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Human Capital Externalities:
Effects for Low Educated Workers and Workers in Low Skilled Jobs

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Percentages of employees and self-employed[b]

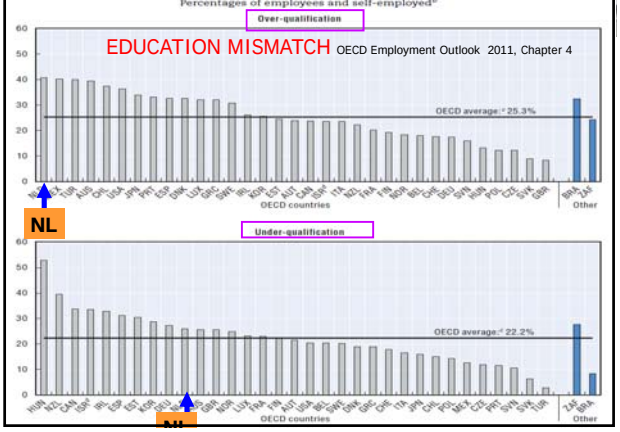

Figure 4.2. **Self-reported skill mismatch, EU19 countries, Estonia, Norway, Slovenia, Switzerland and Turkey, 2005**

Percentages of employees and self-employed[a]

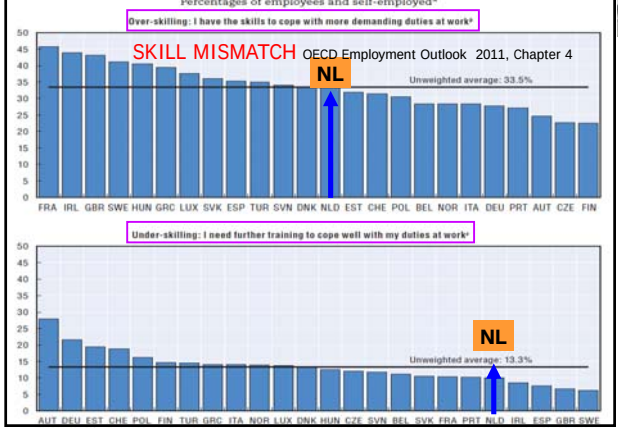

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Table 4.2. **Mismatch by qualifications and skills, EU19 countries, Estonia, Norway, Slovenia, Switzerland and Turkey, 2005**

Employees and self-employed[a]

	Over-qualified	Under-qualified	Matched	Total
	Panel A. **Percentage of workers within qualification-match category**			
Over-skilled	36.4	30.5	31.6	
Under-skilled	14.2	12.1	13.2	
Matched	49.5	57.4	55.1	
Total	**100.0**	**100.0**	**100.0**	
	Panel B. **Percentage of all workers**			
Over-skilled	8.4	6.5	17.6	
Under-skilled	3.3	2.6	7.3	
Matched	11.4	12.3	30.7	
Total				**100.0**

a) Trainees and apprentices are excluded.
Source: European Survey of Working Conditions. OECD Employment Outlook 2011, Chapter 4

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Research context

- How to improve the economic position of low skilled / low educated?
- What will raise the productivity and wage rate of low skilled / low educated?
- Private versus social returns to education
- Social rates of return differentiated to production and consumption externalities
- Production externalities differentiated into firm level externalities, regional (net of firm) level externalities and proximity of low and high skilled within the firm

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Related literature

- Regional or firm level externalities to education:
  private vs. social rate of return to education / Rauch (1993) Blundell et al. (1999) Moretti (2004a) Canton (2009)
- Urban level externalities of education:
  Urban Wage Premium / Moretti (2004b) Heuerman et al (2010)
- Production vs. consumption externalities to education:
  Learning spill-overs vs. expenditure spill-overs / Lucas (1988) vs. Sassen (2001)
- Proximity of low and high skilled at the firm level:
  Learning spill-overs (Lucas, 1988)

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Methodology (1)

$$\log\left(w_{i,f,r,t}\right)=\alpha+X_{i,f,r,t}\beta+Y_{f,r,t}\gamma+Z_{r,t}\delta+\varepsilon_{i,f,r,t}$$

1. $w_{i,f,r,t}$ is the hourly wage rate of individual *i*, working in firm *f*, which is located in region *r*, at time *t*.
2. *X* is a vector of employee characteristics, like:
   - gender
   - working hours
   - human capital (HC) → private rate of return to education
3. *Y* is a vector of firm characteristics, like:
   - industry
   - size
   - HC → production externalities → social rate of return to education
   - distribution low vs. high skilled → production externalities → soc r.o.r
   - McDonalds type of firm versus Microsoft type of firm

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Methodology (2)

$$\log\left(w_{i,f,r,t}\right)=\alpha+X_{i,f,r,t}\beta+Y_{f,r,t}\gamma+Z_{r,t}\delta+\varepsilon_{i,f,r,t}$$

4. *Z* is the vector of regional characteristics, like
   - urbanisation
   - HC of persons working in region outside firm → production externality
     part of social rate of return to education
   - HC of persons living in region → consumption externality
     part of social rate of return to education
5. The residuals are represented by ε, α represents the intercept (including fixed effects), β, γ and δ are effect parameters.

