A STUDY ON CHINA'S EXPORT COMMODITY STRUCTURE REFORM

By

Liu Yu

THESIS

Submitted to
School of Public Policy and Management, KDI
in partial fulfillment of the requirements
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ABSTRACT

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It has been widely acknowledged that, as an important stimulator of economic growth, foreign trade can enlarge a country's national wealth, provide access to scarce resources and gain access to worldwide markets. But the increasingly bigger wealth gap between the North and the South arises questions hereby: what products should be produced and thereby exported by one country? What determines the export commodity composite? By probing into the trade-related theories, while searching proof and evidence from the rapid economic developments of the NIEs, especially by evaluating the structural changes of Chinese export commodity in a historical perspective, a fact is found in this thesis, which is in accordance with what Kuznets (1966) and Chenery and Syrquin (1975) posited—in a growing economy the decline of the agricultural sector has generally been accompanied by strong expansion of the manufacturing and/or services sector. By experiencing a dynamic process of changing comparative advantage into competitive advantage, a rapid growth in the exports of manufacturing products as well as a change in the structure of manufacture exports shall be realized. Hence a rational and efficient export structure might be formed.

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INTRODUCTION

As early as more than one hundred years ago, John Stuart Mill indicated that, "The opening of a foreign trade…sometimes works a sort of industrial revolution in a country whose resources were previously underdeveloped." A latest research report *Trade, Growth, and Poverty* from Development Research Group of World Bank concluded that, "To open trade regimes lead to faster growth and poverty reduction in poor countries." While demonstrating *the East Asian Miracle*, the World Bank reiterated that the NIEs benefited considerably from the export-oriented policy, which was termed as "productivity-based catching up" established on the basis of continuously increased manufactured exports.

Looking back at the past three decades, the rapid economic growth in several Asian economies, especially in the NIEs, has led to rapid structural transformation, which conversely has had a direct bearing on their trade structure, especially of export commodities. Besides, if taking a historical perspective of China's trade structure reform, the process was characterized by a further decrease of agricultural exports while a continuous increase of manufactured exports. In what follows, we find that these economies have experienced a dynamic process of changing comparative advantage, which entailed a rapid growth in their exports of manufactured products as well as a change in the structure of manufactured exports.

CHAPTER ONE RELEVANT THEORIES ON COMMODITY STRUCTURE OF FOREIGN TRADE

What products should be produced in one country? What determines the export commodity composite?

Since the time of Adam Smith, economists have sought the answer in terms of international differences in costs of production and prices of different products. By probing into roots and branches of different kinds of theories, there are at least the following three models to answer the above questions, but from different perspectives.

The Ricardian[1] Model: Labor Productivity and Comparative Advantage

According to this model, international trade was solely due to international differences in the productivity of labor, trade between two countries could benefit both countries if each country exported the goods in which it had a comparative advantage. In this sense, specialization could produce profitable trade even among the most unequal trading partners.

From today's view, clearly there are a number of ways in which the Ricardian model makes misleading predictions. For example, this model predicts an extreme degree of specialization that does not exist in the real world. However, its two-principle implications—that productivity differences play an important role in international trade and that it is comparative rather than absolute advantage that

[1]David Ricardian was British economist who first developed a model of international trade based on the concept of comparative advantage.

matters—do seem to be supported by the evidence.

The Hecksher-Ohlin[2] Model: Factor Endowment Trade Theory

This model shows that comparative advantage is influenced by the interaction between nations' resources (the relative *abundance* of factors of production) and the technology of production (which influences the relative *intensity* with which different factors of production are used in the production of different goods). In this sense, countries tend to export goods that are intensive in the factors with which they are abundantly supplied. By postulating that all countries have access to the same technological possibilities for all commodities, the theory says that given different factor supplies, relative factor prices will differ. Thus, if a country possess certain cheap factor, such as labor, and make abundant use of it to produce commodities (e.g., primary products), that country will have a relative cost and price advantage over countries with relatively expensive labor. Therefore, the country should specialize labor-intensive products and export the surplus in return for imports of capital-intensive goods.

From this trade theory, we would expect that changing factor endowments would result in shifts in the structure of trade in the following manner: the product composition of exports would shift from a predominance of natural resource intensive exports to unskilled labor intensive exports, further to physical and human capital intensive exports, and then on to technology and knowledge intensive exports.

The North-South Models of Unequal Trade: Trade and Resource Growth

[2] Eli Hecksher and Bertil Ohlin were Swedish economists who modified and refined the Recardian model into an variable-proportions approach.

Noticing the different trade earnings arisen from different trade structures, hence the widening distance between the rich (the North) and the poor (the South) nations, North-South models of unequal trade got popular in recent decades. It demonstrates that the relative factor endowments and comparative costs are not given but are in a state of constant change. If a country locks itself into a stagnant situation that perpetuates its comparative advantage in unskilled and unproductive activities, this will in turn inhibit the domestic growth of needed capital, entrepreneurship, and technical skills, which is inimical to its long-run development aspiration. Static efficiency becomes dynamic inefficiency. It's in fact the very popular stories of most poor nations until present.

Since a cumulative process is set in motion in which trade exacerbates already unequal trading relationships, a vicious cycle is formed in present trade patterns: the rich and rapidly growing North has developed a cumulative competitive advantage on capital-intensive products over the poor and slowly-growing South. For the South, where is the way out of poverty?

Among all developing economies, the outstanding economic development of NIEs may point out a bright way for poor nations to succeed in transforming their economies through purposeful efforts from unproductive factors to highly efficient production. As Michael Porter recommends in his *Competitive Advantage of Nations*, "the central task facing developing countries is to escape from the straitjacket of factor-driven national advantage…where national resources, cheap labor, locational factors and other basic factor advantages provide a fragile and often fleeting ability to

export…[and are] vulnerable to exchanged rate and factor cost swings. Many of these industries are also not growing, as the resource intensity of advanced economies falls and demand becomes more sophisticated. Creation of advanced factors is perhaps the first priority."

In Porter's point of view, there exists a qualitative difference between basic factors (e.g. undeveloped physical resources and unskilled labor) and advanced factors of production (e.g. highly trained workers with specific skills, knowledge resources), hence resulting in different productivity and economic growth.

According to the post-neoclassical genre of Porter model, meanwhile along the sequence described by Hecksher-Ohlin factor endowment trade theory, the poor nations could develop their trade earnings by changing poor trade structure. But decades passed, progresses achieved by the developing countries in this respect were far from satisfactory. What inhibited their trade structure changes? Structuralism answers that their structural rigidity often inhibits their abilities to respond smoothly and frictionlessly to the requirements of neoclassical models.

Structuralist argues that, in theory, under the guidance of the changing dictates of world prices and markets, nations shall reallocate resources from one industry to another along its production possibility frontier to adjust their economic structures, but in practice, such reallocations are extremely difficult to achieve especially in developing nations due to their rigid production structures. For a country that relies heavily on a few primary exports, the whole economic and social infrastructure may

be geared to facilitate the movement of these exports. Over time, cumulative investments of capital may have been sunk into these economic and social infrastructure facilities, and they cannot be easily transferred to their manufacturing activities located elsewhere. Thus, the more nations depend on a few primary exports, the more inflexible their economic structure becomes, and the more vulnerable they are to the non-predictability of international markets. It may take many years to transform an underdeveloped economy from an almost exclusively primary-product, export-oriented reliance to a more diversified, multi-sector structure.

CHAPTER TWO EMPERICAL COMPARISON BETWEEN PRIMARY AND MANUFACTURED EXPORTS

By the criterion of factor endowments, the commodity structure of international trade can be simply and roughly divided into two categories: primary products and manufactured products. And each category, like a “ladder”, includes certain grades, usually by their processing degree and value-added. According to Standard International Trade Classification (SITC) of the United Nations, commodities are divided into 10 categories (box), where the first five categories are usually defined as primary products, and the last five as industrial manufactures. Owing to the special characteristics of crude oil, primary products are further divided into crude petroleum and non-fuel primary commodities.

Box: Standard International Trade Classification (SITC)

(By Section/Division)

0 Food and live animals

1 Beverages and tobacco

2 Crude materials, inedible, except fuels

3 Mineral fuels, lubricants and related materials

4 Animal and vegetable oils, fats and waxed

5 Chemicals and related products, nes

6 Manufactured goods classified chiefly by material

7 Machinery and transport equipment
8 Miscellaneous manufactured articles
9 Commodities and transactions not classed elsewhere in the SITC

Relative indexes from *WTO International Trade Statistics 2000* show that, the world merchandise trade expanded 5% in 1999, and “trade in manufactures rose 6%--significantly faster than trade in agricultural products.” By 1999, excluding unspecified products, which accounted for 3% of world merchandise trade, manufactures covered 76.5% of world merchandise exports, while primary products covered 21.1%, decreasing 6 percentage points from the year of 1990. Moreover, some economists estimate that by 2005, the proportion of manufactures in the world trade will further increase to 80%, while primary products decrease to 16% (Zhao Yumin, 1999). As for price index, latest statistics from *WTO annual report 2000* demonstrate that, among the three categories of products, the price developments of non-fuel primary commodities continuously keep the lowest.

