The Long-Term Decline of the U.S. Job Ladder

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OzMac 2025 Workshop

Motivation: 40 years of wage stagnation

- Stagnant real wages for typical US worker over past 40 years. **Why?** ▸ fig
  - technological change — Autor-Levy-Murnane '03, Acemoglu-Autor '11, Acemoglu-Restrepo '20
  - globalization and trade — Elsby-Hobijn-Sahin '13, Autor-Dorn-Hanson '13
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- **This paper:** job ladder model to study role of **changing structure of labour market**
  - mismatch between open jobs & searching workers
  - employer concentration limiting job shopping
  - reduced efficiency of search by employed workers

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  - mismatch between open jobs & searching workers
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- These factors combine to **reduce mobility toward better paid jobs** — Topel-Ward '92

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  - mismatch between open jobs & searching workers
  - employer concentration limiting job shopping
  - **reduced efficiency of search by employed workers**
- These factors combine to **reduce mobility toward better paid jobs** **−40%**
- Why you should care: combined effect leads to **4 p.p. lower real wages**

Outline

1. simple job ladder model: infer mobility from gap b/n overall wages vs offered wages
2. take simple model to data: substantial decline in net upward mobility
   - decline robust to adding on-the-job wage dynamics, unobsvd heterogeneity, measurement error
3. where does decline come from? add labour market frictions to model
   - modest roles for **mismatch**, **employer concentration**
   - results point to **declining search efficiency of employed workers**
4. role of declining mobility for wages
   - combined effect of all labour mkt frictions leads to **4 p.p. lower real wages**
   - by itself, reduced mobility accounts for **nearly 2/3rds of this**

A Simple Job Ladder Model

- Time is continuous, infinite horizon, focus on steady states
- Unit mass of risk-neutral workers move in and out of employment & across jobs
- Let n = share nonemployed. While non-employed, workers receive **job offers** at rate p
  - an offer = a piece rate w drawn from a **wage offer distribution F(w)**
  - assume parameters such that non-employed worker accepts all offers ▸ extensions
- While employed, earn wage w until job ends, for one of 3 reasons:
  1. **Directed Outside offers** at rate λ^e with a wage from $\mathbf{F}(\mathbf{w})$ that she **may** accept
  2. **Undirected Outside offers** at rate λ^f with a wage from $\mathbf{F}(\mathbf{w})$ that she **must** accept
  3. **Job Loss Shocks** at rate δ that leave her non-employed
- **Flow Balance:** outflows from nonemp = inflows, i.e. $pn = \delta(1 - n)$.

A Simple Job Ladder Model

- Let $\mathbf{G}(w)$ = CDF of wages. In steady state, satisfies **Kolmogorov Forward Equation**

$$0 = -\underbrace{\left(\delta + \lambda^f\right)\mathbf{G}(\mathbf{w})}_{\text{job loss+undirected offer}} - \underbrace{\lambda^e\left(1 - \mathbf{F}(\mathbf{w})\right)\mathbf{G}(\mathbf{w})}_{\text{directed outside offers}} + \underbrace{p\,\mathbf{F}(\mathbf{w})\frac{n}{1-n}}_{\text{hires from non-empl.}} + \underbrace{\lambda^f\mathbf{F}(\mathbf{w})}_{\text{undirected offer}}$$

- Wage distribution $\mathbf{G}(\mathbf{w})$ is a function of $\mathbf{F}(\mathbf{w})$ and **net upward mobility** κ:

$$\mathbf{G}(\mathbf{w}) = \frac{\mathbf{F}(\mathbf{w})}{1 + \kappa\left(1 - \mathbf{F}(\mathbf{w})\right)}, \qquad \underbrace{\kappa}_{\text{net upward mobility rate}} \equiv \frac{\lambda^e}{\delta + \lambda^f}$$

- Net upward mobility rate, κ = Average # of outside offers between two separation events
- Higher $\kappa \implies$ Faster wage growth $\implies$ larger gap btw offer & wage distributions

Infer Net Upward Mobility in the Data

- What does κ look like in data? Using CPS (1982-2023), obtain residual wages details
  - **Wage distribution $G(w)$**: residual wages among all workers
  - **Offer distribution $F(w)$**: among those who were non-employed in the previous month

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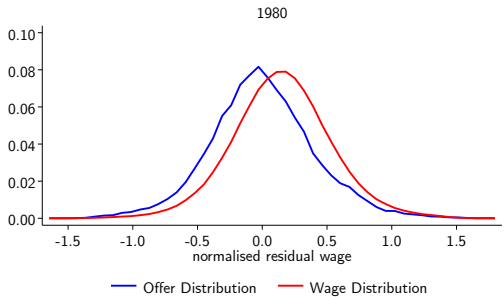

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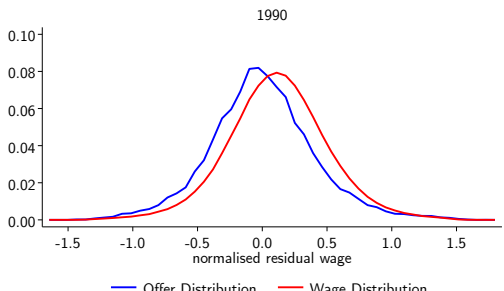

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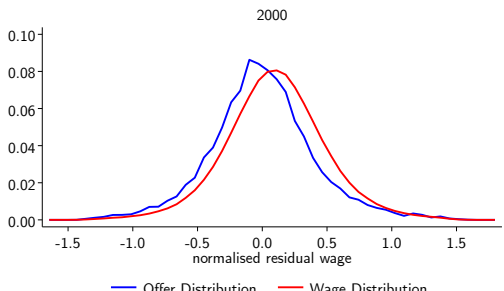

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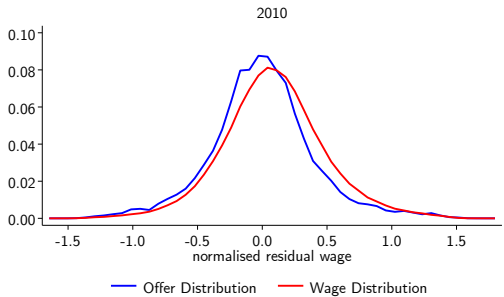

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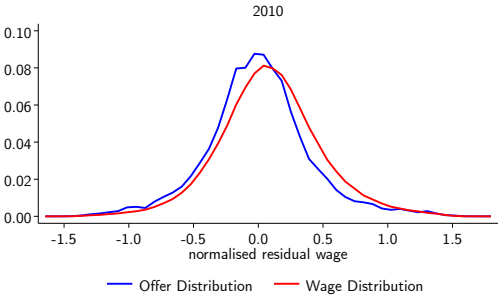

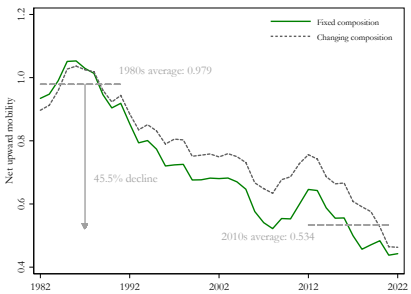

by demographic groups ▸ overid test ▸ between-occupation ▸ better matched? ▸ direct evidence (CPS, PSID)

Estimation of the Simple Model

- Where does declining net upward mobility could come from - $\lambda^e \downarrow$, $\delta \uparrow$, or $\lambda^f \uparrow$?

$\Longrightarrow$ **Estimate** simple model using SMM: taking $F(\cdot)$ from data, pick $(p, \delta, \lambda^f, \kappa)$ ▸ objective

- 4 sets of moments:
  - N-E transition rate, which particularly informs nonemployed offer arrival rate p
  - E-N transition rate, which particularly informs separation rate δ
  - share of job stayers, which particularly informs undirected offer rate λ^f
  - wage distribution, which particularly informs net upward mobility rate κ
- Estimate decade-by-decade from 1980s to 2010s.
- Overidentified but excellent fit, particularly for wage distribution ▸ moments

The Long-term Decline of the U.S. Job Ladder

... is massive: 42% decline in net upward mobility κ between 1980s and 2010s!

	Internally estimated				Implied	Decomposition: $\kappa = \frac{\lambda^e}{\delta+\lambda^f}$		
	p	δ	λ^f	κ	λ^e	δ	λ^f	λ^e
1980s				**1.087** (0.022)				
1990s				0.848 (0.026)				
2000s				0.762 (0.030)				
2010s				**0.569** (0.037)				

The Long-term Decline of the U.S. Job Ladder

... is not driven largely by increased separation rates: δ stable

	Internally estimated			Implied	Decomposition: $\kappa = \frac{\lambda^e}{\delta+\lambda^f}$		
	p	δ	λ^f	κ	λ^e	δ	λ^f	λ^e
1980s		0.007		**1.087**		1.087		
		(0.000)		(0.022)				
1990s		0.007		0.848		1.084		
		(0.000)		(0.026)				
2000s		0.008		0.762		1.064		
		(0.000)		(0.030)				
2010s		0.008		**0.569**		1.056		
		(0.000)		(0.037)		**6%**		

The Long-term Decline of the U.S. Job Ladder

... nor by more frequent undirected offers: λ^f stable

	Internally estimated			Implied	Decomposition: $\kappa = \frac{\lambda^e}{\delta+\lambda^f}$		
	p	δ	λ^f	κ	λ^e	δ	λ^f	λ^e
1980s		0.007	0.015	**1.087**		1.087	1.087	
		(0.000)	(0.000)	(0.022)				
1990s		0.007	0.015	0.848		1.084	1.067	
		(0.000)	(0.000)	(0.026)				
2000s		0.008	0.013	0.762		1.064	1.177	
		(0.000)	(0.001)	(0.030)				
2010s		0.008	0.016	**0.569**		1.056	1.040	
		(0.000)	(0.001)	(0.037)		**6%**	**9%**	

The Long-term Decline of the U.S. Job Ladder

gender race educ age

... but by less frequent directed offers: λ^e declines substantially!

	Internally estimated			Implied	Decomposition: $\kappa = \frac{\lambda^e}{\delta+\lambda^f}$		
	p	δ	λ^f	κ	λ^e	δ	λ^f	λ^e
1980s		0.007	0.015	**1.087**	**0.024**	1.087	1.087	1.087
		(0.000)	(0.000)	(0.022)	(0.000)			
1990s		0.007	0.015	0.848	0.019	1.084	1.067	0.865
		(0.000)	(0.000)	(0.026)	(0.001)			
2000s		0.008	0.013	0.762	0.016	1.064	1.177	0.720
		(0.000)	(0.001)	(0.030)	(0.001)			
2010s		0.008	0.016	**0.569**	**0.014**	1.056	1.040	**0.610**
		(0.000)	(0.001)	(0.037)	(0.001)	**6%**	**9%**	**92%**

The Long-term Decline of the U.S. Job Ladder

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... is really a story about the *employed*: nonemp offer arrival rate p stable

	Internally estimated				Implied	Decomposition: $\kappa = \frac{\lambda^e}{\delta+\lambda^f}$		
	p	δ	λ^f	κ	λ^e	δ	λ^f	λ^e
1980s	0.020	0.007	0.015	**1.087**	**0.024**	1.087	1.087	1.087
	(0.000)	(0.000)	(0.000)	(0.022)	(0.000)			
1990s	0.020	0.007	0.015	0.848	0.019	1.084	1.067	0.865
	(0.000)	(0.000)	(0.000)	(0.026)	(0.001)			
2000s	0.018	0.008	0.013	0.762	0.016	1.064	1.177	0.720
	(0.000)	(0.000)	(0.001)	(0.030)	(0.001)			
2010s	0.018	0.008	0.016	**0.569**	**0.014**	1.056	1.040	**0.610**
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Full Model: Overview

- Extension 1: on-the-job wage dynamics
- Extension 2: unobserved heterogeneity
- Extension 3: respondent error in CPS data

