



北京大学国家发展研究院
National School of Development



Industrial Upgrading, Job Creation, and Poverty Reduction in China

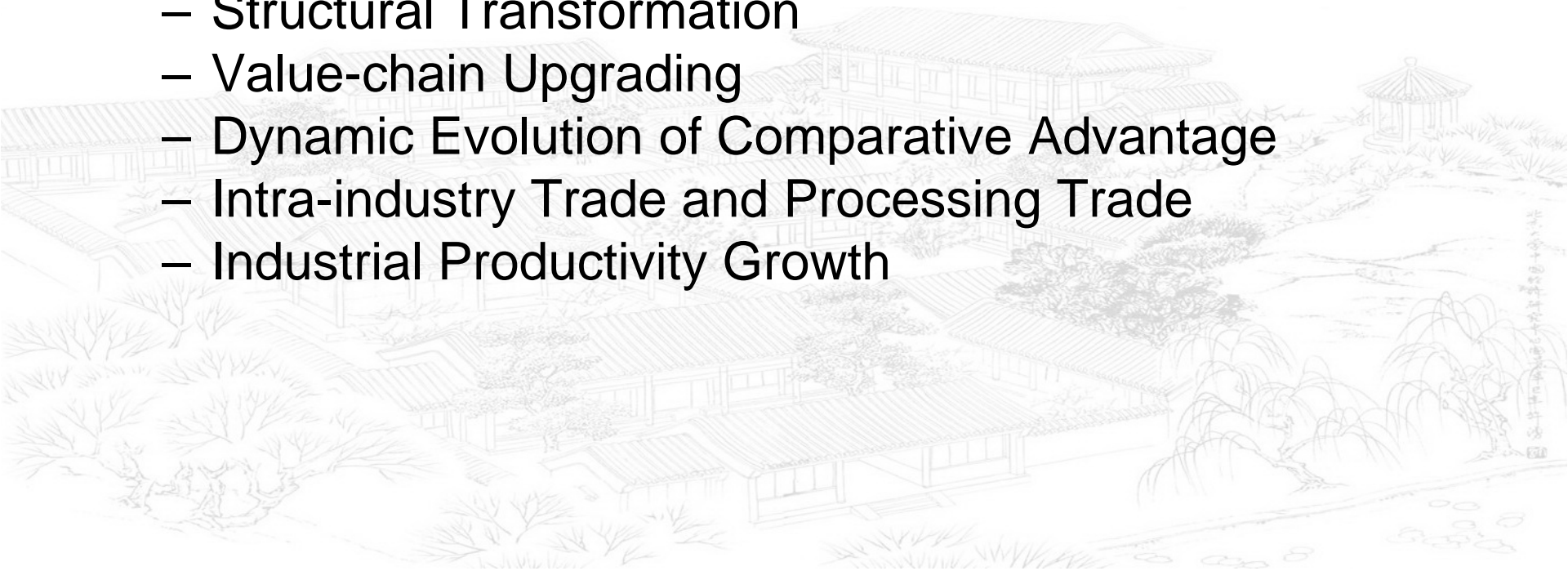
Miaojie Yu
Peking University
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The China Miracle

- China has successfully maintained more than 8% annual GDP growth rates in the last four decades and registered a 15% annual growth rate for international trade
- China is the second largest economy, largest trade country in goods, second largest trade country in service in the world.
- The successful reform is due to adopt a comparative-advantage-following (CAF) development strategy, driven by China's factor endowments (Lin, 2012), as well as the market access due to the WTO accession.
- China thus exhibits a gradual structural transformation and industrial upgrading, creates job opportunity and hence reduce its poverty

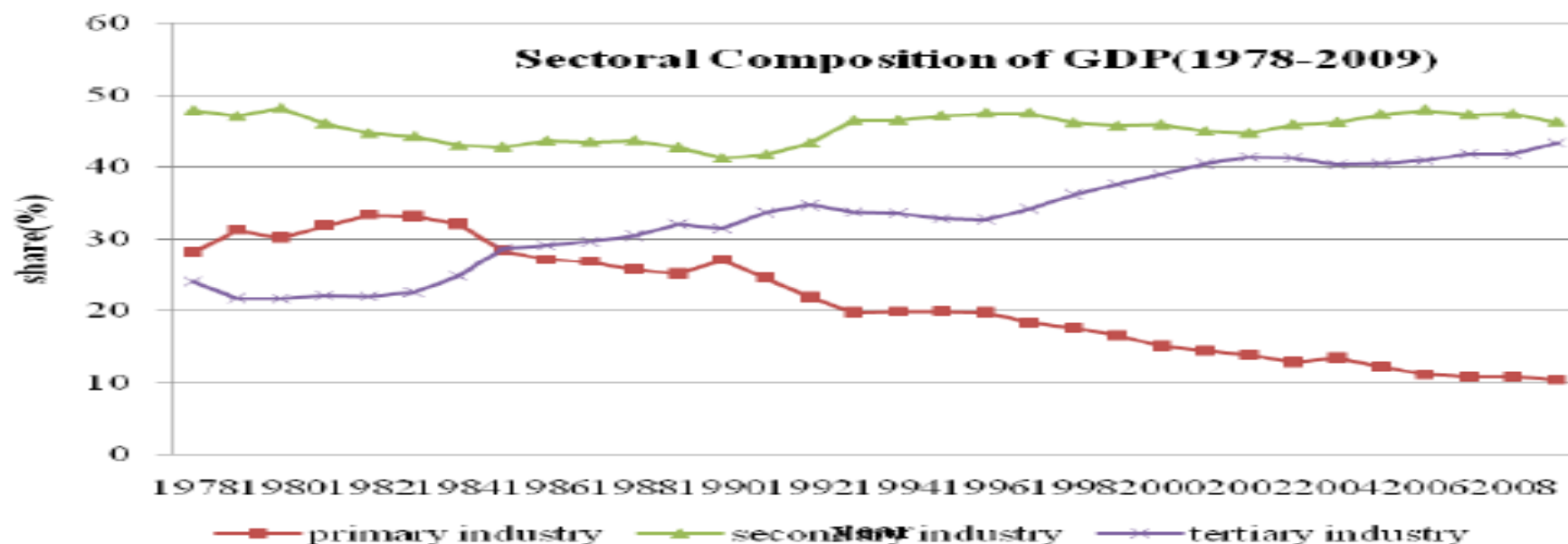
China's Industrial Growth & Structural Upgrading

- Since its economic reform in 1978, China adopts the Comparative-Advantage-Following development strategy based on its factor endowments (Lin, 2003, Yao-Yu, 2009).
- Examine China's production structure and industrial upgrading by examining:
 - Structural Transformation
 - Value-chain Upgrading
 - Dynamic Evolution of Comparative Advantage
 - Intra-industry Trade and Processing Trade
 - Industrial Productivity Growth

