EFFECTS OF CLASS SIZE ON CLASSROOM DISRUPTION

Workshop on Education, Skills, and Labor Market Outcomes

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Motivation

- Existing literature has shown empirical evidence on the
  - Short term effects of class size on scholastic achievement
    - Students randomly allocated into smaller classes performed better in reading and math tests than those randomly allocated into bigger classes (Krueger 1999)
    - Reduction in class size increased test scores (Angrist & Lavy 1999)
  - Long term effects of class size on wages and education
    - Smaller classes have positive effects on completed education, wages and earnings (Fredriksson, Öckert & Oosterbeek 2013)
- Less is known about the mechanisms behind the class size effects, regardless of the substantial costs of the class size reductions

Motivation

- Theoretically class size effects might be related to
  - Response of teachers and parents (Albornoz, Berlinski & Cabreles 2011)
    - Fredriksson, Öckert and Oosterbeek (2014) confirmed empirically that as a result of an increase in class size
      - Teacher's shift greater responsibility of learning to students, and may shift towards full class instruction
      - Parents might move their children to another school, and high income parents help their children more with homework

Motivation

- Or to
  - Classroom disruption (misbehaving, asking questions to which all other students know the answer): One student disrupts the class, learning is reduced for all other students (Lazear 2001)
    - Disruption occurs $1 - p^n$ of the time
      - p= probability that a student is not impeding her own or others' learning at any moment
      - n= class size

Motivation

- Empirical evidence on classroom disruption is limited
  - Positive effect of class size on the time spent on discipline, negative effect of class size on the amount of time spent on instruction (Betts & Shkolnik 1999)
  - Potentially disruptive children (Kristoffersen, Krægpøth, Nielsen, Simonsen 2015) and students with serious behavioral difficulties (Horoi & Ost 2015) reduce the academic performance of their peers
  - We aim to shed more light to this relation by empirically analyzing the relation between class size and classroom disruption

Institutional background

- Class size is determined in general by municipalities
  - Quality criterion of the basic education
    - Maximum class size guideline is on average from 20 to 25 students
  - Basic education regulation
    - Teaching groups should be formed by age groups
    - Maximum class size is 10 students if more than one student has a special support decision
      - Not forcing, has multiple exceptions

Institutional background

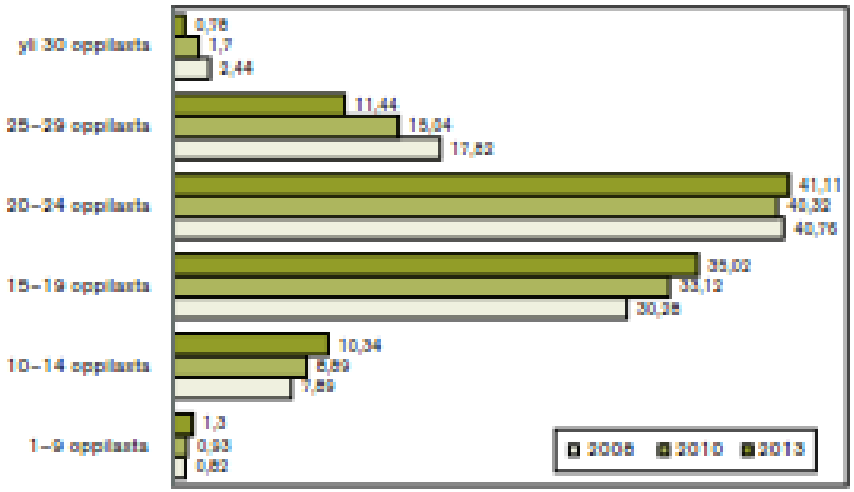
- General support
  - Natural part of everyday teaching and learning process
- Intensified support
  - If general support is not enough
  - Individual learning plan
  - Continuous, individual support
  - Administrative decision, based on pedagogical evaluation
- Special support
  - If intensified support is not enough
  - Fulltime remedial education
  - Personal plan for teaching arrangements
  - Administrative decision, based on pedagogical evaluation

Institutional background

- The Ministry of Education and Culture has granted significant subsidies on reducing class size since 2009
  - Especially for classes that have more than 25 students
  - 2015:30 million euros

- Together the guideline and the monetary incentive create possible exogenous variation that can be used in evaluating the effects of class size

Institutional background



Kuvio 1. Opetusryhmien osuudet (%) koon mukaan 1.–6. luokilla 2008–2013
Lähde: Tilastokeskus 2013. Opettajatiedonkeruu.

