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The Impact of Graduate Mobility on Human Capital Inequalities and Regional Performance

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Presentation at the 36th Conference "Europe and its Regions. Inequalities, Human Capital and Competiveness Policy" of the Italian Regional Science Association, Cosenza, September 15, 2015

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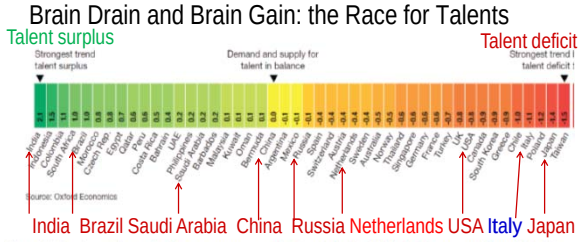
Outline

- Human capital and economic growth in nations and regions
- Individual benefits from investments in education
- Mismatch, education versus skills
- Human capital and migration
- Labour market behaviour of higher educated graduates
- Human capital spill overs at the personal and regional level
- Conclusions and policy implications

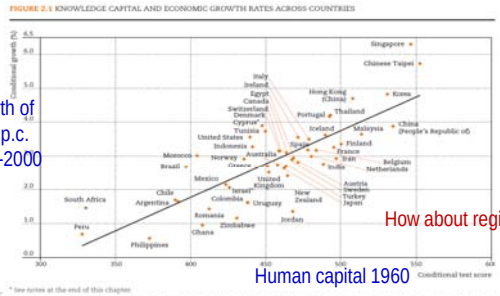
Brain Drain and Brain Gain: the Race for Talents



Figuur 1: De *mismatch* mondiaal tussen vraag en aanbod van talent in 2021. Getallen geven de gemiddelde jaarlijkse percentages aan. (Oxford Economics)

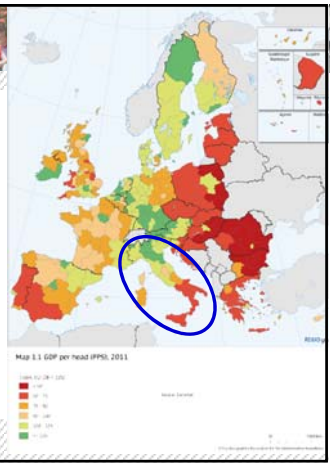
Bron: Kiezen voor kenniswerkers, AWT, 2013

Knowledge capital and economic growth for countries



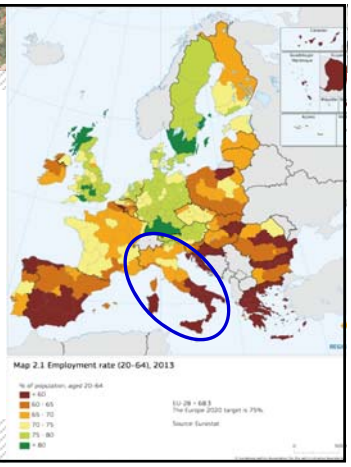
Source: OECD, In it together, 2015

GDP per head (PPS), 2011



Source: EU-Commission (July 2014) Investment for jobs and growth, 6-th Report on Economic, Social and Territorial Cohesion

Employment rate 2013 (jobs per inhabitant 20-64 years)



Source: EU-Commission (July 2014) Investment for jobs and growth, 6-th Report on Economic, Social and Territorial Cohesion

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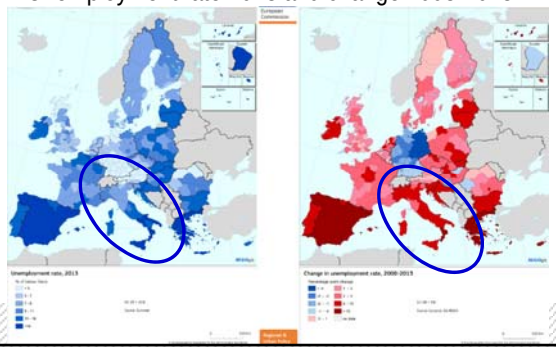
Unemployment rate 2013 and change 2008-2013



