Educational Reform, Ability, and Family Background

By Costas Meghir & Marten Palme
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Tung Samutpradit

Topics in Econometrics C

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Introduction

- In 1948, Sweden had a major educational reform.
  - increase compulsory schooling from 7-8 years to 9 years
  - abolish placement based on academic achievement
  - impose a nationally unified curriculum
- The impact of reform is hard to evaluate because they are implemented nationwide simultaneously.

Research question

To evaluate the effect of educational reform on final education attainment and earnings.

Overview

- Survey data on two cohorts: pupils born in 1948 and 1953
- Differences-in-differences comparing outcomes across cohorts and municipalities

  i.e. compare two individuals who attended different school systems but are working in the same labor market at the same point in time

- Results: The reform led to an increase in proportion attending through the new compulsory level and beyond that level, as well as an increase in years of education.

Literature

Similarly in the US, there is a number of studies which have examined the impact of compulsory schooling laws and child labor laws on educational attainment or returns from education cross-state and cross-time.

Data

Individual characteristics
e.g. educational level of parents, IQ tests, grades, type of school

- Data of students who were born in 1948 (N=11950) and 1953 (N=9927) collected by Individual Statistics (IS) project of University of Gothenburg

- The data was collected in 1961 and 1966 respectively i.e. when the respondents were in the 6th grade

- Select students who were born on the 5th, 15th, 25th day of each month to the sample. Non-response rates were 1.8%(1948) and 7.4%(1953).

Final education attainment

- obtained from 1990 Swedish education register

Annual earnings and employment status

- during 1985 and 1986 were obtained from the Swedish tax registers

Variable	1948 Cohort		1953 Cohort	
	Reform	Non-reform	Reform	Non-reform
Reform assignment, %	34.8		81.1	
Females, %	50.0	48.8	49.8	49.5
Spatial IQ[b]	21.83	21.04	22.16	21.11
	(7.16)	(7.08)	(7.35)	(7.29)
Verbal IQ[b]	22.94	22.53	24.00	22.89
	(6.64)	(6.77)	(6.66)	(6.72)
Mathematical IQ[b]	19.80	19.70	20.48	19.27
	(7.71)	(7.77)	(8.01)	(8.01)
Father's education more than compulsory, %	17.2	13.8	20.9	14.8
Years of schooling	11.93	11.27	11.61	10.84
	(2.72)	(3.09)	(2.50)	(2.73)
Less than 9 years of schooling, %	3.0	20.7	1.7	19.0
9 years of schooling, %	21.4	10.2	29.9	20.0
More than 9 years of schooling, %	73.7	67.6	68.4	61.0
Sample size, cross-section	3,583	6,726	7,303	1,704
Log labor earnings	7.29	7.24	7.19	7.11
	(0.58)	(0.60)	(0.60)	(0.61)
Sample size, labor earnings	39,239	73,468	78,582	18,394

Differences between municipalities that switched reform status and those that did not				
	Rest of the country[c]		Stockholm, Gothenburg, and Malmo	
	Men	Women	Men	Women
IQ average differences in scores (expressed in percentage of test score)	1.91 (2.46)	0.52 (2.21)	−1.50 (2.10)	3.12 (8.57)
Difference in percentage points of father's education > basic compulsory	2.2 (1.5)	−0.4 (1.4)	4.8 (5.4)	7.7 (5.7)

Area characteristics (rest of the country)[c,d]		
	Switchers	Non-switchers
Average population size	19,100	13,590
Mean taxable income, SEK in 1960 prices	3,857	3,827
Mean municipality income tax rate, %	10.04	10.04

Estimating equation

Differences-in-differences

$$Y_{idm} = b_0 + b_1 d_i + b_2' \vec{m}_i + \alpha r_{idm} + \gamma' \vec{x}_{idm} + e_{idm}$$

Y_{idm}: observed outcome for individual i belonging to cohort d and municipality m

d_i: cohort dummy

$\vec{m}_i$: dummies indicating the municipality individual i went to school

r_{idm}: reformed system dummy

$\vec{x}_{idm}$: observable characteristics of each individual

e_{idm}: random error term

Identification Assumptions

- Parallel trend assumption.
- Assume municipalities did not change teaching methods before they were assigned to the reformed system.
- Assume e_{idm} is uncorrelated with r_{idm} conditional on the other regressors.

