Structural Changes of Chinese Economy
---Based on Input-Output Analysis

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Expressions in this report are the author’s view, and are not related to the institution which the author is attached
Outline

- Background
- Economic Structure
- Industrial Linkage
- Intermediate Input Structure
- Trade Structure
- Conclusions
Background

- A “New Normal” for China’s Economy
  - **Growth**
    - High speed (10%) → Mid-high speed, 7-8%
  - **Structure**:
    - Service sector surpassed investment to become the biggest sector in 2013.
  - **Driver Force**:
    - Contribution of investment and export are decreasing.
China’s GNI per capita and Classification of the World Bank
Economic Growth Rate (1981-2013)

10.6 (剔除了1989和1990年的数据)

5年平均增速

11.2

7.7 7.7
GDP Components

(the share of service in GDP was 51.6% in 2016)
Contribution of Demand
(the contribution of consumption was 66.4% in 2015)
我国的总人口和劳动力年龄段人口（联合国的中位预测，新版）
Background

- Structural change emerges as a central feature of the process of development and an essential element in accounting for the rate of pattern of growth. (Syrquin, 2007)
  - Input-Output is a very useful structural analysis tool
Economic Structure

- Economic Structure is changing dramatically from 2007 to 2012
  - Share of agriculture and secondary industry in GDP are declining.
  - Share of service in GDP is increasing and service become biggest sector in China
Manufacture Sector

- Share of labor-intensive and low-tech manufacturing have declining since the end of 90s.
- Share of capital-intensive and Mid-tech manufacturing is increasing. Capital-intensive manufacturing has surpassed labor-intensive manufacturing. Tech-intensive manufacturing is surpassing labor-intensive manufacturing.
Structural Change of Labor-intensive manufacture

- Foods and Tobacco
- Textile
- Textile Wearing Apparel, Footwear, Caps, Leather, Fur, and its products
- Papermaking, Printing and Manufacture of Articles for Culture, Education and Sports
- Processing of Timbers and Manufacture of Furniture
- Artwork, Other Manufacture

Structural Change of Capital-intensive manufacture

- Chemical Industry
- Manufacture and Processing of Metals
- Nonmetallic Mineral Products
- Metals Products
- Processing of Petroleum, Coking, Processing of Nuclear Fuel

Structural Change of Tech-intensive manufacture

- General Purpose and Special Purpose Machinery
- Communication Equipment, Computer and Other Electronic Equipment
- Transport Equipment
- Electrical Machinery and Equipment
- Measuring Instrument and Machinery for Cultural Activity & Office Work

August 28
图7：1963-2007年按收入阶段和技术组别分类的制造业增加值份额变化

图8：1963-2007年按收入和制造业产业分类的人均增加值变化情况
Service

- Share of Producer Service in GDP increases very quickly. It increased by 10.16 pp from 1987 to 2007, and 5.62 pp from 2007 to 2012 respectively.
- There is little increase for Share of Public service in GDP. It increased by 1.23 pp from 1987 to 2007, and 0.73 pp from 2007 to 2012 respectively.
- There is a little change for consumer service.
Industrial Linkage

- **Industrial Linkage**
  - Influence Coefficient—Backward Linkage
  - Response Coefficient—Forward Linkage

- **The Backward Linkage of tech-intensive sector is higher than other sectors’; The Forward Linkage of capital-intensive sector is higher than other sectors’.

- **“Leading industry”**
  - Backward Linkage >1
  - Forward Linkage >1
  - Almost all leading industries are manufacturing
Industrial Linkage
Industrial Linkage

- Leading industries are changing over time
- Labor intensive sector (Textile & Apparel) → capital intensive (Chemicals) / tech-intensive sector (ICT products)

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<td>Textiles</td>
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<td>Paper Making</td>
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<td>●</td>
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<tr>
<td>Chemical Industry</td>
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<td>Smelting and Rolling of Metals</td>
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<td>General and Special Purpose Machinery</td>
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<td>Communication Equipment, Computer</td>
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<tr>
<td>Utility</td>
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<td>●</td>
<td>●</td>
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</table>
Intermediate Input Ratio

- Overall Intermediate input ratio
  - The total Input is sum of intermediate input and initial Input
  - Overall Intermediate input ratio is the ratio of total intermediate input to total Input

