# How much work experience do you need to get your first job?
## The macroeconomic implications of bias against labor market entrants

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November 15, 2024

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# Motivation I

A vicious circle (meme found in social media)...

# Motivation II

- The first step in a worker's career often is particularly hard
  - Job-finding rate for entrants is roughly half of the other unemployed JFRs
  - 35% of entry level positions posted since 2017 on LinkedIn require minimum three years of experience
  - 43% of college graduates start their career with a job that does not require a college degree

- *All* workers in the economy begin their career as labor market entrants

- Large literature documents that early-career shocks have long-lasting effects (von Wachter, 2020)

- Questions:
  1. What are the aggregate implications of firms' preference for experienced workers?
  2. Is there room for welfare-improving government interventions?

# What we do

- Build a DMP model with entrants and experienced workers
  - Firms that hire new workers have to incur training expenses
  - New workers who stay unemployed for an extended time period suffer skill loss

- **Ranking**: firms prefer hiring experienced over new workers to avoid training costs

- **Trade off**: the bias against new workers increases their unemployment duration and persistently lowers their productivity due to skill loss

- Use a calibrated version of the model to quantitatively study various governments interventions/labor market institutions

# What we find

- Four interventions
  - Ranking ban
  - Government subsidizes training costs from tax revenues
  - Internships: exogenous wages for entrants
  - Government subsidizes hiring of entrants only

- Ranking equilibrium features lower welfare than all interventions
  - Interventions increase aggregate unemployment and make firms incur larger training costs
  - Still higher welfare because they lower entrant's unemployment and save them from persistent skill losses

- Internships are welfare-enhancing
  - Exact effect depends on the magnitude of the exogenous wage
  - Inverse U-shape with max welfare at 85% of experienced workers' wage

- Government subsidy of entrants' hiring has the largest welfare gains
  - Directly confronts the issue of entrants' long unemployment duration
  - Rationalizes policies that explicitly target young workers (e.g., Youth Employment Initiative)

# Literature

- **Skill loss in unemployment**: Pissarides (1992); Ljungqvist and Sargent (1998); Coles and Masters (2000); Ortego Marti (2016, 2017); Flemming (2020); Kospentaris (2021); Laureys (2021); Walentin and Westermark (2022); Baley, Ljungqvist and Sargent (2022)

- **Ranking**: Lockwood (1991); Blanchard and Diamond (1994); Petrongolo and Pissarides (2001); Gonzalez and Shi (2010); Pallais (2014); Fernandez-Blanco and Preugschat (2018); Doppelt (2016); Jarosch and Pilossoph (2019)

- **Training and Institutions**: Becker (1964); Acemoglu and Pischke (1998, 1999); Autor (2001); Leuven (2005); Boeri (2011); Masui (2022)

# The model

- Continuous time, infinite horizon; discount rate $r$
- Labor force is normalized to 1, homogeneous workers
- Workers retire (exit) at Poisson rate $\delta$;
  - a retired worker is immediately replaced by a new worker (an inexperienced entrant)
- New workers enter the labor market as unemployed
- A large number of homogeneous firms
  - measure of active firms determined by free entry

# Entry, production, unemployment benefits

- Firms open one vacancy and search for workers; workers search for firms
- Firms pay a standard entry or recruiting cost $c$
- Existing jobs get terminated at the job destruction rate $\lambda$
- All matches produce an amount $p$ of the numeraire good
- Workers and firms negotiate over the wage
  - Nash Bargaining where $\eta$ denotes the bargaining power of the worker
- Unemployed workers enjoy an unemployment benefit $z < p$

# Bias against new workers

- The "story" here is that new/inexperienced workers must be trained to become *productive workers*
- Firms that hire them first must pay flow training cost $\kappa$ until the match dissolves
  - After losing their first job workers become experienced
- Firms prefer trained to untrained: Petrongolo-Pissarides (2001) generalization of the Blanchard-Diamond (1994) matching process with bias
- Similar to the outcome of an urn-ball process
  - A firm receiving multiple applications chooses experienced over inexperienced
  - But a firm receiving applications only from inexperienced workers will hire one

# Bias against new workers: "matching with ranking"

- What does it mean that "firms are biased against inexperienced workers"?
  - (And even more biased against inexperienced workers who have suffered skill loss?)