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- Extension 1: on-the-job wage dynamics
  - Wages evolve **on-the-job** according to an AR1 in continuous time

▸ full model KFE

$$dw = \theta\Big(\mu - w\Big)dt + \sigma dW(t)$$

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- Extension 2: unobserved heterogeneity
  - Two **unobserved types**, different separation rates, wage growth
  - Different offer distributions, $F^k(w)$, differing in mean values with $\mathbb{E}^2(w) = \mathbb{E}^1(w) + \omega$
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- Extension 3: respondent error in CPS data
  - Allow share ε to **misreport being employed**, share ν to **misreport stayer status**
  - Allow persistent **nonresponse**: prob p^{in}, p^{out} of becoming nonresponsive/responsive

Model Estimation: Decade-by-Decade, Flexibly Vary Params

1. Take observed offer distribution $f(w)$ from the data
2. Calibrate three parameters one-to-one to hit particular data moment
   - p^{in}: share of non-missing in month m who are missing in $m+1$
   - p^{out}: share of missing in month m who are non-missing in $m+1$
   - ν: Misclassified stayers from share non-emp. in two consecutive months who are stayers
3. 11 parameters via the Simulated Method of Moments

$$\Big[\underbrace{p, \lambda^e, \lambda^f}_{\text{job offer arrival rates}}, \underbrace{\mu\ ,\ \theta\ ,\ \sigma}_{\text{on-the-job dynamics}}, \underbrace{\pi, \delta^1, \delta^2, \omega}_{\text{selection on unobservables}}, \underbrace{\varepsilon}_{\text{misclassification}}\Big]$$

▸ true offer distbns ▸ employment flows ▸ on-the-job wage dyn ▸ job loser wage dyn ▸ measurement error ▸ SMM intuition
▸ share of stayers ▸ joint distbns (stayers) ▸ joint distbns (losers)

The Long-term Decline of the U.S. Job Ladder Revisited

	μ	θ	σ
1980s	0.081	0.017	0.055
	(0.078)	(0.006)	(0.006)
1990s	0.080	0.017	0.060
	(0.047)	(0.007)	(0.008)
2000s	0.073	0.029	0.078
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The Long-term Decline of the U.S. Job Ladder Revisited

	μ	θ	σ	π	ω	δ^1	δ^2
1980s	0.081	0.017	0.055	0.222	0.197	0.029	0.007
	(0.078)	(0.006)	(0.006)	(0.119)	(0.052)	(0.012)	(0.008)
1990s	0.080	0.017	0.060	0.182	0.291	0.029	0.006
	(0.047)	(0.007)	(0.008)	(0.053)	(0.066)	(0.014)	(0.001)
2000s	0.073	0.029	0.078	0.275	0.192	0.029	0.005
	(0.041)	(0.014)	(0.013)	(0.054)	(0.068)	(0.012)	(0.002)
2010s	0.062	0.041	0.097	0.463	0.197	0.029	0.002
	(0.046)	(0.019)	(0.023)	(0.092)	(0.074)	(0.014)	(0.001)

explain part of gap b/n F, G: lower λ^e, higher λ^f

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▸ EN by wage ▸ JJ rate in model & data ▸ NLSY exercise ▸ NLSY decomposition

Why has mobility declined? Adding labour market structure

details

- Extend model: allow p, λ^e to depend on labour market structure
- Underlying contact rate from a standard matching fn framework
- Assume **on-the-job search**: employed workers search at relative intensity ϕ
- Assume US = many segmented labour markets, differ in mkt tightness

- Each market = finite num of firms (m). Own employees can't apply to own vacancies.

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Barnichon-Figura '15

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$\Longrightarrow$ Concentration: lower m $\Longrightarrow$ lower effective contact rates for emp relative to non-emp

Gottfries-Jarosch '23

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details

- Extend model: allow p, λ^e to depend on labour market structure
- Underlying contact rate from a standard matching fn framework
- Assume **on-the-job search**: employed workers search at relative intensity ϕ
- Assume US = many segmented labour markets, differ in mkt tightness

$\Longrightarrow$ Mismatch: nonlin matching fn + dispersed tightness $\Longrightarrow$ lower effective agg. contact rate

Barnichon-Figura '15

- Each market = finite num of firms (m). Own employees can't apply to own vacancies.

$\Longrightarrow$ Concentration: lower m $\Longrightarrow$ lower effective contact rates for emp relative to non-emp

Gottfries-Jarosch '23

$$\underbrace{\lambda^e}_{\text{Upward mobility}} \approx \underbrace{\chi}_{\text{matching efficiency}} \underbrace{\left(\frac{V}{S}\right)^{\alpha}}_{\text{aggregate tightness}} \underbrace{\left(1-\tau\right)}_{\text{mismatch}} \underbrace{\frac{m-1}{m}}_{\text{employer concentration}} \underbrace{\phi}_{\text{search of employed}}$$

The factors behind the Long-Term Decline of the U.S. Job Ladder

$$\underbrace{\lambda^e}_{\text{Upward mobility}} \approx \underbrace{\chi}_{\text{matching efficiency}} \underbrace{\left(\frac{V}{S}\right)^{\alpha}}_{\text{aggregate tightness}} \underbrace{\left(1-\tau\right)}_{\text{mismatch}} \underbrace{\frac{m-1}{m}}_{\text{employer concentration}} \underbrace{\phi}_{\text{search of employed}}$$

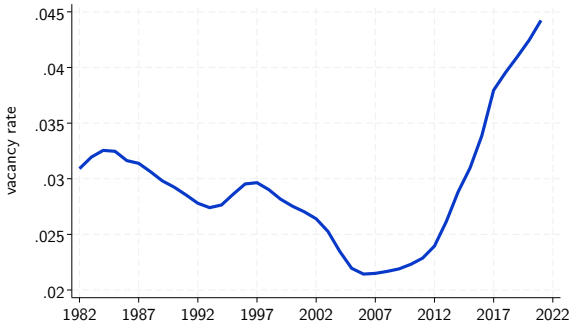
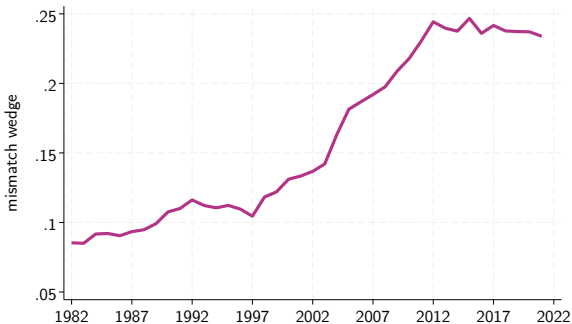


Figure: agg. vacancy rate: from JOLTS/Barnichon (2010)

Contrib. to declining mobility	
Matching efficiency	35%
Aggregate tightness	-45%

The factors behind the Long-Term Decline of the U.S. Job Ladder

$$\underbrace{\lambda^e}_{\text{Upward mobility}} \approx \underbrace{\chi}_{\text{matching efficiency}} \underbrace{\left(\frac{V}{S}\right)^{\alpha}}_{\text{aggregate tightness}} \underbrace{\left(1-\tau\right)}_{\text{mismatch}} \underbrace{\frac{m-1}{m}}_{\text{employer concentration}} \underbrace{\phi}_{\text{search of employed}}$$



Contrib. to declining mobility	
Matching efficiency	35%
Aggregate tightness	-45%
Mismatch	31%

Figure: mismatch: from dispersion in job finding rates across occupations

The factors behind the Long-Term Decline of the U.S. Job Ladder

$$\underbrace{\lambda^e}_{\text{Upward mobility}} \approx \underbrace{\chi}_{\text{matching efficiency}} \underbrace{\left(\frac{V}{S}\right)^{\alpha}}_{\text{aggregate tightness}} \underbrace{\left(1-\tau\right)}_{\text{mismatch}} \underbrace{\frac{m-1}{m}}_{\text{employer concentration}} \underbrace{\phi}_{\text{search of employed}}$$

Concentration: infer from state-level panel. Idea:

- conditional on ϕ, higher concentration

$\Longrightarrow$ lower mobility *for emp relative to nonemp*

▸ details

Contrib. to declining mobility	
Matching efficiency	35%
Aggregate tightness	-45%
Mismatch	31%
Employer concentration	24%

The factors behind the Long-Term Decline of the U.S. Job Ladder

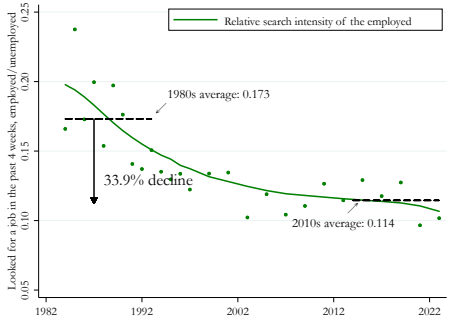
$$\underbrace{\lambda^e}_{\text{Upward mobility}} \approx \underbrace{\chi}_{\text{matching efficiency}} \underbrace{\left(\frac{V}{S}\right)^{\alpha}}_{\text{aggregate tightness}} \underbrace{\left(1-\tau\right)}_{\text{mismatch}} \underbrace{\frac{m-1}{m}}_{\text{employer concentration}} \underbrace{\phi}_{\text{search of employed}}$$

Contrib. to declining mobility	
Matching efficiency	35%
Aggregate tightness	-45%
Mismatch	31%
Employer concentration	24%
Relative search intensity	-70%

The factors behind the Long-Term Decline of the U.S. Job Ladder

$$\underbrace{\lambda^e}_{\text{Upward mobility}} \approx \underbrace{\chi}_{\text{matching efficiency}} \underbrace{\left(\frac{V}{S}\right)^{\alpha}}_{\text{aggregate tightness}} \underbrace{\left(1-\tau\right)}_{\text{mismatch}} \underbrace{\frac{m-1}{m}}_{\text{employer concentration}} \underbrace{\phi}_{\text{search of employed}}$$

Share looking for a new job in past 4 weeks (PSID)



Contrib. to declining mobility	
Matching efficiency	35%
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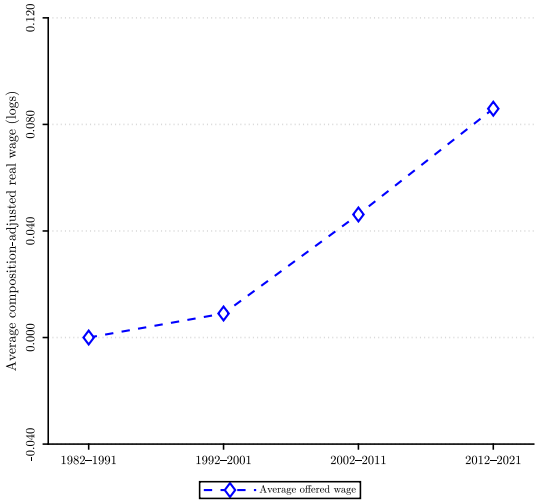
Employer concentration	24%
Relative search intensity	-70%

The Consequences of the Long-Term Decline of the U.S. Job Ladder



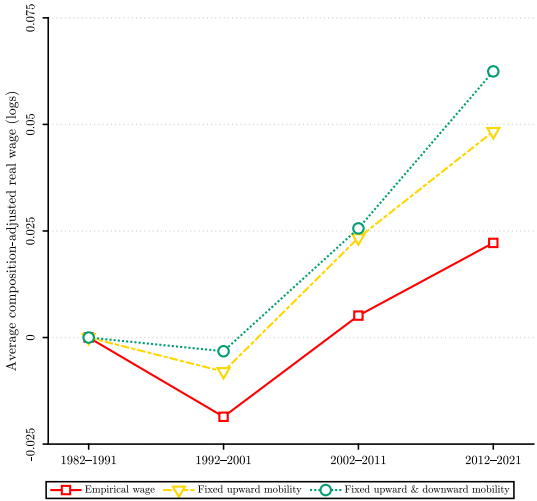
Accounting exercise:

- offered wages ($F_t(w)$): grow as in data
- Hold **one/a few params** fixed in 1980s
- Quantify impact on gap and hence

  overall wages = offered wages + gap

▸ Non-competes

The Consequences of the Long-Term Decline of the U.S. Job Ladder



Accounting exercise:

- offered wages ($F_t(w)$): grow as in data
- Hold **one/a few params** fixed in 1980s
- Quantify impact on gap and hence

  overall wages = offered wages + gap

▸ Non-competes

Combined effect: -4.0p.p. real wages
($\approx$ 40% of labor share decline)

The Structure of the U.S. Labor Market & Wage Stagnation

We use an estimated structural job ladder model to show:

1. **Upward job mobility has fallen by 40%** between the 1980s and 2010s
2. Primarily accounted for by changes in three structural factors:
   (a) **Greater mismatch** between open jobs and searching workers
   (b) **Greater employer concentration** that has limited the scope for job shopping
   (c) **Less search by employed workers**
3. Combined effect: **4 p.p. lower real wages** ($\approx$ 40% of fall in aggregate labor share)

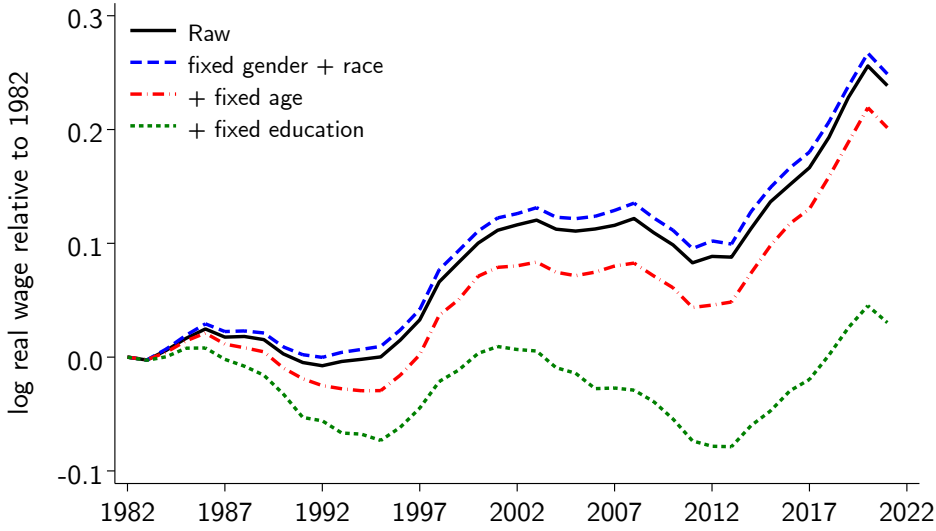
Thank you!

aniket.baksy@unimelb.edu.au

Appendix

Wage stagnation since the 1980s

back



Environment

back

Workers enter non-employed with human capital $h(0) = 0$ and retire at age $\bar{A}$

- Log wage of worker i at age a:

$$\underbrace{W(i,t)}_{\text{wage}} = \underbrace{X(i,t)}_{\text{gender, race, education, occupation, state}} + \underbrace{h(a)}_{\text{human capital evolves flexibly with age } a} + \text{piece r}$$

- Non-employed workers contact open jobs at rate $\widehat{p}$
  - Each job associated with a draw of a piece rate from $\widehat{F}(r)$; accept jobs with $r \geq \widehat{R}$
- Employed workers subject to three type of events
  - **Job loss** at rate $\widehat{\delta} \implies$ non-employment
  - **Directed outside offer** from $\widehat{F}(r)$ at rate $\phi^e \widehat{p} \implies$ accepted if pays better
  - **Undirected outside offer** from $\widehat{F}(r)$ at rate $\phi^f \widehat{p} \implies$ accepted regardless of pay

The Distribution of Workers over States

back

Let $n(a)$ be the non-employment rate at age a and $\widehat{x}(r,a)$ the distribution over piece rates:

$$0 = \underbrace{-\frac{\partial}{\partial a}\left(\left(1-n(a)\right)\widehat{x}(r,a)\right)}_{\text{aging}} \underbrace{-\left(\widehat{\delta}+\phi^{f}\widehat{p}+\phi^{e}\widehat{p}\left(1-\widehat{F}(r)\right)\right)\left(1-n(a)\right)\widehat{x}(r,a)}_{\text{outflows: job loss, undirected JJ, directed JJ}}$$

$$+ \underbrace{\widehat{f}(r)\,\widehat{p}\,n(a)}_{\text{hires from nonemployment}} + \underbrace{\widehat{f}(r)\,\phi^{f}\widehat{p}\,\left(1-n(a)\right)}_{\text{inflows from undirected JJ}} + \underbrace{\widehat{f}(r)\,\phi^{e}\widehat{p}\,\left(1-n(a)\right)\int_{\widehat{R}}^{r}\widehat{x}(u,a)\,du}_{\text{inflows from directed JJ from lower } r}$$

subject to $\lim_{a\to 0}\widehat{x}(r,a)=\widehat{f}(r)$ for all r, and $\int_{\widehat{R}}^{\infty}\widehat{x}(r,a)\,dr=1$ for all a.

Relative Wages

back

$$\underbrace{w}_{\text{relative wage}} = \widehat{w}(i,a) - \underbrace{\overline{w}^{h}(a)}_{\text{average wage of hire from non-employment}},$$

$$\underbrace{F(w)}_{\text{distribution of truncated offered relative wages}} = \frac{\widehat{F}(w+\overline{r}) - \widehat{F}(\widehat{R})}{1-\widehat{F}(\widehat{R})},$$

$$\underbrace{p}_{\text{effective JFR of non-employed}} = \widehat{p}\big(1-\widehat{F}(\widehat{R})\big),$$

$$\underbrace{\delta}_{\text{effective separation rate}} = \widehat{\delta} + \phi^{f}\widehat{p}\widehat{F}(\widehat{R}),$$

$$\underbrace{\lambda^{f}}_{\text{effective undirected offer rate}} = \phi^{f}\widehat{p}\big(1-\widehat{F}(\widehat{R})\big),$$

$$\underbrace{\lambda^{e}}_{\text{effective directed offer rate}} = \phi^{e}\widehat{p}\big(1-\widehat{F}(\widehat{R})\big)$$

The Distribution of Relative Wages

back

- Let $G_{\bar{A}}(w)$ be the overall share of employed workers earning less than relative wage w

- In paper: $G_{\bar{A}}(w)$ depends on $F(w)$, a key ratio of parameters κ, and a finite-life adjustment

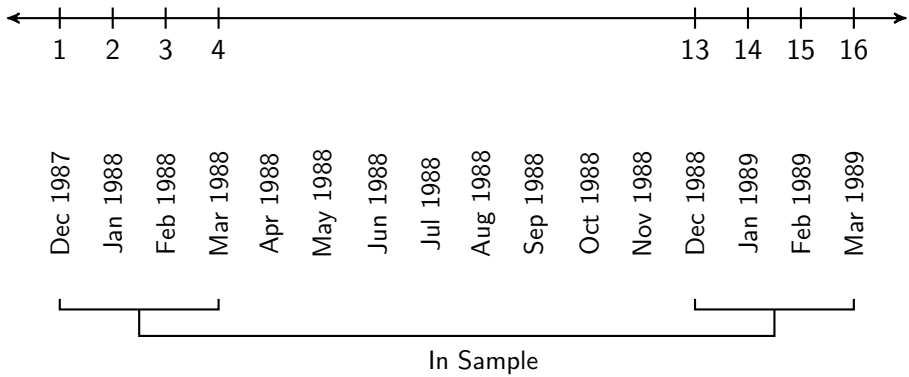
$$G_{\bar{A}}(w) = \frac{F(w)}{1+\kappa(1-F(w))}\Big(1+C_{\bar{A}}(w)\Big), \qquad \text{where} \qquad \lim_{\bar{A}\to\infty} C_{\bar{A}}(w) =$$

$$\underbrace{\kappa}_{\text{net upward mobility rate}} = \underbrace{\frac{\lambda^e}{\delta+\lambda^f}}_{\#\text{ of directed offers between 2 events that set workers back}}$$

- Faster upward mobility $\implies$ greater wage growth $\implies$ larger gap btw offer & wage distr.

Our Data: The Current Population Survey

back

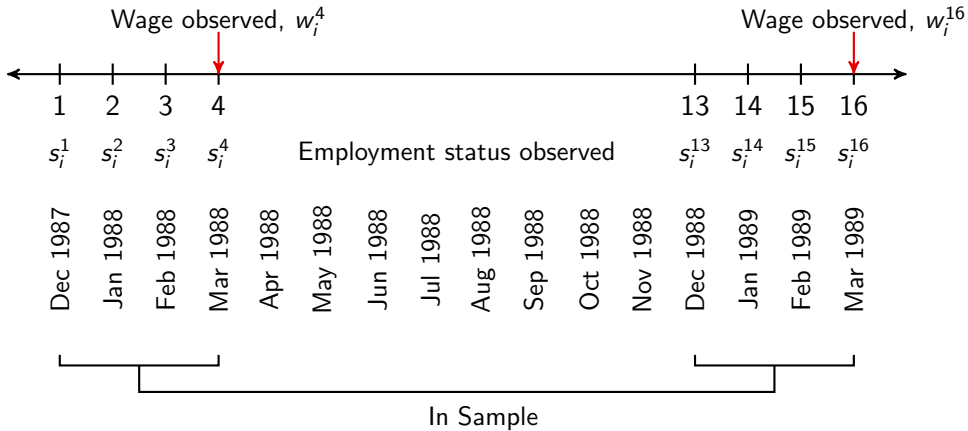


Our Data: The Current Population Survey

back

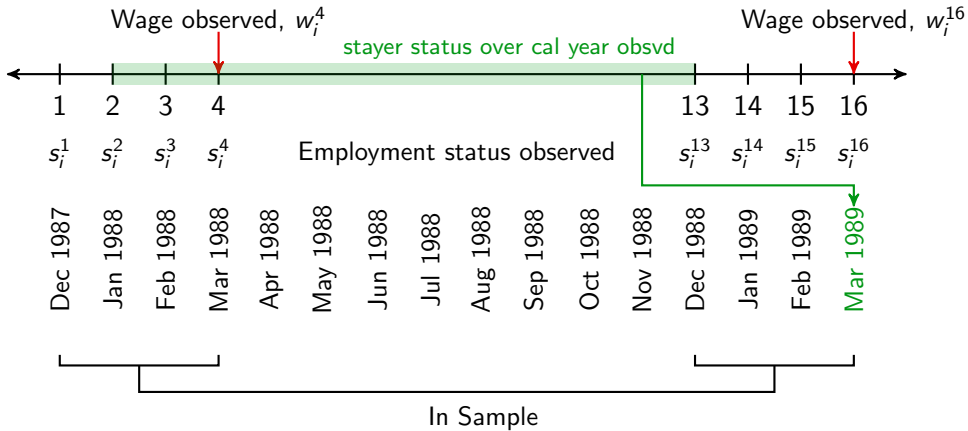
Our Data: The Current Population Survey

back



Our Data: The Current Population Survey

back



Taking the Simple Model to Data

back

- Theory about residual wage dispersion: project log wages on observables year-by-year

$$\ln W_{it} = \underbrace{\alpha_{ry}}_{\text{race}} + \underbrace{\alpha_{gy}}_{\text{gender}} + \underbrace{\alpha_{ey}}_{\text{education}} + \underbrace{\alpha_{sy}}_{\text{state}} + \underbrace{\alpha_{oy}}_{\text{occupation}} + \underbrace{\alpha_{my}}_{\text{survey month}} + \tilde{w}_{it}$$

