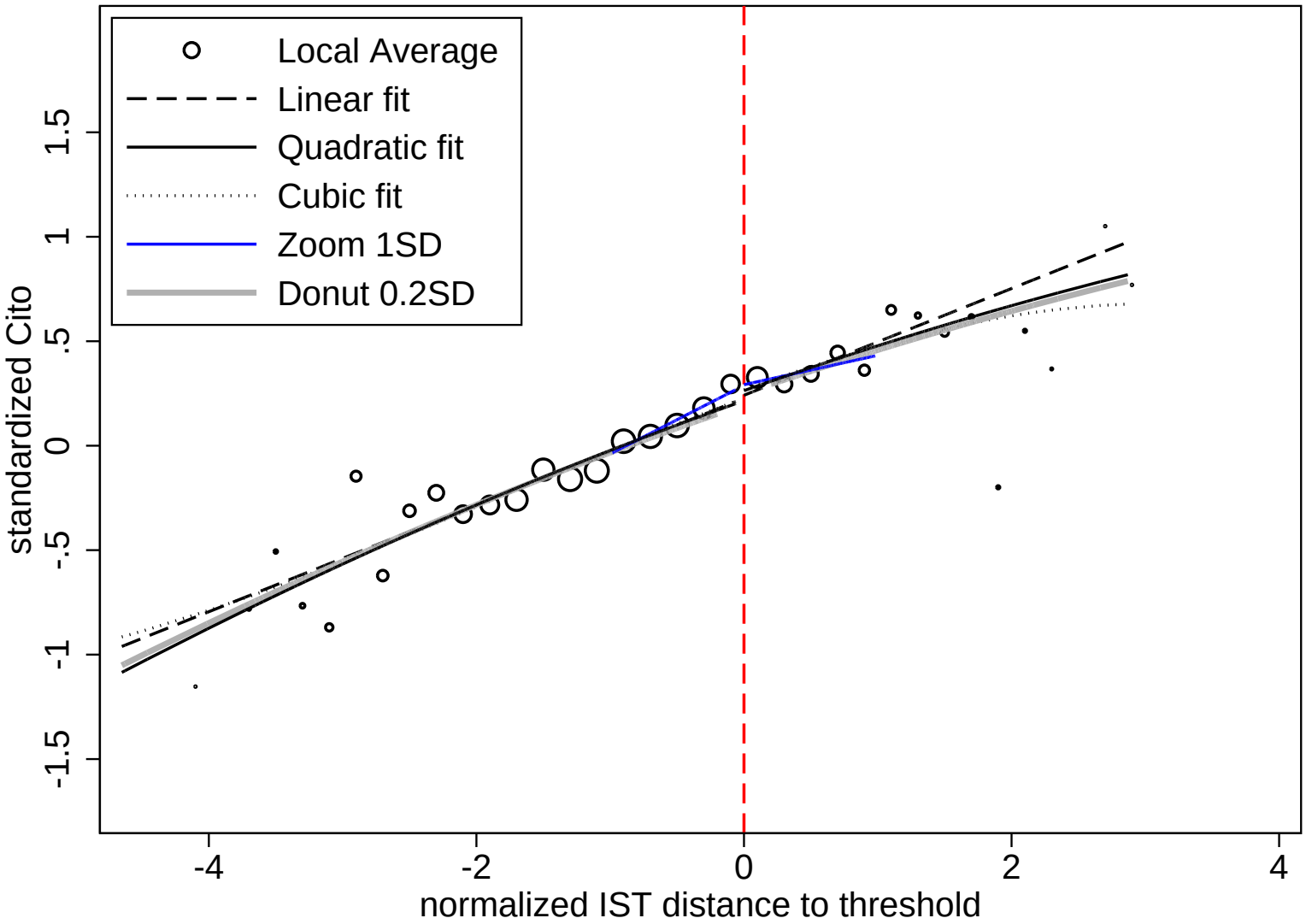
.08
-4
-2
0
2
4
normalized IST distance to threshold

