The Decline of Manufacturing

U.S. Manufacturing Employment and Hours

Production Worker Total Hours (2002 = 100, thin line)

Total Employment (thick line)


Germany  First Oil Shock  Japan

(1000s)
3. The Decline of Manufacturing

\[
\frac{\text{Real VA}^{\text{Manuf}}}{\text{Real GDP}} = \left( \frac{\text{VA}^{\text{Manuf}}}{\text{GDP}} \right) \times \left( \frac{P}{P^{\text{manuf}}} \right)
\]
The Resilience of Manufacturing
## Growing Industries had More Value Added and Creativity-oriented Jobs

<table>
<thead>
<tr>
<th>NAICS4</th>
<th>Share of net change in jobs (2002-2008)</th>
<th>Value added per employee, weighted by employment change</th>
<th>Occupational mix, 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing industries losing jobs</td>
<td></td>
<td></td>
<td>Mix of jobs</td>
</tr>
<tr>
<td>Cut and Sew Clothing</td>
<td>-13%</td>
<td>$88,400</td>
<td>Creativity-oriented 16%</td>
</tr>
<tr>
<td>Sawmills and Wood Preservation</td>
<td>-8</td>
<td></td>
<td>Routine-oriented, physical 68%</td>
</tr>
<tr>
<td>Motor Vehicle Parts</td>
<td>-7</td>
<td></td>
<td>Routine-oriented, service 16%</td>
</tr>
<tr>
<td>Pulp, Paper and Paperboard Mills</td>
<td>-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household and Institutional Furniture and Kitchen Cabinets</td>
<td>-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubber Products</td>
<td>-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor Vehicles</td>
<td>-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semiconductor and Other Electronic Components</td>
<td>-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Printing and Related Support Activities</td>
<td>-4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothing Knitting Mills</td>
<td>-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foundries</td>
<td>-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron and Steel Mills and Ferro-Alloys</td>
<td>-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other 56 industries</td>
<td>-50</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total manufacturing jobs lost</strong></td>
<td></td>
<td></td>
<td>315,000</td>
</tr>
<tr>
<td>Manufacturing industries gaining jobs</td>
<td></td>
<td></td>
<td>Mix of jobs</td>
</tr>
<tr>
<td>Agricultural, Construction and Mining Machinery</td>
<td>2</td>
<td>$110,000</td>
<td>Creativity-oriented 25%</td>
</tr>
<tr>
<td>Other Foods</td>
<td>2</td>
<td></td>
<td>Routine-oriented, physical 53%</td>
</tr>
<tr>
<td>Architectural and Structural Metals</td>
<td>2</td>
<td></td>
<td>Routine-oriented, service 22%</td>
</tr>
<tr>
<td>Pharmaceuticals and Medicines</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cement and Concrete Products</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other General-Purpose Machinery</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petroleum and Coal Products</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical Equipment and Supplies</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other 10 industries</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total manufacturing jobs gained</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Each Sector's Contribution to Real GDP

<table>
<thead>
<tr>
<th>Sector</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Service</strong></td>
<td>70.4%</td>
</tr>
<tr>
<td>Real Estate and Rental and Leasing</td>
<td>12.9%</td>
</tr>
<tr>
<td>Finance and Insurance</td>
<td>6.5%</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>6.1%</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>5.7%</td>
</tr>
<tr>
<td>Public Administration</td>
<td>5.7%</td>
</tr>
<tr>
<td><strong>Goods Producing: Non-Manufacturing</strong></td>
<td>15.3%</td>
</tr>
<tr>
<td>Construction</td>
<td>6.1%</td>
</tr>
<tr>
<td>Mining and Oil and Gas Extraction</td>
<td>4.5%</td>
</tr>
<tr>
<td>Utilities</td>
<td>2.5%</td>
</tr>
<tr>
<td>Agriculture, Forestry, Fishing and Hunting</td>
<td>2.1%</td>
</tr>
<tr>
<td><strong>Goods Producing: Manufacturing</strong></td>
<td>14.3%</td>
</tr>
<tr>
<td>Transportation Equipment Manufacturing</td>
<td>2.5%</td>
</tr>
<tr>
<td>Food Manufacturing</td>
<td>1.6%</td>
</tr>
<tr>
<td>Chemical Manufacturing</td>
<td>1.3%</td>
</tr>
<tr>
<td>Machinery Manufacturing</td>
<td>1.1%</td>
</tr>
<tr>
<td>Paper Manufacturing</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

### Top 5 Imports From China (61% of Total China Imports to Canada)

- Computer and Electronic Product Manufacturing: 0.6%
- Miscellaneous Manufacturing: 0.4%
- Clothing Manufacturing: 0.1%
- Electrical Equipment, Appliance and Component Manufacturing: 0.3%
- Machinery Manufacturing: 1.1%
The Comparative Advantage Police?

