

The Impact of Government Policies on Industrial Evolution: The Case of China's Automotive Industry

by

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Abstract

Governmental industrial policies have great influence on industrial performances and development trajectories. The infant industry theory has been the dominating theoretical foundation of the industrial policies in developing countries to protect and foster their immature industries. However, the successful application of infant industry theory is subject to many conditions, such as the economic and political environment in a specific country.

In this thesis, the case of China's automotive industry under strong industrial policies is used to demonstrate the complex dynamics between policies and industrial development, as well as the interactions between government and industry. Especially, the key factors that determine the success or failure of the infant industry theory are the research focus.

The overall industrial characteristics of China's automotive industry were overviewed. The industry was protected and fostered in the past two decades with a few policy options, such as trade barriers, joint venture regulation, local content rule, industrial entry limit and etc. However, the indigenous industry became highly fragmented, still lacks independent technological capabilities, and relies on the international automakers which have gradually dominated the passenger car market in China over the time of protection.

Systematic causal analyses are conducted to explore the essential reasons for the distorted policy impacts on industrial evolution. The results indicate the regionalism and departmentalism in China's government system led to the fragmentation, and the "regulatory capture" between the government and state-owned enterprises is the major reason for the oligopoly of joint ventures and the industry-wide lack of active capability development. The uniqueness of the strong governmental ownership in the market players in the Chinese automotive industry determined the failure of the application of infant industry theory. A further cross-country comparative analysis also supports these major findings.

A few policy recommendations, including ownership reform of state-owned enterprises, centralization of industrial management and etc., are proposed at the end of the thesis.

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Table of Contents

Chapter 1 Introduction.....	9
1.1 Motivation	9
1.2 Infant Industry Theory and Research Problems	11
1.3 Guide to Thesis.....	15
Chapter 2 Current Industrial Characteristics	17
2.1 Vehicle Production and Sales	17
2.2 Vehicle Manufacturers.....	19
2.2.1 Overview	19
2.2.2 State-Owned Enterprises.....	22
2.2.3 International Joint Ventures	28
2.2.4 Private-Owned Local Manufacturers	34
2.3 The Rise of Independent Indigenous Manufacturers	38
2.4 Technological Capabilities	42
2.4.1 Historical Lack of Technological Capabilities.....	42
2.4.2 Intellectual Property Issues.....	43
2.4.3 Strategies to Technological Independence	44
2.5 Motorization and Future.....	47
2.6 Chapter Summary.....	50
Chapter 3 Industrial Evolution with Policy Interventions.....	51
3.1 The Policies	51
3.2 Establishment of Industrial Fragmentation	53
3.2.1 Fragmentation by Departmentalism and Regionalism.....	53
3.2.2 Case of Development under Regionalism -- Chery Automobile Company.....	59
3.2.3 Case of Multifaceted Strategies of SOEs -- ChangAn Automobile Co.	61
3.3 FDI, Technology Spillover and Limitations.....	63
3.3.1 The Policies Created Oligopoly	65
3.3.2 Oligopoly Held Back R&D Activities within International Joint Ventures	66

3.3.3 Oligopoly Weakened Incentives for Independent R&D of SOEs.....	68
3.3.4 Positive Effects of International Joint Ventures	69
3.4 Infant Industry Theory and Missing of “Learning By Doing”	70
3.4.1 Key Element Behind Protection -- Efficiency Improvement.....	70
3.4.2 Missing of “Learning By Doing”	73
3.5 Institutional Failure of “Regulatory Capture”	76
3.6 Regulation Liberation and Effects.....	79
3.7 Chapter Summary.....	82
Chapter 4 Cross-Country Comparison.....	84
4.1 Brazilian Automotive Industry -- FDI and Import Substitution.....	84
4.2 Japanese Automotive Industry -- Learning By Doing and Catching Up.....	87
4.3 Comparison of Automotive Industries in Brazil, Japan and China	91
4.4 Chapter Summary.....	97
Chapter 5 Conclusions, Policy Recommendations and Future Work.....	98
5.1 Conclusions	98
5.2 Policy Recommendations	100
5.3 Future Work.....	102
Bibliography	103
Appendix A: Networks of Development Strategies of Young Tigers.....	107
Appendix B: Summary of the Chinese Automotive Industry Policy 1994 ...	108
Appendix C: Summary of the Chinese Automotive Industry Policy 2004 ...	109

