Mismatching and job tasks in Germany – rising over-qualification through polarization?

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Paper prepared for presentation at the BIBB/IAB Workshop ‘T.A.S.K.S.’, May 17-18, 2010, Nuremberg

Introduction

- Mismatching as a relevant phenomenon in Germany (Rohrbach-Schmidt / Tiemann 2010)
  - up to 40% of the German labor force in 2006 are mismatched regarding their qualification or skills, or both
  - workers can be over- or under-qualified in terms of formal qualifications, even though their skills or abilities are in fact appropriate to the jobs they do, and vice versa (i.e. weak correlation between qualification and skill mismatching)
  - beyond worker characteristics, i.e. human capital compensation (heterogeneous ability) and career mobility rationalities, job characteristics (task content) at the worker- and the occupation-level have a share in explaining mismatching and its wage penalties.
- Data from Sweden (Korpi and Tåhlin 2009) and UK(Green 2006) indicate increase in over-education.

Introduction

- Open Questions:
  - **Is there is an increase in over-qualification in Germany over time?**
  - **Is there a link between changes in job tasks and polarization in employment and over-qualification in Germany?**

→ Analysis of repeated cross-sections of the BIBB/IAB- and BIBB/BAuA Employment Surveys 1979, 1985/86, 1991/1992, 1998/1999 and 2006

Changing job tasks and over-qualification

- Difficulty of capturing the skill content of jobs → classify jobs according to their core task requirements, and relate them to formal and informal skills that the job-holder needs to carry out these tasks (Autor, Levy et al. 2003)

- Re-finded SBTC hypothesis on the link between computerization (consumer preferences), and skill demand change (ALM): *routinization hypothesis*

- Evidence for employment polarization (polarized upgrading) in Germany (Spitz-Oener 2006, Antonczyk et al. 2010)

Changing job tasks and over-qualification

- Increase in the enrollment rates and the time spent in the education system in Germany (OECD 2007, Hadjar and Becker 2009)
- Access to most occupational positions is bound to formal certification, i.e. ‘the employment system has organized human capital in the form of vocations (Berufe)’ (Hillmert 2008).
- Vocational education in Germany takes place at the upper secondary (ISCED 3B) and the tertiary level.
- Large fractions of each birth cohort (around 60 percent in 2008, see Uhly et al. 2008: 19) enter the ‘dual system’

Changing job tasks and over-qualification

- Compared to the US and UK there are comparatively few studies on mismatching and over-qualification in Germany; available studies report comparatively low rates for Germany (Rohrbach-Schmidt / Tiemann 2010)

- OE >0, UE<0; |UE|<RE>OE (Rubb 2003, Hartog 2000): is valid for Germany as well (Rohrbach-Schmidt / Tiemann 2010)

- Formal over-qualification has increased for graduates from academic tertiary-level institutions from 1984 and 1995 to 2004 (Konsortium Bildungsberichterstattung 2006: 185b ff)

Understanding the matching process

- **HCT**
  - ‘human capital compensation hypothesis’
  - ‘occupational mobility hypothesis’
- **Job competition and assignment models:**
  - ‘labor market rigidities hypothesis’
  - ‘job heterogeneity hypothesis’,
  - **‘mismatching hypothesis’:** imbalances in supply and demand:

    decrease in middling jobs → some educated workers are forced into jobs for which their qualifications are unnecessary (and where educational standards are raised by more credential-oriented selection procedures) and thus raise the mean educational level within these occupations → **increase in over-qualification** (McGuinness 2006, Goos and Manning 2007).

Data and variables

- BIBB/IAB- and BIBB/BAuA Employment Surveys 1979, 1985/86, 1991/92 and 1998/99 and 2006
- representative labor force cross-sections on qualification and working conditions in Germany
- sample size of 20,000 to 35,000 workers per wav
- differences in surveying mode, definition of the overall sample, questionnaire, items

→ study population restricted to male full-time workers aged between 25 and 65, with German nationality working in West Germany (total sample size of 120,000 workers)

→ Output harmonization of measures

Data and variables

→ **Over-qualification** (1979-1998/1999): respondents' assessment (yes/no) to ‚*Could your job also be performed by someone with a lower qualification?*'

→ **Over-skilling** (1998/99, 2006): respondents' assessment to '*Given your skills and competencies, do you generally feel being up to, overstrained or under-challenged by the requirements of your job as a <current main job>?*'

Data and variables

- **Worker heterogeneity***:* age, age cohorts, and highest educational attainment (reclassified in ISCED-97)

- **Job heterogeneity**: task measures for non-routine cognitive (analytic, interactive), routine manual, routine cognitive, and non-routine manual tasks
  - due to the different items available our assignments deviate from Spitz-Oener 2006 (1979-1999) and Antonczyc et al. 2008 (1999 and 2006)

- **Occupational heterogeneity**: task measures aggregated at the KldB88 2-digit-level.

