

Blame It on My Youth: Employer Learning and Age Discrimination

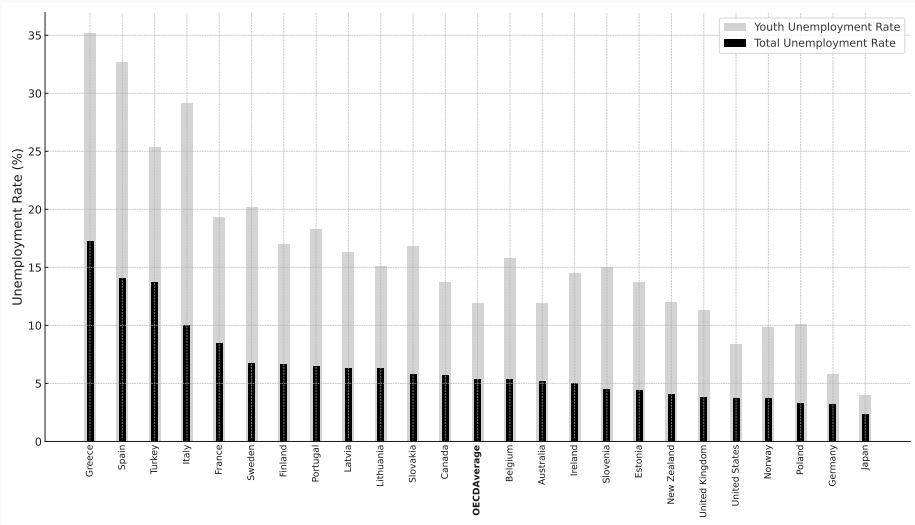
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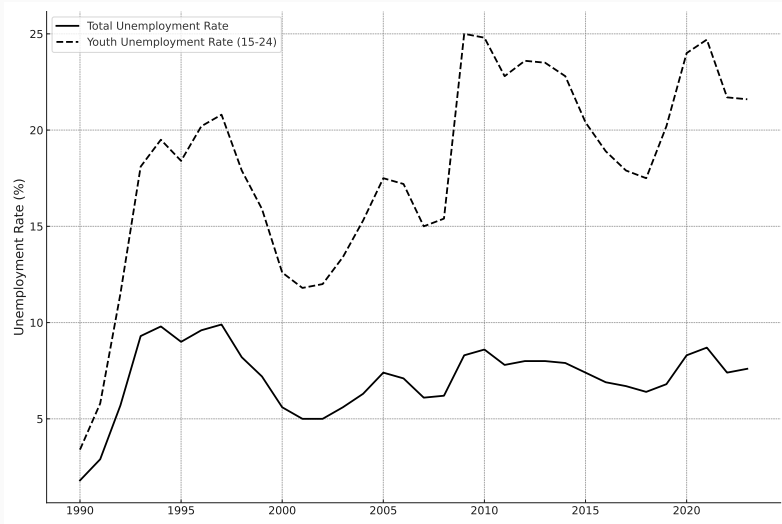
IFAU Seminariekonferens, December 2025

Motivation

Motivation: (Youth) unemployment 2019



Motivation: (Youth) unemployment in Sweden over time



Motivation: consequences for young workers

- Young workers face:
 - Lower wages than prime-age workers
 - Higher unemployment and job instability
 - Stronger exposure to business-cycle shocks
- Early-career shocks have persistent effects on:
 - Careers
 - Earnings
 - Social outcomes (family, children)
- Less known:
 - What are the beliefs about young workers (and their quality)?
 - How do individuals (and employers/managers in particular) perceive young workers?

