“Business Cycle during Structural Change: Arthur Lewis’ Theory from a Neoclassical Perspective”

by Kjetil Storesletten, Bo Zhao and Fabrizio Zilibotti

Discussant: Chaoran Chen
National University of Singapore

May 28, 2019
What SZZ Do

- Two related literature: structural change and business cycle
- Key stylized facts:
  - structural change is accompanied with agricultural modernization
  - $\text{corr}(n, y)$ increases along with structural change
- Build a unified theory that explains these facts
  - Two agricultural technologies: traditional and modern
    - Traditional agr is key: constant MPL ("surplus labor") $\Rightarrow$ stabilize $n$
    - Structural change accelerates in booms and slows down in recessions
    - Structural change $\Rightarrow$ traditional agr ↓ $\Rightarrow$ $n$ more volatile
- The model accounts well for the structural change and business cycle fluctuations of China.
Comment 1: the Share of Traditional Vs. Modern Agr

▶ In the data, one does not directly observe the traditional versus modern agricultural technology ($\nu$).

▶ The paper relies on the following strategy:

$$APG_t = \frac{1 - \nu_t(1 - \beta)}{\alpha} \cdot \frac{1}{1 - \tau}.$$  

relative labor income share, labor mobility barrier

▶ Assume $\tau$ to be constant over time, then the changes in APG imply the change in the composition of two technologies.

▶ $\tau$ may well change over time given the specific history of institutions in China.

▶ We may want to seek for alternative way to characterize the evolution of $\nu$, and then use the residual to determine the evolution of $\tau$. 
Comment 1: the Share of Traditional Vs. Modern Agr

- Micro data from rural household fixed observation points have relevant information that helps determine \( \nu_t \).

<table>
<thead>
<tr>
<th>Year</th>
<th>% of Farms w/o Machinery</th>
<th>% of Output Produced w/o Machinery</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>2.05</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>3.15</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>4.25</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>5.35</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>6.45</td>
<td></td>
</tr>
</tbody>
</table>
Comment 1: the Share of Traditional Vs. Modern Agr

▶ Micro data from rural household fixed observation points have relevant information that helps determine $\nu_t$.

▶ For example, we can calculate the percentage of farms without modern machinery inputs as shown below.
Comment 2: Preferences and Productivity Growth

- Under CES utility and linear technology, the value-added share is
  \[ \frac{p_G Y_G}{p_M Y_M} = \gamma \frac{Z_G}{1 - \gamma} \left( \frac{Z_G}{Z_M} \right)^{\epsilon - 1}. \]

- To get structural transformation right, we need
  1. \( \epsilon < 1 \) AND \( Z_G \) grows faster than \( Z_M \), OR
  2. \( \epsilon > 1 \) AND \( Z_G \) grows slower than \( Z_M \)

- Most papers choose (1), while this paper chooses (2).

- \( \epsilon > 1 \) is almost necessary for the main result:
  - Recession \( \Rightarrow \) labor moves to agr \( \Rightarrow \) \( Y_G \uparrow \), but needs substitutability
  - Then also needs \( Z_G \) (\( Z_{AM} \)) to grow slower than \( Z_M \).
Two cheap ways to reconcile $\varepsilon > 1$ and the main mechanism:

- **open economy setup:**
  - imports agricultural goods $\Rightarrow$ increases the elasticity of substitution

- **national system of purchasing agricultural goods:**
  - guaranteed purchasing price $\bar{p}_G$ for hoarding

- Agricultural goods market does not have to clear in every period.
Comment 2: Preferences and Productivity Growth

- Many studies find that $Z_{AM}$ grows faster than $Z_M$.
- In fact, in the estimation of this paper, $g_M$ and $g_{AM}$ are similar.
Comment 3: Relative Price

- In U.S. as well as in many countries, the relative price of agricultural good declines over time due to strong labor productivity growth in agriculture.
Comment 3: Relative Price

- This relative price is informative on the relative productivity growth (Alvarez-Cuadrado and Poschke 2011).
- How does the relative price evolve over time in China?
- Is the model able to match this trend?
- Especially important as it is related to the previous point.
One Minor Point

- Traditional technology uses labor only: no capital/land input
  - Is this necessary or for simplification?
  - Quantitatively relevant as the model overpredicts 1985 agricultural employment share but underpredicts capital share.
  - Traditional technology has some capital input, such as livestock etc.
This paper studies the relationship between business cycle and structural change.

- Structural change: decline in agriculture or increase in service.
This paper studies the relationship between business cycle and structural change.

- Structural change: decline in agriculture or increase in service.
- This paper chooses to talk about agriculture and business cycle.
Conceptual Question

- This paper studies the relationship between business cycle and structural change
  - Structural change: decline in agriculture or increase in service
  - This paper chooses to talk about agriculture ↓ and business cycle
  - How about service ↑ and business cycle?