Monopsony with Recruiting

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Firms have **wage-setting power**

- Firms face constant labor supply elasticity $\approx 4 \quad \Rightarrow \quad$ Wage markdown of $\frac{\varepsilon}{\varepsilon+1} \approx 0.8$

Challenges:

1. "Profit Puzzle": Estimated elasticities imply too high profit shares [Manning 2021]
2. Firms must pay substantially higher wages to become large
   - Evidence: Wage premium at large firms is small [Bloom et al 2018]
   - But *growing* firms pay high wages [Carillo-Tudela et al 2023, Schmieder 2023, Takana et al 2023]

This paper: If firms can spend on recruiting...

- How large are profits from wage setting power?
- Can we reconcile wage premia at growing but not large firms?

Paper in a Nutshell

1. We develop a tractable on-the-job (random) search model with a recruiting margin
   - Search frictions and preference heterogeneity over employers
   - Firms post wages and spend on recruiting
   - **Prediction:** Labor supply is more elastic in the long run than short run
2. **Empirical evidence**: How do firms grow in response to a demand shock?
   - Confirm that firms pay higher wages when growing
   - Estimate recruiting parameters using minimum distance estimation
3. **Quantitative exercise**: Can we match aggregate income shares?
   - Add labor market concentration, capital, product markups
   - Monopsony rents from wage markdowns are mostly dissipated by recruiting costs

Recruiting Function

Consider a firm j setting wages and recruiting expenditure

Effective recruiting activity $V_{j,t}$ depends on recruiting expenditures and size:

$$V_{j,t} = \tilde{c}_j E_{j,t}^{\frac{1}{1+\chi}} N_{j,t-1}^{\frac{\chi-\sigma}{1+\chi}} \qquad \iff \qquad \frac{E_{j,t}}{N_{j,t-1}} = c_j \left(\frac{V_{j,t}}{N_{j,t-1}} \right)^{1+\chi} N_{j,t-1}^{\sigma}$$

Two key parameters:

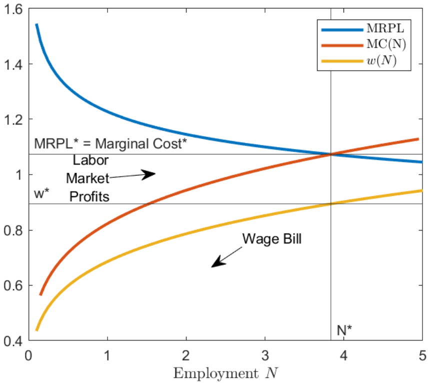
- $\chi \geq 0$: Diminishing returns to recruitment expenditure
- σ: How important is firm size for recruiting?
  - $\sigma = 0$: Constant returns to scale
  - $\sigma > 0$: Decreasing returns to scale

Firm's problem

Labor Market Profits in Steady State

Standard monopsony

$\chi = \sigma$ and $\chi \to \infty$



Math
Steady state

Labor Market Profits in Steady State

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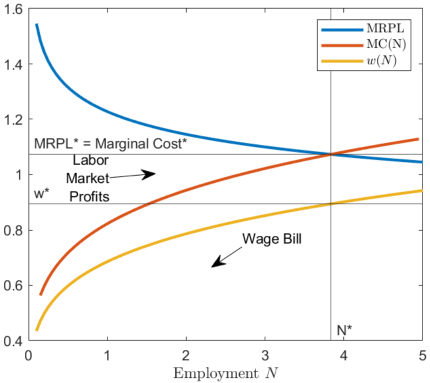
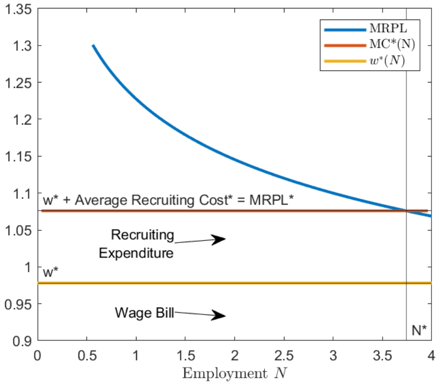


