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Comparative Analysis of the Dual Structure of China's Unique Trade in Mechanical and Electronic Products

Summary

Trade in mechanical and electronic products accounts for nearly 60% of China's foreign trade. The export of mechanical and electronic products in China gradually develops into two systems: one is general trade relying on the domestic industry, and the other is processing trade based on an international industry transfer, and the two systems constitute the dual structure of China's trade in mechanical and electronic products, and support rapid growth in China's trade for mechanical and electronic products. By a comparative analysis of the basis of the dual structure of trade in mechanical and electronic products, the types of enterprises, the product and market structure and through the discussion of the influence of the dual structure of trade growth, international competitiveness and the size of surplus, one can conclude that the government should adopt different policies for different trade systems.

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30 years after the start of reforms and opening up, in the context of economic globalization, the export of mechanical and electronic products in China is gradually forming two systems, one is a general trade system relying on domestic industry, and the other is a processing trade system based on an international industry transfer. Processing trade is an important way of intra-product trade that refers to production and trade activities of importing raw materials or components, then processing and assembling them domestically, and finally exporting semi-finished or finished products. In China, the definition of processing trade refers to the trading activities supervised by the customs authority. According to *the rules of China's customs authority regulating the supervision of trade goods processing*, by definition processing trade includes the import of raw materials and components after domestic assembling and processing, and finally export. The main characteristics of processing trade include the production of raw materials and components abroad, the import, processing and assembling in China, and the export of the final products overseas, which means that the import must correspond to the export. In contrast, general trade is a different method which covers the activities of import and export, and there is no interlinked supervision or correspondence between imports and exports.

The nearly 27 years of uninterrupted rapid growth in the dual structure of mechanical and electronic products places China among the top-ranking countries of trade in electronic and mechanical products. The future developments in this dual structure will determine the trend of China's export of mechanical and electronic products and the international competitiveness of China's mechanical and electronic products. This unique trade structure, characterised by large volumes and fast growth, has accelerated the pace of growth in China's trade in mechanical and electronic products, enlarged its international competitiveness, and increased China's trade surplus. A comparative analysis of these two systems will help recognize the actual state of China's foreign trade, accelerate the transformation of China's export development in the field of mechanical and electronic products, and continuously improve the quality of growth and efficiency.

Features of the dual structure in the development of trade in mechanical and electronic products

Overall situation in the trade of mechanical and electronic products

According to the statistics compiled by the Customs Authority of China, between 1985 and 2012, the value of China's export of mechanical and electronic products increased 643 times from 1.68 billion USD to 1.96 trillion USD at an average annual growth of 27.2%. Excluding the impact of the financial crisis, between 1985 and 2008, the average annual growth rate was 30.9%, 2.9 times the average growth rate of the trade in mechanical and electronic products in the same period, and 3.1 times the world trade. In 2009, the value of China's export of mechanical and electronic products ranked No. 1 in the world, accounted for 13.4% of the world's total trade in mechanical and electronic products.

Different stages of development in the trade of mechanical and electronic products and the corresponding ratios of general and processing trade

First stage: general trade grew rapidly between 1985 and 1990, the average annual growth rate of the value of China's export of trade in mechanical and electronic products was up 45.9%. The increase mainly relied on endogenous factors, such as policy support, institutional innovation and so on. General trade accounted for more than 80% of the value of China's export of mechanical and electronic products. Deficit in the trade of these products had been about 15 billion USD for a long time.

Second stage: both general and processing trade grew rapidly between 1991 and 1995, the average annual growth rate in the value of China's export of mechanical and electronic products was 32.8%. With the acceleration of international industry transfer, processing trade played a more and more important role in the export of mechanical and electronic products, the proportion of processing trade gradually accounted for over 50%. Deficit on the trade of mechanical and electronic products was around 20 billion USD.