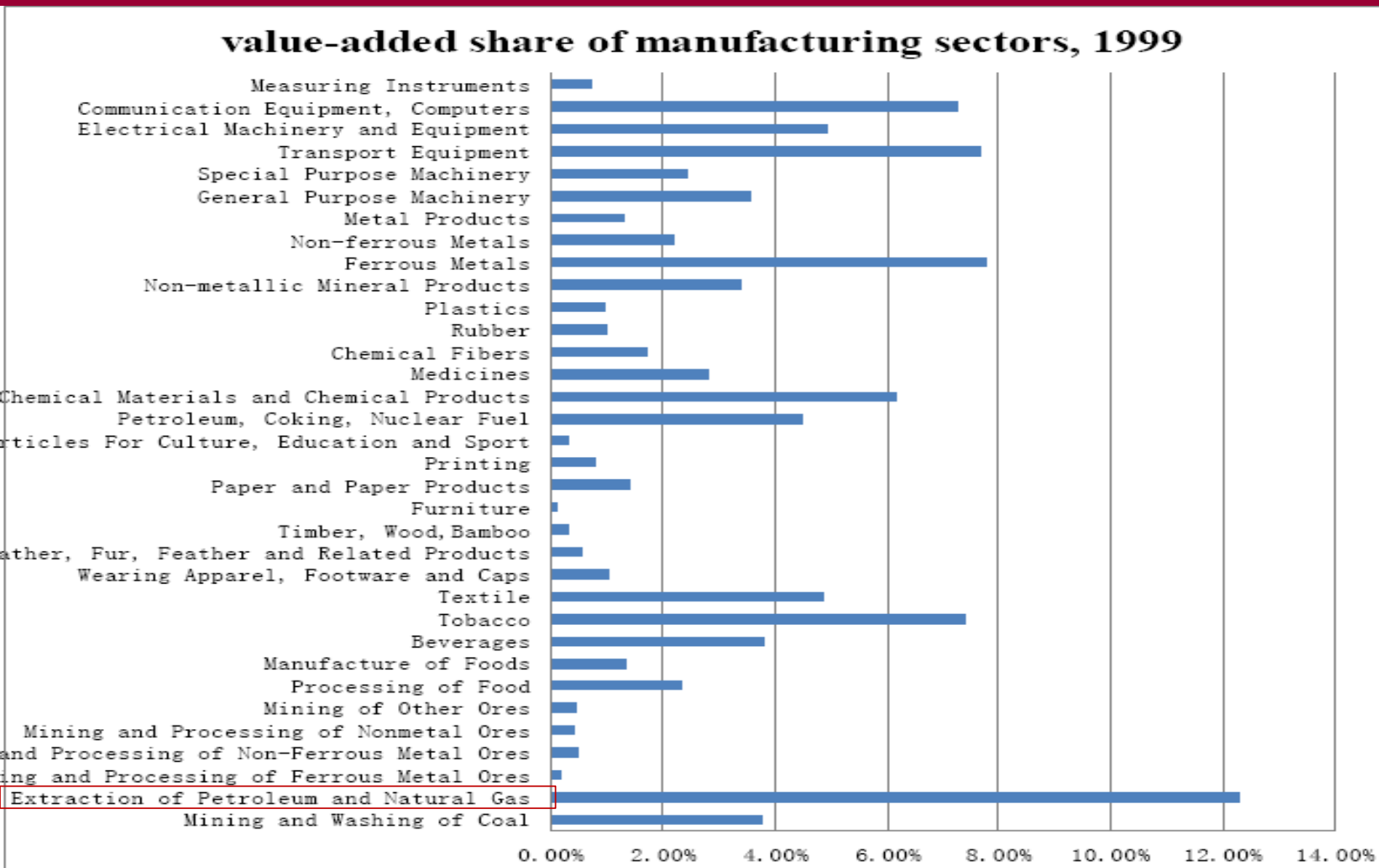


Sectoral Structural Transformation

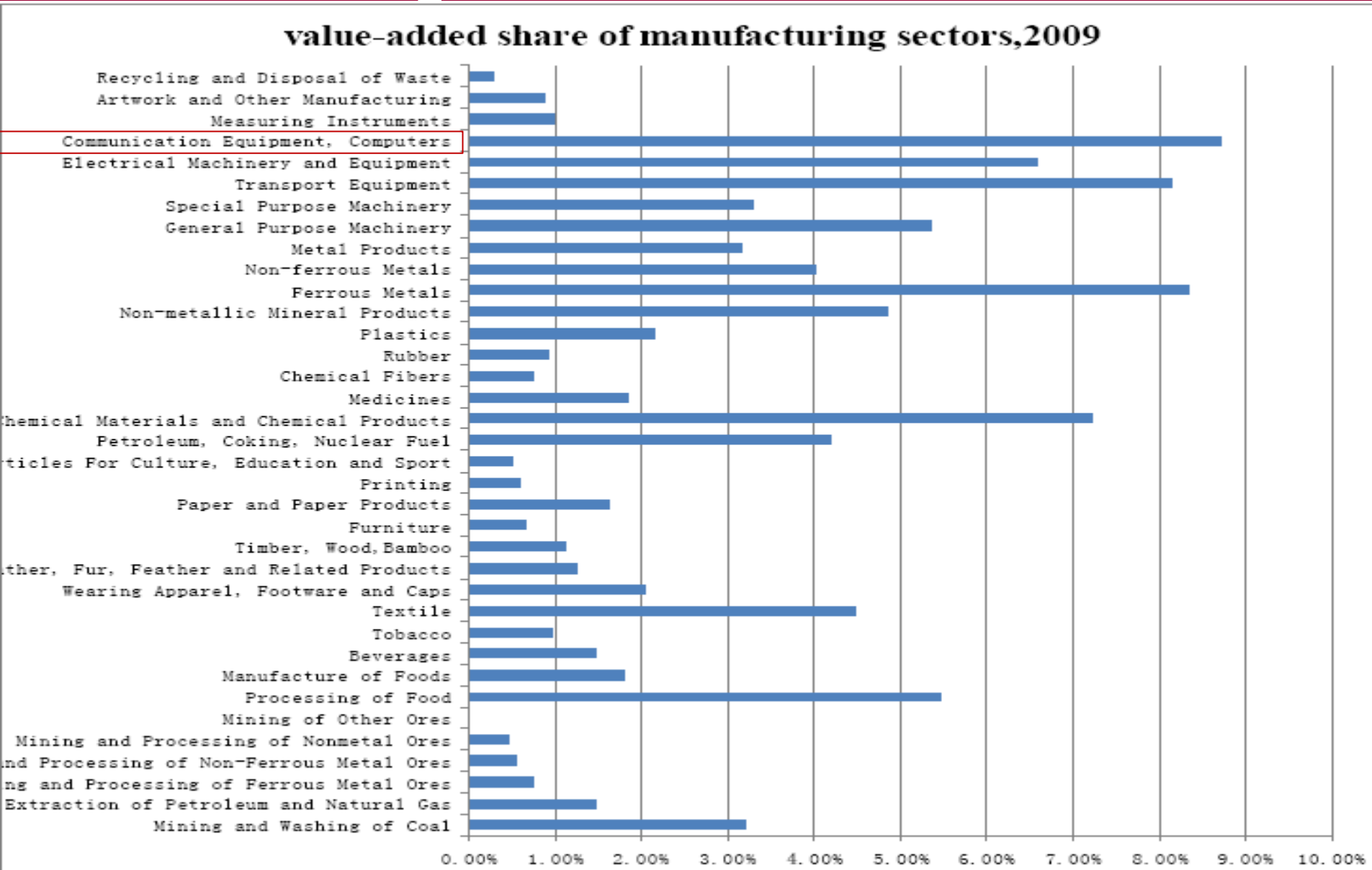
- The GDP sectoral composition of China witnessed an industrial structural change after its economic reforms.
- The share of secondary industry in GDP remained the same.
- Service industry increases gradually, account for more than a half in 2015.



Dynamic Changes: Shares of Manufacturing Sectors in Manufacturing GDP (1999)



Dynamic Changes: Shares of Manufacturing Sectors in Manufacturing GDP (2009)



Value-Chain Upgrading in Trade Sectors

- China is the largest exporter and the second largest importer in the world today.
- The fast growing trade is mainly due to a CAF strategy and the foreign access of the market scale.
- China's exports exhibited four different phases in which the value-chain is upgraded.
 - Low value-added Mineral Fuels such as oils (1979-1985)
 - Labor-intensive goods such as textile and garments (1985-1995)
 - Capital-intensive goods such as transport equipment (1996-2000)
 - High-tech. products such as scientific instrument and pharmaceuticals (2001- present)

Value-Chain Upgrading in Trade Sectors

Table 1: China's Export and Import Composition by Sector (at current prices)

| Export Composition by Sector | | | | | |
|------------------------------|-------------|----------|-----------------------------------|------------------------|---------------------------------------|
| Year | Agriculture | Industry | Mineral Fuels, & Lubricants | Light Manufacturing | Machinery & Transport Equipment |
| 1980 | 50.3 | 49.7 | 23.62 | 22.07 | 4.65 |
| 1985 | 50.56 | 49.44 | 26.08 | 16.43 | 2.82 |
| 1992 | 20.02 | 79.98 | 5.53 | 19 | 15.56 |
| 1995 | 14.44 | 85.56 | 3.58 | 21.67 | 21.11 |
| 1996 | 14.52 | 85.48 | 3.93 | 18.87 | 23.38 |
| 2001 | 9.9 | 90.1 | 3.16 | 16.46 | 35.66 |
| 2009 | 5.25 | 94.75 | 1.7 | 15.38 | 49.12 |
| Import Composition by Sector | | | | | |
| Year | Agriculture | Industry | Mineral Fuels, & Lubricants | Light Manufacturing | Machinery & Transport Equipment |
| 1980 | 34.77 | 65.23 | 1.01 | 20.75 | 25.57 |
| 1985 | 12.52 | 87.48 | 0.41 | 28.16 | 38.43 |
| 1992 | 16.45 | 83.55 | 4.43 | 23.92 | 38.86 |
| 1995 | 18.49 | 81.51 | 3.88 | 21.78 | 39.85 |
| 1996 | 18.32 | 81.68 | 4.95 | 22.61 | 39.45 |
| 2001 | 18.78 | 81.22 | 7.17 | 17.22 | 43.94 |
| 2009 | 28.81 | 71.19 | 12.33 | 10.71 | 40.54 |

Top Products in China's Exports

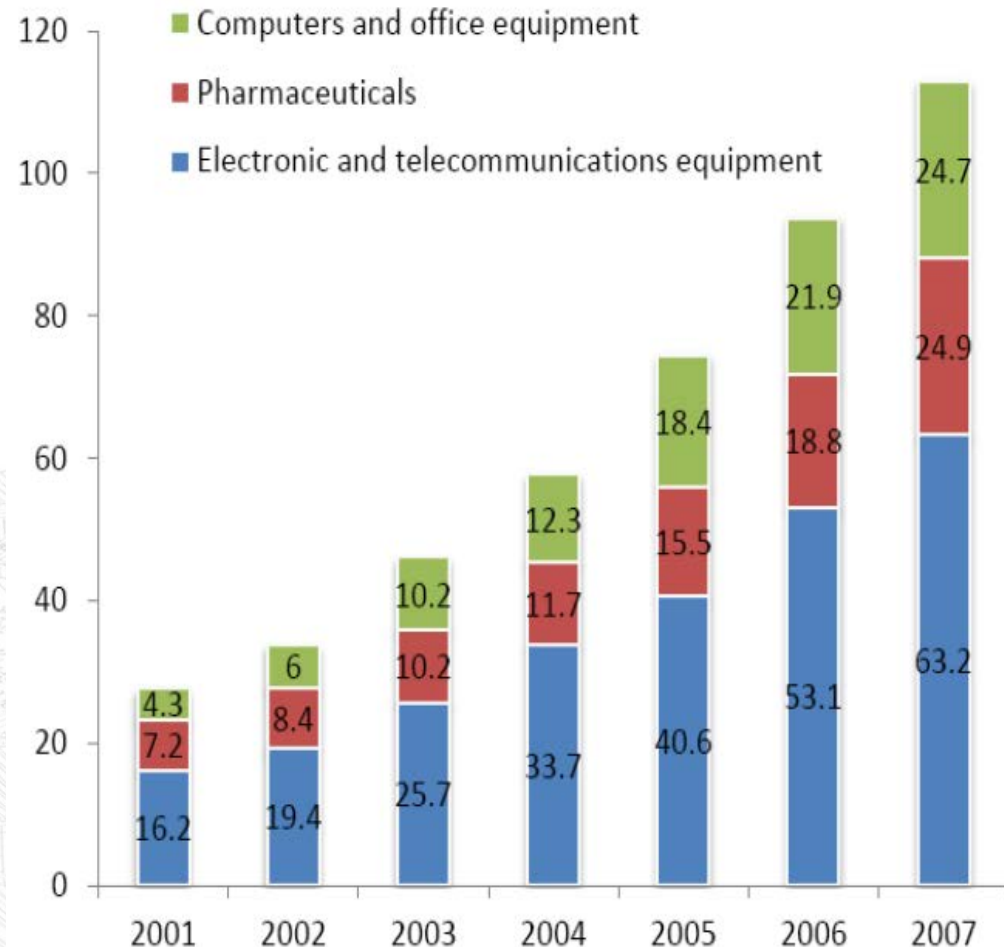
- Low value-added and labor-intensive products were no longer in the top 10 exports of China today.
- The top exports of China are electrical machinery and equipment, followed by machinery and mechanical appliances
- The top 3 categories account for 50% of total exports.

