Crowding Out the Shadow:
Effect of School Expansion on Private Supplementary Education in Taiwan

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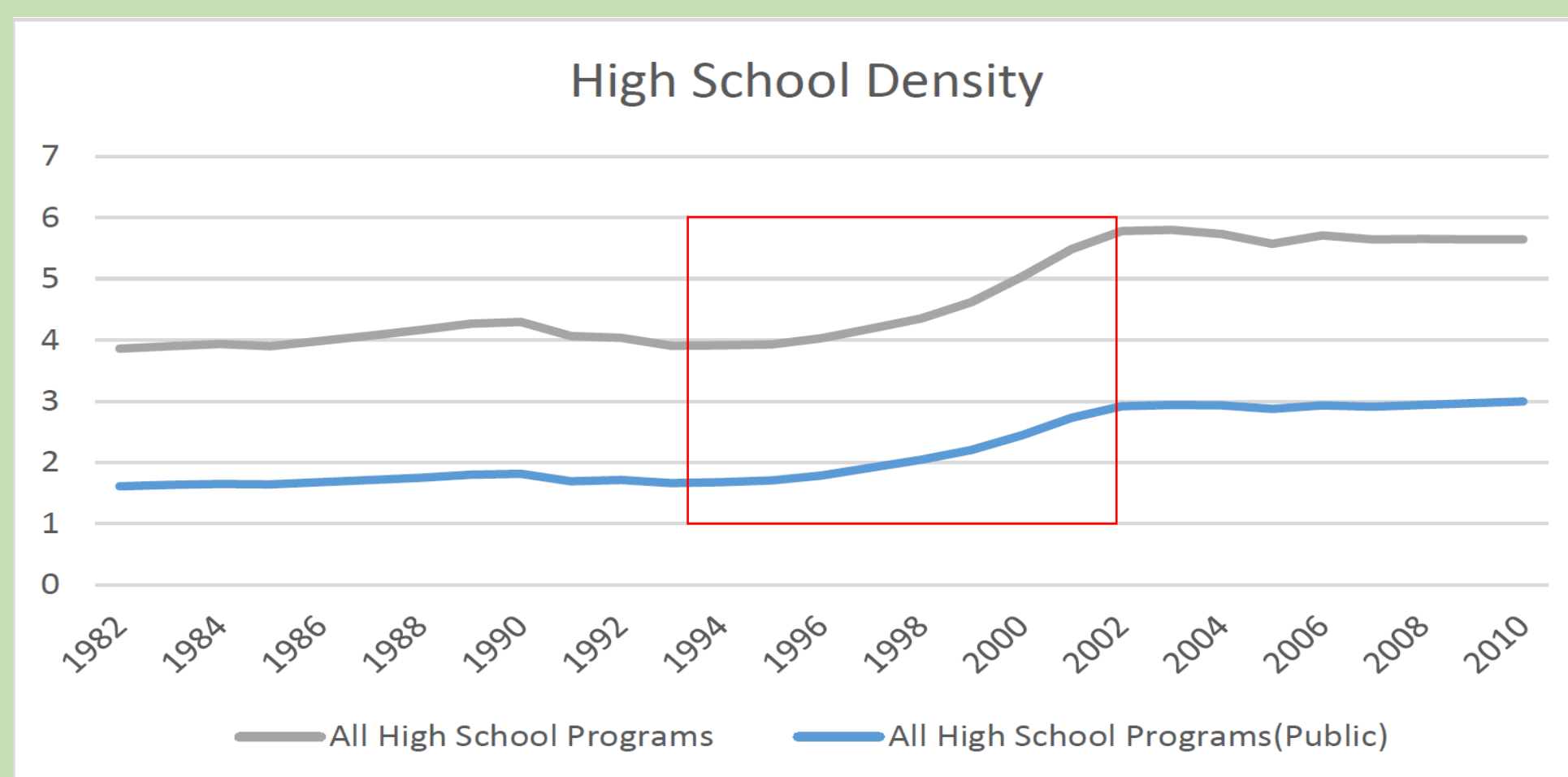
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Introduction

Students in Taiwan often spent considerable amount of time in after-school private tutoring.

Reformers in Taiwan have long argued building more schools would reduce the stress of students trying to get into those schools.

Starting from 1994, the Taiwanese government implemented a series of education reforms. One of the policies implemented was to increase the number of high schools.

