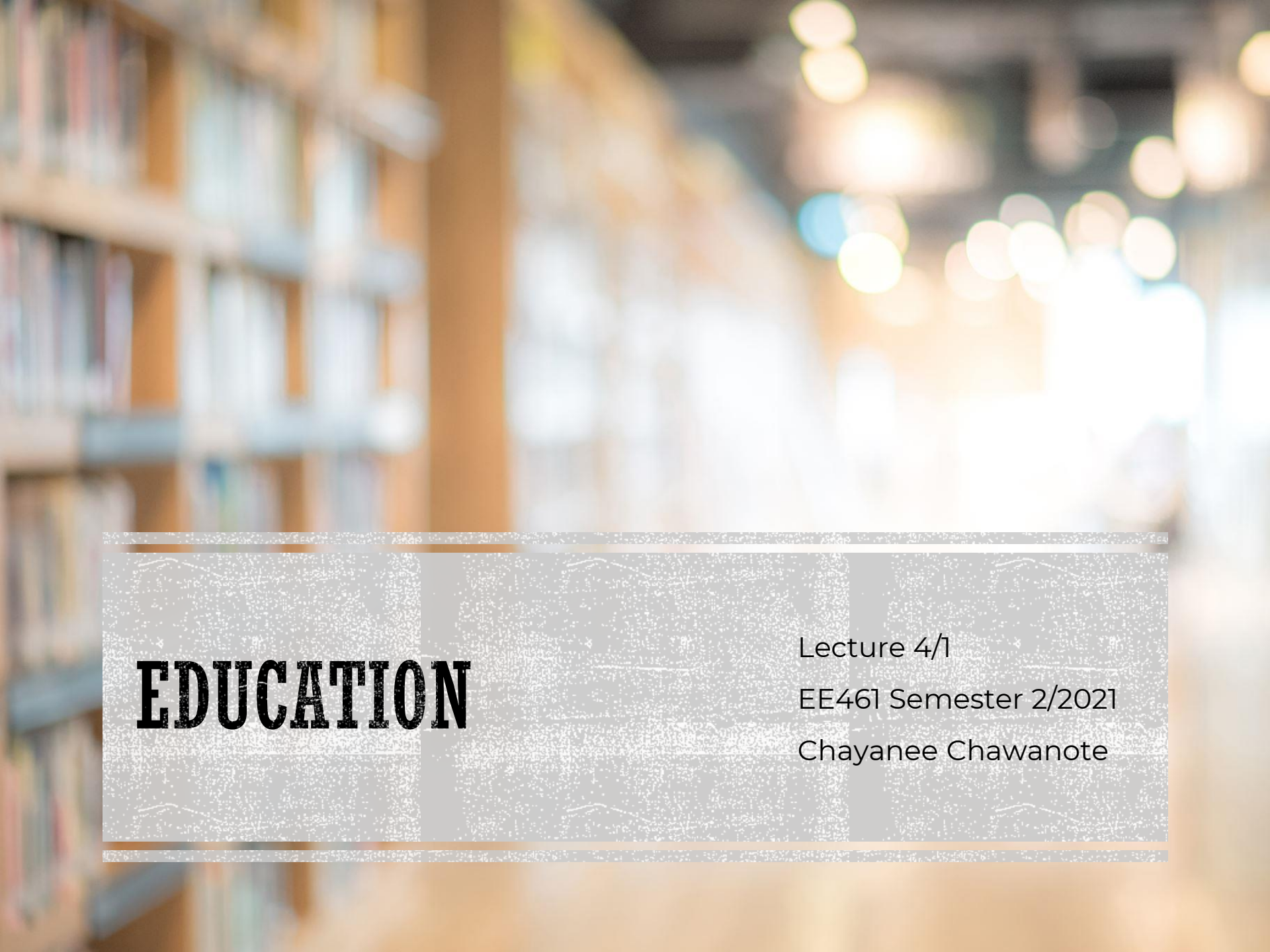