Third stage: Supernormal growth was seen in processing trade between 1996 and 2008, the average annual growth rate of the value of China's export of mechanical and electronic products was 26.7%. Pro-

cessing trade, which increased rapidly, played the most important role in the export of mechanical and electronic products, and 70% of the increment in the export came from the processing trade. Mechanical and electronic product exports exceeded 200 billion USD in 2003, then it maintained an extraordinary growth with an annual increment of more than 100 billion USD, and in the end of 2012, the value of China's export of mechanical and electronic products rose to 1.96 trillion USD. At the same time, the trade surplus surged year by year, the surplus of trade in mechanical and electronic products increased to 284 billion USD in 2008, from13 billion USD deficit in 1996.

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At present these two systems still play an important role in the export of mechanical and electronic products, they are balanced, half a percent coming from general trade, and the rest from processing trade. But excluding the contribution of processing trade, China's export of electronic and mechanical products will probably rank No.5 in the world, according to the preliminary estimate, as the value of China's export of electronic and mechanical products would only be 305 billion USD in 2012, amounting to 38%, 44%, 55% and 91% of the export of electronic and mechanical products by Germany, the United States, Japan and South Korea, respectively.

Basis of the dual structure

In addition to the international market-based and historical opportunities, the unique dual structure of China's export of electromechanical products developed as a result of the proactive strategic choice of the Chinese government.

International market opportunities

International market opportunities include three major factors: comparative advantage, international industry transfer and two innovations in the United States.

Comparative advantage is one of the most important factors to determine the status of the international division of labour, thereby affecting the international trade pattern. China's comparative advantage lies in the low cost of factors such as labour, land, resources, and environment and so on, which determines the status of China in the international division of labour. General trade soars mainly in labour-intensive industries and processing trade mainly in labour-intensive processes.

Regarding the international industry transfer: starting from the late 1980's, the transfer of traditional labour-intensive industries such as the textile, clothing, furniture industries etc. began from *Four Asian Tigers* (South Korea, Singapore and Taiwan, China, Hong Kong, China) to China. In the late 1990's, the labour-intensive assembly within the IT industry began to be relocated to China from Japan, South Korea, Europe and America. China grasped the rare opportunity of international industry transfer, developed processing trade and achieved a large-scale export of mechanical and electronic products.

In the 1990s, the IT innovation in the United States spawned a large industry, and created a large demand for new products. In the first eight years of this century, financial innovation in the United States increased market demand. Both innovations promoted rapid growth in the U.S. economy, thus brought about a global economic boom, and created a good opportunity for a rapid growth in China's exports.

Strategic choice of the Chinese government

Since the reform and opening up, in order to mitigate the shortage of foreign exchange, stabilize employment and sustain economic growth, the Chinese government has always insisted on an export-oriented strategy, with primary focus on the encouragement of exports. This policy has been implemented for nearly 30 years. In the 21st century, the Chinese government has continued the policy of encouraging export as a result of the Asian financial crisis and the conversion of the Chinese economy from a shortage economy to a buyer market. Although the Chinese government proposed to alter the pattern of economic development 16 years ago, there has been no substantial change in China's trade, it remains focussed on the quantitative expansion, while structural reforms are only slowly adjusted.

The efficient utilization of FDI is an important condition to achieve rapid economic growth and an important part of the basic national policy of opening up, which should continue to be insisted on for a long time. According to the statistics of the Chinese Ministry of Commerce, FDI in the manufacturing sector accounted for 70% of the total FDI in China for a long time, but in 2010 this ratio decreased to 47%, with a total value of 106 billion USD. In 2012, due to the international financial crisis, FDI in China decreased by 3.7% year on year, while at the same time, the global FDI decreased by 18%. The enormous production capacity provided by FDI continues to expand the export capacity of the processing trade. At the same time, some Chinese local governments also competed in attracting foreign investors, and introduced unlimited taxation policies, ensured the lowest land prices and lowest-cost labour resources, which distorted the factory prices and to some extent exacerbated the export capacity expansion in the processing trade.

Structural differences in the dual structure

Differences in the basis

Most of the general trade is traditional inter-industry trade, established on the traditional theory of comparative advantage: a country imports a product it is in shortage of and exports its surplus.

