Skill Hybridization and Higher Education Under Technological Advancements

Elmer Zongyang Li (zl685@cornell.edu), Cornell University

Research Question

- Do employers ***mix*** their demand of different skills as technology advances?

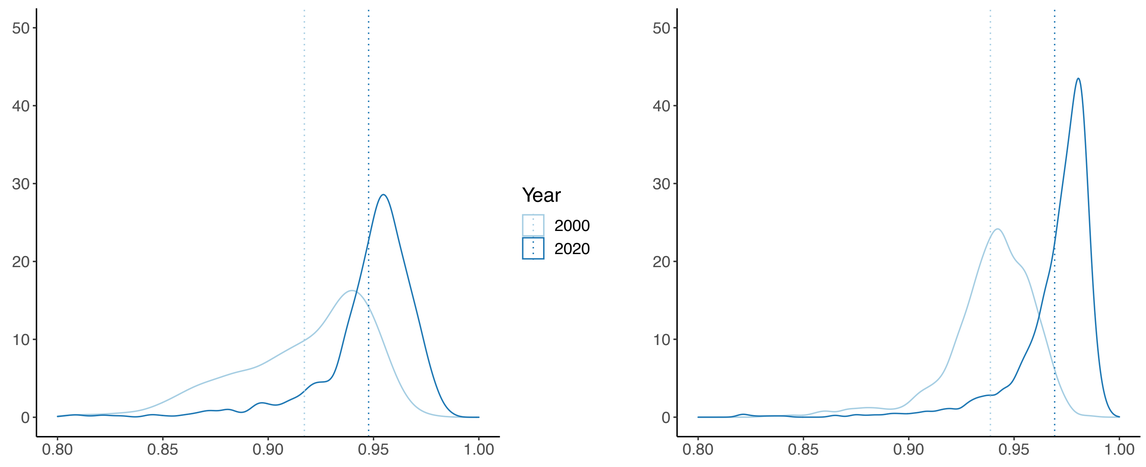
specialization ⇔ "***hybridization***"

- **Yes,** for **[analytical, interpersonal, computer]**, not for mechanical
- **Measure**: the hybrid index for $y_j \in S \subseteq \mathbb{R}^d$ is the cosine similarity:

$$Hybrid(y_j) = \frac{y_j \hat{v}}{||y_j|| \cdot ||\hat{v}||}, where\ \hat{v} = [1, 1, ..., 1]' \subseteq \mathbb{R}^{K+}$$

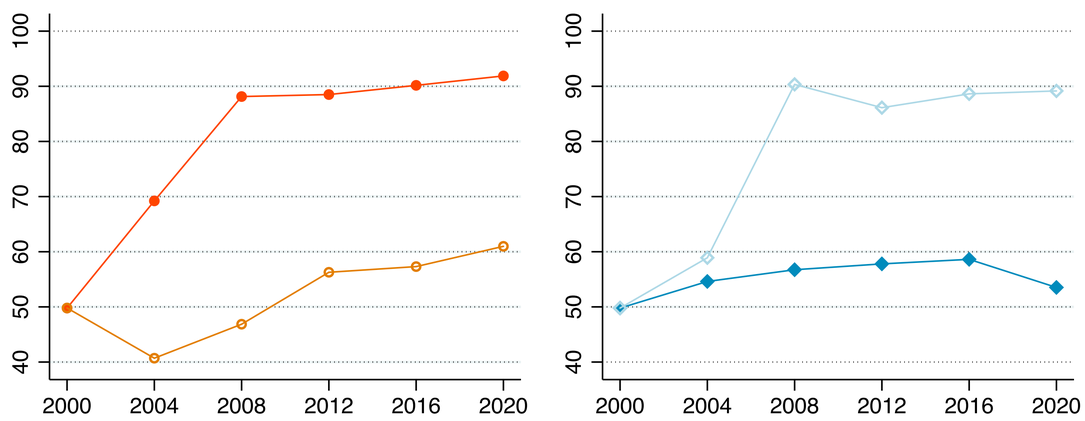
Empirics

- Trend:

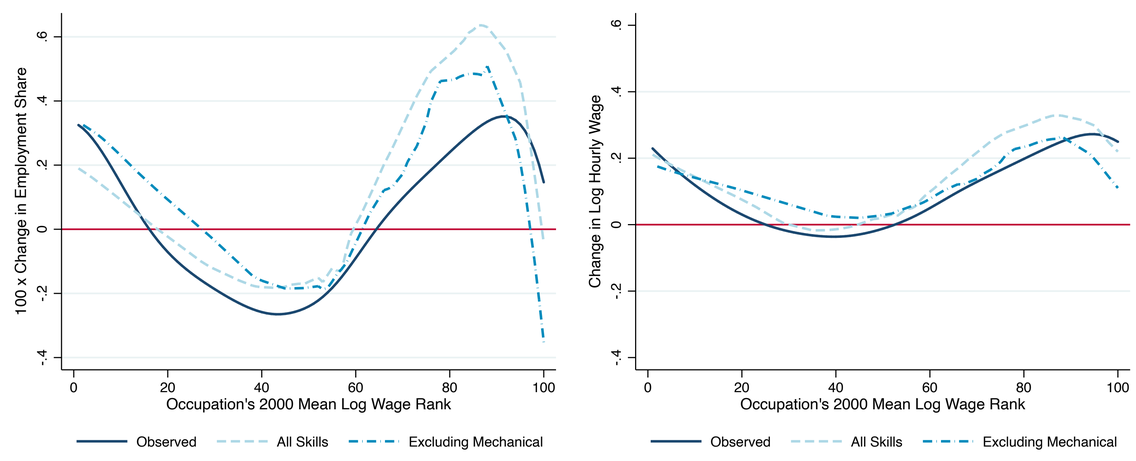


(1) All Skills (2) Excluding Mechanical

- Time Pattern:



- Counterfactual



Wage Return

- Data: NLSY 79&97
- Regression: AKM with worker & occ. FE

Dependent: ln(hourly wage)	Occupation	Worker	College Major
Hybrid (analytical+computer)	0.009***	-0.021	0.048*
	[0.003]	[0.020]	[0.027]
Hybrid (analytical+interpersonal)	0.013***	0.028	0.013
	[0.003]	[0.039]	[0.017]
Hybrid (computer+mechanical)	-0.005	0.014	-0.006
	[0.004]	[0.014]	[0.021]
Hybrid (computer+interpersonal)	-0.012***	-0.029	-0.002
	[0.004]	[0.021]	[0.025]
Hybrid (mechanical+analytical)	-0.002	-0.026***	-0.039
	[0.004]	[0.006]	[0.025]
Hybrid (mechanical+interpersonal)	0.009**	0.108***	0.052**
	[0.003]	[0.018]	[0.023]

Model & Estimation

- Key: ***endogenous specialization in skill demand***
- Follow Caselli and Coleman (2006) and Edmond and Mongey (2021) :

$$Y_j = Z_j[(A_{ja}L_{ja})^\sigma + (A_{js}L_{js})^\sigma]^{\frac{1}{\sigma}}$$

$$\underbrace{A_{jk}}_{skill\ bias} = \underbrace{\kappa_k}_{technology} \times \underbrace{\alpha_{jk}}_{intensity}, k = \{a, s\}$$

$$st.\ [(\alpha_{ja})^\rho + (\alpha_{js})^\rho]^{\frac{1}{\rho}} \leq \bar{A}_j$$

- Insight: race between κ_k and α_{jk}; σ, ρ matter
- Estimation:
  - Computer ↑ 3.5-9.7 times, Analytical ↑ 34%,
  - Mechanical ↓11-91%
- Counterfactual:

ΔTechnology > ΔSkill Supply

Contributions

- Document LM dynamics on *skill mixtures*
- Explore theoretical explanations
- Quantitatively evaluate technological change
- Implications for higher education

References

1. Edmond, C. and Mongey, S. (2021). Unbundling labor. *Working Paper*.
2. Caselli, F. and Coleman, Wilbur John, I. (2006). The world technology frontier. *American Economic Review*, 96(3):499–522.

Website: https://sites.google.com/view/elmerli/home