Moreover, related statistics from World Bank tell that, the poor and developing countries are most usually the supplier of such low-value and poor-price commodities. For example, the developing countries supplied 91.6% of sugar, 98.3% of rubber, 92.1% of cacao, 74.7% of tin, and 63.8% of copper (*Commodity Trade and Price Trends of World Bank,* 1986). It is also widely acknowledged that the poorer and less developed a country is, the bigger proportion of primary products covers in its export structure. Such as Togo and Nigeria, who are still among the name list of the least

developed countries in the world, in the year of 1996, the percentage share of primary commodities is as high as over 90 in their exports, while 5% and 22% in Japan and the U.S respectively (Table II.1). Traditionally, owing to their poor productive forces, primary exports and low-value-added manufactures have accounted for a sizable proportion of GNP in each individual developing countries, especially those poorest. According to relative theories demonstrated in chapter one, even though these countries truly possess comparative advantage in the respect of exporting primary products, but this comparative advantage has evolved into an inefficient factor in their trade development.

It is as Michael P. Todaro describes in his *Economic Development*, "International trade has often played a crucial though not necessarily benign role in the historical development of the Third World." Further, as we have known, different structure of export commodity usually contributes to lots of differences.

Table II. 1 Export Earnings as a Percentage of GDP and Share of Primary and Manufactured Products in Total Exports for Selected Countries, 1996

Country	Percentage of GNP	Percentage Share of Primary Products	Percentage share of Manufactured products
USA	11	22	78
Japan	9	5	95
S. Korea	32	8	92
Philippines	42	16	84
India	12	26	74
China	18.5	14.5	85.5
Togo	31	94	6
Nigeria	38	92	8

Kenya	33	89	11

Source: World Bank, *1998 World Development Indicators*

I. Disadvantage of Primary products

Firstly, the demand for many primary products has decreased owing to the development of technological substitution for many traditional primary products. Over the past four decades, synthetic substitutes for such diverse commodities as rubber, wool, cotton, sisal, jute, hides, and skins have been manufactured in increasing quantities. The Third World's market shares of these natural products in all cases has fallen steadily. For example, between 1950 and 1980, the share of the natural rubber in total world rubber consumption fell from 62% to 28%, and cotton's share of total fiber consumption dropped from 41% to 29%.

Secondly, primary products have less added value, hence lower price compared with manufactures. Relevant statistics[3] show that the price of primary products have been declining most of the time, which is the natural result of the first disadvantage—less demand.

Historically, the markets and prices for primary products were often unstable and vulnerable. For example, recent empirical studies assert that in the 17years between 1977 and 1994, the prices of non-oil primary commodities relative to those of exported manufactures declined by almost 60% [4]. As a result, the developing countries had to sell greater quantities of their primary products in order to purchase a given quantity of manufactured imports, and finally the merchandise trade balances of

[3] See *WTO Annual Report 2001*, p9, Chart II.2 Price Developments in International Trade, 1990-2000.
[4] See *Economic Development*, P466, Michael P. Todaro.

the developing countries steadily worsened during the 1980s and early 1990s, falling from +$55.8 billion in 1981 to -$42.3 billion in 1993 (constant dollars, taken 1985=100). Sources from WTO 1999 Reports says that the annual average prices of non-fuel commodities fell to a ten-year low. Primary products, other than fuels, on average experienced price decline in 1999. In 2000, the poor performance of primary products achieved little improvement.

Thirdly, the high tariff and non-tariff barriers to primary and low-cost manufactured products have artificially reduced the exports of such products from developing countries. On the excuse of “unfair” foreign competition and destroying their relative industries, the developed countries have been trying to restrict the entry of low-cost goods into their home markets by tariff and non-tariff barriers, hence further inhibiting the developing countries’ capacities to produce low-cost, labor-intensive manufactured goods for export in industries such as textiles, shoes, sporting goods, handbags, processed foodstuffs etc. The World Bank has estimated that such trade restrictions cost $75 billion of the least developed countries annually, namely, 3% of their GNP. For textiles and clothing alone, phasing out the North’s Multi-fiber Arrangement (MFA) could increase the South’s exports by $24 billion a year.

Technological substitution, export earnings instability, together with the rise of protectionism in the markets of the developed countries, have refuted point by point to the theoretical dictates of comparative advantage, which has been proved to be probably a risky and often unrewarding venture for many developing countries.

In fact, as early as 1960s, two famous development economists Prebisch and Singer had argued that, there was and would continue to be a secular decline in the terms of trade of primary-commodity exporters due to a combination of low income and price elasticity of demand. Very pessimistically, it proves to be true until today.

II. Advantage of Manufactured Products

On the contrary, compared with primary products, the manufactured products have revealed great vitality owing to their higher added value hence more stable and favorable price and market. Their advantage is widely recognized in comparison to the vulnerability of primary products.

Especially in a developing economy, manufactured exports are valued for helping improve the stability of export earnings and the terms of trade. Generally, both income elasticity and price elasticity of global demand are presumed higher for manufactures than for traditional primary exports. Just as World Bank ever stated that, "Manufactured exports accelerated the acquisition and mastery of international best-practice technologies in highly imperfect international technology markets."[5] Moreover, associated with exports of manufactures, there are dynamic growth-generating effects like learning effects, the realization of scale economies and the creation of positive externalities. For example, in recent ten years, the shares of manufactures in China's exports have been rising outstandingly. On one hand, encouraged by greater foreign earnings from manufactured exports, more and more firms join in the line to export higher value-added manufactures, more importantly,

[5] See The East Asian Miracle, p261, World Bank.

under competitive environment, firms have great incentives to learn advanced managing and marketing experiences from each other to strengthen their own competitive capabilities. On the other hand, the booming exported manufactures have given impetus to production in upstream and downstream industries, and finally realized economies of scale of related industries. Besides, it's believed that the earnings from manufactured exports are *per se* more amenable to stable economic growth than those from exports of primary products. Econometric evidence has proved that exports of manufactures also have short-and medium-term macroeconomic attributes.

The World Bank report concluded in *the East Asian Miracle*, "exports of manufactures and human capital development interacted to provide a particularly rapid phase of productivity-based catching up", exports of manufactures also enable a developing economy to move closer to international best practices[6] as well as raise total factor productivity (TFP). The relationship between high TFP growth and exports of manufactures may well be the result of exporters' role in helping economies adopt and master international best-practice technologies. High levels of labor force cognitive skills permit better firm level adoption, adaptation, and mastery of technology.

III. Proof and Evidence

Given above theories and statistics, many developing countries have been trying to achieve rapid economic growth through changing the composition of their exports,

[6]Note: generally speaking, it represents all most advanced practices of the present world, such as knowledge-based economy, high proportion of technology-intensive exports in trade structure.

in a way of which Kuznets (1966), Chenery and Syrquin (1975) posited—in a growing economy the decline of the agricultural sector has generally been accompanied by strong expansion of the manufacturing and/or services sector. Transforming economic structure has had a direct bearing on the trade structure of the economy. And the outstanding performance of Mexico in 1999 among Latin American countries may give us some enlightenment.

WTO annual report of 1999 observed that, as in 1998, there was a striking difference in output and trade growth between Mexico and all the other Latin American countries combined. While Mexico's merchandise exports and imports rose over the last two years by more than 20%, other Latin American countries combined reported a fall in exports of nearly 8% and in imports of nearly 15%. "A large part of the divergent performance can be contributed to differences in the export structure", WTO report concluded (p12). Manufactured goods accounted for 85% of Mexico's exports, but only 40% for Latin America excluding Mexico. Manufactures enjoyed more stable prices than non-fuel commodities.

Moreover, the economic miracle of the NIEs supplies more persuasive proof to this finding.

According to relevant empirical studies, there is a parallel between the process of the economic development of the NIEs and the process of their changing composition of productive factors. Then structural transformation of export commodities followed.

As stated in Table II.2, over the 1970-1995 period, the proportion of agricultural sector in their economies fell steadily from 17 percent to 4 percent. By the mid 1990s,

the agricultural sector in the NIEs was reduced to the smallest in Asia. In the mean time, share of manufactures in GDP in the NIEs rose from 25% in 1970 to 30% in 1990. And then, as described by the sequence of Hecksher-Ohlin trade theory[7], the share of manufactures began to decline while services rose rapidly. In 1995, services were the largest sector, accounting for 59% of their GDP.