Illustration: Perceptions about young generations

Year: 1990



Illustration: Perceptions about young generations

Year: 2013



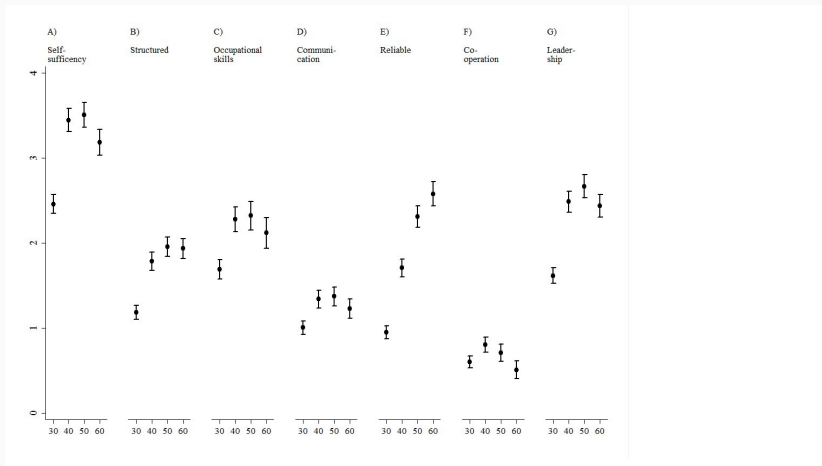
Illustration: Perceptions about young generations

Year: 2023



Employer survey (Carlsson & Andersson; 2019)

"Suppose that you are **recruiting a new employee to a typical position** in your workplace. To what extent do you think that an average employee at age 30, 40, 50, and 60 would have the following characteristics?" N = 1,336.



Aim of this paper

- Employers treat young workers (candidates) differently than prime-age workers
 - Employers treat **young workers as a group**
 - Employers treat **prime-age workers as individuals**
- Key idea: employers are
 - (1) uncertain about the productivity of a worker characteristic (e.g. age) and
 - (2) imperfectly observe productivity at hiring

⇒ Discrepancy between expected and realized productivity ⇒ shock
- **Research question:** do employers value experiences with new hires differently for young vs prime-age workers?
- **New stylized fact:** Dynamic spillovers exist for **young** hires, but not for **prime-age** hires
- Explore different mechanisms
 - Large-scale employer survey on age beliefs and uncertainty (in progress)

- Employer learning:
 - Workers' productivity revealed gradually (Farber & Gibbons; Altonji & Pierret)
 - Employers rely on observables early on → statistical discrimination
- Age discrimination:
 - Mostly about **older workers** (e.g., Neumark et al., 2016)
 - Callback evidence for youth: Farber et al., Carlsson et al.
 - Policy shocks affecting youth: Saez-Marti et al.
- Organizational learning:
 - Learning from hires (Lepage, 2024; Li, 2025; Benson et al., 2025)

Remainder of the presentation

Data and empirical strategy

Main Results

Robustness

Conclusion

Data and empirical strategy

- Aim: construct panel data of all hiring events of all establishments
 - Hiring event: one or several hired individuals in month m
 - Based on ANST/JOBB employment spells
 - Allows to create establishment-specific biography of hiring events
(Complemented with education, age, gender, demographics)
- Military enlistment tests:
 - Cognitive tests (4 dimensions)
 - Non-cognitive psychological assessment
 - Standardized stanine scales
- Time period 1990-2009 ▶ Coverage test scores
- Age of hires: 18-50

Core idea of our estimation framework

- Identify **first hiring event** with each age group of an establishment
- Use **military test scores** to classify these **initial hiring events** with age group g as positive/negative
- Estimate **how these initial experiences affect future hiring behavior** related to age
- Compare effects across
 - Age groups (for figures)
 - Young (18–35) vs prime-age (36–50) (for tables)

How do negative (positive) initial experiences affect future hiring?

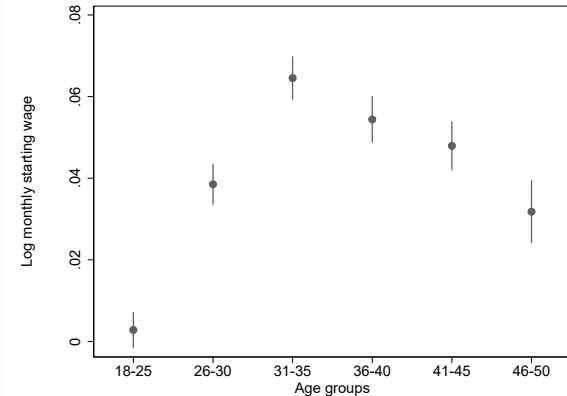
$$Y_{jk}^{(g)} = \alpha_g + \beta_g S_j^{(g, \text{first})} + \gamma_g X_{jk} + \delta_{C(j)} + \zeta_{I(j)} + \eta_{Q(t_{jk})} + \varepsilon_{jk}^{(g)} \quad (1)$$