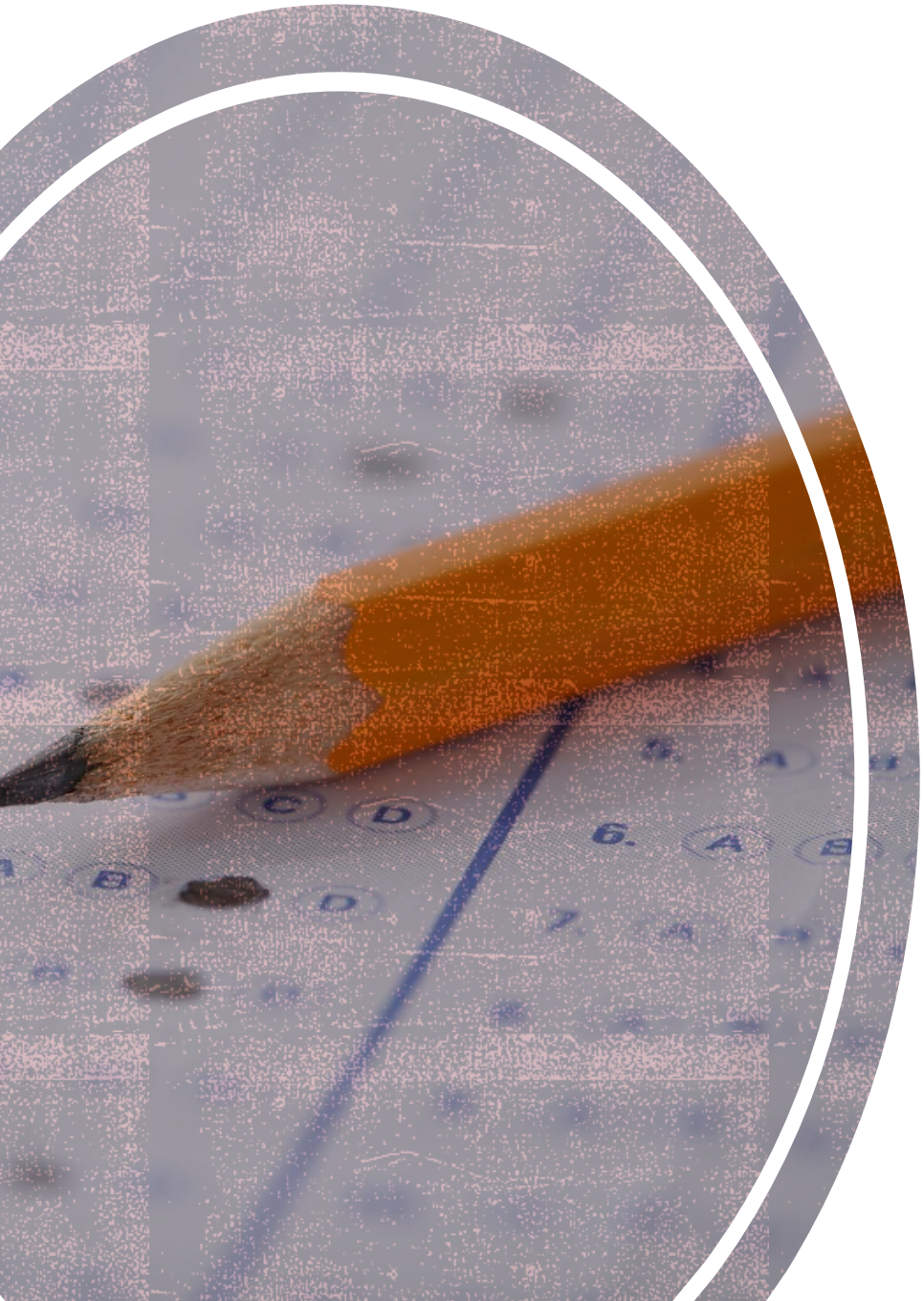