Table II.2 Changing Structure of Production of the NIEs, 1970-1995

(Percent of GDP)

Year	Agriculture	Industry	Manufacturing	Services
1970	17	33	25	51
1980	9	40	34	51
1990	6	41	30	53
1991	5	41	29	54
1994	4	37	26	59
1995	4	37	25	59

Source: World Bank, *World Development Report Vols. 1982, 1992, 1993, 1994, 1996 and 1997.*

In turn, the structural changes of production ushered in transformation of the trading pattern. From Table II.3, exports of manufactures had been rising as a main proportion of total exports in the NIEs. From 1975 to 1996, they rose from 69.7% to almost 90%. Hong Kong and Taiwan had over 94% of their exports falling in the category of manufacturing products in 1996.

Table II.3 Exports of Manufactures as Percentage of

Total Exports in the NIEs, 1975-1996

[7] See relevant explanation about Hecksher-Ohlin model in Chapter One.

Economies	1975	1980	1990	1996
NIEs	69.7	78.2	88.6	89.6
Hong Kong	74.3	96.0	94.9	94.2
S. Korea	81.6	90.2	93.8	89.4
Singapore	41.8	44.7	72.3	84.7
Taiwan	81.3	88.2	93.5	94.2

Source: Asian Development Bank, *Key Indicators of Developing Asian and pacific Countries 1993 and 1997.*

Moreover, an index developed by the United Nations Industrial Development Organization (UNIDO) measured some structural changes of the NIEs during the period of 1970 to 1995. By observing historical changes in the value-added share of 16 individual sectors in total value-added of the industrial sector, it is a good measure of the rapidity of structural change over the period during which exports expanded in the NIEs. It is a measure of the degree of correlation between the value added shares in certain period. If the correlation is high, then there is little structural change, and the index is low. Vice versa. By examining the following table, we can find the expected relationship between high rates of structural change within the manufacturing sector for the NIEs. There are quinquenniums of significant structural change in 1975-80,1985-90, which are in coincidence with the relatively more rapid economic achievements. What the index values establish is that the NIEs have constantly undergone structural transformation, and their manufacturing sector has constantly remained in a state of flux. Meanwhile, the average growth of manufacturing value-added in the NIEs has recorded a massive increase from an annual average of $34303 million for the 1970-75 to $2085709 million for the

1990-95. Little wonder, these economies are presently on the verge of being classified as industrial economies.

Table II.4 The UNIDO Index of Structural Change of the NIEs

	NIEs	Hong Kong	S. Korea	Singapore	Taiwan
I. Index of Structural Change (5-year average in degrees)					
1970-75	7.26	12.54	16.77	20.33	17.78
1975-80	11.40	12.60	14.85	14.17	11.97
1980-85	7.46	6.64	14.74	20.00	6.41
1985-90	13.57	13.39	14.43	28.86	14.70
1990-95	7.66	19.67	8.64	6.81	9.77
II. Manufacturing Value Added (5-year averages, $million)					
1970-75	34303	4775	12419	2431	14678
1975-80	59167	8366	25885	4267	20650
1980-85	86862	10664	39267	6332	30598
1985-90	142900	11976	73273	9395	14083
1990-95	208579	9989	125661	14083	58846

Source: UNIDO data tapes.

As for further transformations in the structure of manufacturing sector, there is some empirical support for hypothesizing the effects of changing factor endowments on export structure, which is in accordance with the changes in comparative advantage of an economy in a Heckscher-Ohlin sense. The NIEs' road to industrialization and export success started with labor-intensive, low-technology manufactures, but with rising investment in both physical and human capital, labor costs increased with the accumulation of skills. The NIEs gradually lost their comparative advantage on the exports of labor-intensive products, especially within

categories of unskilled-labor-intensive exports. Along with their comparative advantage evolving into technology-, capital-, or skilled labor-intensive products, their structure of manufactured exports got transformed into a more advanced one.

CHAPTER THREE RETROSPECTION AND EVALUATION OF CHINA'S EXPORT COMMODITY STRUCTURE

Since 1978, keeping pace with China's economic reform and opening-up policy, the foreign trade has been actively promoted as a growth strategy, emulating other successful East Asian economies, mainly the NIEs. During the 9th Five-Year Plan Period (1996-2000), the average growth rate of merchandise exports was 10.9%, and that of merchandise imports was 11.3%. Both of the figures were bigger than the annual growth rate of the country's GDP and the annual growth rate of world trade during the same period. As a result, China's ranking in the world merchandise trade rose from the 22th in 1981 to the 7th in 2000.

This rapid growth in foreign trade was accompanied by substantial changes in its commodity composition and direction. Exports moved significantly from natural resources to labor-intensive manufactures, better reflecting China's comparative advantage. Presently, Chinese government has strengthened its strategy of "invigorating trade with science and technology", which aims to upgrade the composition and structure of export commodity through technological innovation, henceforth further improve the competitive ability of Chinese exports in the world market, and finally build China into a powerful trading country.

I. Historical Changes of China's Export Commodity Structure in Decades

In retrospect, since the foundation of the People's Republic of China in 1949, the commodity structure of China's exports roughly went through four periods in more

than 50 years.

i. Period of Recovery and Construction (1950s-1960s)

At the beginning of state foundation, primary products accounted for over 80% in China's exports, among which cereals & foodstuff covered nearly a half, livestock products made up almost one third, and mineral products held a share of 10% or so. This export structure was in fact a mirror of China's backwardness as a poor agricultural economy at the time.

In 1953, China began its first Five-Year Plan aiming to boom industrial production and construction. By the end of 1950s, through ten years' efforts, the proportion between agriculture and industry in GDP was successfully adjusted to four to six instead of previous six to four. Along with it, China's export structure experienced great changes. The share of primary products declined to 60%, while industrial manufactures increased to 40%. Nevertheless, a large amount of farming and native produce, such as rice, soybean, bristles, casing for sausages, tea, still occupied leading position in the exports. This composition lagged far behind the level of developed countries and it could not satisfy Chinese own needs for economic development.

Under this circumstances, from the beginning of 1960s, Chinese government put forward a policy called "Three concurrent development". The main content was that: firstly, to export raw material products, semi-products and finished products simultaneously; secondly, to export staple products and instable but new products simultaneously; thirdly, to devote major efforts to develop labor-intensive textiles in

line with the vigorous efforts of developing manufactured exports. Propelled by this policy, the textile industry achieved rapid progress, successively, the exports of textiles gained rapid increase. Only a few years later, textiles enjoyed a share of around 30% in the whole exports, which contributed a lot to the obvious improvement of export structure.

ii. Period of Booming Oil Exports (1970s-1985)

In the whole period of 1970s, the most important change of China's export structure was the rapidly increasing share of oil. In fact, China did not begin to export oil until 1973. But from then on, oil export boomed vigorously and registered a share of around 20% by the end of 1970s, mainly to Japanese market. In the first half of 1980s, with the world oil price tripled to more than $30 per barrel, a great opportunity headed on. China increased its oil export. By 1985, oil ranked first among all export commodities and accounted for 26% in the whole exports.

Categorized as one kind of primary products, the increasing exports of oil compensated for a large part of the decreasing shares of other primary products. Thus, by 1985, primary products still held a share of 50% in China's export structure.

Nevertheless, in the 6th Five-Year Plan period, China's exports registered an average increase of less than 10%, much slower than that of 20% in previous two plan periods.

iii. Period of realizing "the First Transformation" (1985-1990)

Countering the problem of slow development, Chinese government advocated a policy of "two transformations" and started a campaign. "Two transformations" meant

to upgrade the components of China's exports by the following two steps: the first step is to transform primary products into manufactured products; the second step is to transform low-value-added and roughly-processed goods to high-value-added and finely-manufactured goods.

To fulfill these two steps, Chinese government took series of measures to upgrade its trade structure, finally enlarging the amount of total exports. For example, in 1985, most of export commodities were exempted from customs duties, and tax rebate policy was adopted step by step. In October of that year, the state council made a strategic move, which was to propose to enlarge the export of mechanical and electrical products because of their relatively high earnings of foreign currency. From then on, mechanical and electrical products, farming and sideline products, textiles were regarded as three antagonists confronting each other in China's exports.

In 1986, the state council again drew up a plan to establish a whole set of production bases for promoting the exports of above three products. Within this system, the main part was to build a number of production bases and factories designated particularly for export. Meanwhile, physical logistics such as transportation, scientific research, and follow-up services was also established to link up each part to the whole system. The main purpose of establishing this system was to stabilize the supplies for export, to cultivate famous brand and to prioritize export commodities.

