# The Dynamics of Power in Labor Markets: Monopolistic Unions versus Monopsonistic Employers

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## **Competing Interests**

- Wages are the result of some form of negotiation between workers and firms
- Recent research has revealed role of firm market power from concentration or frictions (E.g. Schubert et al. (2020); Prager and Schmitt (2021); Dodini et al. (2020))
  - $\circ~$  Upward-sloping labor supply to the firm  $\rightarrow$  wage markdowns below productivity
- Worker power (through unions)  $\rightarrow$  monopolistic power over labor supply
  - Wage markups above what they would get otherwise (E.g., DiNardo and Lee (2004); Card and De La Rica (2006))
- We have been talking about this since Adam Smith (1776); causal evidence on these interactions is sparse



# The Ambiguity:

- Ability of union to set wages depends on both on union power & employer power
  - Monopsonistic market: more rents but weaker bargaining position
  - Competitive market: fewer rents but stronger bargaining position (leverage outside options, comparisons) (Aghion et al., 1998; Tschopp, 2017)
- How effective are unions in counteracting monopsony power?
- How do union effects differ across competitive vs monopsonistic markets?
  - Are they ameliorating market imperfections or creating new ones?
  - Which workers benefit? What is the effect on inequality?
- Wide-ranging implications for the individual worker, labor market policy, and the overall economy



## **This Paper**

#### Use reforms to tax deduction for union dues in Norway as shock to unionization at the firm

- Measure the causal effects of union density at the firm on earnings in an entire country
- Measure the differential effects across levels of labor market concentration
- Investigate possible sources of rents (labor vs product side)
- Heterogeneous treatment effects by worker types
- Measure effects on employment and inequality in firms and local labor markets



## **Preview of Results**

Earnings by labor market concentration by quintile of predicted union density



## Contributions

- Empirically bring together modern literatures on unions and monopsony
- Rapidly-growing literature that measures labor market concentration and its impact on wages and employment
  - E.g., Schubert et al. (2020); Dodini et al. (2020); Caldwell and Danieli (2018); Azar et al. (2020b;a); Benmelech et al. (2018); Marinescu et al. (2019); Qiu and Sojourner (2019); Rinz (2018); Hershbein et al. (2018)
- Contribute to large literature that causally identifies the union wage effect
  - E.g., Fortin et al. (2022); DiNardo and Lee (2004); Lee and Mas (2012); Frandsen (2021); Sojourner et al. (2015); Card and De La Rica (2006); Bryson (2002); Barth et al. (2020)



# Conceptual Framework - 1

#### Consider a simple earnings equation for a market wage:

$$w^m_{if} = X_ieta + Z_f\gamma - G_f(M) + \epsilon_{if}$$
 ,

- $X_i$  = individual characteristics;  $Z_j$  = firm characteristics
- $\dot{M_j}$  = monopsony power =  $\frac{HH}{\eta}$ , where HHI=concentration;  $\eta$  = inverse elasticity of labor supply to the market
- G function allows for a wage mark-down from imperfect competition

#### Consider Nash bargaining problem (Abowd and Lemieux, 1993; Breda, 2015):

$$w_f^U = Argmax(w_f^U - w_f^m)^{\phi_f} [\Pi_f]^{1 - \phi_f}$$
, (2)

- $\Phi_f$  is bargaining power of the union;  $[pF(L_f) w_f^U] = \prod_f = \text{profits}$  (fixed capital inputs)
- Negotiated wage is market wage plus a fraction of profits per worker, depending on union bargaining power



#### **Conceptual Framework - 2**

As shown in (Abowd and Lemieux, 1993), the solution to the bargaining problem is

$$w_f^U = w_f^m + \frac{\Phi_f \Pi_f}{L_f} , \qquad (3)$$

At the individual level, assuming:

- Egalitarian split of union gains (divided by L<sub>f</sub>)
- Union density (*U<sub>f</sub>*) rather than union membership drives wage changes (Freeman and Medoff, 1984; Fitzenberger et al., 2013; Barth et al., 2000; Balsvik and Sæthre, 2014)

so individual wages are:

$$w_{if} = X_i\beta + Z_f\gamma - G_f(M) + U_f[\frac{\Phi_f \Pi_f}{L_f}] + \epsilon_{if}$$

(4)



## **Conceptual Framework - 3**

Profits & bargaining power may be functions of monopsony power:

- Profits  $\uparrow$  through wage markdown
- Union leverage of worker outside options ↓ with monopsony (e.g. what should fair or efficient wage be?) (Aghion et al., 1998; Yamaguchi, 2010; Tschopp, 2017)
- Relative returns in competitive or concentrated markets depends on race between Π<sub>j</sub> and Φ<sub>j</sub>

For  $\Delta U_f$ , if  $\prod_f$  dominates  $\Phi_f$ , then  $\frac{\partial \log(w_f)}{\partial U_f}$  greater when *M* is high with constant *p* 

If returns higher in concentrated markets, is there a  $U_f$  such that  $G_f(M) = U_f(\Phi_f \Pi_f)$ ?



