

**Changing Dynamics of the Chinese Automotive Industry:
The Impact of Foreign Investment, Technology Transfer,
and WTO Membership**

by

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ABSTRACT

The Chinese automotive industry was established 50 years ago with the technology transfer of a truck production system from the Soviet Union. Since then, it developed into a decentralized and fragmented truck industry layout due to the self-reliant and defensive policies set forth by the central government. Over the past two decades, China has obtained substantial and modern passenger car production systems with a large sum of foreign direct investment (FDI) and comprehensive technology transfer from global carmakers in Europe, the U.S., and Japan. This research studies the 50-year development history of the Chinese automotive industry and seeks to understand the role of the Chinese protectionist automotive industry policies and the impact of FDI and technology transfer. China officially entered the World Trade Organization (WTO) in November 2001 and committed to end the 50 years of protectionism. The WTO membership is expected to inject fierce market competition into the Chinese automotive industry and ultimately propel the industry to a new level. My research attempts to forecast what might happen in the coming years.

My research included site visits and personal interviews with seven senior executives from Chinese automotive firms located in Beijing, Shanghai, and Guangzhou, as well as three academic experts on the Chinese automotive industry at the Tsinghua University.

This research finds that China has benefited significantly from foreign investment and technology transfers. China was able to leapfrog from 1950s-level automotive production systems into 1990s-level advanced technologies, and the gap with world standards continues to narrow. My research also indicates the protectionist automotive industry policies China had before the WTO accession have seriously hindered China's ability to achieve the full potential impact that FDI could have made. The lack of coherent policies between protection and competition has caused the Chinese automotive industry to remain fragmented and uncompetitive. The lack of competition and restrictions on foreign equity has delayed the speed of technology transfers and China's development of full automotive design and production capabilities. China will stride in the post-WTO era. However, the protectionism, particular from regional and local governments, is likely to continue and hinder the full impact of benefits from the WTO membership.

Thesis Supervisor: Michael A. Cusumano
Title: Sloan Management Review Professor of Management

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Michael Y. Lee
Cambridge, Massachusetts
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LIST OF ABBREVIATIONS

AMC	American Motor Corporation
BAW	Beijing Auto Works
CATARC	China Automotive Technology & Research Center
DFMC	Dongfeng Motor Corporation
FAW	First Auto Works
FDI	Foreign Direct Investment
FYP	Five-Year Plan
GDP	Gross Domestic Production
GM	General Motor
JV	Joint Venture
MIT	Massachusetts Institute of Technology
OEM	Original Equipment Manufacture
SAIC	Shanghai Automotive Industry Corporation
SAW	Second Auto Works
SETC	State Economic and Trade Commission
SOE	State-Owned Enterprise
SPC	State Planning Commission
WTO	World Trade Organization

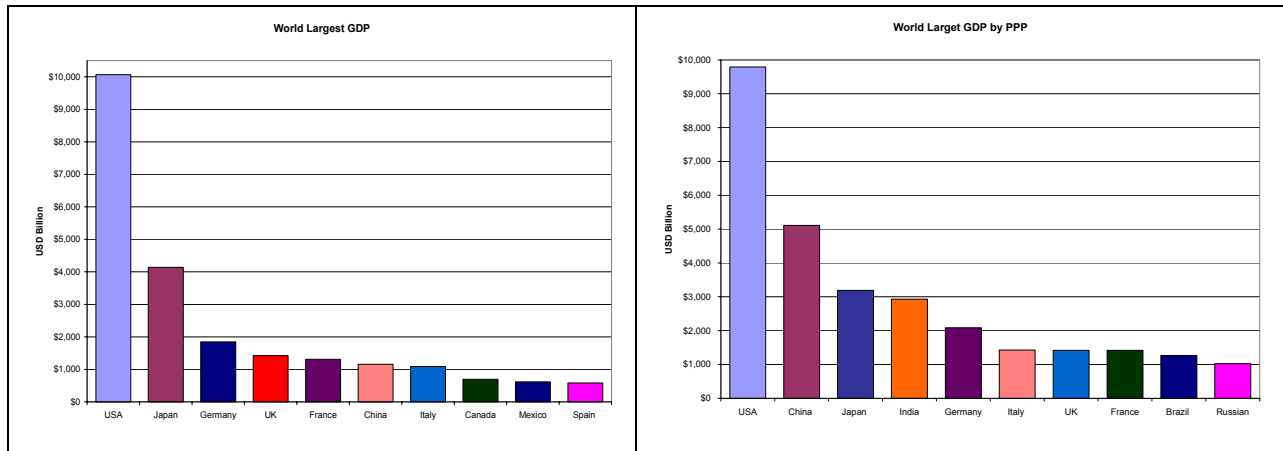
CHAPTER 1

INTRODUCTION

The Year 2003 marks the 50th anniversary of the Chinese automotive industry, which was established with a direct technology transfer of a truck production system from what was then the Soviet Union in 1953. Since then, the industry has been developed within a strong protectionist environment. The first 30 years of the industry were primarily focused on truck production, with the result that China has developed into one of the largest truck producers in the world. Over the past 20 years, China has seen a growing market demand for passenger cars and a rapid development in its car production sector. The development was primarily driven by Foreign Direct Investment (FDI) and direct technology transfer from global carmakers. Because of the protection, the overall development speed over the 50 years is fairly slow compared with the growth speeds of automotive industries from the U.S., Europe and Japan in their respective early development periods. The Chinese automotive market has also been heavily protected with high tariffs and tight industrial policy, so that foreigners could not easily enter the market.

China has a population of 1.3 billion people and extremely low private car ownership (lower than most countries in the world). The Chinese automotive market by large still remains untapped, a key factor that has attracted huge foreign investments. So far, the market has not yet fully materialized, since most Chinese residents still cannot afford to own a car. However, the situation is changing, as the world has focused its attention on China and seen the country's economy surge over the past 20 years. Figure 1 compares the top 10 largest Gross Domestic Production (GDP) and top 10 largest GDP by Purchase Power Parity (PPP), based on World Bank 2001 data. The data indicate that China's 2001 GDP reached USD1.16 trillion, making it the sixth largest economy in the world. If measured with PPP, China reached USD5.11 trillion in 2001, surpassing France, UK, Germany, and Japan, which made it the world's second largest economy.

Figure 1: Largest GDPs in the World in 2001



Source: World Bank Data, April 2003.

A major motivation for this study is that the huge and heavily protected Chinese automotive market was suddenly opened to the world by China's accession to the WTO in 2001. The Chinese automotive market has become a focal point, attracting serious attention from the world business community, particularly the large global carmakers. China has become a new battlefield for carmakers as the 1.3 billion Chinese consumers began to buy cars. This thesis studies, from a macro perspective, what has happened in China's automotive sector and attempts to forecast what might happen in the near future over the next five to ten years.

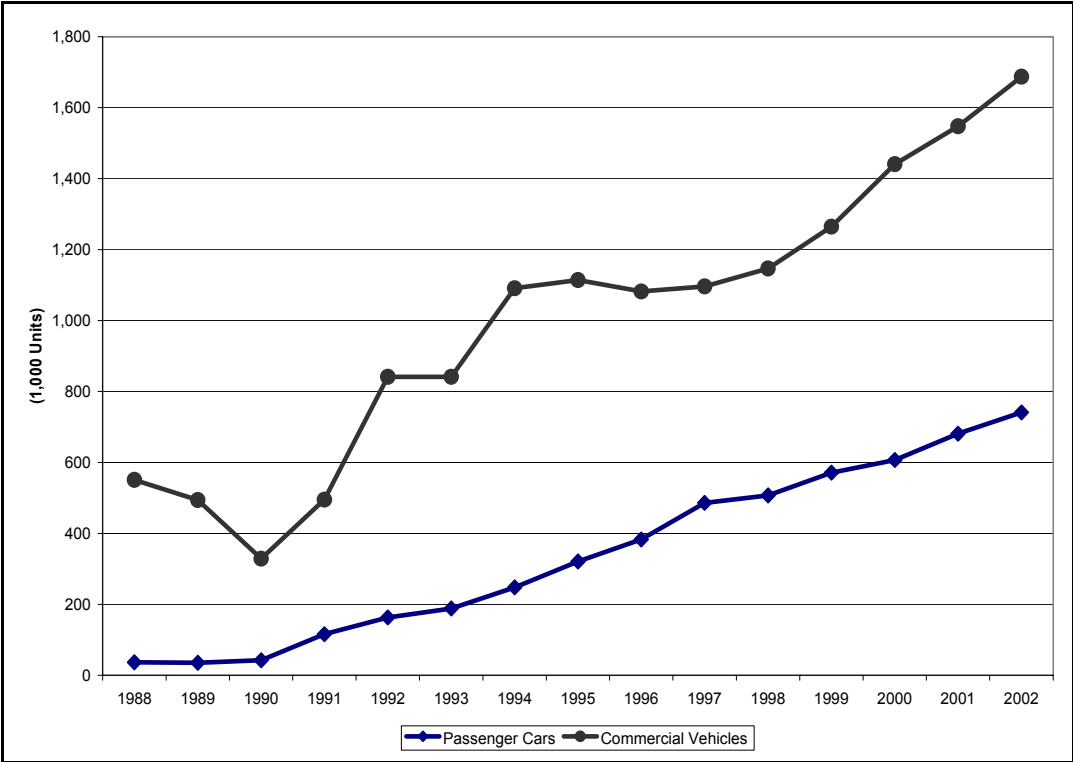
1.1 Characteristics of the Chinese Automotive Industry

A Growing Industry

Figure 2 indicates the automotive production in China from 1988 to 2002 as collected by the Euromonitor Global Market Information Database. Note that sales trends are similar, since most of Chinese made vehicles were for their domestic market, and only a small number of trucks were exported. The figure indicates that China's truck production had a slight dip around 1990 and has since enjoyed a stable growth. China's car production before 1990 was very small, but has grown rapidly since the early 1990s. Most people believe the Chinese automotive industry will continue to grow significantly during the

coming years. Michael Dunne, founder of Automotive Resources Asia, a consultancy with offices in Beijing, predicted that the Chinese automotive industry is likely to surpass the U.S. production by 2025, making China the largest vehicle producing country (Eisenstein, 2001).

Figure 2: China’s Automotive Production, 1988 to 2002



Source: Euromonitor Global Market Information Database, April 2003.

The total production size of the industry today, although still small compared with that of more developed countries, has grown from almost zero 50 years ago to become the eighth largest in the world with annual automotive production of 2.4 million vehicles in 2002. Specifically, a report by the China Automotive Technology & Research Center (CATARC) indicated that China’s automotive industry sub-sector 2001 productions are ranked as follow: ¹

- Passenger car, 14th in the world
- Passenger coach, 7th

¹ CATARC Report, November 12, 2002.

- Light truck, 2nd
- Heavy truck, 3rd

Table 1 lists the automotive production of the top 15 automotive producing countries and their respective average growth rates of domestic car markets over the past 10 years. The car market of China has grown 11.7% on average annually over the last 10 years.

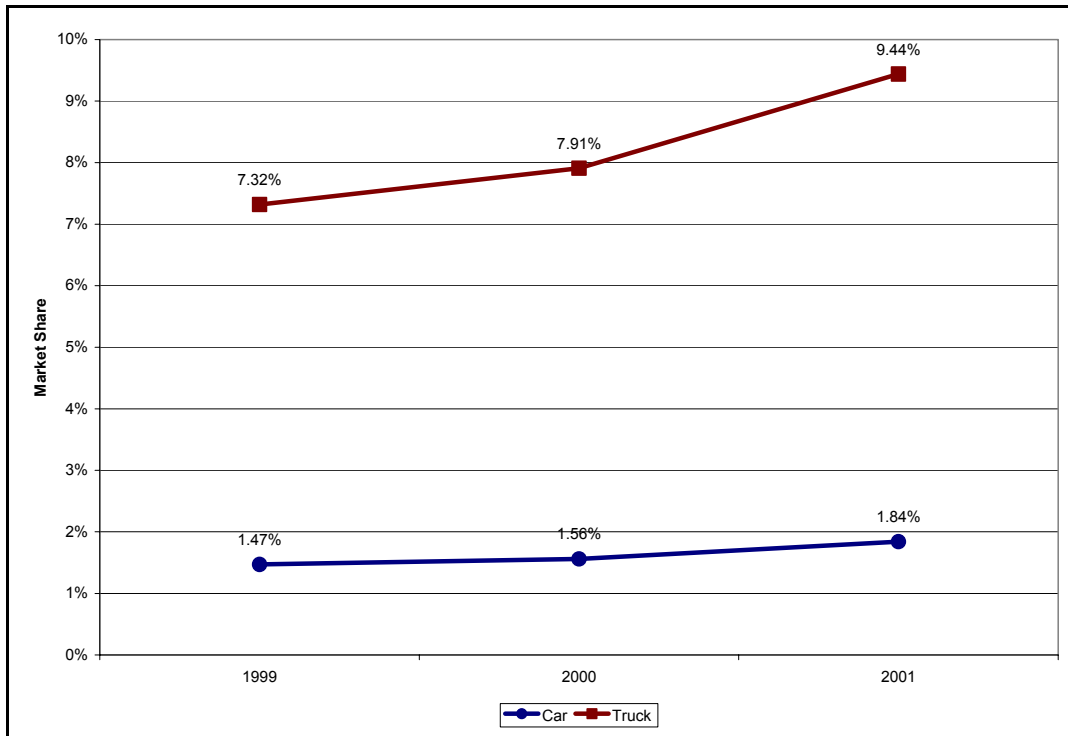
Table 1: Top Automotive Producing Countries (2002)

Rank	Country	Cars	Commercial	Total	Car Market 10-Year Trend
1	USA	5,294,280	8,081,350	13,375,630	0.3%
2	Japan	7,995,000	1,613,000	9,608,000	-0.9%
3	Germany	5,457,320	393,000	5,850,320	1.1%
4	France	3,383,800	450,000	3,833,800	2.2%
5	Canada	1,698,450	1,584,000	3,282,450	1.2%
6	South Korea	2,309,000	436,000	2,745,000	-1.6%
7	Spain	2,105,000	621,000	2,726,000	5.9%
8	China	741,070	1,687,150	2,428,220	11.7%
9	Mexico	1,258,460	540,800	1,799,260	8.4%
10	Brazil	1,441,990	325,210	1,767,200	3.7%
11	United Kingdom	1,401,000	201,000	1,602,000	4.3%
12	Italy	1,250,000	311,000	1,561,000	3.2%
13	Russia	998,460	308,660	1,307,120	1.4%
14	India	717,040	164,250	881,290	14.6%
15	Czech Republic	764,280	0	764,280	7.4%

Production source: Euromonitor International Global Market Information Database, April 2003.
Trend source: MEMA World Automotive Market Report, 2002-2003.

Figure 3 compares China's automotive production share over the world total from 1999 to 2001. As can be seen, China's car production share increased from 1.47% in 1999 to 1.84% in 2001, and their truck production share increased from 7.32% in 1999 to 9.44% in 2001.

Figure 3: China's Automotive Production Share (% of World Total)

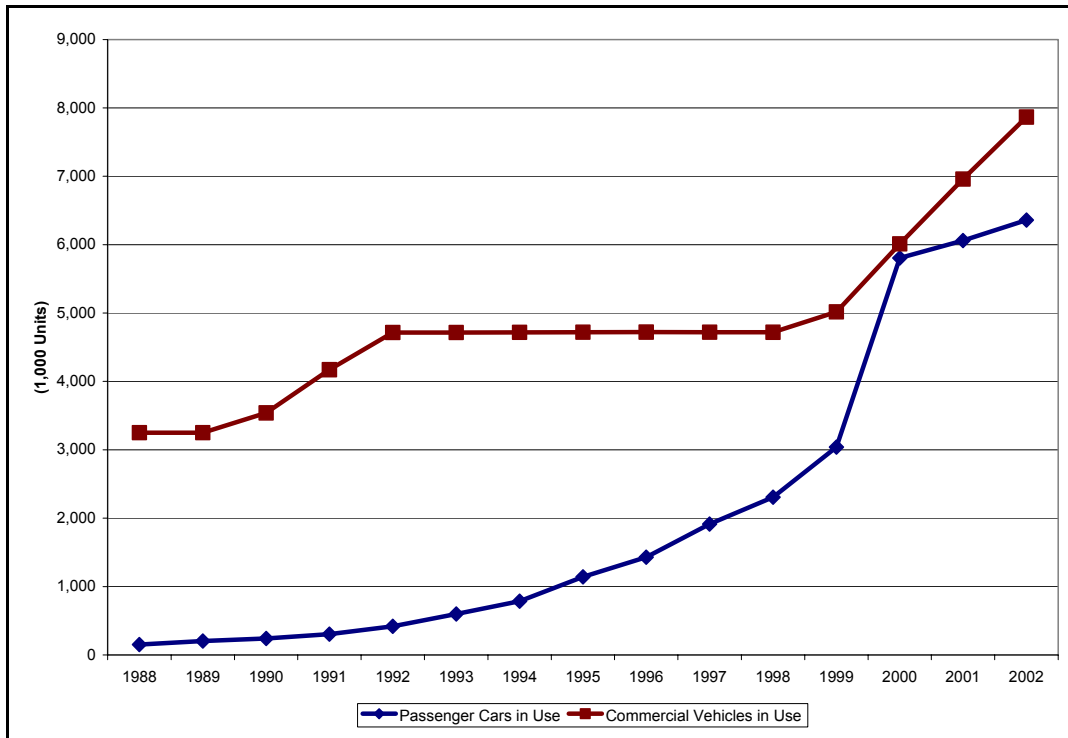


Source: Ward's Automotive Yearbook 2002

A Growing Market

Figure 4 indicates the automotive market size (measured by total vehicles in use) in China from 1988 to 2002. The chart indicates that China's passenger car market has grown steadily since 1988 and experienced a significant increase around 2000. This can be attributed to a combination of factors, including the changed government policy allowing for more private car ownership and the increase in the Chinese middle class, who earn enough money to afford a car. The commercial market was flattened out during the 1990s, but resumed a significant growth trend since 1999.