- Express wages relative to hires from non-employment of same age

$$w_{it} = \tilde{w}_{it} - \underbrace{\overline{w}_{at}}_{\text{average residual wage out of non-empl.}}$$

- Estimate $G(w)$ and $F(w)$ non-parametrically
  - **Wage distribution G(w)**: residual wages among all workers
  - **Offer distribution F(w)**: among those who were non-employed in the previous month

Estimation of the Simple Model

back

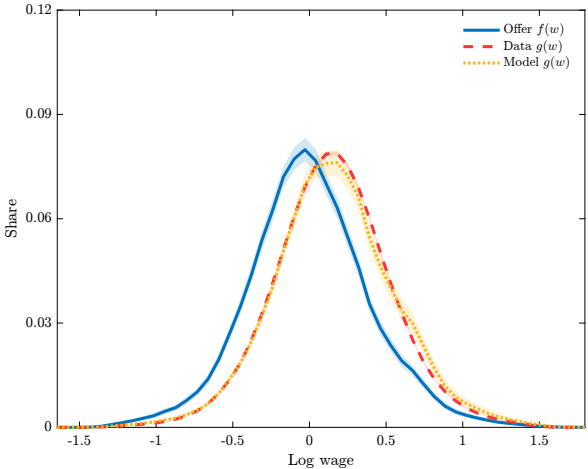
$$\min \Bigg\{ \underbrace{\left(\frac{p}{p+\delta} \left(1 - e^{-12(p+\delta)} \right) - \text{NE rate}^{\text{data}} \right)^2}_{\text{Annual NE rate: particularly informs } p} + \underbrace{\left(\frac{\delta}{p+\delta} \left(1 - e^{-12(p+\delta)} \right) - \text{EN rate}^{\text{data}} \right)^2}_{\text{Annual EN rate: particularly informs } \delta}$$

$$\underbrace{\left(\sum_{i=1}^{N} e^{-11(\delta+\lambda^f)(1+\kappa(1-F_i))} \frac{(1+\kappa) f_i}{(1+\kappa(1-F_i))^2} - \text{stayers}^{\text{data}} \right)^2}_{\text{Annual share job stayers: particularly informs } \lambda^f} + \underbrace{\sum_{i=1}^{N} \left(\frac{(1+\kappa) f_i}{(1+\kappa(1-F_i))^2} - g_i^{\text{data}} \right)^2}_{\text{Wage distribution: particularly informs } \kappa} \Bigg\}$$

- $N = 50$ in our benchmark, estimation decade-by-decade.

Moments by Decade: 1980s

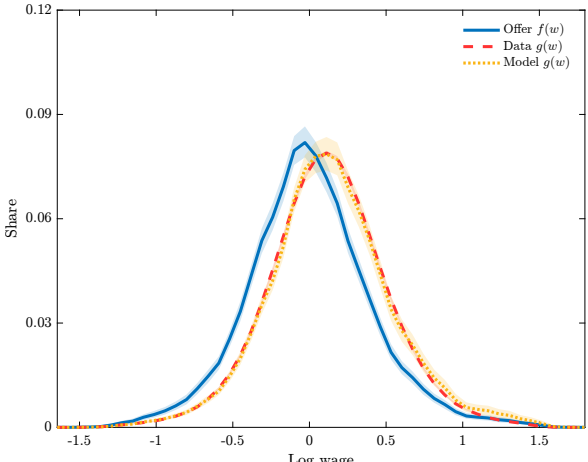
back



	Data	Model
EN rate	0.074	0.074
	(0.000)	(0.000)
NE rate	0.203	0.203
	(0.001)	(0.001)
Stayer	0.741	0.741
	(0.001)	(0.001)

Moments by Decade: 1990s

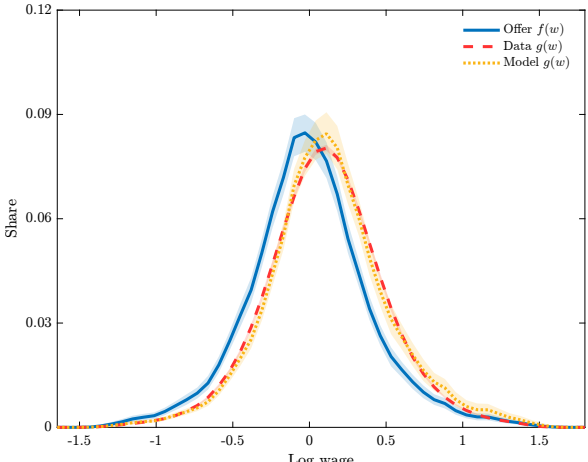
back



	Data	Model
EN rate	0.074	0.074
	(0.000)	(0.000)
NE rate	0.209	0.209
	(0.001)	(0.001)
Stayer	0.759	0.759
	(0.002)	(0.002)

Moments by Decade: 2000s

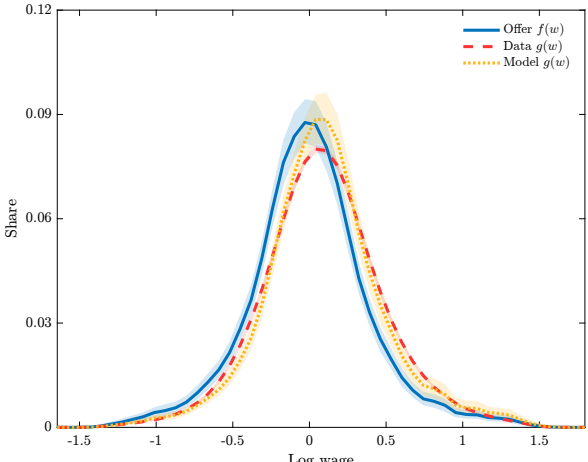
back



	Data	Model
EN rate	0.079	0.079
	(0.000)	(0.000)
NE rate	0.190	0.190
	(0.001)	(0.001)
Stayer	0.789	0.789
	(0.001)	(0.001)

Moments by Decade: 2010s

back

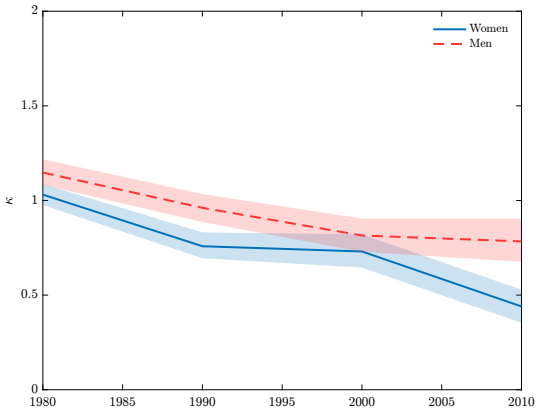


	Data	Model
EN rate	0.081	0.081
	(0.000)	(0.000)
NE rate	0.189	0.189
	(0.001)	(0.001)
Stayer	0.785	0.785
	(0.002)	(0.002)

Net Upward Mobility by Gender

back

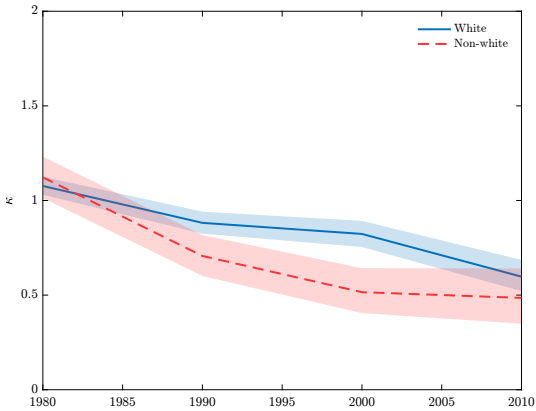
- Women move up the job ladder less
- Experienced somewhat larger declines



Net Upward Mobility by Race

back

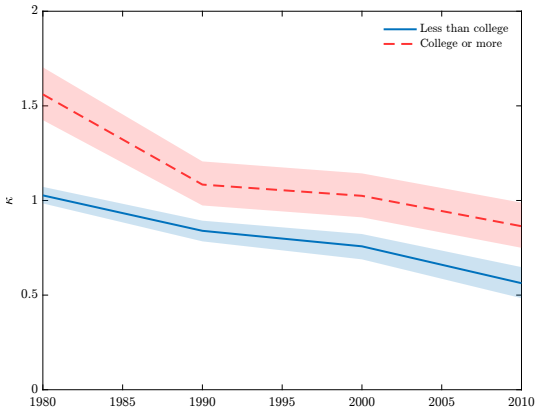
- Minorities move up the job ladder less
- Experienced somewhat larger declines



Net Upward Mobility by Education

back

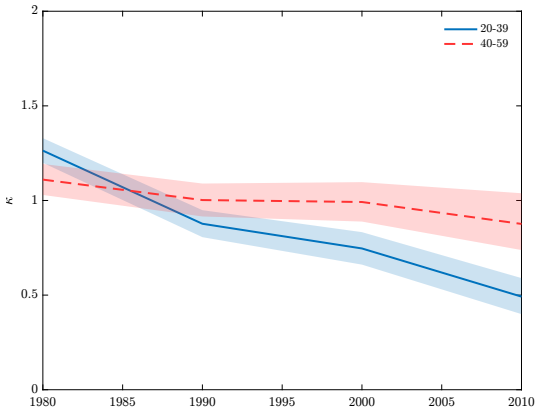
- College graduates move up the job ladder more
- Experienced similarly large proportional declines



Net Upward Mobility by Age

back

- Similar net upward mobility in 1980s
- Particularly large decline for young



Net Upward Mobility has Declined Substantially

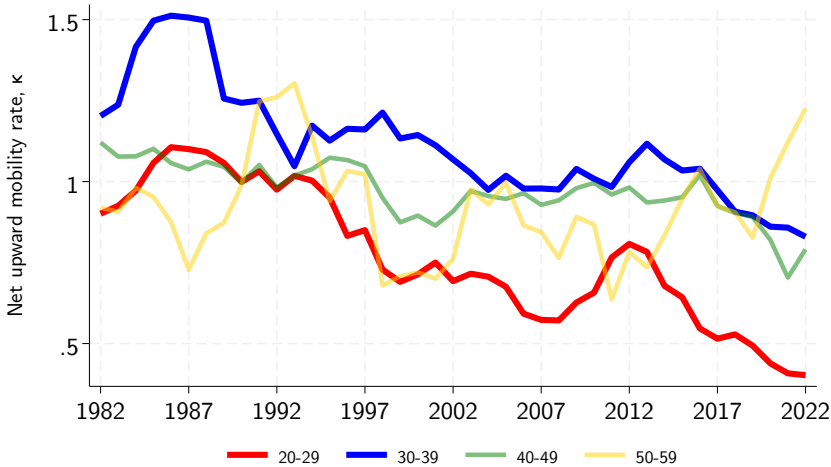
back

The decline is

- larger for younger workers (20-29 and 30-39 relative to 40+) graph
- similar for women relative to men graph
- similar across race groups graph
- larger for better educated workers graph
- mixed across occupation/industry groups graph & graph
- largest in the middle of the occupational wage distribution graph
- larger for occupations more exposed to non-competes graph

