GI JOBS IN GE

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February 2026

Overview

US Armed Forces: Largest domestic US employer

- 2 million enlisted and civilians
- Walmart: 1.6 mil
- Federal gov: 1.3 mil

Army provides **high-skilled** jobs

- Particularly **similar to manufacturing jobs**

This study: GE effects of mil. employment on US labor market

End of Cold War: US military sheds >700K jobs

- Shock to US manufacturing workers on top of trade and automation

Main findings

Empirical: End of Cold War led to 0.5% income decline for civilian workers in “hard hat” jobs similar to military

- Event study design

Theory: GE model of occupational choice and on-the-job skill accumulation.

- Findings TBD

Related Literature

Individual effects of military service
Angrist 1990 (draft); vs. Angrist 1998; Greenberg et al. 2022 (voluntary)

Local labor market effects of public employment
Faggio & Overman 2014, **Zou 2018**, Becker, Heblich & Sturm 2021

Effects of fiscal policy: Aggregate and Procurement
Blanchard & Perotti (2002), Ramey (2011a, 2011b, 2016, 2019), Ilzetzki, Mendoza & Vegh (2013), Nakamura & Steinsson 2014, Ramey & Zubairy (2018), Auerbach, Gorodnichenko & Murphy 2020

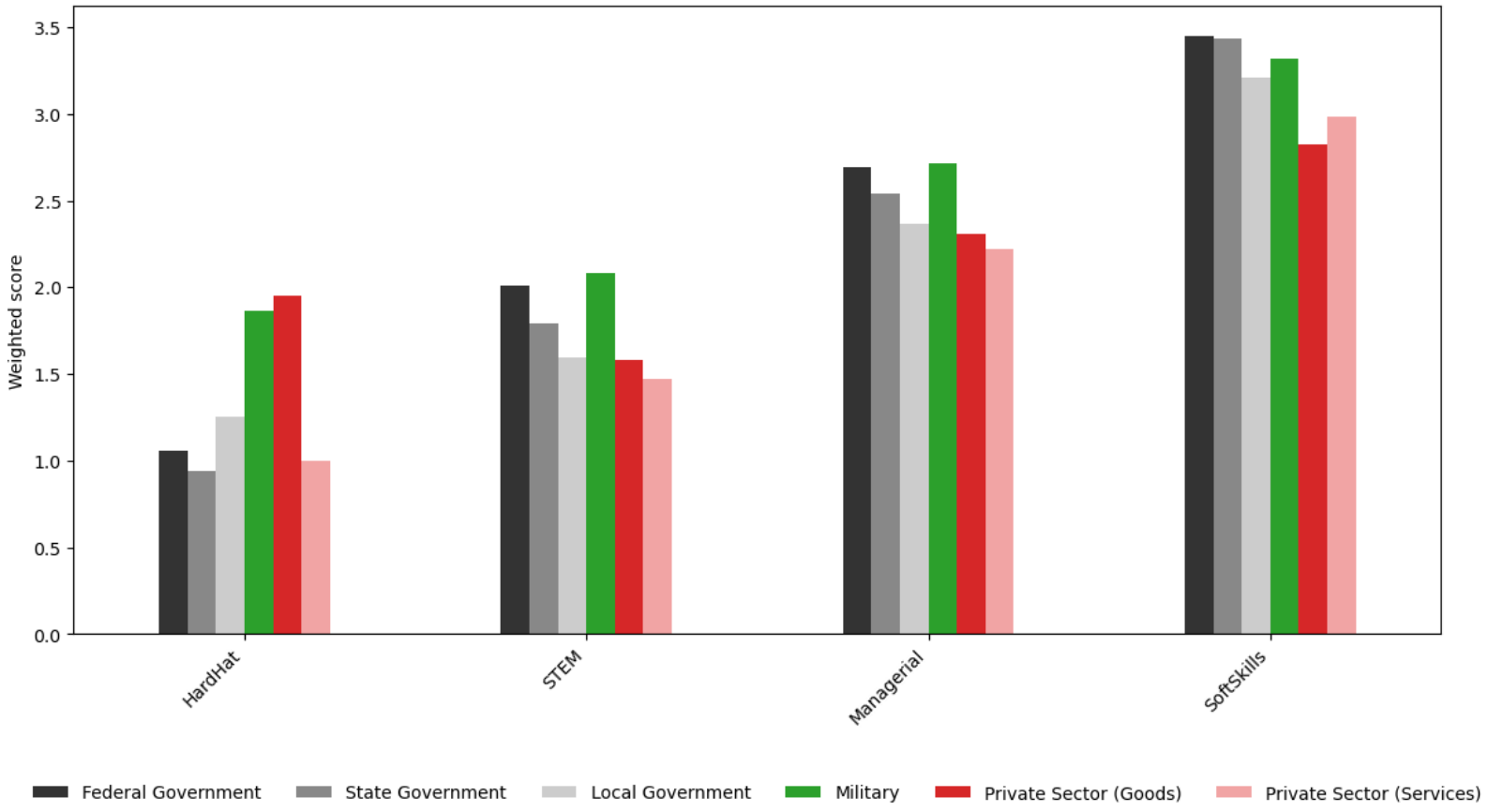
GE effects of public wages in frictional labor markets
Michaillat 2014, Gomes 2015, Afonso & Gomes 2014, Chassamboulli & Gomes 2023)

Occupational choice, tasks, and skill formation
Autor, Levy & Murnane 2003, Acemoglu & Autor 2011, Deming 2017, Althoff & Reichardt 2026

Motivating Facts

Skill Requirements in Employment Sectors

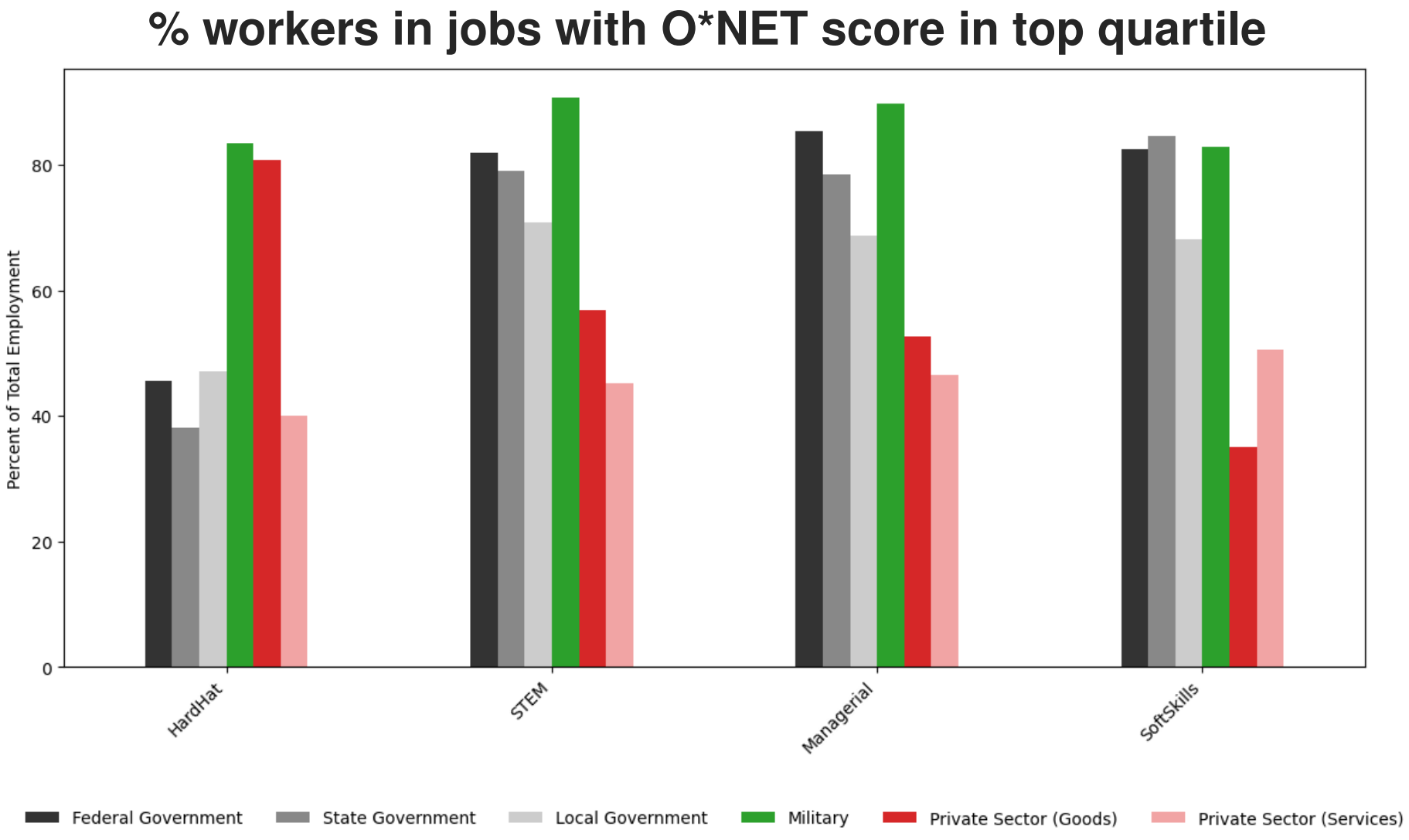
Average O*NET score, 1-7 scale



Sources: American Community Survey, O*NET, and the authors

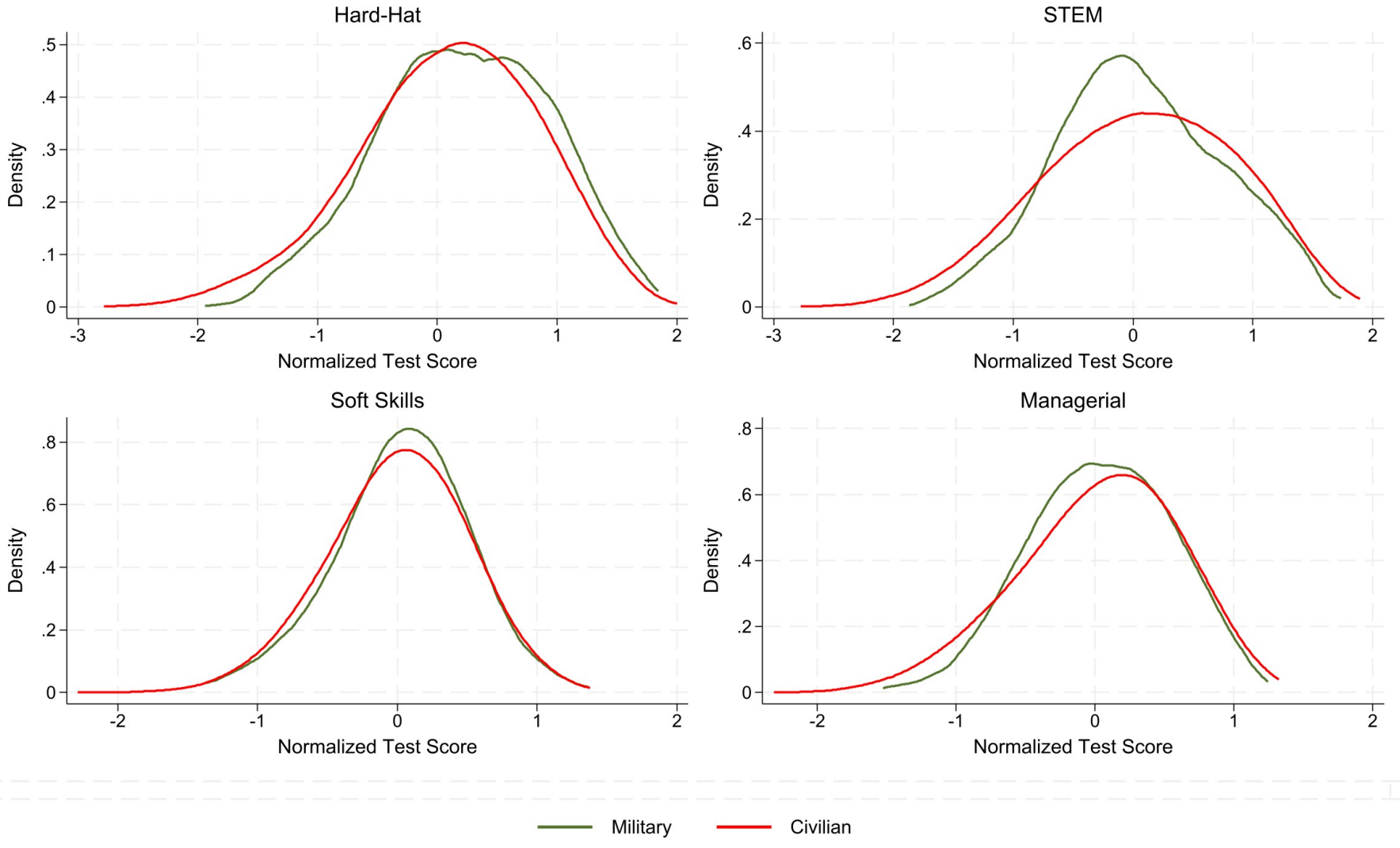
34 skills **Air force** **34 skills (Air force)** **Veterans**

