

How General is Specific Human Capital? A Task- Based Approach

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Motivation

- **This paper asks: How specific is human capital?**
 - Why is it important? For instance:
determines displacement costs and
reallocation costs due to technological
change
- This paper introduces the concept of
task-specific human capital**

Economic Mechanism

- Multiple General Skills in the Labor Market, e.g. Analytical and Manual Skills
- Occupations: combine tasks in different ways
- Individuals are endowed with productivities in each task and search over occupations

Matched Data:

Panel on Worker Careers

+

Tasks Performed in Occupations

Employee Panel

- 2% Sample of Social Security Records in Germany from 1975 - 2001
- Our sample: men in West Germany whom we observe from labor market entry onwards
- Advantages:
 - large samples
 - little measurement error in occupational codes
 - little measurement error in wages

Data on Tasks Performed

- Repeated Cross-sectional Survey
 - 30,000 Employees Each Wave
 - 1979, 1985, 1991/2, 1997/8
- 19 Tasks Performed in Each Occupation
 - Clean, Measure, Repair, Negotiate, ...
 - Main Task, Task Performed, Not Performed

Tasks Performed in Occupations

	<u>Fraction</u>	<u>Std.Dev.</u>
Research, Evaluate, Measure	0.251	0.434
Calculate, Bookkeeping	0.260	0.439
Manufacture, Install	0.120	0.325
Equip, operate machines	0.200	0.400
Manage Personnel, Organize	0.371	0.483
Teach or Train Others	0.171	0.377

Waves: 1979, 1985, 1991, 1997; 19 Tasks observed

Distance Measure: Angular Separation

$$AngSep_{oo'} = \frac{\sum_{j=1}^J q_{jo} * q_{jo'}}{\left[\left(\sum_{j=1}^J q_{jo}^2 \right) * \left(\sum_{k=1}^J q_{ko'}^2 \right) \right]^{1/2}}$$

where q_{jo} is fraction of workers in o using task j

- Distance $_{oo'} = 1 - AngSep_{oo'}$
- Properties: Ranges from 0 and 1
1 = Maximum Distance