- Outcome
 - $Y_{jk}^{(g)}$ - age group g 's share in hiring event k of firm j (default: up to three)
- Variable of main interest:
 - $S_j^{(g, \text{first})}$: dummy for positive/negative deviations of residualized skill measure of establishment in firm j 's **first hiring event** with group g
- Controls
 - X_{jk} : establishment and event-level covariates
 - $\delta_{C(j)}$, $\zeta_{I(j)}$, and $\eta_{Q(t_{jk})}$: county, industry, and calendar year-quarter fixed effects

Do military test scores matter?

- Strong predictors of long-term income (Lindqvist & Vestman, 2011)
 - Employers do **not** observe them at hiring
 - Cognitive/non-cognitive skills are **not priced** in wages of young workers
 - Skills become priced with **experience**
 - Excellent proxy for “unexpected productivity”

Relationship between test scores and income (information differences)



- Young workers:
 - **Flat** relationship between skills and wages
- Prime-age workers:
 - **Positive** skill-wage gradient
 - Employers know far less about young workers at hiring
 - Larger deviations possible

Conceptualization of deviation from expectations

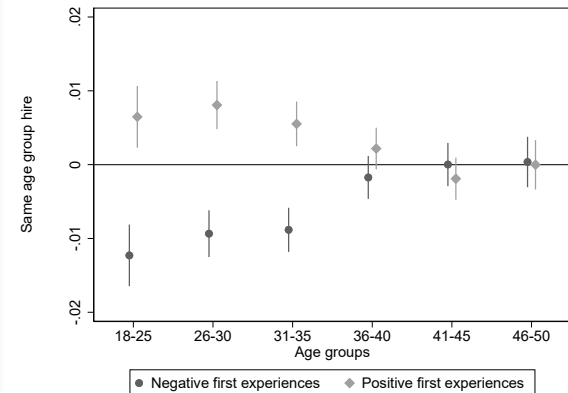
- $S_j^{(g, \text{first})}$: residualized skill measure of first hire from age group g
(residualize with: age, industry, field of education, and years of education)
- Classify residualized skill measures as
 - Positive deviations: top 25%
 - Negative deviations: bottom 25%

- Estimation framework requires **specific sample restrictions**
 - Establishments with **at least two hires**
 - And: initial hires with military test scores
- To capture learning: focus on **new establishments** of **new firms**

► Descriptive statistics

Main Results

Main result: spillovers by age group



- Ages 18–25:
 - Negative shocks → 5 % youth hiring
 - Positive shocks → +3 %
 - Ages 26–35:
 - Same sign, smaller effects
 - Ages 36–50:
 - No spillovers
- Young workers treated as a group; older workers as individuals

Do establishments learn?

1. Organizational learning implies
 - **diminishing effects** over time
 - Stronger effects for new firms than for established firms
2. Experience in hiring young workers
 - In progress
 - Role of managers (“operational leaders”)
 - Survey information to elicit beliefs

1. Organizational learning: Decay of spillovers with hiring experience

	1-5	6-10	11-15	16-20	21-25
Age <36=1 × Share neg.	-0.0146 (0.0029)	-0.0128 (0.0029)	-0.0062 (0.0029)	-0.0072 (0.0029)	-0.0043 (0.0028)
Share neg.	0.0030 (0.0017)	0.0019 (0.0017)	-0.0013 (0.0017)	-0.0008 (0.0017)	-0.0002 (0.0017)
Age <36=1 × Share pos.	0.0063 (0.0027)	0.0094 (0.0027)	0.0048 (0.0027)	0.0060 (0.0027)	0.0038 (0.0027)
Share pos.	0.0009 (0.0016)	-0.0002 (0.0016)	0.0016 (0.0016)	-0.0012 (0.0016)	-0.0001 (0.0016)
Outcome mean	0.188	0.186	0.185	0.184	0.183
Units × age groups	399,474	399,471	399,466	399,473	399,478
Units	27,785	27,786	27,786	27,785	27,785
Clusters (firms)	22,558	22,558	22,558	22,558	22,558
Adjusted R ²	0.139	0.141	0.142	0.145	0.147

