

The Role of Within-Occupation Task Changes in Wage Development

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BACKGROUND

▶ **Employment polarisation**

- ▶ High-skill and low-skill occupations have grown relative to middle-skill occupations in many industrialized countries
- ▶ Middle-skill occupations intensive in routine tasks (Autor, Levy, Murnane 2003; Autor, Katz and Kearney 2006; Goos and Manning 2007).

▶ **Wage premia**

- ▶ US: Wage premium for nonroutine cognitive occupations has increased. Wage premium for routine occupations has decreased (Cortes, 2016).
- ▶ Germany: Wage premium for nonroutine cognitive occupations has increased. Wage premium for routine occupations has remained flat (Wang 2020).

▶ **Task content**

- ▶ Existing literature hardly takes into account that the task content of jobs is likely to change over time.
- ▶ Our contribution!

RESEARCH QUESTIONS

Overall aim: Find out how the intensive margin of job tasks helps workers to adapt to technological change in the medium/longer run.

1. How did the wages of routine workers in Germany evolve compared to nonroutine manual and nonroutine cognitive workers?
2. To what extent can wage changes be explained by changes in task intensities within occupations over time?
3. What are key mechanisms in this context?

OUR ANALYSIS

- ▶ Using survey data on job tasks (BIBB/BAuA), divide occupations into 5 task groups according to task intensity and change in NRCTI between 1985 and 2006:
 - ▶ Non-routine cognitive (NRC), e.g. managers, scientists
 - ▶ Non-routine manual (NRM), e.g. janitors
 - ▶ Routine – Δ NRC high, e.g. occs in finance and accounting, office occs
 - ▶ Routine – Δ NRC middle, e.g. metal producers, bakers
 - ▶ Routine – Δ NRC low, e.g. production of foods, mining
- ▶ Use individual-level panel data (SIAB) to analyse wage development of these task groups for time period 1985-2010.
- ▶ Explore mechanisms
 - ▶ Rule out composition and cohort effects
 - ▶ Training
 - ▶ Transitions to NRC or Routine – Δ NRC increasing

METHOD

Estimation approach for log wages (Cortes 2016)

$$\ln w_{it} = \sum_j D_{ijt} \theta_{jt} + \sum_j D_{ijt} \gamma_{ij} + Z_{it} \zeta + u_{it}$$

θ_{jt} : Occupation-time fixed effects. Capture occupation wage premium in occupation j at time t .

γ_{ij} : Occupation-spell fixed effects. Capture an individual's time-invariant skills and the occupation-specific returns to those skills.

