Worker Mobility, R&D Human Capital, and Firm Productivity

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Research Questions

Does variation in mobility rates of workers with R&D human capital explain variation in US establishment productivity in manufacturing?

Does changing mobility patterns across firms explain declining productivity growth in manufacturing?

Related Literature

Knowledge “in the air”
- Growth: Romer, Aghion et al
- Externalities: Justify public interventions

Labor market spillovers
- Jaffe, Trajanberg, and Henderson (1993) — spillovers geographically limited
- Moen (2005) technical workers accept lower wages early in career to be closer to higher wages later (Norway), [workers pay: spillovers internalized by labor market],
- Maliranta, Mohlen and Rouvinen (2009) links productivity growth to worker mobility from R&D firms (Finland).
- Stoyanov and Zabalan (2012) productivity gains from worker mobility across firms (Denmark)

Concern about declining firm productivity
- Akcigit and Ates (2019), Bloom, Jones, Van Reenen, and Webb (2019)

Declining worker mobility

Data

 Linked U.S. employer-employee data
- Longitudinal Employer-Household Dynamics (LEHD)
- 9 states (AZ CA CO IL IN KS MD PA WA)
- Annualized earnings, gender, age, race
- Work history 1992-2014

 Firm, establishment data
- NSF annual firm R&D surveys (SIRD, BRDIS), 1976-2016
- Annual Survey of Manufacturers (ASM), 1997-2015
- Sales, capital, materials, energy, employment

Measuring Establishment-Level Inflows of Workers with R&D Human Capital

- Individuals’ work history across establishments (including R&D of previous employer)
- Calculate worker flows to an establishment from outside the firm (i.e., from other firms)
- Wage premium associated with R&D experience from other firms narrows over time, becomes small after 5-10 years (Barth et al 2017)
- New workers with R&D human capital: Share of workers at the establishment who are recent hires (<5 years at the firm) and whose previous firm is an R&D performing firm.
- R&D human capital (exposure to previous firm’s R&D) impacts wages in current firm if the human capital (exposure) is recent, less than five years old

Empirical Approach

- Estimating establishment-level Cobb-Douglas production functions:
  - Log output regressed on:
    - Log employment, capital equipment, capital structures, materials, energy (“basic” inputs)
    - Log R&D capital stock (and indicator for positive R&D capital stock)
    - Share of new workers from R&D firms, and from non-R&D firms (quadratic specification)
    - Year and establishment fixed effects
    - Year interactions with 1) R&D indicator, 2) log R&D capital stock, 3) Share of new workers from R&D firms, and from non-R&D firms (including quadratic terms)
  - Total factor productivity at establishment level (TFP) computed as log output minus output contribution of “basic” inputs, calculated using estimated model

Results

- 1997-2015: manufacturing establishment TFP increased by 6% (.23 log points) (Fig. 1)
- At the establishment level, the share of new workers with R&D human capital increased by over 50% to one quarter between 1997-2015 (Fig. 1)
- Productivity impact of new workers with R&D human capital and their representation in average establishment both increase over time (Fig. 2)
- R&D capital stock accounts for about .02 of the .23 log point increase in TFP (Fig. 3)
- Share of new workers with R&D human capital account for about .04 of the .23 log point increase in TFP (Fig. 3)

Conclusion

- New workers associated with higher productivity, but productivity boost especially large for new workers with R&D human capital
- Association between new workers with R&D human capital and productivity is positive and increasing over time.