EDUCATION

Lecture 4/1

EE461 Semester 2/2021

Chayanee Chawanote



OUTLINE

- Impact of education
  - Impact of school construction (school supply) – Duflo (2001) with Difference-in-differences (in Lecture 3-3)
  - Returns to schooling
  - Benefits of education
- School quality
  - Enrollment
  - Performance (test score)

RETURNS TO EDUCATION

How do families make education decision?

- Utility is given by

$$U(S, y) = m*\ln(y) - h(S) \qquad [1]$$

y = wage

m = what the parents anticipate how much they will enjoy it

S = years of schooling

h(S) = the disutility of obtaining S years of schooling (cost of schooling); assume h(S) is convex so that $\frac{\partial^2 h(S)}{\partial S^2} > 0$

- Let's assume that $h(S) = cS^2/2$
- So, it's how parents value the earnings of the children

RETURNS TO EDUCATION

How do families make education decision?

- Assume that schooling yields returns in the labor market as:

$$\ln(y) = a + bS \qquad [2]$$

- Then, the utility function:

$$U(S) = m^*(a + bS) - h(S)$$

- Maximizing this over S yields

$$S^* = mb/c$$

- The model presented in equation [1] assumes that parents derive utility from a child's education only through increases in future income. However, there could be other reasons that parents derive utility from their child having additional years of education that are not included here.
- Returns to education as presented in equation [2] are assumed to be linear in log form across years of education, which may obscure any differential impacts of different years of schooling on income.

RETURNS TO EDUCATION

Quality of education

- Quality of education enters into the model through b. b represents the relationship between schooling and income. As quality of education increases, we would expect that b would increase as well to reflect that the same level of schooling would now translate into a higher level of income. This would increase the optimal level of schooling S*.

Schooling decisions

- Schooling is positively related to the returns, and negatively related to the costs of attending.
- From the maximizing problem above, this leads to several questions:
    - What are returns to education? How can we measure them?
    - Are there ways to improve schooling outcomes through deceases in the costs of attending?
    - Are there ways to improve schooling outcomes through increases in the benefits of attending?

RETURNS TO EDUCATION

- Rate of return to educational investment (r)
  - $r = \frac{(Y_1 - Y_0)}{S(Y_0 + C_1)}$
  - $Y_1 - Y_0$: permanent annual benefits stream due to education, or difference of mean earnings of literate and illiterate workers
  - C_1: annual cost of keeping someone in school, cost of obtaining additional education
  - S: the number of years of schooling it takes for someone to become literate
  - What does Y_0 in the denominator mean?

Micro evidence (PSACHAROPOULOS & PATRINOS, 2004)

- The returns to education in developing countries are higher relative to industrial countries, reflecting the scarcity of human capital in poorer countries and barriers to the allocation of funds to human capital investment.
- Returns to schooling decline by level of schooling.
- Private vs. social returns to schooling
  - Private rates are higher than social rates of return
  - The cost in a private rate of return estimation refers only to what the individual pays out of his/her pocket
  - The cost in a social rate of return estimation refers to the full resource cost of someone attending school
  - The distortion is incurred by the public subsidization of education. [Maximum distortion at university level]
- Investment in education of females yields a higher rate of return than that of males

RETURNS TO EDUCATION

PSACHAROPOULOS & PATRINOS, 2004

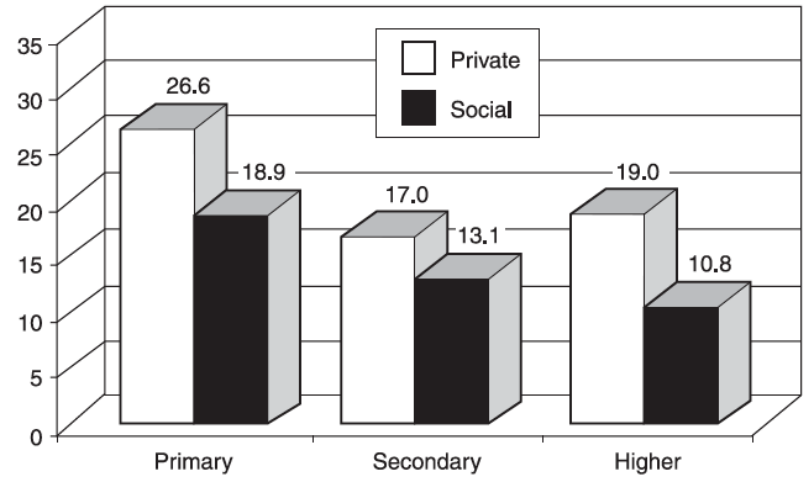


Fig. 1. Returns to investment in education by level, latest year.