Table 2: Top 10 Exports by HS 2-digit of China (2000-2008)

| Rank | HS 2-digit Category | Code | % of total Exports |
|------|------------------------------------|------|--------------------|
| 1 | Electrical Machinery & Equipment | 85 | 25.45 |
| 2 | Machinery & Mechanical Appliances | 84 | 14.37 |
| 3 | Mineral Fuels & Mineral Oils | 27 | 10.66 |
| 4 | Optical & Photographic Instruments | 90 | 6.67 |
| 5 | Plastics and Articles thereof | 39 | 4.95 |
| 6 | Ores, Slag & Ash | 26 | 4.44 |
| 7 | Organic Chemicals | 29 | 3.86 |
| 8 | Iron & Steel | 72 | 3.29 |
| 9 | Vehicles other than Railway | 87 | 2.24 |
| 10 | Copper and Article thereof | 74 | 2.20 |

Value-Chain Upgrading in High-tech. Sectors

- In the new century the value-added ratios for high-tech. sectors exhibit fast growth rates.
- The value-added ratio of computer and office equipment increased from 4.3 to 24.7, a more than five-fold increase.



Dynamic Evolution of Comparative Advantage

- China exports huge volumes of machinery and transport equipment.
- Does China have comparative advantages in such products?
- China still has comparative advantage on textiles & apparel, with a declining RCA, but has an increasing RCA on machinery & transport equipment

Table 3: The Revealed Comparative by Industry, 1996-2008

| Code | Description | 1996 | 2001 | 2006 | 2008 |
|------|---------------------------------|-------|-------|-------|-------|
| 0 | Animals & Vegetable | 0.210 | 0.364 | 0.284 | 0.29 |
| 1 | Foodstuff & Beverages | 1.310 | 0.977 | 0.894 | 1.254 |
| 2 | Tobacco & Mineral | 0.710 | 0.872 | 0.999 | 1.16 |
| 3 | Chemical & Plastics | 1.439 | 1.218 | 0.877 | 0.802 |
| 4 | Leather, Woods, & Papers | 1.080 | 1.201 | 0.945 | 0.95 |
| 5 | Textiles & Apparel | 3.692 | 2.637 | 1.905 | 1.512 |
| 6 | Footwear & Glass | 0.365 | 0.265 | 0.17 | 0.165 |
| 7 | Metals | 1.080 | 1.259 | 0.867 | 0.78 |
| 8 | Machinery & Transport Equipment | 1.014 | 1.085 | 1.231 | 1.149 |
| 9 | Miscellaneous Manufactured | 0.667 | 0.604 | 0.829 | 0.886 |

Product Sophistication & Intra-Industry Trade

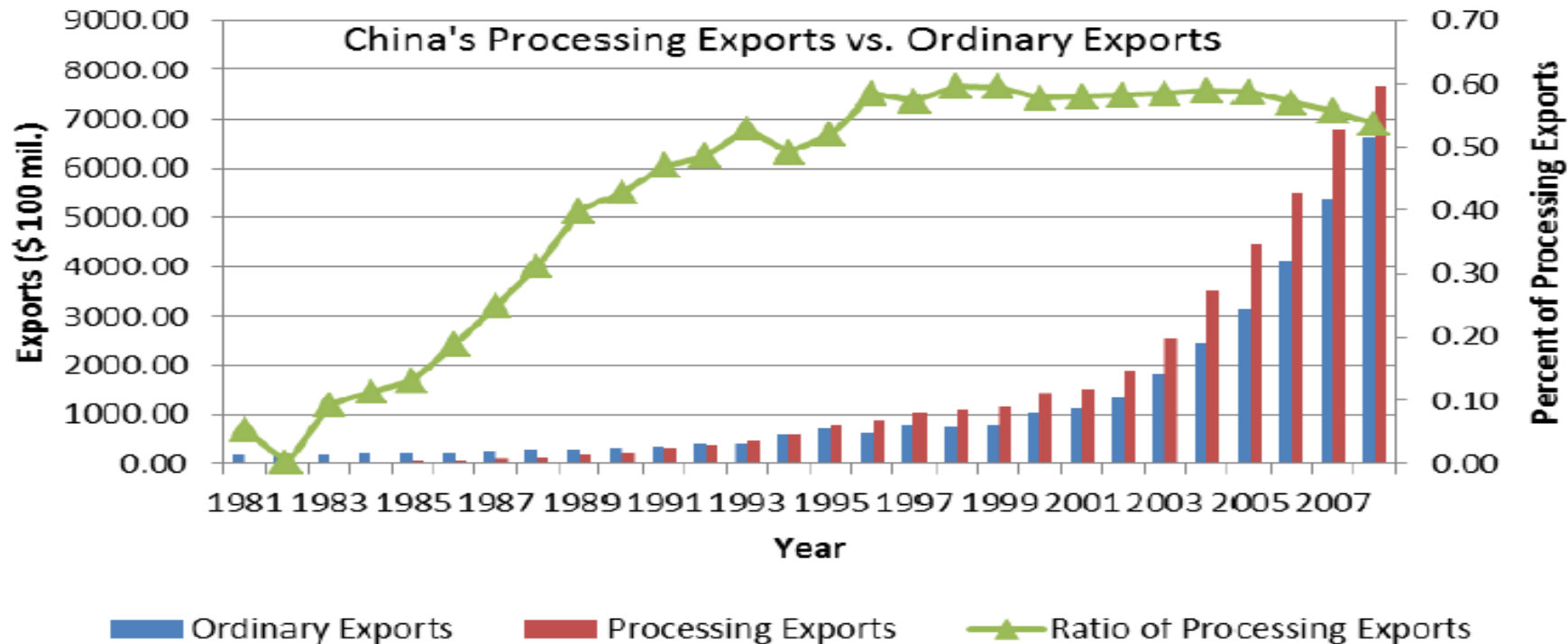
- Product sophistication is a common index to measure manufacturing upgrading.
- China exports are more sophisticated than countries with similar per-capita GDP (Rodrik, 2006)
- A hypothesis attributes this phenomenon to the prevalence of intra-industry trade, due to market expansion.
- Industries like machinery, transport equipment, and optical and photographic products have high levels of intra-industry trade.

Table 4: Intra-Industry Ratio by Sector (1992-2009)

| Industries | 1992 | 1995 | 2001 | 2009 |
|--------------------------|------|------|------|------|
| Textile and Apparel | 0.58 | 0.61 | 0.49 | 0.24 |
| Footwear | 0.18 | 0.10 | 0.07 | 0.06 |
| Machinery | 0.64 | 0.74 | 0.94 | 0.81 |
| Transport Equipment | 0.53 | 0.87 | 0.97 | 0.83 |
| Optical and Photographic | 0.88 | 0.98 | 0.89 | 0.77 |

The Return of the CAF Development Strategy!

- Is the prevalence of intra-industry trade in capital-intensive industries the consequence or the cause of economic development?
- It still follows role of CAF strategy via processing trade (Lin, 2012).
- A domestic firm initially imports raw materials or intermediate inputs. After the materials undergo local processing, the domestic firm exports the value-added final goods (Yu, 2015)



TFP Growth: A Direct Evidence for Upgrading

- A direct way to check manufacturing upgrading is to check industrial firm's TFP growth.
- Calculate the Olley-Pakes (1996) semi-parametric TFP for Chinese large manufacturing firms (2000-2008).
- The average industrial TFP growth rate is 2.43% when measured by gross output and reaches 7% when measured by value-added output.