Data

- ProSchool research (2013-) conducted by Niilo Mäki Institute, University of Eastern Finland and University of Jyväskylä
  - Main aim is to investigate the effectiveness of the ProSchool model in supporting positive student behavior
  - Schools were randomized into control and test groups
  - Questionnaires responded by students, teachers, principals and other staff of schools

Data

- We utilize the student and teacher questionnaires, from the first cross section before the interventions
- Data is restricted to classes with more than 10 students, with only one teacher and with no combined grades

Variables

- Classroom disruption (Levin & Nolan 2007)
  - Disrupts teaching
  - Violates the study rights of other students
  - Causes physical or psychological threat
  - Destroys environment

- Teachers evaluated 17 propositions (e.g., students concentrated well on teaching) and students evaluated 22 propositions that describe classroom disruption (e.g., Classroom environment was loud and disorganized)
  - Sum variables that describe absence of classroom disruption (later called as classroom environment) were formed from the propositions separately for teachers and students

Variables

- Response scale for teachers
  1. Very badly
  2. Badly
  3. Quite badly
  4. Quite well
  5. Well
  6. Very well

- Response scale for students
  1. Never
  2. In some classes
  3. In most classes
  4. In every class

Variables

- Class size
- Enrollment count
- Shares of students in the class
  - Special and intensified support decisions (learning difficulties)
  - Other mother language than Finnish
  - Boys
- Work experience of teachers
- Socioeconomic status of students

Method

- Endogeneity of class size
  - Difficult students might be placed into smaller classes
  - More resources might be granted to those who need it more

- We follow Angrist and Lavy (1999), who used Maimonides' rule as an instrument when studying the effects of class size on school achievement
  - Maimonides was a rabbinic scholar who proposed a maximum class size of 40
  - At the time of the study, this maximum class size rule determined the class size in Israel public schools

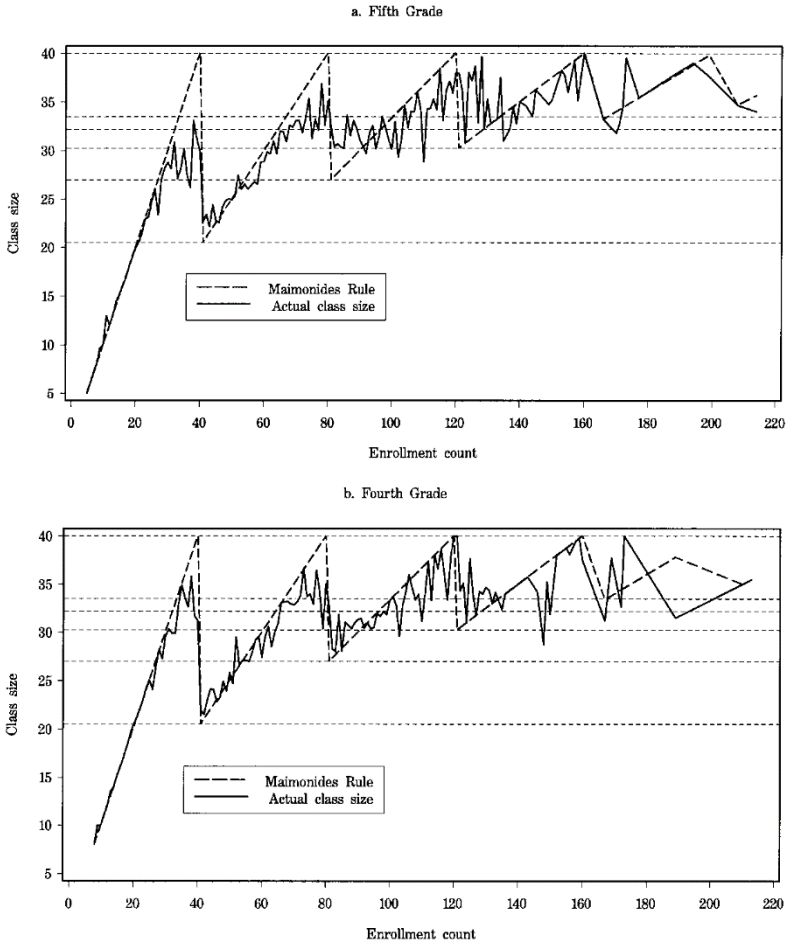
Method

- IV method overcomes the endogeneity of class size

- Following Angrist and Lavy (1999) we construct a instrumental variable, which is a function that describes the maximum class size of 25 students
  - Maximum class size in our case is based on quality criterion and on monetary incentive