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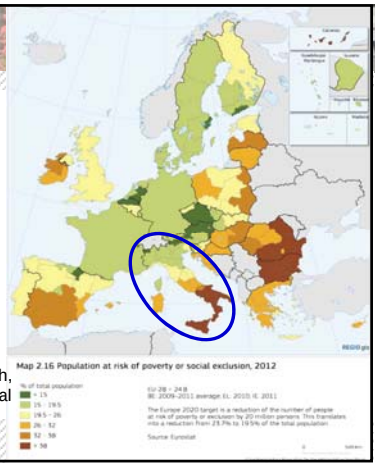
Risc of poverty and social exclusion, 2012



Source: EU-Commission (July 2014)
Investment for jobs and growth, 6-th Report on Economic, Social and Territorial Cohesion

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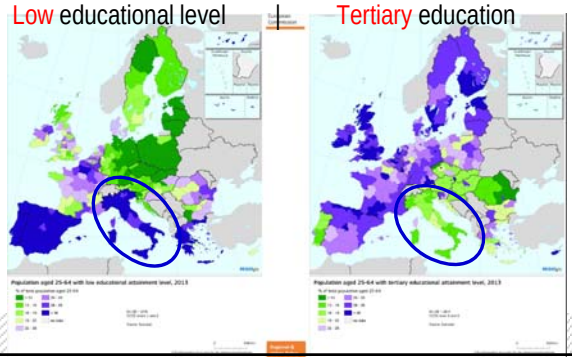
Educational attainment, 2013

Low educational level | Tertiary education



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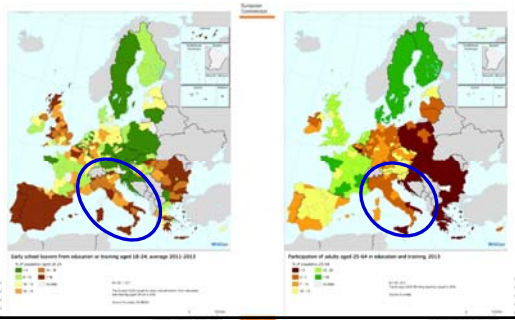
Early schoolleavers | Adult education/training



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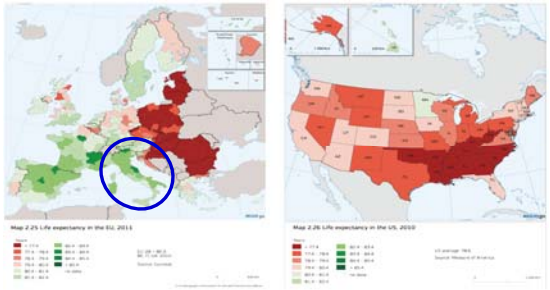
Life expectancy in the EU28 (80.5yr) and the US (78.6), 2011



Source: EU-Commission (July 2014)
Investment for jobs and growth, 6-th Report on Economic, Social and Territorial Cohesion

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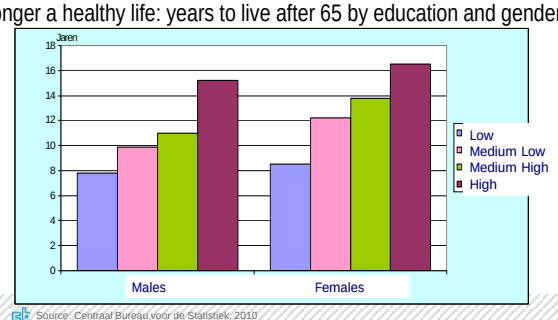
Interactions between education and health: higher educated live longer a healthy life: years to live after 65 by education and gender



Source: Centraal Bureau voor de Statistiek, 2010

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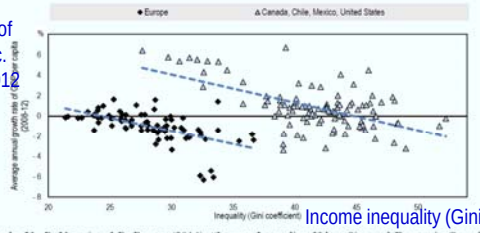
Income inequality and growth in OECD regions 2008-2012

Growth of GDP p.c. 2008-2012



Income inequality (Gini)

Source: Royuela, V., P. Veneri and R. Ramos (2014), "Income Inequality, Urban Size and Economic Growth in OECD Regions", *OECD Regional Development Working Papers*, Vol. 2014/10, OECD Publishing, Paris. http://dx.doi.org/10.1787/5jxrcmg88l8r-en