Figure 4: Total Vehicles in Use in China



Source: Euromonitor Global Market Information Database, April 2003.

China's current automotive market size for passenger cars is comparable to that of South Korea or Mexico. But if one considers the 1.3 billion population of China, the Chinese automotive market is essentially untouched: on average, there is one car per 322 persons in China, compared with one car per 18.4 persons in Mexico, 5.9 persons in South Korea, and 2.2 persons in the U.S.² Most Chinese residents are still far from being able to afford to own a car. The 2001 GDP per capita is only about USD890 while the average car costs USD20,000 or more. Historically, the primary automotive buyers have been government agencies and taxi companies.

China can be viewed as having two separate economies: the urban consumer economy with relatively higher disposable income, and the countryside survival economy with very low income. Table 2 shows the GDP data of selected Chinese cities. Clearly, the gap between the two economies is very wide and is getting wider.

² MEMA World Automotive Market Report, 2002-2003.

Table 2: Chinese GDP in Selected Areas

City	GDP 1988	GDP 1998	Growth %
Beijing	\$781	\$1,950	150%
Shanghai	\$1,093	\$3,043	178%
Tianjin	\$634	\$1,687	166%
Guangdong	\$381	\$1,339	251%
Coastal	\$388	\$1,282	230%
Inland	\$205	\$589	188%
National Average	\$264	\$811	207%

Source: Robert Feenstra "China's Entry to the WTO: A View from Automotive Industry," Transportation Economics (Course ECN 145), University of California Davis, winter 2003.

Researchers believe that a country's automotive market will begin to develop when GDP per capita reached USD4,000 (Zoya, 2001). There has been dramatic increase in private car ownership in recent years. This indicates that China is no longer merely a potential automotive market; instead, the market has begun to materialize, particularly in the coastal areas of China. Looking forward, the China Association of Automakers predicts that the car production in China will surpass 1 million units by 2005 and 2 million units by 2010, as shown in Table 3.

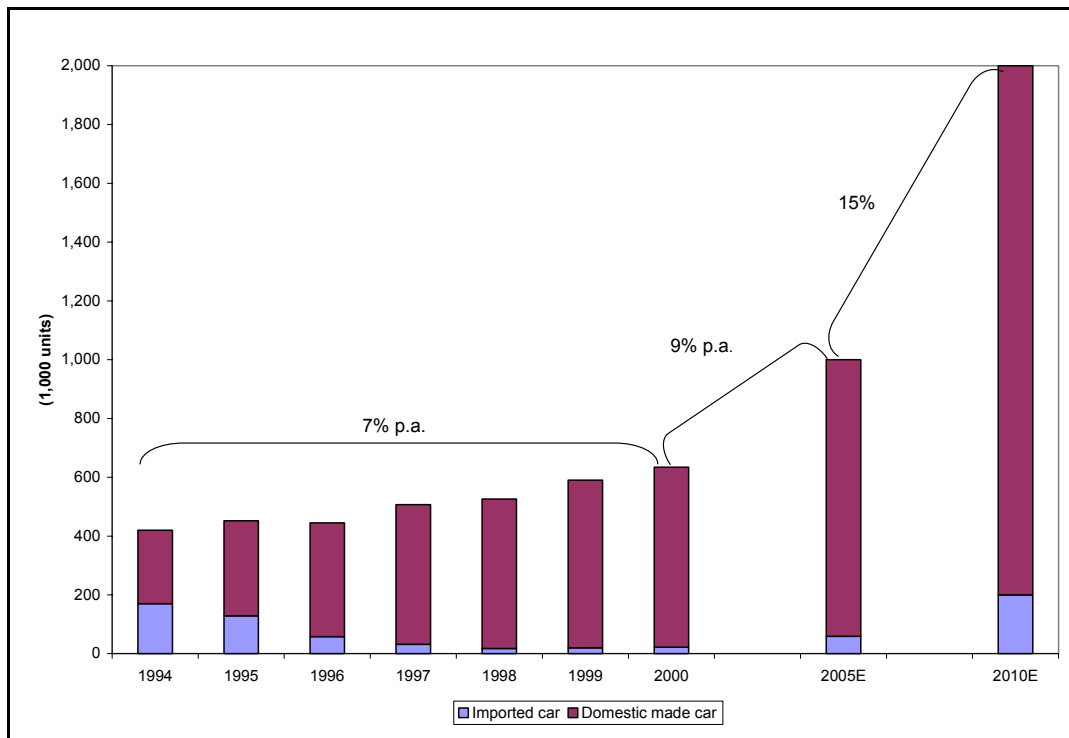
Table 3: Forecast of China's demand for passenger (1,000 units)

	2005	2010	2015
Truck	1,060 – 1,200	1,410 – 1,530	1,670 – 1,780
Bus	550 – 680	600 – 720	650 – 770
Car	1,100 – 1,210	1,930 – 2,200	3,390 – 3550
Total	2,710 – 3,090	3,940 – 4,450	5,710 – 6,100

Source: China Association of Automakers, 2002

Figure 5 illustrates that the passenger car market in China grew on average about 7% per year from 1994 to 2000. RolandBerger Strategy Consultants forecasted that the market will grow at 9% annually from 2000 to 2005 and 15% annually from 2005 to 2010.

Figure 5: Forecast of the Chinese Automotive Market



Source: RolandBerger Strategy Consultants, 2001

China has about 300 million households. Professor Zhenwei Qian of the Tsinghua University, who also serves as an advisor on China's national policies on automotive industry, said that the Chinese government estimated that 8% of households would own a car by 2010, and 20% by 2020.³ The *Far Eastern Economic Review* (Murphy, 2003) reports that Volkswagen plans to boost worldwide sales by 20% to 6 million cars by 2007, and expects half of that increase would come from China, underscoring the vital role of China's growth to global carmakers when their traditional markets are flat.

The passenger car market in China has a pyramid structure with five layers:

- Governmental officials,
- Large enterprises,
- High income families and medium enterprises,
- Middle income families and small firms,
- Relatively lower income families who can afford to own a car.

³ My interview with Professor Qian on December 19, 2002

The reason why Volkswagen's Shanghai plant was so successful was because Santana cars could fit a wide scope of market demand. Santana can function as taxis, vehicles for governmental officials, and vehicles for the newly emerging business elites. Chrysler never found or created a mass market for its high-platform vehicles.

A Heavily Protected Industry

The Chinese automotive industry is a backbone industry of the Chinese national economy and has played a major role in the development of China's national economy and the improvement of people's living standards. As such, the industry has been nurtured in a protectionist environment, more protected than other industries in China. Tariffs for imported automobiles and parts were set high, and there exist many other non-tariff barriers. The Chinese central government is closely involved in the screening and approval of every company seeking to enter the automotive industry.

In my opinion, it can be helpful to place an entry barrier to foreign competitors and provide certain period of protection for infant domestic automakers to explore economies of scale and grow. However, an extended protection period could cause serious consequences. Automakers in China, including foreign joint ventures (JVs), have been less motivated to innovate because of the lack of market competition under protection. Because of the high tariffs for imported cars, they have been able to sell their products at a relatively high price and make profit even though their operations are inefficient and using less-advanced technologies. The Chinese government has attempted to consolidate and restructure the fragmented automotive industry into a fully integrated and competitive industry, but they essentially failed because they could not or were unwilling to remove the protectionist environment quickly. As a result, no real competition could be introduced. All automakers in China are inefficient State-Owned Enterprises (SOEs), and the reforming process of improving the performance of SOEs has been very slow and complex due the social and political structure of China. Today, the industry is still uncompetitive by world standards. The cost of making cars in China is said to be higher than in Europe, the U.S., or Mexico (Murphy, 2003).

Foreign Direct Investment

Over the past two decades, the Chinese automotive industry has attracted a large sum of FDI, USD20.9 billion by 1998 (Wang, 2001), primarily from Europe, the U.S., and Japan. Almost all the global automakers have invested in China and established presence through forming JVs with Chinese automakers, particularly among the car production sector. China's automotive industry was predominantly a truck production industry by the mid-1980s. The huge sum of FDI essentially injected a car production industry directly into China and completely changed the landscape of that industry. A McKinsey research study (Gao, 2002) indicates that, in 2000, 97% of cars were made by joint ventures, 2% were made by the First Auto Works, and 1% were made by 19 others.

WTO Membership

In November 2001, China officially entered the WTO after 15 years of hard negotiations with existing WTO member countries. Under pressure from the U.S., China made major concessions to its protections for many domestic industries. Among many sectors affected by the WTO accession, the automotive industry seems one of the most open to a global challenge. China agreed to phase out most of its automotive trade barriers in 3-5 years and allow foreign firms to enter automotive distribution and sales, automotive related services (such as automotive insurance and financing), and after-sales services (warranty and parts). Most significantly, the tariff for foreign made cars and components will be reduced from 80-100% to 25% by 2006. Many believe that automotive prices in China will reduce significantly in coming years as more and more imported cars enter the competition.

The WTO membership essentially pushed the unprepared industry into fierce competition with global players. However, the positive side is that the WTO membership would inject much-needed market competition mechanisms into the industry and fundamentally boost the competitiveness of the industry. It is widely believed that the WTO accession would put serious pressure on many inefficient Chinese automakers, and that many of them may not survive this process of change.

1.2 Questions to Be Addressed

The first part of this thesis focuses on the development and changing dynamics of the Chinese automotive industry over last two decades. China's major protectionist policies are introduced and discussed. The key question is how strategically and effectively has China used foreign investment and its own capital to develop the car production industry? How successfully have foreign automakers used their opportunities to expand to the Chinese automotive market?

The second part of my thesis looks issues associated with technology transfer. With the influx of FDI and the formation of Sino-foreign joint ventures, there has been large-scale and systematic technology transfer from global automakers to their respective Chinese partners. China basically used the same truck production technologies obtained from Soviet Union for 30 years without major advancement. The new waves of technology transfers have allowed China to leapfrog into 1970s-, 1980s- and 1990s-level automotive technologies. The key question is how has China successfully leveraged their market power to obtain advanced technology? To what extent have Chinese automakers been able to effectively absorb the technology? What is China's current capability in automotive development and production?

The third part of this thesis focuses on the potential impact of WTO membership. China will completely phase out its protection measures by 2006. The key question is what kind of changes should China expect? Many expect dramatic changes will occur, but some are skeptical.

The thesis will attempt to answer the above questions based on my research and insights gained from my site visits in China and personal interviews of executives of the Chinese automotive industry.

CHAPTER 2

DEVELOPMENT OF THE CHINESE AUTOMOTIVE INDUSTRY

2.1 Early History and Formation of Fragmentation

Pre-History

The first automobiles were exported to China in 1901, primarily to Shanghai, the most industrialized city then in China. By the middle of the 1920s, there were only 7,000 cars and 600 trucks, all imported, running around in major cities. Most of them are owned by foreign residents living in China. The development of automotive market in China was very slow because of the lack of paved roads and the low standards of living of most Chinese citizens (Harwit, 1995). There were about 50,000 motorized vehicles of all sorts in the vast land and 24 motor repair factories located in eight big cities when the People's Republic of China was established on October 1, 1949 (Xue, 1988). Prior to that, there had been no significant automotive manufacturing capabilities in China.

First Auto Works and Soviet Union Assistance

Immediately after the founding of the new China, Chinese leaders began to build a domestic industrial foundation by acquiring complete manufacturing plants for steel, coal and electric power, and heavy machinery, primarily from the Soviet Union and Eastern Europe. During the 1950s, 156 large industrial projects were built with direct assistance from the Soviet Union. Among them are the FAW, located in Changchun, northeast China, and the Beijing Auto Works (BAW) (Harwit, 1987).

July 15, 1953, the day China started to build FAW, marked the beginning of the Chinese automotive industry and the first instance of large-scale automotive technology transfer from foreign countries to China. Everything from plant layouts, product designs, and production technology to management system was modeled after the practice at the Soviet "Zis" plant. All machinery was imported from the Soviet Union and Eastern European countries. FAW's design capacity was 30,000 "Liberation" trucks a year. The construction of FAW was complete in three years, due to full support from the Chinese

central government in terms of human, financial, and materials resources. FAW began truck production in 1956 and produced 3,000 “Liberation” 4-ton Soviet Model Zis-150 trucks in the next year. The Liberation trucks had 81% Russian parts initially; the percentage went down to zero by 1965. To accelerate the learning curve, hundreds of Chinese were sent to the Russia and trained in the Zis plant for a six months or a one-year period. At same time, many Russian experts were working at FAW offering technical assistance (Xue, 1988).

FAW was highly vertically integrated due to the lack of a national industrial base. The production of FAW reached 15,000 units in 1958, about equal to the 1953 production volume at Nissan and Toyota (Cusumano, 1985). Looking back, the FAW was not very far behind the Japanese at that time. Both Nissan and Toyota started their postwar transition from trucks to passenger cars. The FAW, however, produced essentially the same truck for 30 years with very little development in production on passenger cars. The primary reason was because the country had high demand for trucks and utility vehicles for military and economy development, but had relatively small demand for passenger cars, since only high level government officials and diplomats needed cars. Ordinary residents were prohibited and could not afford to own a car.

With the establishment of FAW, the Soviet Union essentially transferred a complete motor vehicle manufacturing system to China and thus helped China skip the early phase of world motor vehicle industry development, so that China directly entered the industrial production phase. Following FAW, China continued to build the automotive industry by building more automobile manufacturing factories in other industrialized cities such as Beijing, Nanjing, and Shanghai. All these factories also focused on trucks and utility vehicles.

Major Policy Swing from Openness to Isolationism

The Chinese government initially encouraged the industry to adopt foreign methods and experiences. Besides the Russians, FAW also had early talks with the French on truck technology. New automotive factories were primarily built in urban and industrialized

areas. The relationship between China and the Soviet Union began deteriorating beginning in the late 1950s, and broke up in the early 1960s with the complete withdrawal of the Soviet experts. Governmental policy on the automotive industry experienced major swings as Chinese leaders feared the susceptibility of foreign attacks of the country's large-scale automotive plants in major cities. From then on, new automotive factories built were small-scale and located in remote and mountainous areas to avoid possible foreign attacks. In addition, China adopted a self-reliance policy and required all local governments to have a "small, but complete" industrial system in their own province. As a result, small-scale factories proliferated widely all over the country as local governments competitively set up automotive plants in their regions (Harwit, 1995). Small-scale factories could not leverage economics of scale, and therefore were inefficient.

The policy swings following the break with the Soviet Union had serious detrimental impacts to the future development of the industry. In fact, the Chinese government later has spent more than 20 years, still unsuccessfully, to undo the impact. The result has been a highly fragmented domestic industry that produces low quality, low technology, though perhaps durable, automobiles.

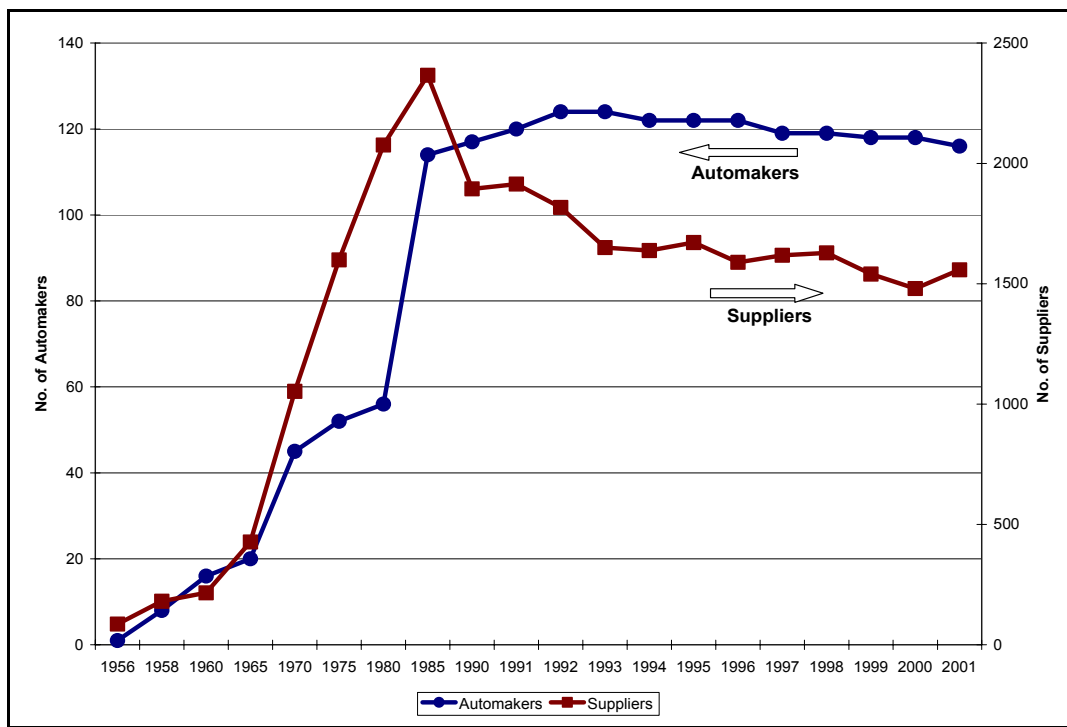
In 1964, the Chinese government approved the creation of the Second Auto Works (SAW), later renamed it to Dongfeng Motor Corporation (DFMC) in 1965, and began to build the second national large-scale automotive manufacturer in 1967. DFMC was located in Shiyan, Hubei Province, also an isolated and mountainous region. The DFMC was completely Chinese-built with technology and experiences learned from other domestic Chinese manufacturers. This is a good example of domestic technology transfer within the Chinese automotive industry. Nearly 98% of DFMC's 20,000 pieces of equipment were made in China. Many were newly developed, including many automatic production lines, also an indication of the progress made during its first two decades of the new China in the machine manufacturing industry (Xue, 1988).

