What Drives Wage Stagnation: Monopsony or Monopoly?

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DG Comp Workshop
Estimating the ‘costs of non-competition’ for the EU economy
23 June, 2022

Any opinions and conclusions expressed herein are those of the authors and do not represent the views of the U.S. Census Bureau. All results have been reviewed to ensure that no confidential information is disclosed. Disclosure Review Board number: CBDRB-FY22-CED006-0018.
Wage Stagnation

Real wages and productivity, 1948 = 1

Productivity

Wages
Motivation

- Explore two mechanisms behind wage stagnation:
  1. **Monopsony**: direct effect from imperfect labor market
     → Lower firm-specific wages for own workers
  2. **Monopoly**: output market power affects labor demand – **General Equilibrium** effect
     → Lowers aggregate, economy-wide wages
Motivation

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∴ Objective:
  1. Explain mechanism behind decoupling of wages and productivity
  2. Decomposition: measure contribution from Monopsony vs. Monopoly
Motivation

Findings

1. Competition has decreased over time:
   - Markups increase substantially
   - Markdowns are stable, increase only marginally
2. Wage stagnation: decoupling wages-productivity
3. Decomposition monopoly vs. monopsony: dominant force is monopoly
Model Setup

Markets

- Continuum of markets $j \in [0, J]$
- Finite numbers of firms in each market $n = 1, \ldots, N$
- Finite number of establishments $i = 1, \ldots, I$ (set of establishments $i$ in firm $n$: $I_{nj}$)

Household Preferences

- CES preferences over Consumption and Labor
  - Within market: goods $\eta$, labor $\hat{\eta}$
  - Between market: goods $\theta$, labor $\hat{\theta}$
  $\to \eta > \theta$ and $\hat{\eta} > \hat{\theta}$
- maximizes static utility

$$
\max_{C_{inj}, L_{inj}} \quad U \left( C - \frac{1}{\phi} L^{\frac{\phi + 1}{\phi}} \right) \quad \text{s.t. } PC = LW + \Pi
$$
**Model Setup**

**Technology**

Firm $n \in \{1, \ldots, N\}$ in sector $j \in [0, J]$

\[
\Pi_{inj} = \max_{\{Y_{inj}\}_{i \in I_{nj}}} \left[ P_{inj}(Y_{inj}, Y_{-inj})Y_{inj} - W_{inj}(L_{inj}, L_{-inj})L_{inj} \right]
\]

subject to

\[
Y_{inj} = A_{inj}L_{inj}
\]

**Prices and Equilibrium**

Cournot-Nash Competition in output markets and labor markets
Equilibrium Solution
Producer Optimality

• The firm’s first order condition can be written as:

\[ P_{inj} \left( 1 + \varepsilon_{inj}^P \right) A_{inj} = W_{inj} \left( 1 + \varepsilon_{inj}^W \right) \]

\[ \mu_{inj}^{-1} \]  
\[ \delta_{inj} \]
Equilibrium Solution

Producer Optimality

- The firm’s first order condition can be written as:

\[
P_{\text{inj}} \left(1 + \varepsilon_{\text{inj}}^P\right) A_{\text{inj}} = W_{\text{inj}} \left(1 + \varepsilon_{\text{inj}}^W\right)
\]

- Markups and Markdowns

\[
\mu_{\text{inj}} = \frac{P_{\text{inj}}}{MC_{\text{inj}}} = \frac{1}{1 + \varepsilon_{\text{inj}}^P}; \quad -\varepsilon_{\text{inj}}^P = \frac{1}{\theta} s_{nj} + \frac{1}{\eta}(1 - s_{nj})
\]

\[
\delta_{\text{inj}} = \frac{MRPL_{\text{inj}}}{W_{\text{inj}}} = 1 + \varepsilon_{\text{inj}}^W; \quad \varepsilon_{\text{inj}}^W = \frac{1}{\hat{\theta}} e_{nj} + \frac{1}{\hat{\eta}}(1 - e_{nj})
\]
Quantitative Exercise

• U.S. Census Bureau Longitudinal Business Database (LBD): Tradeable Sectors
• In the data we observe
  1. Employment by establishment: $L_{inj}$
  2. Average Wages by establishment: $W_{inj} = \frac{\text{Wage Bill}_{inj}}{L_{inj}}$
  3. Revenue: $R_{inj}$
  4. Industry classification NAICS, SIC
## Quantitative Exercise