Table 4: Total Factor Productivity of Chinese Firms (2000-2006)

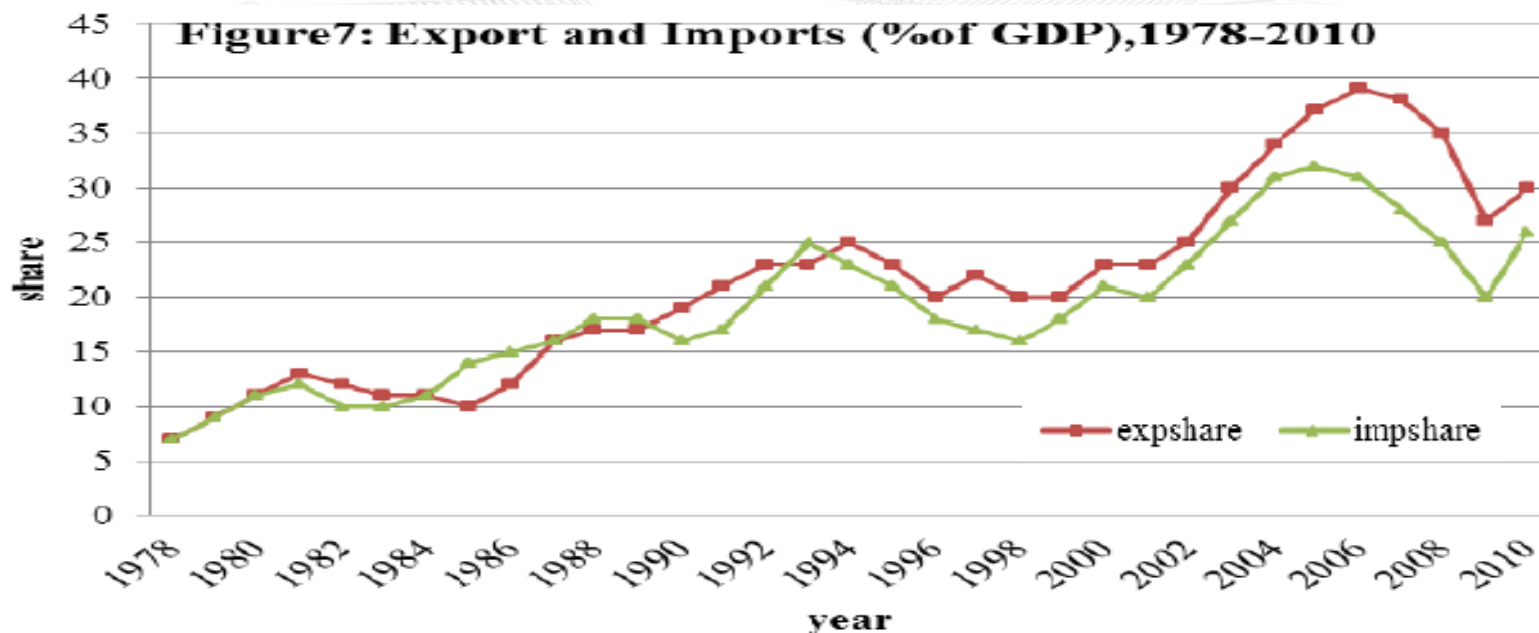
| Industries | Labor | Materials | Capital | TFP | TFP |
|---|-------|-----------|---------|-------|-------------|
| | | | | | Growth Rate |
| Manufacture of Textile (17) | .056 | .879 | .036 | 1.393 | -1.27 |
| Manufacture of Apparel, Footwear & Caps (18) | .096 | .796 | .019 | 1.323 | 1.68 |
| Printing, Reproduction of Recording Media(23) | .063 | .847 | .052 | 1.433 | 3.83 |
| Manufacture of Articles For Culture (24) | .068 | .827 | .045 | 1.374 | 5.03 |
| Manufacture of Transport Equipment (37) | .077 | .804 | .058 | 1.405 | 3.09 |
| Manufacture of Communication Equipment (40) | .094 | .785 | .148 | 1.678 | 3.99 |
| All industries | .061 | .828 | .075 | 1.454 | 2.43 |

How China Realized Structural Transformation and Industrial Upgrading?

- The successful economic reform of China can be directly attributed to its “dual-track” strategy (Lin et al., 2004).
- Gov. provided transitional protection and subsidies to state-owned sectors as a way of maintaining stability.
- Gov. adopted growth identification and facilitation to support new entry to sectors consistent with the CAF strategy.
- Policy Design:
 - Reform of Micro-management Arrangement (SOEs & TVEs reform)
 - “Dual-Track” Price Reform on Output and Input Factors
 - Incremental Reform in the Viable Sectors
 - Open-up Policies and Reform

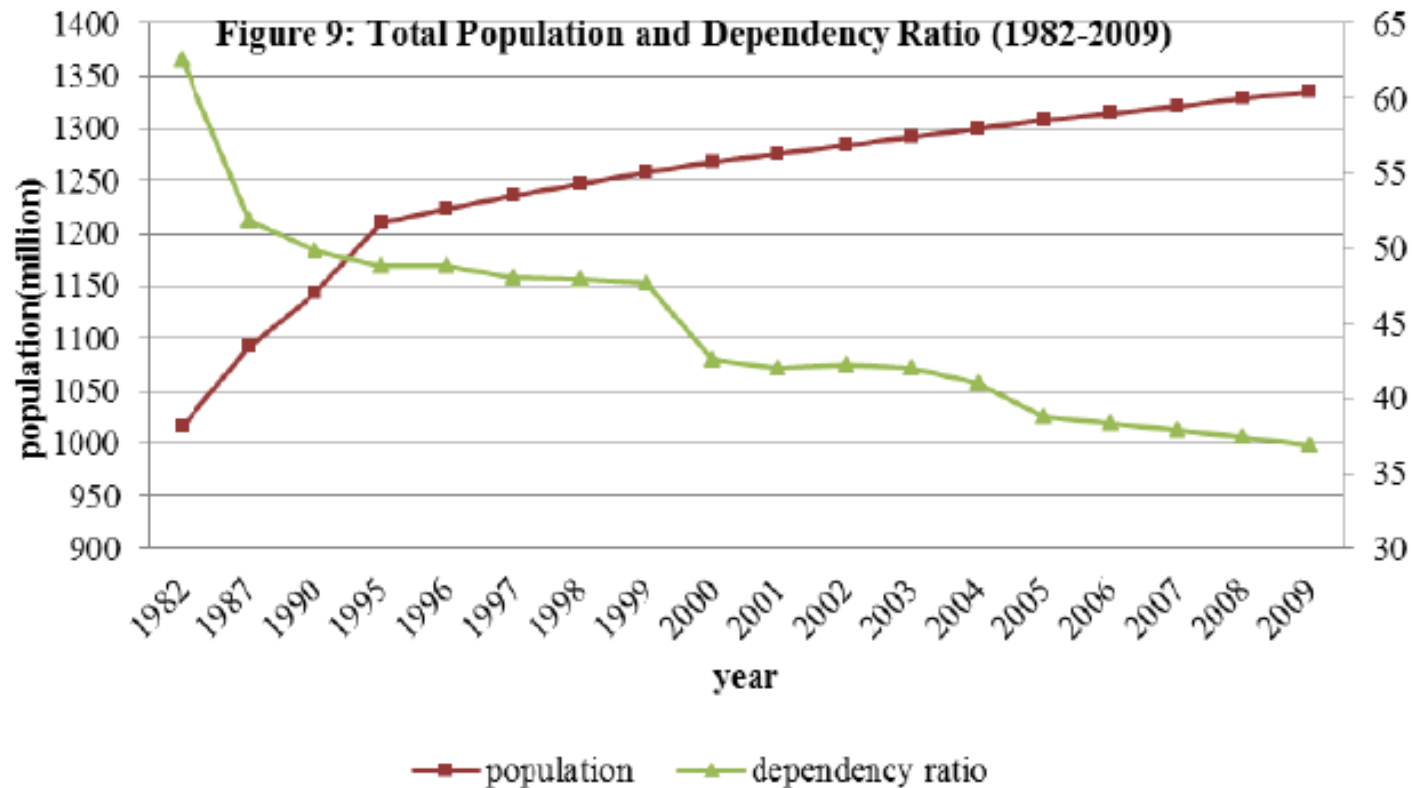
Open-Up Policies and Reform

- China's openness ratio increased from 10% in the 1970s to around 3-quarter in 2007, now down to 1/3.
- The “export-led” growth is the economic consequence of the implementation of the CAF strategy.
 - Supply: produced many labor-intensive goods caused by CAF
 - Demand: China's domestic consumption market is relatively small



