

Worker retirement effect on productivity

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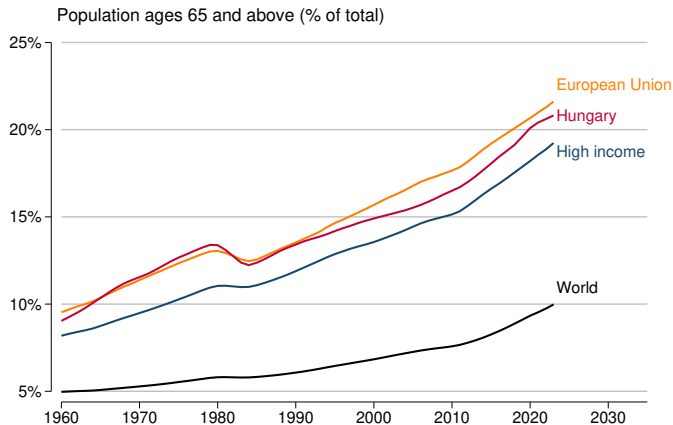
Corvinus University of Budapest

Doctoral Seminar

2025. 03. 05.

Society is aging

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



Source: World Bank

This means...

Each year a larger and larger share of worker exit the labor market

- with high firm-specific human capital
- decreasing marginal product



The impact of retirement on firm productivity is uncertain

Research question

What is the effect of retirement/exit of older workers on firm productivity?

This paper

- Estimates the effect of worker retirement on labor productivity
- Using high quality Hungarian administrative data from 2009-2015
- IV based on a unique early retirement policy change, Nők40 (Women40)
- I find that
 - **high-skill worker retirement decrease labor productivity growth by 2.7%**
 - low-skill worker retirement has no effect on labor productivity

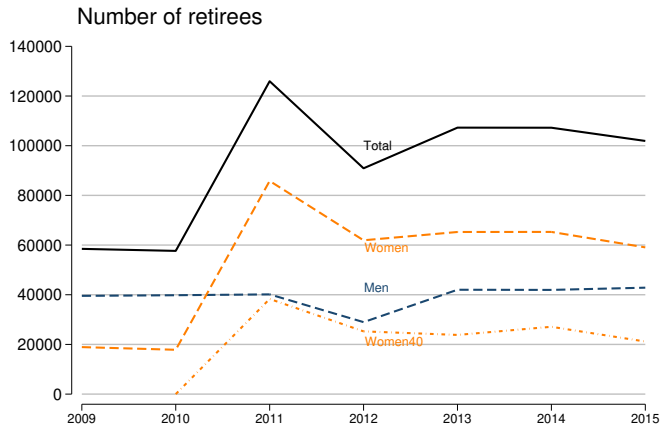
Related literature

- Worker exit
 - High hiring and training costs (Abowd and Kramarz, 2003; Muehlemann and Pfeifer, 2016)
 - 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; Waldinger, 2012)
- Productivity of older workers
 - Diminishing marginal productivity of the older workers (Cardoso et al., 2011)
 - High wages relative to marginal product (Lazear, 1979)
- Pension reform effects
 - Retirement age change impact on firms (Bianchi et al., 2023; Boeri et al., 2022)
 - Women40 policy change (Simonovits and Tir, 2017)

Institutional settings

- Pay-as-you-go pension system: active workers finance the benefits of retirees
- 2009-2015: general retirement age was 62
 - (2014-2015: transitional period, retirement age 62.5)
- High average net pension replacement rate (74% in 2011)
- 2011: introduction of Nők40 (Women40) program
 - women with 40 years of contribution can retire
 - 32 years of working relationship (university and vocational school years count)
 - no reduction in pension benefits → incentive to retire early
 - reduce avg. women retirement age by 2.2 years (Simonovits and Tir, 2017)

Impact of policy change on yearly number of retirees



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

ADMIN3: linked employer-employee administrative social security data

- 2003-2017, but use only the period 2009-2015
- 50% sample of the Hungarian population in 2003
- Covers approximately 5 million individuals
- Monthly employment and pension transfer data

Balance sheet data: administrative tax declaration forms

- All double-entry bookkeeping firms in Hungary
- Appr. 100k firms yearly
- Contains balance sheets and income statements
- Detailed information on firm characteristics

Final sample

- Narrow to firms with at least 5 employees at any year between 2009-2015
- Exclude government related and financial industries
- 575 458 firm-year observations

Women40 Retirement Eligibility and Worker Skill Classification

- **Women40 eligibility:** Women40 retiree or 58-61 years old woman after 2011
- **High-skill workers:** Managers, Professionals, and Technicians
- **Low-skill workers:** Clerical service and sales workers, Skilled agricultural and trades workers, Plant and machine operators, and assemblers, Elementary occupations

