THE GLOBAL DECLINE OF THE LABOR SHARE

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Part I: Motivation and Contribution (I)

- Kaldor’s (1957) stylized fact: The shares of national income received by labor and capital are roughly constant over long periods of time
- Since then \( \Rightarrow \) stability of the labor share of income fundamental feature of macroeconomic models
- BUT \( \Rightarrow \) the global labor share has declined significantly since the early 1980’s

**Goal of the paper:** Why has the global labor share declined?

**Authors’ proposal:** The decline in the relative price of investment goods can explain a large part of this downward trend
Part I: Motivation and Contribution (II)

- Labor share in the model will only change in response to shocks that influence the rental rate of capital, markups or capital-augmenting technology.

- Focus on long-term trends: They treat the data as being generated from the model’s transition from one steady state to another.

- Heterogeneity across countries in the level of growth of any other variable will not matter for long-term trends in the labor share.

- Argument against possibility that shocks to other macroeconomic objects such as labor income taxes or household labor supply are important for explaining the labor share decline.
Part II: Data (I)

- Construction of a new dataset for 59 countries for various years between 1975-2012 using country-level statistics on labor share in the corporate sector
- Five different sources are combined:
  - country-specific Internet web pages
  - digital files and physical books from the UN
  - digital files and physical books from the OECD

Note: Although there are some differences in methodologies across countries, the data conforms to SNA standards.
Two types of labor share:

- The aggregate labor share: Total compensation of labor across households, corporations and government divided by GDP
  \[ 1 - \alpha_{agg} = \frac{WN}{Y} \]

- The corporate labor share: Compensation paid to labor divided by gross value added
  \[ 1 - \alpha_c = \frac{WcNc}{Qc} \]

Note: Focus on the corporate labor share since it is not impacted by the statistical imputation of wages from the combined capital and labor income earned by sole proprietors and unincorporated businesses.
Part III: Trends in Labor shares and Investment prices (I)

Figure 1: Declining Global Labor Share
Part III: Trends in Labor shares and Investment prices (II)

Figure 3: Estimated Trends in Country Labor Shares
Part III: Trends in Labor shares and Investment prices (III)

Figure 4: Estimated Trends in U.S. State Labor Shares
Part III: Trends in Labor shares and Investment prices (IV)

Figure 5: Estimated Trends in Industry Labor Shares
Part III: Trends in Labor shares and Investment prices (V)

Figure 7: Declining Global Price of Investment Goods
Part IV: A model of the Labor Share (I)

- They develop a model that relates the labor share to: the relative price of investment goods, price markups and factor augmenting technology
- Two sector economic environment
- Final consumption goods and investment goods are produced by combining intermediate inputs using a CES technology
- Time is discrete and the horizon is infinite
- No uncertainty and all agents have perfect foresight
- All payments are made in terms of the final consumption good (numeraire)
Part IV: A model of the Labor Share (II)

**FINAL CONSUMPTION GOOD**

- Competitive producers assemble the final consumption good $C_t$ from a continuum of intermediate inputs $z \in [0, 1]$ and sell it to the household at price $P_c^t = 1$.

- They produce with technology:
  $$C_t = \left( \int_0^1 c_t(z) \frac{(\epsilon_t - 1)}{\epsilon_t} dz \right)^{\epsilon_t / (\epsilon_t - 1)}$$

- They purchase these inputs at prices $p_t(z)$ from monopolistically competitive firms that charge a markup over marginal cost $\mu_t$ that depends on $\epsilon_t$.

- From cost minimization we obtain that:
  $$c_t(z) = \left( \frac{p_t(z)}{P_c^t} \right)^{-\epsilon_t} C_t$$
FINAL INVESTMENT GOOD

- Competitive producers assemble the final consumption good $X_t$ from a continuum of intermediate inputs $z \epsilon [0, 1]$
- They produce with technology:
  \[ X_t = \frac{1}{\xi_t} \left( \int_0^1 x_t(z)^{(\epsilon_t - 1)/\epsilon_t} dz \right)^{\epsilon_t/(\epsilon_t - 1)} \]
- Since firms are competitive:
  \[ P_t^x = \xi_t \left( \int_0^1 p_t(z)^{1 - \epsilon_t} dz \right)^{1/(1 - \epsilon_t)} = \xi_t \]
- From cost minimization we obtain that:
  \[ x_t(z) = \xi_t \left( p_t(z)/P_t^c \right)^{-\epsilon_t} X_t \]
PRODUCERS OF INTERMEDIATE GOODS

- CRS technology to produce output sold to consumption and investment good producers: $y_t = F(k_t(z), n_t(z))$