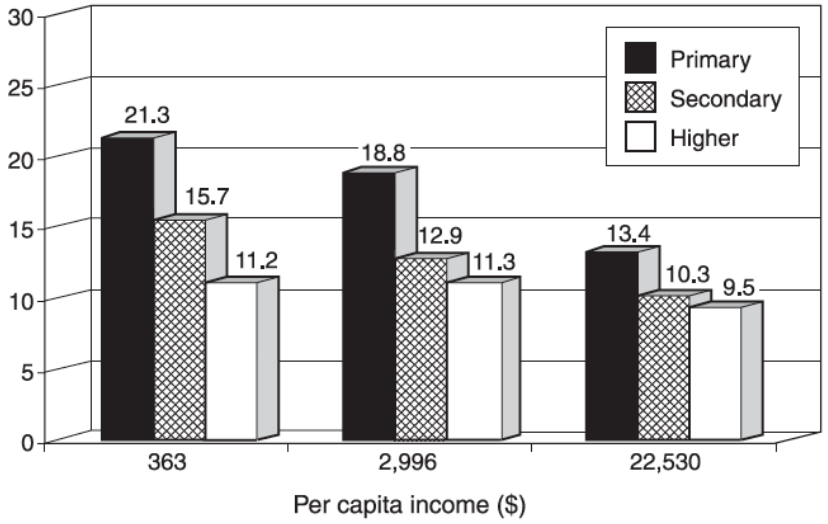


Fig 3. Social returns to investment in education by income level.

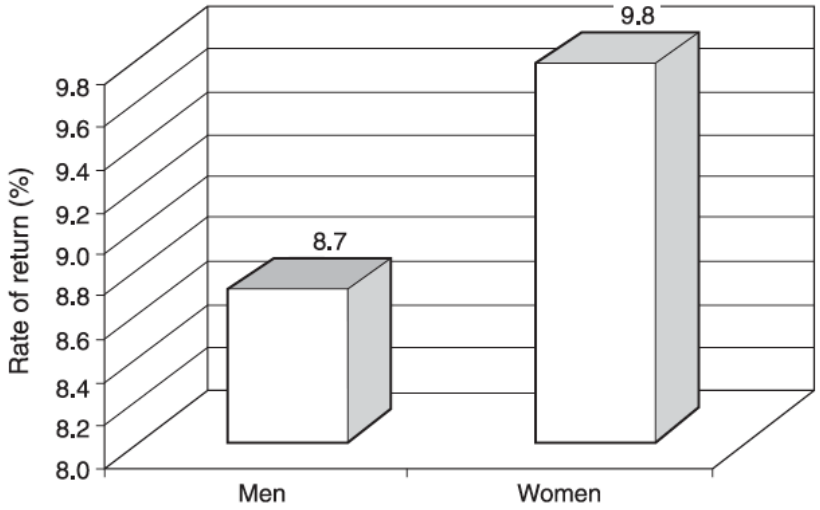


Fig. 5. Mincerian returns to education by gender.

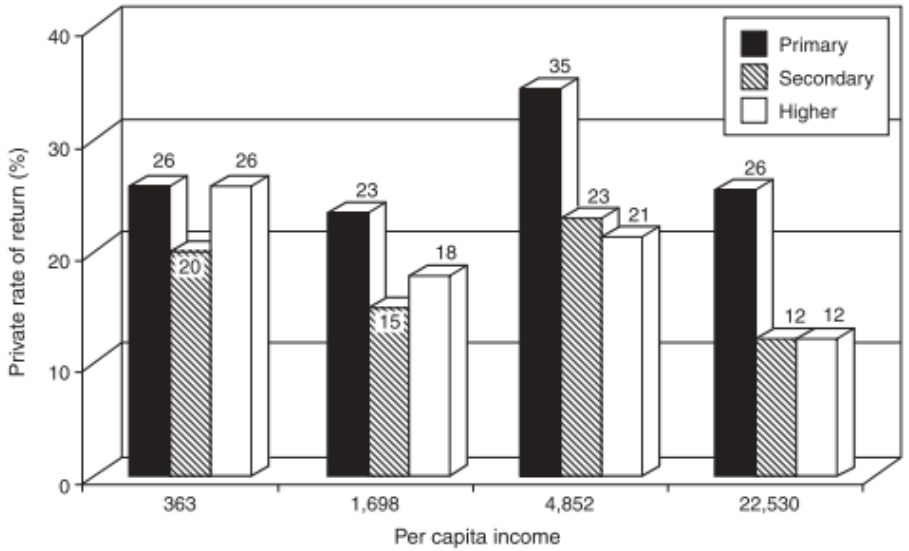


Fig. 4. Private returns to investment in education by income.

