Deindustrialization in Japan and Its Impact on Growth


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Introduction

• Like in the US, deindustrialization continues in Japan.

• Using industry, regional, and factory-level data, I will examine how Japan’s industrial structure has changed and how deindustrialization affects Japan’s economic growth.

Introduction (contd.)

Structure of today’s presentation:

1. The Baumol effect and the effect on capital deepening

2. The regional impact of deindustrialization

3. The relocation of factories abroad and the decline in spillover effects
In what way did the share of the manufacturing sector in nominal GDP decline?

The 40 percent decline in the B. Share of the manufacturing sector in nominal GDP in the last 40 years masks a 35 percent increase in A. Real gross value added of the manufacturing sector/Real GDP.

Thus, the decline in C. Value added deflator of the manufacturing sector/GDP deflator has exceeded the increase in real gross value added.
Given the sharp decline in C. Value added deflator of the manufacturing sector/GDP deflator (in Figure 2), how were production costs covered in the manufacturing sector?

This was made possible by a rapid increase in D. TFP level of manufacturing sector/TFP level of macro economy.

It seems that the price elasticity of demand was not sufficiently large to make output growth greater than TFP growth. And this resulted in a decline in E. Factor input into the manufacturing sector/factor input of the macro economy.
1. The Baumol effect and the effect on capital deepening

- Since TFP growth in the manufacturing sector is much higher than in the non-manufacturing sector, deindustrialization may reduce macro TFP growth (Baumol effect).

- If the activities disappearing in the manufacturing sector are physical and human capital intensive, deindustrialization will also reduce the rate of return to physical and human capital. This might hamper Japan’s economic growth.

- In order to test this hypothesis, we need to investigate what kind of manufacturing activities are disappearing.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Macro economy</td>
<td>0.96</td>
<td>2.57</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.82</td>
<td>2.60</td>
</tr>
</tbody>
</table>

Source: JIP Database 2011.
The Baumol effect

- The figure below shows the relationships between TFP growth and factor input growth at the disaggregated industry level for 1990-2008.

- Within the manufacturing sector (left-hand side of the figure), factor inputs have increased in industries with high TFP growth.
Effect on capital deepening

• From the viewpoint of factor intensity, activities disappearing in the manufacturing sector tend to be less physical and human capital intensive.

• It seems that deindustrialization will not necessarily reduce the rate of return to physical and human capital.

• We should also note that vertical intra-industry trade with Asian countries seems to have caused capital deepening within each sector (Fukao, Ishido and Ito 2003).
The Baumol effect

• Using the following framework, we can decompose the slowdown of Japan’s TFP growth into two factors: the effect of the slowdown of TFP growth within each sector (within effect) and effect of the contraction of industries with high TFP growth (between effect).

\[
\sum_i w_{90,02,i} \Delta A_{90,02,i} - \sum_i w_{80,90,i} \Delta A_{80,90,i} = \frac{1}{2} \sum_i \left( w_{80,90,i} + w_{90,02,i} \right) \left( \Delta A_{90,02,i} - \Delta A_{80,90,i} \right) \\
+ \frac{1}{2} \sum_i \left( \Delta A_{90,02,i} + \Delta A_{80,90,i} \right) \left( w_{90,02,i} - w_{80,90,i} \right)
\]

where \( w_i \) denotes the Domar weight for industry \( i \) and \( A_i \) denotes TFP growth on a gross output basis in industry \( i \).

<table>
<thead>
<tr>
<th></th>
<th>TFP growth 1990-2002 minus TFP growth 1980-90</th>
<th>Within effect</th>
<th>Between effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market economy</td>
<td>-1.14%</td>
<td>-1.13%</td>
<td>-0.01%</td>
</tr>
</tbody>
</table>
Effect on physical capital deepening

• Using a similar framework, we can decompose capital deepening (growth of capital service input/man hours in the macro economy and in the manufacturing sector) into the within effect and the between effect.

• We do not observe large negative between effects.
Effect on human capital deepening

- In the case of human capital deepening, we also do not observe large negative between effects.
2. The regional impact of deindustrialization

- The next issue I would like to examine is how deindustrialization affects the spatial distribution of industries.

- In Japan, manufacturing activities are mainly concentrated in relatively rich prefectures, except in Tokyo.
2. The regional impact of the deindustrialization

- And these relatively rich prefectures have experienced rapid deindustrialization.
3. The relocation of factories abroad and the decline in spillover effects

Studies on productivity dynamics similar to Foster, Haltiwanger and Krizan (2001) for Japan show that the “exit effect” is negative. The market selection process is not working.

→ It is the productive factories that are being shut down. Less productive factories remain.
3. The relocation of factories abroad and the decline in spillover effects

Factories with the lowest labor productivity in their industry are more likely to be shut down than productive factories. However, many factories in the top group are also closed, and they are much larger than less productive factories. This is what causes the negative exit effects.