### Estimation

<table>
<thead>
<tr>
<th>Input/data</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Common elasticities</td>
<td>$W_{inj}, L_{inj}$, $\hat{\theta}, \hat{\eta}$</td>
</tr>
<tr>
<td>2. Firm-specific technology</td>
<td>$L_{inj}, A_{inj}, \mu_{inj}, \delta_{inj}$ system of FOCs given $N$</td>
</tr>
<tr>
<td>3. Market Structure</td>
<td>$R_{inj}$, $N$</td>
</tr>
</tbody>
</table>
Estimating Labor Supply Elasticities

\[ w_{inj} = -\frac{1}{\hat{\theta}} \log \left( \frac{1}{J} \right) - \frac{1}{\hat{\theta}} l + w_{inj} \]

\[ + \frac{1}{\hat{\eta}} \log \left( \frac{1}{l_j} \right) + \left( \frac{1}{\hat{\theta}} - \frac{1}{\hat{\eta}} \right) l_j + \frac{1}{\hat{\eta}} l_{inj} \]
Estimating Labor Supply Elasticities

\[ w_{inj} = -\frac{1}{\hat{\theta}} \log \left( \frac{1}{J} \right) - \frac{1}{\hat{\theta}} l + w - \frac{1}{\hat{\eta}} \log \left( \frac{1}{l_j} \right) + \left( \frac{1}{\hat{\theta}} - \frac{1}{\hat{\eta}} \right) l_j + \frac{1}{\hat{\eta}} l_{inj} \]
Labor Elasticities Estimates

Exogenous variation from tax differences over time

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Estimate IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{\eta}$</td>
<td>Within-market elasticity</td>
<td>3.49</td>
</tr>
<tr>
<td>$\hat{\theta}$</td>
<td>Between-market elasticity</td>
<td>1.71</td>
</tr>
</tbody>
</table>
Estimated Technology Distribution

$A_{inj}$
Markup and Markdown Distributions
Decoupling Wages-Productivity

(a) Data

(b) Model
Decoupling Wages-Productivity

\[ P_{inj} A_{inj} \times \mu_{inj}^{-1} = W_{inj} \times \delta_{inj} \Rightarrow W_{inj} = \frac{R_{inj}}{L_{inj}} \times \mu_{inj}^{-1} \times \delta_{inj}^{-1} \Rightarrow W = GDP/Worker \times \mu^{-1} \times \delta^{-1} \times \Omega \]
Social Planner’s Problem

\[ V = \max_{\{C_{inj}, L_{inj}\}} U \left( C - \frac{1}{\phi} L \frac{\phi + 1}{\phi} \right) \]

s.t. \quad C_{inj} = Y_{inj} = A_{inj} L_{inj} \]
1. Decentralized Equilibrium: \( L_{\text{inj}}^{**} \)

\[ A_{\text{inj}} P_{\text{inj}} \mu_{\text{inj}}^{-1} = W_{\text{inj}} \delta_{\text{inj}} \]
Counterfactual Economies

2. **Social Planner’s Solution:**

\[ L_{\text{inj}}^0 \]

\[ A_{\text{inj}} P_{\text{inj}} = W_{\text{inj}} \]
3. **Goods Market Power; No Monopsony:** $L^o_{inj}$

$$A_{inj}P_{inj} \mu^{-1}_{inj} = W_{inj}$$
Counterfactual Economies

4. **No Goods Market Power; Monopsony:**

\[ L_{inj}^o \]

\[ A_{inj} P_{inj} = W_{inj} \delta_{inj} \]
Counterfactual Economies
Wage Decomposition
Counterfactual Economies

Wage Growth/Stagnation

![Graph showing wage growth and stagnation trends from 1997 to 2016.](image)

- $\Delta W^{O-s}$
- $\Delta W^{*o}$
- $\Delta W^{**}$

![Graph showing percentage changes in LMP and GMP from 2000 to 2016.](image)
Conclusion

• Our Main Findings:
  1. Market Power has increased over time:
     • Markups increase from 1.45 to 1.93
     • Markdowns are stable, increase only marginally from 1.33 to 1.38
  2. Wage stagnation: decoupling wages-productivity
  3. Decomposition: indirect effect from monopoly dominates direct effect from monopsony
     69% of wage level; 80% of the wage stagnation
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