School selects cutoff: Bunching at the threshold

McCrary test



Balancing


Local Average
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-1.5
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1
1.5
-4
-2
0
2
4
normalized IST distance to threshold

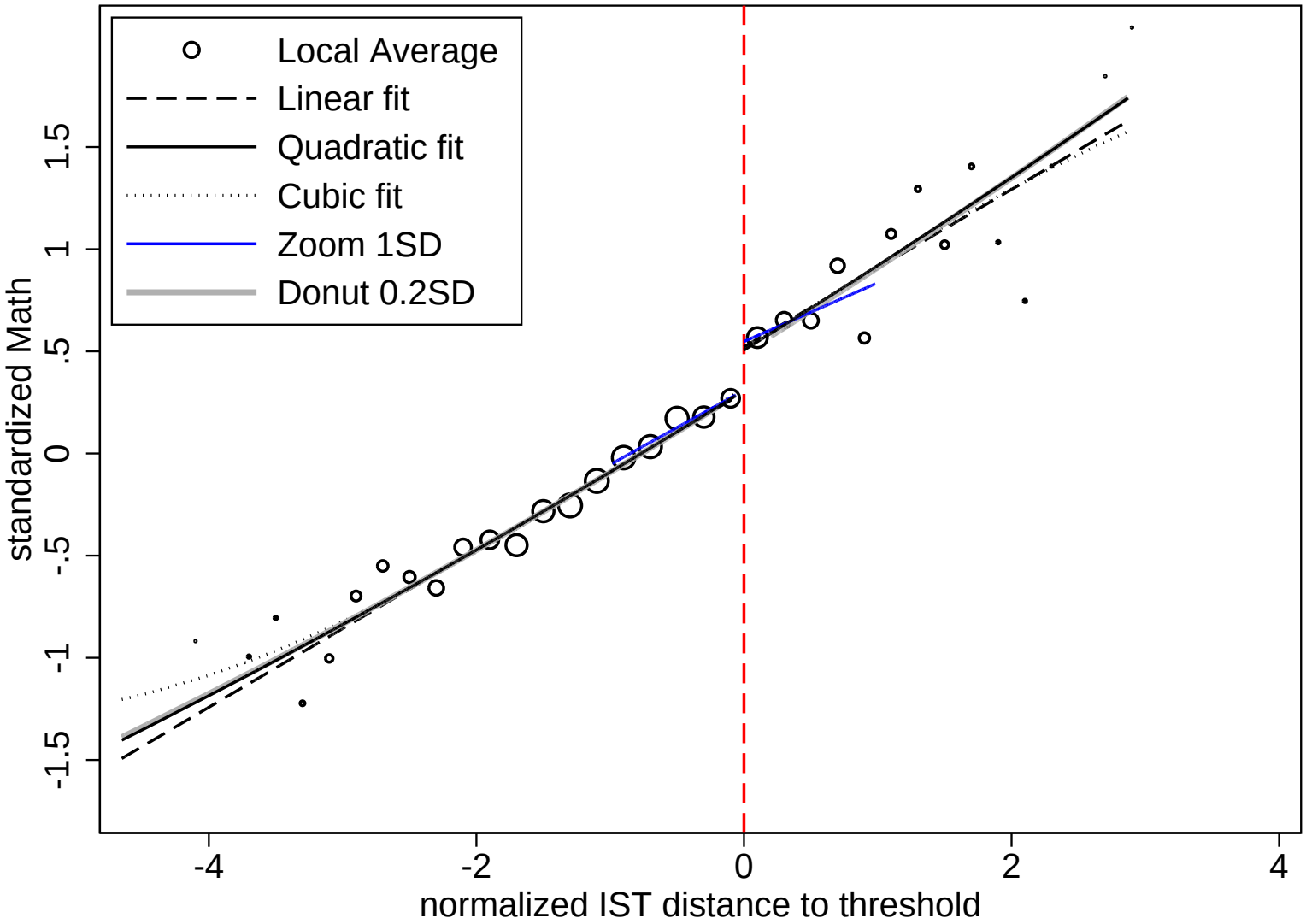
Reduced form

Dissappointed?