Transition matrix for factories' labor productivity rank

<table>
<thead>
<tr>
<th>2003</th>
<th>Top group</th>
<th>Top 20% group</th>
<th>Top 30% group</th>
<th>Top 40% group</th>
<th>Top 50% group</th>
<th>Top 60% group</th>
<th>Top 70% group</th>
<th>Top 80% group</th>
<th>Top 90% group</th>
<th>Bottom group</th>
<th>Closed factories</th>
<th>Whole sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>Top group</td>
<td>8,137</td>
<td>4,472</td>
<td>2,887</td>
<td>1,915</td>
<td>1,399</td>
<td>1,064</td>
<td>852</td>
<td>648</td>
<td>544</td>
<td>511</td>
<td>20,007</td>
</tr>
<tr>
<td></td>
<td>Top 20%</td>
<td>3,583</td>
<td>4,508</td>
<td>3,877</td>
<td>3,044</td>
<td>2,317</td>
<td>1,671</td>
<td>1,337</td>
<td>984</td>
<td>691</td>
<td>582</td>
<td>19,854</td>
</tr>
<tr>
<td></td>
<td>Top 30%</td>
<td>2,028</td>
<td>3,325</td>
<td>3,571</td>
<td>3,259</td>
<td>2,804</td>
<td>2,256</td>
<td>1,678</td>
<td>1,226</td>
<td>924</td>
<td>708</td>
<td>20,678</td>
</tr>
<tr>
<td></td>
<td>Top 40%</td>
<td>1,323</td>
<td>2,250</td>
<td>2,808</td>
<td>3,047</td>
<td>2,915</td>
<td>2,515</td>
<td>2,107</td>
<td>1,659</td>
<td>1,256</td>
<td>839</td>
<td>21,735</td>
</tr>
<tr>
<td></td>
<td>Top 50%</td>
<td>952</td>
<td>1,603</td>
<td>2,097</td>
<td>2,598</td>
<td>2,801</td>
<td>2,683</td>
<td>2,505</td>
<td>1,949</td>
<td>1,491</td>
<td>1,024</td>
<td>22,757</td>
</tr>
<tr>
<td></td>
<td>Top 60%</td>
<td>737</td>
<td>1,062</td>
<td>1,612</td>
<td>1,986</td>
<td>2,332</td>
<td>2,732</td>
<td>2,684</td>
<td>2,387</td>
<td>1,881</td>
<td>1,201</td>
<td>23,834</td>
</tr>
<tr>
<td></td>
<td>Top 70%</td>
<td>534</td>
<td>786</td>
<td>1,097</td>
<td>1,534</td>
<td>1,954</td>
<td>2,348</td>
<td>2,629</td>
<td>2,636</td>
<td>2,279</td>
<td>1,590</td>
<td>25,063</td>
</tr>
<tr>
<td></td>
<td>Top 80%</td>
<td>400</td>
<td>608</td>
<td>787</td>
<td>1,040</td>
<td>1,393</td>
<td>1,913</td>
<td>2,367</td>
<td>2,718</td>
<td>2,793</td>
<td>2,080</td>
<td>26,360</td>
</tr>
<tr>
<td></td>
<td>Top 90%</td>
<td>333</td>
<td>399</td>
<td>576</td>
<td>729</td>
<td>949</td>
<td>1,242</td>
<td>1,701</td>
<td>2,484</td>
<td>3,034</td>
<td>2,824</td>
<td>28,177</td>
</tr>
<tr>
<td></td>
<td>Bottom group</td>
<td>319</td>
<td>348</td>
<td>409</td>
<td>518</td>
<td>588</td>
<td>799</td>
<td>1,028</td>
<td>1,469</td>
<td>2,354</td>
<td>3,626</td>
<td>31,017</td>
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<tr>
<td></td>
<td>Newly opened factories</td>
<td>10,255</td>
<td>9,263</td>
<td>8,897</td>
<td>8,953</td>
<td>9,174</td>
<td>9,392</td>
<td>9,728</td>
<td>10,466</td>
<td>11,370</td>
<td>13,654</td>
<td>101,152</td>
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<tr>
<td></td>
<td>Whole sample</td>
<td>28,601</td>
<td>28,624</td>
<td>28,618</td>
<td>28,623</td>
<td>28,626</td>
<td>28,615</td>
<td>28,616</td>
<td>28,626</td>
<td>28,617</td>
<td>28,639</td>
<td>239,482</td>
</tr>
</tbody>
</table>

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3. The relocation of factories abroad and the decline in spillover effects

It seems that an important factor behind the negative exit effects is hollowing out of Japan’s manufacturing sector through outward FDI. The exit effect takes large negative value in industries where Japanese firms expanded their production in Asia.
3. The relocation of factories abroad and the decline in spillover effects

In the manufacturing sector, the TFP growth of large firms has actually accelerated. Small and medium-sized firms (SMEs) have been left behind.

→ Possible reasons:

(a) SMEs left behind in R&D and internationalization (in Japan, most R&D is conducted by large firms).

(b) decrease in technology spillovers from large firms (supplier relationships in Japan seem to be weakened by outward FDI and deindustrialization).
Main findings

1. Within the manufacturing sector, relatively labor intensive industries with low TFP growth have shrunk. Because of this, we observe neither large negative Baumol effects nor a decline in capital intensity through “between” effects.

2. In Japan, manufacturing activities are mainly concentrated in relatively rich prefectures (except in Tokyo). These rich prefectures have experienced rapid deindustrialization. Deindustrialization in Japan will not increase the income gaps between regions.

3. Because of the shutdown of large productive factories, which seems to have been partly caused by the relocation of factories abroad, Japan has experienced negative “exit” effects. Outward FDI and deindustrialization have weakened Japan’s supplier relationships and this may have decreased technology spillovers from large firms to small firms.