- They take input prices and aggregate demand, $Y_t = C_t + \xi_t X_t$, as given and they maximize profits:

$$\max_{p_t(z), y_t(z), k_t(z), n_t(z)} \Pi_t(z) = p_t(z)y_t(z) - R_t(z)k_t(z) - W_t(z)n_t(z)$$

s.t.

$$y_t(z) = c_t(z) + x_t(z) = p_t(z)^{-\epsilon_t}(C_t + \xi_t X_t) = p_t(z)^{-\epsilon_t} Y_t$$

- Firms set the MR product of factors as a markup $\mu_t = \epsilon_t / (\epsilon_t - 1)$ over factor prices

F.O.C.

$$k_t(z) : p_t(z)F_{k,t}(z) = \mu_t R_t$$

$$n_t(z) : p_t(z)F_{n,t}(z) = \mu_t W_t$$
HOUSEHOLDS

- Derive utility from consumption goods and disutility from supplying labor
- Purchase consumption and investment goods from final good producers at prices one and $\xi$, respectively
- Use investment good to augment the physical capital stock and rent capital to producers of intermediate goods at a rental rate $R_t$
- Own all firms in the economy and receives their profits as dividends in every period
- Supply labor to intermediate input producers at a wage $W_t$
- Hold some asset $B_t$ that pays a real interest rate $r_t$
THE PRODUCTION FUNCTION AND THE LABOR SHARE

- Intermediate goods are produced with a CES production function:
  \[ Y_t = F(K_t, N_t) = \left( \alpha_k (A_{K_t} K_t)^{(\sigma - 1)/\sigma} + (1 - \alpha_k) (A_{N_t} N_t)^{(\sigma - 1)/\sigma} \right)^{\sigma/(\sigma - 1)} \]

- Using the F.O.C. w.r.t. capital and the shares of income:
  \[
  (s_{L,t} = W_t N_t / Y_t ; s_{K,t} = R_t K_t / Y_t; s_{\pi,t} = \pi_t / Y_t) :
  
  (1/(1 - s_L \mu)(1 - s_L (1 + \hat{s}_L) \mu(1 + \hat{\mu})) = \left( (1 + \hat{A}_K) /((1 + \hat{\mu})(1 + \hat{R})) \right)^{\sigma - 1}
  
  \]
## Part V: Estimation of the elasticity and results (I)

<table>
<thead>
<tr>
<th>Labor Share</th>
<th>Investment Price</th>
<th>$\hat{\sigma}$</th>
<th>Std. Error</th>
<th>90% Conf. Interval</th>
<th>Obs.</th>
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</thead>
<tbody>
<tr>
<td>(i) 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>(ii) KN Merged</td>
<td>WDI</td>
<td>1.29</td>
<td>0.07</td>
<td>[1.18,1.41]</td>
<td>54</td>
</tr>
<tr>
<td>(iii) OECD and 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>(iv) OECD and UN</td>
<td>WDI</td>
<td>1.31</td>
<td>0.06</td>
<td>[1.20,1.42]</td>
<td>47</td>
</tr>
<tr>
<td>(v) KLEMS 1</td>
<td>KLEMS</td>
<td>1.17</td>
<td>0.06</td>
<td>[1.06,1.27]</td>
<td>129</td>
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<tr>
<td>(vi) KLEMS 2</td>
<td>KLEMS</td>
<td>1.49</td>
<td>0.13</td>
<td>[1.28,1.70]</td>
<td>129</td>
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<tr>
<td><strong>Average</strong></td>
<td></td>
<td><strong>1.28</strong></td>
<td></td>
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Table 1: Baseline Estimates of Elasticity of Substitution
### Part V: Estimation of the Elasticity and results (II)