High School Density

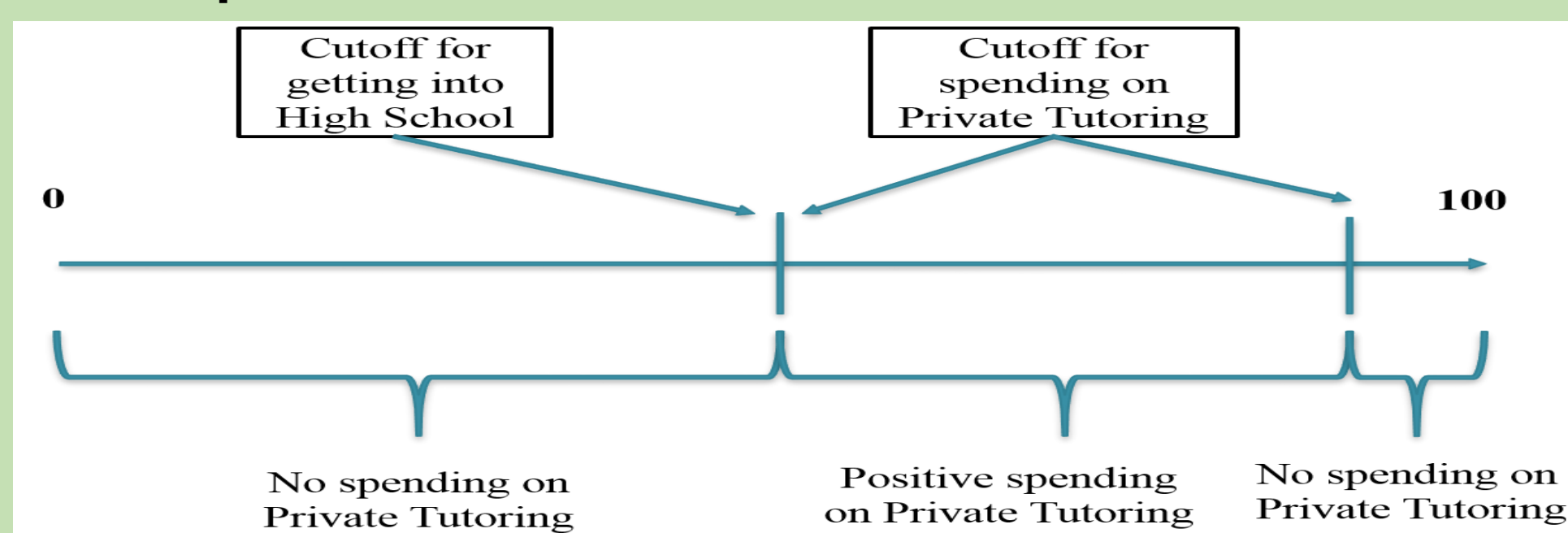Legend: All High School Programs — All High School Programs(Public)

However, many researchers have concluded the education reform a failure when they observe an increase in number of registered private tutoring centers during the same period of the education expansion.
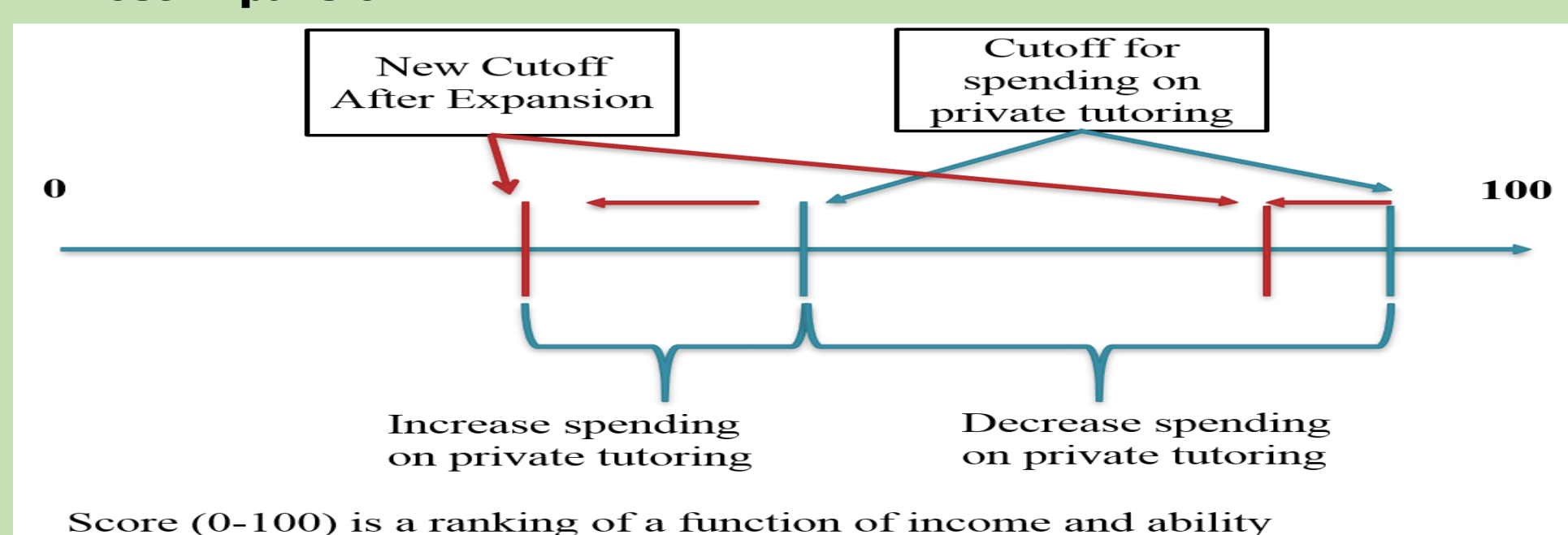
Theoretical Discussion