Formation of Fragmentation

Following the establishment of the DFMC, the number of small-scale factories continued to increase as China continued to build up its automotive industry. Fixed asset investments in these small firms were very low. Many of the small factories started out as automotive repair shops with old plants and equipment. Many small firms established themselves first, and then pressed the central government to grant approvals. Their products were outside the national automotive catalogue, but could still be commercialized under protected regional markets (Wang, 2001).

Figure 6 shows the increase of China's automotive and parts manufacturers from 1956 to 2001. The number of complete automakers in China soared from only 1 in 1956 to 56 in 1980, then to 117 in 1990. Since 1990, the number has been basically flat; it went up to 124 in 1992-1993, and decreased to 116 by 2001. Consolidation occurred in the supplier industry from 1985: the total number of automotive suppliers reduced from an all time high of 2,366 in 1985 to 1,558 by 2001.

Figure 6: Fragmentation of the Chinese Automotive Industry



Source: Chinese Automotive Industry Yearbook 2002.

The problems associated with fragmentation were slowly felt in China and the government has begun to take actions to address this issue. But this is no easy task. In 2002, only seven automakers produced more than 100,000 units; 25 produced more than 10,000 units; and the remaining 91 produced below 10,000 units (74 out of 91 produced below 2,000 units). The average vehicle production size per factory is far below that of developed countries (see Table 4).

Table 4: Comparison of Average Vehicle Production Size

Plant Location	Average vehicle production per plant
North America	149,664
Europe	119,110
Japan/Korea	267,008
S. America	61,198
Emerging Markets	61,364

Source: *Automotive Industry*, February 2002

2.2 Foreign Investment and Internal Protectionism

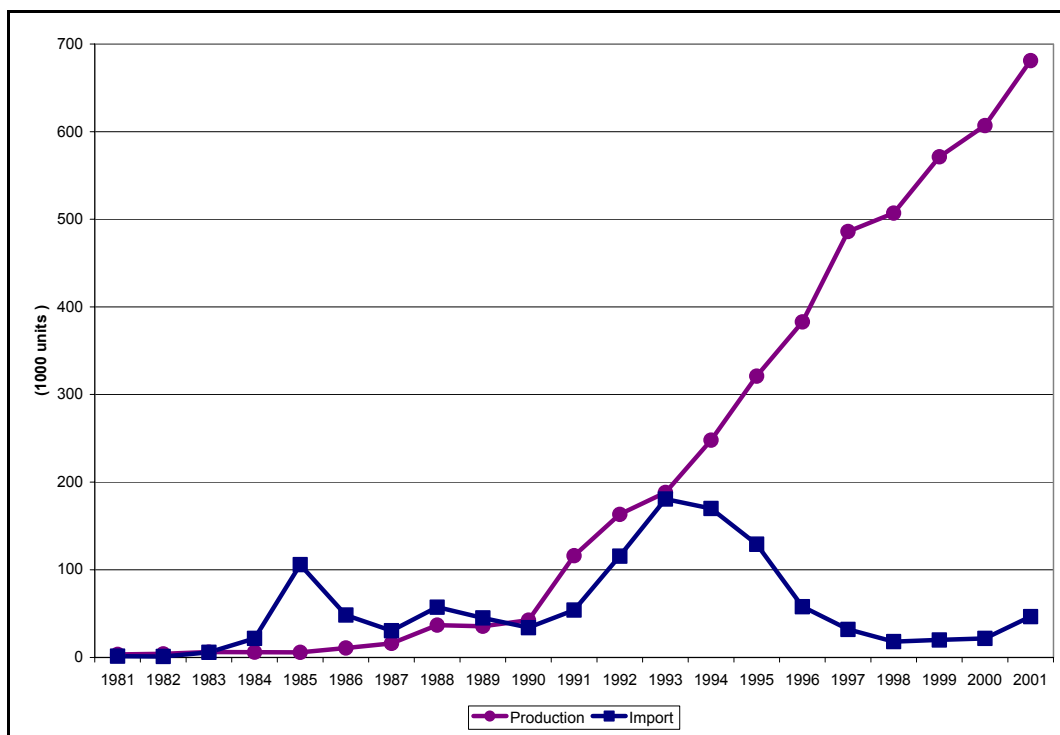
Domestic Car Production and Boom of Imports

By the middle of the 1980s, China basically had an infant passenger car industry and the relatively well-developed truck manufacturing sector. Some trucks are exported to Asian and African countries, but they were not very competitive. They are cheap but do not have very good quality. China started to explore car production in FAW and Shanghai Automotive Industry Corporation (SAIC) in 1958. Actual production was only about a few hundred a year, slowly increased to five thousand a year by 1980 (Harwit, 1995). There was no significant passenger car production until the early 1990s.

In 1978, the Chinese leader Deng Xiaoping began economic reform and the “opening-up” policy, which led rapid economic growth. Demand for passenger cars has increased dramatically as more and more foreign tourists and business people came to China. Because the automobile production in China was truck-oriented, the domestic industry could not meet the increasing demand for passenger cars, which resulted in explosions of imported passenger cars in the mid- 1980s and again in the early

1990s. Figure 7 shows the numbers of imported cars compared with domestic car production from 1981 to 2001.

Figure 7: Passenger Car Imports vs. Domestic Production



Source: China Automotive Industry Yearbook 2002.

However, the imported cars quickly depleted China’s foreign reserve, hard-earned from exports. The *China Automotive Industry Yearbook* (2002) shows that from 1981 to 2001, the country spent USD63 billion for automotive imports (USD48 billion for vehicles, USD15 billion for repair parts). In 1993 alone, the country spent USD5.4 billion to import more than 310,000 vehicles, including 180,000 cars. Taxi companies in particular thirsted for Japanese cars, such as Toyota Crowns and Nissan Bluebirds, because they have better quality and comfort than domestically made cars (Harwit, 1995).

By contrast, a CATARC report, released on November 12, 2002, indicates that the combined total domestic and foreign investment from 1981 to 2001 was only USD26 billion, about one-third of what the country spent for automotive imports. It clearly made

no sense to Chinese leaders to spend capital for importing cars rather than investing in domestic car production. So, China tightened car imports and began to prompt Sino-foreign joint ventures to increase its own domestic car production capacity. In the meantime, global automakers also began to realize the potential of the vast Chinese automotive market and started to explore ways to enter the market.

Emerging of Sino-foreign Joint Ventures

The earliest two Sino-foreign ventures are Beijing Jeep Corporation, formed by the BAW and American Motor Corporation (AMC) (later acquired by Chrysler). This joint venture started in 1984 with USD411 million total initial investment. BAW contributed 58% and AMC contributed 42% for an initial 20 year contract. Two years later, Shanghai Volkswagen was formed between SAIC and German Volkswagen, with USD119 million total initial investment, split evenly between Volkswagen and Chinese side for an initial 25-year contract. It is worthy noting that the Chinese government actively invited Japanese firms (Toyota and Nissan) to enter China and offered incentives to the Japanese. But the Japanese at that time were focusing on their partnerships with American and European carmakers and declined the invitation.

Following Chrysler and Volkswagen, more and more automakers began to invest in China's automotive industry. Fearing that they would lose control, the Chinese government did not allow wholly-owned operations by foreign automakers; foreign equity was not permitted to exceed 50%. Some foreign investors prefer joint ventures for certain reasons, even despite the governmental pressure. Joint ventures that include Chinese partners, necessary to help to understand the functioning of the local market and the business norms, are critical to accomplish goals successfully within the Chinese system and culture.

Fifty years ago, China received a truck production industry through foreign investment and technology transfer from the Russians. China again obtained a car production industry from Americans and Europeans, also through foreign investment and technology transfer. FDI and JVs provided China with crucial opportunities to its

automotive industry to make great strides. Through technology transfer within JVs, the Chinese automotive industry imported many new technologies, including some core technologies for engine and transmission design and development. China's passenger car production steadily increased over the years, reaching 31% of the country's entire vehicle production in 2002 and the Chinese automotive market grew 11.7% annually during the past ten years (Table 1).

Infant Industry Status and Protectionist Environment

In 1987, the government officially set the automotive industry as a pillar industry and entitled it with favorable governmental policies. During the entire 50 year history, the industry was deemed by central government to be a weak industry which needed strong protection from foreign competition. Almost all automakers in China are SOEs which are known to be inefficient and uncompetitive. Under high tariff protection, many SOEs were able to survive, even be profitable, without efficiency or economics of scale. Because of the protection, foreign joint ventures also lacked any motivation to innovate. For example, Shanghai Volkswagen was able to sell an outdated a 70s model, the Santana, for 15 years without significant technologically innovation. There were few private enterprises capable of making cars before the late 1990s since the government basically did not permit private enterprises to enter automotive manufacturing. In the late 1990s, some new private entrants began to emerge but were challenged by shortages of capital.

In summary, after 50 years of development, the Chinese automotive industry is still in its infant stage, far behind the European, American, and Japanese automotive industries. In November 2001, China entered a new era by officially committing itself to the WTO rules. The most significant aspect of the WTO membership is that it will bring market competition and profound challenges to the industry. Some believe that the domestic automotive industry will be crushed by global competition, and many believe the industry will survive and pose major threat to global automakers. I tend to agree with the latter opinion.

CHAPTER 3

CHINA'S PROTECTIONIST POLICIES

Ever since the beginning, the Chinese government has played a vital role in every step of the development of the industry and is heavily involved in micromanaging the industry, including planning and approval of each automotive manufacturing factory (both domestic and joint venture). To understand the impact created by foreign investment and technology transfer, it is necessary to first understand the protectionist policies implemented by the Chinese government over the years.

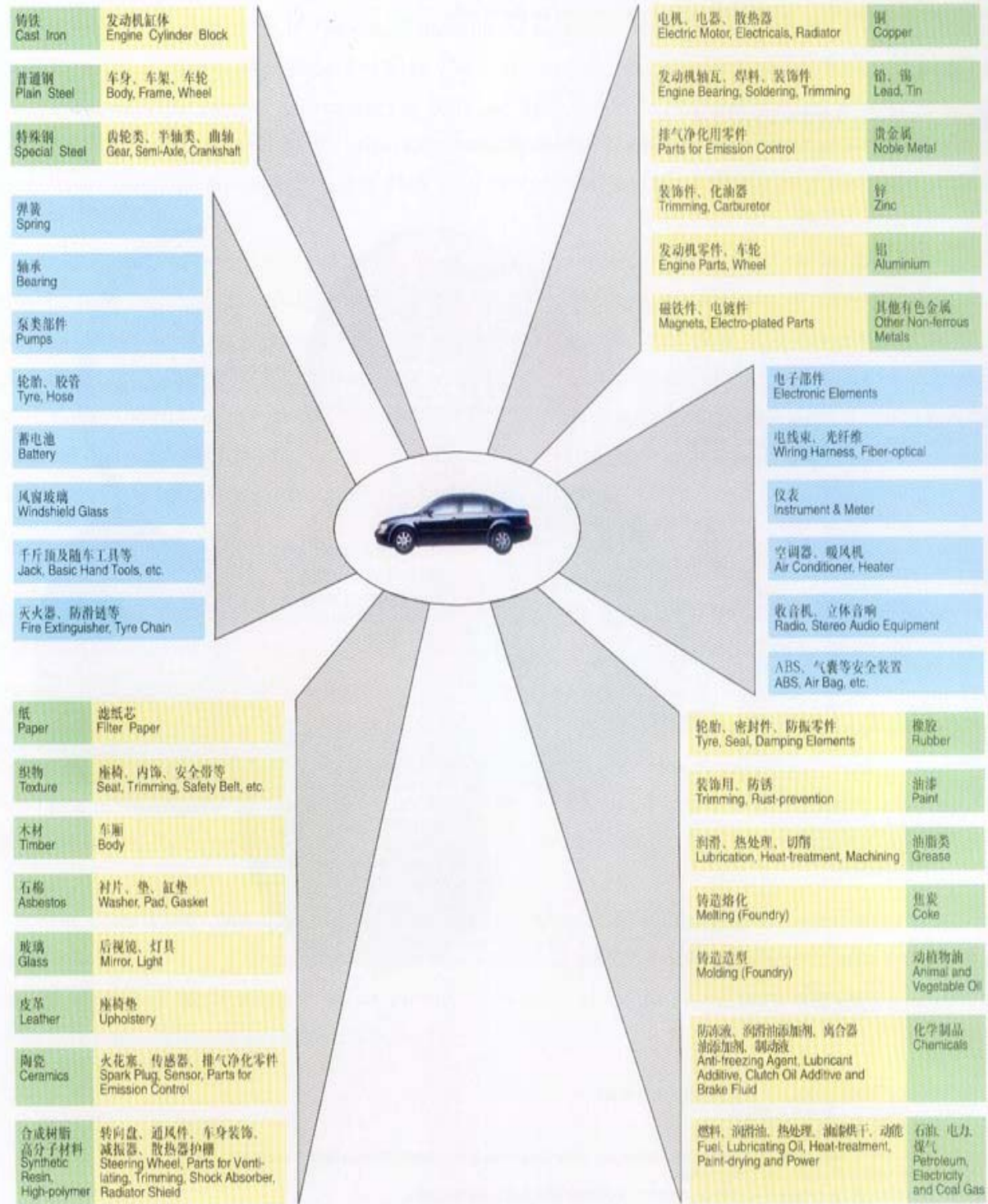
3.1 Pillar Industry Policy

The first important governmental policy on automotive industry is China's official designation of automotive industry as a pillar industry. The Chinese government has long realized the enormous strategic and economic necessity of a well-developed automotive industry. To streamline government leverage and better allocate resources to the development of key industries, in 1987, the Chinese government officially designated several industrial sectors as "pillar" industries, a label that confers the benefits of increased government funding and assistance. The pillar industry policies were reinforced in 1994 and 1999. Pillar industries include machinery, electronics, petrochemicals, automobiles and construction materials. These industries would be developed with strong state support and would provide primary engines for continued economic growth in China. For example, the central government funded more than USD60 billion through the year 2000 to promote domestic capabilities in these industries (BXA, 1998). As pillar industries, these industries receive favorable government support including easier access to capital and priority approval in forming joint ventures and building research and development centers. For key manufacturers, the government also reduces their debt burden by swapping debt for equity and optimizing their capital structure.

Figure 8: Main Materials Used for Automobile Production

● 汽车产品使用的主要原材料

Main Materials Used for Automobile Production



Source: China Automotive Technology & Research Center, November 12, 2002.

The automotive industry is a comprehensive industry and a gigantic system engineering of social economy. A typical car has over 15,000 components. To produce a quality car takes competency in design, engineering, manufacturing, and assembly of all 15,000 components. The quality of cars has been viewed as a yardstick of industrialization and a measurement of overall economic strength of a country.

Research indicates that development of automotive industry would help modernize over 100 sub-industries, both downstream and upstream (Wang, 2003). So, the growth of the automotive industry will give impetus to the development of the related industries and vice versa. The figure shows how car production relates to other industries, which to some extent, reflects the Chinese government's view on the automotive industry.

The pillar policy has given the Chinese automotive industry strong support and attention from the central government to effectively attract FDI. The fact that the industry has successfully attracted almost all global automakers to invest in China over the past 15-20 years confirms that the pillar industry policy has achieved, at least partially, what it intended to achieve. The Chinese government has been working closely with the automotive industry in contacting, negotiating with, and selecting foreign partners for Chinese firms. The government has provided extensive resources to help the industry grow.

3.2 Automotive Industry Policy

The Chinese automotive industry grew under defensive and self-reliance policies which had resulted a largely fragmented and decentralized industry layout. Small-scale productions were spread around all of China and had no economies of scale. Starting in the early 1990s, more and more foreign investors became interested in the industry. To consolidate and protect the industry and effectively manage FDI, the State Planning Commission (SPC) issued the "Industrial Policy for the Automobile Industry" on February 19, 1994. This major governmental policy allowed government to impose more leverage and control on the development of the industry and direct FDI to projects China deemed critical. The approach was modeled on that of Korean industrial

development in the 1970s when the Korean government urgently sought to attract foreign funds, technology, and management to boost its greatly lagging Korean automotive industry (Wang, 2001). The policy is often referred as China's "Automotive Industry Policy" and provided a legal foundation to allow the government to better navigate the industry out of its situation.

Industry Development Control

The Automotive Industry Policy established a list of product categories that government deemed important and marked them with high priority for development. A system was introduced whereby automotive enterprises had to apply for the authentication of their products before they could sell them to market. Once authenticated, specific vehicle models are entered into a nationwide catalogue which is used by public security bureaus to issue licenses for motor vehicles (Nee, 2002). Through the product development control, the government guides the industry to focus on certain product mixes deemed critical by the central government, preventing automotive enterprises from developing other things less desired by the government.

FDI Screening and Approval

The Automotive Industry Policy intended to attract those foreign investors that the government deemed appropriate. The policy required that all foreign investments in the automotive field must be approved by the central government. The central government would only approve those programs that conformed to the policy. Chinese domestic automakers were directed to look for foreign firms that have:

- product patents and trademarks,
- product development and manufacturing technology,
- independent international sales and distributions, and
- strong financial capabilities.