- Early youth experiences matter a lot
- Effects persist for years
- But fade as employers:
 - Gain experience
 - Reduce uncertainty
- → Consistent with organizational learning

1. Organizational learning: firm age

	New 1st (1)	Old 1st (2)	New non-1st (3)
Age <36=1 × Share neg.	-0.0096 (0.0015)	-0.0026 (0.0032)	-0.0055 (0.0009)
Share neg.	-0.0007 (0.0009)	-0.0012 (0.0021)	-0.0014 (0.0006)
Age <36=1 × Share pos.	0.0064 (0.0014)	0.0048 (0.0032)	0.0038 (0.0008)
Share pos.	0.0003 (0.0009)	0.0025 (0.0020)	0.0016 (0.0006)
Outcome mean	0.189	0.186	0.258
Units × age groups	1,457,388	310,951	5,107,555
Units	235,892	45,511	174,536
Clusters (firm)	196,390	14,224	143,514
Adjusted R ²	0.105	0.147	0.194

- Compare:

- (1) New estab. of new firms
- (2) Old estab. of new firms
- (3) New firms / non-first

- 2+3 much weaker / insignificant

2. Experience in hiring young workers

- Less work history
- More noise in signals
- Interview performance less informative
 - Greater **uncertainty** about youth productivity
 - Larger **surprises** → More group updating
- But: in sectors with few/many youth hires similar effect size

Robustness

1. Regression specification checks
2. Sensitivity to (variable) choices made
3. Identification and comparability of estimates

Robustness 1: specifications checks

	Baseline (1)	ev now (2)	+firm now (3)	+ ev 1st exp (4)	+ firm 1stexp (5)	estab FE (6)
Age <36=1 × Share neg.	-0.0096 (0.0015)	-0.0097 (0.0015)	-0.0083 (0.0016)	-0.0085 (0.0015)	-0.0082 (0.0016)	-0.0079 (0.0020)
Share neg.	-0.0007 (0.0009)	-0.0004 (0.0009)	0.0009 (0.0010)	0.0010 (0.0010)	0.0014 (0.0011)	-0.0004 (0.0013)
Age <36=1 × Share pos.	0.0064 (0.0014)	0.0062 (0.0014)	0.0058 (0.0015)	0.0061 (0.0015)	0.0054 (0.0015)	0.0052 (0.0019)
Share pos.	0.0003 (0.0009)	0.0002 (0.0009)	-0.0016 (0.0010)	-0.0021 (0.0010)	-0.0019 (0.0010)	-0.0013 (0.0013)
Outcome mean	0.189	0.189	0.189	0.189	0.187	0.188
Units × age groups	1,457,388	1,451,924	1,317,958	1,317,867	1,165,490	1,425,420
Units	235,892	235,672	214,406	214,399	192,340	203,924
Clusters	196,390	196,206	176,798	176,792	161,262	168,823
Adjusted R ²	0.105	0.106	0.111	0.112	0.109	0.119

