‘Smile curve’
and the service-ification of manufacturing

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‘Smile curve’: Distribution of value

Share of value added

Pre-fab services
Fabrication
Post-fab services

Stage

Post-1990 value distribution

1970s & 1980s value distribution
Task: Map out the whole global supply chain from raw materials / idea generation to a consumer’s final purchase of a N95 at a retail store – All direct & indirect hard & soft inputs – 1–8 stages before the Nokia / final assembly and 2–4 after it

Geography of the provision of all bits & pieces

E.g., N95’s main processor by Texas Instruments

- Hardware design: Dallas (US) & Nice (France).
- Software design & integration to hardware: India.
- Manufacturing: Dallas (US) & Japan.

… skipping thousands of steps and dozens of assumptions/proxies …

Breakdown of $749 (+tax, €547) retail price of Nokia N95 in 2007
- By production stage
- By region

Includes direct & indirect in-house labor cost (as well as other work purchased as billable hours) in R&D, marketing, sales, managing, sourcing, etc. as well as pure profits. Excludes assembly (see item below)
Lack of empirical evidence

Little empirical evidence, why?

One possible reason:

Large datasets are not organised in a way that can shed light on the smile-curve as traditionally conceived in the above figure. The figure above is product/firm level smile curve.
Product-level versus economy-wide smile curve

Economy-wide data is collected by sector, not by value chain stage.

Source: “Servicification of Swedish manufacturing”, National Board of Trade, the government of Sweden
Firm vs Economy-wide Smile Curve

• Problem: Economy-wide data is collected by sector, not by value chain stage.
  – One firm’s downstream is another’s upstream.

• Economy-wide ‘Smile curve’:

• We focus on sectoral value-added from:
  – Primary sectors;
  – Manufacturing sectors
  – Service sectors.

• Focus on exports rather than production.
Value-added trade: Computation

Export value = the cost of value-added + intermediate inputs.

Labour, capital, etc

Iterate to converge (or matrix algebra)

Etc, etc
Smile curve underlying forces

- **Offshoring impact**
  When a stage’s cost is reduced by offshoring, its share in value added falls since a stage’s value added is based on costs.

  Easier to offshore manufacturing activities than service activities

  Cost reduction by the commoditisation (or “Manualisation”) is easier in Manufacturing.

- **Servicification**
  Shifting jobs and tasks from manufacturing firms to service firms would make it look like less of a product’s total value added was coming from fabrication (when we look at it at firm level).
Data

- Asian International Input-Output Table (IDE-JETRO)

- Advantages (over WIOD & TiVa):
  1. Year coverage:
     Asian IO: from 1985 vs 1995 (WIOD & TiVa)
  2. Sector coverage:
     Asian IO: 76 sectors vs 35 (WIOD & TiVa)
Economy-wide smile curve

For example, Japan 1985 and 2005

<table>
<thead>
<tr>
<th>Source sector</th>
<th>1985</th>
<th>2005</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>6.8%</td>
<td>2.1%</td>
<td>-4.7%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>80.1%</td>
<td>69.3%</td>
<td>-10.8%</td>
</tr>
<tr>
<td>Service</td>
<td>13.1%</td>
<td>28.6%</td>
<td>15.6%</td>
</tr>
</tbody>
</table>
Smile curves by nation

1985 vs 2005: Japan, Korea and Taiwan
Likely determinants of the smile?

• Fabrication’s relative price falls:
  – Offshoring with knowhow & Automation.

• Statistical reshuffle:
  – Manufacturing companies outsource services.

• Chenery curve shifts into services.
Smile curves by nation

1985 vs 2005: Developing countries

Thailand

- Primary: -5%
- Manufacturing: -10%
- Service: 16%

China

- Primary: -7%
- Manufacturing: -12%
- Service: 19%

Philippines

- Primary: -10%
- Manufacturing: -2%
- Service: 12%

Indonesia

- Primary: -5%
- Manufacturing: -5%
- Service: 10%

Malaysia

- Primary: -5%
- Manufacturing: -1%
- Service: 22%
Smile curves by industry and nation

1985 vs 2005
Smile curves: 1985 to 1995 vs 1995 to 2005

China

- VA share change 1985-1995
- VA share change 1995-2005

Japan

Korea
Smile curves 1985-1995 and 1995-2005

Smile curves is the phenomenon for 1995-2005 not for 1985-1995
## Service value-added to whom?

### Service sector input by nation of origin

<table>
<thead>
<tr>
<th>Exporter</th>
<th>Export Sector</th>
<th>Service VA Source</th>
<th>China</th>
<th>Japan</th>
<th>US</th>
<th>RoW</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Transport equipment</td>
<td>-16%</td>
<td>7%</td>
<td>3%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>Textile, leather</td>
<td>-16%</td>
<td>7%</td>
<td>3%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>Metal products</td>
<td>-14%</td>
<td>6%</td>
<td>2%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>Machinery</td>
<td>-22%</td>
<td>8%</td>
<td>4%</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>Chemical products</td>
<td>-22%</td>
<td>8%</td>
<td>4%</td>
<td>7%</td>
<td></td>
</tr>
</tbody>
</table>
8 nations, 5 industries

Service value to:
Japan > US
China ≈ US
Conclusion & future research

✓ Smile (smirk) curve seems to be ‘real’ at economy-wide level.
   ✓ NB: ‘Manufacturing jobs’ are disappearing everywhere.
   ✓ Seems ‘good (i.e. service)’ jobs going to (or staying in) advanced economies.

✓ The smile curve occurred 1995-2005; opposite of 1985-1995

✓ Need e’metrics to sort out the causes:
   ✓ GVCs vs general statistical effect.
   ✓ GVC varies radically across industries, time & nations.
• Thank you for listening.

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