Discussion: The Changing Economics of Knowledge Production

by Simona Abis and Laura Veldkamp

Ansgar Walther

Imperial College and CEPR

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Overview

- Agenda: How does AI affect the financial industry?
- This paper: AI reduces the labor share of (knowledge) production

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- This paper: AI reduces the labor share of (knowledge) production
- Contributions
  1. Unequal distribution of AI's benefits

     Fuster, Goldsmith-Pinkham, Ramadorai, Walther 2022
  2. By-product: Measurement of opaque intangible investment

Model

- Production with N technologies

$$\max_{K,L_j} \sum_{j=1}^{N} Y_j - \rho K - \sum_{j=1}^{N} w_j L_j, \quad Y_j = A_j K^{\alpha_j} L_j^{1-\alpha_j}$$

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- Optimal expenditure shares

$$(1-\alpha_j) Y_j = w_j L_j$$

$$\sum_{j=1}^{N} \alpha_j Y_j = \rho K$$

- Estimation equation

$$K = \sum_{j=1}^{N} \underbrace{\frac{1}{\rho} \frac{\alpha_j}{1-\alpha_j}}_{=\beta_j} \underbrace{w_j L_j}_{=X_j} \Rightarrow \frac{\beta_j}{\beta_k} = \frac{\alpha_j}{1-\alpha_j} \frac{1-\alpha_k}{\alpha_k}$$

Measurement in Finance

- Old-school analysts L_1 and AI/ML analysts L_2
- Data capital K is a moving average of past data cleaners L_0
- Infer L_j from job listings across firms, w_j from online survey

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- Data capital K is a moving average of past data cleaners L_0
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- Full structural estimation

$$\alpha_1 - \alpha_2 \simeq 0.05$$

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  - Structuring / sales / executive jobs that convert knowledge into profit could have *greater* shares in the age of AI

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- GE effects? $P_Y A_j$ is identified, diminishing returns could be severe

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- Workers' opportunity set
  - Work old-school for a higher wage
  - Work in AI for an even higher wage
- Pareto improvement due to Cobb-Douglas
- Other functional forms allow task *replacement*

Acemoglu-Restrepo JPE 2020

Specifications: Rivalrous data capital

- Production with heterogeneous labor

$$\max_{K,L_j} \sum_{j=1}^{N} Y_j - \rho \sum_{j=1}^{N} K_j - \sum_{j=1}^{N} w_j L_j, \quad Y_j = A_j K_j^{\alpha_j} L_j^{1-\alpha_j}$$

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Specifications: Single technology

- Production with heterogeneous labor

$$\max_{K,L_j} \sum_{j=1}^{N} Y - \rho K - \sum_{j=1}^{N} w_j L_j, \quad Y = A_j K^{1-\sum_{j=1}^{N}\gamma_j} \prod_j L_j^{\gamma_j}$$

- Optimal expenditure shares

$$\beta_j Y = w_j L_j$$

$$(1 - \sum_{j=1}^{N} \gamma_j) Y = \rho K$$

- Estimation equation

$$K = \sum_{j=1}^{N} \underbrace{\frac{1}{\rho} \frac{\left(\frac{1}{N} - \gamma_j\right)}{\gamma_j}}_{=\beta_j} \underbrace{w_j L_j}_{=X_j}$$

Conclusions

- Huge progress in serious modelling of data-driven technology
- Tight implications for knowledge production
- Potential estimation of a more flexible model