Notes on Labor Share, Concentration, Markup Investment, Intangibles

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Outline

- Declining Labor Share
- Markup and Concentration
  - de Loecker and Eeckhout (2018), Gutierrez and Philippon (2018)
- Intangible Capital
  - Crouzet and Eberly (2019)
Labor Share
Cost-minimization:

\[
C(r, w, Y) \equiv \min_{K,L} \{wL + rK\} \quad \text{s.t.} \quad F(K, L) \geq Y
\]

First-order condition:

\[
r = \lambda F_K, \quad w = \lambda F_L
\]

Note: The Lagrange multiplier is marginal cost:

\[
\lambda = \frac{\partial C}{\partial Y} = MC \quad \text{(Envelope Theorem)}.
\]

Labor share:

\[
sl \equiv \frac{wL}{pY} = \frac{\lambda F_LL}{pY} = \frac{\lambda}{p} \frac{F_LL}{Y} = \frac{1}{\mu} \frac{F_LL}{Y}
\]

For Cobb-Douglas: \(F_LL/Y = (1 - \alpha)\), so \(sl = (1 - \alpha)/\mu\) (constant).
Elasticity of substitution

If the production function is CES:

\[ Y = F(K, L) = \left[ (A_K K)^{1 - \frac{1}{\sigma}} + (A_L L)^{1 - \frac{1}{\sigma}} \right]^{\frac{\sigma}{\sigma - 1}} \]

Optimal factors demand:

\[ \ln \frac{rK}{wL} = (1 - \sigma) \ln \frac{\tilde{r}}{\tilde{w}} \]

where \( \tilde{r} \equiv r/A_K \), \( \tilde{w} \equiv w/A_L \).

Elasticity:

\[ \frac{d \ln \left( \frac{rK}{(wL)} \right)}{d \ln \left( \frac{\tilde{r}}{\tilde{w}} \right)} = 1 - \sigma \]

Suppose capital got relatively cheaper (\( \tilde{r}/\tilde{w} \downarrow \)). The labor share would decline (\( rK/(wL) \uparrow \)) if and only if \( \sigma > 1 \).

- Note: \( \frac{rK}{wL} = \frac{rK/(pY)}{wL/(pY)} = \frac{s_K}{s_L} \). We have \( s_K + s_L + s_{\Pi} = 1 \). To make the argument that \( s_K/s_L \uparrow \) implies \( s_L \downarrow \), implicitly assumed constant \( s_{\Pi} \). (True under monopolistic competition.)
Is $\sigma > 1$?

- Antras (2004): $\sigma \in [0.5, 0.9]$, even when controlling for biased technological change.
- Oberfield and Raval (2018, WP): $\sigma \approx 0.7$ for manufacturing.
  - Estimate plant-level elasticity:
    \[
    \ln \frac{rK_{ni}}{wL_{ni}} = (\sigma_n - 1) \ln w_{ni}^{MSA} + \text{controls} + \varepsilon_{ni}
    \]
  - Assume $r$ roughly constant across MSA (capital is perfectly mobile).
  - Potential endogeneity: $A_L/A_K$ correlates with $w$ at MSA level → solve by Bartik instruments.
  - Aggregating plant-level elasticities:
    \[
    \sigma^{AGG} = (1 - \chi)\sigma + \chi\varepsilon, \quad \chi \equiv \sum \frac{(\alpha_i - \alpha)^2}{\alpha(1 - \alpha)} \theta_i
    \]
Karabarbounis and Neiman (2014)

- Identify $\sigma$ from variation of relative price of investment goods ($\xi$) in the cross-section of countries:

$$\frac{s_{L,j}}{1 - s_{L,j}} \hat{s}_{L,j} = \gamma + (\sigma - 1) \hat{\xi}_j + u_i$$

- $\xi$ influences the rental rate of capital $R$: $\hat{\xi} = \hat{R}$.

<table>
<thead>
<tr>
<th>$s_L$ Data</th>
<th>$\xi$ Data</th>
<th>$\hat{\sigma}$</th>
<th>S.E.</th>
<th>90% CI</th>
<th>Obs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>KN Merged</td>
<td>PWT</td>
<td>1.25</td>
<td>0.08</td>
<td>[1.11,1.38]</td>
<td>58</td>
</tr>
<tr>
<td>KN Merged</td>
<td>WDI</td>
<td>1.29</td>
<td>0.07</td>
<td>[1.18,1.41]</td>
<td>54</td>
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<tr>
<td>OECD/UN</td>
<td>PWT</td>
<td>1.20</td>
<td>0.08</td>
<td>[1.06,1.34]</td>
<td>50</td>
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<tr>
<td>OECD/UN</td>
<td>WDI</td>
<td>1.31</td>
<td>0.06</td>
<td>[1.20,1.42]</td>
<td>47</td>
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<tr>
<td>KLEMS 1</td>
<td>KLEMS</td>
<td>1.17</td>
<td>0.06</td>
<td>[1.06,1.27]</td>
<td>129</td>
</tr>
<tr>
<td>KLEMS 2</td>
<td>KLEMS</td>
<td>1.49</td>
<td>0.13</td>
<td>[1.28,1.70]</td>
<td>129</td>
</tr>
</tbody>
</table>
The rise of “superstar firms” and rising concentration.

Sectors with highest rise in concentration see largest decline in labor share.

Aggregate decline in labor share mostly due to re-allocation between firms, not a general decline within.

