

# Parental investments in private tuition, student test scores and educational outcomes

Konstantina Maragkou<sup>◇</sup>, Cheti Nicoletti<sup>‡§</sup> and Birgitta Rabe<sup>§</sup>

<sup>◇</sup> Faculty of Education, University of Cambridge, UK

<sup>‡</sup> Department of Economics and Related Studies, University of York, UK

<sup>§</sup> Institute for Social and Economic Research, University of Essex, UK

**Conference on Research on Economic Theory and Econometrics**

Tinos, July 11-15, 2022

# Introduction

## Motivation

- Education is important for student life outcomes (e.g. Heckman et al., 2006; Heckman, Humphries, Veramendi, 2018)
- There is, therefore, great interest in understanding which factors can explain educational achievement
- This is particularly true for children who come from disadvantaged backgrounds
- Remedial education can be a factor that could help reducing inequalities in children school achievements

# Introduction

## Research aims

In this paper we study:

- Whether private tutoring can improve students' school performance
- Whether there is a socio-economic gradient in the probability of receiving private tutoring
- Whether there is a socio-economic gradient in the effect of tutoring on school achievements
- The ultimate aim is to understand if private tutoring helps to reduce socio-economic inequalities

# Introduction

## Previous Literature

- While there is some causal evidence on the effect of school remedial programs on children school achievements (Jacob and Lefgren, 2004; Lavy and Schlosser, 2005)
- Evidence on the effect of private tutoring is limited and often biased by the omission of family, school and student characteristics (Dang and Rogers 2008; Nickow, Oreopoulos, and Quan 2020)

# Introduction

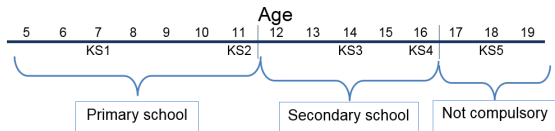
## Contributions

- 1 We estimate a model for the probability of receiving tutoring and for the effect of tutoring on school achievements adopting a student fixed-effect estimation that reduces concerns about endogeneity issues
- 2 We provide the first empirical evidence on whether parents' investments in tutoring compensate or reinforce their children's abilities

# Institutional Background

## The English compulsory schooling system and private tuition

- Timeline of the English school system:



- Private tuition in England:

- ▶ Stark socio-economic and geographic gaps in access to private lessons
- ▶ Increase in private tuition from 18% in 2005 to 27% in 2019 - rising to 41% in London (Sutton Trust, 2019)
- ▶ Similar to other international developed countries

# Data

## Datasets

- The Longitudinal Study of Young People in England (LSYPE)
  - ▶ 15,770 young individuals born between 1989-1990
  - ▶ Survey began in 2004 (age 13-14, Year 9)
  - ▶ Individuals surveyed every year until 2010 (age 19-20)
  - ▶ Final interview in 2015 (age 25)
  
- National Pupil Database (NPD)
  - ▶ Longitudinal administrative dataset recording all students in England
  - ▶ Information on achievement and school characteristics

# Data

## Analytical Sample

- Considered only Wave 1 - 3 participants (N=12,437)
- 9,524 students (77% of Wave 3 participants)
- 28,572 student-subject observations



# Data

## Private tuition

- Subject-level measures of tuition receipt (at age 15 or 16) as reported by main parent

Table 1: Tuition descriptive statistics

|                | Total          | Girl           | Boy            | Diff     | Graduate Parent | Non-Graduate Parent | Diff     |
|----------------|----------------|----------------|----------------|----------|-----------------|---------------------|----------|
|                | Mean/(sd)      | Mean/(sd)      | Mean/(sd)      |          | Mean/(sd)       | Mean/(sd)           |          |
| <i>Tuition</i> |                |                |                |          |                 |                     |          |
| Maths          | 0.12<br>(0.32) | 0.12<br>(0.32) | 0.12<br>(0.32) | 0.00     | 0.17<br>(0.37)  | 0.11<br>(0.31)      | -0.06*** |
| English        | 0.05<br>(0.22) | 0.04<br>(0.20) | 0.06<br>(0.24) | -0.02*** | 0.06<br>(0.24)  | 0.05<br>(0.21)      | -0.02*** |
| Science        | 0.05<br>(0.22) | 0.05<br>(0.22) | 0.05<br>(0.22) | 0.00     | 0.09<br>(0.28)  | 0.04<br>(0.20)      | -0.05*** |
| N              | 9524           | 4768           | 4756           | 9524     | 1557            | 7967                | 9524     |

# Data

## Exam scores

- KS3 scores
  - ▶ Formal, externally marked school tests taken at age 14
  - ▶ Assess performance in maths, science and English
  - ▶ Standardised form
- KS3 to KS4 progress
  - ▶ KS4 exams (GCSEs) are high-stake assessments taken in about 10 subjects at age 16
  - ▶ Standardised point score for maths, science and English
  - ▶ Value-added approach: KS3 to KS4 progress

# Methodology

## Student test scores and parental investments in private tuition

$$Tuition_{i,s} = \alpha_i + \gamma_s + \beta_1 KS3scores_{i,s} + \delta' X'_{i,s} + \epsilon_{i,s}$$

where  $i$  denotes students,  $s$  denotes subjects and the variables are:

- $Tuition_{i,s}$  : a dummy indicator of tuition receipt (age 15 or 16)
- $KS3scores_{i,s}$ : standardised KS3 scores in subject  $s$  (age 14)
- $X'_{i,s}$ : a vector of subject-varying controls
- $\alpha_i$ : a student fixed effect
- $\gamma_s$ : a subject fixed effect
- $\epsilon_{i,s}$ : a standard error clustered at the secondary school level

# Results

## Student test scores and parental investments in private tuition

Table 2: Fixed Effects regressions on KS3 scores and private tuition

|                          | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                  |
|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                          | FE                   | FE                   | FE                   | FE                   | FE                   | FE                   |
|                          | All                  | All                  | Boys                 | Girls                | Graduate Parent      | Non-Graduate Parent  |
| KS3 scores               | -0.016***<br>(0.002) | -0.013***<br>(0.003) | -0.013***<br>(0.003) | -0.013***<br>(0.004) | -0.026***<br>(0.008) | -0.010***<br>(0.002) |
| Observations             | 28572                | 28572                | 14268                | 14304                | 4671                 | 23901                |
| Clusters                 | 609                  | 609                  | 558                  | 575                  | 468                  | 609                  |
| Subject FE               | X                    | X                    | X                    | X                    | X                    | X                    |
| Subject-varying controls |                      | X                    | X                    | X                    | X                    | X                    |

# Robustness checks

Student test scores and parental investments in private tuition

Table 3: Robustness checks on KS3 scores and private tuition

|   | (1)<br>FE<br>English interaction | (2)<br>FE-IV<br>New peers KS3 scores | (3)<br>FE-IV<br>New peers KS2 scores |
|---|----------------------------------|--------------------------------------|--------------------------------------|
| KS3 scores                              | -0.006*<br>(0.003)               | -0.020***<br>(0.007)                 | -0.023<br>(0.058)                    |
| KS3 scores * English                    | -0.021***<br>(0.004)             |                                      |                                      |
| First-stage F-statistic                 |                                  | 2228.08                              | 10.14                                |
| Endogeneity test Chi-squared<br>p-value |                                  | 1.200<br>0.2734                      | 0.025<br>0.8743                      |
| Observations                            | 28572                            | 27942                                | 27942                                |
| Clusters                                | 609                              | 608                                  | 608                                  |
| Subject FE                              | X                                | X                                    | X                                    |
| Subject-varying controls                | X                                | X                                    | X                                    |

# Methodology

## Effect of tuition on KS3 to KS4 progress

$$KS3toKS4progress_{i,s} = \alpha_i + \gamma_s + \beta_1 Tuition_{i,s} + \delta' X'_{i,s} + \zeta_1 S_s + \epsilon_{i,s}$$

where  $i$  denotes students,  $s$  denotes subjects and the variables are:

- $KS3toKS4progress_{i,s}$ : KS3 to KS4 progress (standardised)
- $Tuition_{i,s}$ : a dummy indicator of tuition receipt (age 15 or 16)
- $X'_{i,s}$ : a vector of subject-varying controls
- $S_s$ : a control for school-level performance in subject  $s$  (KS3)
- $\alpha_i$ : a student fixed effect
- $\gamma_s$ : a subject fixed effect
- $\epsilon_{i,s}$ : a standard error clustered at the secondary school level

# Results

## Effect of tuition on KS3 to KS4 progress

Table 4: Fixed Effects regressions on effect of tuition on KS3 to KS4 progress

|                            | (1)                 | (2)                 | (3)                 | (4)                 | (5)                 | (6)              | (7)               | (8)                 |
|----------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|------------------|-------------------|---------------------|
|                            | FE                  | FE                  | FE                  | FE                  | FE                  | FE               | FE                | FE                  |
|                            | All                 | All                 | All                 | All                 | Boys                | Girls            | Graduate Parent   | Non-Graduate Parent |
| Tuition                    | 0.135***<br>(0.039) | 0.121***<br>(0.039) | 0.111***<br>(0.019) | 0.118***<br>(0.042) | 0.150***<br>(0.050) | 0.086<br>(0.058) | 0.114*<br>(0.066) | 0.108**<br>(0.046)  |
| Observations               | 2857                | 28572               | 28572               | 28572               | 14268               | 14304            | 4671              | 23901               |
| Clusters                   | 609                 | 609                 | 609                 | 609                 | 558                 | 575              | 468               | 609                 |
| Subject FE                 | X                   | X                   | X                   | X                   | X                   | X                | X                 | X                   |
| Subject-varying controls   |                     | X                   | X                   | X                   | X                   | X                | X                 | X                   |
| School subject performance |                     |                     | X                   | X                   | X                   | X                | X                 | X                   |
| English interaction        |                     |                     |                     | X                   |                     |                  |                   |                     |

## Discussion and concluding remarks

- Parents use private tuition to compensate rather than to reinforce for their child's performance
- Investments in tutoring differ substantially by socio-economic background
- Receiving private tutoring in a subject improves significantly test performance in that subject
- We don't find statistically significant differences in the effectiveness of tutoring across socio-economic backgrounds
- This evidence ultimately suggests that tutoring increases inequalities in education by socio-economic background