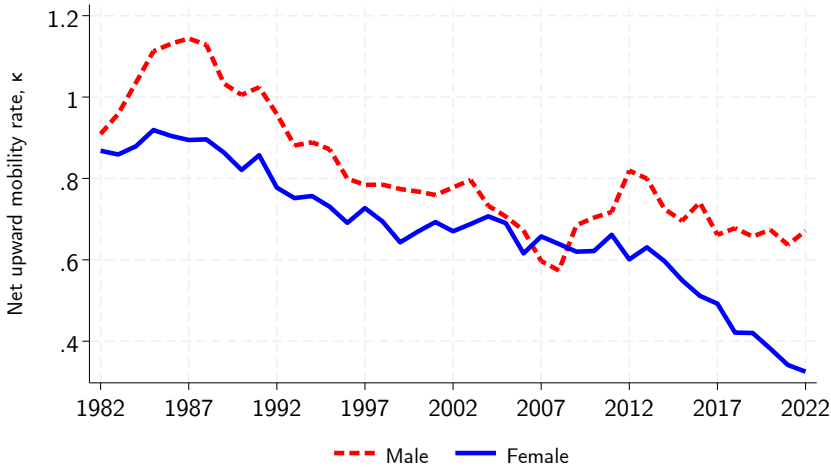
Decline in net upward mobility sharper for the youngest

back



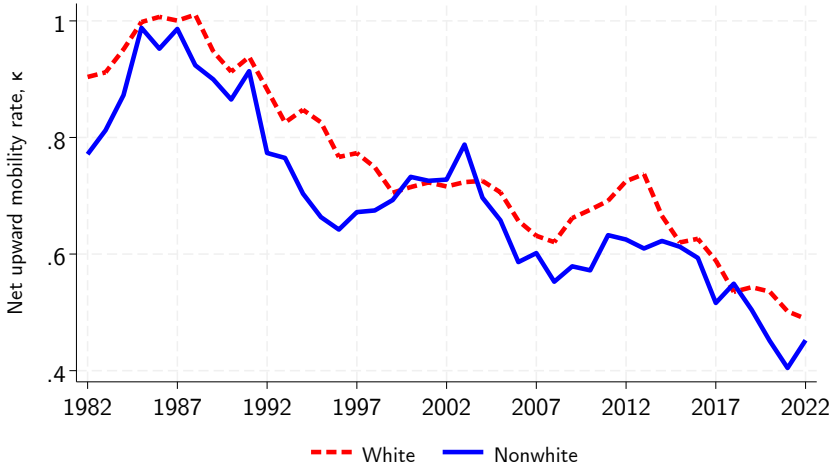
Decline in net upward mobility comparable across genders

back



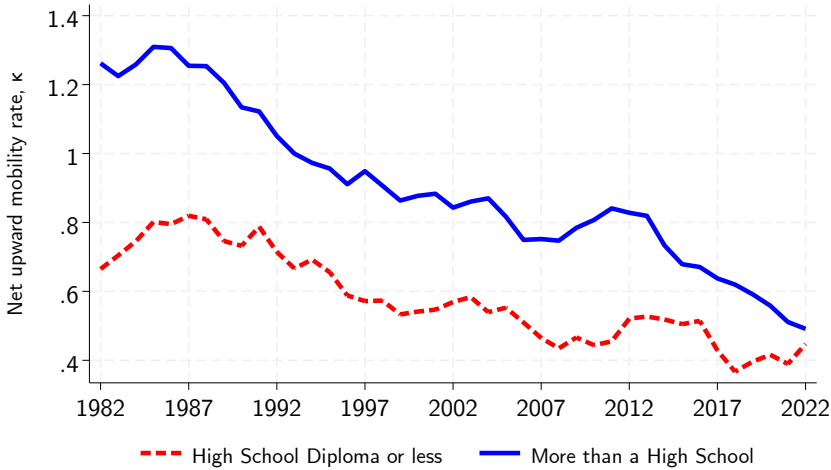
Decline in net upward mobility similar across race groups

back



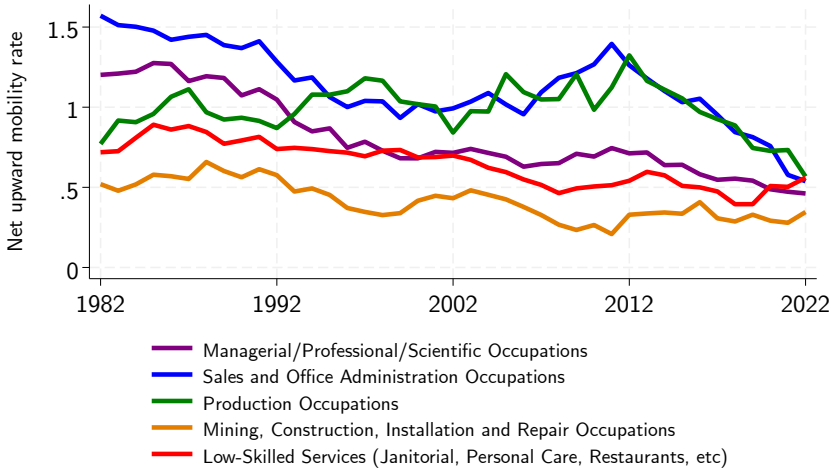
Decline in net upward mobility larger for better educated workers

back



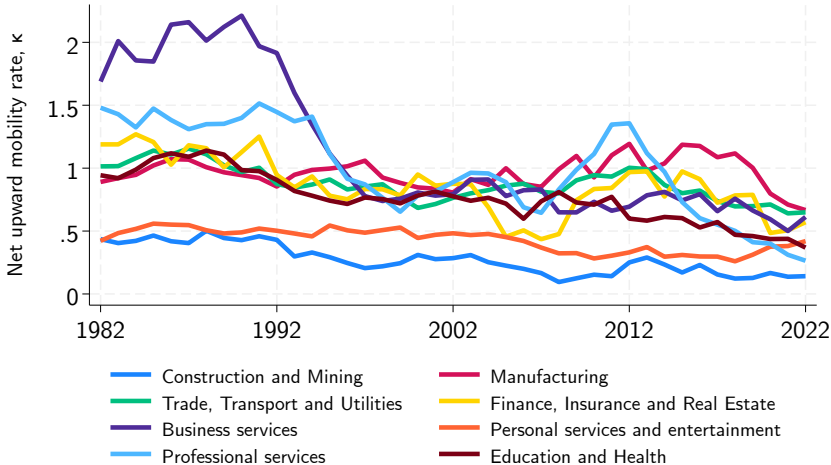
Decline in net upward mobility mixed across Occupation groups

back



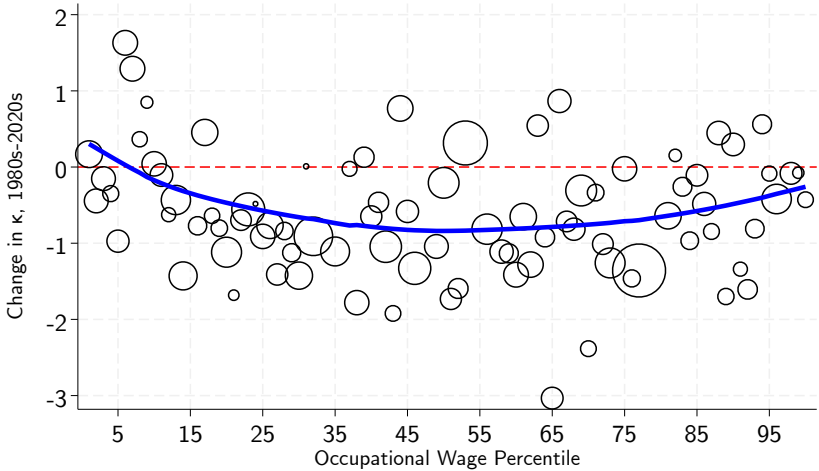
Decline in net upward mobility mixed across Industry groups

back



Decline largest in the middle of Occupational Wage Distribution

back

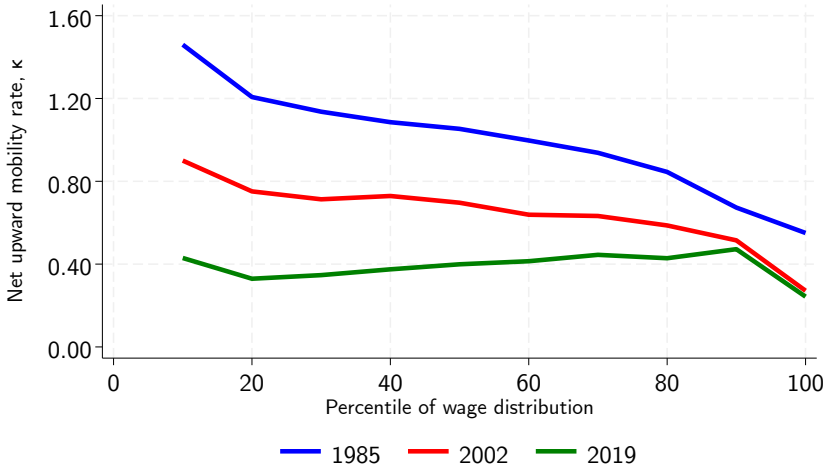


Decline larger for Occupations more exposed to Non-competes

back

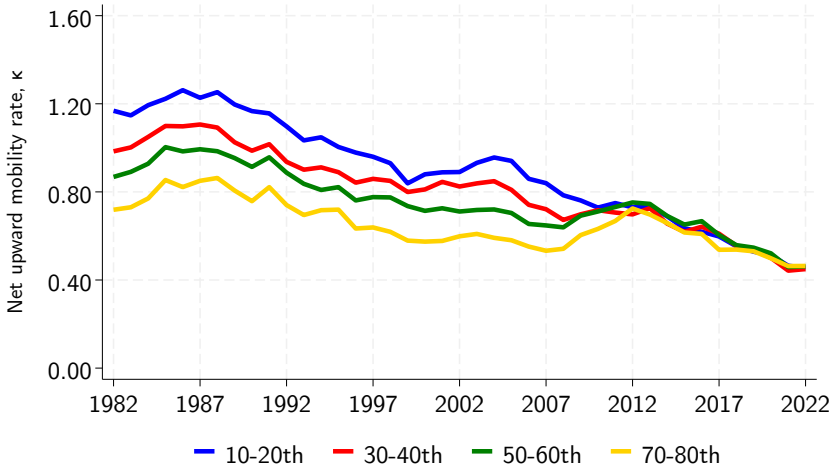
Decline in Net Upward Mobility: κ at Different Percentiles

back



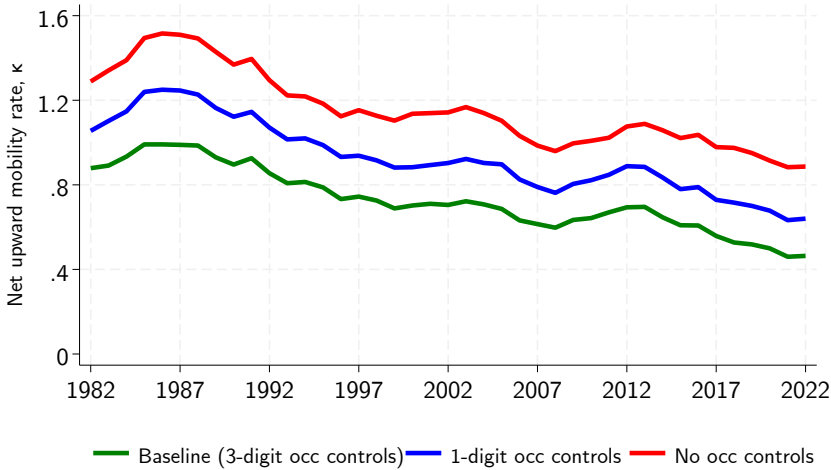
Decline in Net Upward Mobility: κ at Different Percentiles

back



Decline in Net Upward Mobility: Between-Occupation Results

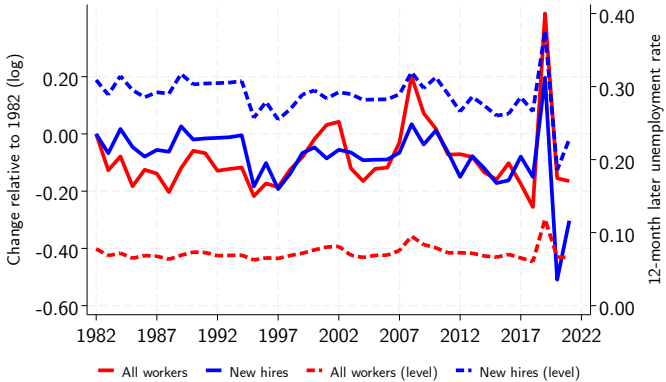
back



Decline in Net Upward Mobility: Unlikely to be better match quality

back

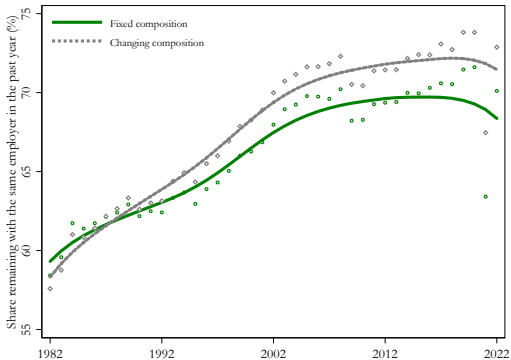
- Better screening $\Longrightarrow$ fewer bad matches form in first place
- Convergence of offer & wage distributions and fall in mobility
- However, implies decline in EN rate, especially among new matches
- Only modest decline in data