Processing trade is a trade pattern based on intra-product trade. Through intra-product specialization the whole production can be divided into different efficient production stages, produced at different locations, increasing efficient resource collocation and capitalizing on the economies of scale. There are four preconditions to intra-product specialization. Firstly, the production process should be separable into different processes which can be produced at a different location. Secondly, the different processes need different inputs. Thirdly, different countries and regions should have different comparative advantages. Fourthly, the development of IT industry reduces distance and transaction costs. With the help of information technology, the benefits of process dispersion are higher than the costs of logistics and communication. China's processing trade is built on the comparative advantage of abundant low-end labour, and multinational corporations mainly

seek labour-intensive production and the assembly of simple parts in China. Despite the exports of processing trade, China has experienced a transition from traditional products to electromechanical and high-tech products, but China's position in the global supply chain has not changed substantially.

Differences in the participation of enterprises

Domestic enterprises transact more than 75% of general trade. While FDI enterprises transact more than 90% of the processing trade, basically the domestic enterprises had no direct access to the industrial chain. Tab.1 and Tab.2 show the ratios of different enterprises in general trade and in processing trade. It can be concluded that the export of general merchandise is mainly performed by China's domestically funded enterprises, while the export in processing trade is mainly carried out by foreign-funded enterprises.

Tab.1: Ratios of different enterprises in general trade, 2001–2012

Year	*State-owned (%)*	*Private-owned (%)*	*Domestic (%)*	*FDI (%)*
2001	65.6	3.0	75.1	24.1
2002	60.5	7.1	74.7	25.0
2003	54.2	11.9	73.1	26.9
2004	48.2	17.1	72.3	27.7
2005	43.7	21.5	71.8	28.2
2006	38.7	25.5	69.8	29.9
2007	35.5	28.1	68.8	30.9
2008	35.9	28.2	69.1	30.5
2009	31.3	31.8	67.8	31.9
2010	32.2	32.0	64.4	35.6
2011	33.7	31.8	65.5	34.5
2012	33.4	30.8	64.2	35.8

Tab.2: Ratios of different enterprises in processing trade, 2001–2012

Year	*State-owned (%)*	*Private-owned (%)*	*Domestic (%)*	*FDI (%)*
2001	23.6	0.3	26.7	73.3
2002	21.0	0.7	24.3	75.7
2003	15.6	2.3	20.4	79.6
2004	13.0	2.9	18.1	81.9
2005	11.0	3.2	16.3	83.7
2006	10.0	3.4	15.2	84.8
2007	9.9	4.0	15.5	84.3
2008	9.2	4.5	15.3	84.5
2009	9.2	5.1	15.7	84.1
2010	7.3	5.0	12.3	87.7
2011	6.3	5.0	11.3	88.7
2012	7.0	5.5	12.5	87.5

Differences in product structure

The majority of export in labour-intensive machinery and electronic products is transacted through general trade. More than 98% of power station construction, 92% of motorcycles, 89% of mobile communication base stations, 87% of machine tools, 86% of textile machinery, 85% of mechanical basic components, 80% of agricultural machinery, 78% of cars and 65% of crane and construction machinery, etc. are general trade exports.

The export of IT and other high-tech products is transacted through processing trade. Worldwide, 90% of notebook computers, 80% of digital cameras and 50% of mobile phones are exported in the framework of processing trade in China, which is leading the world's output, most of them belong to world-famous brands.

Differences in the target markets

The main export markets of general trade are developing countries. Export of electronic and mechanical products to developing countries are mainly completed in general trade. Such as 72% of to Africa, of

70% of Russia, 68% of India, and 50% of Latin America are exported in general trade.

The main export markets of processing trade are developed countries. The exports to developed countries of electromechanical products are mainly completed in processing trade: 87% are exported to Hong Kong, 77% to Japan, 72% to USA and 60% to the EU in processing trade.

Differences in production and marketing patterns

The enterprises engaged in general trade need to take the initiative to face the market and varying degrees of completion of the design, production and marketing in the industrial chain, and assume the risks posed by developing markets.

