

# Teachers' Training, Class Size and Students' Outcomes: An Efficiency-Equity Trade-Off ?

Pascal Bressoux, University of Grenoble

Francis Kramarz, Crest-Insee

Corinne Prost, Crest-Insee, Cornell University

# Outline of the talk

- The data
- The statistical method
- The results
- Conclusions

# Data description

- Survey conducted by the Ministry of Education
- Classes of 3<sup>rd</sup> graders (8 years old) and their teachers in 1991-1992
- National testing at the beginning of the year
- Similar exercises taken at the end of the year
  - Scores in reading (grammar, vocabulary, spelling, reading comprehension)
  - Scores in mathematics (arithmetic, geometry, problem-solving)

# Data description

- French system implies that some novice teachers start their job before any training
- Competitive examination for entering the teacher school ('Ecole normale')
- Number of selected candidates determined according to forecasts of the need of teachers
- More needs → students from the waiting list

# Data description

- Three types of teachers:
  - experienced
  - trained novice: just graduated from the teacher school
  - untrained novice: accepted from the waiting list of the 1991 entrance examination

# Number of selected candidates and of candidates recruited on the waiting list for the entrance examinations from 1986 to 1992

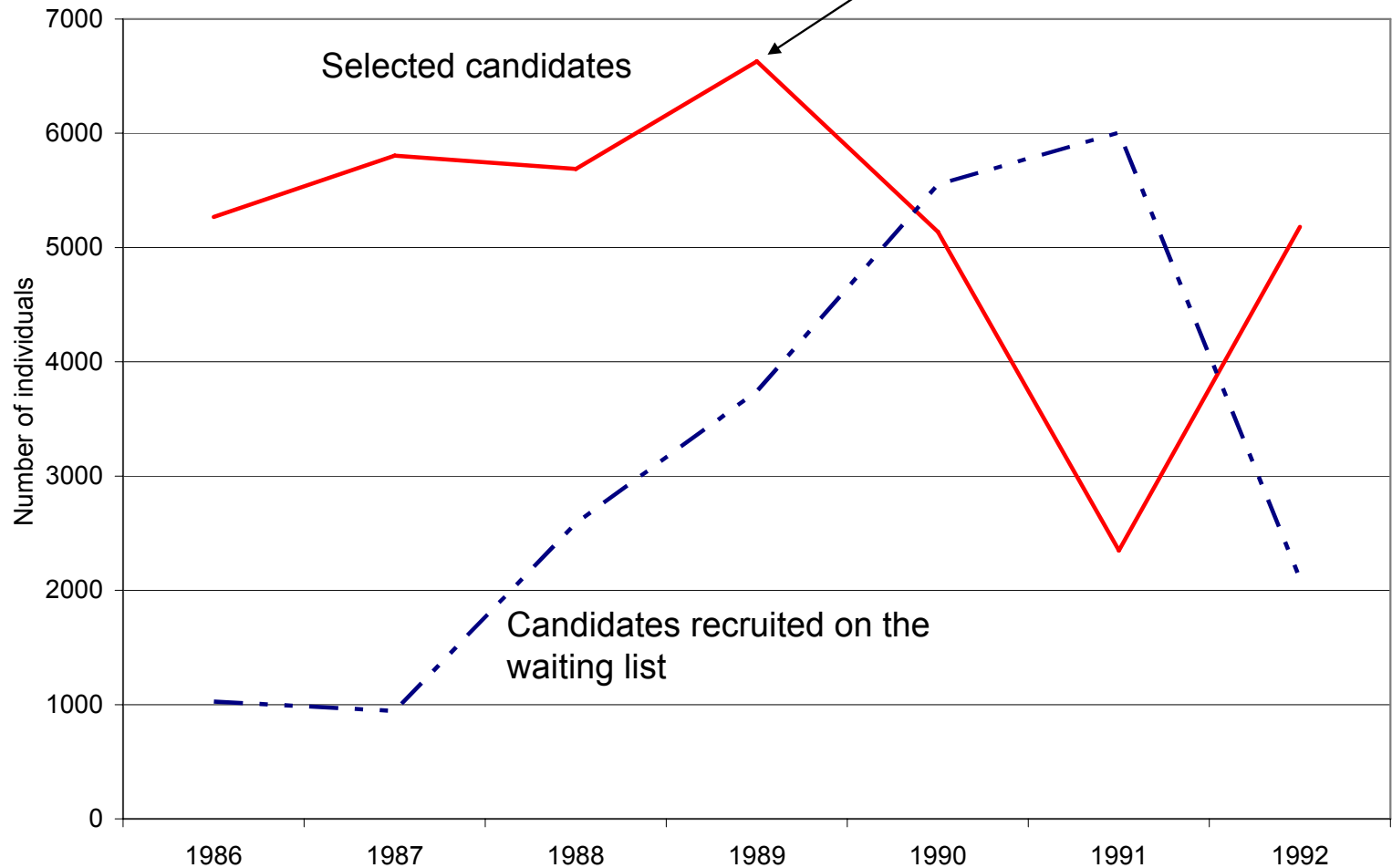
Figure 1



# Number of selected candidates and of candidates recruited on the waiting list for the entrance examinations from 1986 to 1992

