Complex Exam Presentation

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Research Plan

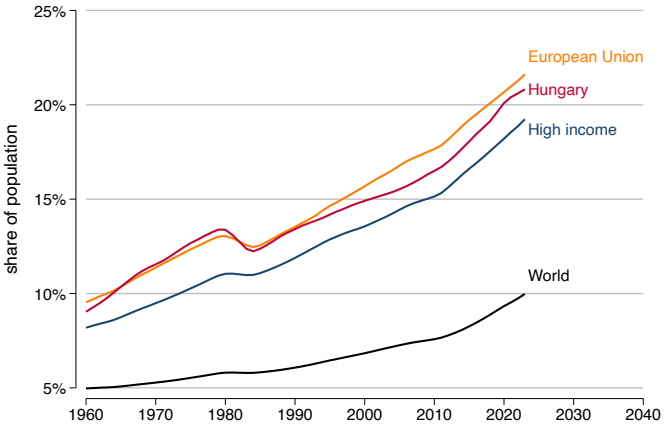
Essays on Productivity

1. **The Effect of Retirement on Firm Productivity**
2. Partnering for Productivity: The Impact of Cooperation on Firm Performance
3. The impact of trade exposure on task composition, productivity, and wages

Society is aging

"By 2030, 1 in 6 people in the world will be aged 60 years or over." (WHO, 2025)

Share of population ages 65 and above (World Bank)



This means...

- Firms struggle with older workforce
- Each year a larger share of workers exit the labour market
- This is not a general worker exit
  - high-level human capital
  - decreasing productivity
- **Research question:** What is the impact of retirement on productivity

This paper

- Estimates the effect of worker retirement on labour productivity
- Using high quality Hungarian administrative data from 2009-2015
- Identification: DiD and IV based on a unique early retirement policy change
- **I find that worker retirement increase labour productivity**
  - low-skill retirement has a small positive impact on productivity in the short run
  - high-skill retirement has a significant positive impact on productivity even in the long-run

Related literature

- **Worker exit**
  - High hiring and training costs for firms (Abowd and Kramarz, 2003; Muehlemann and Pfeifer, 2016) as firms lose specific human capital (Becker, 1962; Bartel et al., 2014)
  - External hires are not perfect substitutes of exiting workers (Jäger et al., 2024; Jaravel et al., 2018)
  - Spillover effects on incumbent workers (Azoulay et al., 2010; Jäger et al., 2024; Jaravel et al., 2018; Waldinger, 2012)
  - **Contribution:** Estimate the effect of the exit of a specific group, older workforce
- **Pension related policy changes**
  - General or early retirement age increase (Simonovits and Tir, 2017; Bíró and Elek, 2018; Bianchi et al., 2023; Carta et al., 2021; Boeri et al., 2022).
  - **Contribution:** Use unique a policy change, that decreases early retirement age
- **Productivity of older workers**
  - Diminishing marginal productivity of the older workers (Cardoso et al., 2011)
  - High wages relative to marginal product (Lazear, 1979)
  - **Contribution:** Estimate the contribution of older workers to overall firm productivity

Institutional settings

- Mandatory pay-as-you-go pension system
- Pension benefits are based on earnings before retirement, with a minimum pension
- Eligibility for pension is conditional on 20 years of service
- Until 2012, two statutory retirement age levels
  - Early retirement age: earliest age when can claim pension but reduced benefits
  - General retirement age: earliest age when an can claim full pension.
- 2012: abolition of early retirement option, except Nők40 (Women40)

Women40

2011: introduction of Women40

- Announcement in November 2010, introduction in January 2011
- Women with 40 years of contribution can retire earlier
- 32 years of working relationship
- High incentive to retire earlier: no reduction in pension benefits with relatively high aggregate replacement ratio (60%, EU avg.: 56%)
- Reduced median women retirement age by 2.2 years (Simonovits and Tir, 2017)
- People retire when they reach early retirement age $\rightarrow$ most affected cohort: 1-2 years far from early retirement age Cohorts

Impact of policy change on yearly number of retirees

Source: Central Administration of the National Pension Insurance Statistical Yearbook 2015