From then on, China's manufactured exports gained rapid increase and totally reversed the original situation of manufactured goods developing more slowly than

the primary products in the past decades. During the whole 7th Five-Year Plan period, the export of manufactures achieved an average increase of 27.8% with an outstanding share of 70%, while primary products just recorded a 2.9% increase annually.

By this time, “the first transformation” was basically fulfilled.

iv. Period of realizing “the Second Transformation” (1991-present)

Stepping into the 1990s, Chinese government deepened the procedure of economic reform and strengthened the opening-up policy. With huge amount of foreign investment began to pour into China, Chinese government began its second step of foreign trade reform, which was to direct exporting from “quantity increase” to “quality increase”. Strategies, such as “to win victory through quality superiority” and “to boom foreign trade with science and technology”, were given wide publicity, and series of favorable measures were directed to “qualitative improvement”. For example, relevant government regulations stipulate that exporters of famous quality products have priority to take part in Guangzhou business fair[8]and get loans at a favorable rate from state administrative banks. With regard to high and new technology products, Chinese government supply favorable conditions especially in the respect of taxation. In a sense, this symbolized the efforts of Chinese government to guide its trade structure to a direction of containing high value-added and technology-intensive commodities.

In the 8th Five-Year Plan period, the exports of industrial manufactures increased

[8] Till now, it is the biggest and most influential business fair in China. Due to the limit of exhibition room, enterprises have to get requisite qualification to take part in the fair.

22.3% annually, and the proportion changed to 82.4%. In the 9th Five-Year, this proportion was further increased to 88.5%, which was not only higher than the world average level, but even higher than that of some developed countries.

Moreover, it's very important to mention hereby that, with "quality improvement", specific components of manufactures changed dramatically in 1990s. By the following table III.1, we can find that in recent ten years, the labor-intensive products kept steady increase, while technology-intensive and capital-intensive products showed accelerating increase in exports. By further analysis, another finding was that in 1994, the proportion of labor-intensive exports reached their historical record high of 60.4%, and then, they began to fall. Hereafter, the tendency of "two high and two low" appeared in China's exports. Namely, the increasing shares of technology-intensive and capital-intensive products kept pace with the decreasing shares of primary and labor-intensive products. This tendency symbolized the adjustment direction of China's export structure.

Table III.1 Composition Changes of Chinese Export Commodities since 1980s (Unit of value: $100 million)

Year	Value of exports	Shares of primary Products (%)	Shares of manufactures (%)		
			Labor-intensive	Capital-intensive	Tech.-intensive
1981	220.1	46.57	41.47	3.99	7.97
1982	223.2	45.03	42.04	5.15	7.78
1983	222.3	43.23	43.59	4.54	8.65
1984	261.4	45.60	42.06	4.18	8.15
1985	273.5	50.49	39.08	2.74	7.69
1986	309.4	36.43	50.45	3.07	10.05

1987	394.2	33.52	52.45	3.18	10.85
1988	475.2	30.28	53.54	4.02	12.16
1989	525.4	28.70	53.73	4.76	12.81
1990	620.9	25.59	54.36	5.66	14.40
1991	719.1	22.54	57.25	6.35	13.85
1992	849.4	20.01	59.30	7.21	13.48
1993	917.4	18.18	60.13	7.38	14.31
1994	1210.1	16.29	60.44	7.65	15.62
1995	1487.7	14.44	58.34	9.48	17.74
1996	1510.7	14.52	56.22	11.10	18.16
1997	1827.0	13.10	57.38	11.54	17.98
1998	1837.6	11.21	55.84	13.73	19.22
1999	1949.3	10.22	54.27	14.32	21.18

Source: Statistics from China's General Office of Customs

II. Analysis and Evaluation of China's Comparative Advantage

Presently, the common method used by Chinese economists to analyze the competitive or comparative advantage of exports is by their TCI (trade competitiveness of industries) or RCA (revealed comparative advantage) indexes. Meanwhile, some other indexes, such as productivity, labor cost, price index, and shares in the world market, are also taken into consideration. In the view of traditional macro-economists, the arguments of competitiveness fundamentally are the questions of price and cost, and essential factors that affect cost include resources, labor, capital and technology. Nowadays, with the popularity of knowledge-based economy, knowledge has somewhat substituted capital and become the first productive factor.

From the view of traditional economics, the degree of factor endowments in one

country fundamentally determines its competitive ability. Therefore, based on the analysis of Chinese TCI or RCA indexes of factor endowments hence its comprehensive competitiveness in the world, by comparing relative indexes with powerful trading countries and China's principle competitors in Asia, this division will evaluate the competitive advantage of Chinese staple export commodities in the international market.

i. Factual Situation of China's Factor Endowments

Table III.2 Discrepancy of Factor Endowments for selected countries, 1995

	USA	Canada	E.C	Japan	S.Korea	Singapore	S.Asia	China
I. Shares in world factor endowments (%)								
Land	12.7	3.1	5.9	0.3	0.1	0.5	13.9	6.5
Agricultural labor	0.3	0.0	0.7	0.3	0.2	0.1	24.8	40.0
Unskilled labor	7.9	0.9	10.4	4.5	1.4	0.6	15.9	13.7
Skilled labor	14.5	1.8	15.6	3.6	0.8	0.5	8.1	17.5
Capital	19.3	1.7	30.7	22.7	1.5	0.6	1.2	2.0
II. Structure of labor (%)								
Agricultural labor	2.7	2.5	5.2	5.5	13.5	19.1	60.8	71.3
Unskilled labor	66.7	64.1	68.9	78.6	76.0	64.9	34.8	21.7
Skilled labor	30.7	33.5	25.9	15.9	10.5	16.0	4.4	7.0
III. Density of capital/land								
Capital/labor ($1000/ person)	115.6	88.6	144.2	281.9	56.5	48.1	1.8	2.2
Land/labor (hectare/person)	1.4	2.9	0.5	0.1	0.1	0.8	0.4	0.1
IV. Relative prices of factors (r=rate of repayment)								
r.of capital/wages	0.47	0.79	0.34	0.25	1.65	2.86	39.66	49.69

r. of land/wages	0.47	0.22	0.91	12.13	109.90	10.00	64.99	102.88
Capital/r. of land	1.01	3.54	0.37	0.02	0.02	0.29	0.61	0.48

Source: Research Reports on China's Entering WTO: *Chinese Industries under WTO*

(Edited by Yu Yongding, Zheng Bingwen)

From above tables, we can observe that among all selected countries, China can be called congenital deficiency in the aspect of factor endowments. According to statistics of 1998 from the State Statistical Bureau of China, as compared to the figure of world average level, the per capita area of Chinese cultivated farmland just equals to that of 7%, while water and forest resources are 25% and 50% respectively. China is in a very severe stage of shortage in energy resources regarding reserves of oil and natural gas sharing only 2% of world proportion.

On the other hand, although China has the largest population among all countries, its labor structure is by no means satisfactory. Agricultural labor possesses a too big share, while skilled labor is in great shortage. Nay more, among all selected countries, the density of capital and land of China is almost the lowest, but the relevant price is nearly the highest. These discrepancies have caused differential competitive abilities among countries, which conversely deeply affect the competitiveness of specific export commodities. For example, the shortage of land resource in Japan, China and South Korea has caused low competitiveness of their agricultural products, and the shortage of skilled labors in China and South Asia affects the competitiveness of their manufactured exports.

Obviously, in the present period, there is little direct competition between China and other developed countries, such as the U.S and the E.U, but complementary

trading between them. Owing to the similar situation of factor endowments, other Asian developing countries have become China's strong competitors in the fields of exporting labor-intensive products and attracting foreign investment,

ii. Comparative Advantage of Chinese Export Commodities

Firstly, by TCI indexes.

Indexes of trade competitiveness of industries are generally expressed as

$$TCI=(Ex-Im)/(Ex+Im)$$

Where *Ex* and *Im* indicate the amount of exports and imports of certain industry in one country during a certain period (usually a year).

In some degree, this index represents the competitive capability of certain industry of one country in foreign trade. If one country has big amount of imports but small amount of exports in certain industry, it demonstrates that this industry is import-oriented, and its TCI tends to be –1 which represents weak competitiveness. If the imports and exports is almost equal, namely, TCI tends to be 0, this industry is trade-balanced with certain degree of competitiveness but not strong. If exports is much bigger than imports, this industry is export-oriented with strong competitiveness in foreign trade, and its TCI tends to be 1. In this sense, we may conclude that "bigger TCI index means stronger competitiveness of this industry in foreign trade."

Table III.3 gives historical changes of TCI indexes of Chinese commodities in three industries.