Skill Requirements in Employment Sectors



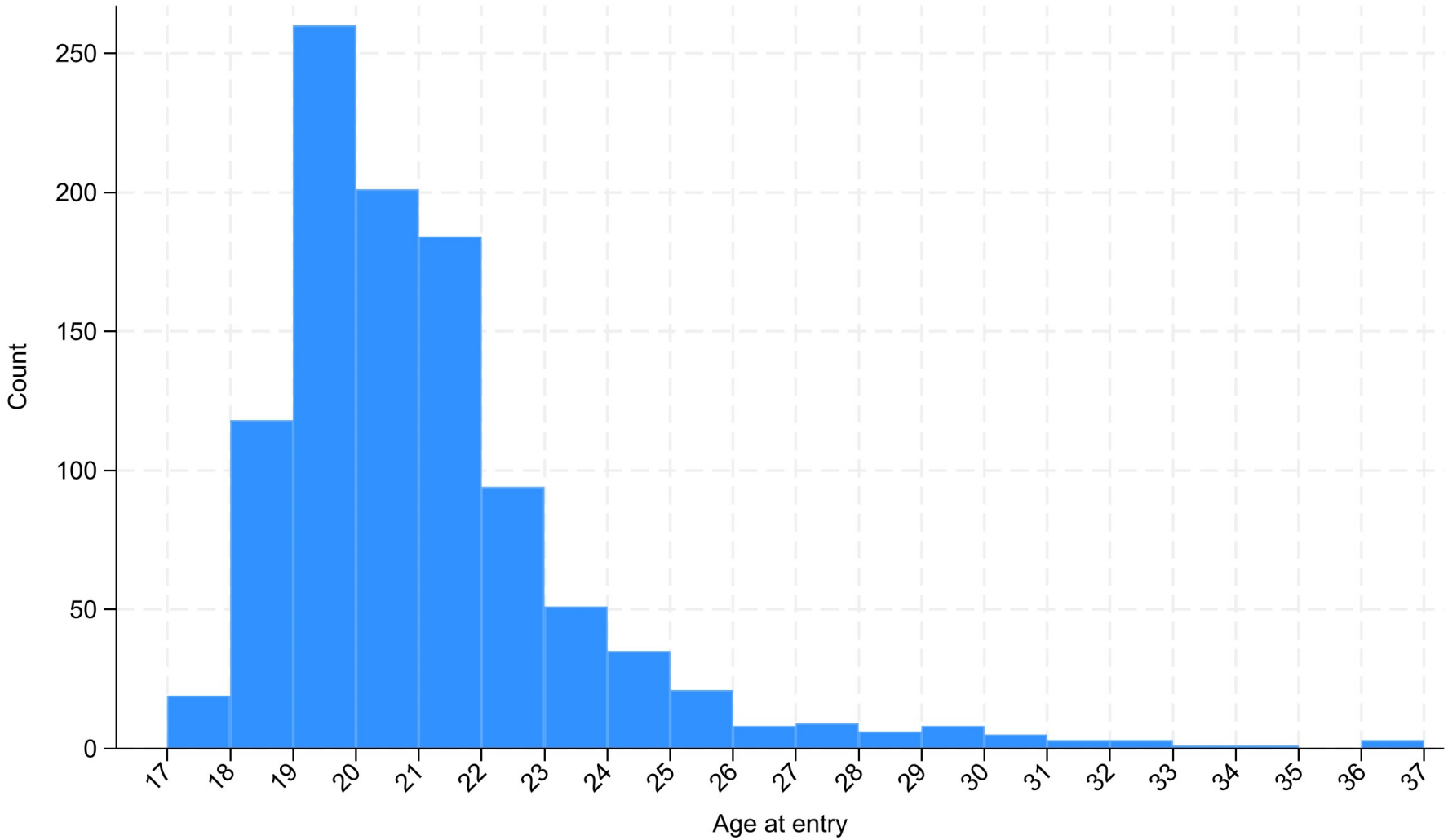
Sources: American Community Survey, O*NET, and the authors