- Sectoral Intermediate input ratio
  - The ratio of sectoral intermediate input to sectoral total input
  - This is backward linkage
Intermediate Input Ratio: “turning point”

- The general trend of overall intermediate input ratio in China is increased from 0.555 in 1987 to 0.665 in 2012.
- But since 1987, the overall intermediate input ratio has fallen twice:
  - 1997-2002: 0.621 ↓→ 0.611
  - 2007-2012: 0.675 ↓→ 0.665
- Why?
  - What’s the difference between the two falling?
  - the decline in 2012: a short-term fluctuation or long-term trend? the overall intermediate input ratio
History and Forecasting of Quantity of Labor Force and Total Dependence Ratio (%), 100 million

- 2013: Quantity of Labor Force = 1.006 billion
- 2030: Quantity of Labor Force = 0.96 billion

- Total Dependency Ratio:
  - 2010: 34.2%
  - 2030: 50%
Change of National Floating Population (billion)

- Average Annual Increase 11 Million
- 0.121 billion
- Average Annual Increase 5 Million
- 0.222 billion
- 0.253 billion
- 0.247 billion
Comparison of wage index and PPI
International Comparison

- China’s overall intermediate input ratio is much higher than USA and Japan (in the same development level)
- China’s OIIR decline in 2012 is consistent with international trends
- Continued Increasing of service after 2012 will be an important sign that the decline of overall intermediate input rate in long-term.
 Reasons…

- Structural decomposition is effective means to investigate why...

- The change of “Overall Intermediate input ratio” can be divided into two parts:
  - Change of industrial structure: $A$
  - Change of Intermediate input rate by industry: $B$

$$R_{ALL} = \sum \alpha_i r_i \quad \Delta R_{ALL} = \sum \Delta \alpha_i r_i^0 + \sum \alpha_i \Delta r_i = A + B$$

- Where $R_{all}$ is Overall Intermediate input rate, $\alpha$ is the share of output by industry (industrial structure), $r$ is Intermediate input rate by industry.

- $A$ denotes the effects of Change of industrial structure; $B$ shows the effects of Change of Intermediate input rate by industry.
<table>
<thead>
<tr>
<th>Year</th>
<th>Effect from change of IIR of Primary Industry</th>
<th>Effect from change of IIR of Secondary Industry</th>
<th>Effect from change of IIR of Tertiary Industry</th>
<th>Effect from change of Sectoral Structure</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987-1992</td>
<td>0.00892</td>
<td>0.02155</td>
<td>0.02646</td>
<td>0.00112</td>
<td>0.05805</td>
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<tr>
<td>1992-1997</td>
<td>0.00912</td>
<td>-0.00609</td>
<td>0.00153</td>
<td>0.01817</td>
<td>0.02273</td>
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<tr>
<td>1997-2002</td>
<td>0.00211</td>
<td>0.00553</td>
<td>-0.01171</td>
<td>-0.0139</td>
<td>-0.01797</td>
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<tr>
<td>2002-2007</td>
<td>-0.00046</td>
<td>0.02687</td>
<td>-0.00124</td>
<td>0.01949</td>
<td>0.04466</td>
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<tr>
<td>2007-2012</td>
<td>0.00006</td>
<td>0.00161</td>
<td>-0.00076</td>
<td>-0.01486</td>
<td>-0.01395</td>
</tr>
</tbody>
</table>
Comparing Two declines

- The drop in 2012 is bigger than that in 2002
- Different reasons
  - 2002
    - Leading cause: the decline of intermediate input ratio in service
    - No. 2 cause: structural change
  - 2012
    - Leading cause: structural change. Almost all of the drop in 2012 comes from structural change.
    - The effect of structure change in 2012 is much bigger than that in 2002
Other Factors