The enterprises engaged in processing trade only perform labour-intensive assembly and processing in the multinational global industry chain, while R&D, design, brand and marketing are controlled by the foreign parent companies, and most of them do not assume the risk involved in developing markets. Although the product structure of China's processing trade is upgrading from traditional to electromechanical and high-tech products, in the multinational supply chain (production and assembly) is still has a low-income status. As shown in Figure 1, Chinese processing trade is still at the bottom of the Smiley Curve, a parabolic curve-like smiling lip used to describe the added value of a particular industrial chain. The high added value parts are located at the ends of the curve, generally representing design and marketing; while the lower value-added part is in the middle, generally represented by product manufacturing, with the lowest point located at the bottom of the curve, generally represented by the assembly link. The rate of return on the two ends of the Smiley Curve is up to 20-25%, while the profit margin on the bottom of the Smiley Curve is only 5%. Therefore, the ratio of the added value in China's processing trade is always low, while at the same time, multinational companies control the upstream and downstream of the industrial chain, which benefit from added values that are often several, or even several hundred times higher than those in processing trade. For example, a pair of Nike shoes costs 100 USD at retail price in the U.S., its material cost is 15.67 USD, and the

ex-factory price in the Chinese processing trade is only 24.71 USD, including 2.58 USD direct labour costs, 4.56 USD management fees and only 1.9 USD factory profits. The wholesale price is 52.03 USD in the United States, the final retail price is 100 USD. We can draw the conclusion that the total value of R&D, brand and sales channels accounted for 70% of the global value chain of Nike shoes, value and income, and the value added of processing trade enterprises in China (including direct labour costs, administrative expenses and profits of factory) only accounted for 9%.

Differences in trade surplus

As shown in Tab. 3, over the long term a trade deficit or a slight surplus is made on mechanical and electronic products in general trade. Prior to 2004, every year was closed with a deficit: in 2001 the general trade deficit amounted to -21.4 billion USD, and in 2004 it was -19.6 billion USD. After 2005 a slight surplus was achieved and grew from10 billion USD to 20billion US, accounting for 10%-30% trade surplus on mechanical and electronic products.

A high amount of surplus was made on mechanical and electronic products in processing. Between 2001 and 2012, the surplus made on processing of mechanical and electronic products increased 8.1 times. Especially between 2001-2004, the surplus made on trade in mechanical and electronic products was very low, for example, in 2001 the surplus was only -2.4 billion USD, while in 2002, the surplus realised on the processing trade of mechanical and electronic products was 43 billion USD, with the trade surplus being 0.7 billion USD, the processing trade surplus 49.3 billion USD, and the general trade surplus -20.4 billion USD. The processing trade surplus accounted for more than 6770% of mechanical and electronic products trade surplus. These data allow the conclusion that China's the largest part of the trade surplus on mechanical and electronic products come from processing trade. As we know, processing trade is the result of the international industry transfer, so in fact, the processing trade surplus is a surplus on the international industry transfer, and most of China's trade surplus made on mechanical and electronic products come from international industry transfer.

At the same time, the surplus made by foreign-funded enterprises on mechanical and electronic products processing trade accounted for more than 70%. The top 50 enterprises in the processing trade between China and the US are mainly engaged in processing trade and foreign-funded enterprises specializing in OEM, which account for 48% of the surplus made on processing trade between China and the US.