Test Scores of Military and Civilian Personnel

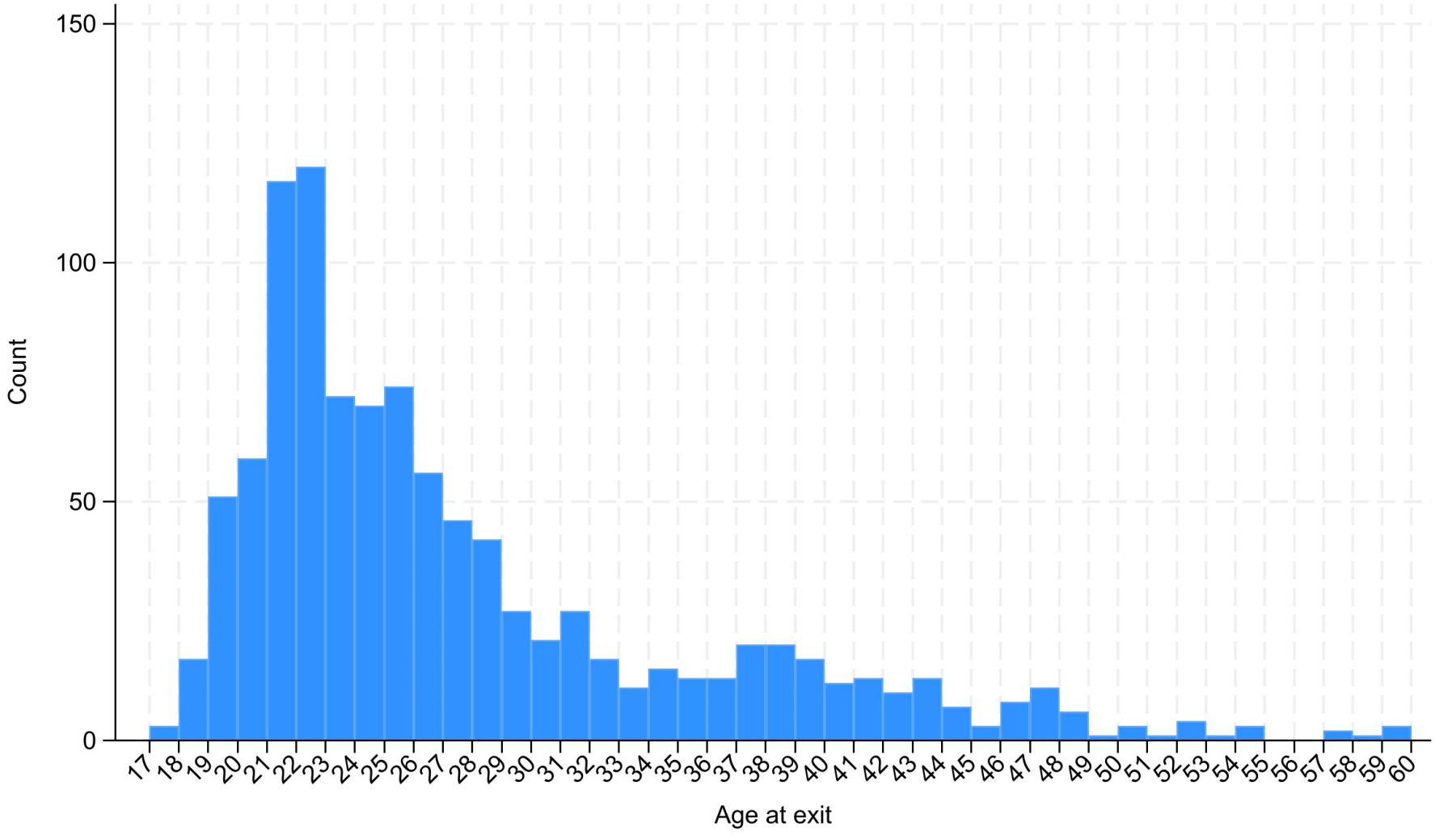


Sources: National Longitudinal Surveys of Youth and the authors

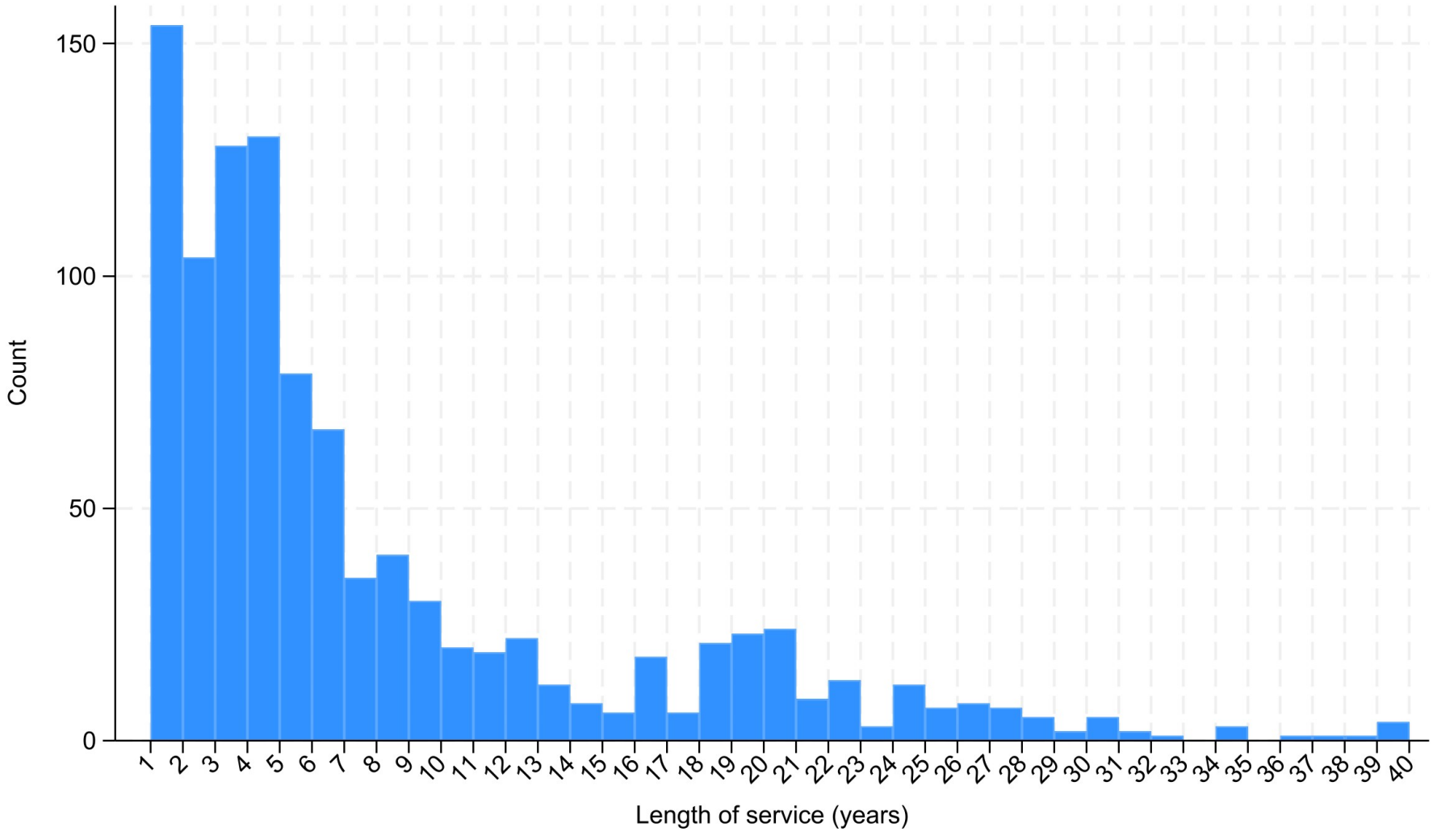
Age at Entry into Military Service



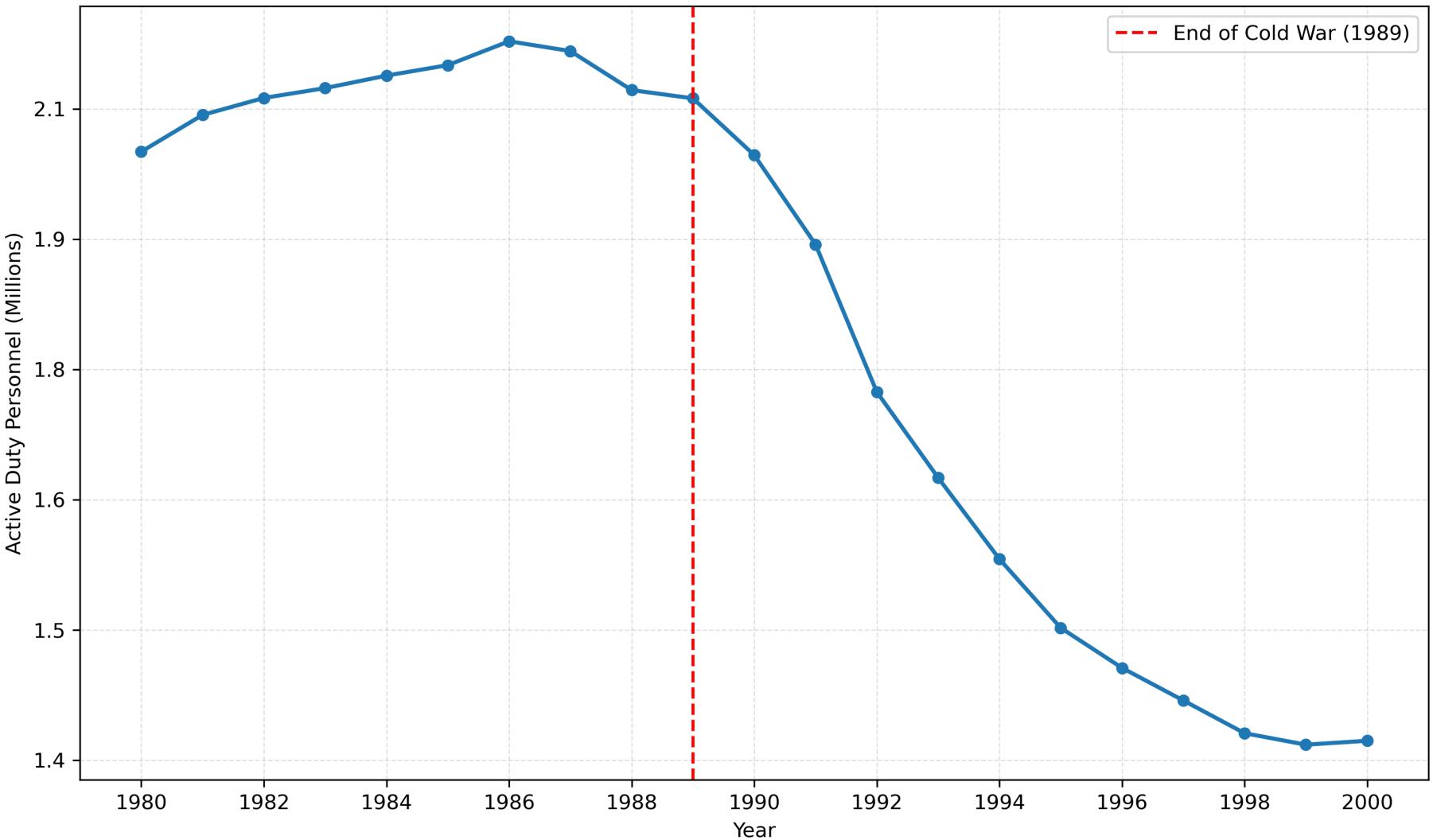
Age at Exit from Military Service



Length of Military Service



Enlisted Soldiers, 1980–2000



Sources: US Department of Defense and the authors

Event Study:
The Cold War End Shock

Data Sources

O*NET: Department of Labor classification of skill requirements in jobs

- Only civilian jobs, but cross-walks available to translate military jobs into civilian counterparts.

American Community Survey: Includes occupation for a representative sample of enlisted soldiers

Air Force Statistical Digest: More granular administrative data on occupations in the Airforce

Current Population Survey: Repeated cross-section of earnings and demographic information on workers.

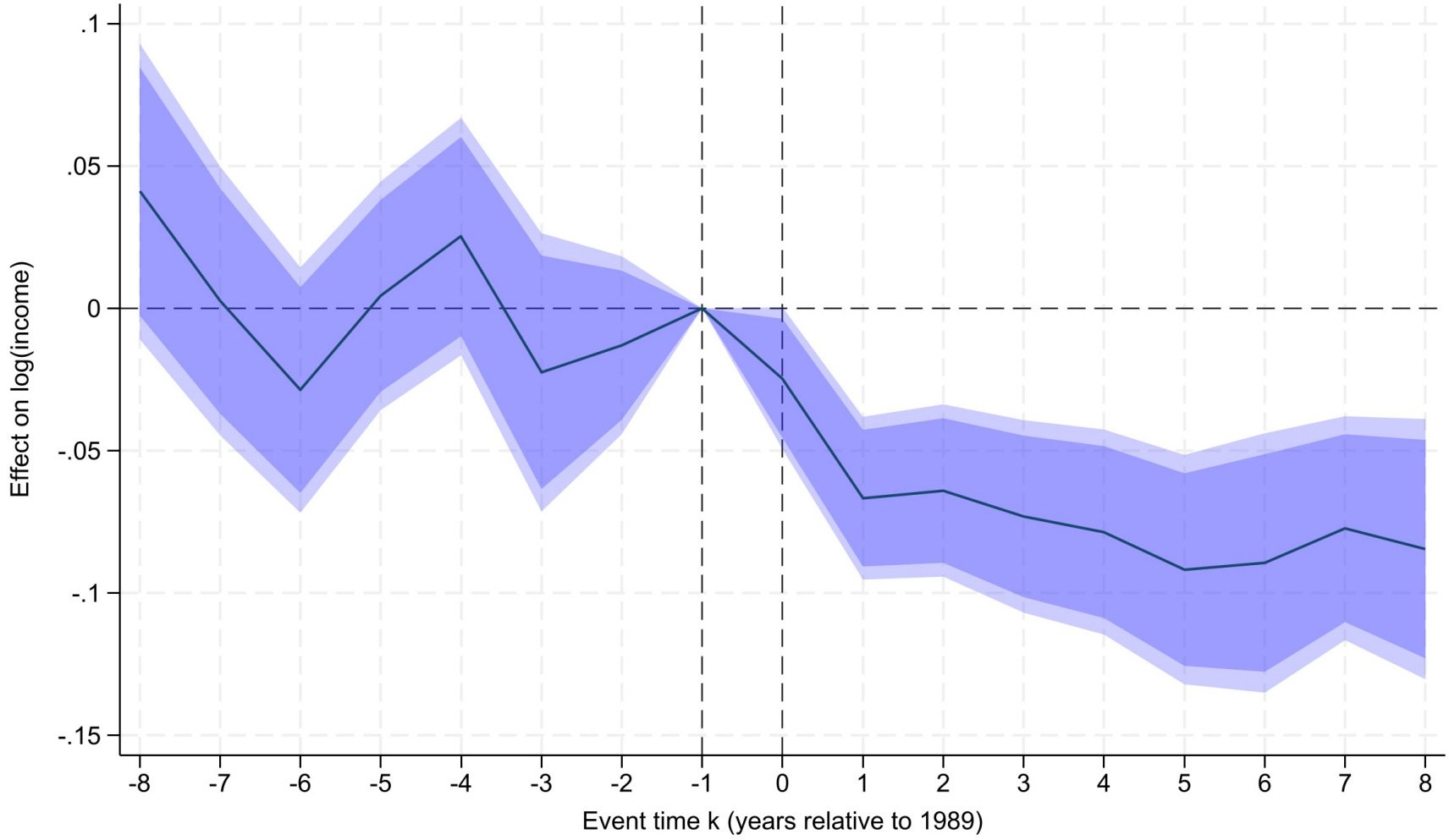
Event Study: Specification

Two-way fixed effects (TWFE) regression:

$$\ln(\text{WageIncome}_{iot}) = \sum_{\substack{k=-8 \\ k\neq -1}}^{8} \beta_k \left(\mathbf{1}\{\text{event}_t = k\} \times \text{Treated}_o\right) + \alpha_o + \lambda_t + \varepsilon_{iot} \quad (1)$$

- i = individuals, o = occupations, t = calendar years, k = event time
- $k = -1$ (year 1989) is the omitted reference period
- α_o = occupation fixed effects, λ_t = year fixed effects
- Treated_o: occupations in top decile of skill similarity to blue-collar military jobs