- Matching with ranking; the matching rate for experienced workers is

$$f_1 = \frac{m(u_1, v)}{u_1}$$

- The matching rate for inexperienced workers is

$$f_0 = \frac{m(u_0 + u_1, v) - m(u_1, v)}{u_0}$$

- It's like type 1 workers "move first"; only then type 0 workers get a chance

- In our model the heterogeneity is richer (4 unemployed types)
  - But this simple idea can be applied to as many types as one likes

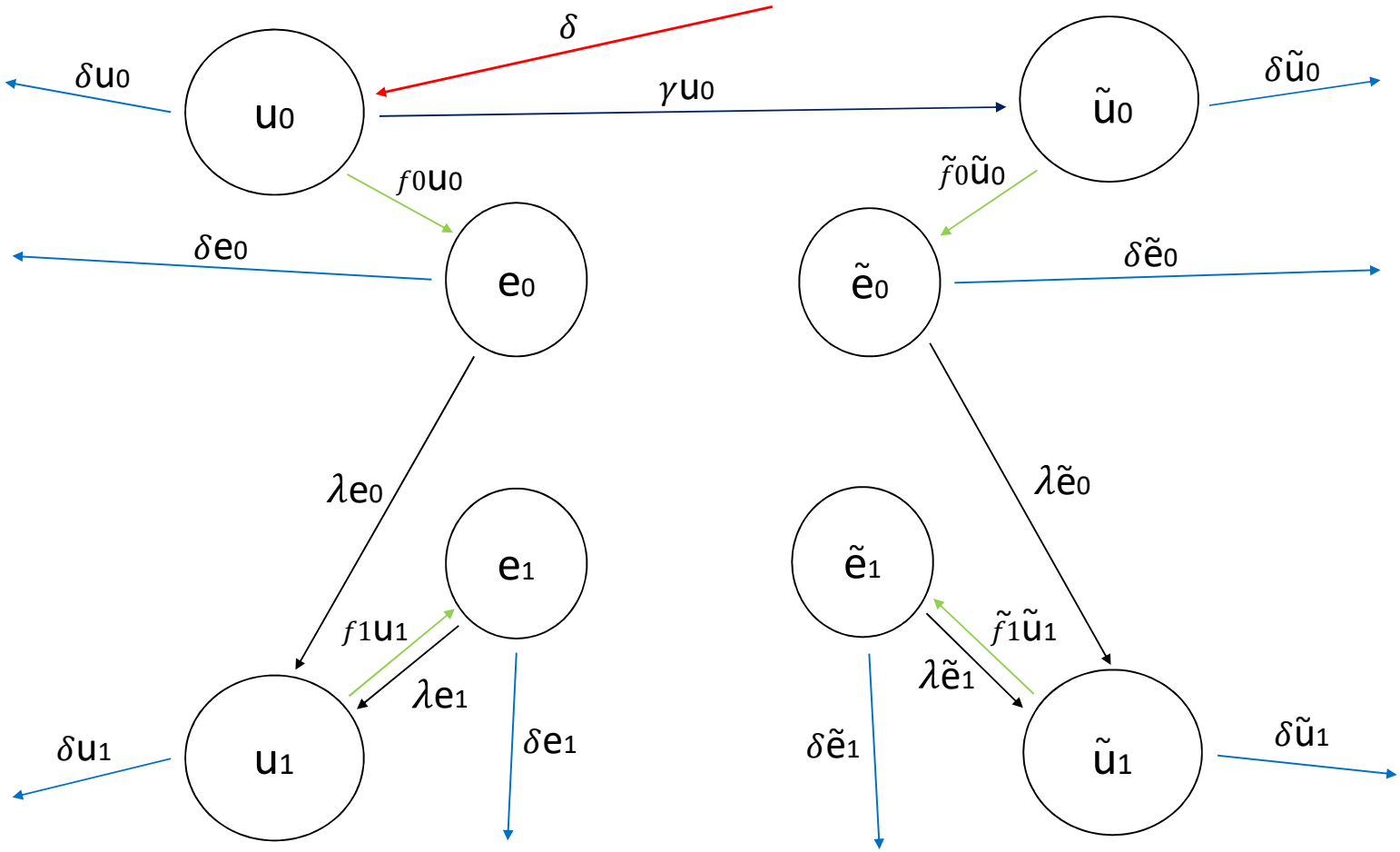
# Skill loss and types of workers in the various states