Tab.3: Surplus made on general and processing trade in mechanical and electronic products, 2000–2012

Year	*General Trade Surplus*			*Processing General Trade Surplus*		
	Value (100 million USD)	*Growth Rate (%)*	*Proportion (%)*	*Value (100 million USD)*	*Growth Rate (%)*	*Proportion (%)*
2001	–213.9	57.0	–	429.6	18.0	–
2002	–203.7	–4.7	–	493.4	14.9	6770
2003	–291.6	43.1	–	710.0	43.9	4112
2004	–195.7	–32.9	–	982.1	38.3	481
2005	70.9	–136.2	9.4	1308.5	33.2	174.0
2006	247.1	248.6	20.5	1753.0	34.0	145.3
2007	526.0	112.9	25.9	2332.4	33.0	115.0
2008	890.6	69.3	31.2	2750.0	17.9	96.4
2009	279.1	–68.7	12.6	2424.7	–11.8	109.3
2010	330.9	18.6	12.1	3071.1	26.7	112.4
2011	582.5	76.0	17.5	3466.8	12.9	104.3
2012	462.4	–20.5	11.2	3800.5	9.7	106.8

Impact analysis of the dual structure

The “two trading patterns” should be different stages of development, but they co-exist in China and form a typical “dual structure”. The overall industry level gap between the “two trading patterns” is about 15 to 20 years, the general trade reflecting the actual, comparative level of China’s industries, and represents industrial complementation to other developing countries. As for processing trade, it only reflects the advantages of manufacturing and assembly capabilities in China, and forms

complementarily with the industrial chain links of the United States, Europe and other developed countries. The specialty of the dual structure should not result in many frictions, or cause widespread concerns, however, due to quality-related and after-sales problems in general trade, coupled with economic and political factors, China's impacts on the world trade have been overstated.

Imbalance between the final product and innovation capacity

In general, the technology transferred to the host country by multinationals is the applicability of technology, and the level of the transferred technology is equal to or slightly higher than the level of domestic technology of the host country. The knowledge absorption capacity of the host country determines the effect of knowledge transfer, and the absorption capacity of the host country is closely related to its R&D investment. A lot of research is done about the relationship between R&D investment, economic growth and production efficiency. For example, Grenada Ritz built an R&D productivity growth model according to the different measures of corporate, industry, economic development levels, based on the study of more than 1000 U.S. manufacturing firms, and drew the conclusions that R&D investment played an important role in the improvement of production efficiency and that the output elasticity was 0.07. In recent years, China's R&D investment has been growing rapidly. As shown in Table 4, China's R&D investment increased to 10 times between 2011 and 2000. The intensity of R&D investment is measured by the amount of R&D investment relative to GDP. In recent years, the intensity of China's R&D investment has also been growing rapidly: in 2011 invest it was 1.83%, from 0.25% in 2000, when China was in a backward position in the world. However, there is still a gap in the intensity of R&D investment between China and the developed countries, where the current R&D investment intensity is 2-3%. According to the statistics, in 2008 the R&D investment intensity was 2.79% in the U.S.; and in 2009 it was 3.33% in Japan and 2.78% in Germany. China's capacity of independent innovation is weak and the R&D investment is low, however, export products cover the underground (8500 m of drilling), ground (350 km of railway locomotives), sea (30-ton super cruise) and the air (30 006 one thousand

meters of the satellite). In the automotive industry, for example, the multinational companies' R&D investment ratio accounted for more than 5% of their sales revenues in 2010, and the R&D investment was more than 6 billion euros in Toyota and Volkswagen, while Chinese car manufacturers generally spend less than 1%, only about 0.6% on research and development. According to a survey of the Information Centre of the National Development and Reform Commission, in 2007, the annual amount spent on R&D investment by the top 500 car parts manufacturers in China was less than the amount invested by a single German company (Bosch). As regards processing trade, although many enterprises supply notebook computers, mobile phones and other high-tech products all over the world, they are satisfied with merely earning the assembly fees.