Constant Returns to Scale Recruiting

$\chi > 0, \sigma = 0$



Math Steady state

Labor Market Profits in Steady State

Steady state wage:

$$w = c(1+\chi)\left(\frac{S(w)}{R(w)}\right)^{1+\chi}(\varepsilon_{R,w} - \varepsilon_{S,w})N^{\sigma}$$

Constant Returns to Scale Recruiting

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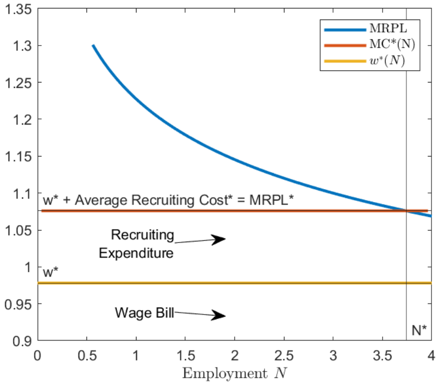


Math
Steady state

Identification: Intuition

$$\textbf{Recruiting function:} \quad V_t = \tilde{c} E_t^{\frac{1}{1+\chi}} N_{t-1}^{\frac{\chi-\sigma}{1+\chi}}$$

The parameters (χ, σ) determine how firms grow in response to a shock:

1. $\chi > 0$ and $\sigma > 0$: Firm-size wage premium
   - Must pay high wages to attract and retain workers
   - Finite labor supply elasticity
2. $\chi > 0$ and $\sigma = 0$: Firms pay high wages to new hires when growing
   - Diminishing returns to recruiting in the short run
   - Constant returns in the long run
3. $\chi = 0$ and $\sigma = 0$: Linear recruiting cost
   - No wage response. Firms grow using *only* recruitment effort.

Empirical Strategy

We use firm-specific export demand shocks to Danish firms [Hummels et al. 2014]

- **Idea:** Exporting firms are differentially exposed to foreign demand shocks depending on
  - The destination of their exports
  - The products they export

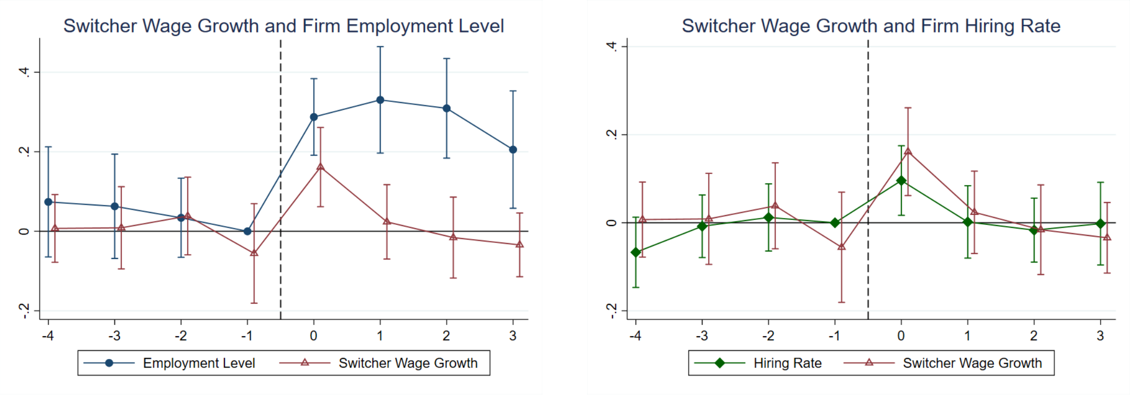
We regress firm outcomes on the demand shock $z_{j,t}$

$$\text{Employment:} \qquad \log N_{j,t+h} - \log N_{j,t-1} = \alpha_h + \beta_h z_{j,t} + \text{controls} + e_{j,t+h}$$

$$\text{Switcher wage growth:} \qquad \Delta \log w_{j,t+h} = \delta_h + \gamma_h z_{j,t} + \text{controls} + e_{j,t+h}$$

