NTNU

Norwegian University of
Science and Technology

Department of Economics

Examination paper for SØK3521 Economics of Education

Academic contact during examination: Colin Green

Phone: 940 37 271

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Examination time (from-to): 6 hours (09.00 -15.00)

Permitted examination support material: C

Formelsamling:

Knut Sydsæter, Arne Strøm og Peter Berck (2006): Matematisk formelsamling for økonomer, 4utg. Gyldendal akademiske.

Knut Sydsæter, Arne Strøm, og Peter Berck (2005): Economists' mathematical manual, Berlin.

Calculator:

Casio fx-82ES PLUS, Casio fx-82EX Citizen SR-270x, SR-270X College or HP 30S.

Language: English

Number of pages (front page excluded): 3

Number of pages enclosed: 0

Informasjon om trykking av eksamensoppgave

Originalen er:

1-sidig □ **2-sidig** □

sort/hvit □ **farger** □

skal ha flervalgskjema □	**Checked by:**
	Date Signature

Answer all 4 questions. Share of marks including with each question.

Question 1 (30%) Human Capital

Consider the relationship between an individual´s wages (w) and how many years of schooling they have completed (yos):

$$\ln(w_i) = \beta_0 + \beta_1 yos_i + \varepsilon_i \qquad (1)$$

a. If (1) is estimated on a representative sample of the working population, what does the estimate of β_1 provide?

b. How do ability differences across individuals lead to differences in levels of schooling? What implications does this have for interpreting the results from estimating (1).

c. Changes in compulsory school laws have been used to estimate the returns to individuals' schooling. For example, the reforms for England and Wales, and France, respectively as described in Grenet (2013).

   How do these laws help to provide a causal estimate of the returns to education?

d. Grenet (2013) demonstrates that the reform in France increased some individuals schooling by 2 years but had no effect on their wages. Similar findings have been shown for Germany. Does this mean the returns to schooling are zero in France and Germany? Discuss.

Question 2 (30%) Educational Production

a. How can education production functions be used to explain individual educational attainment?

b. Appendix 1 reports individual country differences in attainment from an international average. These differences are decomposed into unaccounted and accounted for differences in terms of inputs into an educational production function.

   What is the interpretation of these two sources of differences? Why might this be important for educational policy? Use specific country examples drawn from Appendix 1 to discuss this point.

c. Discuss the advantages and disadvantages in using incentives schemes, for example performance pay or accountability schemes, to improve educational attainment.

d. Simple (i.e. OLS) estimates of class size effects often find that larger classes are associated with higher test scores? Why might this happen? How do class size rules help us to understand the relationship between class size and student performance?

<u>Question 3 (20%) Peer Effects</u>

a. What do we mean by peer effects in education? Provide examples of how peer effects might work.

b. Discuss the problems with estimating peer effects? What are some potential solutions to these problems?

Consider the following linear in means model

$$Y_{ijt} = \beta \bar{Y}_{-i,jt-1} + \gamma \boldsymbol{X}_{ijt} + \varepsilon_{ijt} \quad (2)$$

Where *Y* is a measure of educational attainment, *X* is a vector of controls and $\bar{Y}_{-i,jt}$ is the average educational attainment of the *ith* student's peer group (*j)* at the end of the previous time period (*t-1)*.

c. β provides an estimate of the peer effect and a typical estimate might be 0.20. How do we interpret this? Why might it matter if these peer effects are linear or not?

Question 4 (20%) Issues in Empirical Research in Education

a. Use a paper(s)/research/examples of your choice to discuss how selection often makes it difficult to interpret observed differences in educational outcomes.

   In doing so, discuss why it is important to distinguish between **associations** and **causal** effects.

Table 4
Accounting for Each Country's Difference from the International Mean

				Of which: accounted for by		
	Observed difference (1)	*Unaccounted difference* (2)	*Accounted difference* (3)	*Family background* (4)	*School resources* (5)	*Institutions* (6)
Finland	44.5	31.7	12.9	2.7	−1.3	11.5
Korea	42.0	14.3	27.7	13.0	5.6	9.1
Netherlands	38.4	−8.0	46.4	−3.4	−0.3	50.1
Japan	34.0	4.4	29.6	17.5	2.9	9.2
Canada	33.0	17.4	15.6	15.9	3.2	−3.5
Belgium	29.5	−11.8	41.3	−1.2	1.4	41.0
Switzerland	26.5	27.3	−0.8	−13.2	9.5	2.9
Australia	24.5	2.1	22.4	14.0	6.6	1.7
New Zealand	24.5	17.8	6.7	16.2	−3.0	−6.4
Czech Republic	16.4	2.1	14.3	16.1	−9.0	7.2
Iceland	15.1	−11.6	26.7	29.7	4.9	−7.9
Denmark	14.1	6.0	8.1	0.4	6.5	1.2
Sweden	10.0	5.5	4.5	5.9	−1.0	−0.4
United Kingdom	8.4	−9.1	17.5	13.0	2.7	1.8
Austria	5.5	5.7	−0.2	2.1	6.1	−8.5
Ireland	3.9	−15.0	18.8	−3.3	1.6	20.5
Germany	3.5	5.4	−1.9	−4.0	−0.8	2.8
Slovak Republic	−1.0	6.3	−7.3	4.2	−18.0	6.5
Norway	−4.3	−26.4	22.1	22.1	2.1	−2.1
Luxembourg	−6.3	−10.7	4.4	−25.5	19.3	10.6
Hungary	−9.3	−18.7	9.4	4.5	−5.4	10.4
Poland	−9.5	2.5	−12.0	−11.5	−8.1	7.6
Spain	−14.1	−2.7	−11.4	−4.8	−5.4	−1.2
United States	−16.1	−14.7	−1.4	2.3	9.1	−12.9
Portugal	−33.5	23.0	−56.5	−27.0	−2.8	−26.7
Italy	−33.9	−5.5	−28.3	2.7	3.6	−34.7
Greece	−55.1	−22.1	−33.0	−4.1	−3.0	−26.0
Turkey	−75.8	−4.4	−71.5	−31.7	−17.5	−22.3
Mexico	−114.8	−10.6	−104.2	−52.7	−9.9	−41.6

Notes: Each entry shows the country's test score difference from the international mean on the PISA 2003 mathematics test, expressed in student-level standard deviations. Column 1: actual difference. Column 2: difference not accounted for by a country-level regression of the actual test score difference on the three combined input factors (family background, school resources, institutions), each of which is measured as a linear combination of individual variables using coefficient estimates from the student-level regression of Table 2, collapsed to the country level. Column 3: difference accounted for by this country-level regression. Columns 4–6: difference accounted for by family background, school resources, and institutions, respectively. By constructions, columns 2 and 3 sum to column 1, and columns 4–6 sum to column 3.

Excerpt from Woessmann (2016)