- A new worker who stays unemployed for a long time is at risk of skill loss
  - This happens at rate $\gamma$
- The productivity of workers who have suffered skill loss decreases by $\tilde{\kappa}$
- $2^3 = 8$ worker types: employed vs unemployed, experienced vs inexperienced, scarred vs non-scarred
  - $u_0$ : Inexperienced Unemployed
  - $\tilde{u}_0$ : Inexperienced Unemployed who has also suffered skill loss
  - $e_1$ : Experienced Employed
  - $\tilde{e}_1$ : Experienced Employed who suffered skill loss during youth
  - And so on

# Quick comment on notation

- The previous notation applies to other variables too
  - $\{0, 1\}$ refers to experience; "tilde" means skill loss
- E.g., $\tilde{f}_0$ is the job finding rate of an inexperienced worker who suffered skill loss
- $\tilde{f}_1$ is the job finding rate of an experienced worker who suffered skill loss at youth
- $w_0$ is the wage of an inexperienced worker (without skill loss)
- $u_1$ is the measure of experienced (non-scarred) unemployed workers
- And so on...

# Employment states



# Beveridge curves

**Equating inflows and outflows:**

$$u_0 = \frac{\delta}{\delta + \gamma + f_0}$$

$$\tilde{u}_0 = \frac{\gamma}{\delta + \tilde{f}_0} \cdot \frac{\delta}{\delta + \gamma + f_0}$$

$$e_0 = \frac{f_0}{\delta + \lambda} \cdot \frac{\delta}{\delta + \gamma + f_0}$$

$$\tilde{e}_0 = \frac{\tilde{f}_0}{\delta + \lambda} \cdot \frac{\gamma}{\delta + \tilde{f}_0} \cdot \frac{\delta}{\delta + \gamma + f_0}$$

$$u_1 = \frac{\lambda f_0}{(\gamma + \delta + f_0)(\delta + \lambda + f_1)}$$

$$e_1 = \frac{f_1}{\delta + \lambda} \cdot \frac{\lambda f_0}{(\gamma + \delta + f_0)(\delta + \lambda + f_1)}$$

$$\tilde{u}_1 = \frac{\lambda \gamma \tilde{f}_0}{(\delta + \tilde{f}_0)(\gamma + \delta + f_0)(\delta + \lambda + \tilde{f}_1)}$$

$$\tilde{e}_1 = \frac{\tilde{f}_1 \lambda \gamma \tilde{f}_0}{(\delta + \lambda)(\delta + \tilde{f}_0)(\gamma + \delta + f_0)(\delta + \lambda + \tilde{f}_1)}$$

# Firms' value functions

- Free Entry/ Job Creation:

$$c = q_0 J_0 + \tilde{q}_0 \tilde{J}_0 + q_1 J_1 + \tilde{q}_1 \tilde{J}_1$$

- Values of employing different workers

$$\begin{aligned}
rJ_0 &= p - \kappa - w_0 - (\lambda + \delta) J_0 \\
r\tilde{J}_0 &= p - \kappa - \tilde{\kappa} - \tilde{w}_0 - (\lambda + \delta) \tilde{J}_0 \\
rJ_1 &= p - w_1 - (\lambda + \delta) J_1 \\
r\tilde{J}_1 &= p - \tilde{\kappa} - \tilde{w}_1 - (\lambda + \delta) \tilde{J}_1
\end{aligned}$$