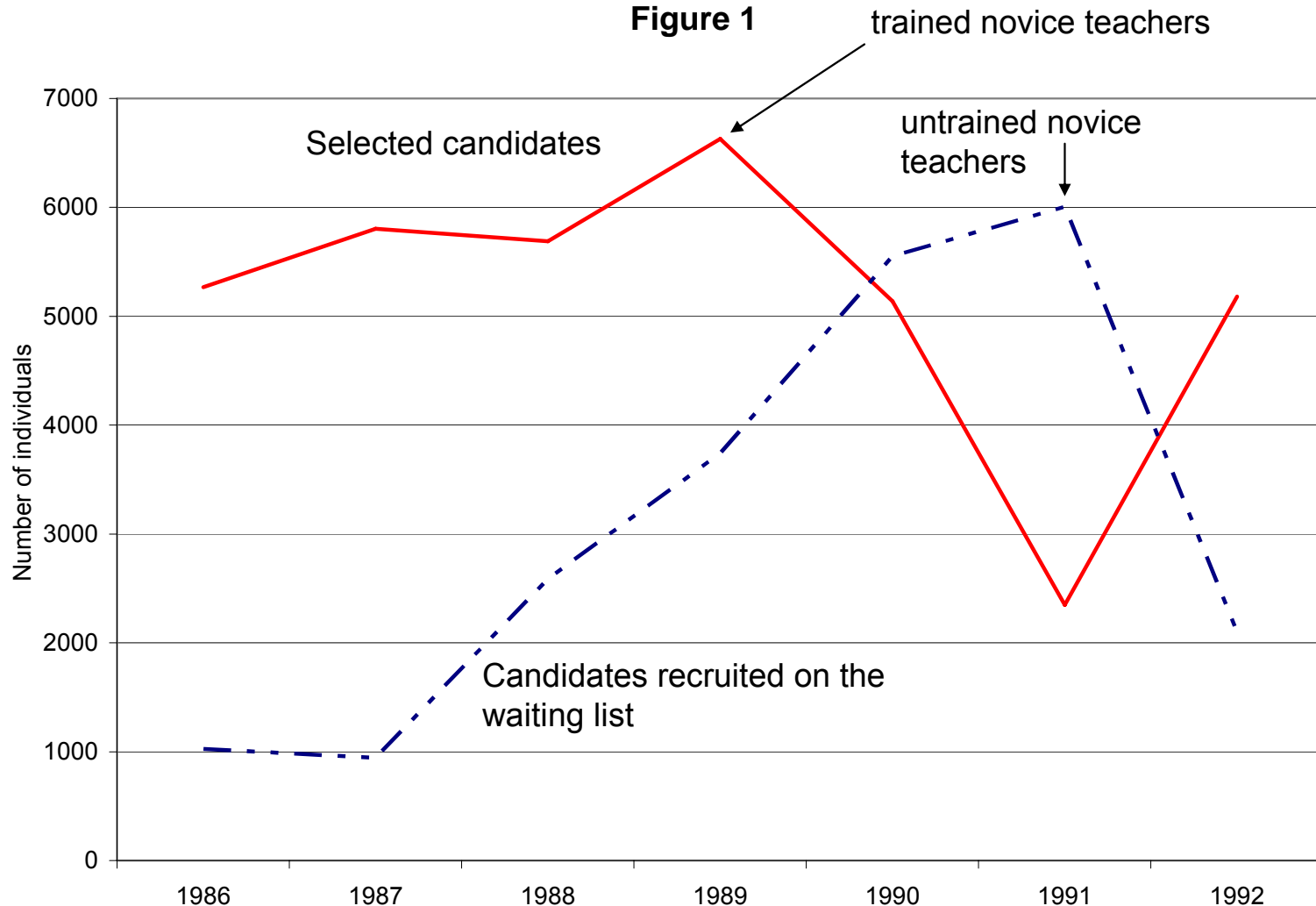
Figure 1

trained novice teachers



# Number of selected candidates and of candidates recruited on the waiting list for the entrance examinations from 1986 to 1992

Figure 1



# Data description

- Sample: in 12 'départements': all novice teachers teaching in 3<sup>rd</sup> grade classes or in multi-grade classes including 3<sup>rd</sup> graders; experienced teachers chosen randomly
- All 3<sup>rd</sup> grade students in the class are included
- Approximately 3,800 students and 200 classes

# Data description

- Students' characteristics:
  - background: nationality, sex, occupations of the parents, number of brothers and sisters, month of birth
  - past schooling information: repetitions, number of years at pre-elementary school
  - initial and final scores

# Data description

- Teachers' characteristics:
  - type (experienced, trained novice, untrained novice)
  - education:
    - university degree
    - specialty: humanities, sciences, other
  - teaching strategy
    - number of hours taught in reading and math in class
    - minutes needed to do homework
    - organizing the class in groups, and how these groups are chosen

# Data description

- Assignment of teachers to classes:
  - experienced teachers have selected their schools through movements during their careers
  - new teachers are residual claimants:
    - if more needs (more pupils than expected, unavailable or absent teachers), some students from the complementary list become untrained novice teachers
    - novice teachers choose among remaining schools

# Statistical model

- Non-randomized assignment of the three types of teachers
- How are they assigned according to students' initial achievement, when controlling for the other observed variables?
- Regression of initial test scores on student and teacher characteristics

# Statistical model

- Identification strategy: excluding experienced teachers
- Idea close to the one in Angrist and Lavy (2001): we would like similar pupils in the treatment group (trained novice teachers) and in the control group (untrained novice teachers)
- To check that, regression of initial scores with the sub-sample of the pupils having novice teachers

# Statistical model

- Same strategy for class size
- Positive and significant correlation between class size and initial scores when all pupils are included
- No more significant when pupils with experienced teachers are discarded

# Results

- teaching strategy
    - number of hours taught in reading and math in class
    - minutes needed to do homework
    - organizing the class in groups, and how these groups are chosen
- no impact on outcomes

# Results

- Field of specialization: sciences. Two types of teachers: trained and untrained
- The effect is the same for trained and untrained teachers: untrained teachers who majored in sciences compensate for the lack of training and are as able to teach mathematics as trained teachers.

## Regression of final test scores with heterogeneous effects of teachers' training

- Low achieving students within the classes benefit less from the training of their teachers
- Students in low achieving classes do not benefit from the training of their teachers