Shift-share details | Shock diagnostics

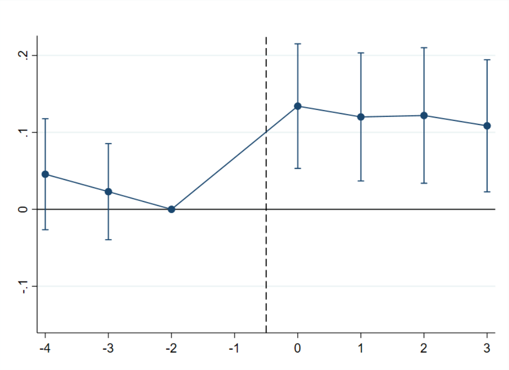
Wages Comove with Hiring Rates, Not Firm-Size



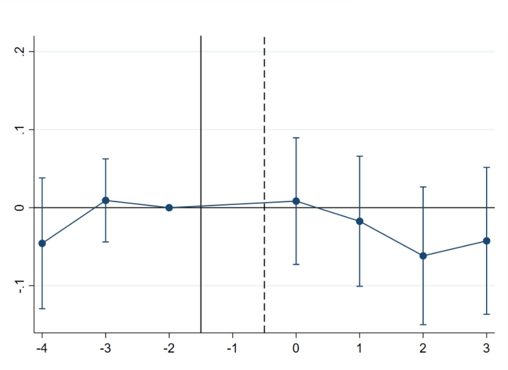
Stayer wages

No Wage Premium for Workers Arriving After Shock

Workers arriving in year of trade shock



Workers arriving in year *after* trade shock



Estimating the Recruitment Parameters (χ, σ)

How does a firm's optimal wage respond to a product demand shock in the model?

$$\tilde{w}_t = \frac{1}{2\Omega}\left(\underbrace{(\chi \tilde{h}_t + \sigma \tilde{N}_{t-1})}_{\text{Current hiring rate and prior employment level}} + \left(S \sum_{\kappa=0}^{\infty} (1-S)^{\kappa} \underbrace{\left(\chi \tilde{h}_{t+\kappa+1} + \sigma \tilde{N}_{t+\kappa} - (1+\chi)\frac{\gamma}{2}\tilde{w}_{t+\kappa+1} \right)}_{\text{Future hiring rates, employment levels, and posted wages}} \right) \right)$$

We estimate χ and σ using **minimum distance estimation**:

- Which values of χ and σ are consistent with the estimated paths of employment, hiring rates, and wages?
- We estimate $\chi = 2.2$ $(CI: [0.8, 3.9])$ and $\sigma = 0.009$ $(CI: [-2.6, 3.3])$
- Implies inverse labor supply elasticity of 0.001, $CI: [-0.18, 0.27]$
  - **Consistent with very elastic long-run labor supply**

The Firm-Size Wage Premium is Small

- Model predicts small firm-size wage premium
- We regress firm wage effects $\hat{\psi}_j$ on firm size for universe of Danish firms
- We estimate an elasticity of 0.01–0.02
  - **When firm-size doubles, wages rise 1–2%**
- Consistent with U.S. evidence [Bloom et al 2018]

AKM Firm Wage Effects and Log Firm Size

	$\hat{\psi}_j$	$\hat{\psi}_j$
$\log \bar{N}_j$	0.019^{***}	0.0094^{***}
	(0.0006)	(0.00098)
Obs	$55,951$	$13,809$
Sample	5+ employees	20+ employees

Resolving the Profit Puzzle

Can we match aggregate income shares?