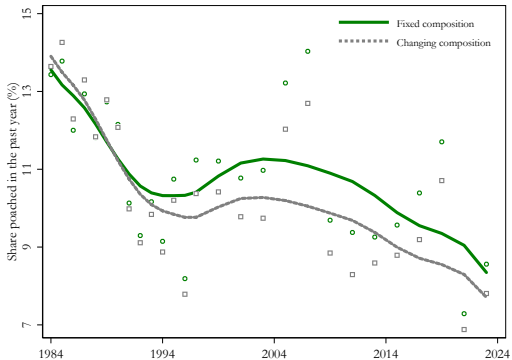
Direct Evidence on Mobility

back

March CPS: Stayed with employer throughout the year



PSID: Share of employed poached in the past year

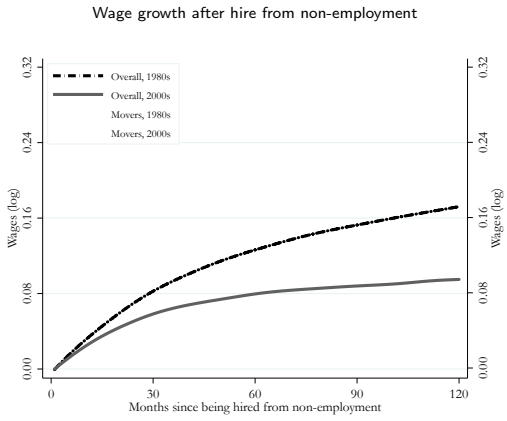


Direct Evidence on Wage & Employment Dynamics

- Ideal data set contains employment & wage dynamics
- Monthly frequency individual-level panel data from NLSY
  - NLSY 1979 was aged 14–22 in 1979, has been followed annually (bi-annually since 1994)
  - NLSY 1997 was aged 12–17 in 1997, has been followed annually (bi-annually since 2014)
- We study wage growth for up to 120 months post a non-employment spell
  - Residualize wages (indiv FEs + deflate with average residual wages of same age)
  - Decompose wage growth: due to job mobility, stayer wage growth, flows in/out of non-emp

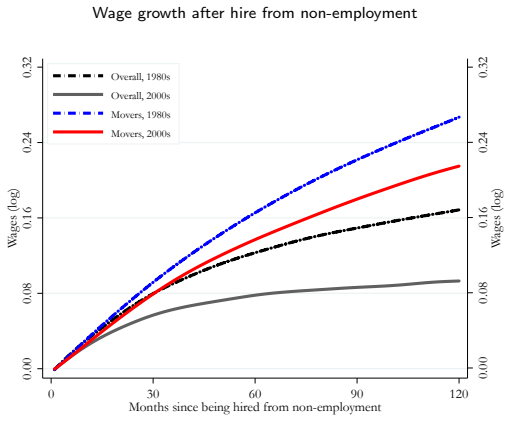
▸ wage distributions ▸ decomposition formula

Less Wage Growth from Upward Job Mobility



NLSY '97 sees much slower wage growth after hire than NLSY '79

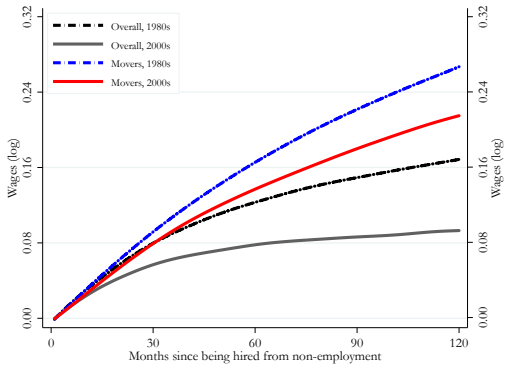
Less Wage Growth from Upward Job Mobility



driven by slower wage growth of movers in NLSY '97 than NLSY '79

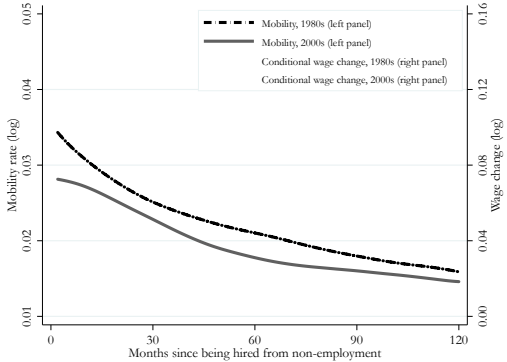
Less Wage Growth from Upward Job Mobility

Wage growth after hire from non-employment



driven by slower wage growth of movers in NLSY '97 than NLSY '79

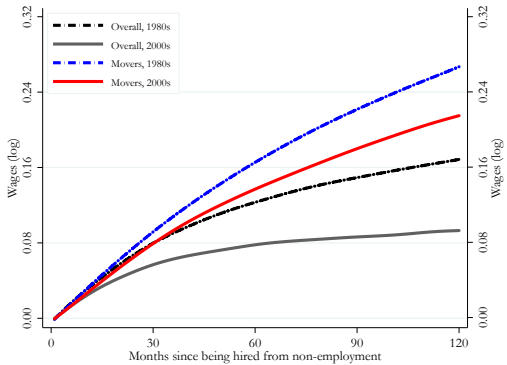
Frequency of mobility & conditional wage gain



driven by both slower mobility rates

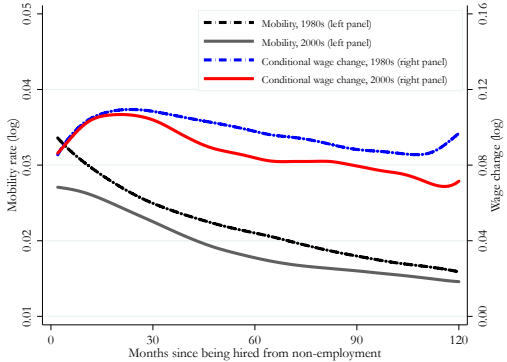
Less Wage Growth from Upward Job Mobility

Wage growth after hire from non-employment



driven by slower wage growth of movers in NLSY '97 than NLSY '79

Frequency of mobility & conditional wage gain



driven by both slower mobility rates and by lower wage growth for movers

Decomposition of Wage Growth (NLSY)

back

- Decompose residual wage growth (rel. to someone of the same age)

$$
\begin{aligned}
dw_t \;=\; & \underbrace{\sum_{i\in\mathcal{S}_t} \frac{\omega_{it}+\omega_{it-1}}{2}\left(w_{it}-w_{it-1}\right)}_{\text{contribution of stayers}} + \underbrace{\sum_{i\in\mathcal{M}_t} \frac{\omega_{it}+\omega_{it-1}}{2}\left(w_{it}-w_{it-1}\right)}_{\text{contribution of movers}} \\
& + \underbrace{\sum_{i\in\mathcal{H}_t} \omega_{it}w_{it} - \sum_{i\in\mathcal{X}_t} \omega_{it-1}w_{it-1}}_{\text{flows in and out of non-empl.}} + \underbrace{\sum_{i\in\mathcal{N}_t} \omega_{it}w_{it} - \sum_{i\in\mathcal{O}_t} \omega_{it-1}w_{it-1}}_{\text{flows in and out of missing}} \\
& + \underbrace{\sum_{i\in\mathcal{S}_t\cup\mathcal{M}_t} \left(w_{it}+w_{it-1}\right)\frac{\omega_{it}-\omega_{it-1}}{2}}_{\text{adjustment factor}}
\end{aligned}
$$

NLSY vs CPS residual wage distributions

back

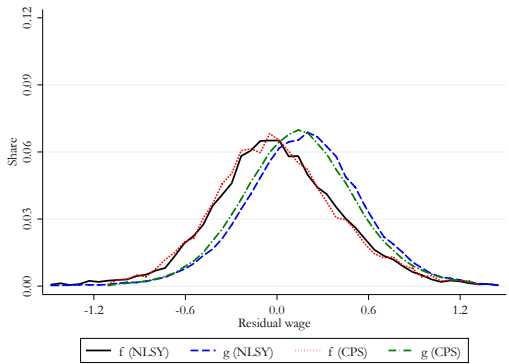


Figure: Wage and Offer Distributions in 1980s

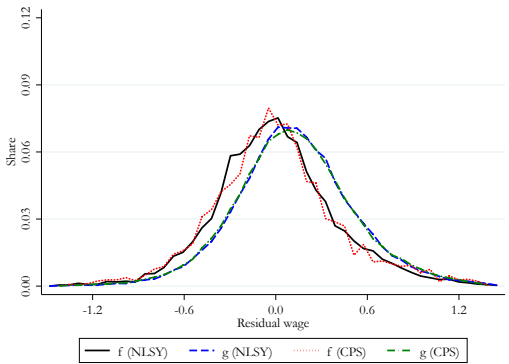


Figure: Wage and Offer Distributions in 2000s

Wage Distributions

back

- Kolmogorov Forward Equation for the wage distribution $G(w)$ is now

$$0 = -\underbrace{\delta G(w)}_{\text{reallocation + job loss}} - \underbrace{\phi\lambda\Big(1-F(w)\Big)G(w)}_{\text{outside offers}} + \underbrace{\lambda F(w)\frac{u}{1-u}}_{\text{hires from non-empl.}} + \underbrace{\delta\lambda^f F(w)}_{\text{reallocation}}$$

$$-\underbrace{\theta(\mu-w)g(w)}_{\text{drift in wages on job}} + \underbrace{\frac{\sigma^2}{2}g'(w)}_{\text{shocks}}$$

with boundary conditions $\lim_{w\to 0} G(w) = 0$ and $\lim_{w\to\infty} G(w) = 1$

- As before u satisfies flow balance equation

$$\lambda u = \delta\left(1-\lambda^f\right)(1-u)$$

Why has mobility declined? Adding labour market structure

back

- Model extension: allow λ^e to be determined by underlying labour market structure
- Assume US divided into perfectly segmented labour markets indexed by i
  - Within each market, m_i identical firms each advertise v_i vacancies. Let $V_i = v_i m_i$.
  - On-the-job search: employed workers search w/ relative intensity ϕ. Search effort $S_i = u_i + \phi e_i$.
  - Cobb-Douglas matching function: $\mathcal{M}_i = \chi S_i^{1-\alpha} V_i^{\alpha}$
  - Firm-worker contact rate $\lambda_i \equiv \frac{\mathcal{M}_i}{S_i} \equiv \chi x_i^{\alpha}$, $x_i =$ tightness
  - Firms can exclude current employees from applying to own vacancies
- This setup generates two forces affecting measured aggregate mobility:
- Mismatch: nonlinear matching fn + dispersion in tightness $\implies$ lower effective agg. contact rate