When forming joint ventures, the policy requires that joint ventures:

- set up a research and development arm,
- produce products meeting international technical standards,
- be able to balance their foreign exchange independently,

- provide preferential status for domestic parts and components, and
- have at least 50% of the venture's equity from the Chinese side.

The goal of FDI screening and approval is to select those global firms that truly are competitive players with strong technology and financial capabilities. The FDI control effectively prevents undesired foreign firms from entering the Chinese market. The policy also requires foreign firms to transfer technology to joint ventures for product development (not just assembling in China) and must export China-made products. The fact that China was able to successfully implement these measures indicates that China is a buyer's market and the Chinese government has been able effectively leverage their market power to select the best investors. Many foreign investors are somewhat blind about the potential of the Chinese market. Some think as long as they have a presence in China, they would be able to sell products to the mass Chinese market.

Import Control and Export Incentive

The Automotive Industry Policy controls automotive imports and encourages exports. Imports tariffs were kept very high (over 100% for most foreign made cars and components) and only four seaports (Dalian, Tianjin, Shanghai, and Huangpu) were permitted to import complete vehicles. This centralized import control to ensure that the numbers of imported vehicles were within planned quotas. Imported vehicles must pay customs duties, except for diplomatic vehicles. All imported vehicles must be inspected for quality, with each vehicle issued an "Inspection and Quarantine Certificate for Entering Commodities" as well as a "Car Attaching Inspection Certificate." This latter document accompanies the car throughout the distribution process in China and must be used to register the car for a license in its city of use (Nee, 2002).

The policy also established a localization requirement for automotive joint ventures whereby the tariffs on imported parts and components were determined by the percentage of the total value of locally made items over the car's final value. The higher the percentage of local content value, the lower the tariff would be. Table 5 shows the tariff rates based on the percentage of local content:

Table 5: Local Content and Import Tariff

Local content	Tariff for imported components
Above 80%	40%
60-80%	60%
Below 60%	75%

Source: *Import Vehicle Market Handbook*, Beijing Transportation Press 1997

Implementation of the Automotive Industry Policy

Unlike in developed countries where such industry policy would be constituted into law or formal regulations, in China, the policy was implemented as an internal domestic policy, primarily due to the central planning and controlling nature of China's political system. However, even though this was just an internal process instead of law, it was implemented very effectively and successfully because of the central approval authorities. It was implemented by a series of notices from relevant departments such as the State Administration of Taxation, and the General Administration of Customs. Because of the policy is internal, foreigners often are not fully aware of their ramifications and must rely upon their Chinese partners. For example, when General Motors was negotiating its Shanghai project, there was no written information available on how the Chinese Customs would apply the localization rules on tariffs for imported automotive parts. The only source of information available was the Chinese partner SAIC, which had experience in dealing with the system and was probably involved in China's policy-making process as well (Nee, 2002).

In preparation for entry into the WTO, China has gradually formalized some of these previously internal measures included in the Automotive Industry Policy. In 1997, a formal regulation was issued which centralized control of the automotive projects approval process. The published regulation formally required that the SPC and State Economic and Trade Commission (SETC) must approve all automotive projects regardless of the source of funding, the amount of funding, the type of construction involved, or the type of assembled product (Nee, 2002). Later in 1997, China issued regulations formalizing the taxation based on local content for domestically produced vehicles. Clearly, China did not plan to give up these controls in the WTO negotiations.

However, these newly created regulations became obsolete and were overridden by the WTO Agreements in November 2001.

3.3 China's 10th Five-Year Plan

The most recent and important governmental policy is China's 10th Five-Year Plan (FYP), released to the public in June 2001. China uses a five-year planning system for most major economic development and resource allocations. The 10th FYP serves as the master plan for economic planning and development for 2001 to 2005.

Background of the 10th FYP

The Automotive Industry Policy, implemented since 1994, has effectively allowed the government to control product development and foreign investment in China. The Chinese government has paired their large-scale domestic automotive manufacturers with global automakers. In some cases, global automakers competed for certain Chinese partners and final decisions usually were made by the central government (similar to arranged marriages).

However, the landscape of the industry was still largely fragmented and decentralized. The total number of whole vehicle manufacturers remained around 120 (with a slight drop to 116 by 2001). Governmental goals of consolidation and restructuring largely failed. There are two possible explanations. First, the industry has been treated as an infant industry and received high-tariff protection from foreign competition. Because of the protection, automobile prices in China were much higher than outside free-market prices. Many Original Equipment Manufactures (OEMs), although inefficient and uncompetitive, were able to make enough profit to survive. The *Chinese Automotive Industry Yearbook 2002* reports that about 65-70% of enterprises across the automotive industry (including OEMs and suppliers) were profitable in 2001. Clearly, that percentage would be expected to decrease in the post-WTO era. Second, the reason why the 30-35% of enterprises that remain could stay in business, not be bankrupted, is because most of them are SOEs and are subsidized by the central government and/or

regional and local governments to avoid bankruptcy and massive layoffs. As China proceeded in its WTO negotiations, government officials may have realized they would lose their leverage by China's accession to WTO. Also the industry would not have sufficient time to grow stronger before facing competition from global players. Hence, a rushed and ambitious consolidation plan was included in the 10th FYP.

Objectives of the 10th FYP

In June 2001, China released the *10th Five-Year Plan for National Economic and Social Development*⁴ where all government units across China set forth specific administrative industrial and development plans for the years 2001-2005. The FYP specifically called for governmental efforts to streamline the automotive industry by consolidating or eliminating small and unprofitable firms to form a few large and strong players. The SETC issued the FYP report with the following ambitious goals set for organizational and restructuring of its automotive sector:

“The establishment of two to three large internationally competitive automotive enterprise groups by 2005. These large enterprise groups will have over 70% of market share. Sales and after-sales service systems will be in conformity with international practice. Five to ten large automotive parts enterprise groups will be built and top three producers of key parts will have over 70% of the domestic market share. Parts exports should account for 20% of these companies' total sales. Three to four motorcycle enterprise groups with strong international competitiveness will be established as well.”⁵

Along with the 10th FYP, relevant government agencies published policies and measures to inject competition, restructuring and technical innovation into the automotive industry (Wang 2003). The 10th FYP marks the first time that China laid out a blueprint for industry consolidation that has broad implications for both domestic enterprises and joint ventures with foreign firms. Under the plan, more than 100 small

⁴ Original Chinese text of the 10th FYP was published at *The People's Daily* on June 26, 2001.

⁵ As translated by Owen D. Nee of Goudert Brothers LLP.

automotive firms in China would be closed or merged into existing three largest automotive groups: SAIC Group, FAW Group and DFAC Group. These three groups and their joint ventures will constitute 70% or more market share of the country's production. The 10th FYP projects that China's total automotive output will increase significantly in the five-year period. The total output by 2005 is forecasted to be about 3.2 million units, including 1.1 million passenger cars.

With the 10th FYP, China is trying to solve the historical automotive industry problems by forcefully grouping those domestic automakers deemed hopeful together, and closing those deemed hopeless. The industry has been under protection for 50 years but still is not mature. It is not clear if Chinese leaders had realized that the lack of competition under the strong government protection was causing the problems. It is doubtful if China would be able to achieve the objectives within the five-year term (2001-2005) given the strong regional protection to their local industries. Thanks to the WTO membership, the consolidation process has definitely been placed on a fast track as real market forces enter the system.

CHAPTER 4

STATUS OF THE CHINESE AUTOMOTIVE INDUSTRY BEFORE WTO ACCESSION

Although the automotive industry has made remarkable developments in recent years, it is still has low productivity, small production size, and an inefficient structure. This chapter provides information and data illustrating the current status of China's automotive industry, before the full impact of WTO membership is felt.

4.1 Domestic Car Production

China has developed capabilities of producing series of automobiles in large batches, including heavy- and medium-duty trucks, light vehicles, mini-buses, cars, coaches, and motor vehicles for special purposes. Among them, the car segment has had the most significant recent development. Table 6 lists the major car assembly projects in China in 2002 and their respective products and capacity.

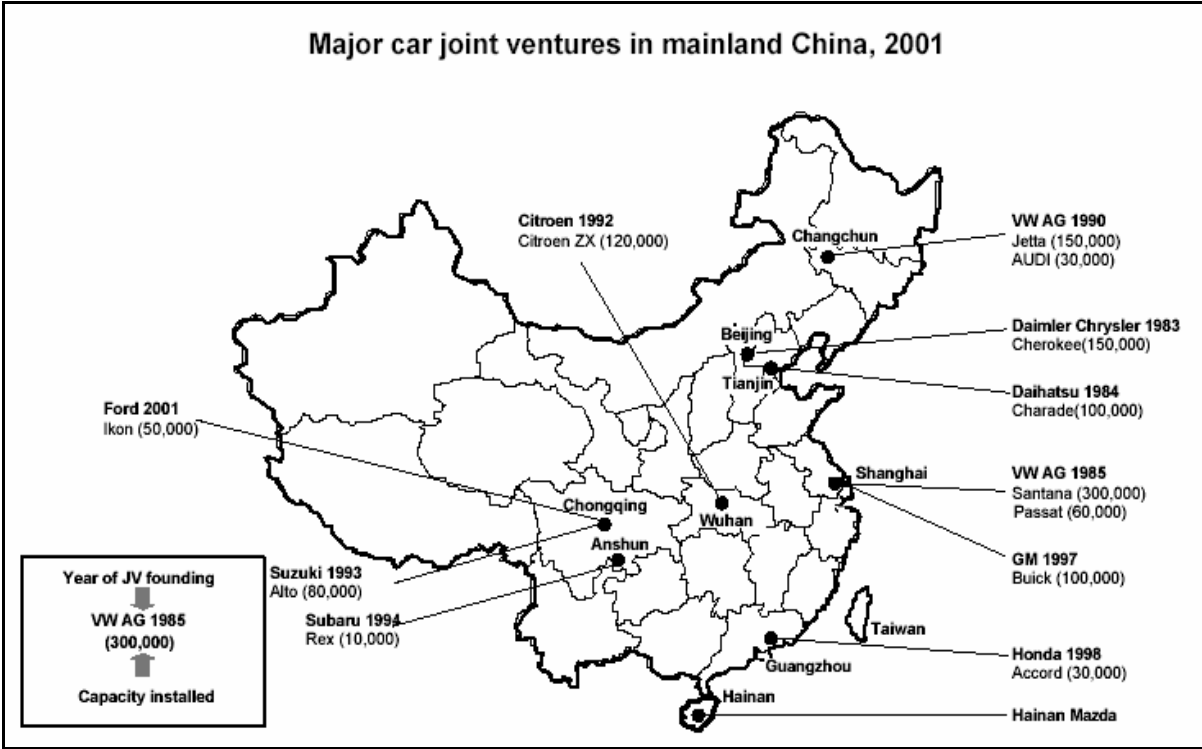
Table 6: Major Car Assembly Projects in China 2002

Company	Foreign Partner(s)	Products	Capacity
FAW-Volkswagen Automotive Co.	Volkswagen	Jetta, Bora, Audi	200,000
Dongfeng Motor Corp.	PSA	ZX/Fookang, Picasso	150,000
	Nissan	Fengshen (Bluebird)	30,000
Shanghai Automotive Industry Corp	Volkswagen	Santana, Passat, Polo	450,000
	General Motors	Buick Century, Sail	150,000
Tianjin Automotive Industrial Co.	Daihatsu	Charade	150,000
	Toyota	NBCV	30,000
Guangzhou Honda Automobile Co.	Honda	Accord, Odyssey	75,000
Chang'an Automobile Co.	Suzuki	Alto, Swift	150,000
	Ford Motor	Fiesta/Ikon	30,000
Geely Group	--	Haoqing, Merrie, Ulio	200,000
SAIC-Qirui Automobile Co.	--	Chery	50,000
Guizhou Aviation Industry	Fuji Heavy	Skylark	50,000
Yuejin Auto Group Corp.	Fiat	Palio	30,000
	--	Eagle/Unique	30,000
FAW Hainan Motor Co.	Mazda	323/Premacy	50,000
Jiangsu Yueda Group Co.	Hyundai/Kia	Pride	30,000
Brilliance China Automotive Holding	--	Zhonghua	30,000
Shanghai JMStar Group	--	Meilu	30,000
Hafei Auto Manufacturing Co.	--	Baili, Saima	30,000
Jiangxi Changhe Suzuki Automobile	Suzuki	Beidouxing (WagonR)	30,000
Xian Qinchuan Automotive Co.	--	Flyer	30,000

Source: China Association of Automakers, China Business Update, 2002.

The table above shows that the total car production capacity has exceeded 2 million units overall. But China's actual car production in 2002 was only 741,000 units, below 40% of its capacity. In China, both over-capacity and high demand of vehicles co-exist, which indicates a mismatch between market demands and what the industry can deliver. So far, the industry, as directed by government, has focused on passenger car models for institutional purchases, while at the same time market demand for private consumers has soared. For example, Dongfeng Citroen had the capacity of 150,000 units per year but their output was only 85,000 units in 2002. This problem affects almost every joint venture. The root of this problem is the lack of the right product for the market's needs, compared to product economies of scale. Most of the automobiles and passenger cars defined by the government are still beyond the means of the average consumers in China. The overcapacity issue is getting worse as reported by the RolandBerger Strategy Consultants that although the average capacity utilization was below 50%, an additional extension of 400,000 units were planned for the next 5 years (Xu, 2001).

Figure 9: Location and Capacity of Major Joint Venture 2001



Source: RolandBerger Strategy Consultants, 2001

Figure 9 shows the location of major car production joint ventures and their respective founding year and production capacity in 2001. Comparing the capacity information reported in Table 6 and on Figure 9, it shows that production capacity in all SAIC, FAW, and DFAC increased from 2001 to 2002.

Level of Fragmentation

The industry layout remains largely fragmented despite aggressive efforts from the central government. The number of whole vehicle manufacturers remains as high as 116 by 2001. Table 7 lists the top 10 automotive manufacturers in China and their market share in 2002. The combined market share of the top 10 firms is about 85%, which means the remaining 106 firms have only 15% of total market share. There are still many small-scale manufacturers with annual production below 1,000 units.

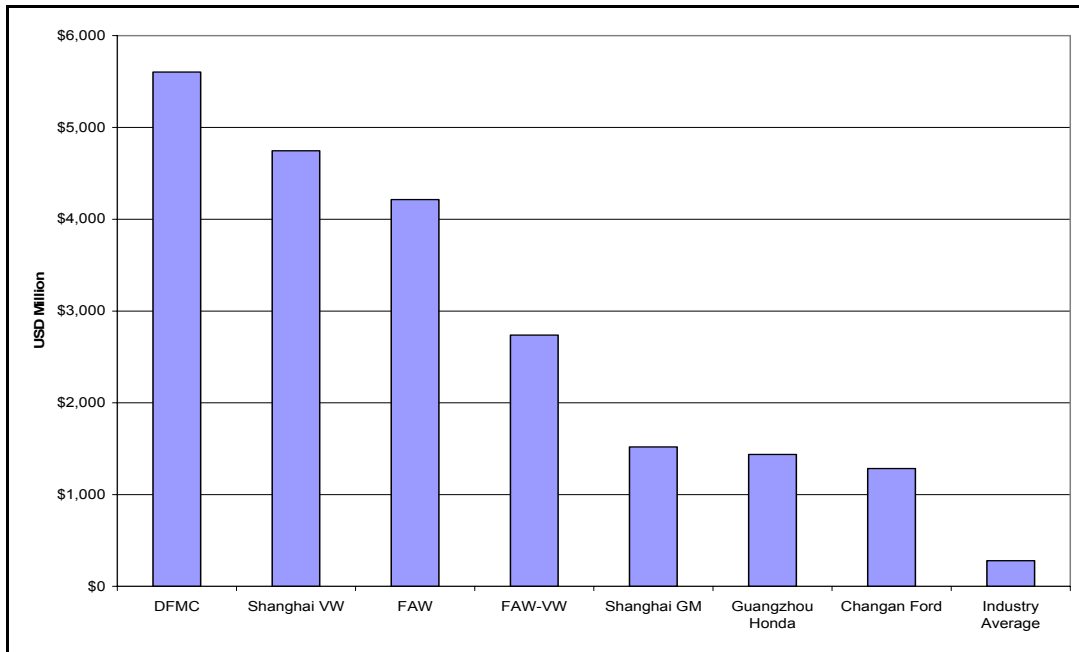
Table 7: Top 10 Automotive Manufacturers and Market Share, 2002

<i>Top 10 Chinese automotive manufacturers</i>	<i>2002 Total Auto Sales</i>	<i>2002 Market Share</i>
Shanghai Auto Industry Corporation	610,157	18.9%
FAW Group Corp.	565,493	17.9%
Dongfeng Motor Corp.	415,714	13.3%
Chana Automobile Liability Co., Ltd.	307,578	10.5%
Beijing Automotive Industry Group Co.	180,531	5.8%
Harbin Hafei Automotive Co., Ltd.	175,055	5.5%
Changhe Aircraft Industries Co., Ltd	150,198	4.9%
Tianjin Automotive Industry Co., Ltd	101,799	3.0%
Jinbei Auto Holding Co., Ltd.	84,483	2.7%
Nanjing Auto Co., Ltd.	83,538	2.7%

Source: China Automotive Technology & Research Center, 2003.

Focusing on the top 7 firms, Figure 10 illustrates the industry fragmentation, by comparing revenue data of the top seven firms with the industry average revenue (USD280 million).

Figure 10: Revenue of Major Automakers 2001



Source: Chinese Automotive Industry Yearbook 2002.