# Workers' value functions

- Employed

$$
\begin{aligned}
rW_0 &= w_0 + \lambda(U_1 - W_0) - \delta W_0 \\
rW_1 &= w_1 + \lambda(U_1 - W_1) - \delta W_1 \\
r\tilde{W}_0 &= \tilde{w}_0 + \lambda(\tilde{U}_1 - \tilde{W}_0) - \delta \tilde{W}_0 \\
r\tilde{W}_1 &= \tilde{w}_1 + \lambda(\tilde{U}_1 - \tilde{W}_1) - \delta \tilde{W}_1
\end{aligned}
$$

- Unemployed

$$
\begin{aligned}
rU_0 &= z + f_0(W_0 - U_0) + \gamma(\tilde{U}_0 - U_0) - \delta U_0 \\
r\tilde{U}_0 &= z + \tilde{f}_0(\tilde{W}_0 - \tilde{U}_0) - \delta \tilde{U}_0 \\
rU_1 &= z + f_1(W_1 - U_1) - \delta U_1 \\
r\tilde{U}_1 &= z + \tilde{f}_1(\tilde{W}_1 - \tilde{U}_1) - \delta \tilde{U}_1
\end{aligned}
$$

# Bargaining I

- Bargaining in type 1 meeting

$$(1-\eta)(W_1 - U_1) = \eta J_1 \implies w_1 = \frac{\eta p(r+\lambda+\delta+f_1) + (1-\eta)z(r+\lambda+\delta)}{r+\lambda+\delta+\eta f_1}$$

- Bargaining in type $\tilde{1}$ meeting

$$(1-\eta)(\tilde{W}_1 - \tilde{U}_1) = \eta \tilde{J}_1 \implies \tilde{w}_1 = \frac{\eta(p-\tilde{\kappa})(r+\lambda+\delta+\tilde{f}_1) + (1-\eta)z(r+\lambda+\delta)}{r+\lambda+\delta+\eta\tilde{f}_1}$$

- Bargaining in type $\tilde{0}$ meeting

$$(1-\eta)(\tilde{W}_0 - \tilde{U}_0) = \eta \tilde{J}_0 \implies \tilde{w}_0 = \frac{1}{r+\delta+\eta\tilde{f}_0}\Big[\eta(p-\kappa-\tilde{\kappa})(r+\delta+\tilde{f}_0) + \\ + (1-\eta)z\frac{(r+\delta+\lambda)(r+\delta+\tilde{f}_1)}{r+\delta+\lambda+\tilde{f}_1} - \frac{\lambda(1-\eta)\tilde{f}_1}{r+\delta+\lambda+\tilde{f}_1}\tilde{w}_1\Big]$$

# Bargaining II

- Bargaining in type 0 meeting

$$(1-\eta)(W_0 - U_0) = \eta J_0 \implies w_0 = \frac{r+\delta+\gamma+f_0}{r+\delta+\gamma+\eta f_0}\eta(p-\kappa)+$$
$$+\frac{(r+\lambda+\delta)(r+f_1+\delta)(r+\gamma+\delta)}{(r+\delta)(r+\delta+\gamma+\eta f_0)(r+\lambda+\delta+f_1)}(1-\eta)z+$$
$$+\frac{\gamma\tilde{f}_0}{(r+\delta)(r+\delta+\gamma+\eta f_0)}\eta(p-\kappa-\tilde{\kappa}-\tilde{w}_0)-$$
$$-\frac{(1-\eta)\lambda f_1(r+\gamma+\delta)w_1}{(r+\delta)(r+\delta+\gamma+\eta f_0)(r+\lambda+\delta+f_1)}$$

- Notice that $w_1$ enters negatively: new workers are willing to accept a lower wage to get access to their first job and a higher continuation value

# Early-career skill loss

- Initial labor market conditions have persistent effects on young adults' earnings for 10-15 years (von Wachter, 2020)

- Two recent studies focus on new workers:
  - Arellano-Bover (2022): workers who faced higher unemployment rates at ages 18 to 25 have lower skills at ages 36 to 59
  - Dinerstein, Megalokonomou and Yannelis (2022): show negative effects of the length of unemployment on teachers' performance measured by students' test scores