## Unions in Norway

- All workers have the right to unionize; collective bargaining required if 10 percent of workers request it
- Historical unionization rates 50-60%
  - 36% private; 79% public; 44% of men; 57% of women
  - Not as high as other Scandinavian neighbors (Sweden, Denmark ↓ membership in last 20 years)
- Commonly structured by professional area or sector; linked to national confederations
- We focus on *local* changes ( $\approx$  70 % of total negotiated wage increases)
- Union dues are tax deductible up to a legislated maximum



# Norwegian Registry Data

#### Linked Employer-Employee Data, 2001-2015

- Follow all workers age 16-74; main outcome is pre-tax labor income
- Individual union dues from tax register
- At least part-time workers (20+ hours/week) making at least 90,000 NOK/year (about \$10,000) at firms with at least 10 workers
- Divided into 160 "local labor markets," similar to US Commuting Zones

#### Firm Tax Data

- Covers firms required to submit accounting data to tax authority
- Construct proxy of product market concentration: shares of national industry revenue, fixed at firm's first year in our sample



## Measures of Labor Market Concentration

#### Define Herfindahl-Hirschman Index (HHI) of employment in each local labor market (LLM)

#### Skill Cluster Based Measures (Dodini et al., 2020)

- Use O\*NET skills data crosswalked to Norwegian occupations in Hierarchical Clustering algorithm to group occupations (Acemoglu and Autor, 2011)
- HHI is based on skill "cluster" employment shares in local labor market
- Accounts for a worker's outside options based on skills they actually possess
- Estimate everything at 20, 40 clusters, rescale [0,1]
- Fixed at firm level at firm's first year in the data  $(\overline{HHI}_f)$

#### **Robustness: Occupation-Based Measures**

- Define share of occupation employment, run entire analysis
- Direction & relative magnitudes all similar



# Changes in Union Deduction, 2001-2015

- Union dues are tax deductible up to a legislated maximum
- Beginning in 2002, large increases in statutory maximum union deduction
- Nearly quadrupled in ten years





# **Exogenous Shifter of Unionization**

- Estimate pr(union) as function of subsidy and union dues
- Impute union dues  $\rightarrow$  mean(union dues) within occupation-industry-year cells
  - $\circ~$  Infers counterfactual union dues for those not in union
  - Abstract away from individual determinants of union dues
- Fix firm average union dues  $(\overline{D_f^0})$  at first year firm appears in data, inflation adjust
  - No endogeneity of setting dues in response to tax policy

$$S_{ft} = T_t * (min\{\overline{D_f^0}, MaxDeduction_t\})$$

#### Identifying Variation:

- Those bound by deduction cap more intensely treated over time
- Intensity of subsidy change based on firm industry x occupation mix at baseline



## Shifts in Union Membership

For worker *i* in occupation *o* in industry *c* in firm *f* in year *t*, estimate:

$$Union_{iocft} = \beta_0 + \beta_1 S_{ft} + \beta_2 ND_{ft} + \beta_3 \overline{HHI}_f$$

$$+ \beta_4 \overline{HHI}_f * S_{ft} + \beta_5 \overline{HHI}_f * ND_{ft} + \delta_{Ed} + \pi_{Age} + \gamma_{oc} + \tau_t + \varepsilon_{iocft}$$
(5)

- $\overline{HHI}_{f}$  is mean firm concentration fixed at first year in data
- $ND_{ft}$  is imputed net-of-subsidy union due =  $\overline{D_f^0} S_{ft}$
- $\delta$  = completed education FE (level & discipline);  $\pi_{Age}$  = age group FE
- $\gamma$  = industry-occupation cell FE;  $\tau$  = year FE
- $\beta_1$  gives effect of subsidy in non-concentrated markets
- $\beta_4$  shows any change in the effect of subsidy in concentrated markets



## Effects of Union Density on Earnings

$$Log(Earnings)_{iocft} = \beta_0 + \beta_1 \widehat{UD}_{ft} + \beta_2 \widehat{UD}_{ft} * \overline{HHI}_f$$

$$+ \delta_{Ed} + \pi_{Age} + \gamma_{oc} + \tau_t + \phi_f + \varepsilon_{iocft}$$
(6)