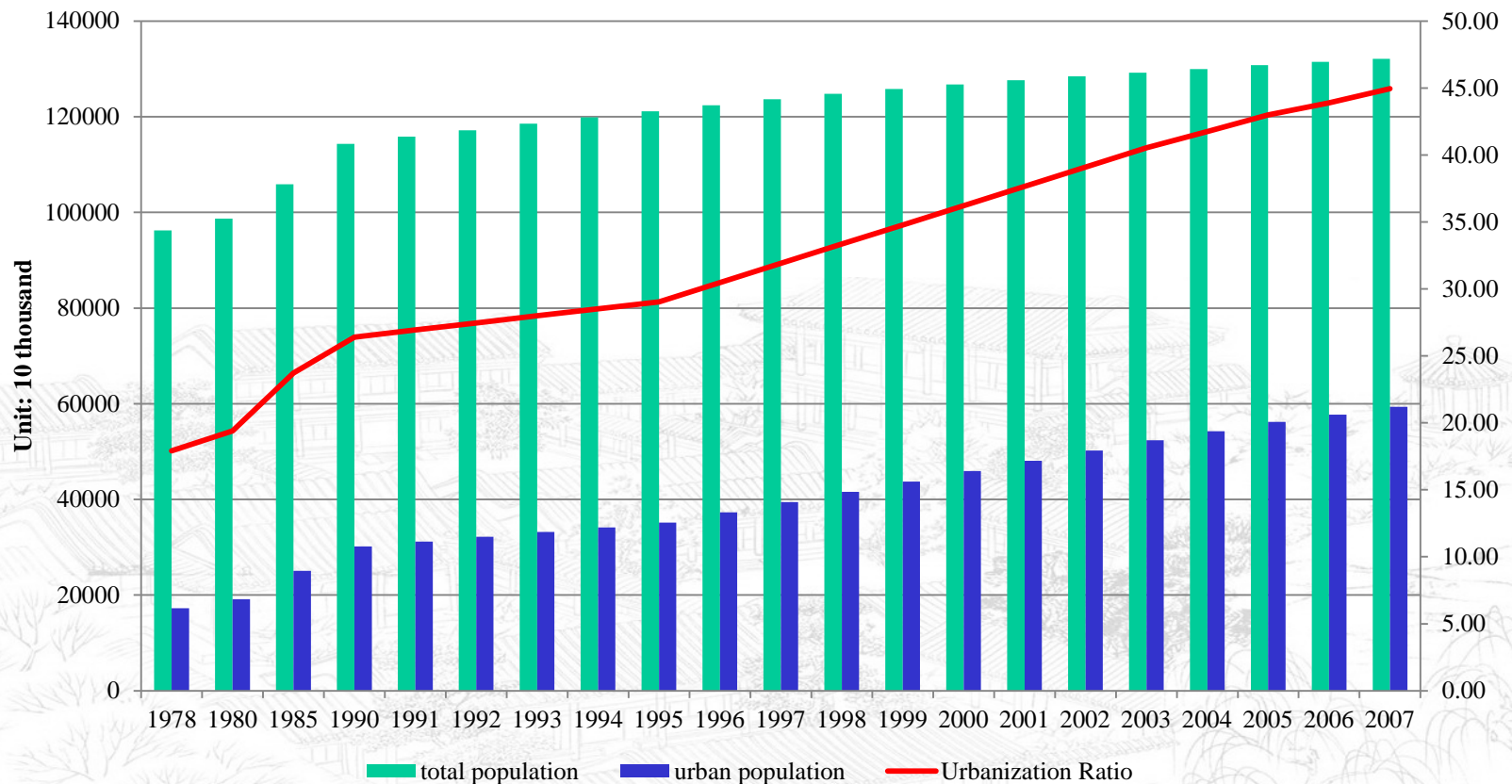
Effect of Structural Transformation on Employment and Poverty Reduction

- China enjoyed huge “demographic dividend” in the last three decades, though facing a possible aging challenge in the future.
- China’s dependency ratio is one of the lowest ratio in the world (Tian et al., 2012)



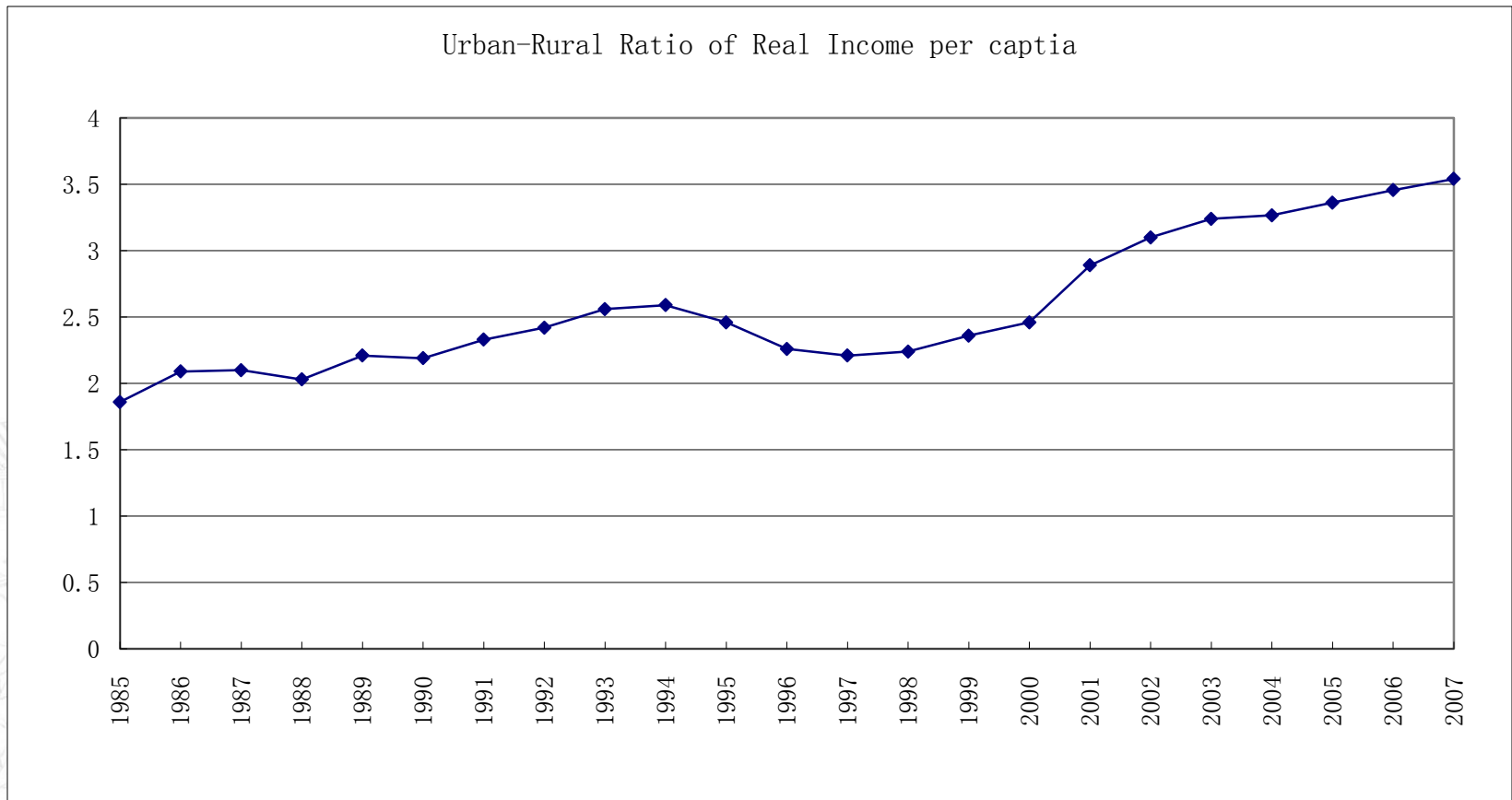
China's Low Urbanization Rate

- China's current urbanization rate is only 55%.



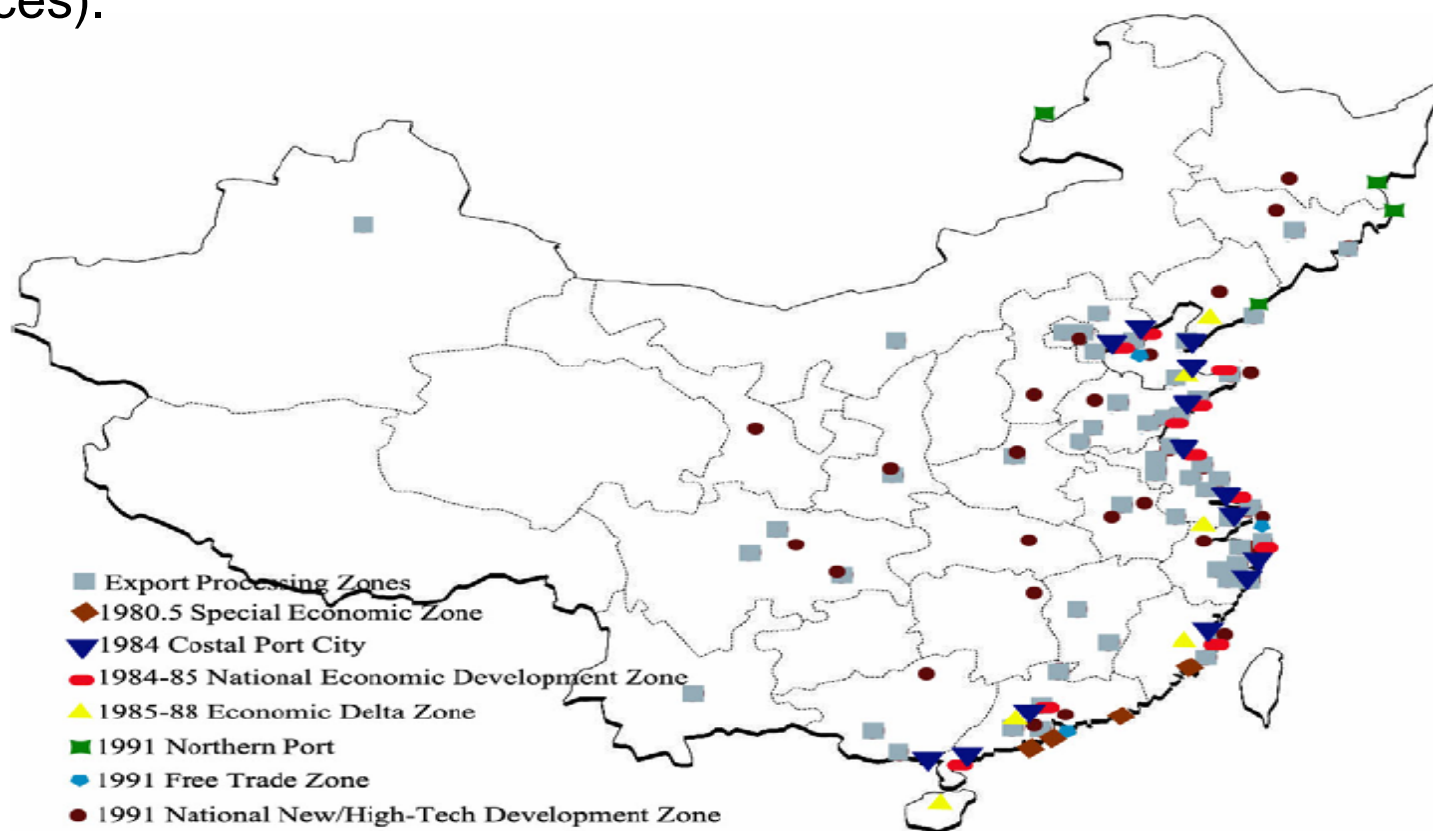
China's Urban-Rural Divide

- China's rural people are still relatively poor



“Open-Up” Policies and Reform

- Set up various free-trade zones.
- The process starts from points (i.e., some cities) to lines (i.e., eastern coastal zones) and then to an entire area (i.e., eastern and central provinces).