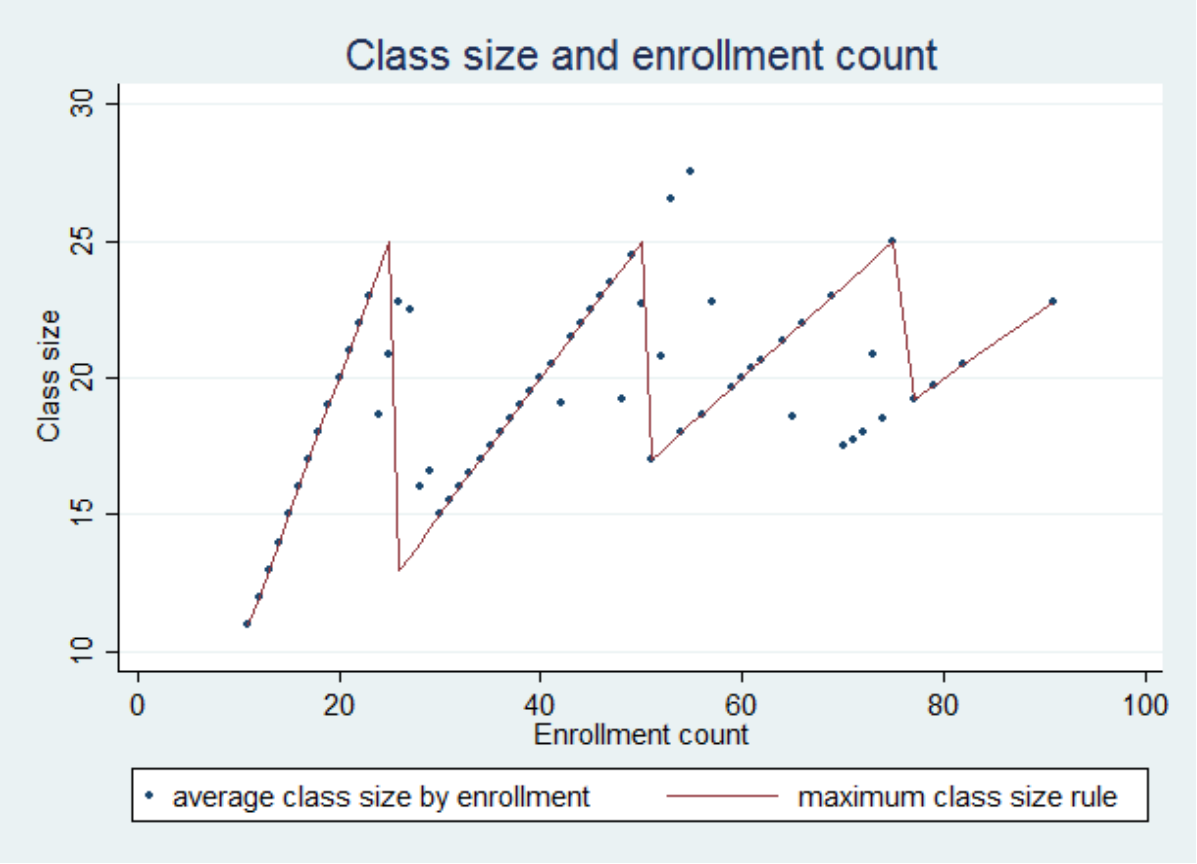
$$Class\ size\ function_{sc} = \frac{e_s}{[int\left(\frac{e_s-1}{25}\right)+1]} \qquad (1)$$