Organizing framework: model with fixed overhead labor

\[ s_L = \frac{1}{\mu} \frac{F_L L}{Y} + \frac{wF}{p_i Y_i} = \frac{1 - \alpha}{\mu} + \frac{wF}{p_i Y_i} \]

A superstar firm can have lower \( s_L \) because it has:

- higher markup \( \mu \).
- higher productivity \( A_i \rightarrow high p_i Y_i \rightarrow lower \frac{F}{(p_i Y_i)} \).
Detour: Measuring Concentration

- Measure 1: Herfindahl - Hirschman Index (HHI)

\[
HHI \equiv \sum_i s_i^2
\]

where \( s_i = \frac{\text{sale}_i}{\sum_j \text{sale}_j} \) is the sale share of firm \( i \).

- Value between 0 to 1 (or 0 to 10000, if share = 1 for 1%)
- \( HHI = 1 \) corresponds to monopoly. \( HHI \approx 0 \) corresponds to perfect competition.


- Often correlates with HHI, but not always.
- Statistics readily available on Census’ website.
Detour: Concentration and Data Availability

- Using Census data vs. Compustat:
  - Census has universe of firms. Compustat only publicly listed firms.
  - Census only provides HHI for manufacturing (last time I check), problematic if you do not have firm-level data.
  - Census only available for census years (1997, 2002, 2007 etc.)
    - So it depends on at which frequency you want to run your analysis.
Autor et al. (2017): Rising Concentration

Figure A.1: Average Herfindahl-Hirschman Index by Sector
Autor et al. (2017): Aggregate decline caused by reallocation

Table A.2: Regressions of the Components of the Change in the Payroll-to-Sales Ratio on the Change in Concentration

<table>
<thead>
<tr>
<th></th>
<th>CR4</th>
<th>CR20</th>
<th>HHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A. Between</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retail</td>
<td>-0.039 *</td>
<td>-0.072 **</td>
<td>-0.044</td>
</tr>
<tr>
<td>Wholesale</td>
<td>-0.01</td>
<td>-0.025 *</td>
<td>-0.029</td>
</tr>
<tr>
<td>Services</td>
<td>-0.165 **</td>
<td>-0.161 **</td>
<td>-0.491 **</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>-0.082 **</td>
<td>-0.104 **</td>
<td>-0.104 *</td>
</tr>
<tr>
<td>Utilities/Transportation</td>
<td>-0.128 **</td>
<td>-0.12 *</td>
<td>-0.453 **</td>
</tr>
<tr>
<td>Finance</td>
<td>-0.262 *</td>
<td>-0.263 *</td>
<td>-0.546 *</td>
</tr>
<tr>
<td>Combined</td>
<td>-0.086 **</td>
<td>-0.096 **</td>
<td>-0.136 **</td>
</tr>
</tbody>
</table>

\[
S = \sum_i \omega_i S_i = \bar{S} + \sum_i (\omega_i - \bar{\omega})(S_i - \bar{S})
\]

\[
\Delta S = \Delta \bar{S} + \Delta \left[ \sum_i (\omega_i - \bar{\omega})(S_i - \bar{S}) \right]
\]

\[
\text{within} \quad \Delta \]

\[
\text{between}
\]
Markup
Recall FOC from cost-minimization for any variable input:

\[ P_{it}^V = \lambda_{it} \frac{\partial Y_{it}}{\partial V_{it}} \Rightarrow \frac{P_{it}^V V_{it}}{P_{it} Y_{it}} = \frac{\lambda_{it}}{P_{it}} \frac{\partial Y_{it}}{\partial V_{it}} \frac{V_{it}}{Y_{it}} = \frac{1}{\mu_{it}} \equiv \theta_{it}^V \]

Thus, markup is given by:

\[ \mu_{it} = \frac{\theta_{it}^V}{s_{it}^V} \]

Estimate \( \theta_{it} \) a la Olley - Pakes (1996)
Calculate \( s_{it}^V \) using Compustat’s Cost of Goods Sold (COGS).
Controversial
Investment has been weak despite high Q.

Potential explanations:

- Financial frictions: external finance, bank dependence
- Measurement errors: intangibles, globalization
- Lack of competition: regulation, concentration due to other factors
- Tighter governance: ownership and shareholder activism.

Find evidence in support of declining competition hypothesis.
Figure 3: Two Measures of Q
Gutierrez and Philippon (2018): Business Dynamism

Establishment entry and exit rates (Census)
Table 5: Summary of Firm- and Industry-level results

<table>
<thead>
<tr>
<th>Potential explanation</th>
<th>Relevant data field(s)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Industry</td>
</tr>
<tr>
<td>Financial constraints</td>
<td>1. External finance</td>
<td>RZ external finance dependence ('99)</td>
</tr>
<tr>
<td></td>
<td>2. Bank dependence</td>
<td>Missing S&amp;P rating ('99)</td>
</tr>
<tr>
<td></td>
<td>3. Safe asset</td>
<td>Industry spread ('99)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Firm-level ratings ('99)</td>
</tr>
<tr>
<td>Measurement error</td>
<td>4. Intangibles</td>
<td>Intangibles ex. goodwill/assets</td>
</tr>
<tr>
<td></td>
<td>5. Globalization</td>
<td>% foreign profits</td>
</tr>
<tr>
<td></td>
<td>6. Regulation &amp; uncertainty</td>
<td>Regulation index</td>
</tr>
<tr>
<td></td>
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<td>Occupational Licensing</td>
</tr>
<tr>
<td></td>
<td>Competition</td>
<td>ΔLog # of firms</td>
</tr>
<tr>
<td></td>
<td>7. Concentration</td>
<td>% sales/market value of top X firms</td>
</tr>
<tr>
<td></td>
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<td>Lerner index (Compustat)</td>
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<td></td>
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<td>Herfindahl (Compustat)</td>
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<td>Modified Herfindahl (Compustat)</td>
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<tr>
<td>Governance</td>
<td>8. Ownership</td>
<td>Share of Institutional ownership</td>
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<td>Share of QIX ownership</td>
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<td>Share of TRA ownership</td>
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