

# Time-Varying Occupational Contents: An Additional Link between Occupational Task Profiles and Individual Wages

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To what extent does the actual task portfolio change after an occupational change occurs? Occupational changes may be of different complexity.

Theoretical models: McCall (1990), Neal (1999)

Kambourov/Manovskii (2009), Poletaev/Robinson (2009): changes in skill portfolios have a stronger effect of wages than a mere change in industry/occupational affiliation.

Using the task-based approach as in Gathmann/Schoenberg (2009), following components of an occ. change can be disentangled:

- transferability of human capital based on similarity of skill portfolios
- occupation-employee match

My contribution: time-varying occupational contents for both occupational movers and stayers.

# Conceptual Framework

Source occupation:  $A_{t-1}$  – apprenticeship

Current occupation:  $C_t$

Human capital transferability:

If  $A_{t-1} \neq C_t$ :  $H(C_t) = \delta \cdot H(A_{t-1})$ ,  $\delta = \delta(\text{similarity}(A_{t-1} \leftrightarrow C_t))$ ,  $\delta' > 0$ .

Productivity/wage changes due to a change of occupation depend on:

- human capital transferability between  $A_{t-1}$  and  $C_t$
- changes in occupation-employee match  $A_{t-1} \neq C_t$

But: Having  $A_{t-1} = C_t$  does not imply  $H(C_t) = H(A_{t-1})$ !!

# Similarity Measure

Following Gathmann/Schoenberg (2009):

Any occupation can be represented by a sum of tasks  $\tau_1.. \tau_J$  weighted by their intensities  $q_{occ,j}$ :

$$A_{t-1} \equiv \sum_{j=1}^J q_{A,j} \tau_j \quad \text{and} \quad C_t \equiv \sum_{j=1}^J q_{C,j} \tau_j \quad (1)$$

Angular separability (similarity):

$$AngSep_{A \leftrightarrow C} = \frac{\sum_{j=1}^J q_{A,j} \cdot q_{C,j}}{\left[ \left( \sum_{j=1}^J q_{A,j}^2 \right) \left( \sum_{k=1}^J q_{C,k}^2 \right) \right]^{1/2}} \quad (2)$$

Distance measure:  $Dis_{A \leftrightarrow C} = 1 - AngSep_{A \leftrightarrow C}$

Qualification and Career Survey, Waves 1998, 1991, 1985

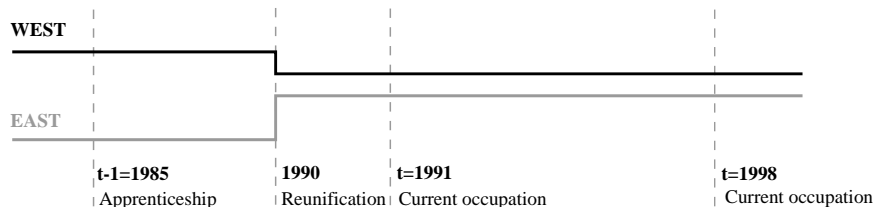
Carried out by federal institutes for occupational training and labor market research (BiBB and IAB).

Main advantages of the data set:

- Detailed information on task portfolios
- Information on the occupation of the apprenticeship and the current employment
- Information on individual characteristics

Main disadvantage: exact timing of an occupational change is unknown

# Empirical Setup



$t - 1$ : Task contents of occupations (using 3 digits of KldB88)

$t$ : Task contents in the current occupation + retrospective infos on apprenticeship (occupation, year of completion)

$t = 1991$  – Short-term developments

$t = 1998$  – Long-term developments

# Sample restrictions

- male employees
- apprenticeship before 1990 in "accredited" occupations
- prime-aged (20-55)
- full-time employment
- did not move from West→East or East→West

After all restrictions: 5600 observations in 1991 and 3900 observations in 1998.



# Fractions of Occupational Stayers and Movers by Year and Region

	1991		1998	
	West	East	West	East
Stayers	60.8	46.6	56.4	39.9
Movers	39.2	53.4	43.6	60.1
Total	100	100	100	100
N	4284	1328	3041	854

# Distances

		1991		1998	
		West	East	West	East
Stayers	mean	0.08	0.10	0.14	0.12
	st.dev.	0.04	0.06	0.08	0.06
	N	2603	619	1714	341
Movers	mean	0.36	0.36	0.33	0.30
	st.dev.	0.23	0.22	0.17	0.18
	N	1681	709	1327	513

# Sample Means West Germany

	1991		1998	
	Stayers	Movers	Stayers	Movers
Log wages	2.298 (0.302)	2.311 (0.297)	2.356 (0.319)	2.332 (0.305)
Age	36.11 (9.749)	39.21 (9.129)	39.47 (7.394)	40.62 (7.225)
Tenure with current employer	12.96 (8.998)	12.44 (8.950)	15.95 (9.420)	13.38 (9.043)
Number of employers	1.921 (1.067)	2.592 (1.088)	2.112 (1.144)	2.786 (1.105)
Master certificate	0.097 (0.296)	0.090 (0.286)	0.143 (0.350)	0.124 (0.329)
Observations	2603	1681	1714	1327

# Sample Means East Germany

	1991		1998	
	Stayers	Movers	Stayers	Movers
Residence in East Germany	0.192 (0.394)	0.297 (0.457)	0.166 (0.372)	0.279 (0.449)
Log wages	1.650 (0.315)	1.608 (0.339)	1.952 (0.318)	1.920 (0.351)
Age	35.97 (9.520)	37.22 (9.236)	39.14 (7.518)	39.87 (7.809)
Tenure with current employer	12.11 (10.54)	9.573 (9.680)	10.91 (8.455)	9.267 (7.460)
Number of employers	1.976 (1.045)	2.401 (1.043)	2.405 (1.133)	2.871 (0.996)
Master certificate	0.115 (0.319)	0.117 (0.322)	0.120 (0.326)	0.144 (0.352)
Observations	619	709	341	513

Separate estimation of the wage equation in 1991 and 1998

$$\ln w_t = \alpha_t + \beta_t X_t + \epsilon_t, \quad t = 1991, 1998, \quad (3)$$

where  $X_t$  contains the three components related to an occupational change:

- *Distance*,
- the binary variable *Occupational change*,
- their interaction *Distance \* Occ. change*,
- individual and employment characteristics.

# OLS Estimation

	Year=1991	Year=1998
Distance	0.330** (0.153)	0.130 (0.135)
Occupational change, KldB88, 3-digit	0.055*** (0.019)	0.055** (0.025)
Distance * Occ. change	-0.494*** (0.158)	-0.321** (0.130)
Residence in East Germany	-0.418*** (0.045)	-0.190*** (0.062)
Distance * East	-0.371 (0.248)	0.323 (0.294)
Occ. change * East	-0.054 (0.035)	-0.019 (0.050)
Distance * Occ. change * East	0.373 (0.253)	-0.205 (0.308)
Tenure with the current employer	0.003***	0.005***
Master certificate	0.127***	0.120***
Age	0.036***	0.019***
Age squared	-0.000***	-0.000**
Number of employers	0.019***	0.001
Constant	1.294***	1.516***
Occupational groups, Firm size, Fed. states	Yes	Yes
Adjusted $R^2$	0.570	0.369
Observations	5612	3895

In general, task-based approach confirms the prediction of human capital and matching theory:

- An occupational change is associated with an on average better match and a wage decrease due to dissimilarity of task portfolios.
- Staying in an occupation gives a wage increase due to changes in task portfolios.
- These associations differ for East and West Germany.
- The estimated results attenuate with time (cp. 1991 vs 1998).