Method

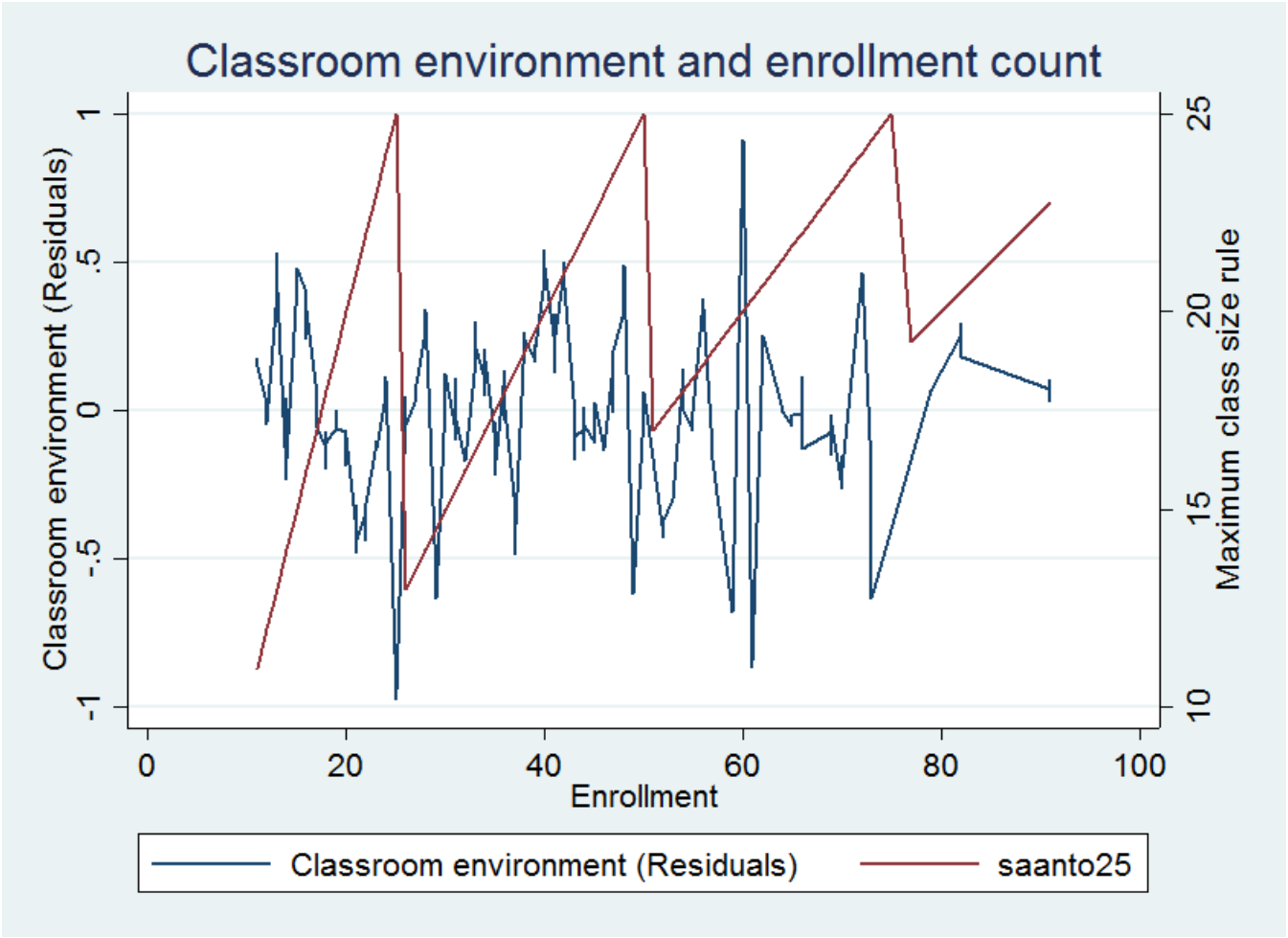


Angrist and Lavy (1999)