"I can suck pudding up my nose and blow it out the corner of my eye, but they *still* won't put me in the gifted class at school!"

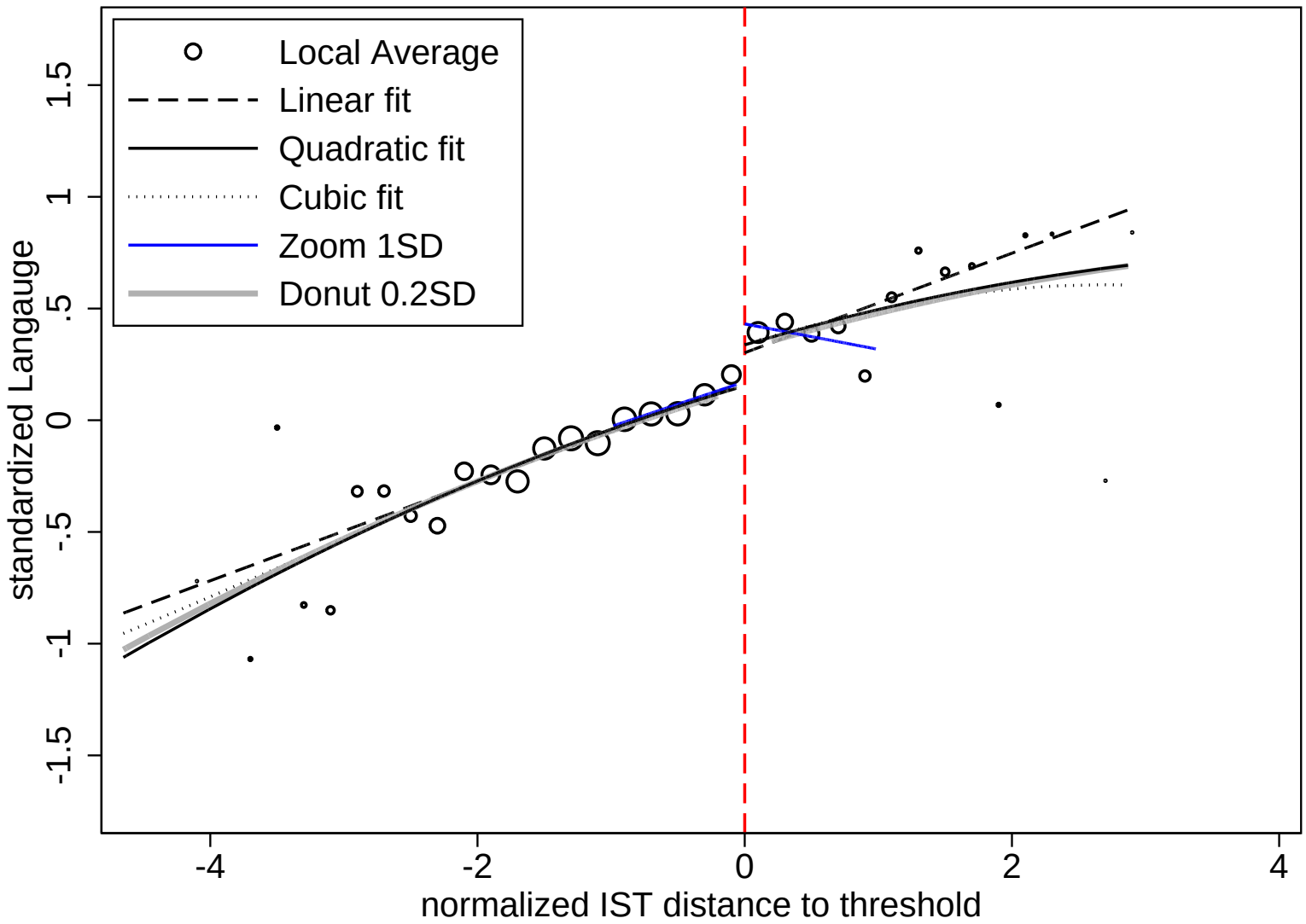
Reduced form

Standardized Math



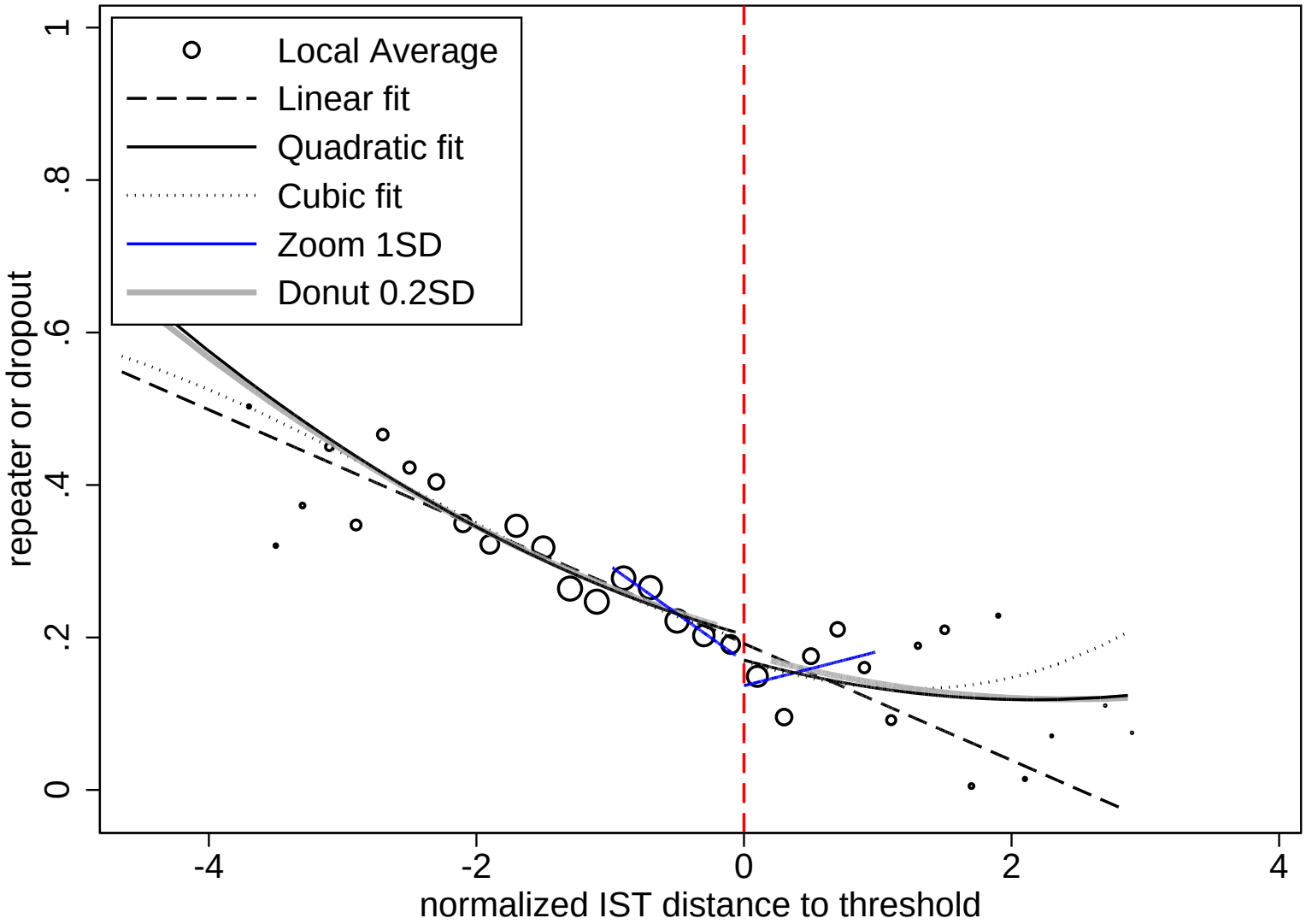
Reduced form

Standardized Language



Reduced form

Repeater or dropout



High school grades

IV estimates

	Sample selection		Math		Language	
	(1) Matched	(2) Retention	(3) Average	(4) Exam	(5) Average	(6) Exam
Enrichment	-0.01	-0.05	0.34	0.50	0.31	0.29
	(0.02)	(0.05)	(0.13)***	(0.21)**	(0.13)**	(0.21)+
std FES score	0.00	-0.00	0.04	0.01	0.03	0.10
	(0.00)+	(0.01)	(0.02)***	(0.02)	(0.02)*	(0.03)***
std CITO score	0.02	-0.10	0.26	0.11	0.37	0.15
	(0.00)***	(0.01)***	(0.02)***	(0.03)***	(0.02)***	(0.04)***
IST-Poly.	2	2	2	2	2	2
Controls	✓	✓	✓	✓	✓	✓
i.Cohort	✓	✓	✓	✓	✓	✓
$\overline{y}$	0.98	0.26	0.00	0.00	0.00	0.00
$sd\,(y)$	0.15	0.42	1.00	0.95	1.00	1.00
p-value	0.502	0.316	0.008	0.019	0.016	0.159