- **Extended model:** labor market oligopsony, capital, imperfect product market competition

	Standard Monopsony	CRS Recruiting $HHI = 0$	CRS + Oligopsony $HHI = 0.1$	National Accounts Data
Net Labor Share	0.57	0.71	0.69	0.70–0.80
Net Capital Share	0.12	0.12	0.12	
Net Pure Profit Share	0.31	0.17	0.19	
Product Market	0.17	0.17	0.17	
Labor Market	0.14	0	0.02	
Recruiting-Adjusted Markdown	20%	0%	2.5%	

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Conclusion

- Build a tractable monopsony model where firms post wages and spend on recruiting
  - Firms face elastic labor supply curves in the long run
  - Firms pay higher wages while growing, but not when they are large
- We confirm these predictions empirically using export demand shocks to Danish firms
- Our results imply that **monopsony rents are dissipated by recruiting costs**
  - Reconcile estimates of monopsony power with profit share of national income
  - With realistic labor market concentration, monopsony profits only 2.5%
  - Order of magnitude smaller than implied by models with no recruiting margin

    [Berger-Herkenhoff-Mongey 2022]

Decomposition the MRPL

Outcome	Definition	Formula
Wage markdown	$\dfrac{w}{MRPL}$	$\dfrac{(1+\chi)\mathcal{E}}{1+(1+\chi)\mathcal{E}+\sigma}$
Recruiting cost share of $MRPL$	$\dfrac{\text{Recruiting costs per worker}}{MRPL}$	$\dfrac{1}{1+(1+\chi)\mathcal{E}+\sigma}$
Labor market profit share of $MRPL$	$\dfrac{MRPL - w - \text{recruiting costs per worker}}{MRPL}$	$\dfrac{\sigma}{1+(1+\chi)\mathcal{E}+\sigma}$
Recruiting-cost-adjusted wage markdown	$\dfrac{w + \text{recruiting costs per worker}}{MRPL}$	$\dfrac{1+(1+\chi)\mathcal{E}}{1+(1+\chi)\mathcal{E}+\sigma}$
Inverse labor supply elasticity	$\varepsilon_{w,N} \equiv \dfrac{d\log w}{d\log N}$	$\dfrac{\sigma}{1+(1+\chi)\mathcal{E}-\varepsilon_{\mathcal{E},w}}$

- $\mathcal{E} = \varepsilon_{R,w} - \varepsilon_{R,w}$ is the sum of recruitment and separation elasticities
- $\varepsilon_{\mathcal{E},w}$ is the elasticity of $\mathcal{E}$ (super elasticity)

Return

Firm's Problem

$$\max_{\left\{V_t,\,K_t,\,N_t,\,\{N_{s,t}\}_{s\leq t},\,\{w_{s,t}\}_{s\leq t}\right\}_{t=0}^{\infty}} \sum_{t=0}^{\infty}\beta^t\left(\underbrace{A_t\left(K_t^{\alpha}N_t^{1-\alpha}\right)^{\frac{\epsilon-1}{\epsilon}}}_{\text{revenue}} - \underbrace{\sum_{s=-\infty}^{t} w_{s,t}N_{s,t}}_{\text{cohort-specific wages}} - r^K K_t - \underbrace{c\left(\frac{V_t}{N_{t-1}}\right)^{\chi} N_{t-1}^{\sigma} V_t}_{\text{recruiting expenditure}}\right)$$

subject to:

Recruiting: $N_{t,t} = R(\mathcal{V}_{j,t,t})V_t \quad \forall t$

Retention: $N_{s,t} = (1 - S(\mathcal{V}_{j,s,t}))N_{s,t-1} \quad \forall t$ and $s < t$

Employment is sum of cohorts: $N_t = \sum_{s=-\infty}^{t} N_{s,t} \quad \forall t$

Wage at least posted wage: $w_{s,t} \geq w_{s,s} \quad \forall t$ and $s < t$,

and the workers' value function $\mathcal{V}_{j,s,t}$ and recruiting and separation rates $R(\cdot), S(\cdot)$.