Firm characteristics

	No retiree	Has retiree	t-test
Large (250+ employee)	0.5%	18.5%	***
Foreign	9%	20%	***
ln(Capital)	7.69	9.97	***
ln(Sales)	11.23	13.34	***
ln(Labor productivity)	7.87	8.12	***
Observations	549 084	26 374	

Distribution of number of retirement

Number of retirement		High-skill				
		0	1	2	3	4+
Low-skill	0	549 107	4 148	217	37	29
	1	15 466	771	89	33	28
	2	2 278	337	81	17	21
	3	743	177	53	13	14
	4+	874	369	173	106	277

Distribution of number of women eligible for early retirement

Number of women eligible		High-skill				
		0	1	2	3	4+
Low-skill	0	522 374	10 359	1 407	266	141
	1	24 247	1 817	395	122	101
	2	5 540	736	198	82	95
	3	1 923	393	114	45	70
	4+	2 902	974	400	220	537

Methodology - FD IV

Causal regression

$$\Delta \ln(y_{it}) = \alpha + \beta_{1IV} \Delta \hat{H}S_{it} + \beta_{2IV} \Delta \hat{L}S_{it} + v_{it}$$

First stage regressions

$$\Delta \hat{H}S_{it} = \pi_0 + \pi_1 \Delta HSW40_{it} + \pi_2 \Delta LSW40_{it} + \eta_{it}$$

$$\Delta \hat{L}S_{it} = \phi_0 + \phi_1 \Delta HSW40_{it} + \phi_2 \Delta LSW40_{it} + \zeta_{it}$$

- Δ : changes from $t - 1$ to t
- y_{it} : labor productivity = $\frac{\text{value added}}{\text{worker}}$
- HS_{it}, LS_{it} : number of high-skilled and low-skilled retired workers
- $HSW40_{it}, LSW40_{it}$: number of high-skilled and low-skilled workers eligible for Women40

Identification assumptions

Relevance condition First Stage

- Women40 policy directly affects retirement behavior
- significant jump in retirement following the policy change
- first stage regression: instruments are strong and relevant
 - high-skill and low-skill instruments are statistically significant
 - F-statistics are above the common threshold of 10

Exclusion restriction

- Women40 policy impacts firm productivity only through worker exits
- the policy change increases only women's retirement eligibility
- only impact on firm productivity through worker retirement

Results

	FD	IV
$\Delta N.$ of HS retirement	-0.004 (0.004)	-0.027*** (0.010)
$\Delta N.$ of LS retirement	-0.001 (0.001)	-0.003 (0.003)
Constant	0.053*** (0.001)	0.053*** (0.001)
Observations	387 347	387 347

Heterogeneity and robustness checks

Heterogeneity

- Size: small firms drive the effect Size
- Industry: services drive the effect Industry
- Ownership: domestic firms drive the effect Ownership

Robustness

- Exclude transitional period (2014-2015) Transitional

Summary

LS retirement: no effect

HS retirement: negative effect on labor productivity growth

- Mostly small, domestic, service firms drive this effect

Next steps

- Use matching to confirm findings
- Understand the mechanism behind the effect

First stage regressions

	ΔHS	ΔLS
$\Delta N.$ of HS W40 eligible	0.273*** (0.035)	0.105* (0.057)
$\Delta N.$ of LS W40 eligible	0.012* (0.007)	0.285*** (0.031)
F-statistic	32.34	53.12
Prob > F	0.00	0.00
R-squared	0.21	0.20

Heterogeneity by size

	Number of employees	
	5-249	250+
$\Delta N.$ of HS retirement	-0.062*** (0.020)	-0.016* (0.009)
$\Delta N.$ of LS retirement	-0.019* (0.011)	-0.002 (0.003)
Constant	0.053*** (0.001)	0.042*** (0.005)
Observations	381 092	5 897

Heterogeneity by industry

	Manufacturing	Services
$\Delta N.$ of HS retirement	-0.015 (0.004)	-0.032** (0.014)
$\Delta N.$ of LS retirement	-0.004 (0.004)	-0.003 (0.006)
Constant	0.049*** (0.002)	0.057*** (0.001)
Observations	71 695	241 252

Heterogeneity by ownership

	Domestic	Foreign
$\Delta N.$ of HS retirement	-0.032** (0.014)	-0.016 (0.011)
$\Delta N.$ of LS retirement	-0.014* (0.007)	0.002 (0.002)
Constant	0.051*** (0.001)	0.069*** (0.003)
Observations	350 273	32 224

Robustness: exclude transitional period

	Main	Excl. transitional
$\Delta N.$ of HS retirement	-0.027*** (0.010)	-0.024** (0.010)
$\Delta N.$ of LS retirement	-0.003 (0.003)	0.003 (0.002)
Constant	0.053*** (0.001)	0.041*** (0.001)
Observations	387 347	254 884

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