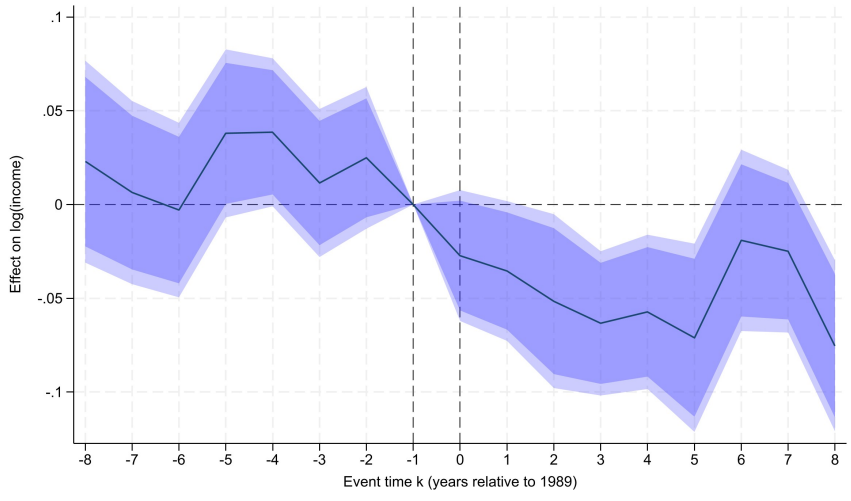
Event Study Responses

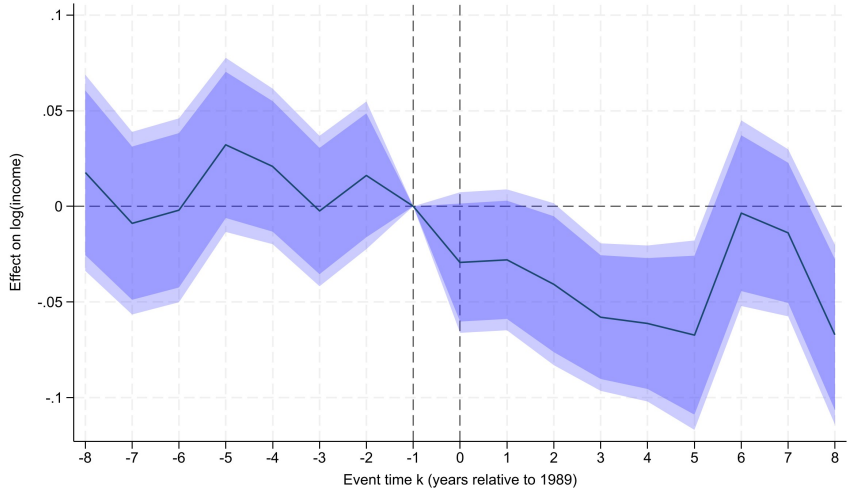


Quartile Controls

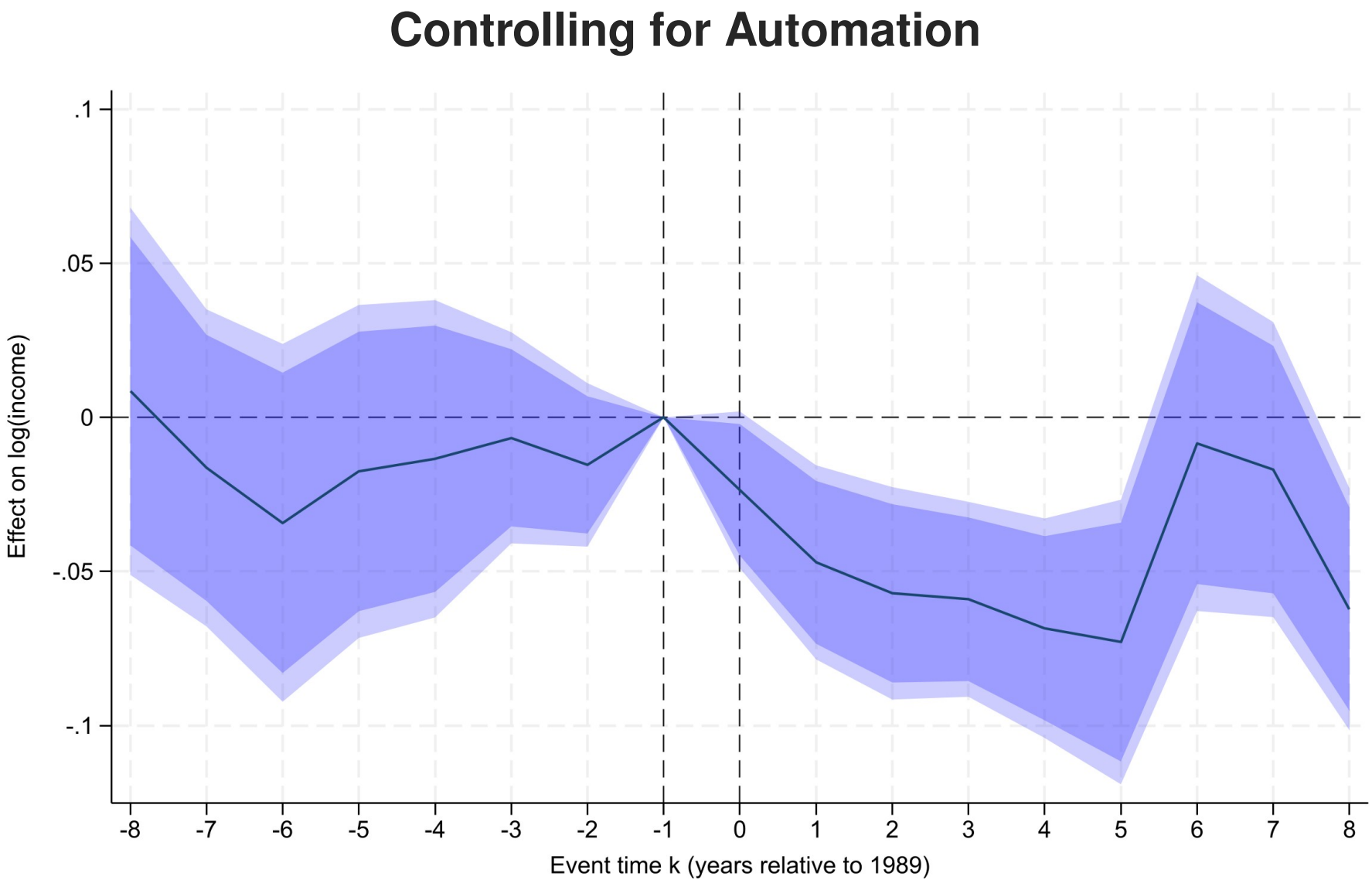
EVENT STUDY

Controlling for China Shock

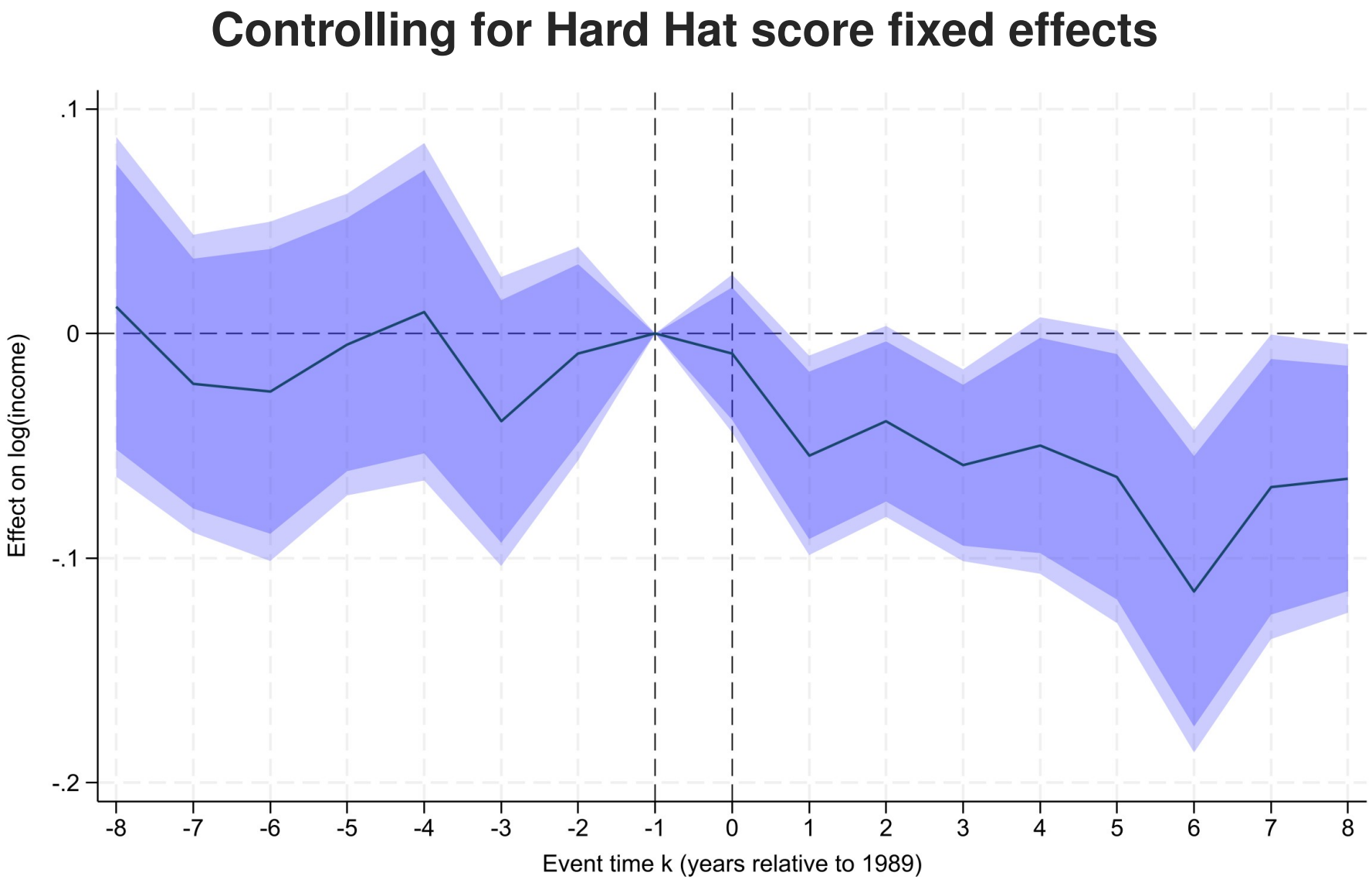




Event Study


Controlling for Automation
.1
.05
0
-.05
-.1
Effect on log(income)
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
Event time k (years relative to 1989)

Event Study


Controlling for Hard Hat score fixed effects
Effect on log(income)
.1
0
-.1
-.2
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
Event time k (years relative to 1989)

MODEL

Model: Workers and Firms

Overlapping generations: measure $1/A$ workers born each period, live A periods

Worker heterogeneity: age $a \in [0, A]$, skill vector $\boldsymbol{h}$, learning ability ψ

Two sectors:

- Occupations $j \in [1, J^C]$: consumer goods sector
- Occupations $j \in [J^C + 1, J^C + J^G = J]$: government / military sector

Government: raises lump-sum tax T to produce public/defense good G

Workers: supply one unit of labor inelastically; consume after-tax income

Model: Production Technology and Wages

Production function for occupation j:

$$y_j(\boldsymbol{h}) = \gamma_j f(\boldsymbol{h}, \boldsymbol{r}_j) \tag{2}$$

γ_j = productivity of occupation j, $\boldsymbol{r}_j$ = skill requirements of occupation j;

$f(\cdot)$ = match between worker skills and job requirements

Competitive wage equals marginal product:

$$w_j(\boldsymbol{h}) = p_j \gamma_j f(\boldsymbol{h}, \boldsymbol{r}_j) \tag{3}$$

Skill accumulation on the job:

$$\boldsymbol{h}' = g_j(\boldsymbol{h}, \psi)$$

Workers accumulate skills according to current occupation and learning ability

Model: Firm's Problem

Each occupation j is produced by a representative firm:

$$\max_{n_j(\boldsymbol{h})} \int n_j(\boldsymbol{h}) \left(p_j y_j(\boldsymbol{h}) - w_j(\boldsymbol{h}) \right) d\boldsymbol{h} \tag{4}$$

- $n_j(\boldsymbol{h})$: labor employed with skill set $\boldsymbol{h}$
- Firms in consumer goods and government sectors operate equivalently
- p_j: price of occupation j's output, determined in equilibrium

Model: Occupational Choice

Value function for a worker of age a, skills $\boldsymbol{h}$, ability ψ, previous occupation k:

$$V_a(\boldsymbol{h}, \psi, k) = \mathbb{E}\left[\max_j \log(w_j(\boldsymbol{h}) - T) + \log \varepsilon_j + \mu_j - \kappa(k, j) + \beta\, V_{a+1}\left(\lambda_j(\boldsymbol{h}, \psi), \psi, j\right)\right] \tag{5}$$

- $\varepsilon_j \sim$ Gumbel: idiosyncratic match/productivity shock for occupation j
- μ_j: amenity value of occupation j
- $\kappa(k, j)$: switching cost from occupation k to j; set to $\kappa \cdot \mathbf{1}[j \neq k]$
- $\lambda_j(\boldsymbol{h}, \psi)$: next period's human capital when choosing j
- Terminal condition: $V_{A+1}(\cdot) = 0$

Model: Logit Choice Probabilities

With Gumbel-distributed shocks, the **choice probability** has a closed form:

$$\mathbb{P}_a(j \mid \boldsymbol{h}, \psi, k) = \frac{\exp\Big(\frac{1}{\zeta}\left(\log(w_j(\boldsymbol{h}) - T) + \mu_j - \kappa(k, j) + \beta\, V_{a+1}\big(\lambda_j(\boldsymbol{h}, \psi), \psi, j\big)\right)\Big)}{\sum_{l=1}^{J} \exp\Big(\frac{1}{\zeta}\left(\log(w_l(\boldsymbol{h}) - T) + \mu_l - \kappa(k, l) + \beta\, V_{a+1}(\lambda_l(\boldsymbol{h}, \psi), \psi, l)\right)\Big)} \tag{6}$$

Simplified value function:

$$V_a(\boldsymbol{h}, \psi, k) = \zeta \log \sum_{j=1}^{J} \exp\Big(\frac{1}{\zeta}\big(\log(w_j(\boldsymbol{h}) - T) + \mu_j - \kappa(k, j) + \beta\, V_{a+1}\big(\lambda_j(\boldsymbol{h}, \psi), \psi, j\big)\big)\Big) \tag{7}$$

