Complex-Skill Biased Technical Change and Labor Market Polarization

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Labor Market Polarization

- Polarization of US labor market
  - well documented: employment, wages
  - potential explanations: computerization, labor force composition (education, gender), international trade, SBTC
  - Katz and Murphy (1992), Autor, Levy, Murnane (2003), Autor and Dorn (2013), Acemoglu and Autor (2011), many more
- This paper: wages and (some) employment
  - introduce own taxonomy of occupations by complexity of tasks
  - descriptive characterization of patterns by occupation type
- My plan
  - main exercise: motivation and results
  - interpretation: mechanism

The Exercise

- Use German *'qualification and working conditions in Germany'* data
  - classify occupations into different complexity bins
  - map US occupations into those bins
  - document relation of wage and complexity
  - compare to Autor and Dorn (2013) routine task-intesity index

Questions

1. Why German data?
   - O*NET data contains detail task content of occupations
   - example: abilities: fluency of ideas.

     The ability to come up with a number of ideas about a topic (the number of ideas is important, not their quality, correctness, or creativity).

     truck drivers: 31 weight 30 importance
     aerospace engineers: 63 weight 57 importance

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1. Why German data?
   - O*NET data contains detail task content of occupations
   - example: skills: operation and control.

     Controlling operations of equipment or systems.

     truck drivers: 53 weight 43 importance
     aerospace engineers: 6 weight 0 importance

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   - example: abilities: manual dexterity.

     The ability to quickly move your hand, your hand together with your arm, or your two hands to grasp, manipulate, or assemble objects.

     truck drivers: 72 weight 50 importance
     aerospace engineers: 0 weight 0 importance

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     truck drivers: 72 weight 50 importance
     aerospace engineers: 0 weight 0 importance
   - it is occupation level, but analysis on occupation level anyway
   - are German occupations and workers similar enough to the US counterparts
     is the apprenticeship information worth it?

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1. Why German data?
2. Why this comparison (A-D RTI index)?
   - why not go back to: Autor, Levy, Murnane (2003)
   - 4 classes: routine vs. non-routine, manual vs. information processing
   - example
     truck driver: non-routine manual
     jobs involving forming/testing hypotheses: non-routine information processing

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2. Why this comparison (A-D RTI index)?
   - why not go back to: Autor, Levy, Murnane (2003)
   - 4 classes: routine vs. non-routine, manual vs. information processing
   - example
     truck driver: non-routine manual
     jobs involving forming/testing hypotheses: non-routine information processing
   - seems like a more relevant alternative
   - paper actually uses almost identical classification
     routine, manual non-routine, cognitive routine, cognitive non-routine, interactive

Questions

1. Why German data?
2. Why this comparison (AD routinization index)?
3. Are we selecting on worker characteristics?
    - growth in labor payment shares in college and female intensive jobs Acemoglu and Autor (2011), Burstein, Morales, Vogel (2015)
    - are we selecting occupations with growing importance of education, interpersonal interactions
    - selection on job composition changes must be a concern

- Bins in paper
    - simple, complex, advanced/managerial, college
    - are we capturing college, age and gender?

Wage Regressions

- Occupation-specific change in mean wages on complexity bins FE, wages in 1980

$$\Delta W_o = \sum_{c=1,2,3,4} \beta_{c,o} \mathcal{I}_{c,o} + \gamma w_{o,1980} + \nu_o$$

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- Selection and composition: consider labor group
  $L =$ (gender, education, age)

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- Suppose weights of L in occupation $\pi_{o,L}$

  Aggregated LHS: $\sum_L \pi_{o,L} \Delta w_{o,L} = \Delta W_o$
  Aggregated RHS: $\sum_L \pi_{o,L} \mathcal{I}_L + \sum_{c=1,2,3,4} \beta_{c,o} \mathcal{I}_{c,o} + \gamma w_{o,1980} + \varepsilon_o$

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  $\eta_o = \varepsilon_o + \sum_L \pi_{o,L} \mathcal{I}_L$

- Need $\mathcal{I}_{c,o}$ to be independent of $\sum_L \pi_{o,L} \mathcal{I}_L$

  example: 'complex' occupations are female and education intensive

Wage Regressions

- Solution, run Mincerian regression first

  $\Delta w_{o,L} = \mathcal{I}_L + \mathcal{I}_o + \varepsilon_o$

  use residuals or $\mathcal{I}_o$ in second stage

- Acemoglu and Autor (2011): $\Delta w_{o,L} = \mathcal{I}_L + \sum_{c=1,2,3,4} \beta_{c,o} \mathcal{I}_{c,o} + \varepsilon_o$
- Does the result survive controlling for these characteristics?

Dependent Variable: Change in Log Hourly Wage			
Independent Variable	(i)	(ii)	(iii)
Education group 2	0.0742***	0.102***	0.0956***
	(3.01)	(4.08)	(3.83)
Education group 3	0.287***	0.303***	0.296***
	(8.58)	(9.19)	(9.06)
Island 2	0.0617***	0.0466**	0.0547***
	(3.31)	(2.51)	(2.94)
Island 3	0.0427	-0.0175	-0.0226
	(1.28)	(-0.49)	(-0.64)
Island 4	0.0397	-0.00267	-0.00469
	(1.11)	(-0.07)	(-0.13)

- What if we control for age and gender, too?

Interpretation

- Suppose we estimate

$$\Delta w_{o,L} = \mathcal{I}_L + \sum_c \beta_{c,o} x_{c,o} + \varepsilon_o$$

- Changes are functions of the equilibrium response of the economy
  - descriptive, need model to take stand of role of shocks
  - then can evaluate potential policies

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- Microfoundation in Burstein, Morales, Vogel (2015)
  - decomopose role of shocks for employment:
    labor composition, equipment prod. occupational shifter, labor prod.
  - extension to wages

Conclusion

- Wage inequality from the perspective of occupation complexity
  - not clear how much due to occupation characteristics
  - are we just renaming college and gender premium?
- What about employment
  - results much weaker
  - hard to put in framework of relative supply-demand of different labor groups
- Still some way to go before we can draw conclusions and address any policy responses