List of Figures

Figure 2.1: Vehicle Production Volumes in China (1990~2005)	18
Figure 2.2: Number of Vehicle Manufacturers in China (1980~2004).....	19
Figure 2.3: Capacity of Chinese Automakers in 2004	20
Figure 2.4: Net Fixed Assets and Working Capital by Firm Type	25
Figure 2.5: Global Volumes of International Joint Venture Partners by Firm Type.....	25
Figure 2.6: Partnership Structure in the Chinese Automotive Industry	30
Figure 2.7: Market Share Comparison of Brands in 2000 and 2004	32
Figure 2.8: Performance Comparison by Firm Type	34
Figure 2.9: Chery QQ and GM Chevrolet Spark	44
Figure 2.10: Vehicles in Use in China (1990~2002).....	48
Figure 2.11: Price Segments of Motor Vehicle Sales in China (2003~2005)	49
Figure 3.1: Accumulation of Automotive Manufacturers over Time.....	54
Figure 3.2: Clusters of Vehicle Manufacturers in China.....	56
Figure 3.3: Reasons for Diseconomy of Scale.....	59
Figure 3.4: Intended Routines of the Government Policies	64
Figure 3.5: Actual Routines for Failure of the Government Policies	65
Figure 3.6: Welfare Effect of Tariff on Supply-Demand Curves	71
Figure 3.7: Effect of Efficiency Improvement on Supply-Demand Curves	72
Figure 3.8: Reinforcing Loop Limiting Technological Spillover Effect.....	74
Figure 3.9: Effects of Regulation Liberation and Economic Growth.....	80
Figure 3.10: Planned Additional Production Capacities until 2010.....	82
Figure 4.1: Vehicle Production, Domestic Sales and Exports in Brazil (1960~1996).....	86
Figure 4.2: Import Tariff Adjusted with Exportation Rate in Japan	89
Figure 4.3: Production, Domestic Sales, Exports and Imports in Japan (1955~2000).....	89

List of Tables

Table 2.1: Industry Concentration Ratio Comparison	20
Table 2.2: Vehicle Production Volumes by Province in 2004	21
Table 2.3: Typology of Manufacturers by Political Ownership	24
Table 2.4: Sales of Top Ten Indigenous Automotive Industry Groups	26
Table 2.5: 2004 Revenues of Top Twenty Indigenous Automotive Industry Groups	27
Table 2.6: 2005 Sales of Top Fifteen Passenger Car Manufacturers in China.....	32
Table 2.7: Comparison of Foreign Brand Penetration by Region.....	33
Table 2.8: Production and Sales of “Young Tigers”	38
Table 3.1: Ownerships of Chinese Indigenous Automotive Industry Groups	57
Table 3.2: Welfare Effects of Tariff.....	71
Table 3.3: Welfare Effects of Efficiency Improvement and Tariff Removal	73
Table 3.4: Capacity Utilization Rate in 2004.....	81
Table 4.1: The Japanese Automotive Industry Leap from 1955 to 1985	90
Table 4.2: Summarization of the Cross-country Policy Comparison	91

Acronyms and Abbreviations

AAMA	America Automobile Manufacturers' Association
AAPIC	Anhui Auto Part Industrial Company
BAIC	Beijing Automotive Industry Corporation
CAAM	China Association of Automotive Manufacturers
CATARC	China Automotive Technology and Research Center
CKD	Completely Knocked Down
FAW	First Automobile Works
FDI	Foreign Direct Investment
GAIG	Guangzhou Automotive Industry Group
GM	General Motors
IJV	International Joint Venture
IMVP	International Motor Vehicle Program at MIT
METI	Ministry of Economy, Trade, and Industry of Japan
MITI	Ministry of International Trade and Industry of Japan
NAC	Nanjing Automobile (Group) Corporation
NDRC	National Development and Reform Commission
SPC	State Planning Committee of China
OICA	Organisation Internationale Des Constructeurs D'Automobiles (International Organization of Motor Vehicle Manufacturers)
PATAC	Pan Asia Technical Automotive Center
PSA	PSA Peugeot Citroën
R&D	Research & Development
SAIC	Shanghai Automotive Industry Corporation
SOE	State-Owned Enterprise
SUV	Sports Utility Vehicle
VW	Volkswagen
WTO	World Trade Organization