Source: OECD Employment Outlook 2014

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Polarisition at the labour market: lower medium jobs disappear due to automation and robotization

Bron: Goos, Manning & Salomons, 2012 / CPB, 2012

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The individual benefits of investing in human capital

- Human Capital Theory (Sjaastad, 1962) and Job Search Theory (Lippman and McCall,1976, 1979 and Pissarides, 1976): higher educated have higher wages, lower risks of unemployment; but also better health, higher life expectancy
- Higher educated are more spatially mobile because they have lower (information and psychic) cost and higher returns in terms of future wages. Path-dependency: if they move once, they are more likely to move again: onward moves versus return moves
- In- and outflows of migration are highly correlated: but destination choice has mixed relations with regional differences in wages and unemployment (e.g. Lowry, 1966). Regional differences in cultural and natural ameneties and quality of life may also play a role (e.g. Graves, 1980)

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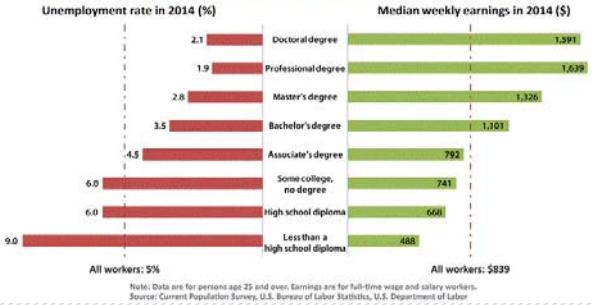
Earnings and unemployment rates by educational attainment



Note: Data are for persons age 25 and over. Earnings are for full-time wage and salary workers.
Source: Current Population Survey, U.S. Bureau of Labor Statistics, U.S. Department of Labor

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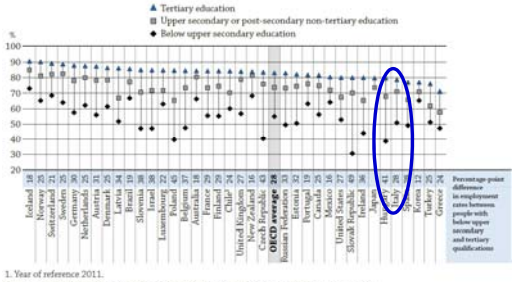
Chart A5.1. Employment rates among 25-64 year-olds, by educational attainment (2012)



1. Year of reference 2011.
Countries are ranked in descending order of the employment rate of tertiary-educated 25-64 year-olds.
Source: OECD Table A5.3a. See Annex 3 for notes (www.oecd.org/edu/eag.htm).

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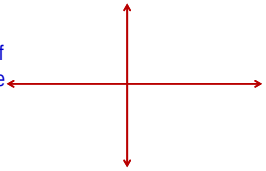
Mismatch?

