The productivity cost of losing experienced workers

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December 13, 2024

Motivation

- High worker mobility in modern labor markets results in frequent worker exits
- Worker exit impose significant cost on firms
  - Costly hiring, training (Abowd & Kramarz, 2003)
  - Loss of firm specific human capital (Becker, 1962)
- Worker exit affects coworkers
  - Wages increase in same occupation, decrease in different occupations (Jäger et al., 2024)
  - Coworker productivity in academia (Azoulay et al., 2010; Waldinger, 2012)
- **Limited knowledge on worker exit impact on firm productivity**
  - How costly is the loss of experienced workers for firm productivity?
  - How do worker skills shape the impact of exits on firm productivity?

This Paper

- Uses high quality linked employer-employee data
- Exploits unique early retirement policy change in Hungary for identification
- Provides causal estimate on the impact of experienced worker exit on firm productivity
- Examines heterogeneity in productivity effects by worker skill level

Preview of Findings

- Worker exit has a negative effect on productivity only in medium-sized firms (50–250 employees)
- Losing one manager reduces labor productivity by 21%
- Losing one high-skill worker reduces labor productivity by 13%

Related literature

Contribute to:

- Worker exit effect (Azoulay et al., 2010; Bennedsen et al., 2020; Jäger et al., 2024; Waldinger, 2012)
- Productivity of older workers (Cardoso et al., 2011; Carta et al., 2021)
- Retirement policy change effect (Bianchi et al., 2023; Boeri et al., 2022; Carta et al., 2021; Simonovits & Tir, 2017)

Data

- **ADMIN3** linked employer-employee administrative social security data
  - 50% sample of the Hungarian population in 2003
  - Covers approximately 5 million individuals
  - Monthly employment and pension data from 2003 to 2017
- **Balance sheet data** from administrative tax declaration forms
  - All double-entry bookkeeping firms in Hungary
  - Contains balance sheet and income statements
  - Detailed information on firm characteristics
  - Narrow to firms with at least 10 employees

Institutional setting in Hungary

- Focus on 2009–2015, when the general retirement age was consistently 62
- Pay-as-you-go pension system
  - Active workers finance pensions for retirees
- Relatively high average net replacement rate (above 78% in 2011, OECD)
- 2011: Introduction of the Women40 policy
  - Women with 40 years of contributions (32 years of working relationship) can retire before 62
  - University and vocational school years count toward the years of contribution
  - No reduction in pension or replacement rate, creating a strong incentive to retire early
  - An additional 55,000 women retired, more than four times the number in 2010
  - The median retirement age for women decreased by 2.2 years (Simonovits & Tir, 2017)

Identification strategy

Causal model

$$ln\left(y_{it}\right) = \phi_i + \lambda_t + \beta_{IV} exit_{it} + \upsilon_{it}$$

First stage

$$exit_{it} = \gamma_i + \zeta_t + \pi w40_{it} + \eta_{it}$$

- y_{it} = labor productivity (value added/number of employees)
- $exit$ = number of workers exit in different skill levels
- $w40$ = number of workers eligible for Women40 in different skill levels
- ϕ_i, γ_i = firm fixed effect
- γ_t, ζ_t = year fixed effect
- υ_{it}, η_{it} = error term

Skill levels: manager, high-skill, medium-skill, low-skill

Identification conditions

- **Relevance condition**:
  - Women40 policy directly affects retirement behavior
  - We can see a big jump in retirement after the policy change
  - First stage regressions show positive correlation
- **Exclusion restriction**:
  - Women40 policy has impact on firm productivity through worker exit only
  - The policy only increases the eligibility of women who can retire
  - It likely holds
  - Potential selection bias: Women who have 40 years of contribution and who does not have differ

Worker exits and Women40 eligibility by firm size

Sample	**Small** 10–49	**Medium** 50–249	**Large** 250+
N of exit	0.08	0.54	4.99
N of manager exit	0.00	0.02	0.23
N of high-skill exit	0.01	0.06	0.74
N of medium-skill exit	0.05	0.36	3.39
N of low-skill exit	0.02	0.10	0.62
N of Woman40	0.21	1.40	11.70
N of manager Woman40	0.02	0.11	0.65
N of high-skill Woman40	0.04	0.25	2.38
N of medium-skill Woman40	0.09	0.67	6.40
N of low-skill Woman40	0.05	0.40	2.50

Firm characteristics

Sample	**Small** 10–49	**Medium** 50–249	**Large** 250+
ln(Sales)	12.29	14.13	16.17
ln(Capital)	8.34	10.31	12.77
ln(Value added)	10.86	12.78	14.93
ln(Labor productivity)	8.00	8.27	8.59
Foreign	0.10	0.27	0.52
Exporter	0.33	0.61	0.76

Baseline Results

Sample	Large	Medium	Small
N of manager exit	0.018*	-0.032	-0.020
	(0.010)	(0.021)	(0.021)
N of high skill exit	0.003	-0.021*	-0.003
	(0.002)	(0.013)	(0.015)
N of medium skill exit	-0.001	-0.020***	-0.003
	(0.002)	(0.005)	(0.005)
N of low skill exit	-0.005	-0.005	-0.020
	(0.005)	(0.009)	(0.037)
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N firm-year observations	5234	25933	139124

IV Results

	Simple FE			IV		
Sample	Large	Medium	Small	Large	Medium	Small
N of manager exit	0.018*	-0.032	-0.020	2.825	-0.209**	-0.098
	(0.010)	(0.021)	(0.021)	(177.773)	(0.103)	(0.185)
N of high skill exit	0.003	-0.021*	-0.003	2.502	-0.128**	-0.061
	(0.002)	(0.013)	(0.015)	(157.073)	(0.065)	(0.091)
N of medium skill exit	-0.001	-0.020***	-0.003	1.234	-0.005	0.152**
	(0.002)	(0.005)	(0.005)	(76.374)	(0.021)	(0.065)
N of low skill exit	-0.005	-0.005	-0.020	0.827	0.067	0.000
	(0.005)	(0.009)	(0.037)	(50.952)	(0.064)	(0.095)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N firm-year observations	5234	25933	139124	5452	27631	151998

Conclusion

- The negative impact of worker exits on firm productivity is most pronounced in medium-sized firms.
- The effect varies significantly by worker skill level:
  - Loss of medium- or low-skill workers has no measurable effect on productivity.
  - Loss of managers or high-skill workers results in a substantial productivity decline of 20% and 13% respectively.