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<tbody>
<tr>
<td>Manufacture of Prepared Animal Feeds</td>
<td>0.0150</td>
<td>0.0246</td>
<td>0.0661</td>
<td>0.0412</td>
<td>0.0747</td>
<td>0.0900</td>
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<tr>
<td>Manufacture of Fertilizers</td>
<td>0.0588</td>
<td>0.0574</td>
<td>0.0567</td>
<td>0.0494</td>
<td>0.0570</td>
<td>0.0592</td>
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<tr>
<td>Manufacture of Pesticides</td>
<td>0.0055</td>
<td>0.0096</td>
<td>0.0100</td>
<td>0.0074</td>
<td>0.0104</td>
<td>0.0133</td>
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<tr>
<td>Manufacture of Machinery for Agriculture, Forestry, Animal Production and Fishery</td>
<td>0.0036</td>
<td>0.0083</td>
<td>0.0076</td>
<td>0.0069</td>
<td>0.0058</td>
<td>0.0065</td>
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<tr>
<td>Utility</td>
<td>0.0042</td>
<td>0.0021</td>
<td>0.0075</td>
<td>0.0116</td>
<td>0.0096</td>
<td>0.0100</td>
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<tr>
<td>Sum</td>
<td>0.0869</td>
<td>0.1021</td>
<td>0.1479</td>
<td>0.1166</td>
<td>0.1574</td>
<td>0.1789</td>
</tr>
</tbody>
</table>

- The shares of Intermediate Input from other sectors to Agriculture are increasing
Other Factors

Change of proportion of processing trade export

- Value added ratio of Processing trade was 0.386
- Value added ratio of ordinary trade was 0.792
<table>
<thead>
<tr>
<th>Influencing Factor</th>
<th>Influencing Channel</th>
<th>Impact</th>
</tr>
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<tbody>
<tr>
<td>Rising of Wages</td>
<td>Price of Labor Rises Faster than Product Reduces Value-added Ratio</td>
<td>Down</td>
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<tr>
<td>Change of Economic Structure</td>
<td>Decreasing of Share of Second Industry, which has a Higher Intermediate Input Ratio</td>
<td>Down</td>
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<tr>
<td>Change of Labor Division</td>
<td>Increase Nodes in Producing Chain which Results in Calculating More times</td>
<td>Up</td>
</tr>
<tr>
<td>Improvement of Technology</td>
<td>Widespread of Machine Instead of Labor in Production process</td>
<td>Up</td>
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<tr>
<td>Change of Relative Price of Producing Factors</td>
<td>Change in Price of Commodity Influences Input of Dependent Sectors</td>
<td>TBD</td>
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<tr>
<td>Change of Relative Share of Different Trading Style</td>
<td>Value-added Ratio of Processing Trade is Lower than General Trade, while the Former Share is Decreasing.</td>
<td>Down</td>
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<tr>
<td>Improvement of Management</td>
<td>Saving Input</td>
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### International trade

<table>
<thead>
<tr>
<th>Export</th>
<th>8% 92.06%</th>
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- From 2007 to 2012 Export proportion of Tertiary Industry is increasing, while the import proportion is increasing also.
International trade

- **Upgrading in trade**
  - Export proportion of Labor-intensive manufacture decreases
  - Manufacture of Textile Wearing Apparel, Footwear, Leather, Fur, Feather and Its Products/Manufacture of Textile
  - Export proportion of Capital-intensive manufacture remains the same
  - Manufacture of Chemicals and Chemical Products / Manufacture of Fabricated Metals Products, Except Machinery and Equipment
  - Export proportion of Tech-intensive manufacture largely increases
  - Communication Equipment, Computer and Other Electronic Equipment/Measuring Instrument and Machinery for Cultural Activity & Office Work
International trade

- Upgrading in trade
  - The share of Machinery & transportation equipment export in total export continued to increasing very quickly.
International trade

- The share of intermediate goods export in total export swing from falling to rising in 2012.
The share of intermediate goods export (2000—2015)
Conclusion

- Input-Output Tables show us plenty of structural evidence that China's economy is undergoing transformation and upgrading.
- The main feature of this transformation is the growing impact of the service sector on China's economy.
Conclusion

The manufacturing sector is still of fundamental importance to China's economy and the manufacturing is upgrading from low-medium to medium-high level.

- Structure of Manufacture - Proportion of Labor-intensive manufacture declines
- Leading Industry changes - from labor-intensive to Tech-intensive manufacture
- Foreign Trade Structure upgrading - Export and import proportion of Capital-intensive, Tech-intensive manufacture increases

The share of intermediate goods export in total increases from 2007 to 2012
THANK YOU VERY MUCH!