Table III.3 TCI Indexes of Chinese Export Commodities, 1980-2000

Year	Primary products	Machinery	Other manufactures

1980	0.134	-0.717	0.014
1981	0.120	-0.687	0.137
1982	0.137	-0.435	0.132
1983	0.247	-0.355	-0.009
1984	0.329	-0.381	-0.080
1985	0.447	-0.909	-0.238
1986	0.332	-0.878	-0.049
1987	0.314	-0.787	0.060
1988	0.177	-0.716	0.031
1989	0.124	-0.649	0.070
1990	0.234	-0.421	0.207
1991	0.197	-0.465	0.186
1992	0.125	-0.406	0.206
1993	0.080	-0.493	0.144
1994	0.090	-0.403	0.250
1995	-0.021	-0.252	0.271
1996	-0.070	-0.210	0.230
1997	-0.090	-0.090	0.310
1998	-0.050	-0.060	0.300
1999	-0.148	-0.086	0.252
2000	-0.295	-0.053	0.240

Source: counted by statistics from the General Office of Customs, P.R.China.

The above table shows that since the middle of 1980s, the TCI index of primary products began to decrease continuously, and became negative in 1995. Until the year of 2000, the negative figure tended to be bigger, showing that Chinese primary products didn’t have competitive ability on the whole. Meanwhile, on the other hand, the indexes of machinery recorded a tendency of continuous rise, demonstrating that

the competitiveness of machinery exports was gradually increasing. As for other manufactures, the indexes had been rising steadily from the year of 1985, meaning that this category has had certain degree of competitive ability.

Secondly, by RCA indexes.

Revealed comparative advantage index is defined as the ratio of exports in a given category to total exports of that country divided by the same ratio for the world economy. Simply, it is expressed as

$$RCA=(Ci/Wi)/(Ct/Wt)$$

Here *Ci* and *Wi* mean exports of category i in country A and in the world respectively, *Ct* and *Wt* mean total exports of country A and of the world.

To some extent, this indicator reflects the degree of international competitiveness of certain commodities. Usually , bigger RCA index represents stronger competitive ability of this commodity in the world.

Table III.4 RCA Indexes for selected countries, 1998

Country	Agricultural products	food	Chemicals	Office machinery/ Telecom equipment	Machinery/ Transport equipment	textiles	clothing
USA	0.75	0.98	1.10	1.33	1.31	0.48	0.39
Germany	0.54	0.56	1.38	0.50	1.27	0.88	0.43
Japan	--	--	0.75	1.25	1.72	0.56	--
H.K.	--	--	0.40	1.20	0.60	1.80	10.80
S. Korea	--	--	0.83	1.96	1.25	3.13	1.08
Singapore	--	--	--	4.50	1.67	0.11	0.20
India	--	--	--	--	--	5.50	4.00
Thailand	1.62	2.10	--	2.14	1.03	1.20	2.00

Mexico	--	--	--	1.45	1.41	0.61	1.68
China	0.58	0.79	0.62	1.09	0.68	2.50	4.91

Source: counted by the statistics from *International Trade Statistics 1999 of WTO*

On table III.4, only three RCA indexes of Chinese commodities, office machines and telecom equipment, textiles, clothing, are more than 1, while all the others are less than one. This phenomenon demonstrates that most of Chinese export commodities are in an inferior position in the competition of world markets. Till recently, compared with other Asian developing countries, China's superiority only concentrates on textiles and clothing.

Thirdly, by labor cost.

For a quite long time, owning to the relative competitive advantage of China focusing mainly on its low labor cost, the exports of resource- and labor-intensive products had been posited a leading position. But in recent years, the developed countries have been continuously improving their productivity through their superiority on technologies, which partly offset the previous superiority of lower labor cost in developing countries. Relative statistics show that, during past ten years, the developed countries' proportion of labor cost in unit production did not rise, but conversely showed a great decrease in the fields of capital- and technology-intensive industries, such as iron & steel, machine, transportation etc. Nevertheless, in the mean time, Chinese labor cost kept rising gradually. For example, during 1980-1996, the average annual increase of Chinese labor cost in textile industry was 5.4%, higher than some developed countries, such as the U.S. (4.2%), Germany (4.9%), also higher

than some Asian strong competitors, such as India (-0.6%), Pakistan (1.6%), Indonesia (4.2%). Hence, a conclusion might be achieved that China is losing its superiority on low labor cost in recent years (Zhao Yumin, 1999).

Fourthly, by trade ranking and market shares.

During 1991-2000, Chinese exports gained an annual increase of 15%. In 2000, the amount of Chinese exports ranked the 7th in the world, sharing 3.9% of proportion in world exports. Sources from WTO demonstrate that in 1999, all commodity exports of Chinese main industries ranked before 15th in world markets. Nay more, compared to the achievements of last year, except a slight decrease of the share of clothing, the whole situation of all other commodities got improved. Till the year of 1999, China was the biggest exporter of textiles and clothing in world markets.

Table III.5 15 biggest Exporters of main commodities, 1999

Rank	Agricultural Products	Manufactures	Machinery and Transport equip.	Office machines/ Telecom equip.	Textiles	Clothing
1	USA	USA	USA	USA	**China**	**China**
2	France	Germany	Japan	Japan	H. K	H.K
3	Holland	Japan	Germany	Singapore	Germany	Italy
4	Canada	France	France	Taiwan	Italy	USA
5	Germany	U.K	U.K	Malaysia	S. Korea	Mexico
6	Bel.-Lux.	Italy	Canada	U.K	Taiwan	Germany
7	U.K.	**China**	Italy	S. Korea	USA	Turkey
8	Spain	H.K	S. Korea	H.K	France	France
9	Italy	Canada	Mexico	Germany	Japan	S. Korea
10	Brazil	Bel-Lux.	Singapore	Holland	Bel-Lux.	U.K
11	Australia	S. Korea	Taiwan	**China**	U.K	Indonesia

12	**China**	Holland	H.K	Franc	Pakistan	Bel-Lex.
13	Argentina	Taiwan	Holland	Mexico	Holland	Thailand
14	Denmark	Mexico	**China**	Philippine	Turkey	Portugal
15	Thailand	Singapore	Malaysia	Ireland	Spain	Taiwan

Source: WTO, *International Trade Statistics 2000*

Table III.6 Changes of China's Shares of Main Exports in World Markets (%), 1990-1999

Year	Agricultural Products	Manufactures	Machinery and Transport equip.	Office machines/ Telecom equip.	Textiles	Clothing
1990	2.43	1.85	0.89	--	6.92	8.95
1996	2.52	3.36	1.76	2.72	8.02	15.25
1997	2.67	3.91	2.05	3.09	8.77	17.45
1998	2.55	3.96	2.30	3.63	8.47	16.39
1999	2.61	4.11	2.56	3.92	8.82	16.17

Source: WTO, *International Trade Statistics 2000*

From above analysis, findings are as follows: at least in recent years, because China's comparative advantage only focus on labor resource, while resources of agriculture, mineral, capital, and technology are in an obviously inferior position, henceforth, Chinese labor-intensive commodities are able to occupy powerful and competitive position in the world market, such as in the fields of textiles and clothing. Relatively, Chinese commodities show inferior competitiveness on such aspects as agricultural and chemical products, machinery and transport equipment, knowledge-based and technology-intensive products. But it is worth of paying

attention that some of Chinese traditional industries and products are losing their former competitive advantage due to China's low productivity and rising labor cost in recent years. For example, the market shares of Chinese clothing have been shrinking continuously in recent three years.

As we have analyzed in *Chapter Two*, not all manufactures might necessarily play a benign role in export activities, and the proportion of manufactures in one country's exports is not necessarily equal to a reasonable structure of export commodity. At present, the export proportion of Chinese industrial manufactures has exceeded the average level of world trade, even higher than that of some developed countries, but most of them are labor-intensive products with low-level machining and low-added-value. The development of Chinese exports mainly depends on quantity increase not quality increase. According to relative statistics, the proportion of capital and technology-intensive products in China's exports is less than 40%, which is much lower than that of developed countries, which generally is over 70%. This proportion is also lower than that of NIEs, which has been over 50% by now. Generally speaking, till now, China can only be called a big trading country, but by no means a strong one. There is still a long way to go for China to upgrade and strengthen the competitive capability of its exports, hence its trading power in the world market.

CHAPTER FOUR SUGGESTIONS ON CHINA'S EXPORT COMMODITY STRUCTURE REFORM

With the speed up of globalization and IT revolution (information & technology), the developing countries have gradually found that their former development models, which were mainly characterized by depending heavily on their comparative advantage of low labor cost hence taking labor-intensive products as principle exports, lagging behind the world development level and requirements. They are in urgent need to explore a new development model to improve and transform their position in the world economy.