Solved via backward induction from age A to 1, with $V_{A+1}(\cdot) = 0$

Model: Private and Public Demand

Consumer goods – CES basket $C = \left(\sum_{j=1}^{J^C} \alpha_j^{\sigma} c_j^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$; cost minimization yields:

$$\frac{p_j}{P_C} = \alpha_j^{\frac{1}{\sigma}} \left(\frac{c_j}{C} \right)^{-\frac{1}{\sigma}}, \qquad P_C = \left(\sum_{j=1}^{J^C} \alpha_j p_j^{1-\sigma} \right)^{\frac{1}{1-\sigma}} = 1 \tag{8}$$

Government good – CES aggregate $G = \left(\sum_{j=J^C+1}^{J} \alpha_j^{\sigma} g_j^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$; cost minimization yields:

$$\frac{p_j}{P^G} = \alpha_j^{\frac{1}{\sigma}} \left(\frac{g_j}{G} \right)^{-\frac{1}{\sigma}}, \qquad P^G = \left(\sum_{j=J^C+1}^{J} \alpha_j p_j^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \tag{9}$$

Government budget constraint: $P^G G = T$

Model: Equilibrium Conditions

Law of motion for the distribution of workers over states:

$$\Lambda_{a+1,t+1}(\boldsymbol{h}', \psi, j) = \sum_{k=1}^{J} \int_{\lambda_j(\boldsymbol{h}', \psi) \leq \boldsymbol{h}} \mathbb{P}_{a,t}(j \mid \boldsymbol{h}, \psi, k)\, d\Lambda_{a,t}(\boldsymbol{h}, \psi, k) \tag{10}$$

Market clearing for each occupation:

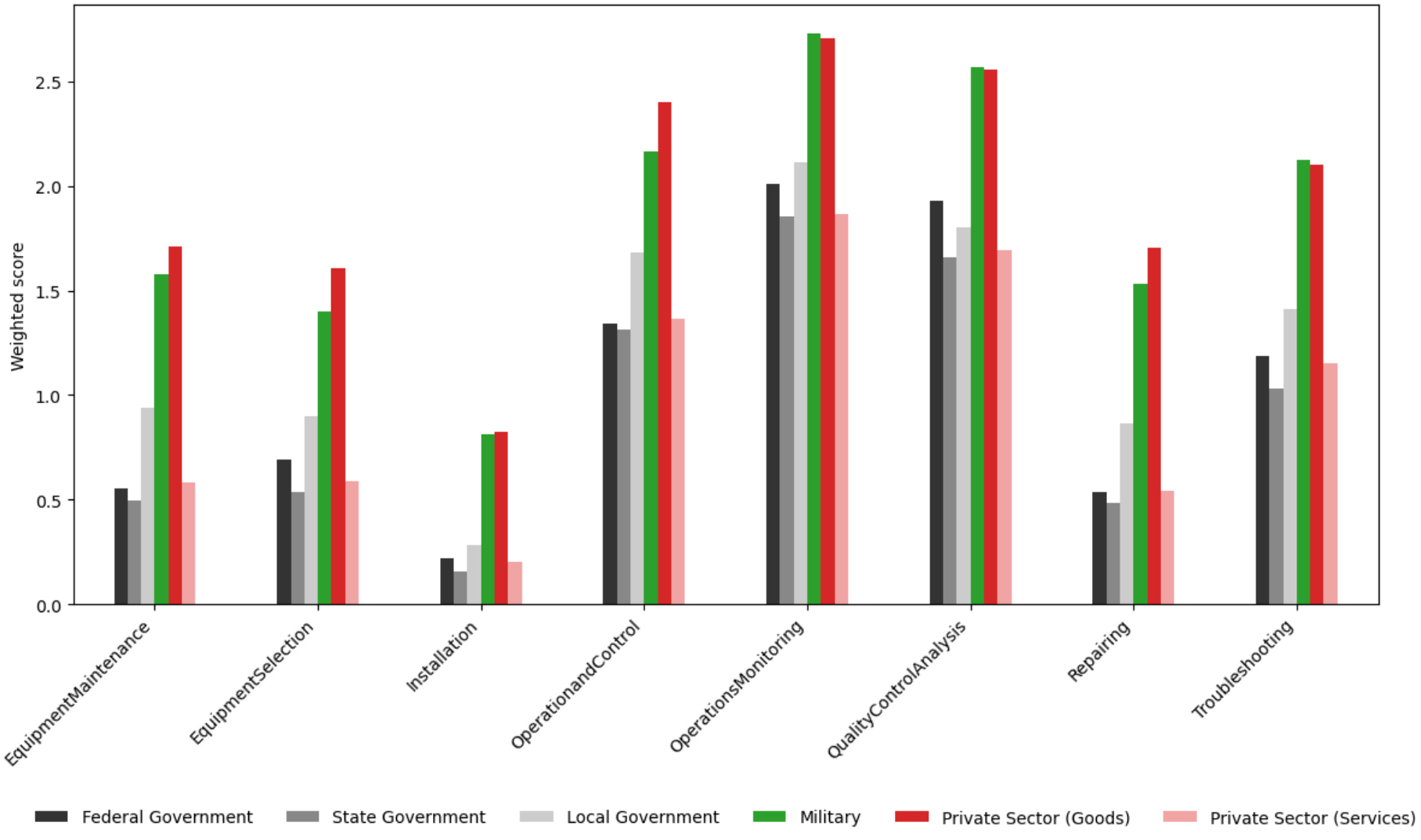
$$y_{j,t} \equiv \sum_{a=1}^{A} \sum_{k=1}^{J} \int y_j(\boldsymbol{h})\, \mathbb{P}_{a,t}(j \mid \boldsymbol{h}, \psi, k)\, \mathbb{E}[\varepsilon_j \mid j, \boldsymbol{h}, \psi, k]\, d\Lambda_{a,t}(\boldsymbol{h}, \psi, k) \tag{11}$$

Output market clearing: $c_j + g_j = y_j \quad \forall j$

Labor market clearing: $n_{j,t}(\boldsymbol{h}) = G_{a,t}(\boldsymbol{h}, \psi, j) \quad \forall j, \boldsymbol{h}$

Additional Materials

HARD HAT SKILL REQUIREMENTS



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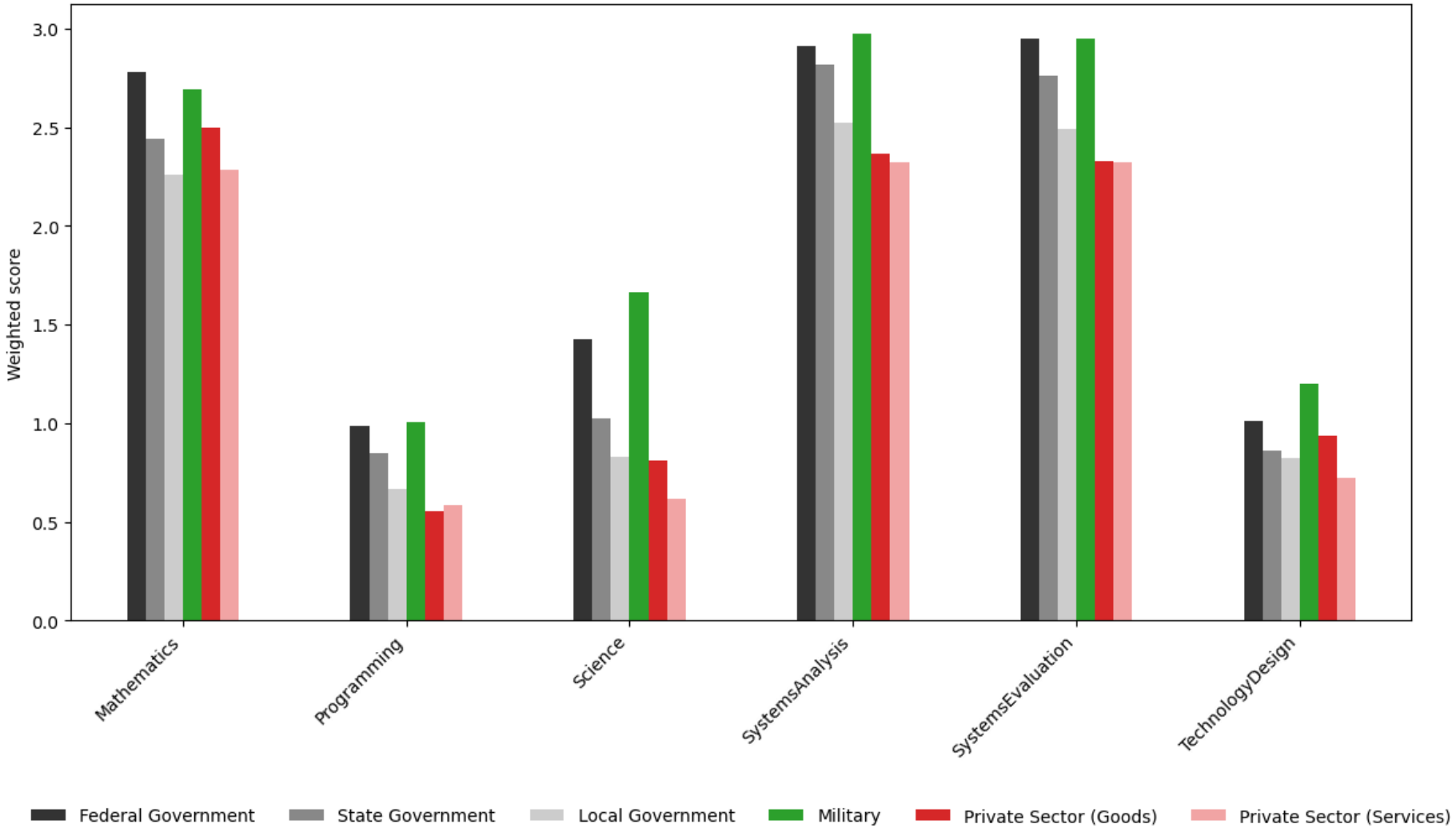
STEM Skill Requirements



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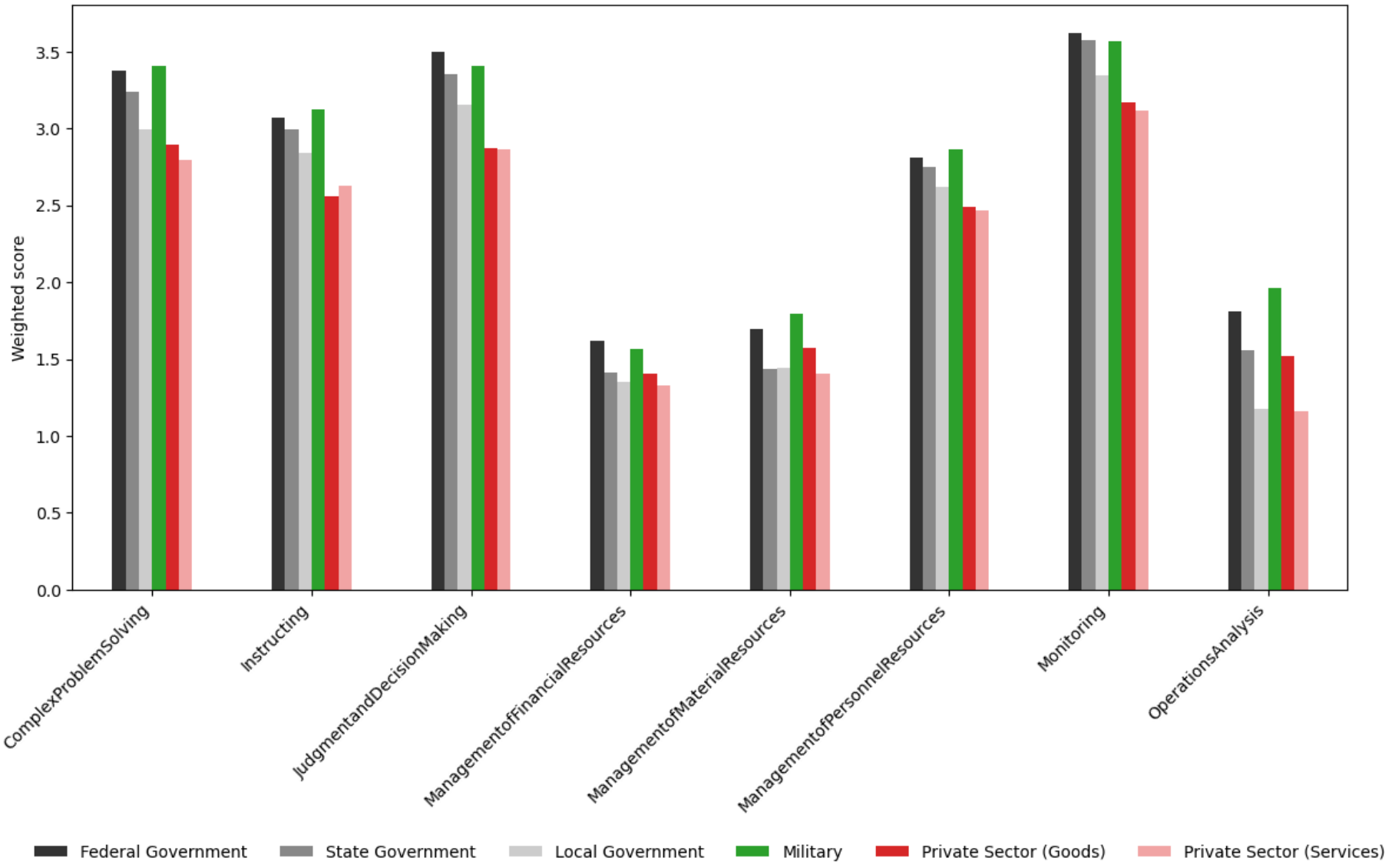
MANAGEMENT SKILL REQUIREMENTS