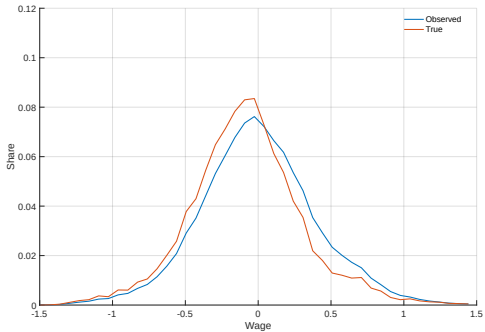
  Barnichon-Figura '15
- Concentration: lower m_i $\implies$ lower effective contact rates for the employed relative to non-emp

  Gottfries-Jarosch '23

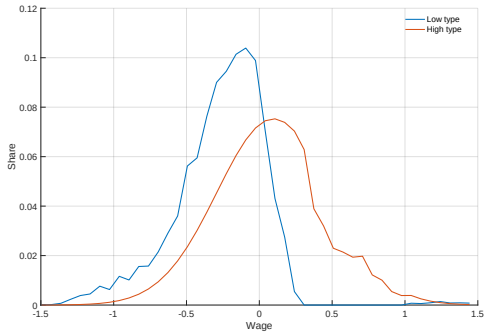
Recovering the True Offer Distributions

back

- The observed offer distribution is mixture of the true and wage distribution
- Given parameter values, we can recover the true offer distribution
  - offer distribution of the high type is log normal distribution with the same st.d and mean $+\omega$
  - offer distribution of the low type is the residual



Observed and true offer distributions"

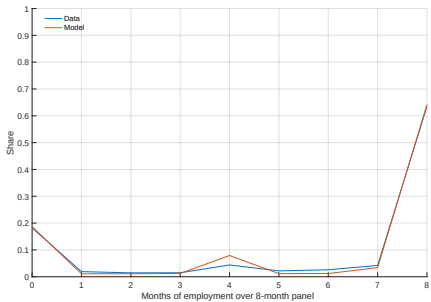


Offer distribution by type

Flows In & Out of Employment

back

$$\Big[\underbrace{\pi}_{\text{share of low type}}, \underbrace{\delta^1}_{\text{job loss of low type}}, \underbrace{\delta^2}_{\text{job loss of high type}}, \underbrace{\lambda}_{\text{job finding rate}}, \underbrace{\varepsilon}_{\text{emp.stat. misclassification}}\Big]$$



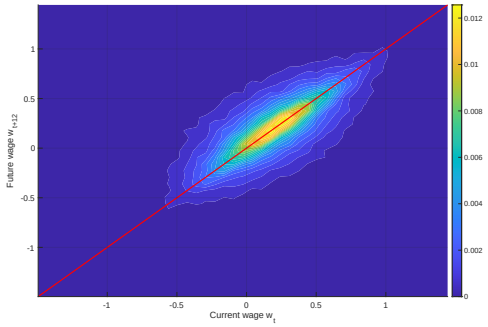
Months of employment

- Some stayers report period of non-employment
- Informs employment status misclassification

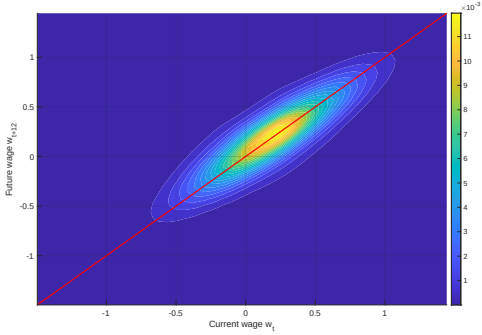
Wage Dynamics of On-the-Job

back

$$\left[\underbrace{\mu}_{\text{long-run mean}}, \underbrace{\theta}_{\text{persistence}}, \underbrace{\sigma}_{\text{st.d. of wage innovations}}\right]$$



Wages of job stayers at t & $t+12$ (data)

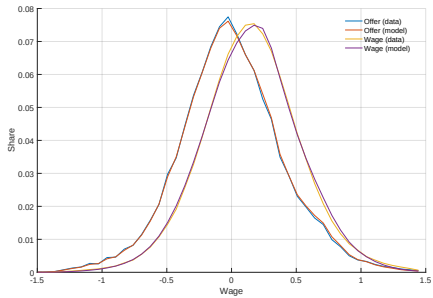


Wages of job stayers at t & $t+12$ (model)

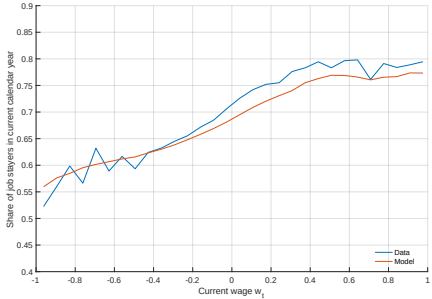
Flows Between Jobs

back

$$\Big[\underbrace{\lambda^e}_{\text{arrival rate of voluntary outside offers}}, \quad \underbrace{\lambda^f}_{\text{arrival rate of reallocation shocks}}\Big]$$



Offer and wage distributions

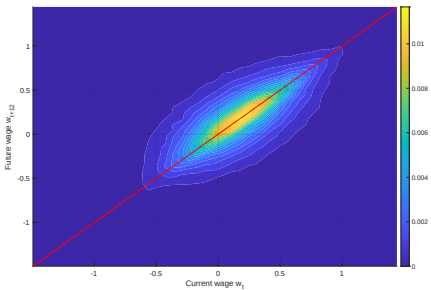


Share of job stayers by wage

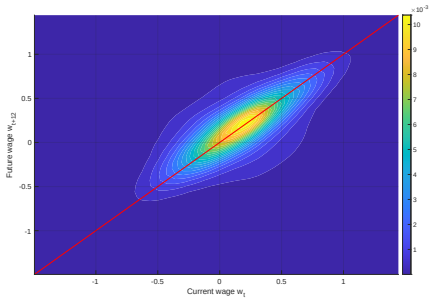
Flows Between Jobs

back

$$\Big[\underbrace{\lambda^e}_{\text{arrival rate of voluntary outside offers}}, \quad \underbrace{\lambda^f}_{\text{arrival rate of reallocation shocks}}\Big]$$



Wages of all workers at t & $t+12$ (data)

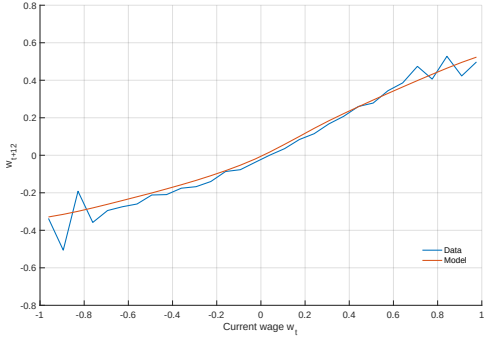


Wages of all workers at t & $t+12$ (model)

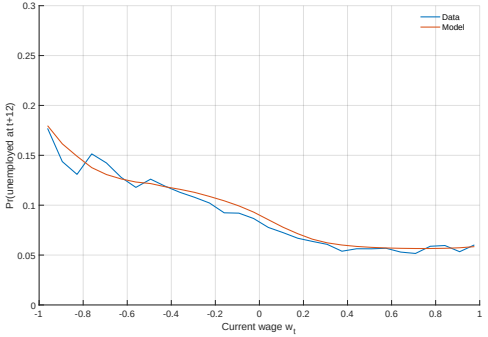
Wage Dynamics of Job Losers

back

$$\underbrace{\omega}_{\text{mean difference in offer distribution}}$$



Wage at $t + 12$ by wage at t among job losers



Share non-employed at $t + 12$ by wage at t

Parameters Directly From the Data

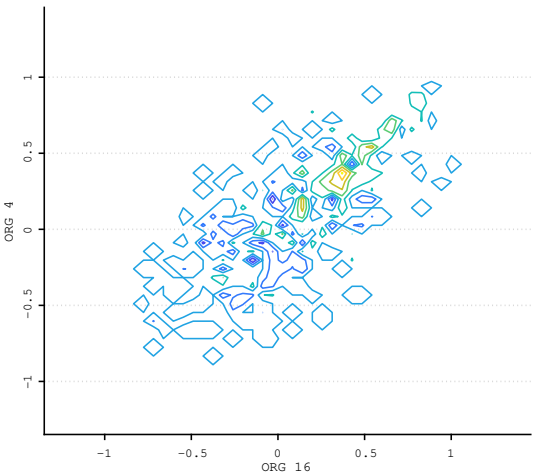
back

		(1) 1980s	(2) 1990s	(3) 2000s	(4) 2010s
in	re-entry to being observed	0.123	0.111	0.115	0.139
out	rate of dropout from survey	0.156	0.146	0.124	0.167
ε	share workers on temp. layoff	0.011	0.011	0.012	0.012
ν	recall error for stayer status (annual)	0.102	0.153	0.198	0.253
λ	job finding rate, unemp	0.055	0.054	0.046	0.046
τ	matching wedge	0.090	0.112	0.194	0.242

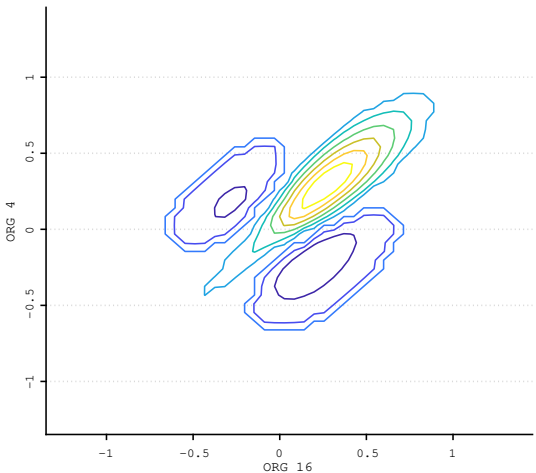
Joint Distribution of Stayers

back

Data



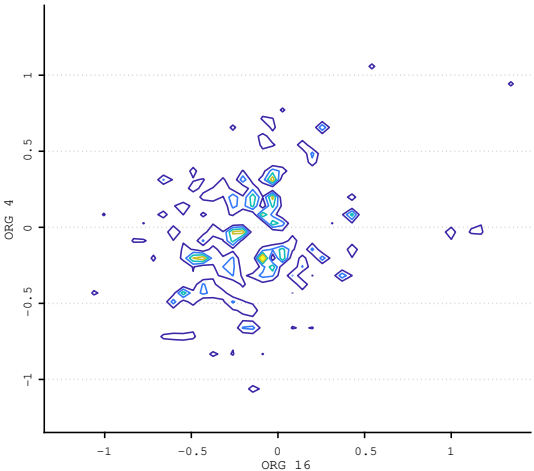
Model



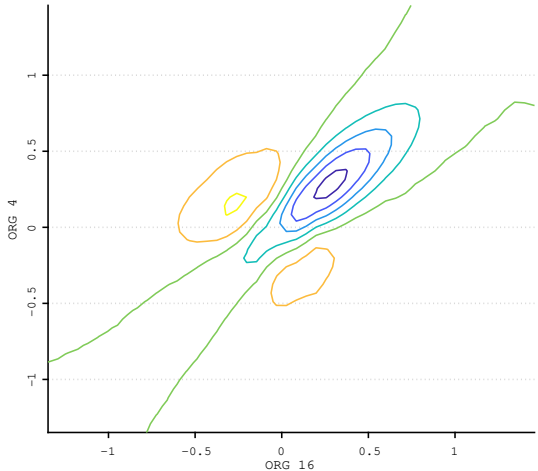
Joint Distribution of Job Losers

back

Data



Model



Eight Parameters Via the Simulated Method of Moments

back

$$\Big\{ \underbrace{\mu \ , \ \theta \ , \ \sigma}_{\text{on-the-job dynamics}} \ , \ \underbrace{\pi, \ \delta^1 \ , \ \delta^2 \ , \ \omega}_{\text{unobserved heterogeneity}} \ , \ \underbrace{p \ , \ \lambda^f \ , \ \lambda^e}_{\text{offer arrival rates}} \Big\}$$