Sources: Author's own compilation.

“Open-Up” Policies and Reform

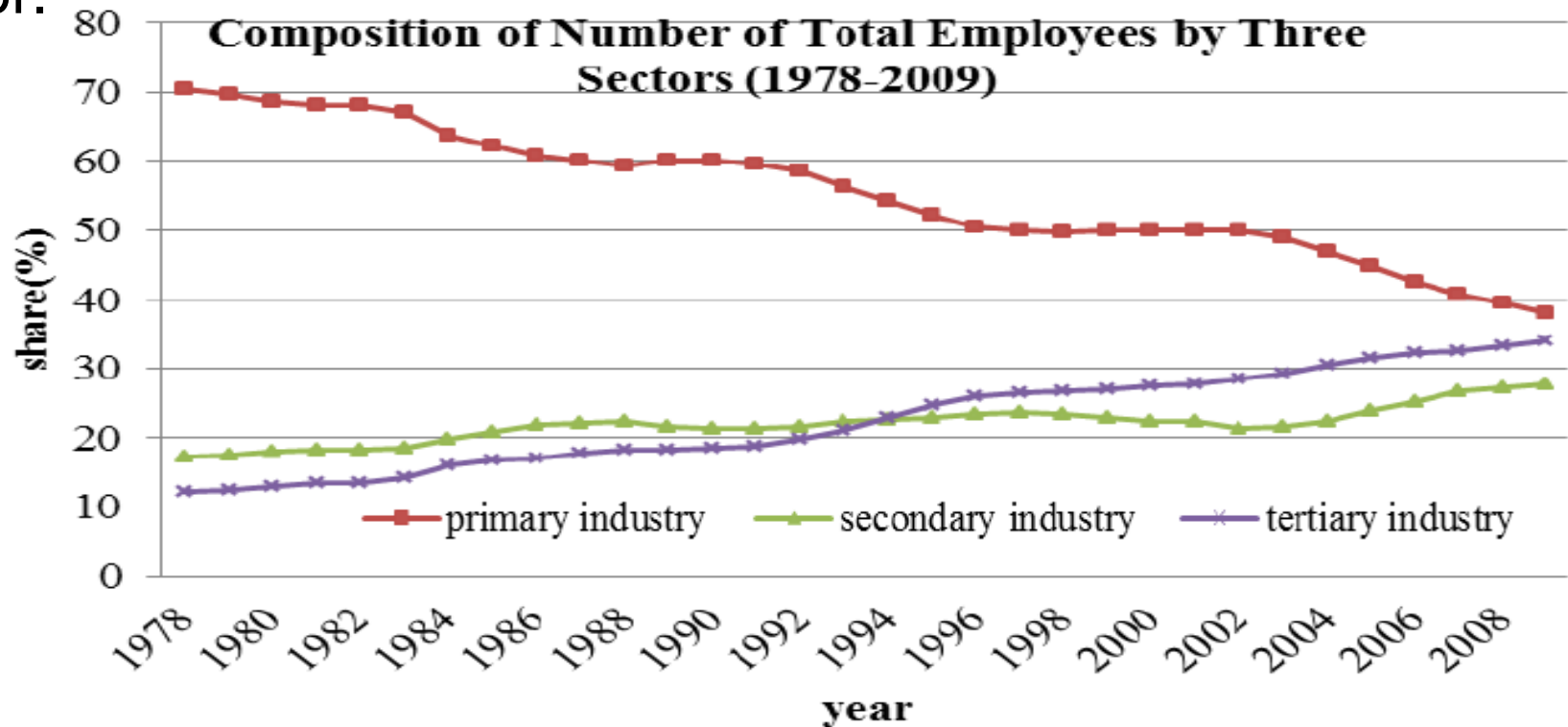
- Trade Liberalization
 - the simple average of China’s import tariffs declined from approximately 42% in 1992 to approximately 35% in 1994
 - China cut its import tariff from 35% in 1994 to 17% in 1997.
- The WTO Accession in 2001
 - With a larger international market, Chinese firms were able to expand their production along with China’s dynamic comparative advantage, becoming a “world factory.”
- Establishment of Export Processing Zones in 2000.

Table 1: Number of Free-Trade Zones in China (1980-2006)

| Types of Special Economic Areas | 2000-2006 | 1990-1999 | 1980-1989 |
|--|-----------|-----------|-----------|
| Special Economic Zone(SEZ) | 0 | 1 | 5 |
| Export Processing Zone(EPZ) | 58 | 0 | 0 |
| Economic & Technological Development Zone (ETDZ) | 17 | 20 | 12 |
| High-tech Industrial Development Zone(HIDZ) | 0 | 53 | 0 |
| Bonded Zones(BZ) | 0 | 14 | 1 |

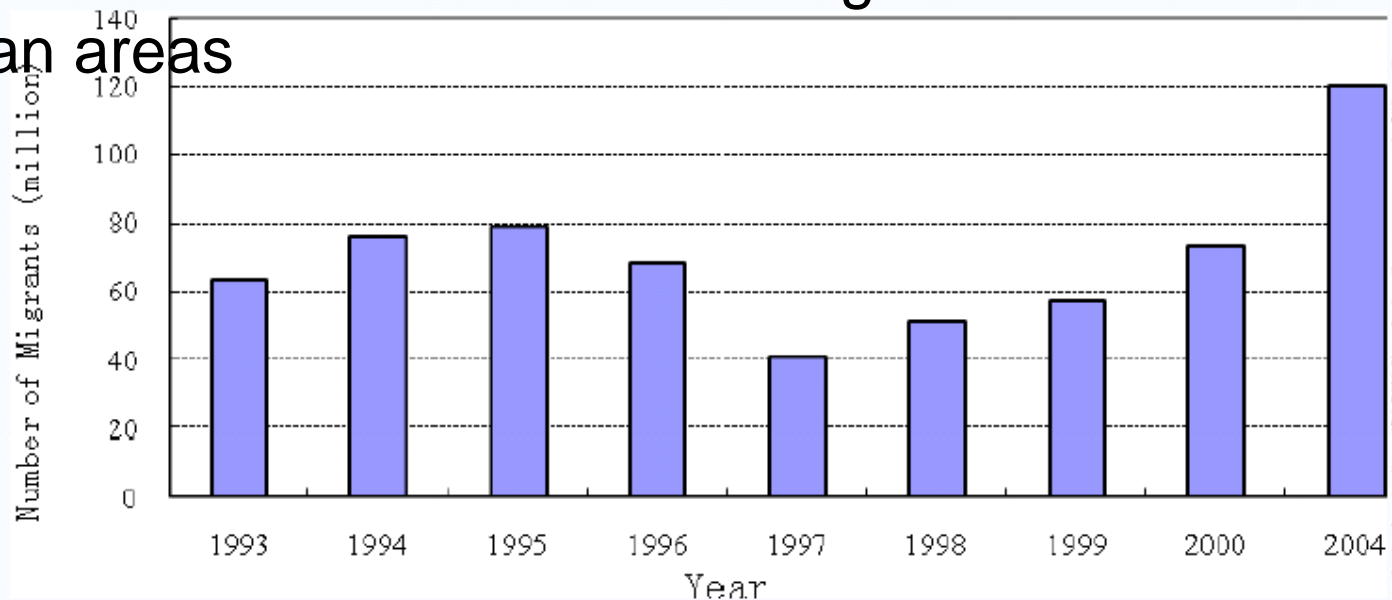
Structural Transition and Employment Change across Sectors

- The employment change by sector is positively associated with China's structural formation.
- Along the movement from CAD strategy to CAF strategy, many people are liberalized from Agriculture to Industry and Service Sector.