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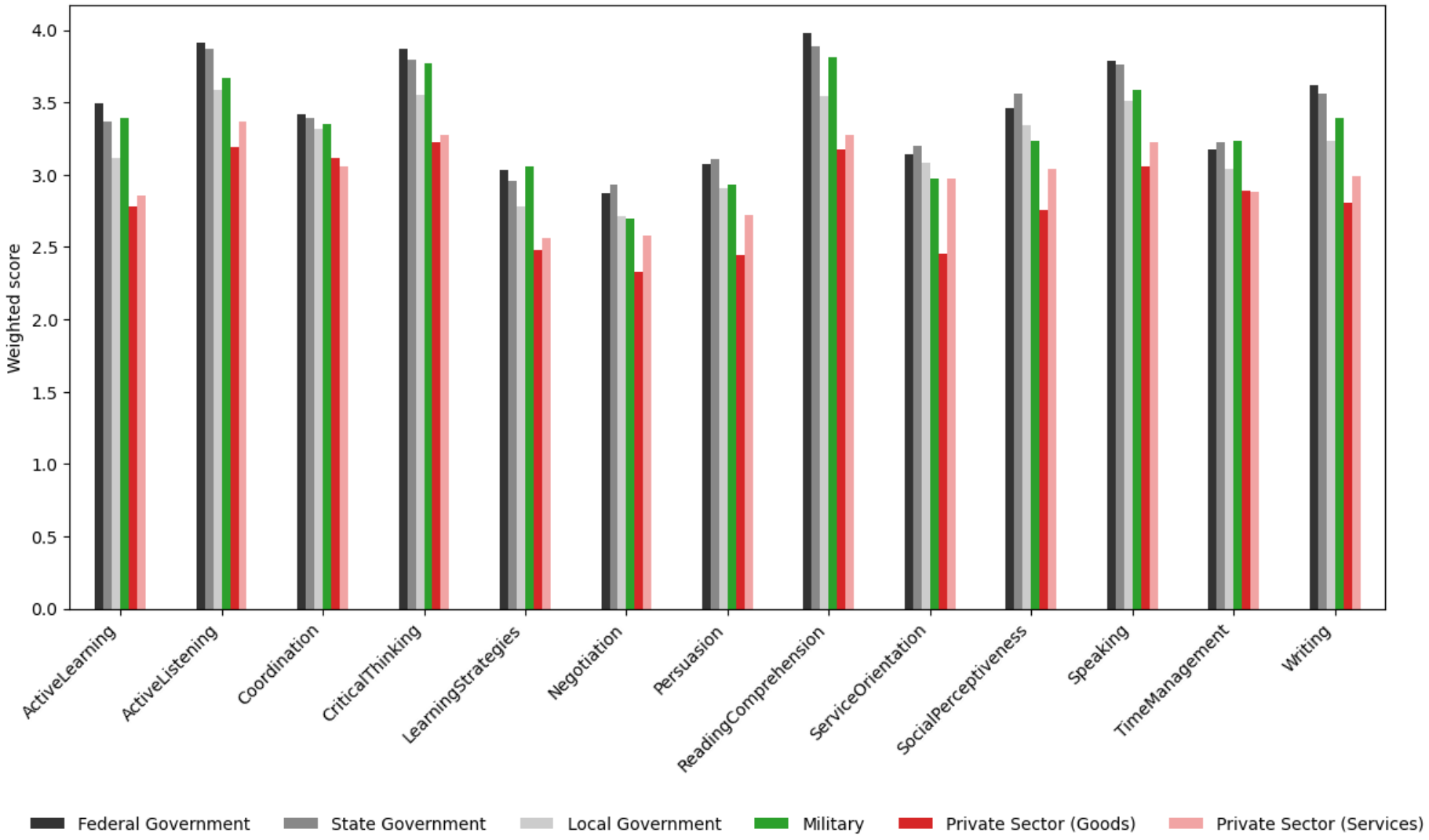
SOFT/SOCIAL SKILL REQUIREMENTS



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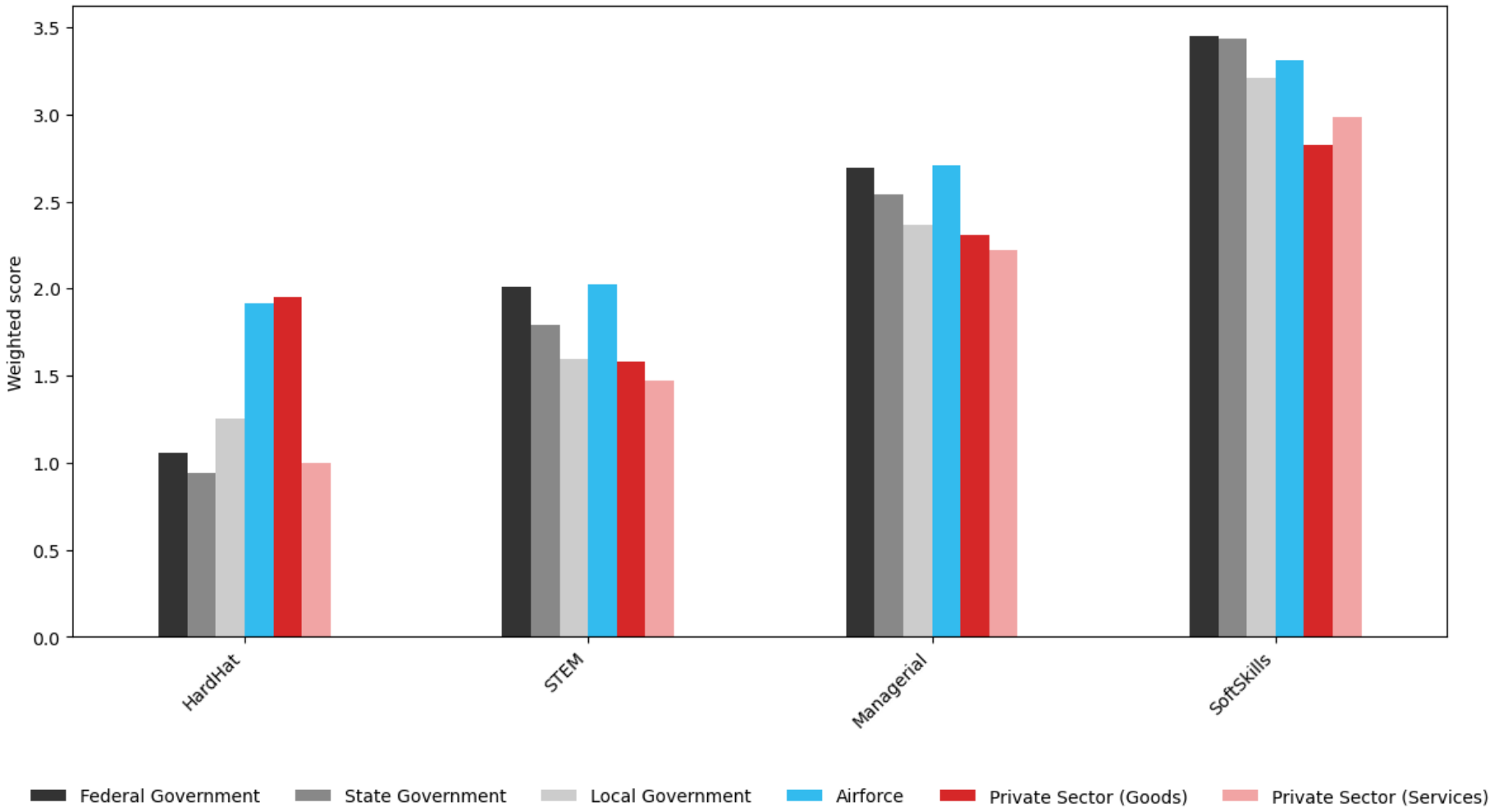
Skill Requirements in Employment Sectors (Air Force)