Data

ADMIN3: linked employer-employee administrative social security data

- 2003-2017
- 50% sample of the Hungarian population in 2003
- Covers approximately 5 million individuals
- Monthly employment and pension transfer, and pension determination data

Retirement exit definition:

- Age ≥ 50
- Main workplace, full time, normal work contract
- Last workplace before pension determination
- Exit month
  - same or following month after pension determination
  - not sooner than six months before the determination
- The individual do not work for this firm anymore

Data

Merge detailed firm characteristics from **Balance Sheet Data**

- Administrative tax declaration forms
- All double-entry bookkeeping firms in Hungary
- More than 300k firms yearly
- Contains balance sheets and income statements
- Industry and employment

Main sample

- Keep only 2009-2015 period: retirement age was constant 62 (except 2014-2015, 62.5)
- 3-250 employees in any year
- Exclude government related and financial industries
- Balanced panel
- More than 87K firms
- Control group (79,261 firms): no retirement at all in this period
- Treatment group (3,647 firms): Badalyan (2025); Jäger et al. (2024); Jaravel et al. (2018)
  - only one worker retired within a single year during this period
  - 3-30 employees one year before retirement
    - in larger firms retirement can occur more frequently (LLM) $\rightarrow$ no sharp shocks
    - the effect of worker retirement on the firm decreases with firm size so it will be hard to detect it in larger firms

Main sample observations

Table: Yearly Frequency of Firms

Year	Raw	Main sample	Control	Treatment	Become treated
2009	319,055	87,721	79,261	3,647	0
2010	330,915	87,721	79,261	3,647	538
2011	352,328	87,721	79,261	3,647	1,162
2012	350,955	87,721	79,261	3,647	798
2013	350,942	87,721	79,261	3,647	372
2014	347,265	87,721	79,261	3,647	391
2015	342,030	87,721	79,261	3,647	386
Total	**2,393,490**	**614,047**	**554,827**	**41,559**	**3,647**

Worker Skill Classification

Based on 1-digit FEOR (ISCO) codes

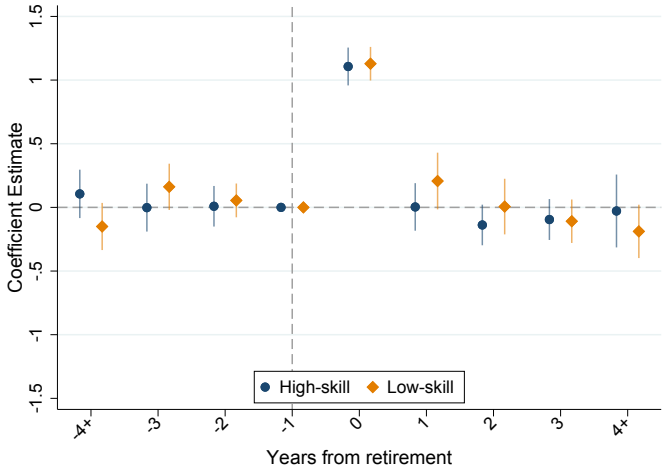
- **High-skill workers**: Managers, Professionals, and Technicians (1-3 major groups)
- **Low-skill workers**: Clerical service and sales workers, Skilled agricultural and trades workers, Plant and machine operators, and assemblers, Elementary occupations (4-9 major groups)

Empirical strategy

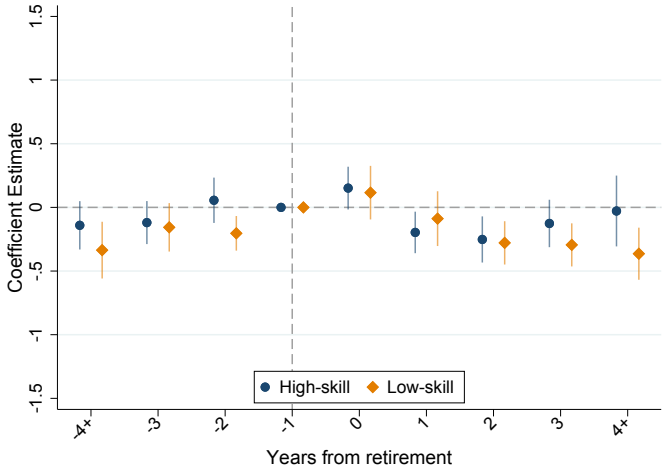
$$y_{i,t} = \sum_{\substack{j=-4 \\ j\neq -1}}^{4} \beta_j HS_{i,j} + \sum_{\substack{k=-4 \\ k\neq -1}}^{4} \delta_k LS_{i,k} + \eta_i + \theta_t + \varepsilon_{i,t}$$