Return

Steady State Equilibrium

Steady state wage:

$$w = c(1+\chi)\left(\frac{S(w)}{R(w)}\right)^{1+\chi}(\varepsilon_{R,w} - \varepsilon_{S,w})N^{\sigma}$$

- Under CRS ($\sigma = 0$), steady state wage independent of size (no size wage premium)
- If marginal recruiting cost is very expensive (high χ), steady state wage is higher

Steady state vacancies:

$$\frac{V}{N} = \frac{S(w)}{R(w)}$$

- Setting a higher wage, means posting fewer vacancies, which lowers recruiting costs

Key mechanism: Firms trade off turnover costs and wage costs

Return

Shift-Share Instrument (I)

Shocks

- For each country-product pair, we construct the world import demand

$$WID_{c,p,t} = \text{Country } c\text{'s imports of product } p \text{ from all countries than Denmark}$$

- Shocks: $d \log WID_{c,p,t}$

Shares

- Danish firm f is exposed to the shock $d \log WID_{c,p,t}$ if they export product p to country c
- We use the lagged share of the firm's exports of product p to country c in the total exports of f:

$$\omega_{f,c,p,t} = \frac{\textit{exports}_{f,c,p,t-1}}{\sum_{c,p} \textit{exports}_{f,c,p,t-1}}$$

Shift-Share Instrument (II)

Change in world import demand for firm f:

$$\tilde{z}_{f,t} = \sum_{c,p} \omega_{f,c,p,t}\, d \log WID_{c,p,t}$$

- Interpretation: Foreign demand shock to firm f's exports
- We rescale by

$$r_{f,t-1} = \frac{\sum_{c,p} \textit{exports}_{f,c,p,t-1}}{\textit{total sales}_{f,t-1}}$$

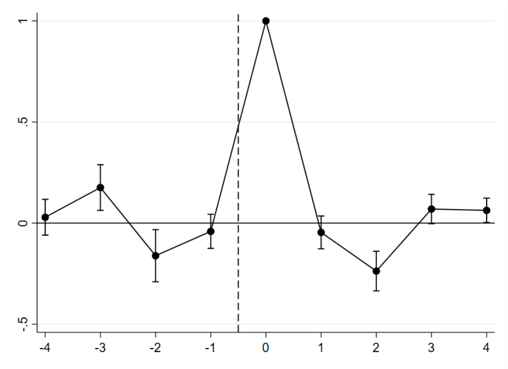
to get firm f's foreign demand shock on its total sales:

$$z_{f,t} = r_{f,t-1}\tilde{z}_{f,t}$$

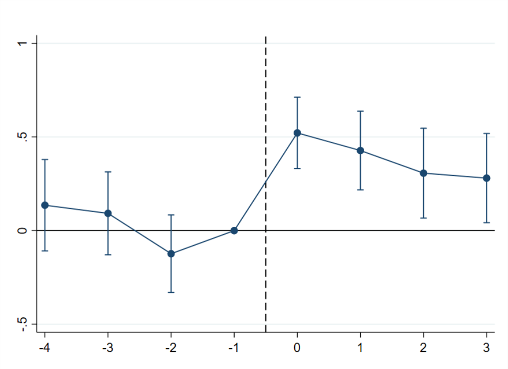
Return

Firm-Specific Export Demand Shock

Weak autocorrelation



Persistent increase in sales



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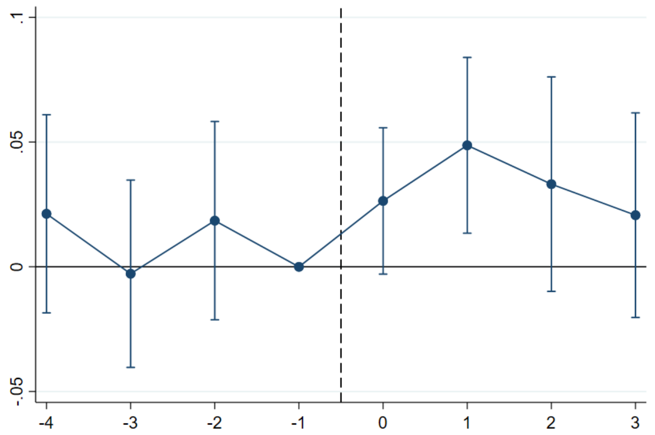
Response of Stayers Wages



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