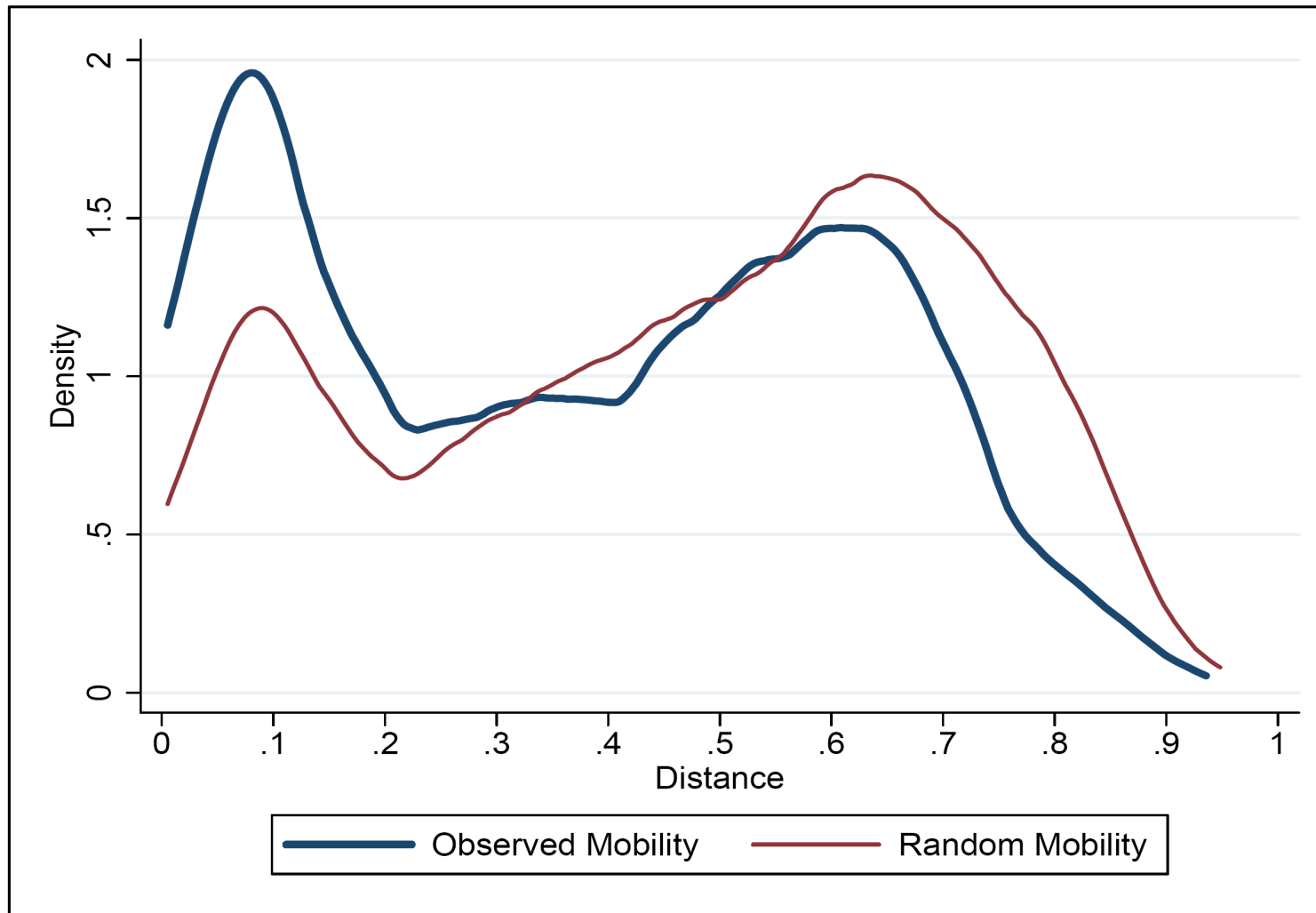
Distant vs. Similar Occupations

<u>Occupation 1</u>	<u>Occupation 2</u>	<u>Distance</u>
Mean		0.244
Standard Deviation		0.221
<i>Minimum Distance:</i>		