Chapter 1 Introduction

1.1 Motivation

Government may play a significant role in protecting local economy and promoting industrial development. And industrial policy and regulation are the basic instruments for the government to intervene and influence industrial evolution. Governments in most of countries have implemented various industrial policies, regulations or laws in order to protect local markets or promote industrial development and economic growth.

The governmental interventions are usually conducted in some basic policy forms, including trade policies (e.g. tariff, quota and other anti-dumping measures) to protect the domestic market that is weak from unbeaten foreign competition, support policies (e.g., tax incentives, subsidies, preferential loan, licenses, government contracts) to promote the development of domestic companies, and foreign investment policies (e.g., joint venture regulation and local content rule) to create production capacity and employment, transfer technology and know-how, and link to the global marketplace.

The forms of industrial policies vary across countries and regions, but their purposes simply centered in two: protection and development. In the developed countries, protection is the major purpose of industrial policies. The United States, which is self-assumed a “free-trade” country, also has anti-dumping measures in forms of tax, tariff, quota and etc. to protect domestic industries from foreign competition, with which the domestic companies by themselves have no power to compete. Sometimes, developed countries also use policy options to promote the development of its specific less developed industries. As a matter of fact, the government industrial policies are more popularly used in the less developed countries with both of the protection and development purposes: to protect their immature domestic industries from foreign competitions, and to promote industrial development and catch-up.

Industrial policies have been widely and successfully used in the world, especially in the centrally planned economies like Japan and China to leap frog economic growth and

the development of industries, though many of these industrial policies, especially the protectionism policies, are always criticized by the advocators of the “free trade” principle. Japan’s fast economic growth and catching-up in nearly all major industries since the 1950s largely attributed to the successful active government interventions through comprehensive industrial policies. And China’s comprehensive economic policies under the “Reform and Open” principle also have been driving the fastest economic growth in the world during the past two decades.

However, the success of industrial policies highly depends on the content of policies, the specifics of the industrial status, the political and economic environments and many other factors. The dynamics between industrial policies, industry performance, and government system are complicated. Many developing countries in Latin America and Africa failed to attain international competitiveness after 15 or 20 years of protection of similar governmental policies, which the Eastern Asian countries took to succeed.

Therefore, the basic motivation of this study is to demonstrate and analyze the complex interactions and dynamics between the governmental policies, industrial environment and the industrial development, with the case of a typical “infant industry” - - China’s automotive industry from the 1980s.

China has a typical government-intervened economic system. And, regarded as an infant industry, the automotive industry was one of the highly regulated industries that the Chinese government tried to protect and nurture with a comprehensive set of industrial policies¹. Many classic policy options under the structures of trade barriers, promotional policies and foreign investment policies have been implemented in this case with strong Chinese characteristics in the automotive sector. The interactions between those individual policy measures have been strong, and generated many expected as well as unexpected impacts that each measure can not generate individually.

Therefore, using the case of China’s automotive industry would be valuable to capture the interacting dynamics between the government and industrial development,

¹ The reason for many developing countries to pick the automotive industry as a pillar industry to protect and foster first is because there are strong spillover effects from the automotive industry to many of its associated industries within the domestic economy. Spillover effects from the initially-protected pillar industry may stimulate the growth of other domestic industries and the overall economy.

and dig the determinant factors within the policy framework to influence the industrial development.