- To translate this into wages we use Ortego Marti's (2016, 2017) estimates assuming $\gamma = 1/6$

# More data

- Monthly CPS data 1994-2020
  - Average unemployment rate: 5.8%
  - Fraction of entrants in the unemployment pool: 9%
  - Fraction of LTU in the entrant pool: 28%
- Various surveys for training costs
  - Training Industry Report: \$1,075 in 2017, \$1,071 in 2021
  - Association for talent development: \$1,252 in 2016
  - Masui (2022) calibrates them at a value comparable to vacancy costs
- We set a target of \$1,000 2017 dollars which results in 0.8% of GDP
  - Vacancy costs are estimated 1-2% of GDP in the literature
- Finally, we use Hall and Milgrom's (2008) 71% for $z/\mathbb{E}(p)$ (midpoint of Chodorow-Reich and Karabarbounis, 2016)

# Parameter values

| Parameter | Description | Value |
|---|---|---|
| $p$ | Productivity | 1 |
| $r$ | Interest Rate | 0.0042 |
| $\alpha$ | Matching Elasticity | 0.72 |
| $\eta$ | Worker Bargaining Power | 0.72 |
| $\gamma$ | Skill Loss Rate | 1/6 |
| $\delta$ | Worker Exit Rate | 0.0023 |
| $\lambda$ | Separation Rate | 0.0341 |
| $c$ | Vacancy Cost | 1.71 |
| $z$ | Unemployment Value | 0.65 |
| $\kappa$ | Training Cost | 0.11 |
| $\tilde{\kappa}$ | Skill Loss Scar | 0.07 |

# Policy interventions

1. Ranking is not allowed by government regulation
   - Standard DMP with heterogeneous workers in a common labor market

2. Government subsidizes firms to cover for training costs and skill loss
   - Government takes away $\tau$ from all matches
   - Firms are indifferent between workers

3. Internships: new workers are paid an exogenous wage
   - Ranking is not allowed
   - Fix $\tilde{w_0} = z$ and compute the effects of different $w_0$

4. Government subsidizes firms enough to prefer entrants
   - Subsidy $\sigma_0 = \kappa(1+\rho)$ to every firm that hires a type-0 worker
   - Flat tax $\tau = \kappa(1+\rho)e_0/e$

Welfare = aggregate surplus - vacancy costs

Short- vs Long-run Productivity trade off: less hires of new workers $\Rightarrow$ more matches without training costs but greater skill loss for entrants

# Baseline economy with ranking

- Welfare level is 0.9398
- Unemployment rate is 5.8%
- Job finding rates
  - $\tilde{f}_0 = 0.42$
  - $f_0 = 0.43$
  - $\tilde{f}_1 = 0.46$
  - $f_1 = 0.69$
- Wages
  - $\tilde{w}_0 = 0.82$
  - $w_0 = 0.66$ (non-scarred workers accept lower wages to get out of the bad state)
  - $\tilde{w}_1 = 0.92$
  - $w_1 = 0.99$

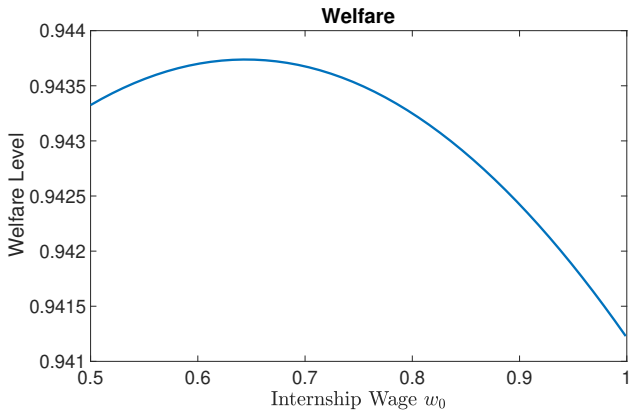
# Intervention 1: Ranking ban

- Welfare level is 0.9433 (from 0.9398); firms rank too much!
- Unemployment rate is 6.9% (from 5.8%)
- Job finding rate is the same for all workers: $f = 0.49$
  - Increases for all workers other than the experienced ones without scar
- Wages
  - $\tilde{w}_0 = 0.81$
  - $w_0 = 0.84$ (big winners)
  - $\tilde{w}_1 = 0.92$
  - $w_0 = 0.99$
- Economics: we "force" firms to incur larger training costs
  - less entry $\Rightarrow$ aggregate unemployment increases
  - more matches with inexperienced workers $\Rightarrow$ short-run productivity decreases
  - in general equilibrium, however, welfare is higher!
  - entrants' unemployment duration is shorter $\Rightarrow$ less likely to suffer skill loss