Tab.4: Data of Chinese R&D spending, 2000–2011

Year	*R&D investment (10 million RMB)*	*R&D investment intensity (%)*
2000	896	0.25
2001	1042	0.95
2002	1288	1.07
2003	1540	1.13
2004	1966	1.23
2005	2450	1.34
2006	3003	1.40
2007	3710	1.49
2008	4616	1.54
2009	5433	1.62
2010	7063	1.76
2011	8610	1.83

Imbalance between the market structure and marketing capacity

The average market share of Chinese mechanical and electronic products in 32 developed countries, such as the United States, Japan and EU increased from 7.1% in 2001 to 19.9% in 2011, while during the same period its market share in 37 developing countries, such as Mexico, India, and Brazil increased from 4.1% to 20.1%. There are

226 export markets around the world for China, but less than 5% of them are developed and have established marketing channels. The majority of general trade companies remain "workshops", "factories" or "import and export" companies, the ratio of "marketing type" enterprises is low, marketing networks are not established, there is no export market planning and after-sales service, they do not cultivate their own brands, the market share is decentralized, they mainly export to Africa, Latin America and other developing countries and regions.

At processing trade enterprises marketing is basically dominated by foreign parent companies, and the main export markets are America, Europe and other developed countries and regions.

Imbalance between trade surplus and the industrial strength

Foreign trade competitiveness is a result of industrial competitiveness. But in fact, there is a 15–20 years gap of the strength and level of mechanical and electronic industries between China and the developed countries. China would be unable to achieve such a large scale export and surplus without the international industry transfer, which increases the competitiveness of China's mechanical and electronic industry, and processing trade, which is based on the international industry transfer and accounted for 65% of the export of mechanical and electronic products. As a result, China achieved a huge trade surplus. According to the statistics compiled by the Chinese Administration of Foreign Exchange, between 1985 and 2012, China accumulated foreign exchange reserves in the amount of about 3.31 trillion USD.

Imbalance in the trade benefit between China and developed countries

There are two kinds of complementary mechanical and electronic industries between China and other countries. One is the complementary mechanical and electronic industry between China and other developing and developed countries, including export mainly by way of general trade. The other is the complementary industrial chain link between China and United States or Europe, including export mainly channelled through processing trades. In this relation, Chi-

na's comparative advantages are the low cost of product factors, while the comparative advantages of Europe and the United States are high technology, brand, marketing abilities etc. Although China and other countries have a strong industrial capacity, China only obtains little trade benefit. On the one hand, China's general trade export enterprises rely mainly on price competition, the industrial profit margin is less than 5%, lower profits are made on trade, but at the same time they provide inexpensive and high-quality goods to other countries. On the other hand, China has a huge trade surplus, but is not paid corresponding trade interests. China's huge trade surplus actually results from the international industry transfer, the surplus generated by FDI enterprises, but the real winners of the interests are multinational companies, industrial chain brand and technology providers. Export in Chinese processing trade provides a high number of low-priced quality products to the United States and Europe and reduces domestic inflation rate. If these goods are not produced in China, the United States and Europe must import them from other developing countries. If the processing trade was not made by China, it would be made by other developing countries. At the same time, the trade deficit of the United States will not be cut. According to statistics of the Chinese Ministry of Commerce, the wholesale price of an iPhone is 178.96 USD, of which Japan shares 34%, Germany 17%, South Korea 13%, and China gets only 3.6%, approximately 6.5 USD. However, due to the huge amount of processing trade surplus, China can withstand the enormous pressure on RMB appreciation, and has to face the pains of structural adjustment.

Conclusions

First of all, China's own strength of mechanical and electronic industry cannot achieve such a large-scale export, but China has implemented preferential processing trade and FDI policies to receive a large-scale international industry transfer, and developed a large-scale export capacity, which has led to rapid growth in China's export of electromechanical products.

Secondly, although China has achieved fast growth in exports, but gained less. China's huge trade surplus actually results from an interna-

tional industry transfer and the surplus generated by FDI enterprises, the real winners of the interests are multinational companies and the industrial chain brand and technology providers.

Finally, the "two trading patterns" have different structural characteristics and different sensitivities to the macroeconomic policy of export tax rebates, tariffs, exchange rate and FDI, and China should apply comprehensive policies for this dual structure. The general trade system should be based on fair competition in order to build and maintain a good environment conducive to technological innovation: strengthen IPR protection, increase investment in research, encourage enterprises to become a mainstay in technological innovation to create new advantages in technological innovation, shift industry from the comparative advantage of low cost labour to technological innovation.

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