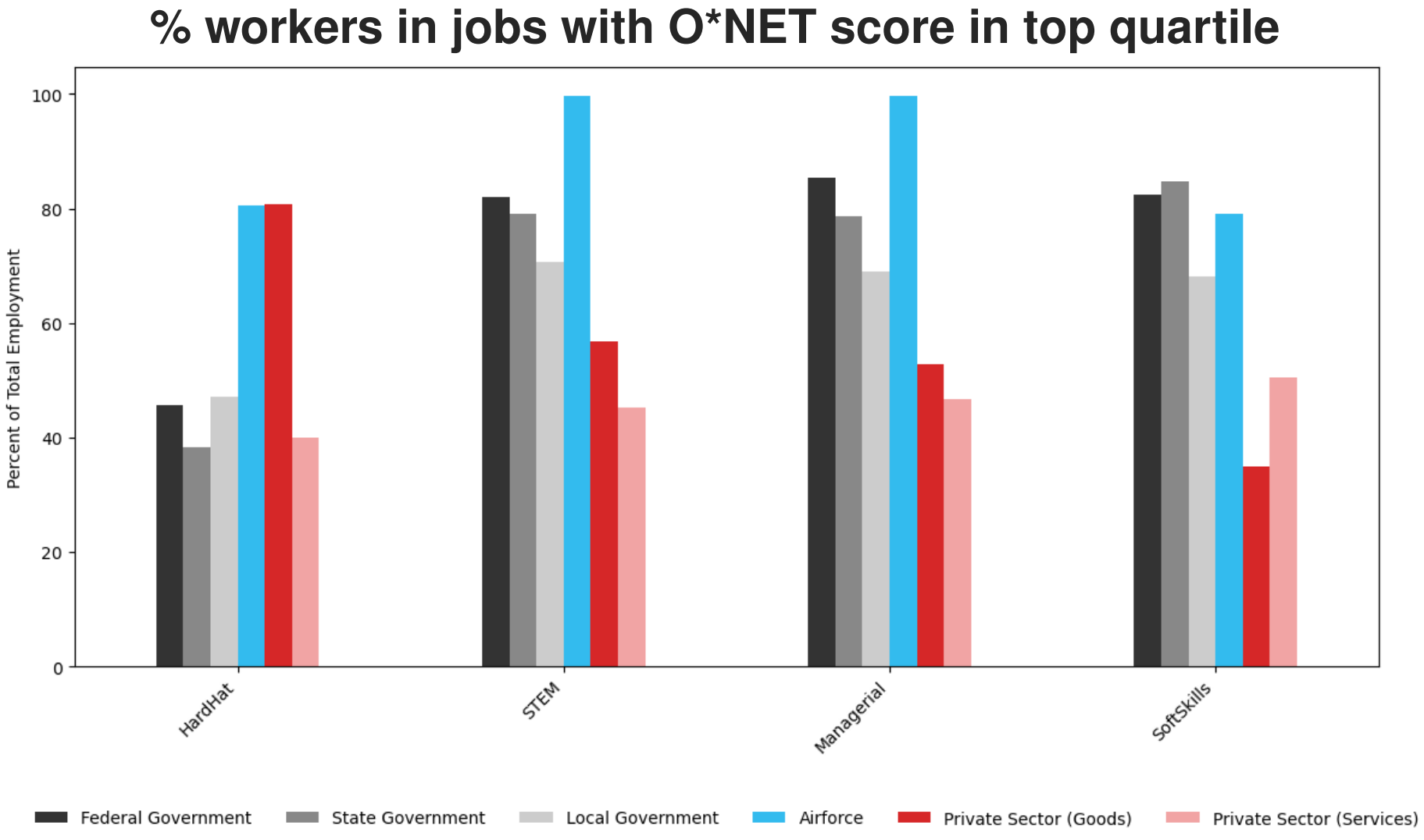
Average O*NET score, 1-7 scale



Sources: American Community Survey, O*NET, and the authors

Return

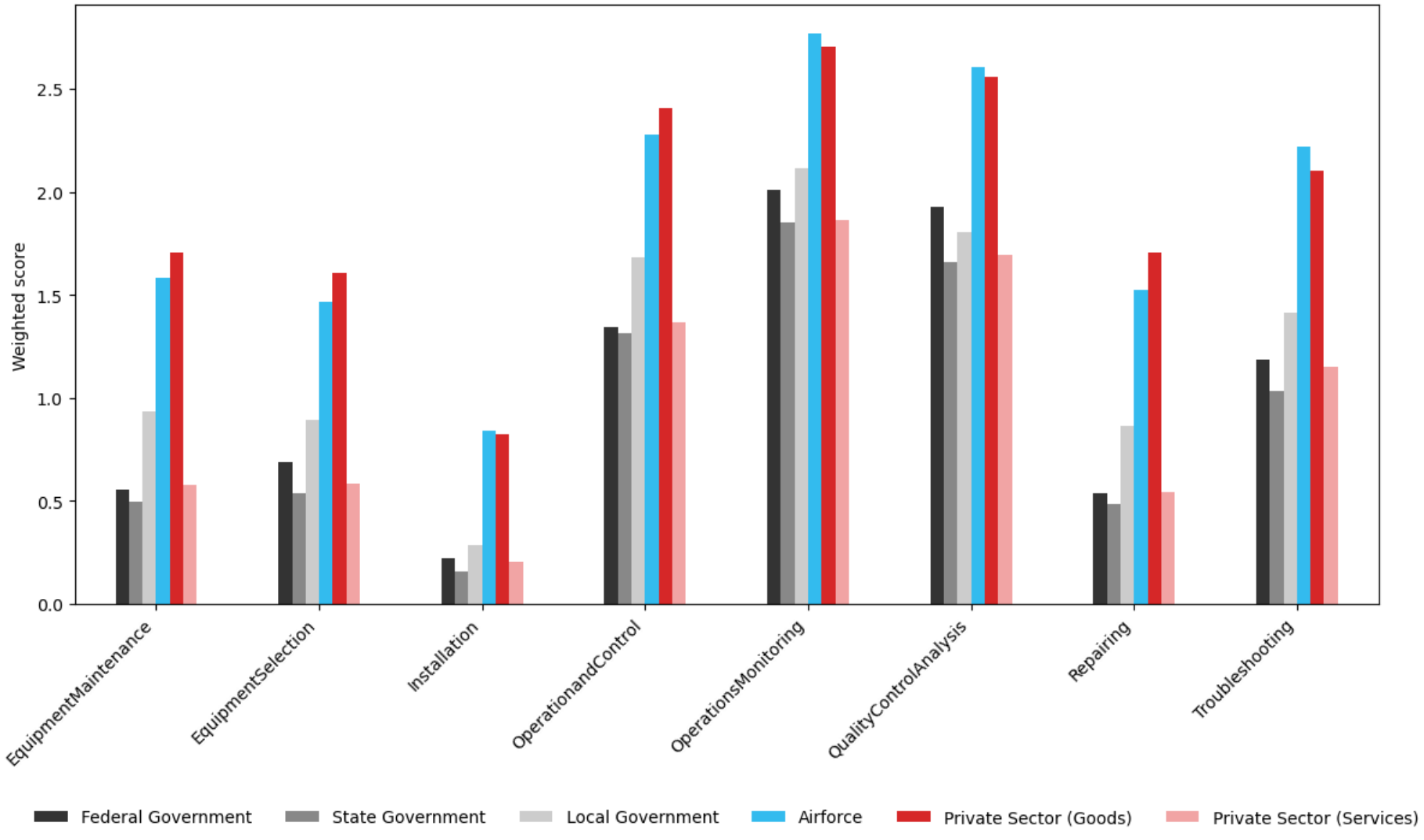
Skill Requirements in Employment Sectors (Air Force)



Sources: American Community Survey, O*NET, and the authors

Return

Hard Hat Skill Requirements (Air Force)



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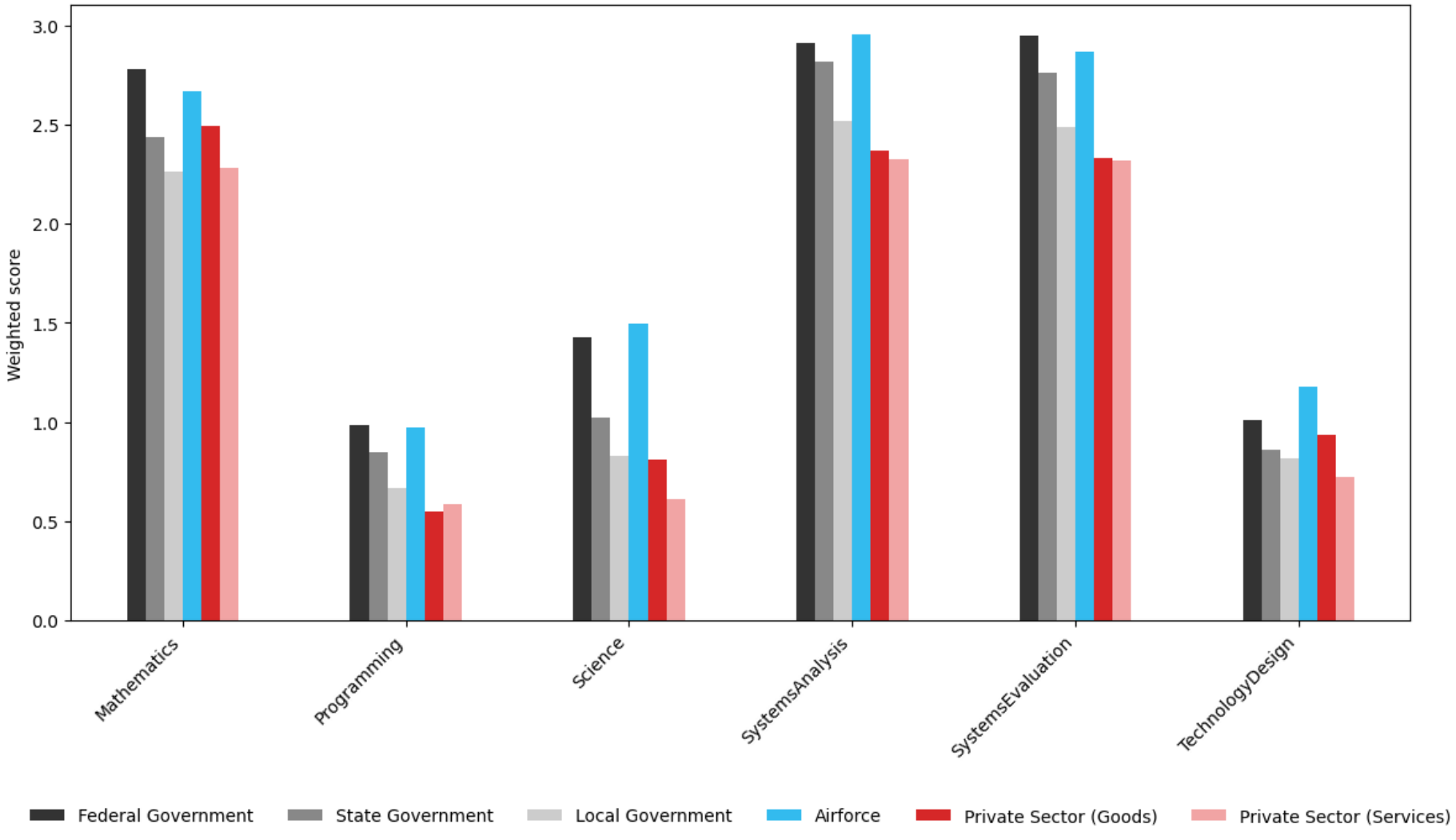
STEM Skill Requirements (Air Force)



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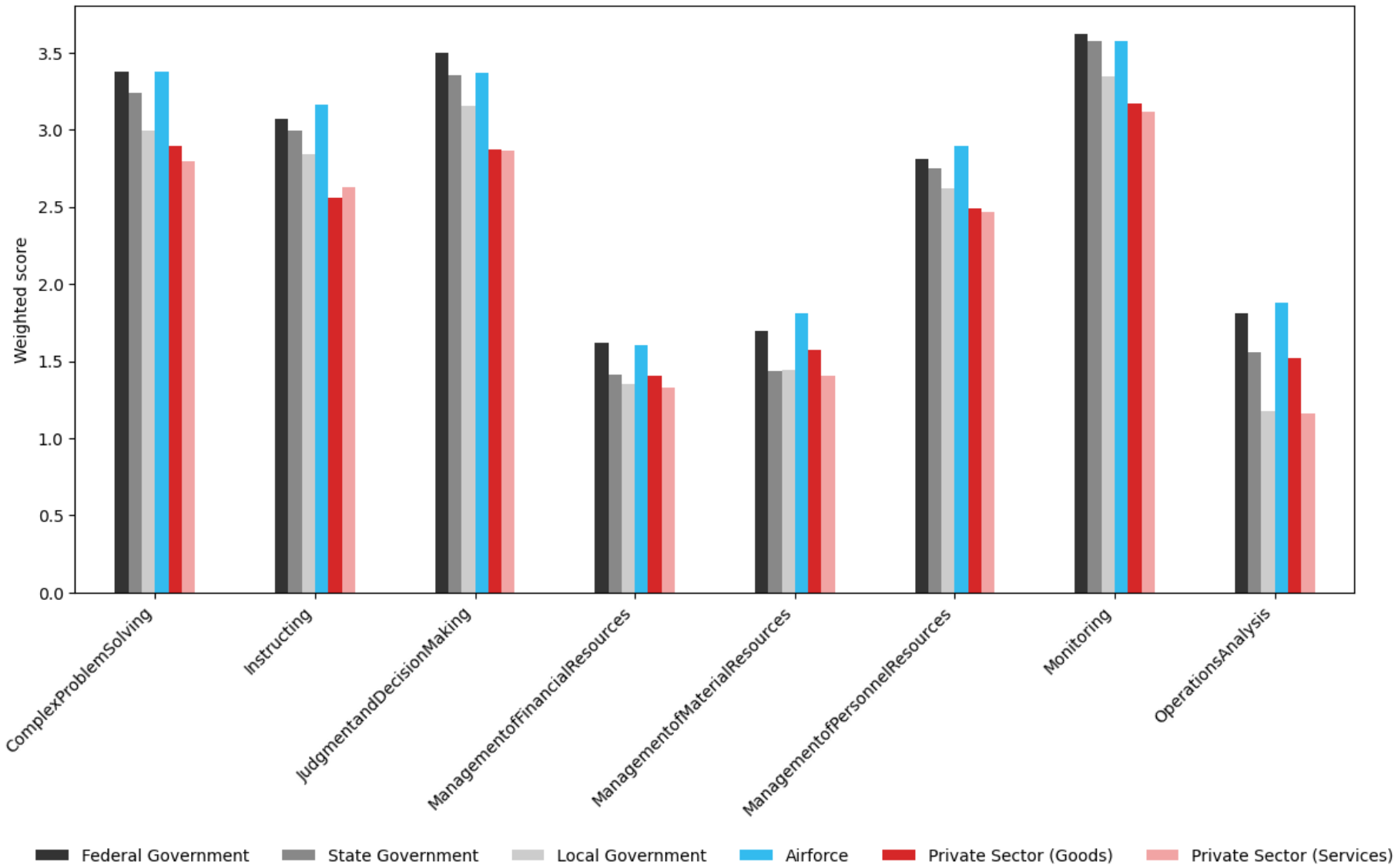
MANAGEMENT SKILL REQUIREMENTS (AIR FORCE)