Vertical mismatch: level of education is too high or too low for the job

Horizontal mismatch: level of education is OK, but the type of education not



1. Do we talk about education or skills?
2. Do we talk about the short term (job) or long term (carreer)?

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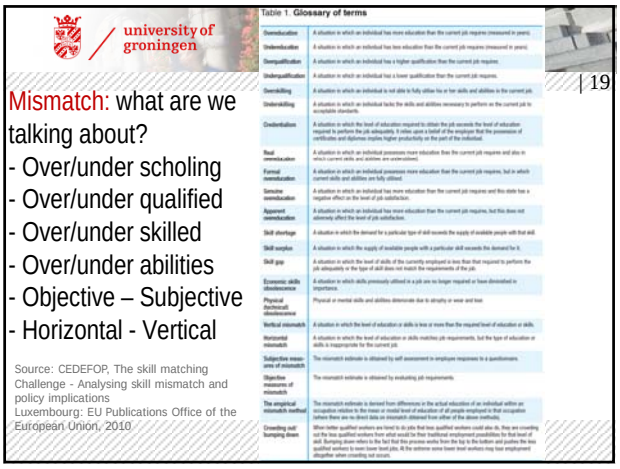
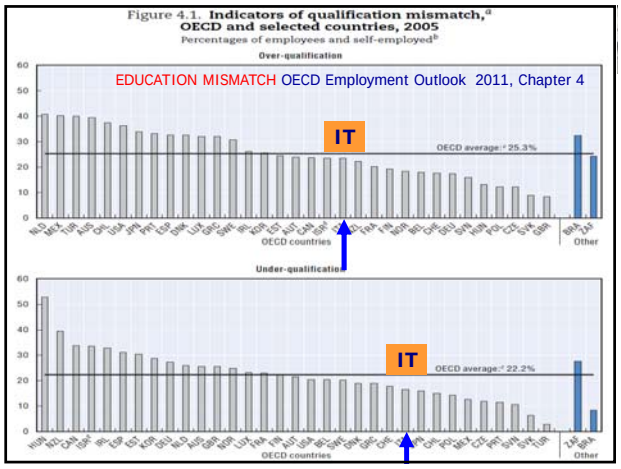
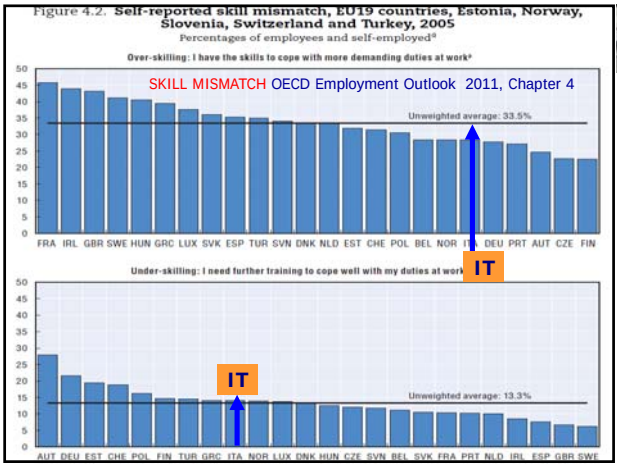
Mismatch: what are we talking about?

- Over/under scholing
- Over/under qualified
- Over/under skilled
- Over/under abilities
- Objective – Subjective
- Horizontal - Vertical

Source: CEDEFOP, The skill matching Challenge - Analysing skill mismatch and policy implications
Luxembourg: EU Publications Office of the European Union, 2010







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Cost and consequences of skill mismatch

Table 3: Costs and consequences of skill mismatch

	Individuals	Employers	Society
Direct costs	loss of earnings	higher recruitment costs	unemployment benefits
	higher turnover and absenteeism	lower productivity	public expenses for training and other ALMPs
		lower product quality	
		higher-skilled workers' wages	
		higher turnover costs	
Indirect, long-run and non-monetary costs	loss of skills/skill obsolescence	lower innovation capacity	under-investment in training
	loss of self-confidence	lower competitiveness	low-skills-bad jobs-low wages equilibrium
	lower levels of trust in government		higher equilibrium/structural unemployment
	lower job satisfaction		loss of potential output and employment
	lower participation in training		lower long-run growth

Source: Cedefop review of available literature on skill mismatch.

But is overeducation also bad from the regional perspective?

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Migration of human capital and regional growth

- Neo-classical theory: migrants move from regions with low wages and high unemployment to regions with high wages and low unemployment → regional differences will narrow (equilibrium)
- Cumulative causation: high wage regions attract high skilled migrants leading to an increase in effective internal regional demand → greater knowledge activities and investments and results in increasing regional disparities
- Escalator model: large gross flows of young high educated migrants (univirsity graduates) enter particular locations to replace older workers with other residential preferences, leading to a constant human capital churn of new, ideas, knowledge and skills. Driven by intergenerational and life-cycle features, spatial effects can be divers.
- Policy perspective: is in- or out-migration good or bad? Mixed ideas.