1.2 Infant Industry Theory and Research Problems

The theoretical foundation for most of the common industrial policies that aim to protect and foster industry development is the “Infant Industry Theory”, which was founded systematically by Friedrich List² in his famous book “*The National System of Political Economy*” first published in 1841. And, Alexander Hamilton³ is widely cited as the original contributor to the fundamental ideas of the infant industry theory. The theory advocates that infant/immature domestic industries in the less developed countries should be protected by the government with tariffs, quotas, and other useful means from the international competitions for a limited time period until their capabilities reach the international level, and become mature and stable⁴.

The immature firms in the less developed countries have little chance to survive from the competition of the mature firms in the developed countries that have been in the business for a long time, operating with high efficiency, low price and high quality for similar products or service. Therefore, the government in the developing countries should play a role to protect the immature industries and foster its growth. The protections, generally in forms of tariff, quota and etc., may result in a monopoly or oligopoly and a higher domestic price in the protected domestic market than that in the international market. Then the high price may cover the higher production costs and help the inefficient immature firms remain in business. With the profits gained inefficiently during

² Friedrich List (1789~1846) was a German political economist and nationalist. Friedrich List resided in America from 1825 to 1832, and there he created his "National System" theory based on his observations and the inspiration from Alexander Hamilton's work. His best-known book, *The National System of Political Economy* (1841), was written as against the free-trade doctrines that permeated classical economics. The infant industry theory was regarded as first comprehensively developed and formulated in this book.

³ Alexander Hamilton (1755~1804) was the founder of Federalist Party - the first American political party, and the first Secretary of the Treasury of the United States. He initiated the debate on industrialization through infant industry protection in 1791, and argued for the protection of United States' industries against imports from Great Britain. The first Tariff Act of the United State in 1789 was regarded as having elements of protectionism. Hence, the United State was also regarded as the motherland of infant industry protection as an economic theory and as a tool of trade and industrialization policy.

⁴ Infant Industry Argument, Wikipedia, June 2006.

the protection period of time, the immature firms would improve its experience and efficiency that could improve its product quality and reduce operation costs. The protections may be reduced gradually along with the improvements of the competitiveness of the domestic firms. When the industry reaches a minimum level to be able to compete with the well-established industries abroad, the protections should be lifted. Generally speaking, the protection is designed to create an environment for the infant industries' initial growth, and facilitate a faster development.

Even though the infant industry theory is disputed by the advocates of the “free trade” theory, it has been widely used in the world, and has actually served as the theoretical foundation of the development strategies pursued by countries like the United States and Germany to catch up with Britain in the late 19th century, and Japan and South Korea in late 20th century to stimulate the economic growth.

However, the appropriate protections based on the infant industry theory are conditioned by many specific circumstances and restrictions. As a matter of fact, the developing countries that simply isolated the domestic market for the protection purposes used to fail in developing the strength of the domestic industries. Frederick List actually *regards restrictions as a means to development, independence and ultimately liberty, i.e. free trade* (Shafaeddin, 2000). The correct understanding is that, it is not contradictory against the “free trade” doctrines, but one complement. Besides the basic ideas, a few issues surrounding the practical application of the infant industry theory should be addressed.

1) The protection needs an appropriate due and level.

First, the protection has costs for the inefficiency of the regulated industry. The core role of protection is to give the chance to immature firms for their initial growth. If the firms in the developing industries have grown to be able to compete with the mature firms in the developed countries, the protection is no longer needed. On the contrary, keeping the protection in place would induce costs. Secondly, if the protection is expected to be long-lasting, then the protected domestic firms would have less incentive to improve their productive efficiency. Also the level of protection (e.g. the level of tariff or quota) is associated with the market welfare deadweight loss, so needs to be set and

adjusted according to the relative competitiveness difference between the levels of domestic firms and international firms. For example, the rate of tariff should be decreased in accordance with the competitiveness development of the protected industry. The tariff should be lifted at the end of the protection when the domestic industry has been mature enough. However, to determine the correct protection level and time period is not a simple and easy matter (Shafaeddin, 2000; Shi, 2005).

2) Learning effects must be fostered and generated during the protection period.