Robustness 2: specification choices

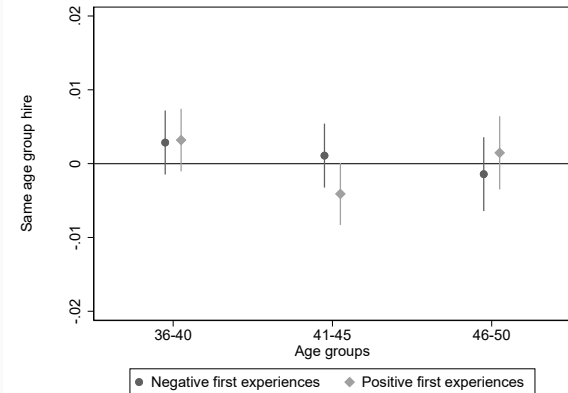
	50/50 (1)	Cog (2)	Noncog (3)	Firm (4)	Men (5)	Ext margin (6)	W/o ID (7)	One-foll (8)	One regression (9)
Age < 36 = 1 × Share neg.	-0.006 (0.001)	-0.010 (0.001)	-0.004 (0.001)	-0.008 (0.002)	-0.010 (0.001)	-0.013 (0.002)	-0.008 (0.002)	-0.011 (0.002)	-0.008 (0.002)
Share neg.	-0.001 (0.001)	0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	0.003 (0.001)	-0.001 (0.001)	-0.002 (0.002)	-0.001 (0.001)
Age < 36 = 1 × Share pos.	0.006 (0.001)	0.007 (0.001)	0.005 (0.001)	0.006 (0.002)	0.005 (0.002)	0.010 (0.002)	0.005 (0.002)	0.005 (0.002)	0.003 (0.002)
Share pos.	0.001 (0.001)	-0.001 (0.001)	0.002 (0.001)	0.000 (0.001)	0.000 (0.001)	-0.003 (0.001)	0.000 (0.001)	0.002 (0.002)	-0.000 (0.001)
Age < 36 = 1 × Share neg. (scaled)	-0.009	-0.012	-0.005	-0.009	-0.011	-0.011	-0.010	-0.012	-0.009
Age < 36 = 1 × Share pos. (scaled)	0.009	0.008	0.006	0.007	0.006	0.009	0.006	0.006	0.003
Outcome mean	0.189	0.189	0.186	0.188	0.187	0.286	0.187	0.190	0.187
Outcome SD	0.351	0.351	0.348	0.350	0.354	0.452	0.354	0.356	0.354
SD of share negative exp.	0.474	0.409	0.408	0.413	0.409	0.410	0.409	0.411	0.409
SD of share positive exp.	0.474	0.412	0.410	0.417	0.410	0.412	0.410	0.411	0.410
Units × age groups	1,457,388	1,452,863	1,401,399	1,200,284	1,139,874	1,457,388	1,128,407	435,545	1,139,874
Units	235,892	235,394	230,416	196,302	212,632	235,892	210,774	187,614	212,632
Clusters	196,390	195,984	191,818	196,302	178,080	196,390	176,543	159,545	178,080
Adjusted R ²	0.105	0.104	0.104	0.089	0.094	0.086	0.094	0.091	0.094

- Are establishments hiring young and old workers just different?
- Skill proximity
- Heterogeneity: differences across sectors, industry and regional characteristics

Selection 1: Prime-age spillovers within establishments

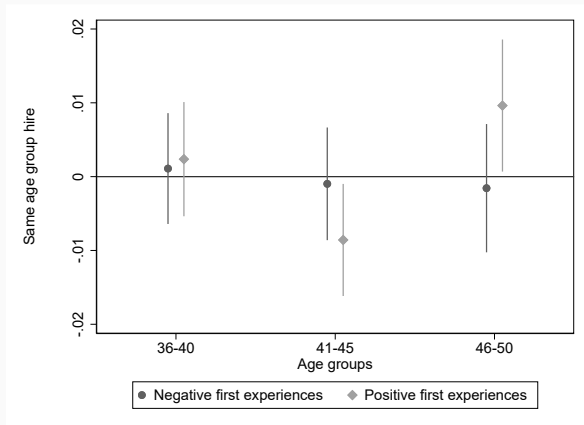
- Are **estimated coefficients estimated on different populations** and thereby produce this pattern?
- Focus on establishments that make experience with young hires **and** hire prime-age workers

Selection 1: Prime-age spillovers within establishments



- Same establishments that react strongly to youth experiences
 - Prime-age experiences:
 - Near-zero coefficients
 - No systematic updating
- Not driven by establishment composition

Selection 1: Prime-age spillovers within establishments (within education field)



- Restrict: first youth and prime-age hires in **same education field**
 - Result:
 - Still **no prime-age spillovers**
- Not driven by job-task differences