In his recently published book *Selling China: Foreign Direct Investment during the Reform Era*, Professor of Yasheng Huang of the Harvard Business School studied the fragmentation of the Chinese auto industry by comparing the industry concentration levels of the automotive industries of Brazil, Japan, and Korea during similar development periods. Table 8 indicates the four country comparison of industry concentration level of the top one firm, top two firms, and top three firms. The data reveal that China's industry concentration level has been lower than that of other three countries. The top three firms in Brazil and Korea were able to achieve a very high level of oligopoly (90+% market shares). Similarly in Japan, the top three firms were able to control 72.8% market. However, in China, the top three firms only accounted for about one-third of the market. The situation has been improved lately, with the top three firms accounting for 50% of the total market in 2002. There are simply too many auto players in China which have dragged the whole industry down, from developing into fully integrated, large-scale, efficient operations.

Table 8: Concentration Ratios of the Automotive Industry (%)

		One-Firm ratio	Two-Firm ratio	Three-firm ratio	Market size (million units)
Brazil	1959	24.8	42.7	60.6	0.42
	1970	56.1	74.3	91.2	
Japan	1960	32.1	56.1	65.1	0.41
	1975	33.7	63.6	72.8	6.94
Korea	1975	54.6	77.7	96.4	0.97
	1986	71.3	88.6	97.9	
China	1985	19.2	38.0	43.0	1.07
	1992	13.1	26.0	32.1	
	1995	12.6	23.6	33.3	
	1998	14.7	25.4	34.4	
	2002	18.9	36.8	50.1	

Source: Yasheng Huang, *Selling China: Foreign Direct Investment during the Reform Era*, 2003.

4.2 China's "Big Three"

The Tenth Five-Year Plan of China's automotive industry presents a consolidation plan whereby the Chinese government was determined to shake up the industry and restructure them into three large-scale groups that will at least have 70% market share. The ultimate goal is to create a Chinese version of the "Big Three" American automobile makers. Table 9 lists the top three automotive players in China and their market share in total automotive production and car production (including production from joint ventures). The data show that the Big Three have 50% overall market share and 78% car production share. The high concentration levels enjoyed in car production industry could be attributed to the dominance of a few global players. Significantly, Volkswagen alone takes more than 50% of the market, by partnering with 2 of the Chinese Big Three automakers.

Table 9: Top 3 market share 2002

	Total	Car
SAIC Group (JVs with VW and GM)	18.9%	38.3%
FAW Group (JV with VW)	17.9%	29.0%
DFMC Group (JV with Citroen)	13.3%	11.7%
Top 3 Total	50%	78%

Source: China Automotive Technology & Research Center, 2003.

The Chinese government will no doubt give the Big Three considerable advantages on both policies and resources to allow them to expand and take over small firms. Many current small automakers will be either closed or integrated into the Big Three.

Table 10 gives a snapshot of the makeup of the Big Three's car production by the end of 2002. As industry consolidation and re-organization continues, the compositions of the Big Three are likely to change over time.

Table 10: The Big Three of China's Car Industry

Group/ Car maker	Location (city)	Description	2002 market share
FAW Group	Changchun		29.0%
FAW VW	Changchun	A joint venture between VW and FAW which holds 60 % of shares	17.9%
FAW Xiali	Tianjin	FAW has held 51 % of shares since June 2002	8.2%
Tianjing Toyota	Tianjin	FAW Xiali (holding 50 % of shares of Tianjin Toyota)	0%
FAW Cars	Changchun	Listed company of FAW	
FAW Hainan Auto Co.	Haikou	Wholly owned subsidiary company of FAW	2.9%
DFAC Group	Shiyan, Hubei		11.7%
Dongfeng Citroen Auto	Wuhan	Dongfeng holds 32%	7.0%
Fengshen Auto	Guangzhou	Dongfeng holds 60%	3.2%
Dongfeng Yueda Kia	Yancheng, Jiangsu	Dongfeng holds 25%	1.5%
Dongfeng Nissan	Wuhan	Dongfeng may hold up to 50 %	0%
SAIC Group	Shanghai		38.3%
VW Shanghai	Shanghai	SAIC holds 25 % of shares	24.7%
GM Shanghai	Shanghai	SAIC holds 50% of shares	9.5%
Chery SAIC	Wuhu, Anhui	SAIC holds 20 % of shares but is not involved in management	4.2%
Yantai GM Daewoo Project	Yantai, Shandong	Would- be venture with GM Shanghai	0%

Source: China Automotive Technology & Research Center, 2003.

The table reveals that the organizational structure of the Big Three is quite complex, and would be even more complex if commercial vehicle production is added into the table. All of them are geographically spread around China, with FAW group encompassing the widest geographical distance, from their most northern city of Changchun to their most southern city of Haikou. Different equity holding, partnership, and management formats were employed, and all three are involved with multiple foreign partners. No public information was found to show how the big groups were formed and what kind of synergies could be developed from subsidiaries within each group. It is difficult to predict how well the Big Three will evolve over the coming years;

however, judging from their organizational structures, they are bound to face tremendous challenges.

4.3 Industry Profiles

2001 Industry Profile

Table 11: Chinese Automotive Industry in 2001

	Number of Firm	% of Unprofitable Firm	Total Industry Revenue (\$M)	Average Revenue Per Firm (\$M)	Average R&D Expense
Whole vehicle	116	31.0%	32,469	280	1.3%
Retrofitter	525	37.7%	4,487	9	1.2%
Motorcycle makers	148	36.5%	8,711	59	0.5%
Engine makers	54	35.2%	1,276	24	1.2%
Suppliers	1558	28.4%	11,606	7	1.6%

Source: Chinese Automotive Industry Yearbook 2002

Table 11 lists the industry profiles of the Chinese automotive industry in 2001. Compared with developed countries, the size of the industry is quite small. The combined revenue of all 116 automotive manufacturers is only about USD32 billion, which is about one-sixth of that of General Motors. The striking characteristics are that about 30% of firms are unprofitable across the industry, and the average size of firms is extremely low, indications of diseconomy of scale. It is reported that components made in China cost 10-20% higher than world standards despite the cheaper labor costs in China (Murphy, 2003). Given the average revenue of USD7 million, it is easy to conclude diseconomy of scale is a major factor for the high supplier costs. The table also illustrates that R&D expense is low across the industry, ranging from 0.5% to 1.6%.

2001 Joint Venture Profile

Table 12: Profile of Joint Ventures and Foreign Wholly-Owned Firms 2001

	Number of Firms	% of Unprofitable Firm	Total Revenue (\$M)	Average Revenue per Firm (\$M)	R&D Expense
Whole vehicle JVs	21	23.8%	11,720	558	1.4%
Retrofitter JVs	20	25.0%	169	8	0.7%
Motorcycle maker JVs	10	50.0%	703	70	0.2%

Engine maker JVs	9	22.2%	257	29	0.1%
Suppliers JVs	148	21.6%	3,172	21	2.2%
JV Total	208	23.6%	16,020	77	1.5%
Engine makers wholly-owned	1	0.0%	62	62	0.2%
Suppliers wholly-owned	20	0.0%	589	29	0.8%
Wholly-owned total	21	0.0%	650	31	0.8%

Source: Chinese Automotive Industry Yearbook 2002.

Table 12 illustrates the profile of Sino-foreign joint ventures and foreign wholly-owned firms in China's automotive industry. China does not yet allow wholly-owned foreign operations in vehicle assembly and manufacture of major components, except for certain less important parts. Comparing the two tables above, it can be seen that the total revenue of joint ventures makes up about one-third of that of the entire industry. In general, the average firm size joint venture is bigger than industry average, but it is still small to reach any sensible scale of economy.

A clear and distinct point the table reveals is that 23.6% of the joint ventures lost money in 2001, while 100% of wholly-owned firms were profitable. This suggests that wholly-owned firms are operated in a more efficient manner. In addition, any continued lack of profitability of these JVs would require re-evaluation of the firm's strategy. The table also reveals that average revenue of joint ventures and wholly-owned firms is fairly small and that very little was spent on R&D.

Although foreign carmakers do not have majority ownership, they have tremendous discretion on the operation of joint ventures because they hold the intellectual property rights and technology. Over the years, the Chinese government also loosened up some policies which would allow foreign partners to impose more influence over the management of joint ventures. For example, Citroen, which holds 25% in Dongfeng Citroen, controls important management activities such as sales, purchasing, finances, as well as technology transfer, production control, and quality control. Similar situations can be found in many other automotive joint ventures in China.

Product Quality and Cost

With the high local content requirement and the generally poor industrial manufacturing capabilities China has had, the product quality and cost are of great concern to many foreign carmakers. Their JV products have lower quality but higher cost, compared with world standards, particularly because of their parts cost is higher.

So why are automotive parts costly while China provides the cheapest labor, and prices for goods are generally falling across all markets in China? One explanation is that each of the 116 automakers in China has its own, exclusive suppliers, which goes back to this same issue of fragmentation and diseconomy of scale. Furthermore, under national and regional protections, suppliers tend to be locked into contracts to supply a single automaker, giving them a virtual monopoly on that business, and therefore are able to charge what they like for components (Access Asia, 2003).

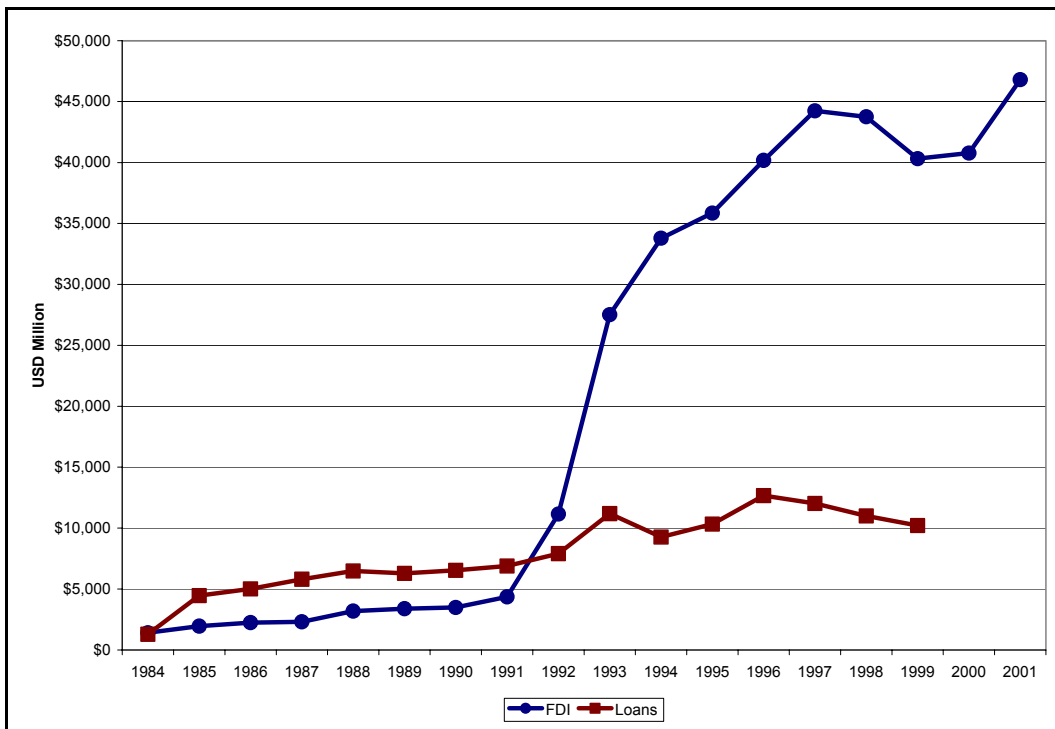
Under WTO rules, many small-scale suppliers are expected to be pushed out or absorbed into bigger suppliers. With strong market competition and pressure from government, the industry is unavoidably heading to mass integration and consolidation during the coming years. Even though Chinese suppliers are not as competitive as global automotive suppliers, most global companies realize that a strong local supplier base is needed for long term competitiveness on both cost and quality. At least local suppliers should have lower freight costs and faster supply.

In summary, China has successfully established a few large-scale automotive manufacturers with sizeable operations. The Chinese version of the Big Three automakers began to emerge as the Chinese government aggressively pushed for industry consolidation and restructure. However, the size of the industry is still small and the industry is by and large very fragmented and without economies of scale.

CHAPTER 5 FOREIGN INVESTMENT

China started its economic reforms and opening-up policy in 1978. Chinese leaders quickly realized that China seriously lacked financial resources and they had to rely on foreign capital for the economic development. Before 1991, China was able to attract on average USD3-4 billion each year in foreign direct investment. The government also used foreign loans for infrastructure development in order to improve its abilities to attract more foreign investment. Starting in 1991, China has seen significant soaring of FDI to its economy, as shown in Figure 11. In 2001, FDI to China surpassed that to the U.S. and China became the recipient of the largest proportion of FDI in the world.

Figure 11: FDI and Foreign Loans to China



Source: 2001 Report of Transnational Corporations' Investment in China.

5.1 FDI to Automotive Industry

Chinese leaders realized that FDI is the only way to boost the automotive industry and made tremendous effort to attract global automakers to invest in China. FDI to the automotive industry began to accelerate sharply from 1992, and the accumulated investment reached USD20.9 billion by 1998 (Wang, 2001). Research also indicates that about two-thirds of FDI during the period 1981-1996 came from Europe, the U.S. and Japan, and the remaining one third was from Hong Kong, Taiwan, and other Asian countries (Wang, 2001). Investments from Europe, the U.S., and Japan have brought advanced technologies to China and created an oligopolistic position in China's car production industry (thanks to the Automotive Industry Policy which limited number of Chinese automakers for car production). In contrast, investments from HK, Taiwan, and Asian countries focused on labor intensive and less- sophisticated technologies, primarily for simple components, motorcycle assembly, and special vehicle retrofitting.

To a large extent, China was very successful in leveraging its market power to use foreign investments to fulfill their goals. Since the early 1980s, China has seen three waves of foreign investment to its automobile industry. The first wave of investment began in the mid-1980s and included the establishment of Beijing Jeep and Shanghai Volkswagen. The second wave came in the early 1990s, when FAW-Volkswagen, Guangzhou Peugeot, and Dongfeng-Citroen came into existence. The third wave dates to the late 1990s when GM, Honda, Toyota, and Ford secured their respective deals creating GM Shanghai, Guangzhou Honda, Tianjin Toyota, and Chang'an-Ford.

Besides foreign investment, China has seen the emergence of significant domestic investment since the late 1990s. They are not from the central government, but from private Chinese investors and regional governments. The past two years have seen the emergence of new carmakers: Geely Group, Brilliance China, Jiangsu Nanya, Yueda-Kia, and Shanghai Qirui. All these private enterprises entered the automotive market with approval from the central government, and attempted to compete with low-end, inexpensive cars for mass Chinese consumers.

With all these waves of investment, China's automotive market has become the front line of global competition. With China's entry to the WTO, another new wave of foreign investment is pouring in to the country's automotive sector with a much wider spectrum. New areas of investment include sales, distribution, and after-sales services, such as automotive financing and insurance. For example, Ford's Hertz rental car division opened offices in Beijing, Guangzhou, and Shanghai in 2002. Volkswagen Finance, General Motors Acceptance Corporation., and Ford Motor Credit Co. have all set up offices in China (Xing, 2002).

5.2 Major JVs in China

A research report (Wu, 2003) published by the China Automotive Technology and Research Center summarized major Sino-foreign automotive joint ventures according a "six plus three" framework. The framework illustrates that the world automotive market is predominantly controlled by six large companies: GM, Ford, DaimlerChrysler, Toyota, VW and Renault-Nissan; and three smaller companies: Honda, PSA, and BMW. The production of these nine companies accounts for around 95% of world production. The research concludes that the development of China's car industry is significantly affected by the existing structure of world automotive industry and the "six plus three" framework is also imprinted in China's car industry. Likewise, the nine companies, through their joint ventures in China, also control over 95% of China's car market. Table 13 on next page lists the major Sino-foreign joint ventures and cooperative enterprises indexed by the nine global companies.