- $y_{i,t}$ outcome in firm i at year t: number of employees, number of worker exits or entries, labour cost, value added, and labour productivity
- $HS_{i,j}$: dummies $=1$ if firm i is j years away from the retirement of a high-skill worker ($j = -1$ reference)
- $LS_{i,k}$: dummies $=1$ if firm i is k years away from the retirement of a low-skill worker ($k = -1$ reference)
- Parameters of interest: β_j and δ_k
- Firm fixed effects η_i control for time-invariant firm-level characteristics
- Year fixed effects θ_t account for common shocks over time

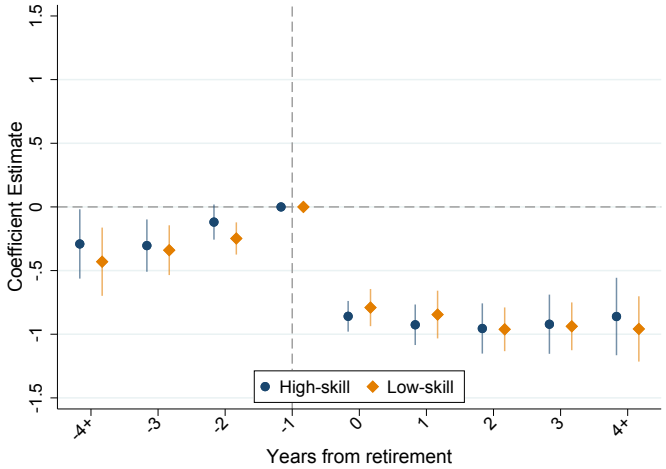
Results - Exit



Results - Hiring

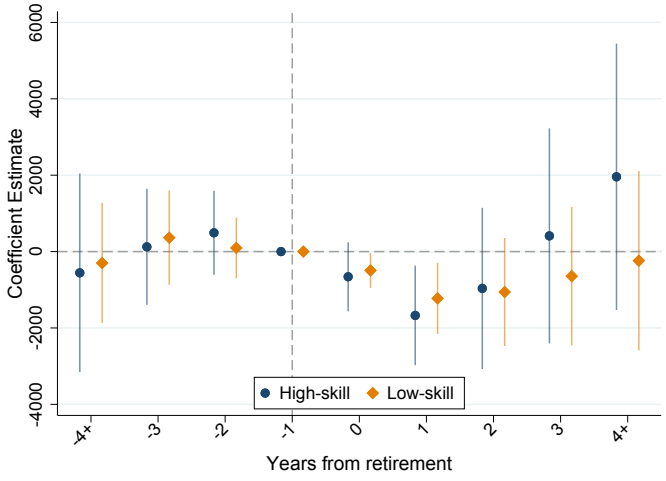


Results - Number of workers

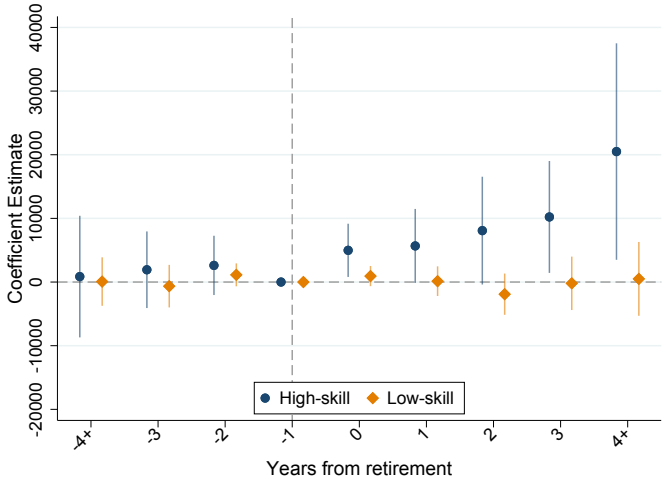


BS number of workers

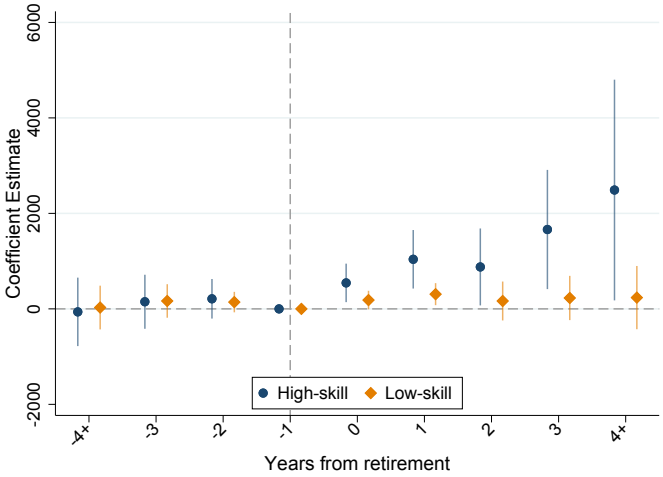
Results - Labour cost



Results - Value added



Results - Labour productivity



Summary

- LS retirement: small short term positive effect on productivity
- HS retirement: significant positive effect on productivity even in the long run

Future plans:

- use Women40 eligibility as an instrument for worker retirement
- analyze worker level outcomes
- put a theoretical model behind the empirical findings and understand the mechanism

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Summary

- How cooperation with different partner types in the innovation process affects productivity