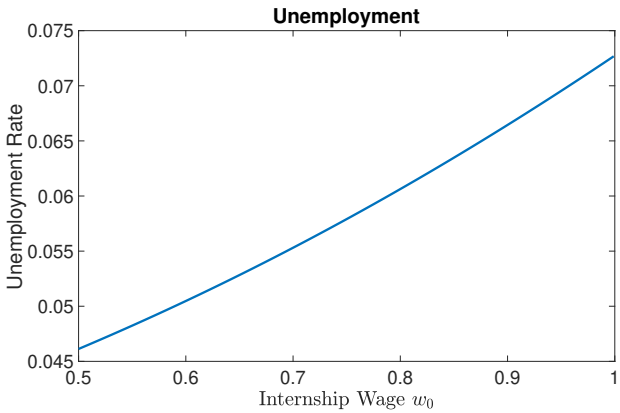
# Intervention 2: Government subsidies

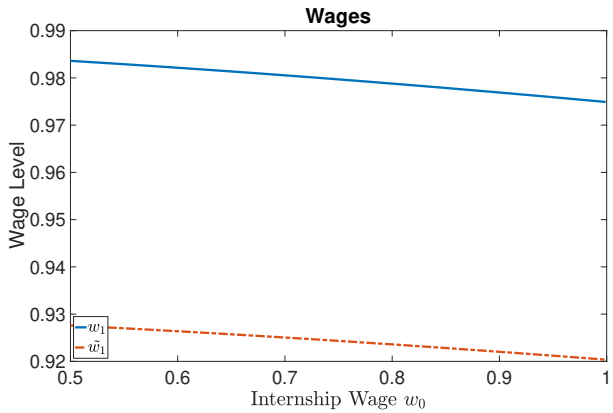
- Welfare level is 0.9427; not as effective as ranking ban
- Unemployment rate is 7.2% (an even greater increase)
- Job finding rate is the same for all workers: $f = 0.47$
  - Increases for all workers other than the experienced ones without scar
- Wage is the same for all workers: $w = 0.96$
  - Increases for all workers other than the experienced ones without scar
- Same economics as the government ban
  - The model that bans ranking delivers higher welfare
  - It avoids the use of additional distortionary taxes

# Intervention 3: Internships




- $\tilde{w_0} = z$
- Welfare always greater than ranking, max at 0.9437 with $w_0 = 0.82$
- Too low $w_0 \Rightarrow$ entrants too cheap, large training and vacancy costs
- Too high $w_0 \Rightarrow$ back to main channel, large skill losses



# Intervention 4: Type-0 Bias

- Welfare level is 0.9531: 1.42% increase, three times more effective than internships!
- Unemployment rate is 6.52% (in between internships and other interventions)
- Raises $f_0$ almost four times: directly confronts the issue of entrants' long unemployment duration
- Youth Employment Initiative: €8.9 billion program (2014-2020) to directly finance young workers' apprenticeships, traineeships, job placements, and further education within 4 months of leaving school or becoming unemployed
- Based on our results, interventions of this kind are expected to have positive welfare gains even if they raise aggregate unemployment

# Conclusion

- Built a DMP model with entrants and experienced workers to study the implications of firms' preference for experienced workers