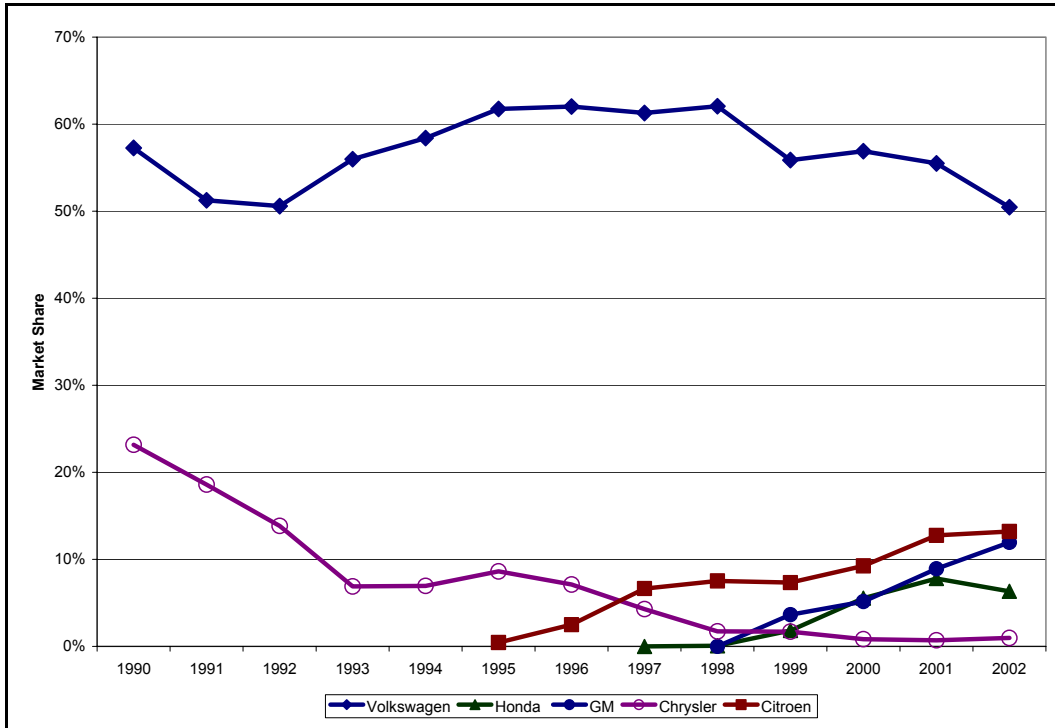
The table clearly reveals that all the major global automakers have entered China at this time. Comparing the table with the top 15 global vehicle makers reported by the U.S.-published *Automotive News 2002 Market Data Book*, all 15 are included. The table groups Fuji Heavy Industries and Fiat with GM, Mazda with Ford, Hyundai and Mitsubishi with DaimlerChrysler. Figure 12 indicates the market share of global carmakers in China from 1990 to 2002. Volkswagen established very strong first-mover

Table 13: Joint ventures or cooperative enterprises in China's car industry, 2002

Global companies	JVs or cooperatives in China	Key products	Notes
GM	Shanghai GM	Economy and intermediate cars	A joint venture between GM and SAIC with equal shares.
	GM Shanghai Dongyue Auto Co.	Economy cars	A joint venture among GM, SAIC and GM Shanghai with share proportions of 25%, 25% and 50% respectively.
	Chongqing Chana-Suzuki	Economy cars	A joint venture between Chana and Suzuki (GM has 20% of shares).
	Nanjing Nanya	Economy cars	A joint venture between Nanjing Auto Group and Fiat (GM has 20% of Fiat shares).
	Guizhou Lark	Mini cars	A joint venture between Guihang Group and Fuji Heavy Industry (GM holding 21% of Fuji shares)
VW	Shanghai VW	Economy and medium-end cars	A joint venture between VW and SAIC with the two sides holding 50% shares respectively
	FAW VW	Compact and intermediate cars	A joint venture among VW, Audi and FAW, with 30%, 10% and 60% shares respectively
	Anhui Chery	Economy cars	A Technological cooperative enterprise between VW and Chery
Ford	Changan Ford	Economy cars	A joint venture between Ford and Changan and the two sides taking equal shares
	FAW Hainan	Medium end cars	A joint venture between FAW and Mazda (Ford has 33.4% of Mazda share)
	FAW	Medium and high end cars	A cooperative enterprise between FAW and Mazda (Ford has 33.4% of Mazda share)
Toyota	Tianjin Toyota	Economy and intermediate cars	A joint venture between Toyota and FAW Xiali with the two sides holding equal shares
	FAW Xiali	Mini and economy cars	A cooperative enterprise between Toyota (through its subsidiary Daihatsu) and FAW Xiali
DaimlerChrysler	Beijing Jeep	Intermediate off-road vehicles	A joint venture between DaimlerChrysler and Beijing Automotive Industry Co.
	South East (Fujian)	Economy cars (in negotiation)	A joint venture between DaimlerChrysler (through its holding company Mitsubishi) and Fujian Auto Group
	Beijing Hyundai	Economy and intermediate cars	A joint venture between Hyundai in which DaimlerChrysler has shares and Beijing Automotive Industry Holding Co.
	Dongfeng Yueda Kia	Economy cars	A joint venture between DFAC, Yueda Investment and Kia which is a subsidiary company of Hyundai
Renault-Nissan	Fengshen Auto	Series cars	A joint venture between Renault-Nissan, through Taiwan Yulong which has cooperative relationships with Nissan, and DFAC
	DFAC (Wuhan)	Series cars	A would-be joint venture between DFAC and Nissan and the two sides will hold equal shares
PSA-Citroen	Dongfeng Citroen Auto (Wuhan)	Compact and intermediate cars	A joint venture between PSA and DFAC
Honda	Guangzhou Honda	Economy and intermediate cars	A joint venture between Honda and Guangzhou Auto Group
	Guangzhou Honda for export	Economy cars	A joint venture among Honda, DFAC and Guangzhou Auto Group
BMW	Brilliance Auto Co., Ltd	Medium end cars	A cooperative enterprise between BMW and Golden Cup
	Brilliance-BMW (not yet approved)	Intermediate cars	A joint venture between Brilliant Group and BMW.

Source: China Automotive Technology & Research Center, 2003.

Figure 12: Market Share of Global Automakers



Source for 1990-1999 data: Harwit 2001; source for 2000-2001 data: MEMA World Automotive Market Report, 2002-2003; source for 2002 data: China Automotive Technology & Research Center, 2003.

advantages in China that no car company in any other major markets has ever enjoyed (Murphy, 2003). Thanks to protection of the industry, foreign investments have largely paid off. With tariffs ranging from 80 to 100 percent, models bear price tags up to 150 percent higher than those in the United States and Europe, allowing successful joint ventures in China to enjoy levels of profitability not seen anywhere else. In the case of Shanghai VW, the domestic sales price in 1993 was around USD24,000 per car (and the production cost was around USD10,270). The price was nearly doubled the world price. For the case of Honda Accord, Honda's Guangzhou joint venture makes over USD3,000 in net profit, three times the net profit for a comparable U.S. model (Gao, 2002).

It's worth noting Nissan just invested USD1 billion to buy 50% of the Dongfeng Motor Corporation. (All Dongfeng's automotive operations except their JVs with Citroen), which would give Nissan the most favorable terms for a JV in China. Nissan aims to

boost Dongfeng sales from 265,000 vehicles in 2001 to 550,000 by 2006. Out of the 2006 sales, 220,000 will be cars (Wang, 2003).

China has not opened the door for wholly-owned automotive manufacturing in China and the shares of foreign partners in joint ventures still cannot exceed 50%. Thus the bulk of foreign investment is equity joint ventures or cooperative joint ventures. For the near future, global companies still cannot set up wholly-owned automotive manufacturing in China, but they can export cars to China to compete with domestic made cars.

The massive influx of FDI to China's automotive industry, particularly in the car production industry, has fundamentally integrated the Chinese automotive industry into the world automotive industry. China has become a new battlefield for global players. The obvious winner so far is Volkswagen, which has used the unique window of opportunity to establish first-mover advantages, and essentially monopolized China's car market for 15 years.

CHAPTER 6

TECHNOLOGY TRANSFER

With the influx of FDI and the formation of Sino-foreign joint ventures, there has been large-scale and systematic technology transfer from global automakers to their respective joint ventures. Since the beginning, Chinese leaders have emphasized obtaining the advanced automotive technologies necessary to develop the industry. The automotive sector is also the area where the earliest wave of Sino-foreign joint ventures started. Beijing Jeep and Shanghai Volkswagen are among the first large-scale Sino-foreign joint ventures in China. My research in this area included a series of site visits and personal interviews with senior executives from Chinese automotive firms located in Beijing, Shanghai, and Guangzhou, as well as academic experts on the Chinese automotive industry at the Tsinghua University (see interviewee information in the Bibliography section).

6.1 Characteristics of Technology Transfer

A Touchy Issue

Technology transfer is a sensitive issue for many joint ventures and often was handled ineffectively, as described in Jim Mann's book *Beijing Jeep* (1997). The effectiveness or ineffectiveness in handling technology transfer issues often determines the success or failure of a joint venture. Technology transfer usually results from the core misalignment of the strategic goals of foreign companies and those of the Chinese government. Foreign companies desire to sell products to the large Chinese domestic market, while the Chinese government wants to obtain technologies and exports as means of obtaining foreign exchange. This goal non-alignment often leads to difficulties when problems arise and compromises between two groups must be sought.

Beijing Jeep serves as a good example for the strategic goal misalignment between the U.S. and Chinese partners. The BAW was primarily interested in obtaining technology in order to produce products that they wanted to export, while Chrysler was primarily

interested in selling Jeeps to the Chinese market. Chrysler executives were clearly blinded by the enormity of the Chinese market and desired to sell the jointly produced products in China. Many of them felt that by establishing a presence in China they could also capture a large portion of the Chinese domestic automotive market (Mann, 1997).

Chrysler has been in China longer than most any other foreign automotive manufacturer, with the first Sino-foreign auto joint venture. Despite almost a decade experience in China, by 1995, Chrysler had pulled out of its bid to build a new minivan joint venture enterprise in Shanghai out of complete frustration. Given their unhappy experience with Beijing Jeep over disputes on technology transfer and intellectual property rights, Chrysler executives determined the risks associated with the technology transfers, proposed licensing deal, and export quotas being requested as part of the Shanghai deal were simply too significant (BAX, 1998).

Nevertheless, China is a buyer's market, and Chrysler clearly suffered from their handling of technology transfer issues. As the very first foreign automotive company to enter the Chinese market, Chrysler did not establish any first-mover advantages compared with Volkswagen. In 2002, Chrysler only sold 9,052 cars, including 1,540 Jeep Cherokees while Volkswagen sold 360,000 cars. Chrysler's market position in China today is even behind that of such late movers as GM, Honda, and Ford.

In contrast to Chrysler, GM deployed an ambitious and aggressive strategy to transfer technology to the China in order to gain market access. GM beat out other prospective foreign partners with a USD1.5 billion bid to produce a variation of Buick sedans with the SAIC. One of the major factors leading to GM's success was reportedly their willingness to transfer a good deal of "state-of-the-art" technology. GM's technology transfers are primarily in the form of joint research and development projects, as well as training of Chinese workers and managers (BXA, 1998).

By many accounts, the GM Shanghai deal is viewed as an extremely attractive deal for any later comers. First, the deal let GM strategically build itself into as the second largest foreign automotive giant in China. Second, SAIC is one of the China's Big Three and is subject to many special privileges that other smaller manufacturers would not enjoy. Third, as reported by Professor Zhenwei Qian of Tsinghua University, China is strategically developing Shanghai into China's Detroit and has systematically invested in the necessary infrastructure to attract foreign investment on automotive supply-chain networks and automotive related services. Other advantages include Shanghai being the most developed city in China with a plentiful supply of skilled labor and engineers. Shanghai, with a population of 16 million and 17,000 foreign businesses, also has a large and materialized automotive market.

It is also interesting to note that SAIC is expanding into automotive service areas by forming a joint venture with AVIS on a vehicle leasing business. This service will be launched in major Chinese cities from 2007. So far only the Chinese Big Three are permitted to operate in the new business areas and SAIC has managed to be the first one (Wu, 2003). It is clear that partnership with SAIC will provide competitive advantages to both Volkswagen and GM over other players.

Technology Transfer is Mandatory

The experience with Chrysler also prompted the Chinese government to streamline the process of technology transfer. The Automotive Industry Policy issued in 1994 served as the first document published by Chinese officials in an effort to provide transparent investment guidelines for prospective foreign investors. The policy explicitly spells out the following technology transfer requirements for establishment of an automotive manufacturing joint venture in China (BXA, 1998):

- “An office responsible for technological research and development must be set up within the enterprise. The office will have the capacity to update products.”
- “The enterprise must have a capacity for manufacturing products which attain the international technological levels of the 1990s.”
- “The joint venture enterprise will obtain the foreign exchange it needs mainly through exporting its products.”

- “The joint venture must give priority to locally made spare or component parts when they need them.”

Chinese leaders realized that an effective way to push for technology transfer is to require components to be made in China rather allowing foreign firms, as they had hoped, to simply import components from global sources and assemble them in China. For foreign firms to reach sufficiently high levels of quality local content, they have two options: to either encourage their suppliers to also come to China, or to train local suppliers to produce quality products. Either way, technology is transferred to China. The Automotive Industry Policy explicitly increased the levels of local content mandates. For passenger car production, they are:

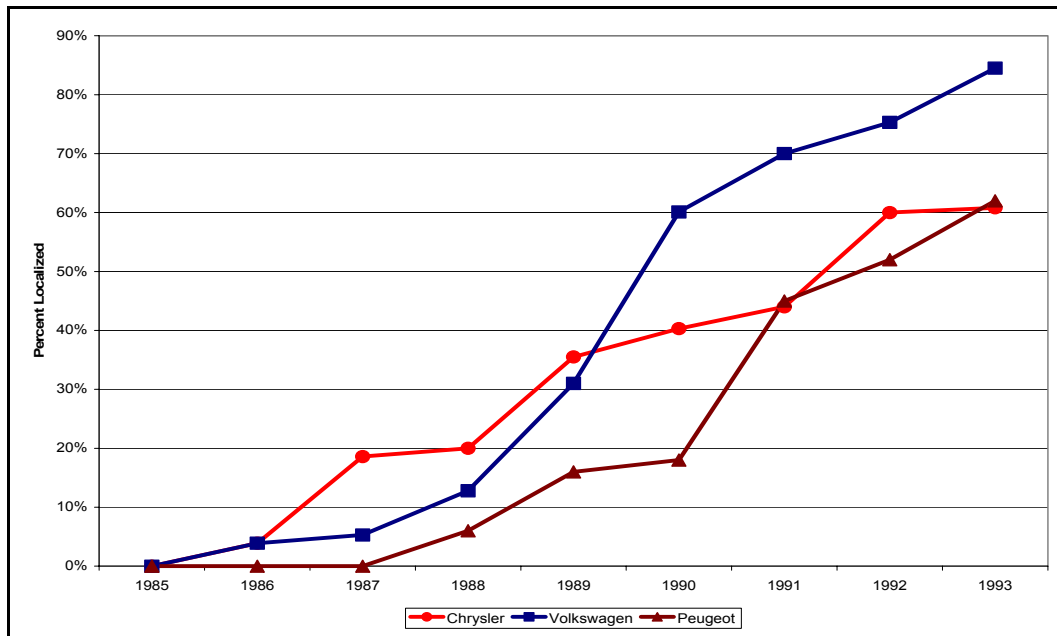
- 40% local content at start up (this had previously been required only after the third year in operation)
- 60% by the second year
- 80% by the third year

Similar local content requirements were set for the manufacturing of key automotive components such as engines, transmissions, airbags, and antilock braking system, and the local content levels for trucks are even higher.

Local content requirements are not unknown in developing nations, but they are rarely so high as in China. The policy explicitly calls for production of domestic automobiles and parts as substitutes for imports, and forces joint ventures to use domestic products whether they are comparable in quality and price or not. Clearly, the Automotive Industry Policy made China’s intentions and motivations for technology transfer more clear and transparent. Figure 13 compares the localization rates of Beijing Jeep (Chrysler), Shanghai Volkswagen, and Guangzhou Peugeot from 1985 to 1993. Clearly, Volkswagen localized their component manufacturing in China more and faster than did Chrysler and Peugeot. Shanghai Volkswagen managed to allocate 20,000 RMB (about

USD2,400) per car from sales to a special fund for localization, which has been very helpful in smoothing the localization process.⁶

Figure 13: Localization of Chrysler, Volkswagen, and Peugeot



Source: Harwit, 1995.

Shanghai Volkswagen formed a "Shanghai Santana Local Content Co-operative" by bringing together the parts makers, banks, universities, and research institutes. Being a member of the co-operative means a long-term contract and steady supply of components. This provides the key incentives for the component suppliers to execute continuous quality improvement.

The reaction of the global automakers towards the local content requirement can be an important factor affecting the performance of joint ventures. A good comparison can be made between the success of Shanghai VW and the failure of Guangzhou Peugeot which both started producing cars in the same year. To capture the short-term profitability, the latter preferred to import component knock-down kits and assemble them in China with little effort expended in developing local component suppliers. On

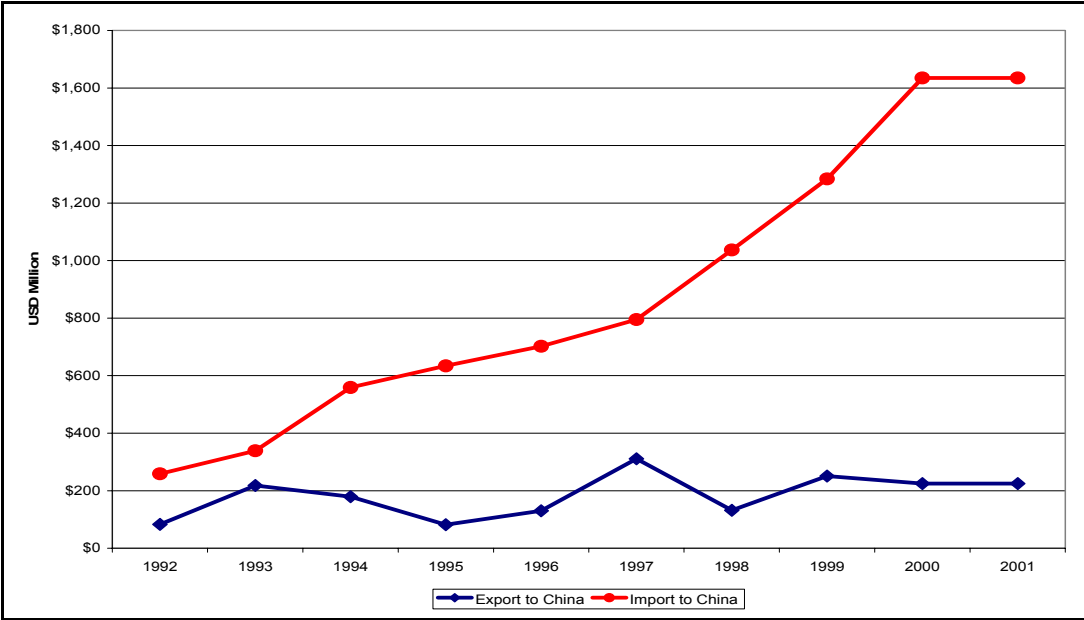
⁶ My interview with Wenda Chen of Shanghai Volkswagen on December 26, 2002

the contrary, the Shanghai VW adopted a rigorous local content program together with the support from the local authority (Wang, 2001). Guangzhou Peugeot serves as the only failure example of Sino-foreign automotive joint venture by Peugeot's complete withdrawal from the deal because of disputes associated with local content and technology transfer. The Chinese partner later formed a new joint venture with Japanese Honda, the Guangzhou Honda.