Effect of the Reform on Education

TABLE 1—THE IMPACT OF THE REFORM ON EDUCATIONAL ATTAINMENT

	(1)	(2)	(3)	(4)	(5)
Father's education[a]	All	Low	Low	Low	High
Ability[b]	All	All	Low	High	All
	Men and women				
Change in percent attending:[c]					
Comprehensive/junior secondary	8.54	10.31	17.50	1.97	2.15
	(1.67)	(2.13)	(2.60)	(2.66)	(1.25)
More than comprehensive/junior secondary	2.61	3.26	1.29	7.35	−1.23
	(1.14)	(1.42)	(1.99)	(2.73)	(1.44)
Change in years of education	0.298	0.405	0.467	0.355	−0.130
	(0.075)	(0.070)	(0.098)	(0.095)	(0.124)
Years of education in non-reform areas	11.19	10.78	9.89	11.93	13.69
	(0.032)	(0.033)	(0.036)	(0.055)	(0.085)
Sample size	19,316	15,989	8,633	7,356	3,327
	Men				
Change in percent attending:[c]					
Comprehensive/junior secondary	9.84	12.22	18.57	4.78	2.06
	(2.35)	(2.96)	(3.86)	(3.92)	(1.58)
More than comprehensive/junior secondary	0.76	1.15	−0.20	4.04	−1.46
	(2.17)	(2.63)	(3.20)	(3.75)	(1.68)
Change in years of education	0.252	0.300	0.450	0.104	0.092
	(0.081)	(0.093)	(0.105)	(0.155)	(0.174)
Sample size	9,760	8,084	4,260	3,824	1,676
	Women				
Change in percent attending:[d]					
Comprehensive/junior secondary	7.46	8.99	18.18	−1.26	3.20
	(1.85)	(2.48)	(2.92)	(4.40)	(2.52)
More than comprehensive/junior secondary	4.65	5.75	2.04	8.59	−2.00
	(1.85)	(2.15)	(3.26)	(4.06)	(2.70)
Change in years of education	0.339	0.512	0.479	0.585	−0.415
	(0.105)	(0.087)	(0.140)	(0.127)	(0.193)
Sample size	9,556	7,905	4,373	3,532	1,651

Effect of the Reform on Earnings

TABLE 2—THE IMPACT OF THE REFORM ON EARNINGS

| | Differences-in-differences | | |
	Males and females	Males	Females
All	1.42	0.88	2.11
	(0.89)	(1.37)	(1.24)
Low father's education All abilities pooled	3.36 (0.91)	3.06 (1.36)	3.79 (1.30)
Low father's education Low ability	2.62 (1.28)	3.23 (2.03)	1.66 (1.59)
Low father's education High ability	4.53 (1.27)	2.97 (1.87)	6.71 (2.02)
High father's education All abilities pooled	−5.59 (1.88)	−7.66 (3.12)	−4.22 (2.72)

Notes: Standard errors in round brackets allowing for clustering by municipality, thus also allowing for arbitrary serial correlation. Coefficients are interpreted as percentage effects on annual earnings.

Robustness check

TABLE 3—RESULTS FROM SENSITIVITY ANALYSIS ON THE IMPACT OF THE REFORM ON EARNINGS

	(1)	(2)	(3)	(4)	(5)
	Males and females[a]				
	Alternative comparison groups			Impact of mobility	
	Reform for both cohorts	Non-reform for both cohorts	Excluding Stockholm, Gothenburg, and Malmo	Excluding movers[b]	IV[c]
Low father's education All abilities pooled	3.29 (0.96)	3.14 (0.94)	3.77 (1.18)	3.25 (0.94)	4.20 (2.67)
High father's education All abilities pooled	−6.25 (1.88)	−6.43 (2.05)	−4.11 (3.05)	−4.40 (2.15)	−17.52 (12.79)

Discussion

- Large sample size
- Conducted throughout many years
- Analyzed data of two cohorts
  when the municipalities assigned to the new system were about 25%
  and 70%
- Assumptions were not validated.
- Can ability and family background be represented *only* by IQ
  test results, grades, and father's education?
  e.g. maybe we can include parents' earnings
- Further studies on which aspect of the reform affects
  outcomes most.