Results

	Over-qualification		Over-skilling	
	Absolute	Percent	Absolute	Percent
1979	3,881	**24.4**	n.av.	
1985/1986	1,027	**15.2**	n.av.	
1991/1992	2,315	**17.5**	n.av.	
1998/1999	4,333	**34.3**	789	**6.0**
2006	n.av.		897	**12.1**

Results

ISCED	**<3B[1]**	0/2A	2B	3A	**3B**	**4**	**5A**	**5B**	Yrs. of .educ. (all workers)
					Over-qualification				
1979	45.8	22.7	48.3	28.8	23.5	13.0	9.2	10.8	9.3
	(20.1)	(1.2)	(18.0)	(0.8)	(53.0)	(0.6)	(10.0)	(16.4)	(10.5)
1985/1986	36.7	26.2	37.9	27.2	16.0	4.6	5.1	6.3	9.6
	(12.4)	(0.7)	(10.6)	(1.0)	(50.7)	(1.5)	(15.2)	(20.3)	(11.4)
1991/1992	45.0	25.9	49.5	20.1	18.8	13.3	8.7	9.2	10.2
	(9.6)	(0.7)	(8.1)	(0.8)	(51.6)	(1.6)	(15.3)	(22.0)	(11.6)
1998/1999	**60.8**	48.0	69.3	34.6	**36.8**	24.5	**19.9**	**26.9**	11.1
	(10.8)	(1.3)	(7.7)	(1.6)	(52.7)	(3.5)	(18.2)	(15.2)	(12.1)
					Over-skilling				
1998/1999	5.4	6.2	4.1	8.9	5.6	7.5	6.4	6.9	12.5
2006	13.6	12.2	13.3	13.2	13.2	14.9	**8.2**	14.1	12.2
	(5.8)	(0.9)	(3.8)	(0.8)	(55.0)	(3.6)	(25.6)	(10.4)	(12.5)

Results

	Years of education			% over-qualified (% employment)		
	Mean 1979	Mean 2006	Diff.	Mean 1979	Mean 1999	Diff.
Occupation						
Primary production jobs	8.84	11.06	**2.22**	.30 (.06)	**.48** (.03)	**.18** (-.03)
Processing, metalworking, repairing jobs	9.48	10.88	1.29	.25 (.26)	.32 (.19)	.07 (-.07)
Operating / servicing machines	9.16	10.60	1.44	.35 (.09)	**.43** (.12)	.08 (.03)
Trade in goods, sales	10.58	12.58	2.00	.25 (.07)	**.49** (.06)	**.24** (-.01)
Jobs is transport, storage, shipping, security	9.24	11.11	1.87	.40 (.11)	**.53** (.12)	.13 (.01)
Jobs in gastronomy, cleaners	9.81	11.15	1.34	.28 (.03)	**.47** (.03)	**.19** (.00)
Clerks, merchants	11.39	13.73	**2.34**	.19 (.15)	.29 (.12)	.10 (-.03)
Technicians, natural scientists	12.22	14.22	2.00	.11 (.11)	.22 (.16)	.11 (.05)
Layer, manager, economists	13.05	14.63	1.59	.12 (.04)	.28 (.07)	.16 (.03)
Artist, media jobs, humanists, social scientists	12.45	14.15	1.69	.13 (.01)	.31 (.02)	**.18** (.01)
Jobs in healthcare, social care, hygiene	13.01	14.63	1.62	.13 (.02)	.16 (.04)	.03 (.02)
Teaching professions	16.03	16.47	0.44	.07 (.03)	.09 (.04)	.02 (.01)
All occupations	**10.51**	**12.54**	**2.03**	**.24**	**.34**	**.10**

Results

Task Measure	Mean 1979	Mean 1985/86	Mean 1991/92	Mean 1998/99	Mean 2006	Change 1979-2006
			All workers			
Non-routine cognitive	16.5	21.7	22.4	33.3	31.4	**14.9**
Analytic	*15.5*	*22.3*	*28.2*	*25.5*	*26.4*	*10.9*
Interactive	*17.1*	*21.2*	*18.6*	*38.6*	*34.7*	*17.6*
Routine	25.8	23.3	22.5	31.2	36.6	10.8
Cognitive	*23.5*	*15.8*	*16.1*	*43.7*	*52.4*	*28.9*
Manual	*27.0*	*27.0*	*25.7*	*25.0*	*28.8*	***1.8***
Non-routine manual	10.1	18.5	15.2	28.4	19.9	**9.8**