Technology Transfer at Supplier Level

The mandatory requirements on local content have forced many world-class automotive parts suppliers to follow their Original OEM leaders to China: Delphi Automotive Systems, Bosch, Valeo, Siemens, Dana, Allied Signal, Lucas Varsity, United Technologies, ITT, TRW, Rockwell, Tenneco, Cooper, and others. The Chinese automotive component industry has been profoundly changed by the presence of these foreign parts suppliers.

Figure 14: U.S.-China Trade on Auto Parts



Source: MEMA World Automotive Market Report, 2002-2003

Given that the Chinese government requires automotive JVs to export to obtain foreign exchange, it is likely that many China-made components are exported back to their

OEM's home country. U.S. trade figures indicate that U.S. imports of automotive parts from China have risen dramatically since 1992, almost tripling in value by 1996-97 (see Figure 14). The situation is likely to change as the impact of WTO membership slowly takes effect.

Establishing R&D in China

In addition to technology transfer in manufacturing and local content, the Automotive Industry Policy also calls for the establishment of technology development centers by each major joint venture deal. For example, as part of GM Shanghai deal, GM has set up three R&D centers in China to date and at least two more are planned. In 1995, GM set up the "GM in China Technology Institute" at Tsinghua University in Beijing for R&D, post-graduate education, and training in auto-making. R&D work includes fuel quality studies, piston ring package development, crash injury and airbag module studies, and pedestrian protection test modeling. In the same year, GM also set up the "Powertrain Technology Institute" at Shanghai Jiaotong University. The most recent one is a USD4 million R&D center at GM Shanghai (BXA, 1998).

Ford's joint venture deal followed the same path. Ford has established R&D centers at Tsinghua University and Jiling University, a research lab at Shanghai Jiaotong University (involving the latest software for advanced computer-aided design, manufacturing, product information management and training of Chinese employees), and recent signed an agreement with Fudan University to establish a "Joint Research Institute of Automotive Electronics" (BXA, 1998).

Technology Transfer Comparison among European Union, Japan, and U.S.

One interesting point is to compare the technology transfer strategy of automakers from different countries. A research conducted by U.S. Department of Commerce (BXA, 1998) indicates that the EU has fully embraced technology transfers to China, while Japan has been comparatively much more conservative, and the United States' approach has been somewhere in the middle.

The EU views technology transfer as an effective way to gain access the Chinese market and has adopted a formal policy to embrace the transfer of technology to China. The Commission of the European Union's long-term strategy states that initiatives to promote economic and social reform should offer training and technical assistance to support modernization and market oriented policies in key economic sectors.

The European automotive industry has been systematically transferring technology to Chinese manufacturers by actively providing industrial training in manufacturing as well as management training to their Chinese partners. Judging from what European automakers have achieved in China, for example, that Volkswagen alone occupies over half the market share in China, it validates that more technology transfer results more market access. The European policy on actively engaging on technology transfer should be viewed as success.

In contrast to the EU, Japanese firms seem to think that exporting technology would gain them comparatively little in the future. Japan's relationship with China is very complex compared with that of the EU or the U.S. for both geographic and historical reasons. The result is that the Japanese government aggressively using government loans to smooth over relations with China. However, while anxious to enter China the Japanese automotive industry is quietly reluctant to transfer advanced technologies. In the early 1980s, Chinese government actively invited the Japanese to be the first movers to China's automotive sector, but they declined.

In contrast to the Japanese, American and European carmakers accepted the Chinese invitation and strategically entered the Chinese automotive market at the earliest possible time. It was until the early 1990s when the Japanese realized the disadvantages of not being present in China and the dominant position achieved by Volkswagen. At this realization, they then became active investors in China. This situation is quite in contrast to Japan's presence in Southeast Asia, where Japanese carmakers are not only engaging in on-site production, but also dominate the market. Many believe that Japan is intentionally withholding its technologies from the Chinese market because they feared that China would become an industry power.

Direct and Indirect Technology Transfer

Almost all technology transfers over the past 50 years, including the earliest one with the Soviet Union, have followed the direct technology transfer model, which requires formal tie-ups with foreign automakers and parts manufacturers, or direct assistance from foreign engineers (Cusumano, 1985). Recently, some emerging private Chinese carmakers began using the indirect technology transfer model, i.e., selective copying of designs and manufacturing techniques from various foreign producers, and the importation and copying of machinery. The Geely Group, one of the newly approved private carmakers in China, chose not to form a production joint venture with foreign players but signed contracts with Fiat and Daewoo for product development. As a new entrant, Geely also lacked capital. However, rather than seek investment from global auto giants, Geely recently raised USD60 million investments from the Guorun Holding, a Hong Kong-based financial group with no background in the automotive industry (CATARA, 2003).

6.2 Impact of Technology Transfer

Productivity Improvement

The FDI and technology transfer have profoundly impacted the Chinese automotive industry and have significantly improved the average performance and productivity of Chinese manufacturing firms. Today in China, joint ventures generally having higher performance, both market share and productivity, than domestic firms. For example, in 1998, joint ventures accounted for 57% of the total output of vehicles even though the number of joint ventures only accounted for 33% of the total car makers in China. Table 14 indicates the performance differences by the nature of firm in 1997. The productivity in European, American and Japanese joint ventures were four times as high as the average industry level, and more than five times as high as the SOEs. With respect to other financial indicators such as the profit per employee, return on assets, and return on sales, joint ventures also performed better than the SOEs and collectively-owned Chinese firms. This clearly shows FDI and technology transfer have given joint ventures firm-specific advantages over local ones.

Table 14: Performance difference by the nature of the firm, 1997

	JVs with Europe, US, & Japan	JVs with HK & other Asian countries	State-owned Enterprises	Collectively-owned Firms	Average Firms in China
Productivity (RMB/Emp)	564,000	272,000	104,000	99,000	138,000
Profit (RMB/Emp)	28,000	21,000	1,000	1,600	3,900
Return on Assets (%)	4.20	6.04	0.50	1.59	1.73
Return on Sales (%)	5.56	8.62	0.98	1.74	2.93

Source: Wang, 2001. (Productivity = Revenue/Total Employee).

Management Improvement

Besides technology transfer, there has been extensive management know-how transfer from foreign partners to their Chinese partners. China clearly benefited from the “free training” on Western management practices from their foreign partners and gained a pool of management workforce. Due to the nature of the central planning economy China has had, manufacturing factories were just one element of the vast planned national economy. Executives from automotive factories only worried about producing pre-assigned production tasks and never had responsibilities for sales. Many of them had no sense about marketing or customer relationship management. Foreign automakers, particularly early entrants, had to train their Chinese partners on the most basic management knowledge. For late entrants, this is not a major issue anymore. For example, when SAIC started its joint venture with GM, most of the SAIC executives had work experience with Volkswagen and directly transferred their knowledge to the joint venture operations with GM. This greatly frustrated the Volkswagen executives, because they felt the Chinese took the business practices and trade secrets from Volkswagen to GM, letting GM gain unfair advantage.⁷

Executives in China were able to combine Western management knowledge with their Chinese expertise and apply them to joint ventures successfully, adapted to a recent SAIC newsletter indicates that a new meaning was invented for the acronym “SAIC” which stands for:

⁷ My interview with Wenda Chen of Shanghai Volkswagen on December 26, 2002.

- S – Satisfaction for customers
- A – Advantage through innovation
- I – Internalization in operating
- C – Concentration on people

This reflects how Chinese managers combine western marketing techniques with traditional motivation techniques for the workforce and customers.

CHAPTER 7

WTO MEMBERSHIP

7.1 China's Journey to WTO

China's quest for WTO membership began in 1986, and proceeded slowly. There was strong resistance from industries that were not yet ready to face foreign competition, among them the automotive industry. Many feared that opening Chinese markets to foreign competition would result in massive unemployment. The automotive related industries in China employ some 7 million workers, about 3.3% of total Chinese urban workforce (CATARC, 2002). The industry was particularly worried that most of the small-scale automotive manufacturers and suppliers would not survive the foreign competition and would be forced to close (Harwit 2001). In their 1998 study, Chinese officials estimated that the automotive industry would need at least nine years to be competitive under WTO rules. Even large players such as FAW which has a JV with Volkswagen feared foreign competition. FAW officials said in 1999 they would need at least two to three more years to catch up (Harwit, 2001).

Proponents argued that competition with foreign firms would sharpen the quality of Chinese production and increase access to foreign markets. As pointed out by Mr. Hang Zhao, President of the China Automotive technology & Research Center, during his visit to MIT in early 2002,⁸ that the WTO membership would provide the market force needed to close the most inefficient small-scale firms. Facing the mixed picture of China's readiness for WTO entry, the Chinese visionary leader, then Premier Zhu Rongji, made the decision to move forward and pushed China into the WTO.

On November 11, 2001, China officially committed itself to the terms of the WTO Agreements. This would mark the ending of the powerful Automotive Industry Policy implemented since 1994 and the beginning of an unprecedented new era for the Chinese automotive industry. Before entry into the WTO, China clearly had hoped to

⁸ Hang Zhao was a member of a Tianjin City delegate that visited MIT in early 2002.

build a self-sufficient and export-oriented automotive industry, such as Japan and Korea have done. According to Chinese trade statistics, in 1986, 80% of all cars in China were imports, whereas currently less than 10% of China's automobiles are imports. China had hoped, by 2010, to achieve zero imports of foreign automobiles and export 10% of its domestically made cars. The WTO membership will change the picture completely as the Chinese government essentially gave up most of their controlling leverages in order to gain U.S. support for the WTO membership.

What Did China Agree?

So what did China sign for WTO membership? WTO is a group of trade agreements between the 140 member states that set for a rule-based system for international trade, intellectual property, and foreign direct investment. The more well-known agreements include the General Agreement on Tariffs and Trade (GATT), the General Agreement on Trade in Services (GATS), and Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). There are actually over 60 separate agreements, protocols, and understandings that bind members to the WTO.

China's accession on December 11, 2001 subjects it to all of the agreements in force on that date, each of which constitutes binding international law superceding conflicting domestic legislation, such as China's Automotive Industry Policy. The next to last paragraph of the Protocol states that the WTO Agreements are also to be registered under the provisions of Article 102 of the Charter of the United Nations, which signifies its binding nature as an international treaty obligation of all signatory countries (Nee, 2002).

7.2 Impact on Automotive Industry

The terms of the WTO Agreements call for commitments that would significant impacts on China's ability to control its automotive industry. These include tariff reduction commitments, commitments as to how China will comply with the WTO Agreements,

and commitments for opening special markets. Specifically, China committed to the following:

Import Tariff Reduction

China committed to significantly reduce import tariffs for automobiles and parts. Table 15 illustrates the tariff reduction schedule for passenger cars. Import tariffs will be reduced to 25% by 2006.

Table 15: Tariff Rate Reductions for Imported Cars

Historical	1992	1993	1994	1995	1996	1997	1998	1999
	180%	180%	180%	110%	100%	100%	80%	80%
WTO-era	2000	2001	2002	2003	2004	2005	2006	7/2006
<=3000cc	63.5%	51.9%	43.8%	38.2%	34.2%	30%	28%	25%
>3000cc	77.5%	61.7%	50.7%	43.0%	37.6%	30%	28%	25%

Source of historical tariff: Ping 2001, source of WTO-era tariff: Nee, 2002.

Licenses and Quotas

China committed to eliminate import license requirements for passenger vehicles by 2005; for buses, trucks, and motorcycles by 2004; and for engines by 2003. China committed to increase import quotas for all automotive vehicles 15% annually and completely phase out quotas by 2005, as shown in Table 16.

Table 16: Import Quotas on Motor Vehicle Products (\$million)

	2000	2002	2003	2004	2005
Motor vehicles and parts	\$6,000	\$7,935	\$9,125	\$10,494	No quota
Motorcycles and parts	\$286	\$376	\$432	\$497	No quota
Automotive Chassis	\$88	\$116	\$133	\$153	No quota

Source: Xing, 2002.

Distribution

Prior to WTO accession, foreign-invested enterprises were not permitted to sell or distribute products they did not manufacture themselves, or in the case of holding companies, products that were not manufactured by companies in which they had invested. This prevented foreign-invested companies from distributing imported products within China and prevented the development of distributor networks.

By 2002, foreign-invested companies began to be permitted to distribute both domestic and foreign products. Restrictions on the establishment of distribution companies will be completely phased out within three years of accession.

The timetable for distribution opening is as follows:

- within one year of accession, wholesale joint ventures may be established with a minority foreign investment,
- in the second year, majority foreign investment will be permitted,
- in the third year, wholly foreign-owned wholesale distributors will be permitted.

Therefore, both domestic and foreign companies will be permitted to distribute autos and automotive parts into any part of China after a three-year period.

Retailing

WTO membership permits foreign retail ventures. Foreign retailers are permitted to supply services in the form of joint ventures in the five Special Economic Zones (Shenzhen, Zhuhai, Shantou, Xiamen and Hainan) and six cities (Beijing, Shanghai, Tianjin, Guangzhou, Dalian and Qingdao). Within two years after China's WTO accession, foreign majority control will be permitted in joint venture retailing enterprises and the market will open to all provincial capitals, as well as Chongqing and Ningbo.

Local Authority

Provincial authorities will be able to approve investments in the automotive sector of up to USD150 million (increased from USD30 million), thereby substantially reducing red tape for car manufacturers. Like many WTO commitments, this one will be phased in over three years: joint ventures will be able to have provincial level approvals of under USD60 million after one year, USD90 million after 2 years, and USD150 million after 4 years from accession.

Engine Production

China's joint-venture requirement of foreign equity not exceed 50% was removed, allowing wholly foreign owned production of engines. This occurred on accession.

Financial Services

Non-bank financial institutions are now permitted to provide automotive and vehicle financing and insurance services without any geographic limitations to market access.

Local Content

The local content ratios requirements were removed on China's WTO accession. This would have profound impact and serious pressure to existing suppliers as their OEMs may skip domestic suppliers and direct go to their global sourcing for parts. This also would encourage efficient suppliers to be integrated into OEM's global sourcing system.

China's entry into the WTO will increase pressure on local producers. It will also allow global carmakers to own businesses in which they have unmatched advantages: sales, service, and distribution, as well as loan services to car buyers, which are sure to be welcome in a market where personal credit is scarce.

7.3 Three Possible Scenarios

Feenstra and his colleagues (2001) conducted an impact study of WTO membership to the Chinese automotive industry where they postulated three possible scenarios. The first scenario is of *negative impact* where China's domestic industry (including joint ventures) is swamped by imports, and becomes a minor player even in the domestic automotive market. This scenario is possible if foreign companies with relatively small production presence in China, such as DaimlerChrysler and Hyundai, become aggressive about exporting cars to China. A basic logic assumed is that imported cars selling at competitive prices could be more attractive to Chinese residents than domestically made cars with lesser technologies. This would be even more possible if Volkswagen, GM, Toyota and Honda forego domestic production and ship cars to China.

The second scenario is of *positive impact* where China's domestic industry rises to the challenge of WTO membership, and eventually becomes an important world center of automotive production. This scenario assumes that companies such as Volkswagen

and GM would continue to assure product quality and update their vehicles to world standards. Given the Chinese automotive market structure, if all foreign joint ventures expand product lines towards low-end economical cars that are affordable to middle income Chinese families, the challenge of imported cars could fail to materialize. Eventually, China would absorb advanced technology, and emerge as a world-class automotive producer, as South Korea did in the 1980s and 1990s.

The third scenario is on *middle ground* where the Chinese automotive industry would muddle along with characteristics similar to the status quo, with some substantial improvement in the efficiency of the domestic industry, but not enough to make China an important automobile exporter. This scenario assumes that the WTO rules fail to have much real impact in China. Although import tariffs fall, China may try to use regional and local non-tariff barriers to continue subtle protection of the domestic industry. Based on their study and survey of executives, Feenstra and his colleagues estimated a 20% probability for the first scenario, 30% for second scenario, and 50% for the third scenario.

Regardless of which scenario actually occurs, it is predictable that imported cars will increase as China lowers the tariffs, which will put serious pressures on the existing joint ventures in China, and will improve their global competitiveness. The global carmakers who have already invested heavily in the Chinese market will be confronted with intensified competition from the late-comers, which therefore would force them to speed up their technology transfer efforts, model variety, and price reductions.

WTO Will Inject Competition to China

One of the greatest benefits of FDI to the local firms, in theory, is the injection of competition and technologies that lead to the exit of inefficient enterprises and the raising of efficiency in the industry. The precondition on this conclusion is the existence of a contestable market which arguably did not exist in China before its entry into WTO. Wang (2001) pointed out that when investors are located behind tariff barriers or given quasi-monopoly status, they tend to transfer only less-advanced technologies that are

sufficient to produce in an un-competitive market. The Brazilian automotive industry in the days of import substitution is a perfect example. If foreign investors face intense competition either from importation or from other investors, they have an incentive to transfer technology in order to be able to compete more effectively.