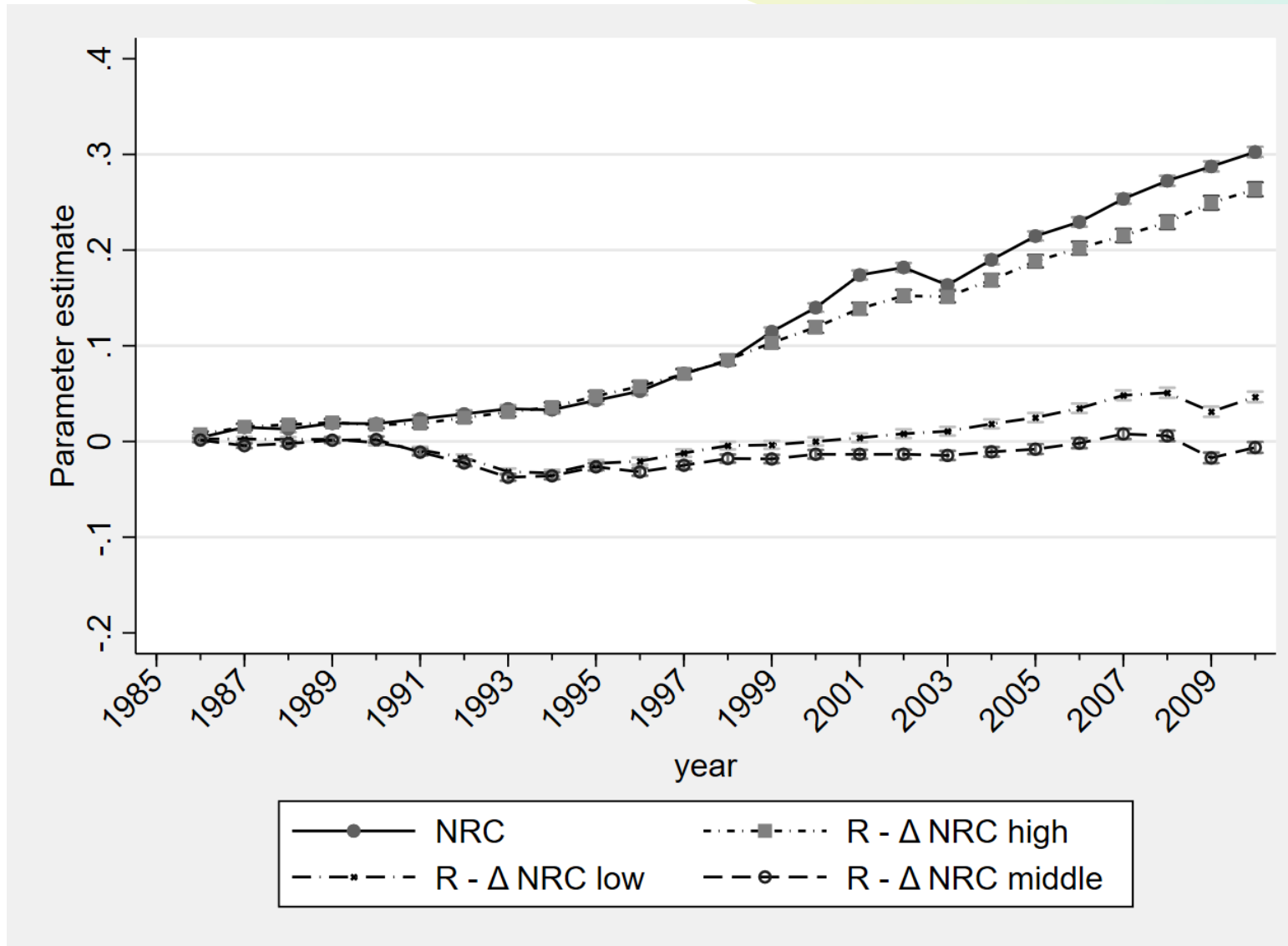
Identifying variation: Occupation-time fixed effects identified from variation over time within occupation spells.

SHIFT-SHARE ANALYSIS OF ROUTINE TASK INTENSITY (RTI), DIFFERENT TIME PERIODS

	Total	Between	Within
1985-1992	-0.87	-1.01	0.14
1992-1999	-3.73	-1.54	-2.20
1999-2006	-3.17	-0.58	-2.59
1985-2006	-7.78	-1.97	-5.81