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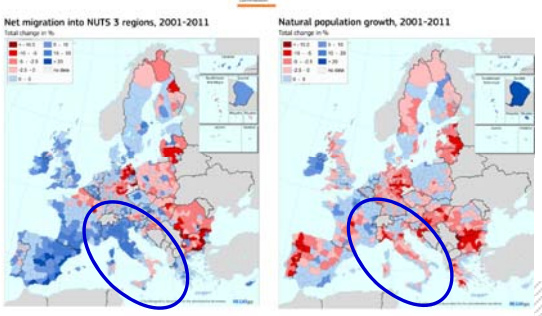
Net migration 2001-2011 Natural growth



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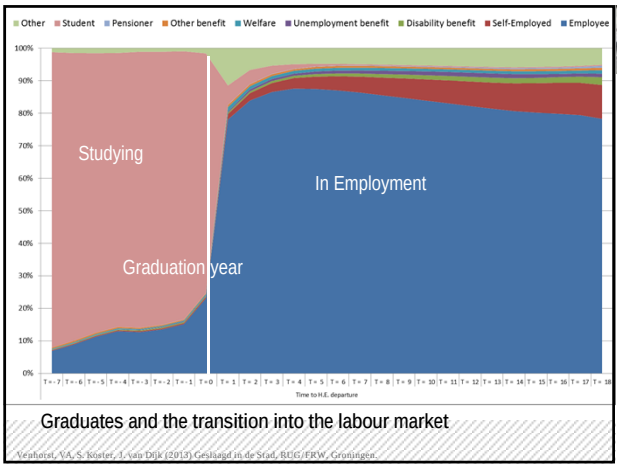
Graduate Migration Behaviour in the Netherlands using longitudinal (25 years) micro data



Graduates and the transition into the labour market

Veenhoven, V.A.S. Koster, J. van Dijk (2013) Geslaagd in de Stad, RUG/FRW, Groningen.

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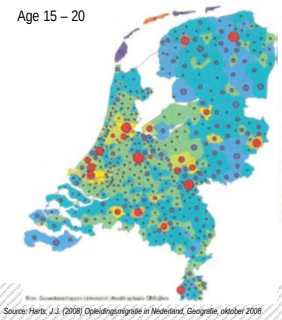
Migration patterns of youngsters

Age 15 – 20



Age 20 – 25

Source: Harts, J.J. (2008) Opleidingsmigratie in Nederland, Geografie, oktober 2008

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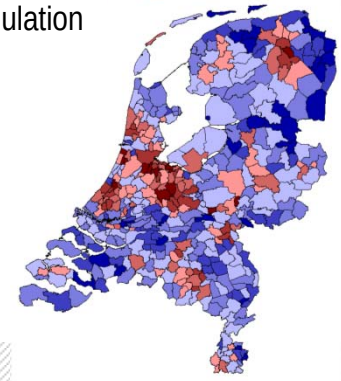
Education index population 15-64 year

Darkred: > 2,4

Darkblue < 1,6

Source: Pau/Louter, 2010

Index 1-5



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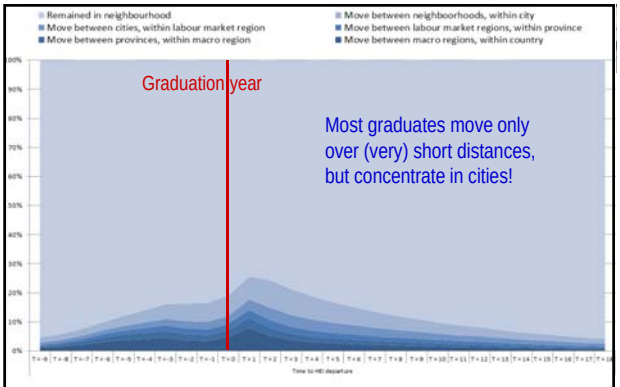
Growing cities in a shrinking surrounding region:

The escalator-model

→ redistribution of human capital mainly within, but also between regions!



Graduates by spatial mobility, movers and non-movers

Veenhoven, V.A.S. Koster, J. van Dijk (2013) Geslaagd in de Stad, RUG/FRW, Groningen.

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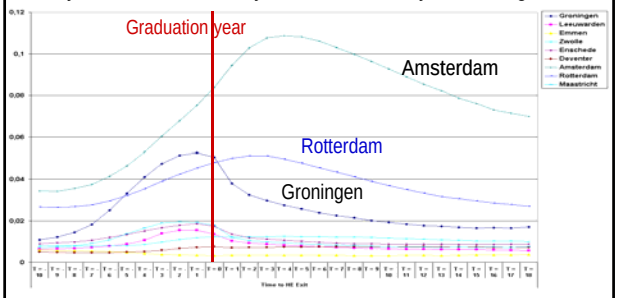
Mobility of students from 10 years before till 18 years after graduation



Bron: Venhorst, V.A., Koster, S. en Van Dijk, J. (2013), Geslaagd in de Stad.