From the analysis in chapter three, it is clear that being a country that owns the most population in the world but meanwhile falls into relative shortage of physical capital, land, and technology resources, Chinese comparative also competitive advantage presently still focus on its low labor cost. China has become a big trading country in the aspect of exporting labor-intensive products, and this tendency will continue at least in the next five years (Wang Zixian, 2000). Based on this situation, China's trade structure has long been characterized by holding labor-intensive products as principle exports. This fact shall play an important role in drawing up China's economic development strategy, which conversely determines its trade structure of export commodity.

But on the other hand, like primary products, labor-intensive products will be put under bigger pressure due to the low income and price elasticity of demand, together with the rising protectionism from developed countries. The continuously declining increase rate of Chinese labor-intensive exports since the second half of 1990s is

exactly a piece of persuasive evidence for the above argument. So, obviously it's not the final goal for Chinese government to maintain such a commodity structure for a quite long period. In the short run, China's way-out lies in upgrading the traditional labor-intensive export commodities by reforming the traditional industries with vast of capital resource and technological innovation. But in the long run, propelled by the irreversible forces of international competition, Chinese government should explore a good way to create strong competitive abilities in fields of high technology-intensive industries.

In conclusion, it's absolutely not a wise idea to totally give up this commodity structure and create a new one by now. And for this reason, there are the following three points for references to the undergoing trade structure reform of Chinese export commodity:

I. To Continue Competitive Advantage in Exporting Labor-intensive Products

According to the specific conditions of Chinese factor endowments, the comparative advantage as of low labor cost will keep for a certain time in the future. Presently, half of Chinese exports are categorized as labor-intensive products, and world opinion widely admits that China's entering WTO will open up a wider market for the exporting of such products. It is estimated that at least in the next five years, labor-intensive products will still be the "fist" among China's export commodities. Henceforth, it will continue to have great significance for China, while speeding up its development in other industries.

Relative studies argue that China's WTO entry will surely open up more export opportunities for China's products, which would further expand its labor-intensive exports. More importantly, the quotas of MFA will be completely eliminated by the year 2005. Some CGE (computable general equilibrium) studies suggest that this is a major benefit of the WTO membership for China, as the textile and clothing sectors are where China's comparative advantage lays (Warwick J. McKibbin and K.K.Tang, 2000). Another argument from economist Wang Zhi says that, if China joins the WTO and obtains the benefits from phasing-out MFA quotas for its textile and clothing exports, its world market share would rise more than one percentage point during the MFA phase-out period, with a gain of four percentage points in the year 2010, maintaining its position as the largest textile and clothing exporter among developing countries for a future period of time.

But as having been widely admitted, the traditional labor-intensive products are called as "sunset commodity" compared with highly technological products (such as IT products) and they are losing previous advantage and competitiveness in world markets. Some of them would probably disappear from world markets if they continue the tendency of being low value-added and low technology-contented. Therefore, transforming them by mainly investing in new knowledge and suitable technology might be a wise and prompt way to recreate their former splendor.

The vitalization of American toy industry is a typical example to demonstrate the efficiency of linking traditional industries with innovative ideas and technologies.

At the beginning of 1990s, the annual sales amount of toys in the USA was

$20billion, and most of them were imports. After the middle of 1990s, American toy manufacturers defined toy industry as rest and family recreational industry, hence strengthened the production and imports of toys with intellectual faculties. From then on, the toys with unique characteristics and high contents of technology got boomed in the USA market. In 1998, the electrical toy FURBY made by Tiger Co. achieved brilliant sales record in the world market and was elected as one of the best innovative products by *Business Weekly* of the USA, being on a par with some other "big" products, such as luxury car and advanced computer.

Another similar story comes from textile industry. After 1995, the sales increase rate of world textiles was only 3.9%. If the factor of population increase was deducted, the above record was almost zero. In January of 1999, the cotton without any technology content was sold at a price of $59 per ounce in New York market, 30% lower than that of last summer. From 1994 to 1996, 7000 textile and clothing workplaces were closed in Germany. The bad situation continued in successive years. Under such a desolate scene, some textile manufacturers found their way out by transforming their products through injecting high contents of science and technology. In Japan, a textile factory developed a new type of raw silk by technological innovation, and very soon, the price and amount of this product got rapid increase (Zhang Jinsheng, 1998). That was the charm of innovative ideas and technologies.

In China, the above story continues until now. The economic depression of the world economy in 2001, especially of the USA and Japan, has caused Chinese exports greatly slowing down their increase rates compared to the figure at the same period

last year. And especially those traditional exports, including textiles, clothing, toys, and furniture etc, showed a sluggish situation. But among of them, some specific products gained outstandingly good records. Detailed investigation demonstrated that those “high technological products” content more MVA (manufacture value added) and are more difficult to be duplicated and substituted, hence having longer product life cycle.

From above analysis, the following conclusion might be drawn: in such a time as of knowledge-based economy, only by means of focusing on further improving the quality of labors, not on emphasizing the lowness of labor cost, is China able to occupy a favorable position in the new round of blazing new trails of world industries and products. In this sense, China must accelerate the pace of transforming its traditional export industries by making full use of technological innovation, henceforth to improve the technology-content and value-added traditional exports. Also only by this way, China’s comparative advantage can be transformed efficiently into competitive advantage.

II. To Create Competitive Advantage of Technology-intensive Products, especially High-tech Products, hence Upgrade the General Structure of Export Commodities

In general, technology-intensive products include two categories: one is traditional products with high intensity of both capital and technology, such as motor, machinery etc., another is new & high technological products with high intensity of technology but low intensity of capital, such as information technology, biological

technology etc. The latter is not only the leading industry of present development of world economy, but also the highly vigorous part in international trade.

In this sense, the twenty-first century will be a period characterized by rapid promotion and appliance of high & new technologies. Knowledge-based economy will become the theme of world development. In fact, since the 1990s, the new technological revolution, taking IT as leading factor, has brought great changes to the world industrial structure. Especially in the developed countries, technology-intensive industries have occupied dominant position in national economies. Latest resources from OECD show that knowledge-based economy has registered 50% shares of GDP in its principal members, with high and new technological industries sharing 30% in manufactures. At the same time, their export structure has been transforming to the direction of taking technology-intensive products as leading exports. By the end of 1999, the high & new technological products have posited almost 40% in the exports of industrial manufactures in OECD members (Wang Zixian, 2000). In recent decades, technology-intensive industries also got boomed in some newly developed markets. According to *World Development Indicators* of World Bank, by 1996, the high & new technological products covered a high level in the manufacturing exports in the following economies: 71% of Singapore, 67% of Malaysia, Ireland of 62%, 39% of S. Korea, 32% of Mexico, and almost 50% of Taiwan. In case of China, it was 5.1%, lagging behind of above economies.

Box: Definition and Measurement of High-technology Industries

The “technology-intensity” of an industry can be measured through a number of indicators, ranging from input-related (e.g. expenditures on research and development (R&D), number of scientists and engineers) to output-related measures (e.g. number of patents). For all, there is a certain arbitrariness in choosing the cut-off points that separate the different technology classes.

Broadly speaking, manufacturing industries can be classed in four different categories of technology intensity: i) high technology; ii) medium-high-technology; iii)medium-low-technology; iv) low-technology. For reasons of availability of comparable statistics, it is generally beneficial to base this classification on indicators of (direct as well as indirect) technology intensity which reflect to some degree “technology-producer” versus “technology-user” aspects: i) R&D expenditures divided by value added; ii) R&D expenditures divided by production; iii) R&D expenditures plus technology embodied in intermediate and capital goods divided by production.

Such information is particularly useful for analyzing industry information, for example on employment or value added by technology intensity. To do so for international trade flows—which are defined at the product level – requires attributing each product to a specific industry. Not all products within a “high-technology industry” necessarily have a high technology content; likewise, some products in industries with lower technology intensities may well incorporate a high degree of technological input.

Table IV: International Trade by Type Product

(Shares of Each Type in Total Global Trade in Products 1976 vs. 1996)

Type of Product	1976	1996

High technology	11	22
Medium technology	22	32
Low technology	21	18
Resource based	11	11
Other primary products	34	13
Miscellaneous	1	4

Note: the technology intensity of manufactured products is determined by the share of R&D to sales, where high technology products are those with the highest shares.

Source: based on *figure 2.2, p.28 World Bank 1999a*, based on *World Bank Comtrade data base*.

