The Position of China's High-tech Industry on International Division of Labor and Its Industrial Upgrading Strategies: A Case Study of the IC Industry

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Outline:

- I. Questions and Introduction
- II. The position of China’s IC industry
- III. Technological Level of China’s IC Industry
- IV. Ecological Pattern of China’s IC Industry
- V. Conclusions

Questions:

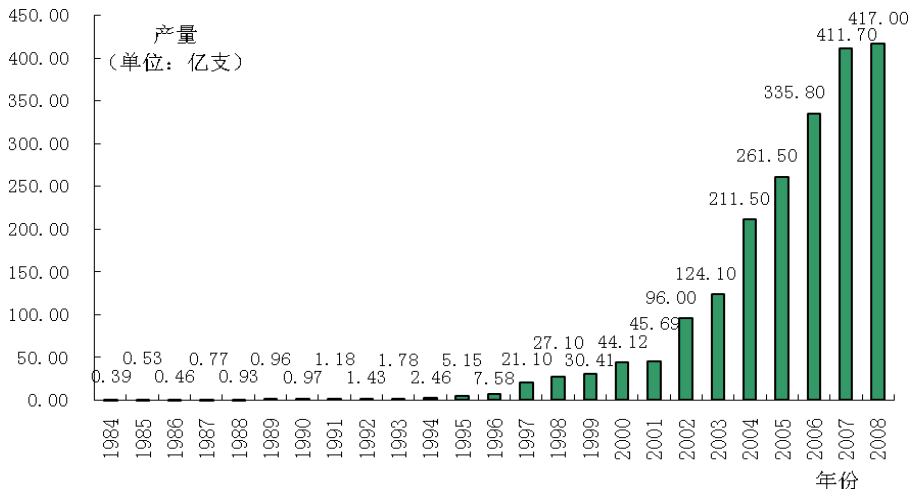
- What is the position of China’s IC industry on the international division of labor?
- What is the technological level of China’s IC industry?
- What are the determining factors for industrial upgrade in international industrial transfer?

I. Introduction: the pattern of Labor Division of the IC Industry in worldwide

- The value train of Integrated Circuit (IC) industry is composed of three segments including IC design, IC manufacturing, packaging and testing.

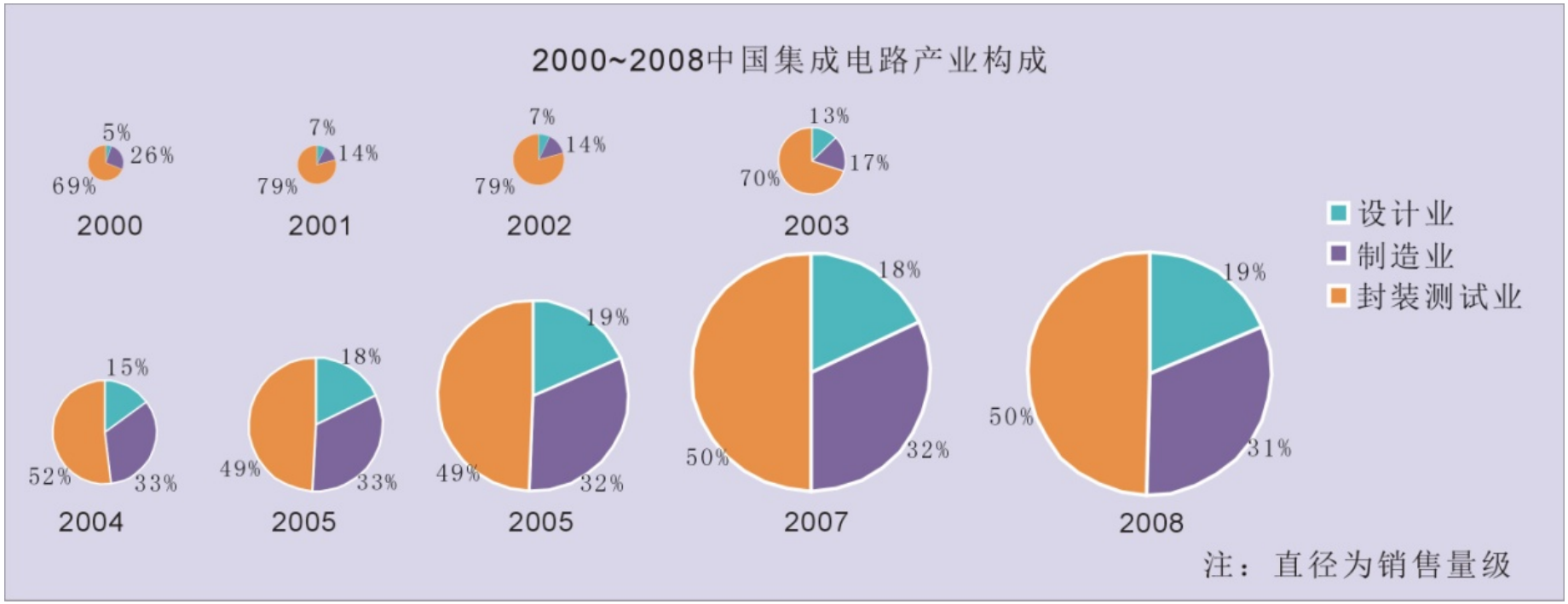
- Worldwide in general, 80% of IC design is located in U.S., and 80% of manufacturing, packaging and testing is located in the Asian area.