Selection 2: Skill proximity

	Baseline 1	Same 1-d EF 2	Other 1-d EF 3
Age <36=1 × Share neg.	-0.0096 (0.0015)	-0.0124 (0.0025)	-0.0084 (0.0017)
Share neg.	-0.0007 (0.0009)	-0.0025 (0.0016)	0.0003 (0.0011)
Age <36=1 × Share pos.	0.0064 (0.0014)	0.0122 (0.0024)	0.0040 (0.0017)
Share pos.	0.0003 (0.0009)	-0.0003 (0.0016)	0.0006 (0.0011)
Outcome mean	0.189	0.206	0.180
Units × age groups	1,457,388	488,266	963,649
Units	235,892	168,667	215,011
Clusters (firm)	196,390	141,051	179,706
Adjusted R ²	0.105	0.126	0.095

Selection 3: Differences across sectors

	Farm. and resources (1)	Manufacturing (2)	Construction (3)	Retail/wholesale (4)	Hotels and rest. (5)	Services (6)	Public, educ., (7)
Age < 36 = 1 × Share neg.	0.002 (0.007)	-0.022 (0.005)	-0.010 (0.004)	-0.010 (0.003)	-0.027 (0.005)	-0.004 (0.002)	0.001 (0.005)
Share neg.	-0.003 (0.005)	0.005 (0.003)	0.003 (0.003)	-0.001 (0.002)	0.006 (0.003)	-0.005 (0.001)	-0.003 (0.003)
Age < 36 = 1 × Share pos.	-0.003 (0.007)	0.011 (0.004)	0.003 (0.004)	0.010 (0.003)	0.025 (0.005)	0.004 (0.002)	-0.003 (0.005)
Share pos.	-0.001 (0.005)	-0.001 (0.003)	-0.002 (0.003)	-0.000 (0.002)	-0.006 (0.003)	0.002 (0.001)	0.003 (0.003)
Age < 36 = 1 × Share neg. (scaled)	0.003	-0.027	-0.011	-0.010	-0.032	-0.005	0.001
Age < 36 = 1 × Share pos. (scaled)	-0.003	0.014	0.004	0.011	0.028	0.004	-0.004
Outcome mean	0.196	0.177	0.185	0.215	0.228	0.182	0.166
Outcome SD	0.370	0.343	0.356	0.383	0.354	0.343	0.312
SD of share negative exp.	0.423	0.410	0.414	0.413	0.424	0.402	0.406
SD of share positive exp.	0.416	0.409	0.412	0.418	0.392	0.414	0.405
Units × age groups	53,185	169,349	191,349	248,604	97,972	540,506	97,380
Units	9,316	23,518	27,260	45,263	17,755	86,495	15,495
Clusters	8,203	20,071	25,094	36,705	16,067	72,500	12,844
Adjusted R ²	0.148	0.073	0.073	0.156	0.257	0.071	0.066

Selection 4: Industry and regional characteristics

	Industry share high-skilled hires		Industry share young hires		Below median unempl		Estabs hiring rate	
	Below median	Above median	Below median	Above median	Below median	Above median	Below median	Above median
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$36 = 1 \times \text{Share neg.}$	-0.013 (0.002)	-0.004 (0.002)	-0.011 (0.002)	-0.008 (0.002)	-0.008 (0.002)	-0.013 (0.002)	-0.008 (0.002)	-0.011 (0.002)
neg.	0.001 (0.001)	-0.003 (0.001)	0.002 (0.001)	-0.003 (0.001)	-0.003 (0.001)	0.004 (0.002)	-0.001 (0.001)	-0.003 (0.001)
$36 = 1 \times \text{Share pos.}$	0.009 (0.002)	0.003 (0.002)	0.005 (0.002)	0.008 (0.002)	0.008 (0.002)	0.003 (0.002)	0.005 (0.002)	0.008 (0.002)
pos.	-0.001 (0.001)	0.002 (0.001)	-0.001 (0.001)	0.002 (0.001)	-0.000 (0.001)	0.002 (0.002)	-0.000 (0.001)	0.000 (0.001)
$36 = 1 \times \text{Share neg. (sc)}$	-0.015	-0.004	-0.014	-0.009	-0.009	-0.016	-0.009	-0.014
$36 = 1 \times \text{Share pos. (sc)}$	0.010	0.003	0.006	0.009	0.009	0.004	0.006	0.009
me mean	0.196	0.179	0.171	0.204	0.190	0.187	0.194	0.184
me SD	0.361	0.336	0.336	0.362	0.352	0.350	0.375	0.326
share negative exp.	0.415	0.400	0.413	0.407	0.409	0.411	0.422	0.397
share positive exp.	0.411	0.413	0.412	0.412	0.414	0.407	0.429	0.394
\times age groups	873,643	583,745	659,795	797,593	979,428	477,960	731,506	725,888
	137,815	98,077	99,474	136,418	171,815	85,479	147,609	88,288
rs	117,619	80,011	83,871	113,853	145,880	73,270	136,011	65,899
ed R ²	0.129	0.062	0.054	0.137	0.105	0.106	0.080	0.141

