

ECONOMICS OF EDUCATION





NEW

SZÉCHENYI PLAN

ECONOMICS OF EDUCATION

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Course Material Developed by Department of Economics,

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ELTE Faculty of Social Sciences, Department of Economics

ECONOMICS OF EDUCATION

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ECONOMICS OF EDUCATION

Week 5

Cost- Benefit Analysis in Education 2

Júlia Varga

Rate of returns – earnings function method

$W = f(\text{years of schooling, age, gender})$

$$\ln(W_i) = \alpha \cdot S_i + \beta EX_i + \gamma EX_i^2 + \varepsilon_i$$

$$\alpha = \frac{\partial \ln(W)}{\partial S} \approx r \quad (\%)$$

Rate of returns – earnings function method

$$\ln w_i = a \cdot ALT_i + b \cdot KOZ_i + c \cdot FELS_i + dEX_i + eEX_i^2 + \varepsilon_i$$

$$r_{alt} = b / S_a$$

$$r_{koz} = (b - a) / (S_k - S_a)$$

$$r_{fels} = (c - b) / (S_F - S_k)$$

Result of earnings regressions (stata)

Hungary, 2009 private sector

```
. regress lnker iskev exp exp2,robust
```

Linear regression

Number of obs = 192760
 F(3,192756) =28667.10
 Prob > F = 0.0000
 R-squared = 0.3432
 Root MSE = .49175

lnker	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
iskev	.1486063	.0005194	286.13	0.000	.1475884	.1496243
exp	.0196935	.0003854	51.09	0.000	.018938	.0204489
exp2	-.0003101	7.73e-06	-40.12	0.000	-.0003253	-.000295
_cons	9.925003	.0079269	1252.07	0.000	9.909466	9.940539

lnker= log wages,

iskev= years of schooling; exp =years of labor market experience

Based on data of Hungarian Wage Tariff Survey 2009.

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Result of earnings regressions (stata)

Hungary, 2009 private sector

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. regress lnker szakm kozepf felsof exp exp2,robust
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Linear regression

Number of obs = 192760
 F(5,192754) =18787.32
 Prob > F = 0.0000
 R-squared = 0.3450
 Root MSE = .4911

lnker	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
szakm	.1616752	.0028687	56.36	0.000	.1560527	.1672978
kozepf	.4507761	.0030585	147.39	0.000	.4447816	.4567706
felsof	1.022121	.0037349	273.67	0.000	1.014801	1.029442
exp	.0214718	.0003854	55.72	0.000	.0207165	.0222271
exp2	-.0003553	7.68e-06	-46.26	0.000	-.0003704	-.0003403
_cons	11.26442	.0049007	2298.53	0.000	11.25482	11.27403

lnker= log wages; szakm = vocational secondary dummy; kozepf = general secondary dummy; felsof = college dummy; exp = years of labor market

Based on data of Hungarian Wage Tariff Survey 2009.

Result of earnings regressions (stata)

Hungary, 2009 private sector

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Based on data of Hungarian Wage Tariff Survey 2009.

How returns to education have changed during transition in Hungary? (OLS estimation results)

	α
1986	0.058
1989	0.075
1992	0.092
1995	0.106
1998	0.112
2000	0.124

Controlled for age, gender, region, industry. etc. Private sector
N=150,000

Source: estimations of János Köllő, using data from Hungarian Wage Tariff Surveys

How returns to education and labor market experience have changed during transition in Hungary? (OLS estimation results)

	r	β_1	β_2
1986	.058	.030	-.044
2000	.124	.020	-.028

Controlled for age , gender, region, industry, etc. Private sector N=150,000

Source: estimations of János Köllő, using data from Hungarian Wage Tariff Surveys

Measurement problems

Costs – foregone earnings, no direct costs included

Measurement problems – ability bias

- Standard OLS Mincer-type regressions run on cross-section data, compares earnings and education levels of different individuals.
- We can not control for all other factors that might affect earnings but not are caused by education.
- Unmeasured factors that increase earnings (ability etc.) tend to increase education as well – ability bias.