Hourly Compensation Relative to the U.S. (Logs)

Convergence

Germany

Japan

Korea

Taiwan

Hong Kong

China


1,000% 100% 10% 1%
Source: Puga and Trefler, JDE, 2010
With China’s R&D Expenditures, Patents are Below Expectations
China is not yet at the Innovation Tipping Point

### Low-cost competition
- Gains advantage from low cost resources and labour
- Focuses on achieving greater volumes and low prices
- Imports or copies technology
- Follows trends

### Innovation-based competition
- Gains advantage from creating a unique market position
- Focuses on new products and processes
- Develops world-class technology
- Sets trends
Institutions Matter

The graph illustrates the relationship between the rule of law and the log of GDP per capita. The data points represent various countries, with three countries labeled: India, China, and USA. The line of best fit indicates a strong positive correlation, with an $R^2$ value of 0.71.
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Offshore Outsourcing in Services

- Services trade revolution driven by ICT and China/India.
- Educated U.S. workers are competing with workers from low-wage countries.
- Blinder and many others have found ways of linking occupation data with service trade data: about 20% of workers are in occupations associated with tradeable services.
- What has this done to wages, employment and occupational switching?
- Is services different from manufacturing? Yes: educated workers are less likely to become and stay unemployed, and less likely to be earning ‘good-job’ rents.


Relate these to occupations:
- financial analyst -> financial service imports
- computer support specialist -> computer and information service imports.

Link to matched CPS data in order to track workers for a year.
Liu and Trefler

- Rank occupations by average wage after controlling for worker characteristics such as education e.g., doctors earn more than plumbers because of education.

- For each worker who switches occupations, did the worker move to a lower- or high-paying occupation.
Results

1997-2007 growth of service imports from China and India:

1. Occupational switching:
   - Downward switching rose by 17%.
   - Upward switching rose by 4%.
   - David’s cohorts: same if you track individuals

2. Transitions to unemployment: Up 0.9 percentage points.

3. Earnings changes:
   - Occupational stayers: Down 2.3%
   - Downward switchers: Down 13.9% or 0%
   - Upward switchers: Up 12.1% or 0%.
Education

- Is more STEM the answer to prosperity?

- Emphasize *process* of thinking.
  - Bernard’s WATSON
  - Mihnea Moldevano

- Integrative thinking:
  - Cox: All models are wrong.
  - Leamer: Models are not right or wrong, they are useful.
  - **Roger Martin**: Conflicting models are an opportunity for a rethink, for finding a third possibility.

- Example for Bernard: Lenovo (hardware, costs) vs. IBM (software, margins).
Four Components:

1. Salience:

2. Causality:
   - Models are wrong and the real world is complex – that’s OK.
   - In STEM: work toward a correct answer, salience is pre-defined, there are no trade-offs.
Institutions Matter

The image shows a scatter plot correlating Rule of Law with Log GDP Per Capita. The data points indicate a positive correlation, as evidenced by the regression line with an $R^2 = 0.71$. The countries represented are USA, China, and India, with their respective GDP per capita plotted along the y-axis and Rule of Law along the x-axis. The scatter plot visually supports the assertion that institutions matter for economic performance.
Institutions Matter

Near frontier in some tasks: need advanced incentives OR women.

Far from frontier in some tasks, need coercive institutions there
In addition to STEM --- Integrative Thinking

Four Components:
1. **Salience:**

2. **Causality:**
   - Models are wrong and the real world is complex – that’s OK.
   - In STEM: work toward a correct answer, salience is pre-defined, there are no trade-offs.

3. **Decision Making:**
   - All the pieces must be considered at once.
   - E.g., STEM + Entrepreneurship + Innovation + Polarization + (Can everyone learn – ECE) + Government Deficit + Outsourcing.
   - Good decisions are not the hard ones, they are the ones that create a new option.

1. **Achieving a resolution:**
   - Put new ideas on the table, choices are not either-or.
   - E.g., “Pick a big problem in your life”