The worldwide technological revolution hence great changes of world industries brought sharp challenge to China's export structure. Even though Chinese government has been accelerating its pace of promoting technological appliance in all aspects of economy, especially on the side of exporting, nevertheless, due to its relatively rigid economic structure and the fact of "bad old practices die hard", Chinese technology-intensive exports still posited a slender share, with inferior competitive advantage in the world market. Henceforth, Chinese government must be meticulous in desire and construction to realize its strategic blueprint of "trade prosperity with science and technology" by creating favorable environment for the development of high-tech exports.

Here are some specific suggestions:

—To set the list of high-tech products while strengthening relevant industrial programme according to both China's specific situation and present needs in

international market.

First of all, by doing the following research—the real needs and development tendency of high-tech products in international markets and the real situation and export potential of Chinese high-tech products, Chinese government shall determine the name list of high-tech industries and enterprises to which supplying favorable support on sides of financial and information services etc. At present, it's urgent to select a category of high-tech products mainly in the fields of IT, biological medicine, new materials and electrical household appliances which have relatively comparative advantage among Chinese high-tech industries. Besides, the promotion of high-tech exports must be combined with the development programme of high-tech industries, which shall form a virtuous circle of interaction.

–To gradually perfect relevant legal system for the development of high-tech industries and exports.

It mainly includes: to perfect the legal system of intellectual property so as to implement efficient protection to patents and exclusive technologies, which will greatly encourage technological innovation and scientific development; to further improve the environment of foreign investment by increasing necessary levels on sides of financial and information services, moreover, by strengthening cooperation between transnational corporations and domestic enterprises or scientific institutions, to soon establish some first-class R&D centers in China; to improve the import and export managerial system and relative policies of high-tech products by such means as of entrusting trading power to high-tech enterprises and simplifying their formalities

of being into and out of China.

—To supply favorable policies to high-tech industries and exports in the respect of financial support and tax reduction.

It mainly requires government to supply favorable conditions to high-tech enterprises on the following sides: to establish fund for opening up overseas markets to encourage high-tech enterprises to compete worldwide; to supply convenient and efficient insurance service on export credit by perfecting the relevant insurance system and policies; to encourage high-tech enterprises to raise investment on R&D and develop more high-tech products by means of supplying favorable loan rate, reducing or exempting income tax, accelerating relevant depreciation etc.

—To foster competent personnel in the fields of technological innovation and management.

Firstly, to establish a managerial system which helps the development of high-tech enterprises through reforming wage system etc. For example, enterprises can give much higher bonus to competent technologists, allow technologists to buy shares using technologies or innovations they hold. Secondly, to speed up the training and exchange of personnel in the fields of high-tech and international management, including inducing overseas students coming back to take active part in the construction and development of high-tech industries.

CONCLUDING REMARKS

The open-door development strategy, together with preferential policies for outward-looking industries, has vigorously promoted China's foreign trade. Unquestionably, China can be posed as a big trading country worldwide today. But meanwhile, the issue is how to keep the expansive export momentum in the increasingly competitive world market through significant improvement in the structure of export commodity.

According to the Hecksher-Olion model, which has long occupied a central place in trade theories, the intensity of factor endowments are usually the determinants of a country's comparative advantage, a rational and efficient export structure should be established by this hypothesis. Through empirical analysis, we find that most of historical changes of China's export structure has actually followed the routine of its comparative advantage changes in a Hecksher-Olion sense. By long possessing such comparative advantage as low labor cost, Chinese labor-intensive commodities have relatively strong competitive advantage in the world market, especially in the fields of textiles and clothing.

But on the other hand, the North-South models of unequal trade reveal another truth: A trade structure based on comparative advantage is not necessarily a good one. If a country locks itself into a stagnant situation that perpetuates its comparative advantage in unskilled and unproductive activities, this will finally in turn inhibit its long-run development aspiration. Static efficiency will become dynamic inefficiency. Lessons from poor trade developments of the developing countries, including China, have strongly proved this point. Nevertheless, from another aspect, the successful

achievements of the NIEs and the recent rapid improvements of Chinese trade conditions have meanwhile pointed out a bright way for the development of other developing countries: based on the present comparative advantage, to create advanced factor endowment is perhaps the first priority. As we know, that's the argument from Michael Porter.

In brief, being a country congenitally deficient in factor endowments, especially in the fields of natural resources, capital and technology, China will have an arduous and long way to go to upgrade its comparative advantage, hence creating a more advanced and efficient trade structure. But just as what a proverb says, challenge sometimes means more opportunities, the soon accession to WTO would open a wider market for China to fully play its traditional comparative advantage, while putting bigger pressure to speeding up the creation of advanced factor endowments.

APPENDIX TABLES

Table 1: Total Amounts and Growth Rates of China's Imports and Exports between 1980 and 2000 (unit: $100 million)

Year	Exports & Imports		Exports		Imports		Difference
	Total value	Growth rate(%)	Total value	Growth rate(%)	Total value	Growth rate(%)	
6th Five-Year	**2524.0**	**12.8**	**1200.4**	**8.6**	**1323.5**	**16.1**	**-123.1**
1981	440.2	15.4	220.1	21.5	220.2	10.0	-0.1
1982	416.1	-5.5	223.2	1.4	192.9	-12.4	30.4
1983	436.2	4.8	222.3	-0.4	213.9	10.9	8.4
1984	535.5	22.8	261.4	17.6	274.1	28.1	-12.7
1985	696.0	30.0	273.5	4.6	422.5	54.1	-149.0
7th Five-Year	**4864.0**	**10.6**	**2325.2**	**17.8**	**2538.7**	**4.8**	**-213.5**
1986	738.5	6.1	309.4	13.1	429.0	1.5	-119.6
1987	826.5	11.9	394.3	27.5	432.2	0.7	-37.8
1988	1027.8	24.4	475.2	20.5	552.7	27.9	-77.5
1989	1116.8	8.7	525.4	10.6	591.4	7.0	-66.0
1990	1154.4	3.4	620.9	18.2	533.5	-9.8	87.5
8th Five-Year	**10144.1**	**19.5**	**5183.8**	**19.1**	**4960.3**	**19.9**	**223.5**
1991	1357.0	17.6	719.1	15.8	637.9	19.6	81.2
1992	1653.3	22.0	849.4	18.1	805.9	26.3	43.6
1993	1957.0	18.2	917.4	8.0	1039.6	29.0	-122.2
1994	2366.2	20.9	1210.1	31.9	1156.2	11.2	53.9
1995	2808.6	18.7	1487.8	23.0	1320.8	14.2	167.0
9th Five-Year	**17739.3**	**11.0**	**9617.0**	**10.9**	**8122.4**	**11.3**	**1494.6**
1996	2898.8	3.2	1510.5	1.5	1388.3	5.1	122.2
1997	3251.6	12.2	1827.9	21.0	1423.7	2.5	404.2
1998	3239.5	-0.4	1837.1	0.5	1402.4	-1.5	434.7
1999	3606.3	11.3	1949.3	6.1	1657.0	18.2	292.3
2000	4743.1	31.5	2492.1	27.8	2251.0	35.8	241.2

Source: Statistics from China's General Office of Customs

Table 2: Ranking and Shares of China's Exports and Imports in the World Trade between 1981 and 2000

Year	Exports & Imports		Exports		Imports	
	Ranking	Share(%)	Ranking	Share(%)	Ranking	Share(%)
1981	22	1.1	19	1.1	21	1.1
1982	20	1.1	17	1.2	22	1.0
1983	20	1.2	17	1.2	19	1.1
1984	16	1.4	18	1.4	17	1.4
1985	11	1.8	17	1.4	11	2.1
1986	12	1.7	16	1.5	11	2.0
1987	17	1.6	16	1.6	14	1.7
1988	15	1.8	16	1.7	14	1.9
1989	15	1.8	14	1.7	14	1.9
1990	16	1.7	15	1.8	18	1.5
1991	15	2.0	13	2.0	15	1.8
1992	11	2.2	11	2.3	13	2.1
1993	11	2.7	11	2.5	11	2.8
1994	11	2.9	11	3.9	11	2.8
1995	11	2.9	11	3.0	12	2.7
1996	11	3.0	11	2.9	12	2.6
1997	10	2.9	10	3.3	12	2.5
1998	11	3.0	9	3.4	11	2.5
1999	9	3.2	9	3.5	11	2.8
2000	7	3.6	7	3.9	8	3.4

Source: To sort out from relative statistics of *WTO International Trade Statistics*.