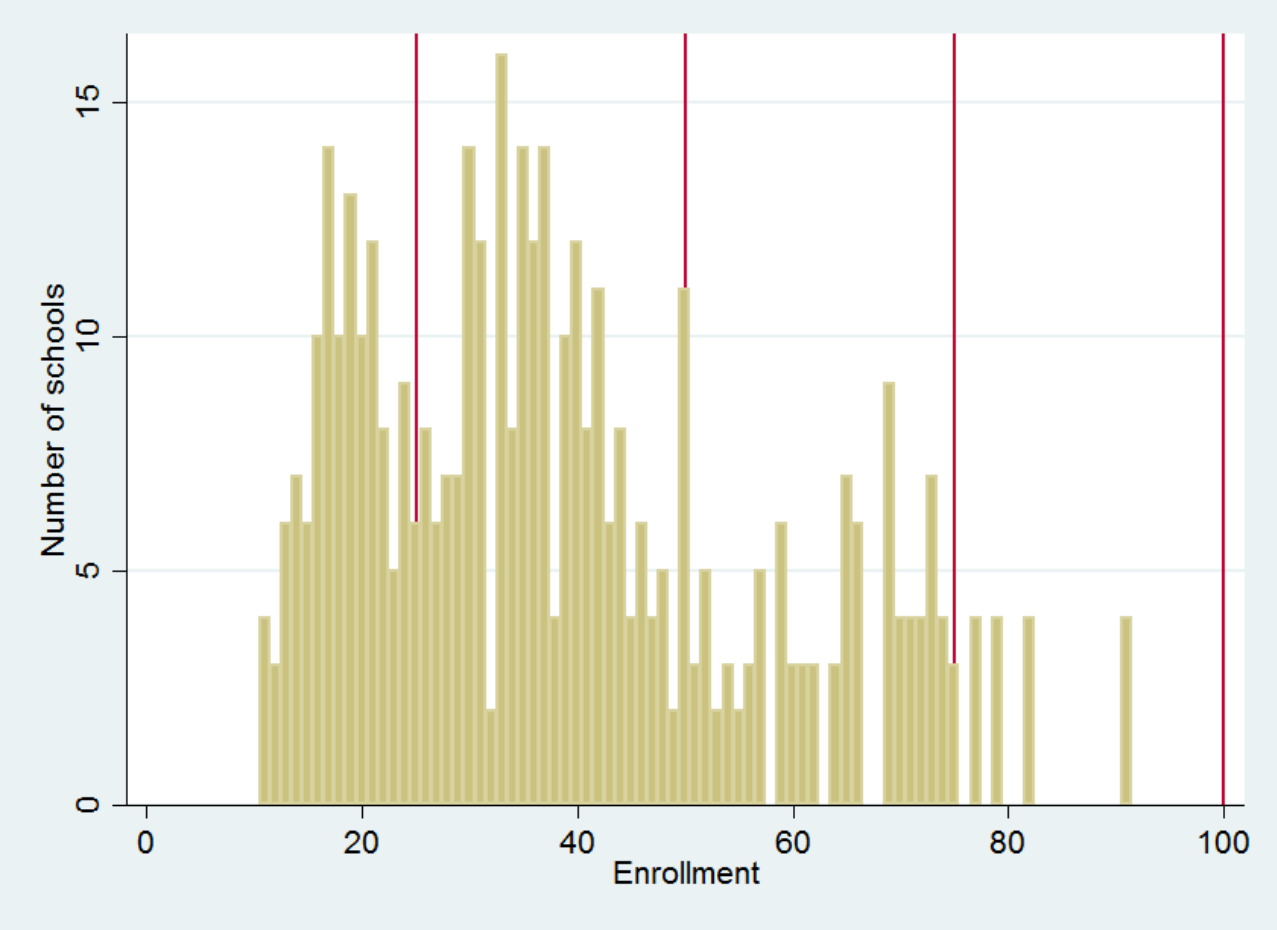
Method


Class size and enrollment count
Class size
10
15
20
25
30
0
20
40
60
80
100
Enrollment count
average class size by enrollment
maximum class size rule