Measurement problems – ability bias

$$\ln(W) = b_0 + bs + a + \varepsilon$$

true model - ability a

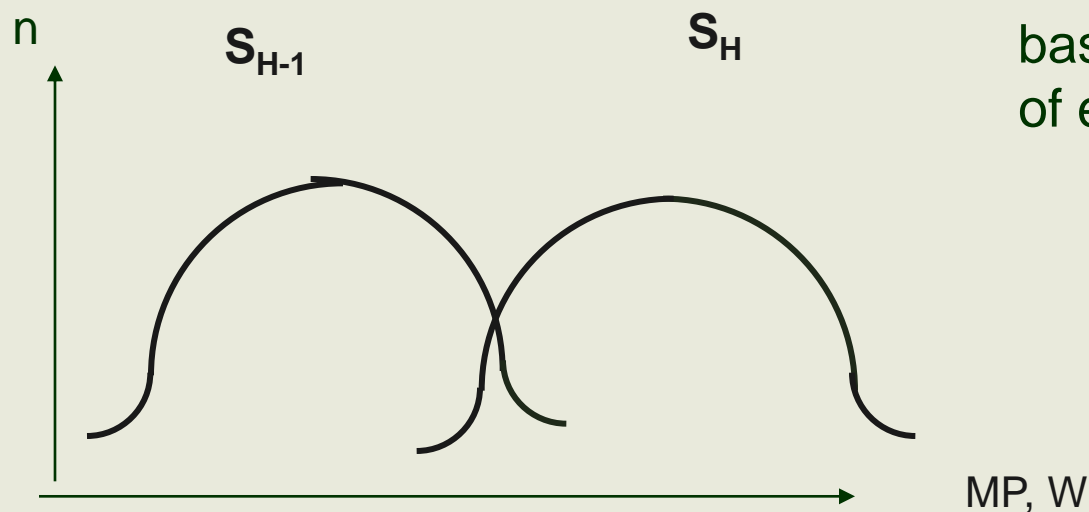
$$\ln(W) = \beta_0 + \beta s + u$$

a is omitted from regression

$$p \lim \left(\hat{\beta}^{OLS} \right) = b + \frac{Cov(a, s)}{Var(s)}$$

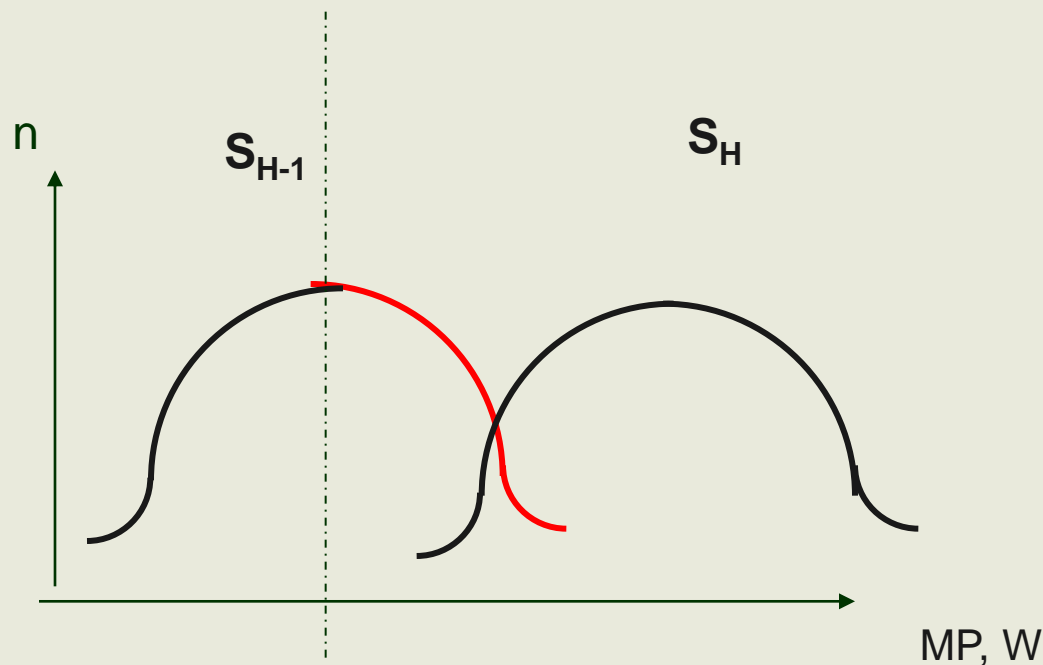
omitted variables bias

Measurement problems – selectivity bias



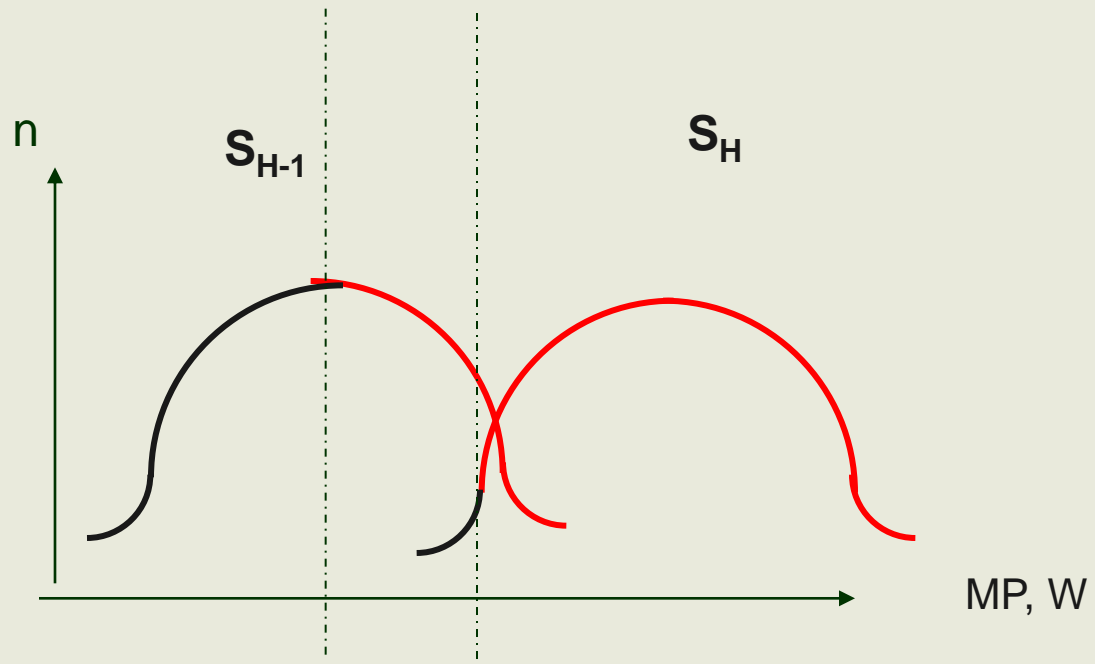
Earnings regressions are based on earnings data of employed people.

Measurement problems – selection in to employment – selectivity bias



- Employment rates of the less educated people are lower than employment rates of more educated people.
- If among the less educated the more able are employed, their observed wages are higher than that of the whole population.

Measurement problems – selectivity bias



Employment rates of the better educated are higher, their observed wages are close to wages of the whole population.

Earnings differences underestimate the expected returns to education.

Solutions to omitted ability bias

1. Instrumental variable (IV) method
2. Twin studies
3. Better controls for ability (IQ tests etc.)

Solutions to omitted variable bias – Instrumental variable method

Instrument:

Correlated with S , but uncorrelated with ability.

Often used instruments:

- quarter of birth, month of birth
- compulsory school age changes

Often find higher returns than OLS

Twin studies

Assumption: twins' have identical ability $a_{1i}=a_{2i}$

$$\ln(W_{1i}) = b_0 + bs_{1i} + a_{1i} + \varepsilon_{1i}$$

$$\ln(W_{2i}) = b_0 + bs_{2i} + a_{2i} + \varepsilon_{2i}$$

Can not estimate OLS as s may be correlated with a

Take differences:

$$\Delta \ln(W_i) = b_0 + b\Delta s_i + \Delta \varepsilon_i$$

Often find lower return than OLS

First study: Taubman (1976)

Rates of returns to education – earnings function method (OLS)

Country	Mean per capita income US\$	Years of schooling	Coefficient%
High income	23 463	9.4	7.4
Middle income	3 025	8.2	10.7
Low income	375	7.6	10.9
Total	9 160	8,3	9.7

Source: G. Psacharopoulos -H.A. Patrinos: Returns to Investment in Education. A Further update. World Bank Policy Research Working Papers 2002.