Paper and Pulp Processing	Printer, Type-Setter	0.002
<i>Maximum Distance:</i>		
Unskilled Construction Worker	Banker	0.939

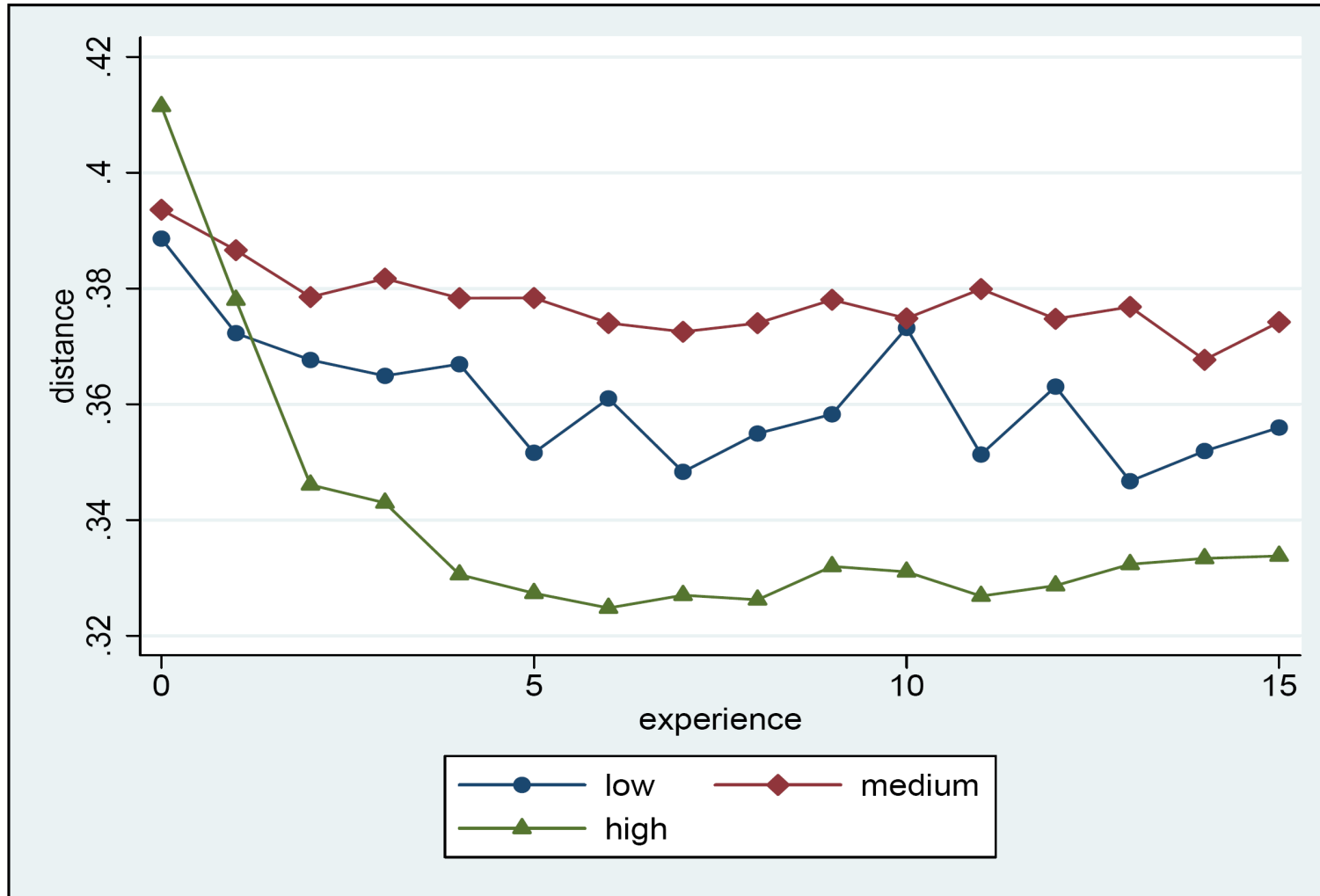
Empirical Results:

Patterns in Mobility and Wages

Mobility is to Similar Occupations

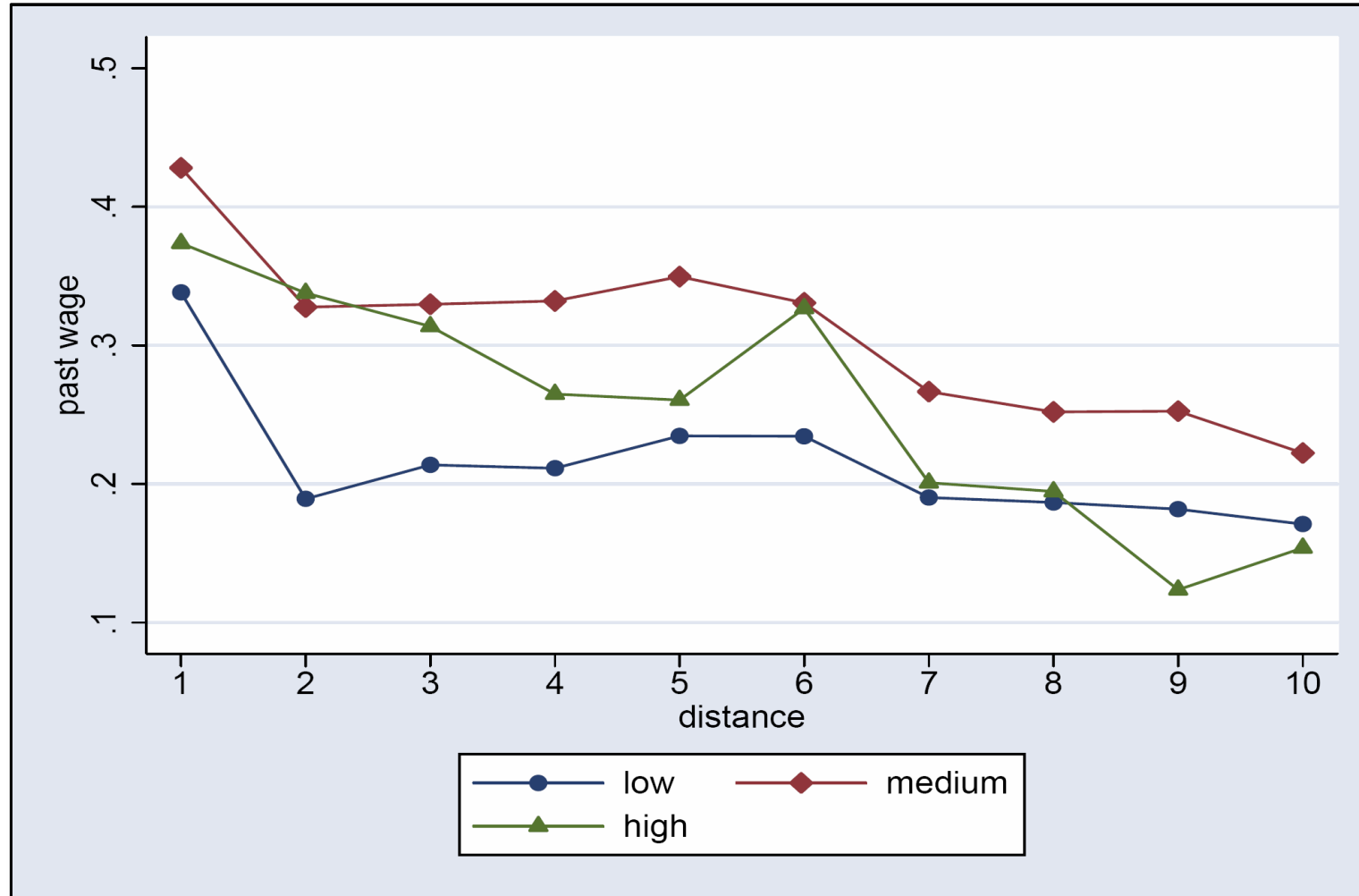


Distance of Moves ↓ with Experience



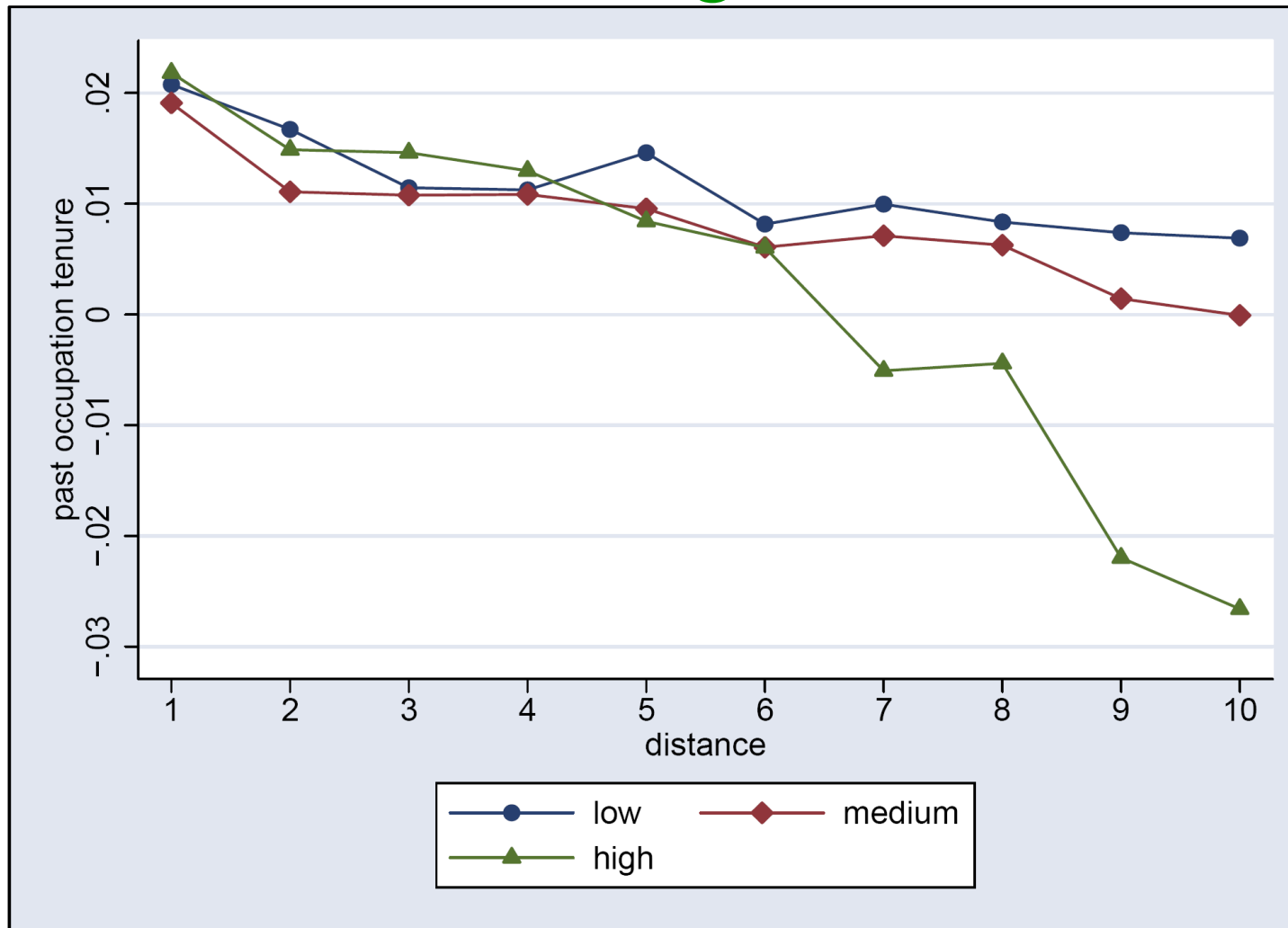
Sample of Movers

Correlation of Wages ↓ Distance



Based on Tobit model

Past Occupational Tenure and Wages



Based on Tobit model; standard errors bootstrapped

Task-Specific Human Capital and Wage Growth

$$\ln w_{iot} = \gamma_{1o}Exp_{it} + \gamma_{2o}OT_{iot} + \gamma_{3o}TT_{iot} + \eta' \tilde{X}_{iot} + u_{iot},$$

$$u_{iot} = \beta_o T_i^A + (1 - \beta_o) T_i^M + \varepsilon_{iot}.$$

Example 1: old occ.: Processing, OT = 3

new occ.: Printer, OT = 0, TT = 2.99

Example 2: old occ.: Banker, OT=3

new occ.: Unskilled Construction

Worker, OT = 0, ST = 0

Task Tenure and Wages: High-Skilled

	OLS	OLS	Displaced	Control Function
Experience	0.082 (0.001)***	0.065 (0.001)***	0.037 (0.006)***	0.091 (0.022)***
Experience Squared	-0.003 (0.000)***	-0.003 (0.000)***	-0.002 (0.000)***	-0.008 (0.000)***
Occupation Tenure	0.006 (0.000)***	0.004 (0.000)***	0.010 (0.003)***	-0.037 (0.010)***
Task Tenure		0.021 (0.001)***	0.023 (0.005)***	0.068 (0.029)**

Task Tenure and Wages: Medium-Skilled

	OLS	OLS	Displaced	Control Function
Experience	0.040 (0.000)***	0.034 (0.000)***	0.028 (0.002)***	0.029 (0.003)***
Experience Squared	-0.001 (0.000)***	-0.001 (0.000)***	-0.002 (0.000)***	-0.001 (0.000)***