- $\widehat{UD}_{ft}$  here is mean of individual predicted pr(union) in each firm-year
- β<sub>2</sub> shows differential marginal effect of union density in fully concentrated markets accounting for individual & job characteristics
- $\phi_f$  holds constant time invariant characteristics of the firm



#### Product vs Labor Market Rents

Calculate HHI of each firm's share of industry revenue fixed at baseline  $\overline{HHI}_{f}^{P}$  and estimate:

$$Log(Earnings)_{iocft} = \alpha_0 + \alpha_1 \widehat{UD}_{ft} + \alpha_2 \widehat{UD}_{ft} * \overline{HHI}_f + \alpha_3 \widehat{UD}_{ft} * \overline{HHI}_f^P$$
(7)  
+  $\delta_{Ed} + \pi_{Age} + \gamma_{oc} + \tau_t + \phi_f + \eta_{iocft}$ 

- $\alpha_1$  gives baseline effects when labor and industry HHI are both zero
- $\alpha_2$  gives differential effects by labor HHI conditional on industry HHI effects
- $\alpha_3$  gives differential effects by industry revenue HHI conditional on labor HHI effects
- Traces out which types of rents dominate in contributions to earnings



## **Responses to Base Subsidies**

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	No HHI	No HHI	20 Clusters	20 Clusters	40 Clusters	40 Clusters
Subsidy (1,000 NOK)	0.125**	0.151***	0.0926*	0.131***	0.0958*	0.135***
	(0.0517)	(0.0198)	(0.0527)	(0.0199)	(0.0528)	(0.0200)
HHI x Subsidy			0.171***	0.221***	0.109***	0.141***
			(0.0479)	(0.0294)	(0.0419)	(0.0263)
Observations	16,181,785	15,992,458	16,181,785	15,992,458	16,181,785	15,992,458
Individual FE	No	Yes	No	Yes	No	Yes
Avg Pr(Union)	0.597	0.597	0.597	0.597	0.597	0.597
Mean Base Subsidy 2001 (1,000)	0.252	0.252	0.252	0.252	0.252	0.252
Mean Base Subsidy 2014 (1,000)	1.022	1.022	1.022	1.022	1.022	1.022

#### Takeaways

- $\uparrow$  base subsidy by 1,000 NOK  $\uparrow$  pr(union)  $\approx$  13-15 ppts
- Effect of base subsidies rises with concentration
- Holds even with individual FE



# Earnings Effects by HHI

	Panel A: Full Sample		
	(1)	(2)	(3)
VARIABLES	No HHI	20 Clusters	40 Clusters
Predicted Firm Union Density	0.0181***	0.0114***	0.0107***
	(0.00219)	(0.00218)	(0.00221)
Predicted Firm Union Density * HHI		0.0141***	0.0185***
		(0.00301)	(0.00271)
Observations	16,181,780	16,181,780	16,181,780
	1.1		
	Panel B: Private Sector Only		
Predicted Firm Union Density	0.0105***	0.00512**	0.00482**
	(0.00207)	(0.00218)	(0.00216)
Predicted Firm Union Density * HHI		0.0431***	0.0298***
		(0.00540)	(0.00560)
Observations	11,009,362	11,009,362	11,009,362



# Product/Industry vs Labor Concentration

VARIABLES	(1) No Labor HHI	(2) 20 Clusters	(3) 40 Clusters
Predicted Firm Union Density	0.0147***	0.0132***	0.0126***
	(0.00256)	(0.00285)	(0.00279)
Predicted Firm Union Density * Labor HHI		0.0256***	0.0106
		(0.00815)	(0.00752)
Predicted Firm Union Density * Industry Revenue HHI		0.0191***	0.0176***
		(0.00664)	(0.00654)
Observations	7,634,149	7,634,149	7,634,149

#### Takeaways

- Labor rents and product rents are separately important
- Two separate rent buckets with different implications



## Heterogeneous Effects - 1

	Above vs Below Firm-Occupation Median			
VARIABLES	(1) No HHI	(2) 20 Clusters	(3) 40 Clusters	
Predicted Firm Union Density	0.00462**	-0.00150	-0.00239	
Predicted Firm Union Density * HHI	(0.00207)	(0.00199) 0.0276*** (0.00280)	(0.00199) 0.0294*** (0.00249)	
Union Density * Above Firm-Occ Median	0.00633***	0.00657***	0.00664***	
Union Density * HHI * Above Firm-Occ Median	(4.02e-05)	(4.97e-05) -0.00498*** (0.000332)	(5.03e-05) -0.00550*** (0.000322)	
Observations	16,181,780	16,181,780	16,181,780	