Table 3: Composition of China's Export Commodities before 1980s (%)

Commodity Categories	1953	1957	1965	1970	1975	1980
Exports	100.0	100.0	100.0	100.0	100.0	100.0
I. Primary products	**79.4**	**63.6**	**51.2**	**53.5**	**56.4**	**53.4**
i. foodstuffs	30.9	27.2	31.1	31.8	28.4	17.3
ii. non-edible raw materials	33.3	28.3	15.1	17.4	11.2	10.2
iii. mineral fuels	0.8	1.1	3.1	2.8	15.0	25.1
iv. other products	14.4	7.0	1.9	1.5	1.8	0.8
II. Industrial manufactures	**20.6**	**36.4**	**48.8**	**46.5**	**43.6**	**46.6**
i. chemical products	0.7	1.3	2.4	2.9	3.0	3.4
ii. light industrial and textile products	12.3	26.3	31.0	33.7	31.1	33.7
iii. machinery & transport equipment	--	0.1	7.5	3.1	3.4	4.7
iv. miscellaneous	7.6	8.7	7.9	6.8	6.1	4.8

Source: Business statistics of foreign trade from MOFTEC, since customs statistics were unavailable before 1981 in China.

Table 4: Composition of China's Export Commodities between 1981 and 2000 (unit: $100 million)

Year	Primary products		Industrial manufactures	
	Total value	Share (%)	Total value	Share (%)
6th Five-Year	**556.4**	**46.3**	**644.1**	**53.7**
1981	102.5	46.7	117.6	53.3
1982	100.5	45.0	122.2	55.0
1983	96.1	43.3	126.1	56.7
1984	119.2	45.6	142.2	54.4
1985	138.1	50.5	135.4	49.5
7th Five-Year	**698.4**	**30.0**	**1626.9**	**70.0**
1986	112.7	36.4	196.7	63.6
1987	132.2	33.5	262.2	66.5
1988	143.9	30.3	331.2	69.7
1989	150.7	28.7	374.6	71.3
1990	158.9	25.6	461.8	74.4
8th Five-Year	**910.2**	**17.6**	**4273.5**	**82.4**
1991	162.1	22.5	556.9	77.5
1992	170.0	20.0	679.4	80.0
1993	166.7	18.2	750.9	81.8
1994	197.1	16.3	1013.3	83.7
1995	214.9	14.4	1272.8	85.6
9th Five-Year	**1118.5**	**11.6**	**8498.2**	**88.4**
1996	219.3	14.5	1291.4	85.5
1997	239.3	13.1	1587.7	86.9
1998	206.0	11.2	1631.6	88.8
1999	199.3	10.2	1750.0	89.8
2000	254.6	10.2	2237.5	89.8

Source: Statistics from China's General Office of Customs

Table 5: Historical Changes of High-technology Products in China's Exports

(unit: $100 million, %)

Year	Total Value	Shares
1991	28.74	4.0
1992	39.92	4.7
1993	46.80	5.1
1994	62.94	5.2
1995	101.16	6.8
1996	126.90	8.4
1997	162.68	8.9
1998	202.14	11.0
1999	247.56	12.7
2000	371.3	14.9

Source: Ministry of Science and Technology, China

Table 6: Total Value of China's Export Commodities between 1991 and 2000, as Classified according to the Forms of Their trading

(unit:$100million)

Year	Total value	General trade	Processing trade	Barter trade	Other forms
1991	718.43	381.16	324.25	6.65	6.37
1992	849.40	436.75	396.17	10.78	5.70
1993	917.44	431.99	442.48	34.82	8.15
1994	1210.06	615.61	569.80	18.32	6.33
1995	1487.80	713.66	737.03	16.42	20.69
1996	1510.48	628.39	843.33	5.70	33.06
1997	1827.92	780.03	996.58	1.48	49.83
1998	1838.09	741.94	1045.53	0.98	49.64
1999	1949.31	791.13	1108.72	1.63	47.83
2000	2492.12	1051.92	1376.55	0.84	62.81

Source: Statistics from China' General Office of Customs

Table 7: Composition of China's Major Handlers of Export Commodities between 1991 and 2000 (unit: $100million)

Year	Total value	State-owned enterprises	Foreign-funded enterprises	Collectively-owned enterprises	Others
1991	718.43	--	120.47	--	--
1992	849.40	--	173.60	--	--
1993	917.44	--	252.37	--	--
1994	1210.06	849.43	347.09	10.73	2.81
1995	1487.80	992.50	468.91	22.81	3.58
1996	1510.48	860.58	615.06	30.73	4.11
1997	1827.92	1027.41	749.40	45.38	5.73
1998	1838.09	968.53	809.47	54.02	6.07
1999	1949.31	984.86	886.28	68.24	9.94
2000	2492.12	1164.49	1194.41	105.68	27.53

Source: Statistics from China's General Office of Customs

Table 8: Total Value of Chinese Exports to Different Countries and Regions between 1991 and 2000(unit: $100 million)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total value	718.43	849.40	917.44	1210.06	1487.80	1510.48	1827.92	1838.09	1949.31	2492.12
Asia	**532.80**	**610.67**	**526.18**	**734.48**	**920.02**	**912.42**	**1089.66**	**982.47**	**1025.79**	**1323.11**
Japan	102.19	116.79	157.77	215.79	284.67	308.86	318.39	296.60	323.99	416.54
S. Korea	21.79	24.05	28.61	44.02	66.88	75.00	91.27	62.52	78.08	112.93
H.K.	321.37	375.12	220.50	323.61	359.83	329.06	437.83	387.42	368.91	445.20
Taiwan	5.95	6.94	14.62	22.42	30.98	28.02	33.97	38.69	39.50	50.37
ASEAN	41.35	42.62	46.83	63.79	90.36	96.97	120.40	110.50	121.70	173.41
Africa	**10.00**	**13.91**	**15.27**	**17.49**	**24.94**	**25.66**	**32.09**	**40.56**	**41.08**	**50.43**
Europe	**94.00**	**113.64**	**164.27**	**187.71**	**229.88**	**238.60**	**289.88**	**334.25**	**354.75**	**454.82**
E.U	67.39	76.02	116.92	145.80	190.96	198.25	238.28	281.47	302.11	381.93
U.K	7.28	9.23	19.29	24.14	27.98	32.01	38.15	46.32	48.79	63.10
Germany	23.56	24.48	39.68	47.61	56.71	58.43	64.97	73.54	77.78	92.78
France	7.33	7.64	12.90	14.24	18.42	19.07	23.30	28.23	29.20	37.05
Italy	9.31	10.95	13.05	15.91	20.67	18.36	22.39	25.77	29.29	38.02
L.America	**7.95**	**10.76**	**17.76**	**24.55**	**31.47**	**31.18**	**46.08**	**53.21**	**52.69**	**71.85**
N.America	**67.14**	**92.47**	**181.64**	**228.60**	**262.47**	**283.00**	**346.23**	**400.75**	**443.88**	**552.78**
Canada	5.55	6.53	11.98	13.97	15.33	16.16	19.07	21.27	24.33	31.58
USA	61.59	85.94	169.65	214.61	247.14	266.83	327.15	379.48	419.46	521.04
O&PIslands	**6.46**	**7.95**	**12.31**	**17.24**	**19.02**	**19.62**	**23.98**	**26.85**	**31.13**	**39.10**
Australia	5.54	6.61	10.61	14.88	16.26	16.73	20.55	23.65	27.04	34.29

Notes: *ASEAN* groups Brunei, Malaysia, the Philippines, Singapore, and Taiwan. Viet Nam joined the group in 1996, Laos and Bermuda joined it in 1998, and Cambodia entered it in 2000. *EU* was known as the European Community (EC) before 1994. EU groups Belgium, Denmark, Britain, Germany, France, Ireland, Italy, Luxembourg, Holland, Greece, Portugal, and Spain. It accepted Austria, Finland and Switzerland as its members after 1995. O&P Islands is Oceania & the Pacific Islands.

Source: Statistics from China's General Office of Customs

ABBREVIATIONS AND SYMBOLS

USA	the United States of America
U.K	the United Kingdom of Britain
H.K	Hong Kong, China
S. Korea	the Republic of Korea
S. Asia	the South Asia
NIEs	the Newly Industrialized Economies
EU	European Union
Bel.-Lux.	Belgium-Luxembourg
OECD	Organization for Economic Cooperation and Development
MOFTEC	Ministry of Foreign Trade and Economic Cooperation, P.R. China
GDP/GNP	Gross Domestic Product / Gross National Product

The following symbols are used in this thesis:

--	not available
0	figure is zero or became zero due to rounding
$	United States dollars

Billion means one thousand million.

Unless otherwise indicated, i) all value figures are expressed in USA. dollars; ii) trade figures include the intra-trade of free trade areas, customs unions, regional and other country grouping; iii) merchandise trade figures are on a customs basis and iv) merchandise exports are f.o.b. and merchandise imports are c.i.f.

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Some materials are available in the following websites:

www.wto.org/; www.imf.org/; www.worldbank.org/; www.moftec.gov.cn/; www.stb.gov.cn/ etc.