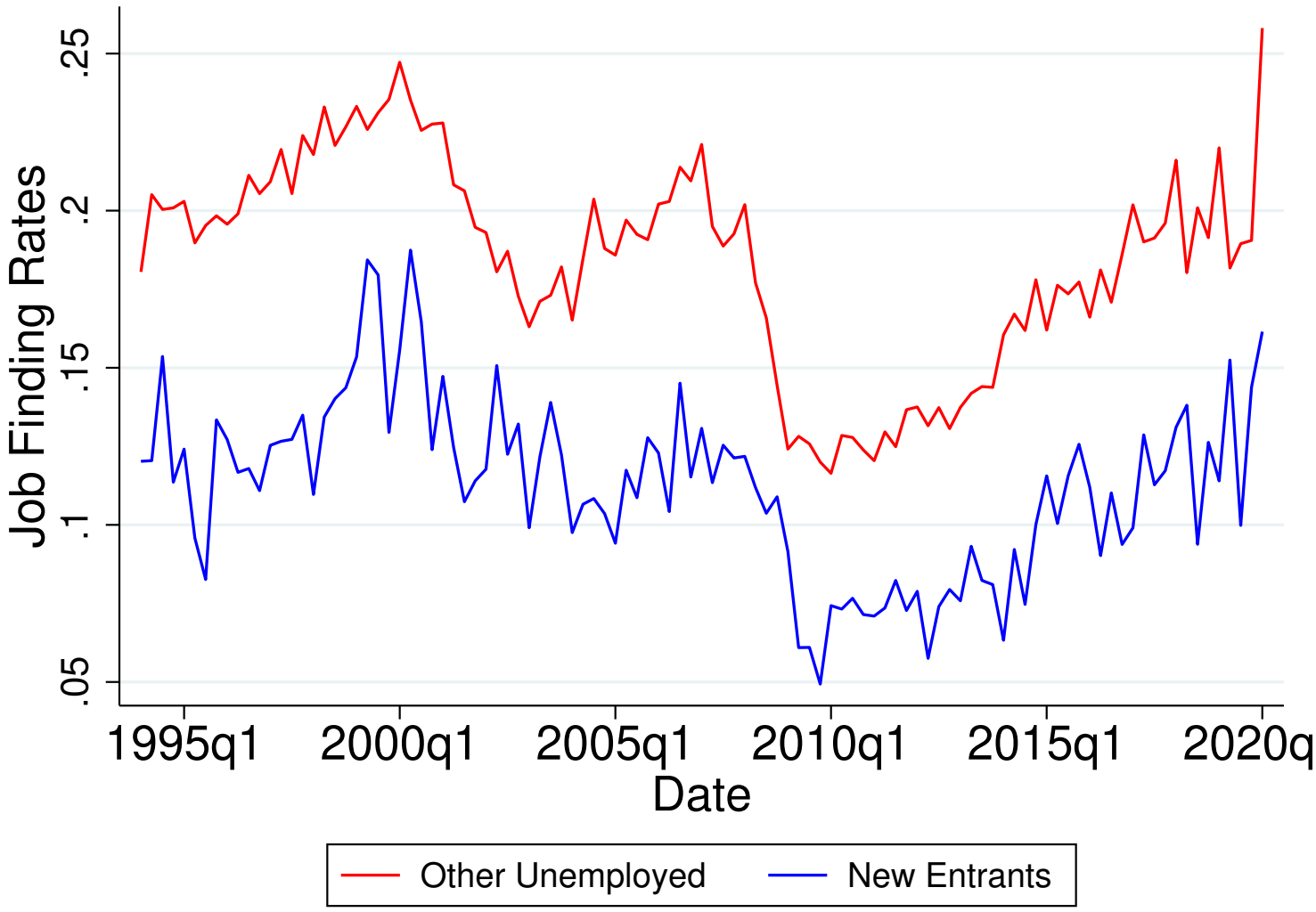
- In the model, firms who hire entrants provide a public service but are not compensated for it
  - Hence, they rank experienced over new workers

- **Trade off**: more experienced hires have lower training costs and larger match surplus but increase entrants' unemployment duration leading to larger skill losses