Occupation Tenure	0.007 (0.000)***	0.005 (0.000)***	0.013 (0.001)***	-0.002 (0.003)
Task Tenure		0.009 (0.001)***	0.012 (0.002)***	0.027 (0.007)***

Task Tenure and Wages: Low Skilled

	OLS	OLS	Displaced	Control Function
Experience	0.062 (0.001)***	0.054 (0.000)** *	0.031 (0.004)***	0.044 (0.018)***
Experience Squared	-0.002 (0.000)***	-0.002 (0.000)** *	-0.001 (0.000)***	-0.002 (0.000)***
Occupation Tenure	0.009 (0.001)***	0.007 (0.001)** *	0.014 (0.002)***	-0.016 (0.005)
Task Tenure		0.012 (0.001)***	0.020 (0.003)***	0.035 (0.015)**

Bias: Why do workers move to similar/distant occupations ?

$$\tilde{u}_{iot} = (\gamma_{1o} - \bar{\gamma}_1)Exp_{it} + (\gamma_{2o} - \bar{\gamma}_2)OT_{it} + (\gamma_{3o} - \bar{\gamma}_3)TT_{it} + \beta_o T_i^A + (1 - \beta_o)T_i^M + \varepsilon_{iot}.$$

- Occupational mobility depends on loss in specific skills, task-match, and occupation-specific skill prices
 - Control function approach
- Instruments:
- 1) OT: deviation from occupation-specific mean
 - 2) variation in occupational structure over time and across regions

Conclusion

- Strong patterns in mobility and wages that are consistent with task-based approach
- Task-specific human capital is important for wage growth
- Approach may be useful to study patterns of specialization, skill-biased technological change, wage inequality ...