<table>
<thead>
<tr>
<th>Labor Share</th>
<th>Investment Price</th>
<th>Investment Rate</th>
<th>$\hat{\sigma}$</th>
<th>Std. Error</th>
<th>90% Conf. Interval</th>
<th>Obs.</th>
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</thead>
<tbody>
<tr>
<td>(i) KN Merged</td>
<td>PWT</td>
<td>Corporate</td>
<td>1.03</td>
<td>0.09</td>
<td>[0.87,1.19]</td>
<td>55</td>
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<tr>
<td>(ii) KN Merged</td>
<td>WDI</td>
<td>Corporate</td>
<td>1.29</td>
<td>0.08</td>
<td>[1.16,1.42]</td>
<td>52</td>
</tr>
<tr>
<td>(iii) OECD and UN</td>
<td>PWT</td>
<td>Corporate</td>
<td>1.24</td>
<td>0.11</td>
<td>[1.05,1.43]</td>
<td>46</td>
</tr>
<tr>
<td>(iv) OECD and UN</td>
<td>WDI</td>
<td>Corporate</td>
<td>1.43</td>
<td>0.08</td>
<td>[1.28,1.57]</td>
<td>44</td>
</tr>
<tr>
<td>(v) KN Merged</td>
<td>PWT</td>
<td>Total</td>
<td>1.11</td>
<td>0.11</td>
<td>[0.93,1.29]</td>
<td>54</td>
</tr>
<tr>
<td>(vi) KN Merged</td>
<td>WDI</td>
<td>Total</td>
<td>1.35</td>
<td>0.08</td>
<td>[1.22,1.49]</td>
<td>52</td>
</tr>
<tr>
<td>(vii) OECD and UN</td>
<td>PWT</td>
<td>Total</td>
<td>1.24</td>
<td>0.11</td>
<td>[1.06,1.43]</td>
<td>46</td>
</tr>
<tr>
<td>(viii) OECD and UN</td>
<td>WDI</td>
<td>Total</td>
<td>1.42</td>
<td>0.09</td>
<td>[1.27,1.56]</td>
<td>44</td>
</tr>
</tbody>
</table>

**Average**: 1.26

Table 2: Estimates of Elasticity of Substitution Allowing for Markups
### Part V: Estimation of the Elasticity and Results (III)

<table>
<thead>
<tr>
<th></th>
<th>CD</th>
<th>CES</th>
<th>CD</th>
<th>CES</th>
<th>CD</th>
<th>CES</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(\xi)</td>
<td>(\xi)</td>
<td>(\mu)</td>
<td>(\hat{\xi}, \hat{\mu})</td>
<td>(\xi, \mu)</td>
<td></td>
</tr>
<tr>
<td>(i) Labor Share (Percentage Points)</td>
<td>0.0</td>
<td>-2.6</td>
<td>-3.1</td>
<td>-2.6</td>
<td>-3.1</td>
<td>-4.9</td>
</tr>
<tr>
<td>(ii) Capital Share (Percentage Points)</td>
<td>0.0</td>
<td>2.6</td>
<td>-1.9</td>
<td>-2.4</td>
<td>-1.9</td>
<td>-0.1</td>
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<tr>
<td>(iii) Profit Share (Percentage Points)</td>
<td>0.0</td>
<td>0.0</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
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<tr>
<td>(iv) Consumption</td>
<td>18.1</td>
<td>20.1</td>
<td>-5.2</td>
<td>-5.4</td>
<td>10.7</td>
<td>12.4</td>
</tr>
<tr>
<td>(v) Nominal Investment</td>
<td>18.1</td>
<td>30.8</td>
<td>-11.1</td>
<td>-12.7</td>
<td>3.7</td>
<td>11.9</td>
</tr>
<tr>
<td>(vi) Labor Input</td>
<td>0.0</td>
<td>-1.4</td>
<td>-3.2</td>
<td>-2.9</td>
<td>-3.2</td>
<td>-4.2</td>
</tr>
<tr>
<td>(vii) Capital Input</td>
<td>51.6</td>
<td>67.8</td>
<td>-11.1</td>
<td>-12.7</td>
<td>33.2</td>
<td>43.6</td>
</tr>
<tr>
<td>(viii) Output</td>
<td>18.1</td>
<td>22.8</td>
<td>-6.3</td>
<td>-6.8</td>
<td>9.4</td>
<td>12.3</td>
</tr>
<tr>
<td>(ix) Wage</td>
<td>18.1</td>
<td>19.2</td>
<td>-8.2</td>
<td>-8.2</td>
<td>7.1</td>
<td>7.7</td>
</tr>
<tr>
<td>(x) Rental Rate</td>
<td>-22.1</td>
<td>-22.1</td>
<td>0.0</td>
<td>0.0</td>
<td>-22.1</td>
<td>-22.1</td>
</tr>
<tr>
<td>(xi) Capital-to-Output</td>
<td>28.4</td>
<td>36.6</td>
<td>-5.2</td>
<td>-6.4</td>
<td>21.8</td>
<td>27.9</td>
</tr>
<tr>
<td>(xii) Welfare Equivalent Consumption</td>
<td>18.1</td>
<td>22.1</td>
<td>-3.0</td>
<td>-3.4</td>
<td>13.2</td>
<td>15.8</td>
</tr>
</tbody>
</table>
Part VI: Conclusion

- The authors document a decline in the global labor share over the past 35 years.
- They explanation they offer for the downward trend is a decrease in the relative price of investment goods.
- They construct a model of the labor share.
- They find that a 25 per cent decline in the relative price of investment goods explains roughly half of the decline in the labor share.

What other factors could explain the other half?