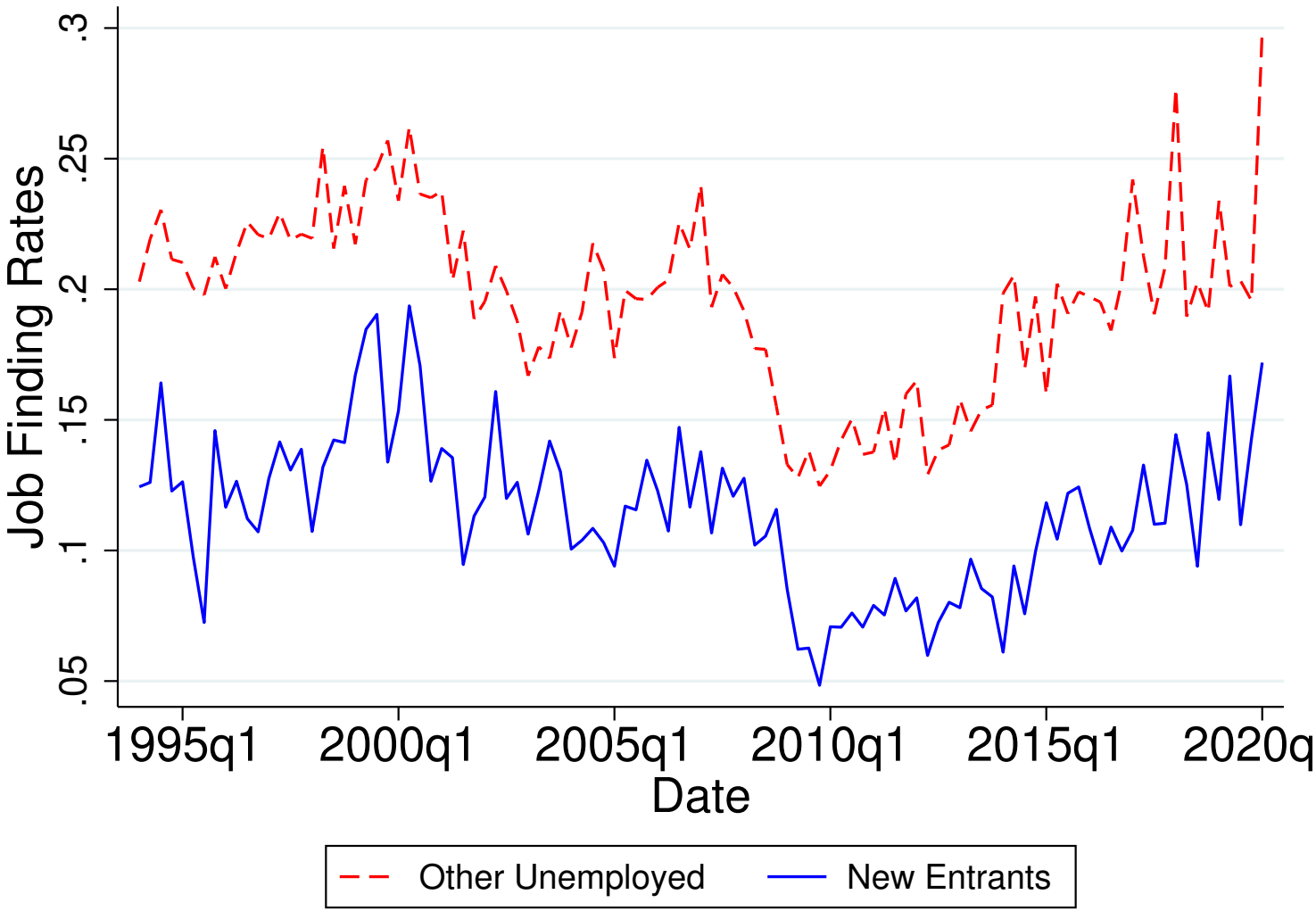
- We evaluated four interventions with the calibrated model
  - Ranking ban, government subsidies, internships, type-0 bias
  - Ranking equilibrium has lower welfare than all government interventions
  - Internships are welfare-enhancing; optimal entrant wages at intermediate levels
  - Type-0 bias delivers the largest welfare gains

Thank you!

# Job Finding Rates Workers 16-64



# Job Finding Rates Workers 16-24

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