Even if the students study just enough to get into high school, recent theoretical work by Chang (2011) and Chu (2015) showed that the outcome of education expansion is uncertain. There are students who would increase spending on private tutoring while some would decrease their spending on private tutoring.

- **Pre-Expansion**

- **Post-Expansion**

Score (0-100) is a ranking of a function of income and ability

Method

I use a household survey on income and expenditure collected by the Taiwanese government (Survey of Family Income and Expenditure) from 1991-2006 and run the following regression:
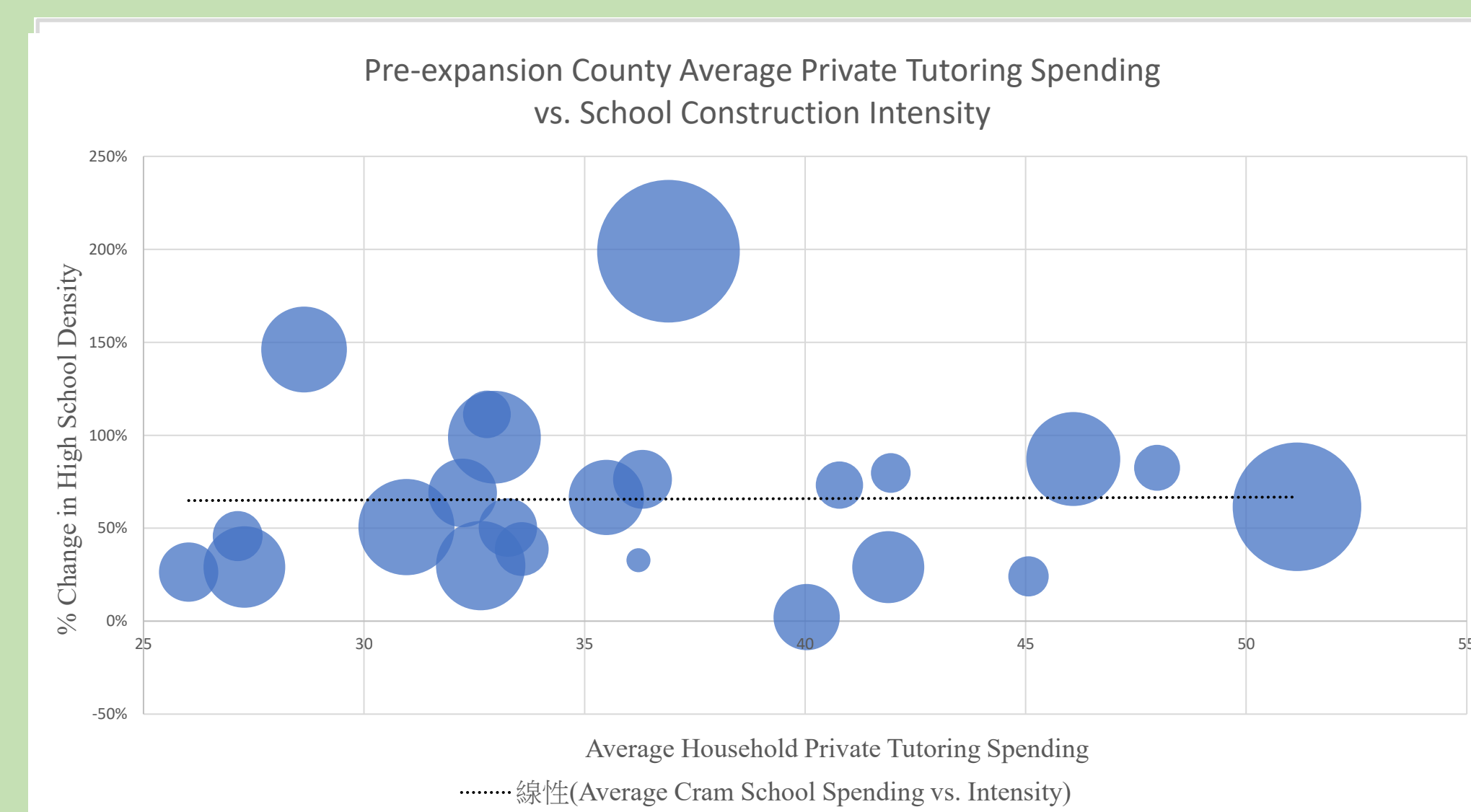
$$Y_{ijt} = \alpha * H_{jt} + \beta * X_{ijt} + D_j + D_t + \varepsilon_{ijt}$$