- Since the year 2000, China's IC industry has seen tremendous changes in both production capacity and technical level. Around 80% of the IC manufacturing, 90% of IC packaging and testing exported.



II. The position of China's IC industry: a general overview

- Production capacity:4.4 billion to 41.7 billion (volume)
- Annual growth rate: 37.1%
- Industrial structure: 2:3:5 (balanced ratio is 3:4:3)



II. The position of China's IC industry:
IC Design

- Chinese mainland only accounts for less than 3% in the IC design industry worldwide.
  - America: 80%, Taiwan, China:<10%
- The total sales volume of Top 10 Chinese IC design enterprises is 1.3 billion $, which only could rank No. 9 in the world.
- 17% of the whole IC industry sales in China
- Mainly are small-scale ASIC chips for domestic market

II. The position of China's IC industry:
IC Manufacturing

- Account for 31% of the whole IC industry sales in China.
- Chinese mainland only accounts for 5% in the IC manufacturing industry worldwide.
- 5 Chinese foundries in the world's top 17 pure-play foundries which sales volume exceed 1 billion.
- 78.9% of the total sales for export.

Leading Pure-Play Foundries worldwide, 2008

	IC foundries	*Sales（100 million US dollars）*
1	TSMC	105.56
2	UMC	34.00
3	Chartered	17.43
4	**SMIC**	13.54
5	Vanguard	5.11
6	Dongbu Hitek	4.90
7	X-Fab	4.00
8	**HHNEC**	3.50
9	**He Jian**	3.45
10	SSMC	3.40
11	**Grace**	3.35
12	Tower	2.52
13	Jazz	1.90
14	Silterra	1.75
15	**ASMC**	1.49
16	Polar Semiconductor	1.10
17	Mosel-Vitelic	1.00
	Total	208

Data Source: IC Insights

II. The position of China's IC industry:
IC Packaging and Testing

- Account for 50% of the whole IC industry sales.
- Chinese mainland makes up 10% of the global packaging industry.
- 90.0% export.

III. Technological Level of China's IC Industry

- **IC design**: technology developed independently
  - Vimicro Corp
  - Loongson CPU
  - CIDC
- However, the rapid development of the IC design industry after 2000 has mainly benefited from three factors:
  - the vigorous growth of local consumer electronics products, such as home-made cell phone and cars (motor electronic);
  - the push from government on technological innovation and government procurement;
  - the combination of the technological capability accumulated by domestic large research institutions over a long time with the market demand.

III. Technological Level of China's IC Industry (continued)

- **IC manufacturing**: greatly benefit from equipment providers and clients through the international foundry businesses.
  - Case: SMIC
- **IC packaging and testing**: international IDMs hold the higher level technologies, domestic companies get slight opportunity to upgrade.

IV. Ecological Pattern of China's IC Industry

- Two Foreign Capitals: Financial Investor and Strategic Investor
  - Indigenous Companies vs. MNC Branches
- **IC design**: The top 9 out of the Chinese top 10 IC design enterprises are indigenous companies, and their incomes account for 97% of the gross earning of the top 10.
- **IC manufacturing**: 8 indigenous companies among Chinese top 10, their incomes account for 65% of the gross earning of the top 10.
- **IC packaging and testing**: only 2 indigenous companies among the top 10, their incomes account for 14% of the gross earning of the top 10.

V. Conclusions

- China’s IC industry is deeply involved and benefits from the international division of labor, both in terms of production capacity and technological level.

- The evolution of China’s IC industry did not follow the traditional linear trajectory, which was partly influenced by the new international landscape of the industry and partly influenced by the local technical capabilities.

- The industrial chain with upgrade potential might not have to have a balanced industrial structure, but have the endogenous technological capability of indigenous companies.

V. Conclusions (continued)

- what kind of enterprises will be able to move towards the high end of the value chain in the international division of labor?

  (1) Indigenous companies, instead of MNC strategic branches;

  (2) Chinese Returnees' team or national research institutions and state-owned enterprises with a long-term technological accumulation;

  (3) Government support and favorable policies on technological innovation and industrialization.

Thank you!

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