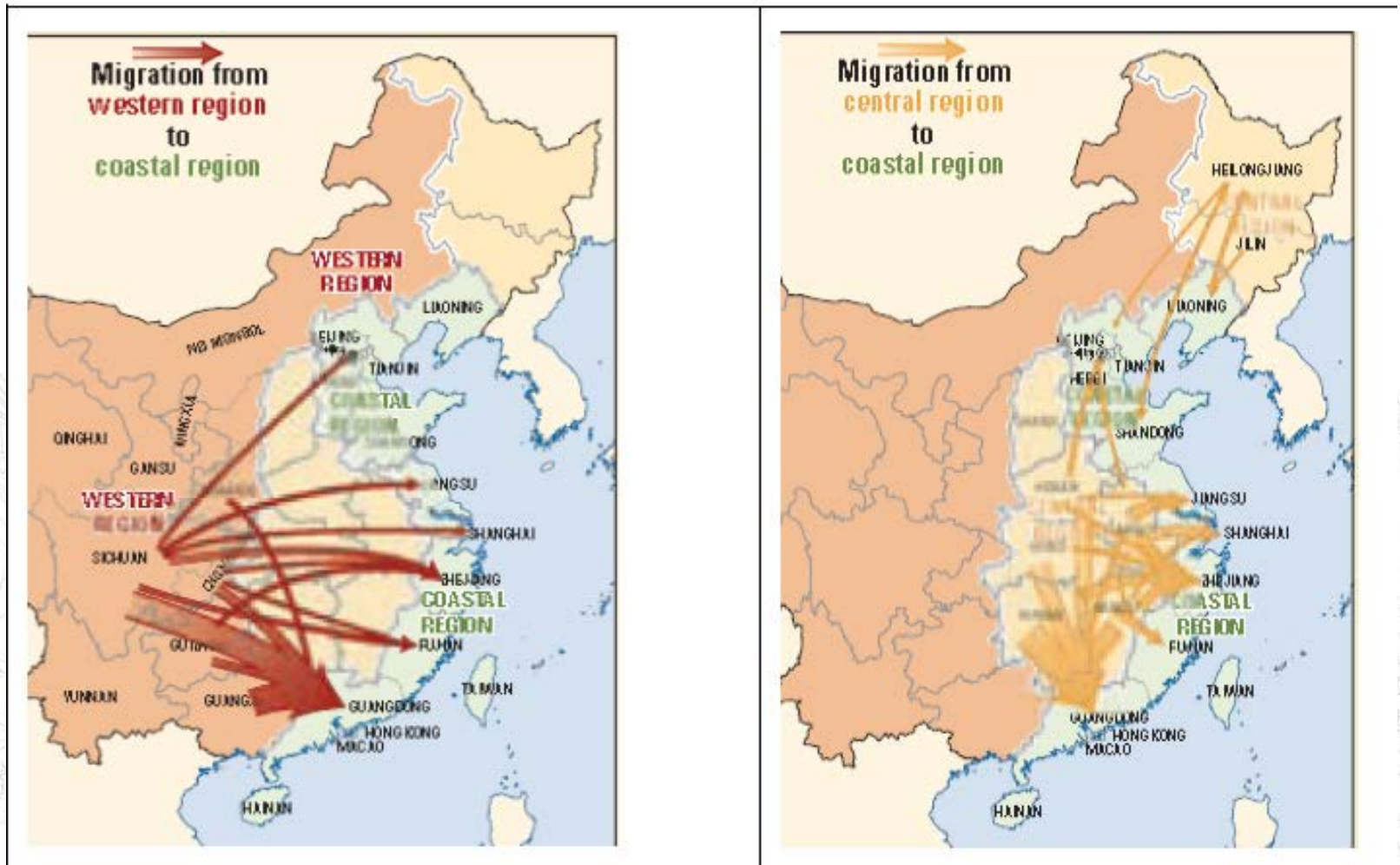
Evolution of Structural Change in Employment

- Exhibit four stages
- 1978-1991: A fast declining share in the primary sector and quick increase in the secondary and tertiary industries.
 - The Implementation of Household responsibility system
 - The Emerging TVEs
 - The Onset of the reform in the SOEs
- 1992-1996: China further alleviated the migration restriction from rural to urban areas



Evolution of Structural Change in Employment

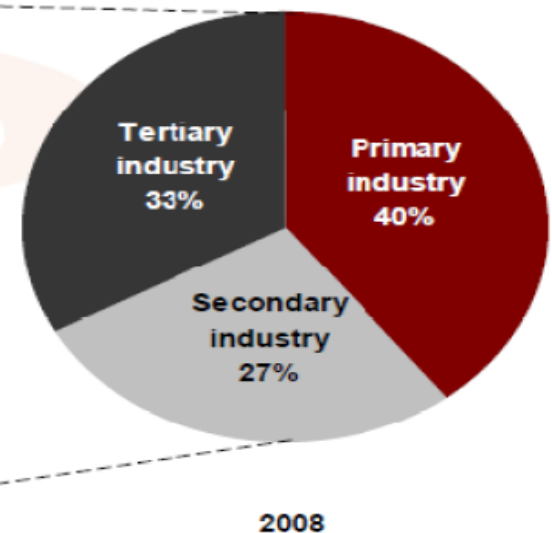
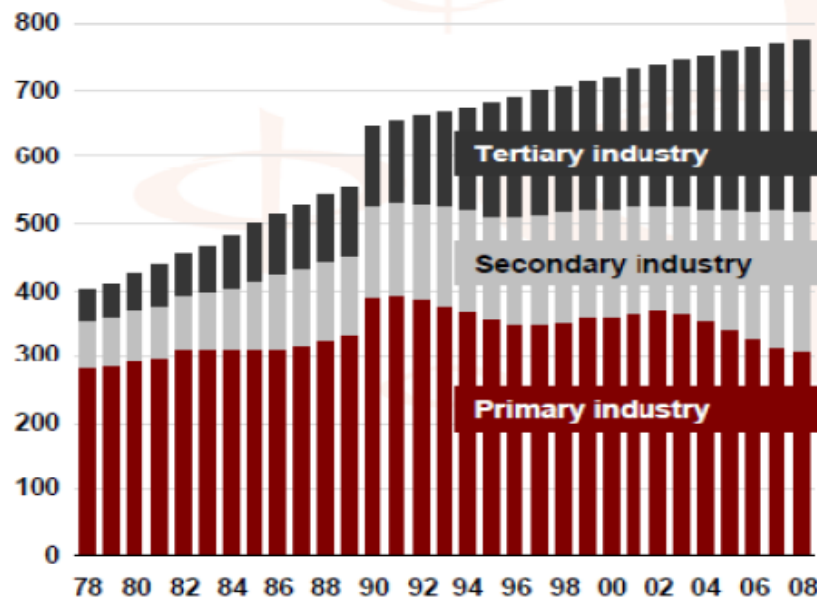
- Labor Migration is mainly from the western and central regions to the coastal regions.



Evolution of Structural Change in Employment

- 1996-2001: the slow pace of structural change in employment
 - The East-Asian Financial Crisis in 1997
 - The Hard-time of the SOEs reform (triangle-debts problem)
- Since WTO accession, Membership to the WTO granted China access to a larger international market, which provided better opportunities for China to implement its CAF strategy.

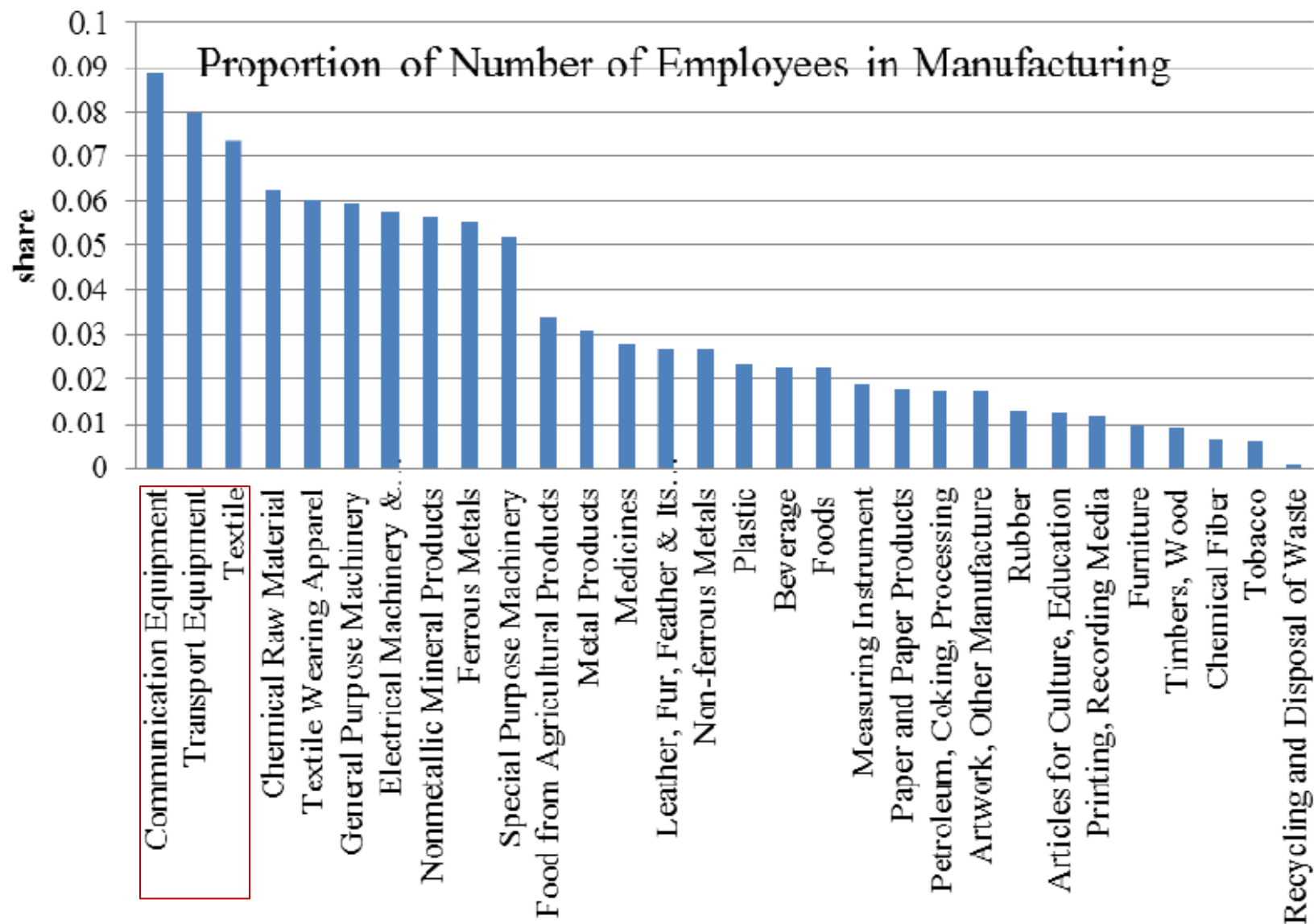
Total Employed Persons By Sector (mn, 1978-2008)