FS F-stat	286.1	284.0	284.0	128.3	284.0	128.3
R^2	0.06	0.09	0.29	0.13	0.24	0.09
N	3349	3276	3276	1610	3276	1610

Gender differences

IV estimates

	Math		Language	
	(1)	(2)	(3)	(4)
	Average	Exam	Average	Exam
Baseline ($N = 3349$)				
Enrichment	0.34 (0.13)***	0.50 (0.21)**	0.31 (0.13)**	0.29 (0.21)+
Girls ($N = 1540$)				
Enrichment	0.22 (0.21)	0.54 (0.34)+	0.42 (0.20)**	0.72 (0.33)**
Boys ($N = 1809$)				
Enrichment	0.48 (0.17)***	0.41 (0.29)+	0.28 (0.18)+	-0.10 (0.28)

University subject choice

IV estimates

			Effect of *Enrichment*		
Chose field of study....	Predicted wage	Fraction	Total	Boys	Girls
Healthcare	€ 2974	0.17	0.10	0.02	0.20
			(0.08)	(0.10)	(0.14)+
Economics and business	€ 2752	0.14	-0.03	0.00	-0.07
			(0.06)	(0.10)	(0.08)
Law and governance	€ 2544	0.12	0.04	0.09	-0.01
			(0.06)	(0.08)	(0.10)
Language and communications	€ 2115	0.09	0.01	0.08	-0.09
			(0.05)	(0.06)+	(0.10)
Educational and pedagogy	€ 2045	0.03	-0.05	-0.03	-0.08
			(0.03)+	(0.03)	(0.06)
Behavioral and societal sciences	€ 1969	0.09	-0.07	-0.09	-0.05
			(0.05)+	(0.05)*	(0.10)
The Arts	€ 1909	0.09	-0.13	-0.20	-0.04
			(0.06)*	(0.09)**	(0.10)
Science and informatics	€ 2730	0.08	0.08	0.10	0.06
			(0.07)	(0.12)	(0.07)
Technical	€ 2520	0.12	0.03	-0.00	0.06
			(0.07)	(0.11)	(0.09)
Earth and environment	€ 2392	0.06	0.01	0.02	0.00
			(0.06)	(0.09)	(0.07)

Mechanisms

- Controls unaffected [no apparant peer, dissapointment, or class size effect]
- No substitution away from other subjects
- Gender diff explained by task choice
- Other: Survey [May 2014, individualized, online]
  - Homework/Learning time
  - Motivation/Boredom/Academic Self Concept
  - Peers [who and how many?]
  - Clear future plans / visit universities
  - Treated pupils [end of survey]
    - Number of lectures/hour exchanged [current and past]
    - Substitute away from which subjects [best?, least interesting?]
    - Received direct help from tutor
    - Used for other purpose