Conclusion

- Employers hire youth as a **group**
- Spillovers from early youth hires are:
 - Large
 - Persistent
 - Age-specific
- Mechanism:
 - Employers have **less information** about young workers
 - → Update their beliefs about the group, not individuals
- Implications:
 - Early experiences may entrench **age stereotypes**
 - Policy may need to reduce youth uncertainty (training, certification)

- Employer survey:
 - Beliefs about youth productivity
 - Uncertainty and hiring heuristics
- Extensions:
 - Manager-level variation
 - Spillovers across occupations
 - Effects on wages and job match quality

Appendix

Backup: sample coverage

First year	Last year	total number of hires	share with test	18-25	26-30	31-35	36-40	41-45	46-50	51-80
1990	1991	139379	.586	.9018	.8389	.7613	.8286	.0167	.0001	0
1992	1993	306899	.5933	.9073	.8818	.719	.8819	.2834	0	0
1994	1995	515956	.6581	.9112	.8696	.7321	.8794	.6234	0	0
1996	1997	514502	.6821	.8983	.8553	.8443	.6955	.8599	.115	0
1998	1999	684161	.6917	.8631	.8525	.8165	.676	.8347	.45	0
2000	2001	806424	.696	.8339	.835	.7954	.7268	.7386	.7508	.0043
2002	2003	721669	.6889	.7936	.8163	.7926	.7807	.6409	.8126	.1141
2004	2005	751270	.6914	.7587	.7887	.7939	.7774	.6579	.8185	.2418
2006	2007	927332	.6649	.691	.7289	.744	.7432	.7544	.6389	.3383
2008	2009	869167	.6063	.5456	.6754	.7119	.7272	.7366	.6242	.4273
2010	2011	1023050	.5491	.4113	.6345	.6593	.7088	.723	.6922	.4783
2012	2013	990583	.4637	.2237	.5779	.6069	.6615	.6904	.7318	.4969
2014	2015	1091235	.3994	.1015	.4794	.5521	.6062	.6624	.7042	.5476
2016	2017	1202735	.3397	.0264	.3266	.4797	.5308	.6088	.6596	.5822
2018	2019	1190903	.3027	0	.1727	.4253	.4776	.5619	.6252	.6117
2020	2021	1056574	.2705	0	.0717	.3264	.4499	.5129	.6047	.6398

Descriptives

	All establishments	Estimation sample
Average number of employees	13.082 (68.256)	14.465 (62.698)
Number of hires (per year)	5.971 (28.637)	7.608 (32.688)
Value-added per employee (log)	12.111 (2.029)	11.811 (1.634)
Average age	33.872 (5.827)	33.322 (5.227)
Share foreign born	0.117 (0.219)	0.106 (0.184)
Share female	0.421 (0.340)	0.309 (0.274)
Share high-skilled	0.271 (0.297)	0.266 (0.288)
Income	1727.454 (1154.438)	1897.527 (1193.071)
Number of observations	766,431	234,824

► back

Backup: sample coverage

- Enlistment coverage stable for ages 18–35
- Lower for 36–50 (older cohorts)
- Analysis restricted accordingly

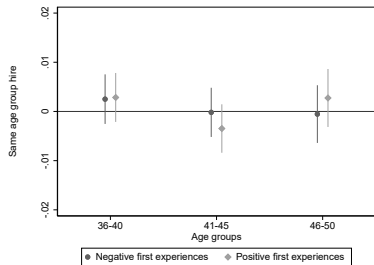
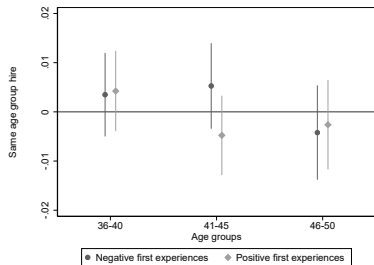
Backup: Robustness across specifications 1