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Methodology (3)

- We can distinguish between education of workers and skill level of jobs
- This distribution is defined as the share of workers/jobs in firm *f* by education/skill level *k*, where *k* refers to either low or high educated workers or to low or high skilled jobs.

$$d=\left(e_{low}-e_{high}\right),\qquad WHERE\ e_k=\sum_{i\in f}e_{i,k}/e$$

- McDonalds type firm specialized in low skilled labour: d = positive
  Microsoft type firm specialized in high skilled labour: d = negative

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Data

- Matched Employer-Employee dataset over 1995-2007. Source: Dutch Ministry of Social Affairs, Working Conditions Survey (WCS)
- Sample of firms in which a stratified sample of employees is drawn, each annual wave approx. 27.000 employees in approx. 2000 firms
- No panel, but a repeated cross-section
- Rich set of background characteristics of individual employees and firms (gender, working hours, wages, work experience, education, occupational skills, industry, firm size, firm location)
- WCS is based on work location (2-dgit zip-code). WCS is augmented with data on HC of workers living in these 2-digit zip-codes. Latter yields consumption externalities

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Results: Human Capital Externalities: all employees

	Dependent variable	Log of hourly wage rate				
	Model	1	2	3	4	5
Level of education	Education level of individual	0.081**	0.077**	0.081**	0.081**	0.077**
	Average Education level in region	0.008**			0.002**	
	Average Education workers in firm		0.011**			0.011**
	Average Education regional workers excl. firm		0.002			-0.003
	Average Education regional inhabitants 15-64			0.029**	0.027**	0.027**
Properties workers	Experience	0.047**	0.047**	0.047**	0.047**	0.047**
	Experience squared	-7.5E-04**	-7.5E-04**	-7.5E-04**	-7.5E-04**	-7.5E-04**
	Female	-0.063**	-0.065**	-0.064**	-0.064**	-0.066**
	Part-time	0.247**	0.242**	0.247**	0.246**	0.242**
Properties region	Population density	1.9E-05**	1.9E-05**	1.7E-05**	1.7E-05**	1.7E-05**
	Regional unemployment	-0.821**	-0.810**	-0.722**	-0.723**	-0.712**
	Number of variables	38	39	38	39	40
	Number of observations	368,541	368,439	368,541	368,541	368,439
	R^2	0.760	0.761	0.761	0.761	0.762

All specifications include also the following control variables: industry dummies, firm size dummies, year fixed effect dummies.

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Conclusion for all workers

- Human capital (HC) stock is years of education
- Private net rate of return to education: 8%
- Social net rate of return to education: 3.8% of which:

  - production externalities at the firm: 1.1%
  - production externalities in the region: 0.0%
  - consumption externalities in the region: 2.7%

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Results: Human Capital Externalities: low educated / skilled

	Dependent variable: log of hourly wage rate	employees with low education		employees on low skilled jobs	
	Variables	coefficient	coefficient	coefficient	coefficient
Level of education	Education of individual	0.033**	0.033**	0.032**	0.035**
	Average education workers in firm	0.020**	0.020**	0.016**	0.003**
	Average education regional workers excl. in firm	-0.001	-0.001	1.9E-04	-2.8E-04
	Average education regional inhabitants aged 15-64	0.019**	0.019**	0.025**	0.023**
Properties workers	Experience	0.049**	0.049**	0.048**	0.048**
	Experience squared	-7.8E-04**	-7.8E-04**	-8.1E-04**	-8.1E-04**
	Female	-0.064**	-0.064**	-0.028**	-0.028**
	Part-time	0.234**	0.234**	0.204**	0.198**
Properties region	Population density	1.3E-05**	1.3E-05 **	1.4E-05**	1.3E-05**
	Regional unemployment	-0.430**	-0.430**	-0.491**	-0.447**
Distribution education at firm-level	low and high educated workers		0.001		
	low vs. high plus scientifically skilled jobs				-0.077**
	Number of variables	40	41	40	41
	Number of observations	188,532	188,532	131,773	131,773
	R^2	0.766	0.766	0.765	0.766

All specifications include also the following control variables: industry dummies, firm size dummies, year fixed effect dummies.

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Conclusion for low educated / low skilled jobs workers

- Private net rate of return to education lower: 3.2 - 3.5%
- For low educated the Social net rate of return is: 4.0%
  - production externalities at the firm: 2.0%
  - production externalities in the region: 0.1%
  - consumption externalities in the region: 1.9%
  - No effect of distribution of education within firm 0.0%
- For low skilled jobs the Social net rate of return is: 4.1%
  - production externalities at the firm: 1.6%
  - production externalities in the region: 0.0%
  - consumption externalities in the region: 2.5%
  - But large effect of distribution of education within Microsoft type firm of 7.7%!

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Overall conclusions effect of Human Capital Externalities

› An additional year of schooling increases the wage rate of average employees with 8% and for low educated / low skilled with 3%
→ improve position low skilled by increase in individual education

› HCE's are about 4% and the same for all employees and low educated.

› At the regional level consumption spillovers are significant and larger for all employees than for low educated.

› Production/learning spillovers are not significant at the regional level, these take place at the firm level. These effects are larger for low educated workers

› Those with low skilled jobs in firms with many high skilled jobs (Microsoft type of firm) realize a substantial higher wage than in McDonald type of firms:

› → proximity to many high skilled jobs improves position of workers on low skilled jobs

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Thank you for your attention