Conclusion

The *Enrichment* program seems to have made

- Boys perform (substantially) better in Maths
- Girls perform better in Languages

Effects persistent over time, no subs from other subjects

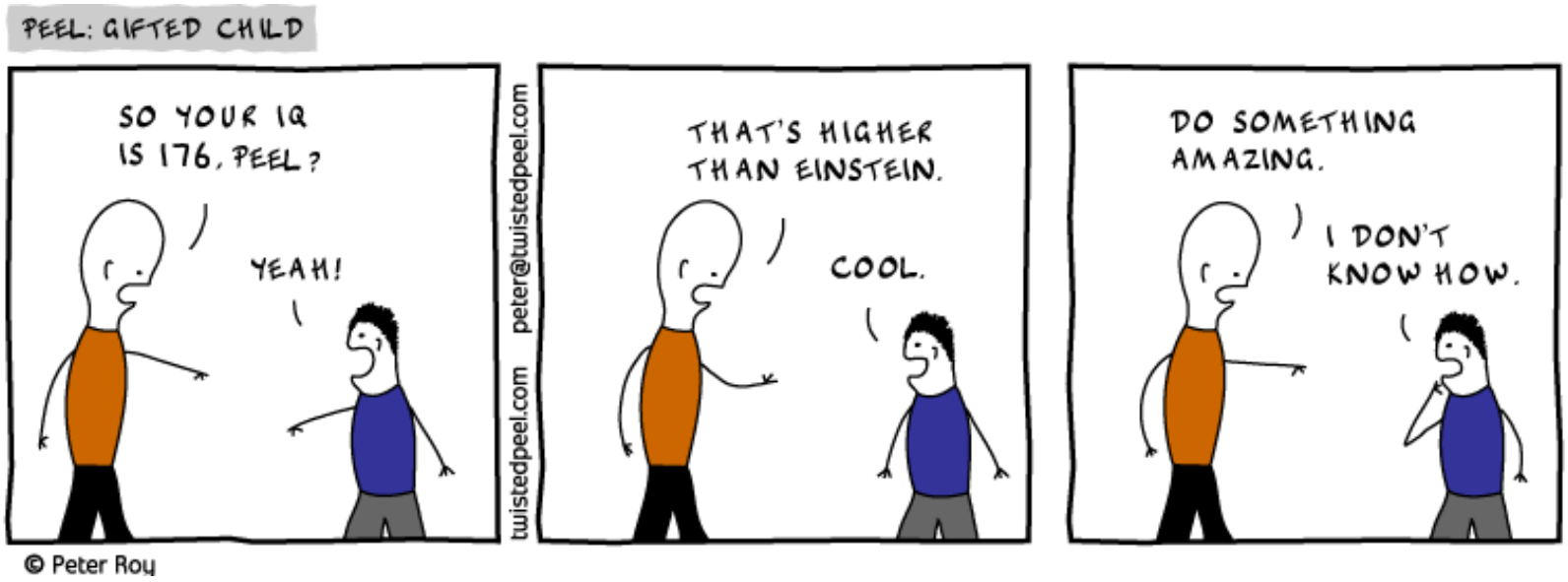
HE subject choice is also affected

- Girls subs. Language and Edu for higher paid **Healthcare**
- Boys switch more and subs. Arts for higher paid **Science** and **Law**

Survey should reveal mechanisms

Given relative low cost involved, giving gifted students some (guided) liberty to *enrich* themselves is effective in improving test-scores and career choice

Gifted


PEEL: GIFTED CHILD
SO YOUR IQ IS 176, PEEL?
YEAH!
THAT'S HIGHER THAN EINSTEIN.
COOL.
DO SOMETHING AMAZING.
I DON'T KNOW HOW.
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