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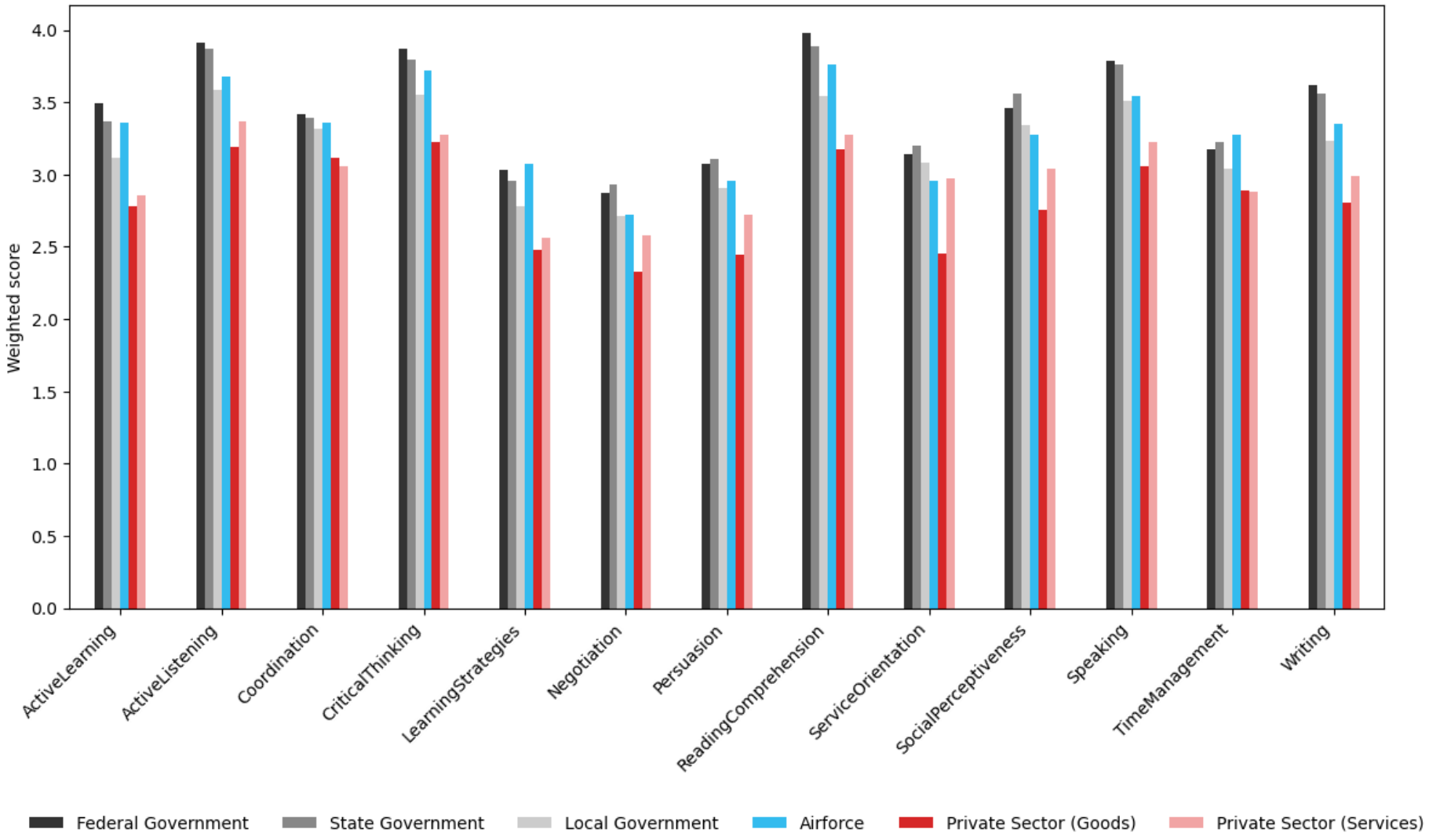
SOFT/SOCIAL SKILL REQUIREMENTS (AIR FORCE)



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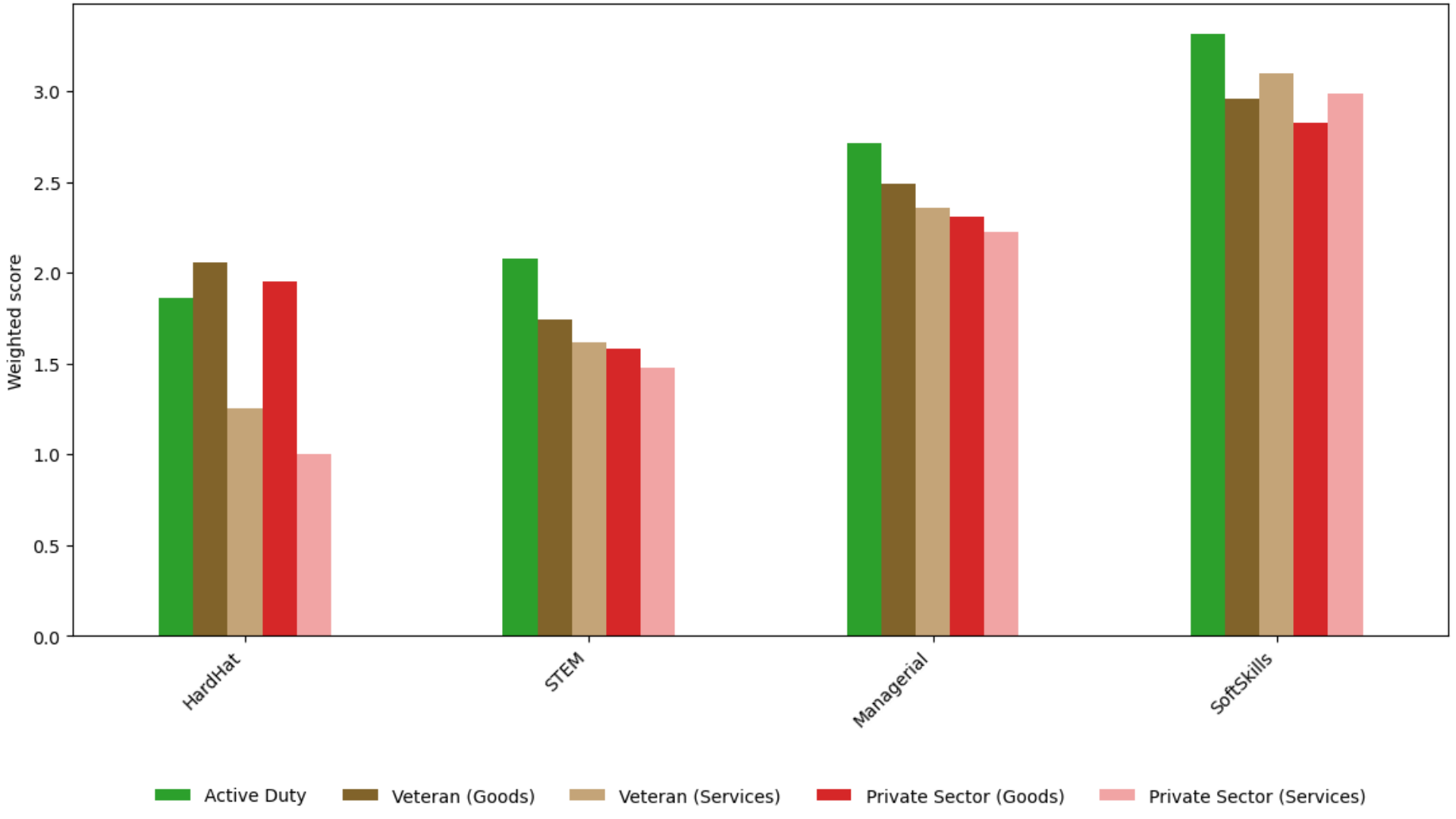
Skill Requirements in Jobs Held by Veterans



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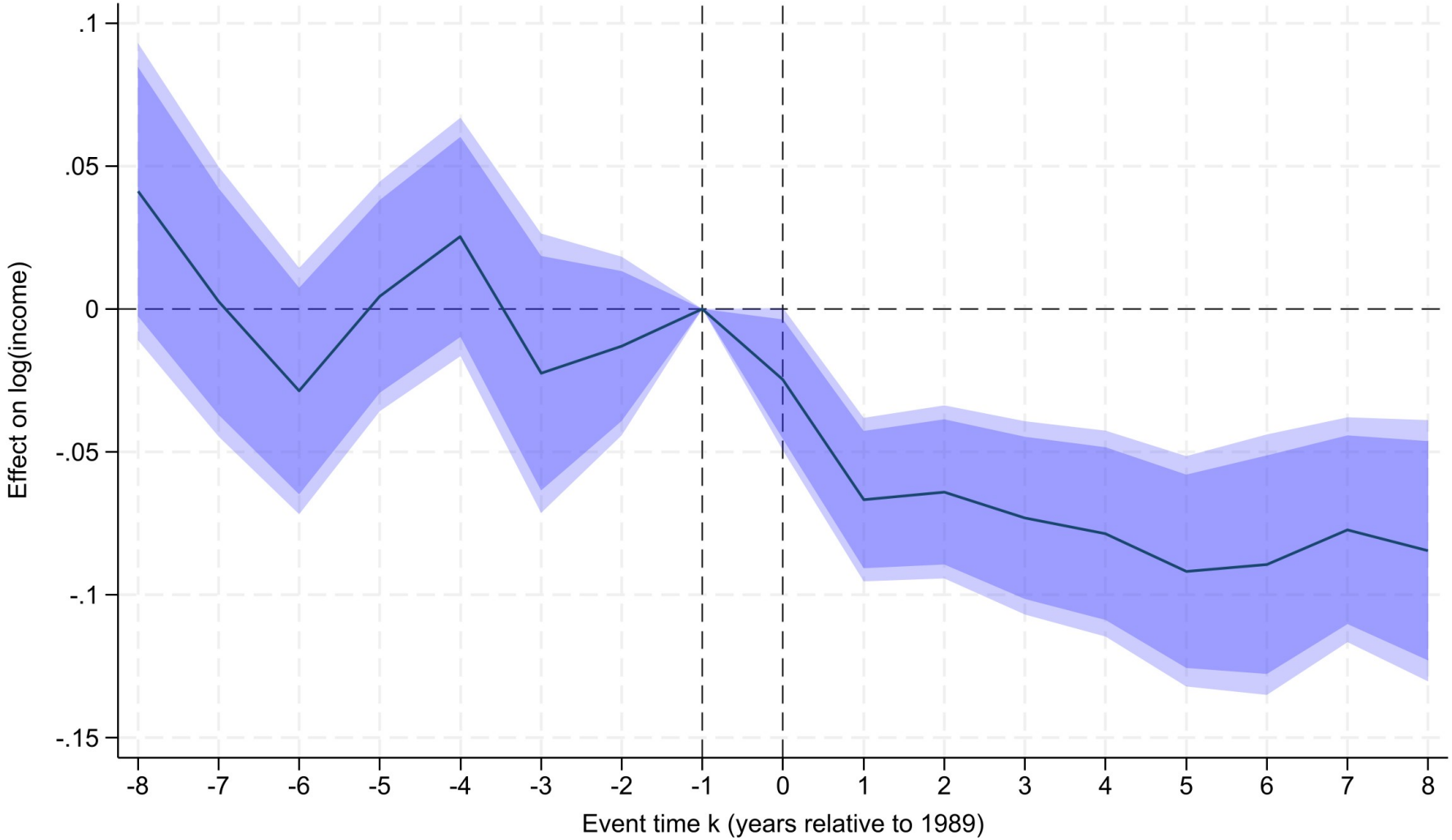
Event Study

Top Quartile of Similarity



EVENT STUDY

Controlling for individual characteristics