Accounting for Factorless Income

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What is Factorless Income?

\[
\text{Factorless Income} = Y - WL - \sum_j R^j K^j
\]
How to Allocate and Interpret Factorless Income?

- Three polar cases (among other possibilities):
  1. Maybe it’s all economic profits (\textit{Case }\Pi)
  2. Maybe we are “missing” investment (\textit{Case }K)
  3. Maybe our imputation of rental rate isn’t good (\textit{Case }R)

  Variants of these three strategies are common in literature:

  We explore these interpretations and their implications
How to Allocate and Interpret Factorless Income?

• Three polar cases (among other possibilities):
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• Variants of these three strategies are common in literature:

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Constructing Factorless Income \((Y -WL - \sum_j R^j K^j)\)

- Data from US NIPA and FAT, excludes government, 1960-2016

- \(Y\) is GDP and \(WL\) is raw compensation (robust to common alternatives)

- We aggregate to three capital stocks \(K^j\):
  - \(j = I\): IT capital (used by business sector)
  - \(j = N\): Non-IT capital (used by business sector)
  - \(j = H\): Housing (used by households)

- Rental rate (ala Hall-Jorgenson (1967), from model, taxes removed):

\[
R_t^j = \xi_t^j \left[ \left( \frac{\xi_{t-1}^j}{\xi_t^j} \right) (1 + r_t) - \left( 1 - \delta_t^j \right) \right]
\]
Factor Shares Before Allocating Factorless Income

(Note: All plots throughout are 5-year moving averages.)
Case Π

- Increase in $\bar{s}_\Pi$ since 1980 related to $s_L$ decline
- Referenced by view that monopoly power ↑ or call for antitrust
Case Π

- But \( s_\Pi \) remains below average levels from 1960s/1970s
Case Π

- Correlation \( r, s_\Pi \) = −0.91: Not a change in markups alone!
- Cost share variation has implications for technology
Case $K$

- Unmeasured investment spending $\xi^U X^U$ and income $R^U K^U$

- "Revised" GDP $\tilde{Y}$ related to measured income $Y$ as:

$$
\tilde{Y} = Y + \xi^U X^U = WL + \sum_{j \in I, N, H} R^i K^j + \Pi + R^U K^U
$$

- We rearrange so RHS is all known or assumed:

$$
R^U K^U - \xi^U X^U = Y - WL - \sum_{j \in I, N, H} R^j K^j - \Pi^Q - \Pi^H
$$

- Find $\{\xi_t^U, X_t^U, R_t^U, K_t^U\}$ for $t \in (1960, 2016)$ which satisfy:

  - Above equation
  - $R_{t+1}^U = R(\xi_t^U, \xi_{t+1}^U, \delta^U_t, r_t)$
  - $K_{t+1}^U = (1 - \delta^U) K_t^U + X_t^U$
Case $K$

\[ \xi_t^j X_t^j / \tilde{Y}_t \]

\[ \xi_t K_t^i / \tilde{Y}_t \]

Investment Spending / GDP

Capital Value / GDP

Non–IT
Unmeasured
IT
Residential
Case $R$

- Idea is lots of factors omitted from our rental-rate calculation (risk premium, adjustment costs, etc.)

- Solve for revised opportunity cost of capital $\tilde{r}$ such that:

$$P^Q Q - WN - \tilde{R}^I K^I - \tilde{R}^N K^N - \Pi^Q = 0,$$

where $\tilde{R}^j = R(\tilde{r}, \cdot)$ and where $\Pi^Q$ as in Case $K$. 

Case $R$

$	ilde{r}_t$ and $r_t$

<table>
<thead>
<tr>
<th></th>
<th>Measured</th>
<th>Revised</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td></td>
<td></td>
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<tr>
<td>2000</td>
<td></td>
<td></td>
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<tr>
<td>2020</td>
<td></td>
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</tbody>
</table>
Case $R$

$\tilde{R}_t^I$ and $R_t^I$

$\tilde{R}_t^N$ and $R_t^N$
Model

- Business and housing sectors, multiple capital types, capitalists and hand-to-mouth workers, perfect foresight, and exogenous interest rate path

- Intermediates produced with CES technology:

\[ Q_t = \left( \alpha \left( A_t^K K_t^Q \right) \right)^{\frac{\sigma - 1}{\sigma}} + (1 - \alpha) \left( A_t^L L_t \right)^{\frac{\sigma - 1}{\sigma}} \]

- Business capital bundle:

\[ K_t^Q = \left( \sum_{j \neq H} \left( J_t \right)^{\frac{1}{\theta}} \left( K_t^j \right)^{\frac{\theta - 1}{\theta}} \right)^{\frac{\theta}{\theta - 1}} \]