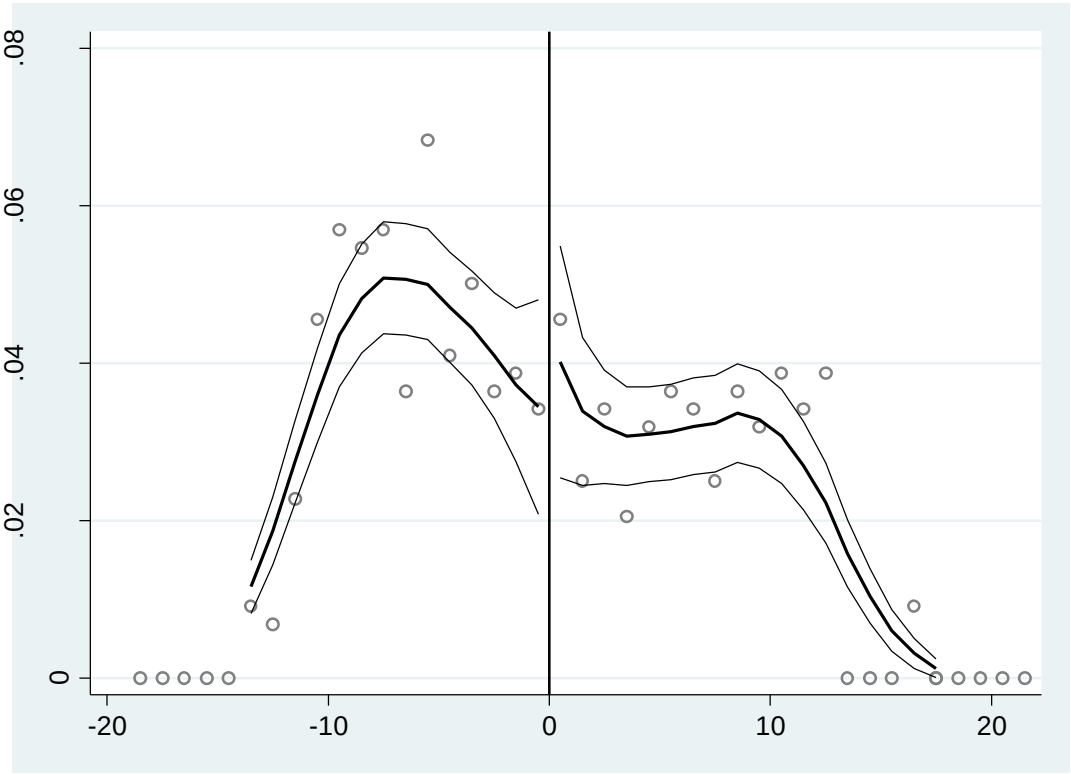
Classroom environment and enrollment



Balancing



McCrary's density test



Log difference in height: .286 (.342)

Method

Correlations, teachers

Variable	1	2	3	4	5	6	7	8
1. Classroom environment	-							
2. Class size	-.13**	-						
3. Grade	-.05	.24***	-					
4. Share special/intensified	-.15***	-.12**	.14**	-				
5. Share boys	-.14**	-.12**	.08	.22***	-			
6. Share other language	-.04	.10*	-.01	.01	.05	-		
7. Work experience	.15***	.04	.09*	-.14***	-.08	-.04	-	
8. Socioeconomic status (mean)	.03	.12**	.09	-.05	-.14**	-.04	.10*	-

*p<0.1, **p<0.05, ***p<0.01

IV results, teachers

	Class size (1. stage)	Classroom environment (2. stage)	Class size (1. stage)	Classroom environment (2. stage)
Maximum class size rule	0.682*** (0.082)		0.531*** (0.115)	
Class size		-0.060** (0.029)		-0.103** (0.044)
Enrollment			0.296*** (0.111)	0.032 (0.048)
Enrollment^2			-0.005** (0.003)	-0.000 (0.001)
Enrollment^3			0.000* (0.000)	0.000 (0.000)
Grade			0.388*** (0.139)	-0.015 (0.055)
Share special or intensified support decision			-2.574* (1.501)	-1.097 (0.747)
Share boys			-3.802** (1.767)	-1.710** (0.611)
Share other mother language than Finnish			4.554** (2.005)	0.043 (0.542)
Work experience			-0.188 (0.178)	0.088 (0.056)
Socioeconomic status (mean)			0.093 (0.281)	0.002 (0.138)
F-test for instrument	69.25	69.25	21.23	21.23
N	263	263	263	263

IV results, students

	Class size (1. stage)	Classroom environment (2. stage)	Class size (1. stage)	Classroom environment (2. stage)
Maximum class size rule	0.562*** (0.101)		0.393*** (0.113)	
Class size		-0.007 (0.020)		-0.034 (0.030)
Enrollment			0.370** (0.156)	0.027 (0.029)
Enrollment^2			-0.006* (0.004)	-0.000 (0.001)
Enrollment^3			0.000 (0.000)	0.000 (0.000)
Grade			0.350** (0.147)	-0.044 (0.029)
Share special or intensified support decision			-3.075 (2.021)	-0.374 (0.391)
Share boys			-3.786** (1.595)	-0.933*** (.335)
Share other mother language than Finnish			4.893** (2.120)	-0.332 (0.375)
Work experience			0.003 (0.115)	0.068** (0.030)
Socioeconomic status (mean)			-0.280 (0.189)	0.036 (0.041)
F-test for instrument	31.15	31.15	12.04	12.04
N	3590	3590	3590	3590

Conclusions

- Based on teachers' classroom environment evaluations, the results support the negative effect of class size on classroom environment

- Utilizing students' classroom environment evaluations, the effect of class size on classroom environment was negative but statistically insignificant

Conclusions

- High share of boys was positively associated with the classroom disruption
- Based on students' classroom environment evaluations, teachers' work experience was negatively associated with classroom disruption

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