#### Takeaways

- Above-median workers gain in non-concentrated markets
- Benefits accrue to below median workers as concentration increases



## Heterogeneous Effects - 2

		By Gender	
	(1)	(2)	(3)
VARIABLES	No HHI	20 Clusters	40 Clusters
Predicted Firm Union Density	0.0168***	0.00857***	0.00778***
	(0.00146)	(0.00150)	(0.00147)
Predicted Firm Union Density * HHI		0.0177***	0.0211***
		(0.00261)	(0.00242)
Union Density * Female	-0.00261***	-0.00275***	-0.00275***
	(3.79e-05)	(4.68e-05)	(4.74e-05)
Union Density * HHI * Female		0.00303***	0.00248***
		(0.000362)	(0.000312)
Observations	16,181,780	16,181,780	16,181,780

#### Takeaways

• Men benefit more in competitive markets, no gap in concentrated markets

• Conditional on occupation, firm, but aggregate effects will show decreases in inequality



## Effects on Overall Gender Earnings Gap

Log Earnings by Concentration and Gender By Top and Bottom Quintile of Predicted Union Density

13.2 Men. 13 High Density A 12.8 -og Earnings նե Women. Men **High Density** 12.6 Low Density 12.4 Women. Low Density 12.2 .05 .15 Ó .2 .25 1 HHI (20 Clusters)

- Though marginal returns larger for men, union levels, occupation choice ⇒ ↓ gap
- Women in Norway face higher HHI

# Effects on Employment (Next Year)

	(1)	(2)	(3)	(4)
VARIABLES	Pr(Hours>30)	Pr(Hours>30)	Workers	Workers
Lagged Predicted Union Density	0.00817**	-0.0128***	0.0432	0.364
	(0.00330)	(0.00399)	(0.912)	(1.093)
Lagged Predicted Union Density * HHI		0.0419***		-0.788
		(0.00522)		(2.154)
Constant	0.308	1.435***	91.48*	74.23
	(0.190)	(0.227)	(52.00)	(62.07)
Observations	14,425,353	14,425,353	221,672	221,672

#### Takeaways

- Increase in employment on the intensive margin in concentrated markets; reduction in non-concentrated markets
- No strong effects on extensive margin [rigidity in Norwegian labor market?]



# Inequality Within Firms

	Firm Level Inequality			
	(1)	(2)	(3)	
VARIABLES	Firm 90/10	Firm 90/50	Firm 50/10	
Predicted Union Density	0.149***	0.0526***	0.0384***	
	(0.00958)	(0.00284)	(0.00476)	
Predicted Union Density x HHI	-0.213***	-0.0824***	-0.0438***	
	(0.0154)	(0.00482)	(0.00780)	
Dep Variable Mean	2.58	1.52	1.70	
Pct Effect Union Density	5.78 %	3.46 %	2.26 %	
Pct Effect Union Density x HHI	-8.26 %	-5.42 %	-2.58 %	
Observations	252,363	252,363	252,363	

#### Takeaways

• Increase in competitive markets, decrease in concentrated markets

• Largest effects in either direction mostly in upper half of distribution



# Inequality Within Local Labor Markets

	Local Labor Market Level Inequality		
	(1)	(2)	(3)
VARIABLES	LLM 90/10	LLM 90/50	LLM 50/10
Predicted Union Density	0.0339**	-0.0108	0.0319***
	(0.0156)	(0.00664)	(0.00880)
Predicted Union Density x HHI	-0.0509***	0.00160	-0.0313***
	(0.0112)	(0.00337)	(0.00709)
Dep Variable Mean	3.22	1.68	1.91
Pct Effect Union Density	1.05 %	-0.64 %	1.67 %
Pct Effect Union Density x HHI	-1.58 %	0.10 %	-1.64 %
Observations	2,396	2,396	2,396

#### Takeaways

• 1 net effect of "within-" & "across-sector" inequality in concentrated markets

Firm sorting blunts percent effect of within-firm changes



## **Policy Implications**

- Unions may be addressing a market imperfection when there is a lack of competition
- Some evidence of inequality enhancing effect when markets are competitive
- Estimates based on a simple policy lever: a modest tax subsidy for union dues
  - Concentrated markets disproportionately benefit; though universal, well targeted in effects
  - $\circ\,$  Marginal union member likely to be in concentrated market  $\,\Longrightarrow\,$  overall  $\downarrow\,$  in inequality
  - $\circ \implies$  Norway's more condensed pre-tax income distribution compared to US



# Thank You

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