Skill Hybridization and Higher Education  
Under Technological Advancements

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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:

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

Empirics

- Trend:

- Time Pattern:

- Counterfactual

Wage Return

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

<table>
<thead>
<tr>
<th>Dependent: ln(hourly wage)</th>
<th>Occupation Worker College Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid (analytical+computer)</td>
<td>0.069*** -0.021 0.048*</td>
</tr>
<tr>
<td></td>
<td>[0.003] [0.026] [0.027]</td>
</tr>
<tr>
<td>Hybrid (analytical+interpersonal)</td>
<td>0.013*** 0.028 0.013</td>
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<tr>
<td></td>
<td>[0.003] [0.039] [0.073]</td>
</tr>
<tr>
<td>Hybrid (computer+mechanical)</td>
<td>-0.005 0.014 -0.006</td>
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<tr>
<td></td>
<td>[0.004] [0.014] [0.021]</td>
</tr>
<tr>
<td>Hybrid (computer+interpersonal)</td>
<td>-0.012*** -0.029 -0.002</td>
</tr>
<tr>
<td></td>
<td>[0.004] [0.023] [0.005]</td>
</tr>
<tr>
<td>Hybrid (mechanical+analytical)</td>
<td>0.009** 0.108*** 0.052**</td>
</tr>
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<td>[0.003] [0.018] [0.023]</td>
</tr>
</tbody>
</table>

Model & Estimation

- Key: endogenous specialization in skill demand

- Follow Caselli and Coleman (2006) and Edmond and Mongey (2021):

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

\[
A_{jk} = \kappa_k \cdot \alpha_{jk}, \quad k = \{a, s\}
\]

- Insight: race between \( \kappa_k \) and \( \alpha_{jk} \); \( \sigma, \rho \) 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


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