Results

	Over-qualification		Over-skilling	
	Over-qualified (n_{ij}=11,257)	Not over-qualified (n_{ij}=37,217)	Over-skilled (n_{ij}=1,751)	Not over-skilled (n_{ij}=18,840)
Non-routine cognitive	**16.9**	**25.4**	**30.0**	**32.9**
Analytic	14.2	25.1	23.7	26.0
Interactive	18.7	25.6	34.1	37.5
Routine	25.7	25.8[1]	35.6	32.9
Cognitive	22.6	26.6	*48.5*	*46.6*[1]
Manual	**27.2**	**25.4**	**29.1**	**26.1**
Non-routine manual	**17.0**	**17.8**	**24.3**	**25.5**

Results

	Over-qualification	Over-skilling
LEVEL 1: Worker		
Year	1.046*** (.002)	1.113*** (.012)
Age	.990 (.010)	.951* (.022)
Age sq.	1.000 (.000)	1.000 (.000)
ISCED-97 (*ref.*: 0/2B)		
ISCED-97 2A	.869 (.103)	1.590 (.430)
ISCED-97 3B	.723*** (.030)	1.580*** (.215)
ISCED-97 3A	1.055 (.126)	2.710*** (.644)
ISCED-97 4	.614*** (.061)	2.204*** (.401)
ISCED-97 5B	.500*** (.027)	2.497*** (.388)
ISCED-97 5A	.670*** (.044)	2.367*** (.378)
Non-routine analytic	**.996**** (.001)	.999 (.001)
Non-routine interactive	1.002*** (.001)	1.001 (.001)
Routine cognitive	1.001*** (.000)	.999 (.001)
Routine manual	**1.432**** (.139)	**.252**** (.108)
Non-routine manual	**.631**** (.081)	**.820**** (.435)
Year*routine manual	.999*** (.000)	1.001*** (.000)
Year*non-routine man.	1.000*** (.000)	1.000 (.000)
LEVEL 2: Occup. (included)	n_i=47,460, n_j=56	n_i=19,973, n_j=56

Results

	Over-qualification		
n_i=223, n_j=56	**Intercept-only m.**	**2**	**3**
Year		.0040*	.0067***
Non-routine analytic		-.0016	-.0014
Non-routine interactive		.0013	.0021*
Routine cognitive		.0028***	.0028***
Routine manual		**.1838***	**.1880***
Non-routine manual		**-.3570***	**-.2672**
Year*routine manual		-.0001*	-.0001*
Year*non-routine manual		.0002*	.0001
Years of education			-.0514**
Constant	.236***	-7.79*	-12.67**
R-sq. within	*.00*	*.53*	*.55*
R-sq. between	*.00*	*.01*	*.31*
σ_{u0}	*.136*	*.161*	*.132*
σ_e	*.115*	*.081*	*.079*
Rho	*.58*	*.80*	*.74*

Conclusion

- Substantial upgrading in educational attainment within occupational groups over time
- Some polarization in employment throughout the observed period
- Increase in over-qualification in Germany from the mid 1980s on (from the beginning of the 1990s for some qualification groups)

Conclusion

- Random-coefficient models with workers ‘nested’ in occupations and fixed effects models with repeated measures for 2-digit occupational codes speak in favor of the supply-demand explanation of over-qualification (but: panel estimates with only four waves might not tackle potential dynamics; reverse causation?)

- Using the BIBB/IAB- and BIBB/BAuA surveys 1979 to 2006 for longitudinal analysis, changes in the questionnaire and data collection should be kept in mind (e.g. coefficients in job task measures are sensible to item changes!, more work on validation of measures)

Thank you!

Please let us know your comments and questions!!!

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Papers can be e-mailed on request!

Classification of tasks to domains

Non-routine cognitive:

- Organizing, planning/preparing work processes
- Researching, developing, designing

Non-routine interactive:

- Training, teaching, tutoring, education
- Advising, informing
- Buying, providing, marketing, public relations, bargaining

Routine cognitive:

- Measuring, testing, quality control (in Spitz-Oener 2006: *Measuring length/weight/temperature)*

Routine manual:

- Operating/supervising, controlling machines, plants, technical processes
- Manufacturing, producing of products and goods

Non-routine manual:

- Repairing, patching (in Spitz-Oener 2006: *Repairing or renovating houses, apartments, machines, vehicles, restoring art, monuments*)
- Nursing, serving, healing (in Spitz-Oener 2006: *serving and accommodating*)