- **On-the-job wage dynamics**
  - Joint distribution over wages of job stayers

joint distribution of stayers

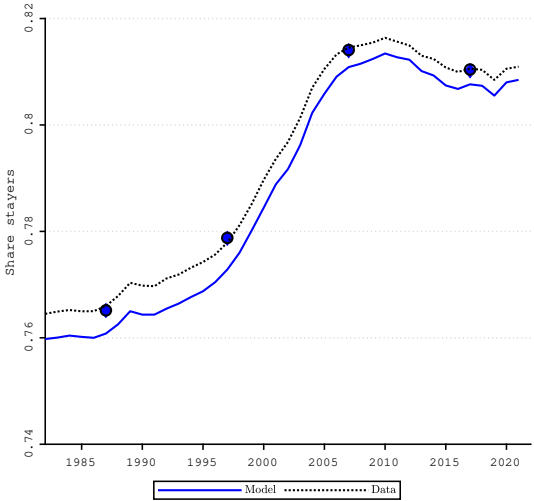
- **Unobserved heterogeneity**
  - Joint distribution over wages of job losers

joint distribution of job losers

- **Nonemp. Offer Arrival Rate**: NE rates (as in simple model)
- **Reallocation shocks**: Joint distribution over wages of all workers and share of stayers
- **Arrival rate of outside offers**: Gap between wage and offer distribution

Share of Stayers

back



- The EN rate informs the model EN rate $\delta(1-\lambda^f)$
- λ^e gives voluntary job-to-job flows
- Use the share that remain in job to get λ^f

Employer Granularity From State-Year Panel

back

- # of LMs in state s in period y, B_{sy} assumed proportional to the # of workers N_{sy}

$$\beta \quad = \quad \frac{N_{sy}}{B_{sy}} \equiv \text{const. no. workers/market}$$

- It follows that the # of firms per market m_{sy} is

$$m_{sy} \quad = \quad \frac{M_{sy}}{B_{sy}} \quad = \quad \beta \frac{M_{sy}}{N_{sy}}.$$

- Then we can obtain a measure of the number of workers per market from

$$\ln \frac{\lambda^e_{sy}}{\lambda_{sy}} \quad = \quad \ln \left(1 - \frac{fsize_{sy}}{\beta} \right) + \alpha_s + \alpha_y + \varepsilon_{sy}, \qquad m_y \quad = \quad \frac{\beta}{fsize_y}$$

Employer Granularity From State-Year Panel

back

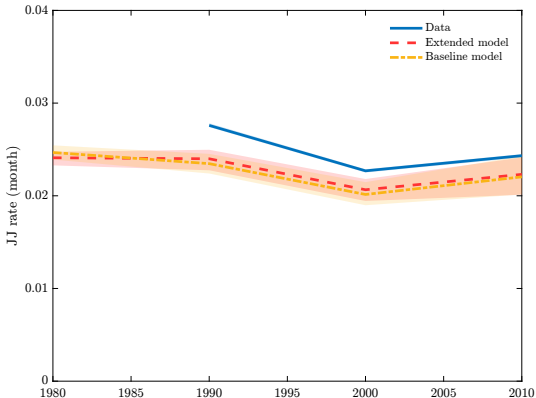
Table: Parameter estimates from cross-state panel

	(1)	(2)	(3)	(4)	(5)	(6)
β	43.454	34.133	63.754	39.185	38.834	39.143
	(5.255)	(2.050)	(17.543)	(7.510)	(9.526)	(7.186)
Trend						-0.000
						(0.000)
Controls	yes	yes	yes	yes	no	yes
Year FE	no	no	yes	yes	yes	yes
State FE	no	yes	no	yes	yes	yes
Obs.	2,000	2,000	2,000	2,000	2,000	2,000

JJ Rate in Model & Data

back

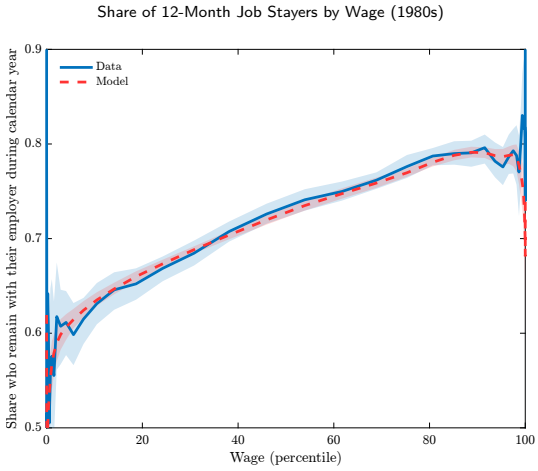
- Can get JJ rate in CPS since 1994
- Model understates somewhat the data
- But matches well the trend



Suggestive Evidence of a Decline in Upward Job Mobility

back

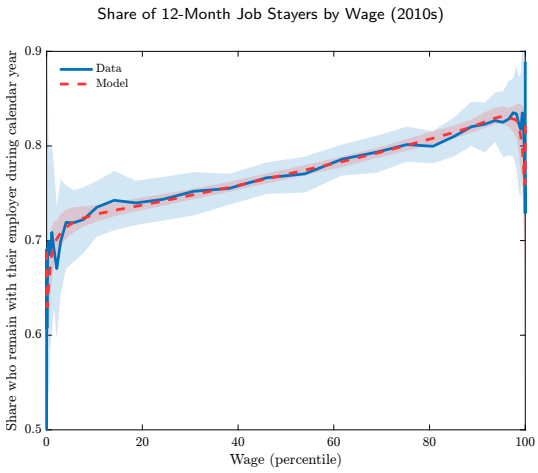
- Workers at the top are more likely to stay



Suggestive Evidence of a Decline in Upward Job Mobility

back

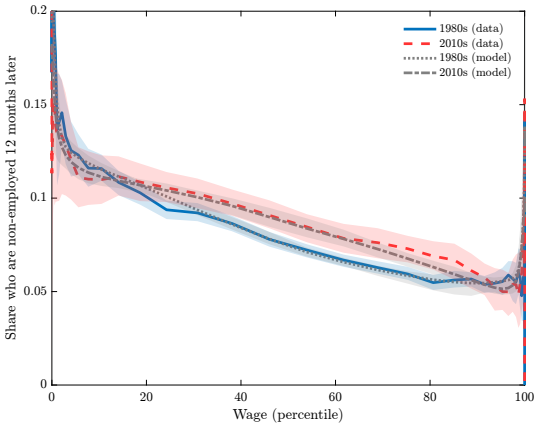
- Workers at the top are more likely to stay
- The share of stayers has risen
- Large rise at bottom consistent with $\lambda^e \downarrow$



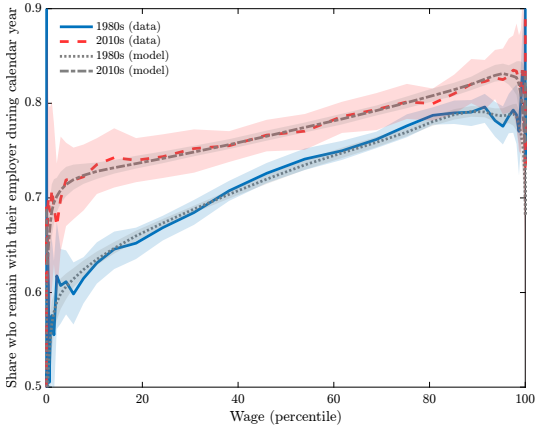
EN by Wage

back

12-Month EN Rate by Wage



12-Month Job Stayers by Wage



Direct Evidence of a Decline in Upward Job Mobility

back

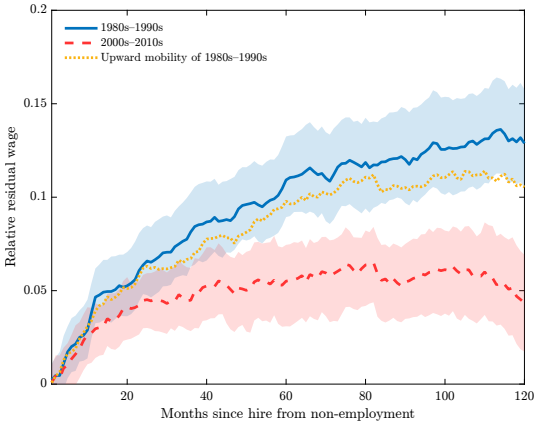
- Use data on employment *and* wage dynamics from the NLSY 1979 and 1997
- Residualize off person FEs, deflate with residual wage of hire from non-empl. of that age
- Follow workers for up to 120 months after a spell of non-employment

$$\begin{aligned}\overline{w}_t \;=\; \sum_{\tau=1}^{t} \Big\{ & \text{stayer}_\tau \Delta w_\tau^{\text{stayer}} + \text{mover}_\tau \; \Delta w_\tau^{\text{mover}} \\ & + \; \text{hire}_\tau \Delta w_\tau^{\text{hire}} + \text{separator}_\tau \Delta w_\tau^{\text{separator}} \\ & + \; \text{from missing}_\tau \Delta w_\tau^{\text{from missing}} + \text{to missing}_\tau \Delta w_\tau^{\text{to missing}} \Big\}\end{aligned}$$

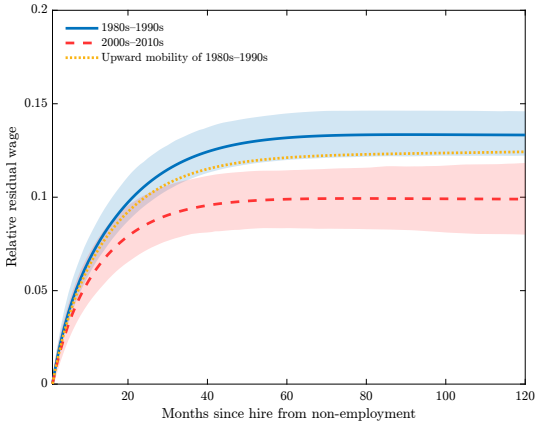
Direct Evidence of a Decline in Upward Job Mobility

back

Data



Model



Direct Evidence of a Decline in Upward Job Mobility

back

	1980s–1990s		2000s–2010s		Change	
	Model	Data	Model	Data	Model	Data
$\overline{w}_{120} - \overline{w}_1$	0.133	0.127	0.099	0.043	-0.034	-0.084
	(0.005)	(0.012)	(0.009)	(0.014)	(0.010)	(0.019)
$\overline{\Delta w^{\text{stayer}}}$	-0.000	-0.000	-0.000	-0.000	0.000	-0.000
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
$\overline{\Delta w^{\text{mover}}}$	0.072	0.099	0.066	0.087	-0.006	-0.012
	(0.021)	(0.006)	(0.028)	(0.009)	(0.035)	(0.010)
$\overline{\text{mover}}$	0.019	0.021	0.018	0.017	-0.001	-0.004
	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)

Non-compete enforcement

back

- Assume that share k of firms enforce noncompetes preventing directed ee moves
- Assume k rises from 0 to 20% between 1980s and 2010s steady states
  - Effectively assumes 0 coverage initially $\rightarrow$ level of coverage estd in SHED data
  - Virtually no data on early period noncompete coverage - we'd love ideas
- We find that this generates:
  - a decline in directed moves: rate falls from 2.4% to around 1.9%
  - up to a 13% lower level of wages!
- In progress: more rigorous quantification of the impact of noncompetes