- Long difference on Hungarian CIS panel data linked to balance sheet data
- **Findings:** Vertical cooperation has a positive impact on firm productivity
  - Around 3-4% increase in productivity on top of innovation effect
  - Supplier collaboration improves firm performance even if firms introduce only incremental innovation

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(idea) Summary

- Firms increasingly rely on imported inputs
- Less is known about how this transforms tasks done by employees
- Task-based models: offshore easily moved task and keep complex tasks domestic (Grossman and Rossi-Hansberg, 2008; Blinder and Krueger, 2013)
- Task-level datasets are rare, researchers use O*NET occupation-level task proxies (Autor et al., 2003; Acemoglu and Autor, 2011; Acemoglu and Restrepo, 2019, 2022)
- This paper: fill this gap using linked employer-employee data merged with detailed task level data on workers from a survey
- Contribution: Documentation of how tasks responds to trade exposure and import intensity, and how this affects wages and productivity

Cohort status 1950-51

1950

1951

Back

Cohort status 1952-53

1952

1953

Back

Cohort status 1954-55

1954

1955

Back

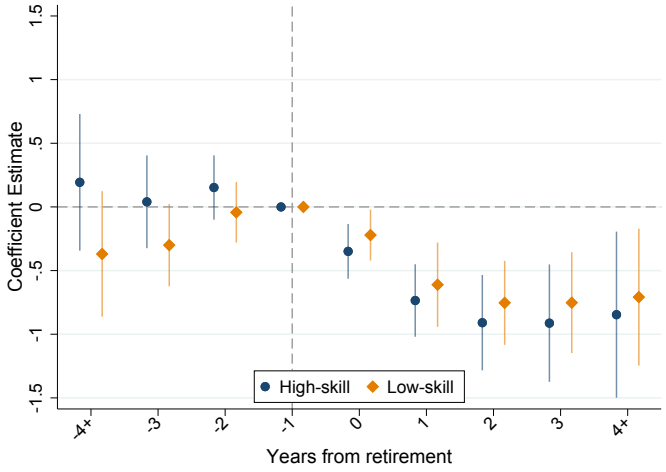
Cohort status 1956-57

1956

1957

Back

Results - Number of workers BS data



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