Global Players Will Bring Technology to China Faster

When Volkswagen first started in Shanghai in 1985, they initially introduced a 1970s model, the Santana, to China, and only upgraded it to the Santana 2000 model until 1995. They sold essentially the same car for 15 years without technological innovation. The Santana was China's best selling car for a long time because of the lack of competition. As more and more players entered the game, competition became more intense, forcing each player to speed up their introduction of new models to China only months after their launch in more mature markets. For example, VW now plans to introduce one or two new models every year in China, and GM Shanghai recently introduced the popular Opel Corsa model from GM Germany to GM Shanghai. DaimlerChrysler recently approved plans to introduce the Pajero, a best selling SUV made by Mitsubishi, to be produced by Beijing Jeep (Wu, 2003). In 2000, automotive consumers had only eight models to choose from; in 2003, they will have 65 models available to them (Murphy, 2001).

Many people believe the quality gap between joint venture-made cars and imported models would get closer as post-WTO competition really picks up. However, JV-made cars may still not be equally cost-competitive, given that the import tariff would remain at 25% and there might be informal and regional restrictions imposed on imported cars. Many believe that China will not become an important exporter in the region or worldwide. Given the size of China's potential internal market, there seems little reason to focus on exports.

Potential Obstacles in Post-WTO Era

Many people believe that China will not go for a straightforward implementation of WTO rules and protectionism will likely continue with a variety of non-tariff barriers. The Chinese government could continue to informally constrain imports and favor domestic production even as markets open up and formal tariff barriers come down. It is possible they would find ways to do that but still be in compliance with the WTO rules. The biggest skepticism are in China's regional governments as they have incentives and certain leverage not to implement WTO measures fully within their regions. Other concerns involve China's social and political stability. Any WTO measures could be questionable if China social stability or political system is endangered. Given the Chinese history over the last 50 years, the concerns are legitimate. In the new era of SARS (severe acute respiratory syndrome), risks are no longer merely social or political, but also include disease, quarantine, and social reactions to health concerns.

Preparation of Global Carmakers

To prepare for post-WTO era competition, global carmakers have been actively adjusting their strategy to make their operations in China internationally competitive.

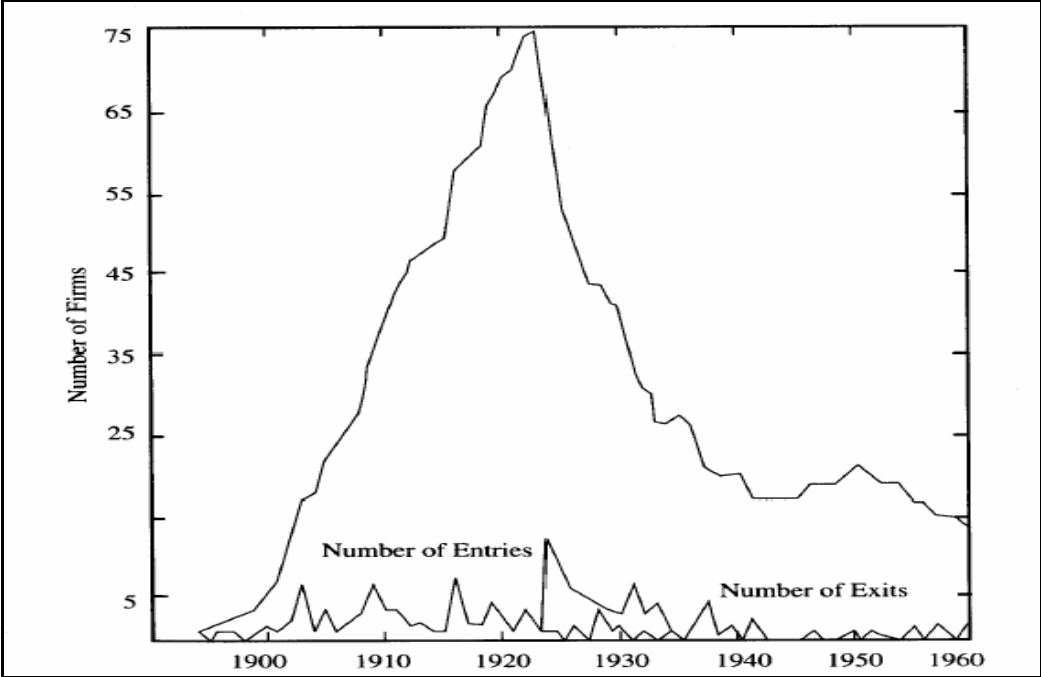
A study by RolandBerger Strategy Consultants (Xu, 2001) reveals that currently Volkswagen's parts cost in China is about 20-40% higher than elsewhere in the world market. As a result, they will have to cut down their sourcing costs by 30% in 5 years. Volkswagen already announced they would use their global sourcing system for parts as China lowers their tariffs. Local suppliers are being pressured to cut down costs and hopefully eventually to be integrated into Volkswagen's global sourcing network. Volkswagen already began to integrate their suppliers of Shanghai Volkswagen and FAW-Volkswagen. For distribution, Volkswagen already formed a 50:50 sales joint venture with SAIC and will merge sales and service network into unified full-range dealer network offering both sales and after-sales services. Volkswagen also is preparing to offer financing and leasing services as more regulations phase out.

GM also announced they would globally source for parts, but would give preference to local suppliers if they meet requirements. GM is actively assisting local suppliers in improving efficiency and integrating qualified local suppliers into GM's global sourcing system. GM is also engaged in dealer networks development with full-range service and is preparing to offer financing, leasing and second car sales service.

The biggest issue facing the foreign automakers is the future of equity control in automotive assembly operations. China's WTO commitments do not include a timetable to eliminate such equity controls, and the Chinese government is expected to limit foreign equity ownership to 50% or less for some time to come. Foreign automakers with joint ventures in China have expressed their readiness to buy out their Chinese partners and are expected to increasingly pressure the government to lift the cap on foreign ownership (Xing, 2002)

Industry Shakeout

Figure 15: Number of Firms in the U.S. Automotive Industry



Source: James Utterback, *Mastering the Dynamics of Innovation*, 1994.

Figure 15 illustrate the research of Professor James Utterback of MIT Sloan School of Management on the industry dynamics of the entry and exit of firms as technology and market developed. Part of his research was reported in his book “*Mastering the Dynamics of Innovation*” (1994). Among the industries he studied is the U.S. automotive industry during its early development period. Professor Utterback’s research shows that there were less than five automakers in the U.S. in 1900 when the automotive industry first started. As technology and markets developed, more than 100 firms entered and participated in the industry for a period of five years or longer. The total number of automakers peaked at 75 by the early 1920s. As the automotive technology became more mature and competition became more intense, an industry shakeout began, and many smaller or uncompetitive firms were either absorbed or pushed out by newly emerged industry leaders. By the early 1940s, the total number of automakers decreased to about 15. Although China’s current situation is not entirely comparable to the early development of the U.S. automotive industry, I believe that China’s WTO membership marks the beginning of an industry shakeout period in China and that the total number of automakers is bound to decrease within the coming years.

7.4 What Has Happened?

2002 was the first year that China has operated under the WTO rules. So far, there are no substantial studies or researches on the early impact of WTO membership. Based on interviews with Chinese executives conducted by the author during December 2002, here are some early indications:

Several OEM and supplier executives⁹ said that the WTO impact in its first year was not as bad as many people in China had anticipated. Many early forecasts on automotive sales in 2002 predicted that 2002 would be a slow year as consumers would forego planned purchases of domestically made cars and wait for imported cars at lower prices. However, the 2002 automotive sales turned out to be a boom and more cars were sold than in 2001. Almost all the carmakers sold as much as they were able to produce.

⁹ These include Hongjie Wang and Fred Yang of Cummins China, a major engine supplier in China.

Chinese automotive enterprises are more competitive than anticipated by many people. There are several factors explaining this point. First, under true competition, many Chinese enterprises, to avoid being closed, are able to cut down costs and improve their competitiveness. Many of them adjusted their strategy, focusing on the low-end markets to avoid direct competition with big automakers. The Chinese automotive market is large enough to allow them to survive at least for a while. Irregularity of the Chinese market is a major issue and a challenge for foreigners as the country slowly transforms itself from a planned economy into a market economy. However, the irregularity could be factor that favors local Chinese players. Finally, support from regional governments likely played a role. There are many techniques local governments can use. These include: reducing local taxes, getting favorable funding terms, and government-sponsored training.

The emergence of private carmakers in China, such as the Geely Group and Brilliance Group, is worth attention from global giants. These firms developed their car manufacturing ability without government support. Ms. Yang Bai, Vice President of Geely Group, said that private carmakers in China have organizational and cost competitive advantages over SOEs and even foreign joint ventures. They are agile and closer to the market, in particular, the low-end market, than the SOEs and foreign joint ventures.¹⁰ Some consider them the new hope for China's automotive industry as these firms have strategically positioned themselves for China's low-end market, which is likely to boom but has largely been ignored by foreign joint ventures.

As discussed in Chapter 6, Geely adopted a strategy based on an indirect technology transfer model. Cusumano (1995) compared the early development strategies of Toyota and Nissan, where Nissan adopted direct technology transfer from the American automotive industry and was able to develop mass production capabilities in a short time frame. In contrast, Toyota adopted an indirect technology transfer strategy and chose to selectively import pieces technologies that best fitted Toyota's ability to absorb and later to perfect them, which eventually yielded Toyota's competitive advantage over

¹⁰ My interview with Yang Bai of Geely Group on December 26, 2002.

Nissan. While Geely is living in a totally different time and environment, a comparable strategy may still be effective and help them gain competitive advantages over SOEs and joint ventures. If companies, such as Geely, succeed as a low-cost leader, they may be able to move from a dominant position in the low-end market up the chain to more expensive and profitable cars, as described by Professor Clayton Christensen of Harvard Business School in his book (1997): *The Innovator's Dilemma*.

CHAPTER 8

CONCLUSIONS

Three major conclusions are made based on discussions in this thesis.

First, China has benefited radically from foreign investments and technology transfers.

The Chinese automotive industry was essentially transferred from foreign countries. China first obtained truck production technologies from the former Soviet Union in the 1950s and slowly grew the truck manufacturing capability to 1.7 million annual production units. However, technology innovation in China has been slow and the Chinese trucks are uncompetitive, based on quality, compared with world standards, they are cheap but do not have very good quality.

Then, in the 1980s and 1990s, China obtained mass production technologies of passenger cars from Americans, Europeans, and the Japanese firms. China essentially had no car production before the 1980s and most cars in China were imported. With China's economic reform, China has successfully attracted billions of dollars in foreign investment, which have helped the automotive industry to upgrade its technology and efficiency levels. The industry has made remarkable progress, productivity levels and management capacity in joint ventures have increased significantly over average Chinese enterprises. China has grown to be the eighth largest automobile producer in the world, and the growing trend is likely to continue in years to come.

Although China has gained a 2-million car production capacity from foreign investment, automotive joint ventures are controlled by foreigners and China has not yet absorbed the full capabilities of automotive development and production. China would have to really inject rigorous market competition into the automotive industry in order to attract faster and broader technology transfers.

Second, China's automotive policies lacked strategic thinking and failed to lead the industry to be integrated and competitive.

After initial establishing a truck production industry, China has adopted a defensive and self-reliance policy which proliferated small-scale automotive manufacturing factories all around the country and led to a fragmented, decentralized, and uncompetitive industry. The Chinese government pulled all the levers to promote an indigenous pillar industry through internally favorable policies, high tariff protection, and foreign investment. However, they essentially failed to achieve what they had intended. As MIT Sloan Professor Jay Forrester notes, "structure drives behavior." The Chinese government is trying to use policies which contradict the protectionist industry structure, which shapes people's and companies' behavior.

Misleading Industry Orientation

The central Chinese government has always treated the industry with an infant status and kept it in a protectionist environment. This research shows that the infant industry thinking has led to serious consequences: high protection yields high profits from price distortion and leads to inefficiency, diseconomy of scale, and un-competitiveness. The Chinese automotive enterprises have undergone 50 years of manufacturing and over two decades of technology importation. They should have been able to mature more rapidly had they been subjected to rigorous domestic and foreign competitions.

Lack of Coherence between Policies

China's automotive policies lacked coherence between trade and investment, between protection and competition, between production-oriented and market-oriented policies. On the one hand, China hopes foreign investment and advanced technologies would boost China's automotive industry and increase its competitiveness. On the other hand, it adopts a high tariff protection policy that provides no incentives for continuing technological innovation, which consequently undermines the potential positive impacts that the foreign investment could have made. China issued many rules and hoped these rules would create competition, but they failed to understand that real competition

was impossible under heavy protection. China hopes to prompt a market-driven economy, but its automotive policies are production-driven and prohibit foreign companies from entering the market.

It is evident from my research that foreign investors are benefiting from the protection policies. They even lobbied government for more protection in order to make more profits. The early entrants clearly lacked motivation to innovate or bring in new technology after their initial investment. The research also shows that the combination of high local content requirement and a protected market made both domestic suppliers and foreign carmakers highly inefficient.

Protection is the Root Problem

My research shows that the high protection policy is the root of many problems China has experienced. First of all, it is arguable that the protectionist policy led to the proliferation of inefficient small-scale manufacturers in China, as economy of scale was no longer a necessary condition for companies to be profitable.

Secondly, protectionist policies led to foreign companies lobbying for more protection rather than upgrading technology and improving competitiveness. They clearly have incentives to request protection in order to gain an advantage over their competitors outside of China. Furthermore, regional protectionism is created under the combined forces of foreign firms and local government. For example, Shanghai Volkswagen has succeeded in making the Shanghai City Government forbid other cars from entering the Shanghai taxi market and government purchase plan. The same protection measures are taken by the other joint ventures over the local region (Wang, 2001). Therefore, China's passenger car market is highly fragmented.

Protection has led to strong regional incentives to support local automotive manufacturers for providing employment and preventing them from being closed, which significantly decreases the speed for industry consolidation. The central government

will be challenged to achieve what is spelled out in the 10th Five-Year Plan within the specified time frame.

Lack of Effective Competition Policy

It is clear that China lacks an effective competition policy which is an absolute necessity for a market driven economy. Given the strong resistance to China's accession to WTO, it is even questionable whether the leaders in the automotive industry were aware of the need for such a policy. Under the opening-up policy China has had, the central government has been pushed for deregulation in many industries in order to bring in competition. However, the automotive industry continuously received high protection and no competition, which may well explain the inefficiencies of the industry. Fortunately, China's top visionary leaders came to realize that market competition is more important than the protection, and successfully pushed China into the WTO.

Failure to Spend Capital Strategically

There are two aspects to China's capital spending. First, China spent more on automotive imports compared to the total combined domestic and foreign investment. Developing countries, such as China, usually lack capital and foreign reserves for economic development. It is questionable why USD63 billion was spent to import cars while only USD26 billion was invested in the industry.¹¹ Second, in China, domestic firms are not treated equally. SOEs systematically receive preferential support while private firms are discriminated against. However, the performance of those SOEs is generally poor. The mandatory partnership of FDI with SOEs may prove to be a heavy cost to Chinese consumers and China's economic growth.

Equity JVs Slow Down Technology Transfer

The mandatory joint venture requirement that foreign equity not exceed 50% does not achieve the objective of management control and desired level of technology transfer. This research shows that most joint ventures are "controlled" by foreign partners despite

¹¹ As I summed the figures from tables of the Chinese Automotive Yearbook 2002, it clearly made no sense that the capital used for imports is almost three times of the total combined capital invested to the industry. Give a man a fish, feed him today, teach a man to fish, feed him for life." Was this not the rule?

of their minority status and the JV pattern decreases the speed and depth of technology transfer. Research indicates that average parent firms transfer technology to wholly-owned subsidiaries in developing countries one-third faster than to joint ventures (Wang, 2001). That is to say, technology transfer is relatively limited under the pattern of joint venture. In China, it took five years for local content to reach 50%, and ten years to reach 90%. In the world market, the product life cycle of a model is normally around three-four years. It is therefore no wonder that most of the cars produced in China until the late 1990s were outdated models.

Although the influx of foreign investment and technologies into China has significantly upgraded China's automotive capabilities, with 50 years of development, Chinese automakers only mastered the basic manufacturing and assembly of vehicles. China still lacks sufficient understanding of the complete automotive development process from cradle to grave. All joint ventures are making cars developed in foreign countries. None of them were developed in China. All production in any scale and with any real quality has been done with the help of a foreign partner in a joint venture.¹² It's arguable that had China allowed earlier wholly-owned automotive manufacturing, it could have obtained more automotive development and production capabilities, more management capabilities, and more rigorous training than they have now.

Third, WTO membership will inject long-needed market competition to China and will cause fundamental changes to the automotive industry.

The WTO membership would inject real market competition to China's automotive industry and provide foreign companies a new host of opportunities to establish or expand their share of the world's largest potential consumer market. My research clearly reveals that the Chinese automotive market represents one of the hottest – if not the hottest – business niches in the world. With respect to the three scenarios discussed in Section 7.3, I believe that the WTO membership will make a real impact on the industry and the second scenario would be most likely to occur. For an industry that

¹² My interview with Yongqing Ye of DaimlerChrysler China on December 18, 2002.

grew under 50 years of protection, the WTO membership will force it to rethink the importance of market competition, which ultimately will promote it into a new stage. Although the fragmentation may not disappear anytime soon and small-scale Chinese automakers will try to survive, the Chinese automotive industry will eventually rise up to the WTO challenge and become an important automotive manufacturing base in the world. China has progressed remarkably quickly from mastering low-tech product manufacturing to higher technology-driven product manufacturing. There is no reason to believe they would fail to master automotive manufacturing. The only question is how long will it take? From the view of macro-economic reform, the success of the automotive industry largely depends on the extent to which China, as a whole, will transform into a market-driven economy and be integrated into the world economy.

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