	Baseline (1)	No seasonal (2)	No stud (3)	Priv. owned (4)	One initial hire (5)
Age < 36 = 1 × Share neg.	-0.010 (0.001)	-0.008 (0.002)	-0.008 (0.001)	-0.010 (0.001)	-0.007 (0.002)
Share neg.	-0.001 (0.001)	-0.002 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Age < 36 = 1 × Share pos.	0.006 (0.001)	0.006 (0.002)	0.006 (0.001)	0.007 (0.001)	0.005 (0.002)
Share pos.	0.000 (0.001)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
Age < 36 = 1 × Share neg. (scaled)	-0.011	-0.010	-0.009	-0.012	-0.009
Age < 36 = 1 × Share pos. (scaled)	0.008	0.007	0.007	0.008	0.006
Outcome mean	0.189	0.185	0.186	0.190	0.176
Outcome SD	0.351	0.345	0.350	0.352	0.349
SD of share negative exp.	0.410	0.405	0.410	0.410	0.431
SD of share positive exp.	0.412	0.410	0.413	0.412	0.435
Units × age groups	1,457,388	926,651	1,418,028	1,435,160	1,043,181
Units	235,892	193,416	230,917	232,754	207,131
Clusters	196,390	165,906	192,490	195,869	178,436
Adjusted R ²	0.105	0.093	0.089	0.105	0.078

Main result: robustness 2

Median	Industry share high-sk. hires		Industry share young hires		Below median unempl		Estabs hiring rate	
	Below (1)	Above (2)	Below (3)	Above (4)	Below (5)	Above (6)	Below (7)	Above (8)
Age < 36 = 1 × Share neg.	-0.013 (0.002)	-0.004 (0.002)	-0.011 (0.002)	-0.008 (0.002)	-0.008 (0.002)	-0.013 (0.002)	-0.008 (0.002)	-0.011 (0.002)
Share neg.	0.001 (0.001)	-0.003 (0.001)	0.002 (0.001)	-0.003 (0.001)	-0.003 (0.001)	0.004 (0.002)	-0.001 (0.001)	-0.000 (0.001)
Age < 36 = 1 × Share pos.	0.009 (0.002)	0.003 (0.002)	0.005 (0.002)	0.008 (0.002)	0.008 (0.002)	0.003 (0.002)	0.005 (0.002)	0.007 (0.002)
Share pos.	-0.001 (0.001)	0.002 (0.001)	-0.001 (0.001)	0.002 (0.001)	-0.000 (0.001)	0.002 (0.002)	-0.000 (0.001)	0.000 (0.001)
Age < 36 = 1 × Share neg. (sc)	-0.015	-0.004	-0.014	-0.009	-0.009	-0.016	-0.009	-0.014
Age < 36 = 1 × Share pos. (sc)	0.010	0.003	0.006	0.009	0.009	0.004	0.006	0.009
Outcome mean	0.196	0.179	0.171	0.204	0.190	0.187	0.194	0.184
Outcome SD	0.361	0.336	0.336	0.362	0.352	0.350	0.375	0.326
SD of share negative exp.	0.415	0.400	0.413	0.407	0.409	0.411	0.422	0.397
SD of share positive exp.	0.411	0.413	0.412	0.412	0.414	0.407	0.429	0.394
Units × age groups	873,643	583,745	659,795	797,593	979,428	477,960	731,506	725,881
Units	137,815	98,077	99,474	136,418	171,815	85,479	147,609	88,283
Clusters	117,619	80,011	83,871	113,853	145,880	73,270	136,011	65,891
Adjusted R ²	0.129	0.062	0.054	0.137	0.105	0.106	0.080	0.141

Prime-age: controlling for timing of experiences



- Whether youth experience comes first or second:
 - No spillovers for prime-age
- Age pattern robust to timing