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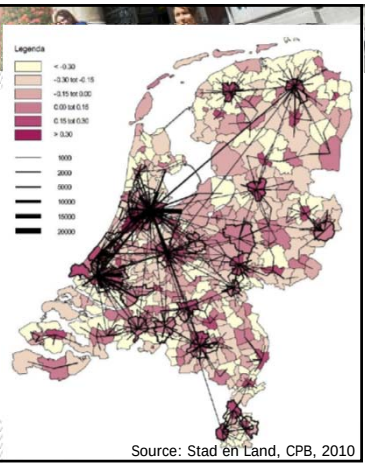
Commuting distances increase, especially for higher educated

New working arrangements: change form daily face-to-face contact to a frequency 1-2 times per week
→ ICT Broadband!



Source: Stad en Land, CPB, 2010

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Brain drain / brain gain: conclusions

- Research question:
  - *Where do students come from and where are they going to live and work after graduation?*
  - *Does this pattern shows variation by discipline and regional labour market conditions?*
- Data and analysis: micro data (1999-2007) / regression analysis
- Conclusions:
  - *The region looses, the city wins and in the end especially Amsterdam*
  - *Bonding is important, mobility is only high around the graduation date. Many stay put.*
  - *Considerable regional differences in the way they serve their own labour market*
  - *Periphery doesn't loose automatically the best students, except for economists and lawyers. Is this a problem? Brain drain or clean export product?*
  - *Migration is paying-off, but not for all (self-selection;)*
  - *Job opportunities are more important for migration than residential amenities*

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

Jouke van Dijk (joint work with with Lourens Broersma and Arjen Edzes)

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Regional Studies, 2014

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Relevant externalities and 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); Horndal effect / Malmberg et al. (2008)

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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
   - Human Capital firm level→ production externalities → social rate of return
   - Distribution low vs. high skilled → production externalities → social rate of return
   - McDonalds type of firm (mostly low skilled) versus Microsoft type of firm high skilled

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Methodology (2)

4. *Z* is the vector of regional characteristics, like
   - Urbanisation, Unemployment
   - Human Capital of persons working in region outside firm → production externality, part of social rate of return to education
   - Human Capital 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.
6. We can distinguish between educational level of the workers and the skill level of jobs

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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, 90 small regions). 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 the analysis on all employees

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

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Results: Human Capital Externalities: low educated / low 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 the analysis for low educated, low skilled jobs

- Private net rate of return to education for low educated / low skilled jobs substantially 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
- Social returns HCE's are about 4% and the same for all employees and low educated.
- At the regional level consumption spill overs are significant and more or less equal for all employees, low educated and low skilled jobs.
- Production/learning spill overs 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 realize a substantial higher wage: → proximity to many high skilled improves position of workers on low skilled jobs

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Human capital and regional economic growth

- Endogenous growth models → accumulation of knowledge (Romer, 1990) and of human capital (Lucas, 1988) leads to higher growth rates in terms of GDP and employment. For countries this is true, but empirical evidence for regions is inconclusive.
- Possible explanations: the 'openness' of regions and the high spatial mobility of higher educated; and also: the measurement of human capital stock (years of education, spendings on education), education versus skills, vertical and horizontal mismatch, over- and under-education, migration of human capital (brain drain versus brain gain)
- Re-allocation of human capital does not necessary lead to reduced interregional disparities as neo-classical theory predicts, instead 'cumulative causation' or the escalator model is more likely to happen at the regional level (Van Dijk et al.1989)

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Conclusions and policy implications

- Higher educated graduates are the most spatially mobile group in the labour market, especially in the years before and after graduation. But most of them stay in the home region.
- It leads to a redistribution of human capital within regions, but also between regions; impacts on regions are complex processes
- If they leave: brain drain or clean export product?
- If they stay: underutilization of human capital investment or beneficial for the region due to positive production and consumption externalities of which also low educated benefit?
- Policy implication: stimulate private and public investment in education because it is beneficial both for individuals and regions

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Thank you for your attention