Monopsony and Concentration in the Labor Market: Evidence from Vacancy and Employment Data

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Employer Market Power

Is the U.S. labor market monopsonistic?
Is the degree of monopsony increasing over time?

- answer may affect labor market fluidity, wage growth, and inequality, as well as characteristics of jobs (wages, tasks)

- degree of monopsony affects evaluation of policies altering workers’ compensation and mobility
  - minimum wage increases
  - regulations limiting growth of large firms

Hershbein, Macaluso and Yeh (2019)
Measurement matters

Despite relevance of the monopsony question . . .

- few *direct* measures of employer market power
  - how to address this gap?
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→ estimate *plant-level markdowns*
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  - is concentration a good proxy for monopsony?
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→ *markdowns increase with size*
  - how to interpret differences arising from the definition of "labor market"?
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  - how to interpret differences arising from the definition of “labor market”?

→ decrease in spatial dispersion of employment explains diverging local v. national concentration
Markdowns
A measure of monopsony power: markdowns

- Monopsony: a firm’s ability to compensate workers below its MRPL
- Measured through a firm’s “markdown”

\[
\max_{N \geq 0} Y(N) - w(N) \cdot N
\]

\[
Y'(N^*) = w'(N^*)N^* + w(N^*)
\]

\[
Y'(N^*) = \left[ \frac{\varepsilon_S + 1}{\varepsilon_S} \frac{\varepsilon_S}{\varepsilon_S} \right] w(N^*)
\]

markdown

where \( \varepsilon_S = \frac{dN}{dw} \frac{w}{N} \bigg|_{N=N^*} \) is a firm’s labor supply elasticity.
Estimating markdowns

Markdown formula:

\[
\frac{\varepsilon_S + 1}{\varepsilon_S} = \mu^{-1} \cdot \theta_N \cdot \alpha^{-1}_N
\]

markdown
markup
output elasticity
labor share

A1 Firms engage in cost minimization
A2 Production function is continuous and twice differentiable
Estimating markdowns

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\]

markdown \quad \text{markup} \quad \text{output elasticity} \quad \text{labor share}

A1 Firms engage in cost minimization
A2 Production function is continuous and twice differentiable
A3 Production function is \( Y(N, K, M, E) \) and translog
A4 Material inputs \( M \) are free of adjustment costs and monopsony power
Markdown distribution

Mean: 78%
Within-industry IQR: 64%
Markdowns increase with employment share

<table>
<thead>
<tr>
<th>Dependent variable: plant-level (log) markdowns</th>
</tr>
</thead>
<tbody>
<tr>
<td>log share</td>
</tr>
<tr>
<td><strong>Cobb-Douglas</strong></td>
</tr>
<tr>
<td>log share</td>
</tr>
<tr>
<td>0.0292 (0.0140)</td>
</tr>
<tr>
<td><strong>Translog</strong></td>
</tr>
<tr>
<td>log share</td>
</tr>
<tr>
<td>0.0251 (0.0052)</td>
</tr>
<tr>
<td>Observations (in millions)</td>
</tr>
<tr>
<td>1.449</td>
</tr>
<tr>
<td>1.449</td>
</tr>
</tbody>
</table>

Source: ASM data on U.S. manufacturing plants 1976-2014. All regression specifications include industry, state, and year fixed effects, and age controls. Standard errors are clustered at the industry (3-digit NAICS) level.

→ 1 SD ↑ in a plant’s share is associated with a 3.7% ↑ in the plant’s markdown rate
→ indexes based on employment shares (e.g., HHI) capture concentration as well as monopsony power
Concentration
HHI at the market- and aggregate level

Concentration: \( \text{HHI}_{mt} = \sum_{f \in F(m)} \left( \frac{x_{mft}}{X_{mt}} \right)^2 \)

Two aggregates:

\[
\text{NATIONAL}_t \equiv \sum_{j \in J} \omega_{jt} \text{HHI}_{jt}
\]

\[
\text{LOCAL}_t \equiv \sum_{j \in J} \sum_{\ell \in L} \omega_{j\ell t} \text{HHI}_{j\ell t}
\]

where \( \omega_{mt} \) is employment/vacancies share of market \( m \) for \( m \in \{j, (j, \ell)\} \).
Local v. national (LBD 1976-2014)
Statistical decomposition of local concentration:

\[
\sum_{j \in J} \sum_{\ell \in L} \omega_{j\ell t} HHI_{j\ell t} = \sum_{j \in J} \omega_{jt} \left[ \sum_{\ell \in L} s_{\ell t}^j HHI_{j\ell t} \right] \\
= \sum_{j \in J} \omega_{jt} \left[ HHI_{jt} + \text{cov}(s_{\ell t}^j, HHI_{j\ell t}) \right] \\
= \sum_{j \in J} \omega_{jt} HHI_{jt} + \sum_{j \in J} \omega_{jt} \text{cov}(s_{\ell t}^j, HHI_{j\ell t}) - \sum_{j \in J} \omega_{jt} (HHI_{jt} - HHI_{jt})
\]

\[\text{LOCAL}_t = \text{NATIONAL}_t + \text{OP}_t - \text{SPATIAL}_t\]

where:

- \(s_{\ell t}^j = \frac{\omega_{j\ell t}}{\omega_{jt}}\)
- \(\overline{HHI}_{jt} \equiv \frac{1}{|L|} \sum_{\ell \in L} HHI_{j\ell t}\)
Trend in $OP_t = \sum_{j \in J} \omega_{jt} \text{cov}(s^j_{lt}, HHI_{jlt})$

Figure 1: The OP covariance term has been increasing over time, so it cannot account for the divergence.
Trend in $SPATIAL_t = \sum_{j \in J} \omega_{jt} (HHI_{jt} - \overline{HHI}_{jt})$

Figure 2: A pronounced decrease in spatial dispersion can account for the divergence between NATIONAL and LOCAL.
SPATIAL$_t$ for an industry $j$

Interpretation of SPATIAL$_t$ ↑:

Table 1: “small” local monopsonies

<table>
<thead>
<tr>
<th>region</th>
<th>firm</th>
<th>x</th>
<th>y</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>0</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 2: equally spaced economy

<table>
<thead>
<tr>
<th>region</th>
<th>firm</th>
<th>x</th>
<th>y</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

- $HHI_j = 3 \cdot \left(\frac{1}{3}\right)^2 = \frac{1}{3}$
- $\overline{HHI}_j = \frac{1+1+1}{3} = 1$
- $\text{SPATIAL}_t = \frac{1}{3} - 1$
- as $N_f \to \infty$, $\text{SPATIAL}_t \to -1$

- $HHI_j = 3 \cdot \left(\frac{1}{3}\right)^2 = \frac{1}{3}$
- $\overline{HHI}_j = \frac{3 \cdot \frac{1}{3}}{3} = \frac{1}{3}$
- $\text{SPATIAL}_t = 0$
To sum up: what we do

1. **Estimate plant-level markdown rates**
   - Average 78%, average within-industry IQR 64%

2. **Markdowns increase with size**

3. **Local v. national labor market concentration**
   - statistical decomposition to interpret divergence over time
   - drop in spatial dispersion of employment across U.S. local labor markets

4. Negative time trend and limited cross-sectional incidence of local concentration in both employment and vacancies

5. **Wage compression + upskilling**
Thank you!

Comments: cmacaluso.econ@gmail.com
Unweighted HHI distribution

Source: BGT 2010-17
Weighted HHI distribution

HHI distribution across jobs

Source: BGT/OES 2010-17
Estimating markdowns (1)

- How to estimate markdowns?
- Plant’s cost minimization problem:

\[
\min_{N \geq 0} w(N) \cdot N \quad \text{s.t.} \quad Y(N) \geq Y
\]

- Optimality condition can be written as:

\[
\frac{w'(N) \cdot N}{w(N)} + 1 = \lambda \frac{Y'(N)}{w(N)}
\]

\[
\frac{\varepsilon S + 1}{\varepsilon S} = \underbrace{\mu^{-1}}_{\text{markup}} \cdot \underbrace{\theta_N}_{\text{output elasticity}} \cdot \underbrace{\alpha_N^{-1}}_{\text{labor share}}
\]
Estimating markdowns (2)

- We obtain:

\[
\frac{\varepsilon S + 1}{\varepsilon S} = \mu^{-1} \cdot \theta_N \cdot \alpha^{-1}_N
\]

- \( \mu = \frac{P}{\lambda} \) is the price-cost markup
- \( \theta_N = \frac{Y'(N) \cdot N}{Y(N)} \) is the output elasticity with respect to labor
- \( \alpha_N = \frac{w(N) \cdot N}{P \cdot Y(N)} \) is the revenue share of labor

- Intuition as in Hall (1988)
- Procedure from de Loecker and Warzynski (2012) on material inputs: markups
- Production function estimation: output elasticities
- Revenue shares are directly observable
Local labor market concentration across time (BGT)

Concentration based on vacancies in BGT ($\text{LOCAL}_{2007} = 1$)