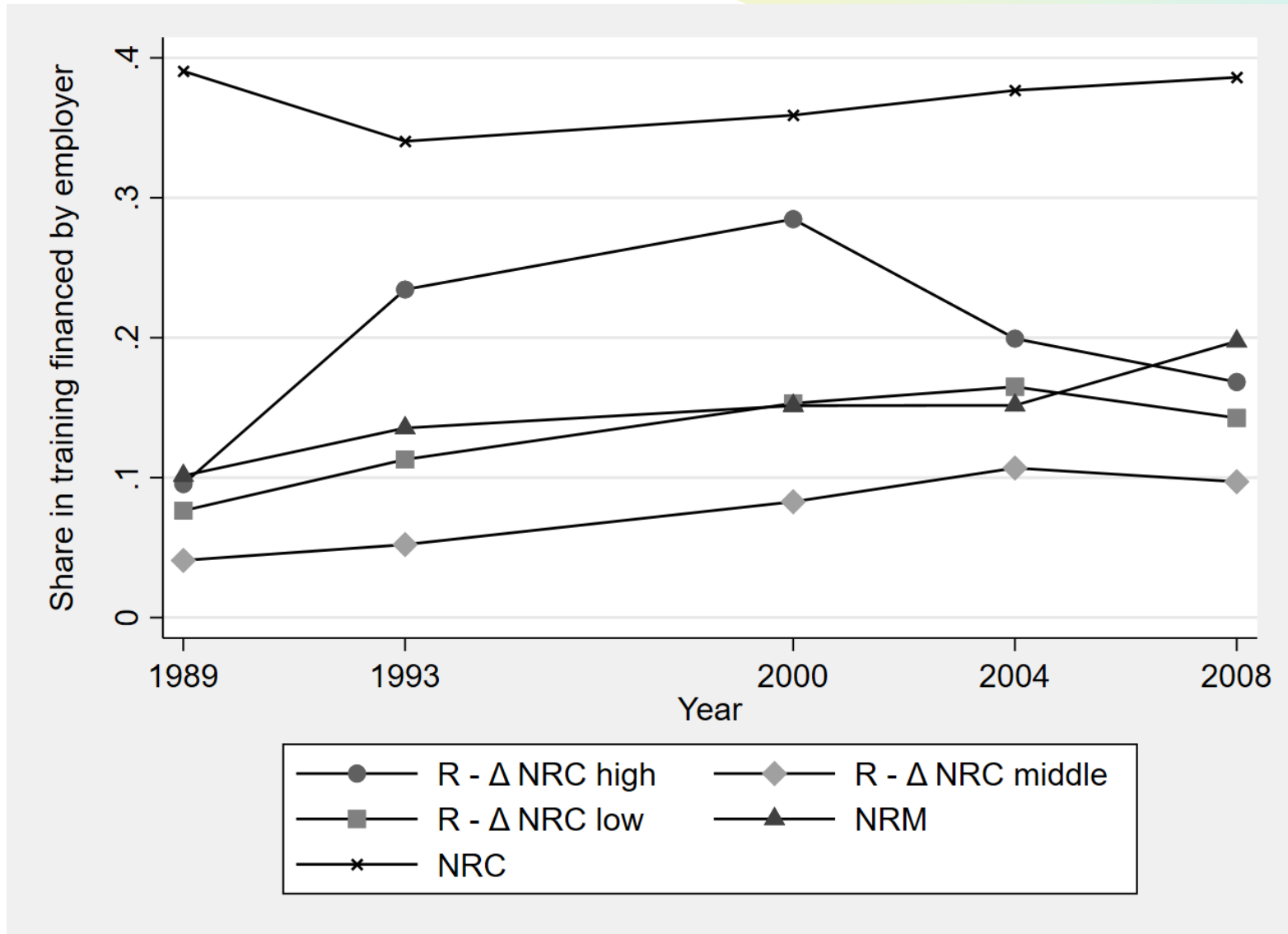
- Changes in RTI strongly driven by changes within occupations, rather than between occupations
- Strongest changes in RTI between early 1990s and mid-2000s

TASK-GROUP SPECIFIC WAGES OVER TIME



- Not taking into account heterogeneity would understate occupation-specific wage components by up to 16 percentage points for Routine – ΔNRC high and overstate occupation-specific wage components by up to 10.9 percentage points for Routine – ΔNRC low

SHARES IN TRAINING COURSE FINANCED BY EMPLOYER



- Source: SOEP
- Highest training share for Routine – Δ NRC high in time periods with strongest change in task intensity
- Results for training overall very similar

ROBUSTNESS: COMPOSITION AND COHORT EFFECTS

- ▶ Decomposition analysis wrt education
 - ▶ Decomposition of change in difference in NRCTI between task groups
 - ▶ Almost all the change in mean NRCTI for R - Δ NRC high can be explained by a change in returns to education
 - ▶ Increase in mean NRCTI within the R - Δ NRC high task group cannot be explained by an inflow of highly educated workers
- ▶ Different samples: only manufacturing, only workers without university degree → very similar results
- ▶ Cohort effects
 - ▶ Wage growth regressions for different age groups and cohorts (by start year) very similar to main results
 - ▶ Average task intensities very similar for young and old workers

TASK GROUP SWITCHERS

- ▶ Task group switches and wages
 - ▶ Switching to NRC occupations is always associated with positive subsequent wage growth
 - ▶ Switching to R - Δ NRC high is also associated with positive wage growth. This effect even increases over time and is therefore most pronounced for long periods (t+10).
 - ▶ Switching out of R - Δ NRC high to the other routine occupations is associated with negative wage growth.

- ▶ Switching by ability quintiles (from occ spell fixed effects)
 - ▶ In case of switch, NRC often switch to R - Δ NRC high and vice-versa, i.e. high skill transferability between these two groups.
 - ▶ Pattern stronger for higher ability quintiles.
 - ▶ NRC and R - Δ NRC: high wage growth, high ability; opposite true for other groups.

CONCLUSIONS AND IMPLICATIONS

- ▶ Long-run wage development of routine occupations depends strongly on evolution of NRCTI
- ▶ Intensive margin of employment plays an important role for the adaptation process to technological change
- ▶ Suggestive evidence that training is important in this context
- ▶ Cohort and composition effects not likely explanations
- ▶ Our results provide a potential explanation why routine workers have experienced a relative decline in wages in the US but not in Germany.