## Regression of final test scores with heterogeneous effects of class size

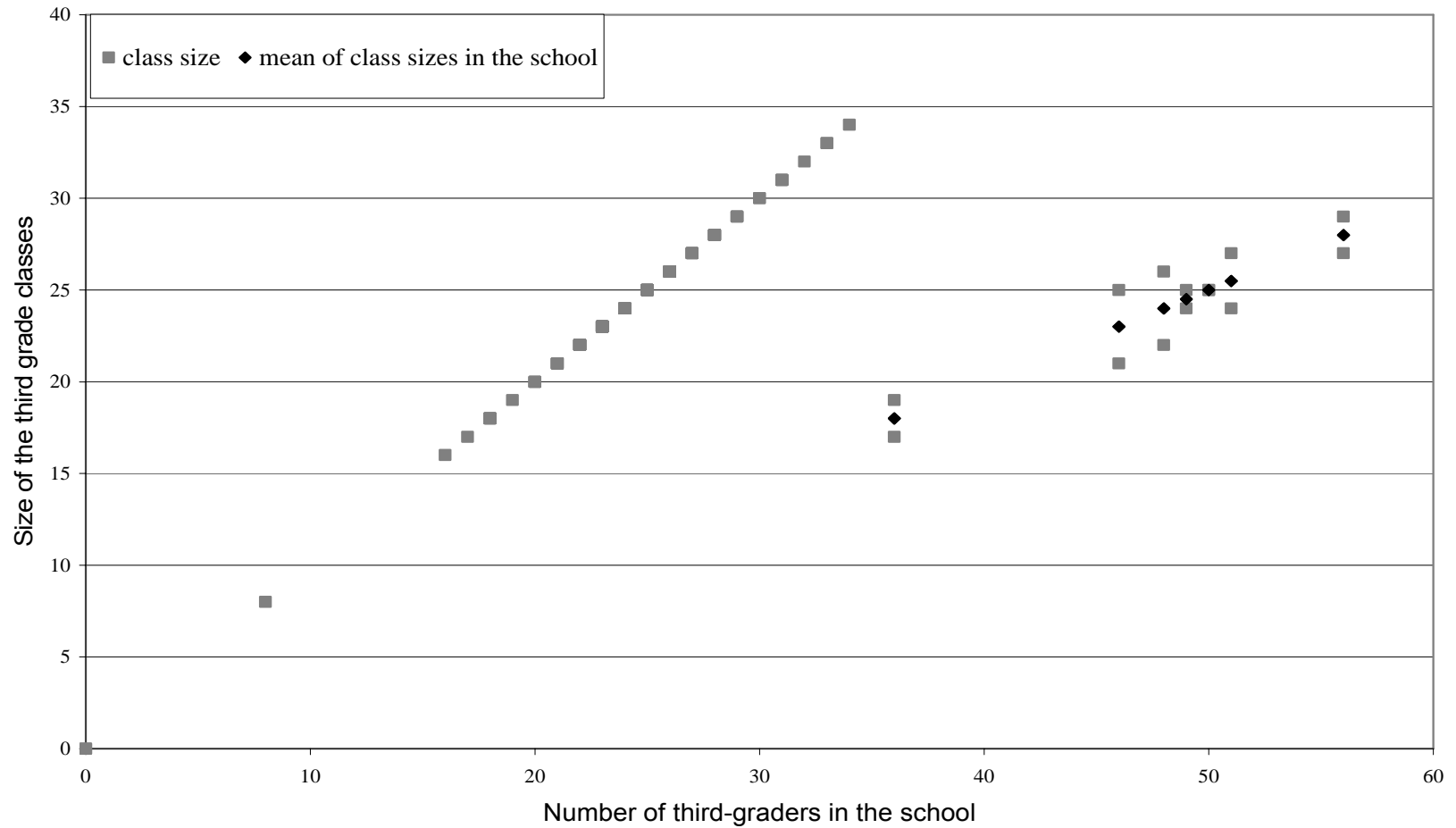
- Class size affects similarly students within classes
- Class size effect is larger for students in low achieving classes and decreases when the “quality” of the class increases
- Clarify results in some other papers

# Instrumental variable

- Instrumental variable for class size
- Piketty (2004); Angrist and Lavy (1999)
- When enrollment goes beyond 30, another class is opened in most cases
- This exogenous discontinuity can be used to estimate the causal class size effect

# Enrollment and size of third-grade classes, excluding combination classes

Figure 5



# Results

- Instrumental variable: mean of the class sizes in the school
- Takes care of the selection bias when schools organize classes so that small classes gather low-achieving students
- To use the discontinuity: restriction to some enrollments around the “breaking point”

# Results

- These estimates confirm the class size effect and its size: between 0.3 and 0.5 percentage points of final test scores

# Conclusion

- Substantial training effect (3 percentage points)
- Educational background: important
- Significant and negative effects of class size (between -0.3 and -0.5 percentage point)
- Training teachers is better than reducing class size (by less than 10 students)?

# Conclusion

- Effects vary according to mean achievements of the classes
- Classes with a high proportion of low-achieving students do not benefit from a trained teacher
- By contrast, the effect of class size is even more beneficial for these classes
- Very large effect for students in priority education areas