Evolution of Structural Change in Employment

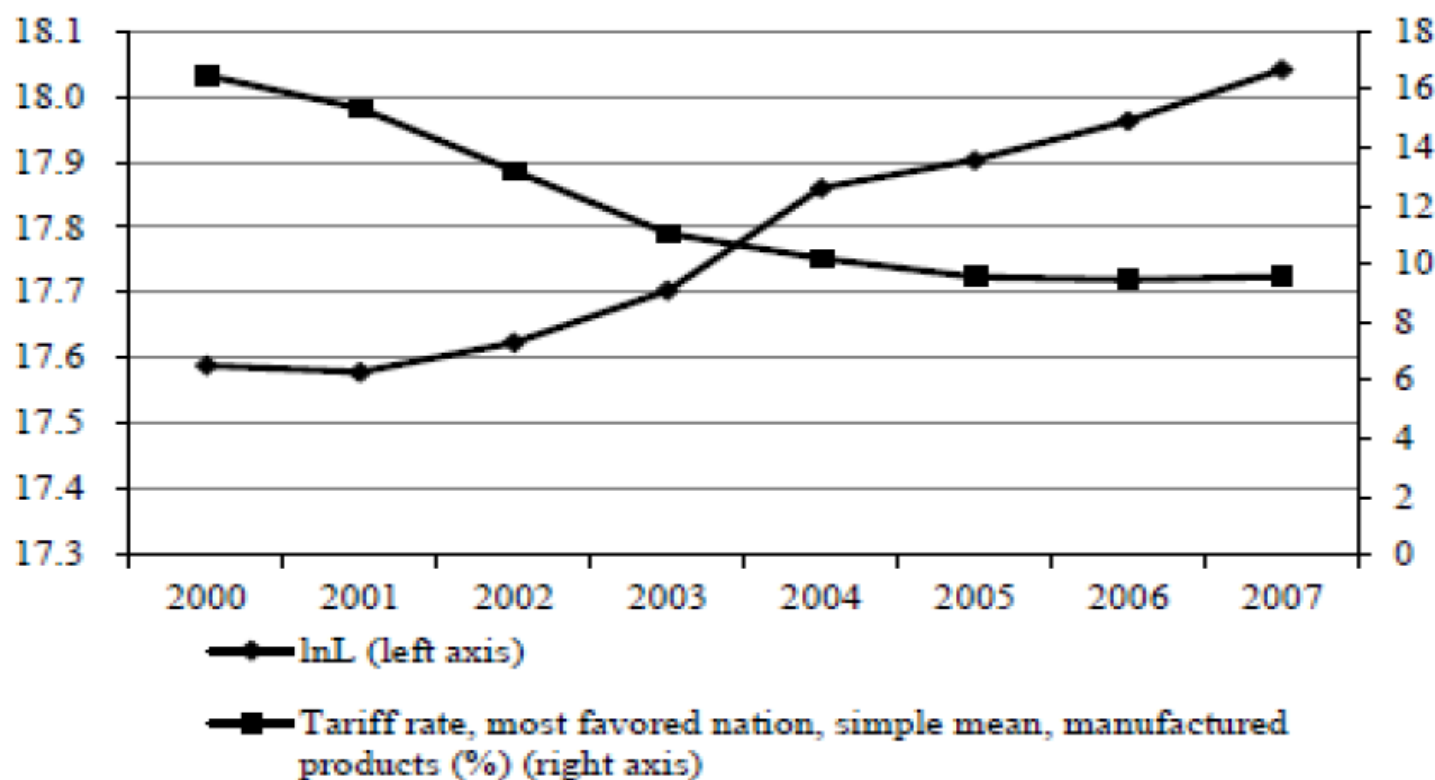
- Examine the change in share of manufacturing employment to the entire employment in the secondary industries over time.
- In 1982, manufacturing workers accounted for around 71% of labor in the secondary industry.
- The proportion was reduced to only around 50% in 2009.
- The movement is partly because of the labor-saving improvement in technology.
- In 2009, the sector with the largest employment was manufacturing of communication equipment (9%), followed by that of transport equipment (8%).
- suggests that the employment structure within the manufacturing sectors move along with industrial upgrading.

Evolution of Structural Change in Employment



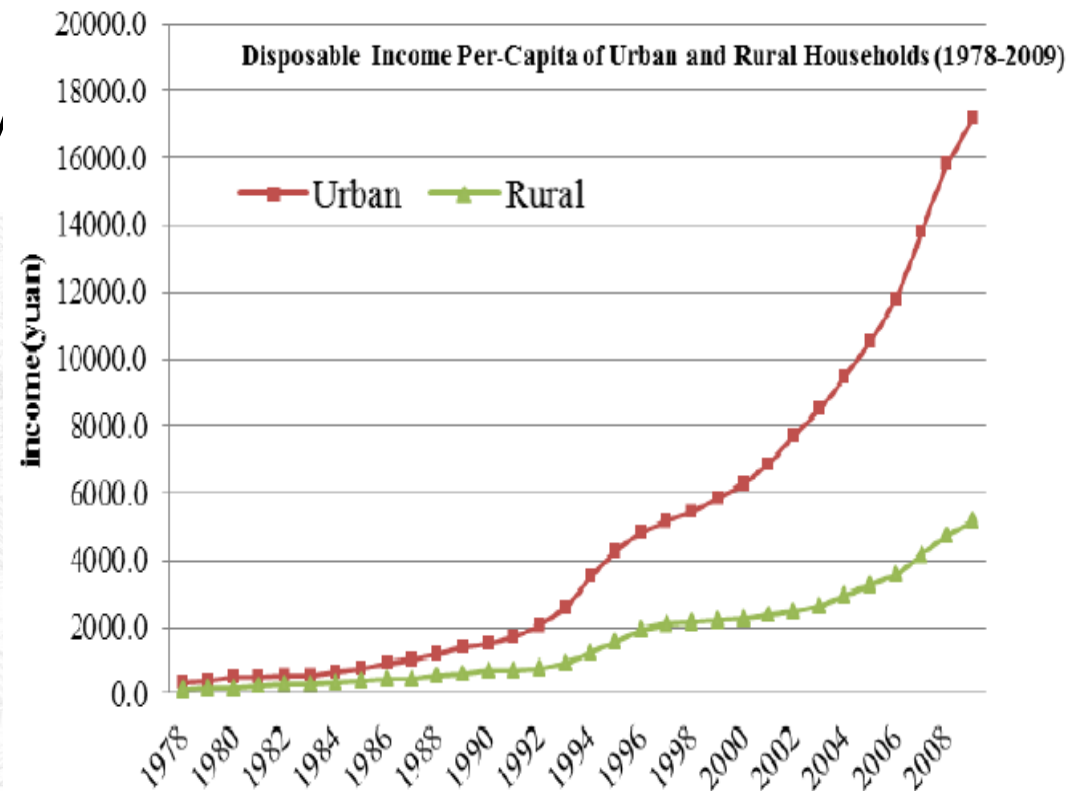
Trade Liberalization & Job Employment

- Trade liberalization creates more job flow (Rodriguez-Lopez & Yu, 2016)
- Evidence from Chinese manufacturing firms (2000-08)



Structural Transformation & Poverty Reduction

- With CAD strategy, the profit generated by the heavy industries was not used for consumption but for further capital accumulation.
- At least 30% of people lived below the poverty line before reform.
- With CAF strategy, poverty in China was alleviated to less than 3% of its total population.



Why Industrial Upgrading can reduce Poverty?

- The burst of TVEs in line with the structural transition in China
 - TVEs provided huge working opportunities for peasants.
 - Compared with working in the primary sectors, obtaining a job in the TVEs generally secured a higher income.
- Trade globalization creates job opportunity
 - Processing trade
 - WTO and foreign market accession
- The increasing share of service industry.
 - The increase in employment in services is more prominent than that in the secondary industry.
 - the employment ratio in service industry increased from 12.2% in 1978 to around 33% today.
 - the employment ratio in secondary industry only increased from 17.3% in 1978 to around 27% today.
- Support and facilitation from the government
 - A generous anti-poverty funding to facilitate poor areas
 - A Western Development Program

Conclusions

- China's economic miracle is due to the application of the CAF strategy.
- Two sets of policies are essential:
 - Export-led growth
 - Access to large market scale
- The successful structural transformation and manufacturing upgrading created many new working opportunities
- Poverty in China was greatly reduced.