RETURNS TO EDUCATION: HOW TO ESTIMATE

- Classic method: ordinary least-squares (OLS) regression
- Mincer equation for returns to education:
  $log(wage) = \beta_0 + \beta_1 S + \beta_2 Exper + \beta_3 Exper^2 + u$
- OLS: estimating a correlation, not necessarily a causal relationship
- If the 'other stuff' in the estimating equation affects both schooling and earnings, then the OLS estimates will be biased
  - High-ability people or more wealthy people both go to school and have higher earnings

RETURNS TO EDUCATION: HOW TO ESTIMATE

- From the basic regression, we can add controls to help improve the causal interpretation of the estimates
- Some useful controls would be
  - Age
  - Income (or consumption)
  - A measure of ability (standardized test score)
- By including control variables, we can measure the relationship between schooling and earnings, *holding these factors fixed*.
  - These controls can help isolate the causal effects, but it is difficult to control for everything

DUFLO (2001) – INSTRUMENTAL VARIABLE (IV)

- We can actually use the school construction experiment to construct estimates of the returns to education
- This involved using the number of constructed schools in a region as an instrument for the level of a child's schooling.
- Instrumental variables (IV) estimates a regression of wages on the level of schooling predicted by the number of schools
- School construction, conditional on observable factors, must be exogenous, that is, not related to any third factor associated with wages.
- IV has to satisfy 2 properties:
  - I: "First stage" IV has to be correlated with the variable that it instruments (i.e., the level of schooling)
  - II: "Exclusion restriction" IV can only affect the dependent variable (wages) through the instrumented variable (the level of schooling)

IV ESTIMATION (SIMPLIFIED)

- Main equation:
  $ln(wage_{ir}) = \alpha_0 + \alpha_1 \hat{S}_{ir} + \alpha_2 C_{ir} + \nu_{ir}$
  - $\hat{S}_{ir}$ are predicted values of the level of schooling from the first stage
- First stage:
  $S_{ir} = \gamma_0 + \gamma_1 P_{ir} + \gamma_2 C_{ir} + \epsilon_{ir}$
- To get the main equation, we run the first stage to get $\hat{S}_{ir}$ and using the estimated values with other controls to get $\gamma_0, \gamma_1, \gamma_2$
- See Duflo (2001) Table 7

DUFLO (2001) – RETURNS TO EDUCATION

TABLE 7—EFFECT OF EDUCATION ON LABOR MARKET OUTCOMES: OLS AND 2SLS ESTIMATES

Method	Instrument	(1)	(2)	(3)	(4)
Panel A: Sample of Wage Earners					
Panel A1: Dependent variable: log(hourly wage)					
OLS		0.0776	0.0777	0.0767	
		(0.000620)	(0.000621)	(0.000646)	
2SLS	Year of birth dummies*program	0.0675	0.0809	0.106	0.0908
	intensity in region of birth	(0.0280)	(0.0272)	(0.0222)	(0.0541)
		[0.96]	[0.9]	[0.93]	[0.9]
2SLS	(Aged 2–6 in 1974)*program	0.0752	0.0862	0.104	
	intensity in region of birth	(0.0338)	(0.0336)	(0.0304)	
		(0.0338)	(0.0336)	(0.0304)	
Control variables:					
Year of birth*enrollment rate in 1971		No	Yes	Yes	Yes
Year of birth*water and sanitation program		No	No	Yes	No
Propensity score, propensity score squared		No	No	No	Yes

Notes: Year of birth dummies, region of birth dummies, and the interactions between year of birth dummies and the number of children in the region of birth in 1971 are included in the regressions. Standard errors are in parentheses. *F*-statistics of the test of overidentification restrictions are in square brackets.

- Using IV, returns to education estimates are 0.7 to 0.11 per year of additional schooling; not much different compared to OLS estimates and in line with the Psacharopoulos and Patrinos (2004)

- Broadly, IV strategies tend to produce similar estimates of returns to education compared with OLS.