- Y_{ijt} : log of household private tutoring spending/indicator for participation
- H_{jt} : availability of high schools (Number of first year high school students divided by number of middle school graduates)
- X_{ijt} : household characteristics and county unemployment rate
- D_j, D_t : county and year fixed effects
  * i denotes individual household, j denotes county, t denotes year

I estimate the model using Tobit and Probit to separately look at effect on
- amount of spending
- likelihood of having any spending

To account for other policies during the education reform, I exploit the variation in school construction intensity across counties. The figure below suggests that the government built high schools randomly across counties.

Pre-expansion County Average Private Tutoring Spending vs. School Construction Intensity

線性(Average Cram School Spending vs. Intensity)

* The size of the dots represents the population size in each county

Results

	(1)	(2)	(3)	(4)	(5)
Private Tutoring Participation (Probit)					
Public High School Probability	0.001***	−0.002**	−0.002	−0.003***	−0.002**
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	96669	96669	96669	96669	96669
Ymean	0.503	0.503	0.503	0.503	0.503
Private Tutoring Spending (Tobit)					
Public High School Probability	0.320***	−0.292**	−0.209	−0.410***	−0.309**
	(0.034)	(0.134)	(0.141)	(0.130)	(0.124)
Observations	96669	96669	96669	96669	96669
Ymean	23.033	23.033	23.033	23.033	23.033
Controls					
County Fixed Effects	No	Yes	Yes	Yes	Yes
Head Characteristics	No	No	Yes	Yes	Yes
Family Type	No	No	No	Yes	Yes
Macro Conditions	No	No	No	No	Yes

Note: Head Controls include age, education level, and occupation fixed effects of household head. Family type include family type fixed effects, number of male students, and number of students at each education level. Macro controls include urbanicity fixed effects and county unemployment rate. Standard errors clustered at county-year level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Results - Heterogeneity

	University Participation	University Spending	High School Participation	High School Spending	Middle School Participation	Middle School Spending	Elementary Participation	Elementary Spending
Same Grade								
Public High School Probability	0.000	−0.083	0.003**	0.437*	−0.002	−0.378**	−0.005***	−0.697***
	(0.001)	(0.347)	(0.002)	(0.231)	(0.002)	(0.183)	(0.002)	(0.200)
Observations	11860	11860	7604	7604	6717	6717	34238	34238
Only Student								
Public High School Probability	0.000	−0.014	0.004**	0.701***	−0.002	−0.381*	−0.005***	−0.665***
	(0.001)	(0.400)	(0.002)	(0.247)	(0.002)	(0.209)	(0.002)	(0.213)
Observations	8419	8419	5656	5656	4342	4342	17052	17052

Note: Head Controls include age, education level, and occupation fixed effects of household head. Family type include family type fixed effects, number of male students, and number of students at each education level. Macro controls include urbanicity fixed effects and county unemployment rate. Standard errors clustered at county-year level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Effect on different households

(a) Spending (by Income Quintile)
(b) Participation (by Income Quintile)
(c) Spending (by Head Education)
(d) Participation (by Head Education)