- Input/extract exogenous processes to match endogenous variables during 1960-2016 under each of the three cases
Extracted Labor-Augmenting Technology (Detrended)

\[ A_t^L = (1 - \alpha)^{\frac{1}{1-\sigma}} \left( s_{Q,t}^{Q} \right)^{\frac{1}{\sigma-1}} \left( \mu_t^Q \right)^{\frac{\sigma}{\sigma-1}} W_t \]

\[ \sigma = 1.25 \]

\[ \sigma = 0.75 \]
## Counterfactuals

Changes (1986-1990 vs. 2011-2015) in $s_L^Q$

<table>
<thead>
<tr>
<th></th>
<th>Elasticity $\sigma = 1.25$</th>
<th>Elasticity $\sigma = 0.75$</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Case $\Pi$</td>
<td>Case $K$</td>
</tr>
<tr>
<td><strong>Baseline</strong></td>
<td>-0.030</td>
<td>-0.029</td>
</tr>
<tr>
<td>$\mu^Q$</td>
<td>-0.071</td>
<td>0.000</td>
</tr>
<tr>
<td>$(A^K, \nu^I)$</td>
<td>0.041</td>
<td>-0.056</td>
</tr>
</tbody>
</table>

Changes (1961-1965 vs. 2011-2015) in $\ln Q$

<table>
<thead>
<tr>
<th></th>
<th>Elasticity $\sigma = 1.25$</th>
<th>Elasticity $\sigma = 0.75$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Case $\Pi$</td>
<td>Case $K$</td>
</tr>
<tr>
<td><strong>Baseline</strong></td>
<td>-0.068</td>
<td>-0.087</td>
</tr>
<tr>
<td>$\xi^I$</td>
<td>0.177</td>
<td>0.183</td>
</tr>
</tbody>
</table>
Conclusions

• For many questions – including cause of $s_L$ decline, but also much more – interpretation of factorless income matters!

• Skeptical of Case Π:
  • Not a change in markups alone!
  • Requires longer view than just early-1980s onward

• A bit less skeptical of Case K: Our version requires too much $K^U$ early-on, but other versions might do better

• Most optimistic about Case R: But what is source of wedge?

• Hope to see explorations of factorless income around the world
EXTRA SLIDES
Case Π

- What about with (hypothetical) flat real interest rate?
What About De Loecker and Eeckhout (2017)?

- But rise in Sales/COGS due to fall in COGS/(COGS+SG&A)!
  - First showed by Traina (2018)
  - Consistent with Gutierrez and Philippon (2017)

![Graph showing Estimated Markup (DLE, 2017) and three types of firm sales ratios over time from 1960 to 2020. The x-axis represents the years, and the y-axis represents the ratio. The graph includes four lines: Estimated Markup (DLE, 2017) in dark black, Aggregation of Firms’ Sales/COGS in red, Aggregation of Firms’ Sales/(COGS+SG&A) in blue, and Aggregation of Firms’ Sales/(COGS+SG&A−R&D) in green. Each line shows a distinct trend from 1960 to 2020.](image-url)
What About De Loecker and Eeckhout (2017)?

<table>
<thead>
<tr>
<th>Country</th>
<th>Trend (per 10 years)</th>
<th>Years Covered</th>
<th>Firms Included</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sales COGS</td>
<td>Sales COGS+SG&amp;A</td>
<td>Start</td>
</tr>
<tr>
<td>Brazil</td>
<td>-0.04</td>
<td>-0.00</td>
<td>1996</td>
</tr>
<tr>
<td>China</td>
<td>-0.01</td>
<td>-0.02***</td>
<td>1993</td>
</tr>
<tr>
<td>France</td>
<td>-0.07*</td>
<td>-0.01</td>
<td>1999</td>
</tr>
<tr>
<td>Germany</td>
<td>0.00</td>
<td>0.03***</td>
<td>1998</td>
</tr>
<tr>
<td>India</td>
<td>0.12***</td>
<td>0.06**</td>
<td>1995</td>
</tr>
<tr>
<td>Italy</td>
<td>0.00</td>
<td>-0.06***</td>
<td>2005</td>
</tr>
<tr>
<td>Japan</td>
<td>0.06***</td>
<td>0.03***</td>
<td>1987</td>
</tr>
<tr>
<td>Korea</td>
<td>0.00</td>
<td>-0.03***</td>
<td>1987</td>
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<tr>
<td>Russia</td>
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<td>-0.01</td>
<td>2004</td>
</tr>
<tr>
<td>Spain</td>
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<td>-0.03</td>
<td>2005</td>
</tr>
<tr>
<td>Taiwan</td>
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<td>-0.02</td>
<td>1997</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>0.28***</td>
<td>0.07***</td>
<td>1988</td>
</tr>
<tr>
<td>United States</td>
<td>0.09***</td>
<td>0.02***</td>
<td>1981</td>
</tr>
</tbody>
</table>

**Simple Average**: 0.04  0.00