Protection may reduce the need and motivation of the protected firms to learn and improve. Without learning and spillover effects, the immature firms are unlikely to improve and grow. Therefore, besides the protectionism policies, the measures to promote learning effects must be integrated in the policy package. First, domestic competition is necessary as foreign competition has been kept out. This is because, without competition, the domestic firms will gain monopoly or oligopoly and lose the need and motivation to improve its operation efficiency and capability. Second, international cooperation and foreign direct investment (FDI) may drive the spillover of management and technological know-how to the less developed countries and accelerate learning. Actually, Frederick List never meant the protection on domestic market is to challenge the international trade.

3) Not all the immature industries should be protected.

The industries that have potential to compete with the international level in the future and the industries that have strong knowledge spillover function to other related industries, such as the automotive industry, should have the priorities of enjoying the governmental protection. Moreover, the protection is unnecessary for those industries that have rare competition in the global range, even if they are under-developed (Shi, 2005).

However, the infant industry theory is always disputed. The advocates of “free trade” and “comparative advantage” claim that the protection over infant industry would split up the global market, induce inefficient allocation of resources, and generate society deadweight loss in a global horizon. Also, the immature industry under protection would end up with small-scale, localized, and inefficient. The infant industry theory is still widely regarded as the opposite of the WTO (World Trade Organization) missions and

agreements that promote a free global market. And such debates and doubts on the infant industry theory have never stopped.

As a matter of fact, not all the governmental policies that have been implemented as application of the infant industry theory succeeded. In many developing countries, industries have failed to attain international competitiveness even after 15 or 20 years of protection, and might not survive if such measures as protective tariffs were removed. Mostly, the Asian countries performed much better than those in the Latin America and Africa. The reasons for the existing failures are complex, either theoretical or application problems, which still need to be further investigated.

In the case of automotive industry, even though the industrial policies based on the basic principles of the infant industry theory succeeded in Japan and South Korea, they did not perform perfectly in most of the other developing countries in Latin America and Africa. The situation in the Chinese automotive industry is a little complex. After 20 years of protected development, the domestic automotive industry has been economically developed to be close to the international level. China has become one of the biggest power houses for the global automotive industry. However, the indigenous firms are technologically underdeveloped relative to the initial policy goal to leap frog. Similar governmental policies and intentions in Japan based on the infant industry theory during the 1950s and 1970s drove the development faster than that during the 20 years since the middle 1980s in China.

Therefore, what are the reasons for the inefficiency of China's automotive industrial policies compared with Japan's successful policies? What part of the policies is successful, and what part has failed? Does the failure imply the correctness of the proponents of theoretical economic theories against government interventions in economic development, and the deficit of the infant industry theory? And what are the key factors that will determine the policy impacts on industrial development? More generally, similar policies built on the infant industry theory failed, but some others succeeded, therefore, what are the key factors that determine the success and failures? These will be the key research questions that will be answered through the analysis in this thesis.

There have been various studies about the history and development of China's automotive industry, as well as the governmental policies to foster the development of this industry. Some of these studies have deep insights about the substances of the policies, and complex structure and status of the current Chinese automotive industry. However, very few studies have systematically investigated the complex dynamics between the industrial policies and trajectories of development of China's automotive industry. Also, a few studies implied the inefficiency of China's automotive industrial policies, and the negative effects of governmental interventions in the industry, but very few explained clearly why similar policies succeed in Japan but fail in China with a theoretical basis.

This study will focus on the interactions between the industrial policies, industrial performance as well as the political and economic environment, and also apply the infant industry theory to explain the success and failures that have taken place in the past two decades of the Chinese automotive industry under policy protection and promotion.

1.3 Guide to Thesis

A brief overview of the structure of subsequent chapters is given in this section.

In chapter 2, a general overview of the current status of the Chinese automotive industry and its special characteristics are presented, including the production and sales volume, industry structure, major vehicle manufacturers, technological capabilities, industry development outlook and etc.

Chapter 3 analyzes the complex system dynamics between the industrial evolution and the governmental policies of the Chinese automotive industry in the past 20 years. In particular, the analysis emphasizes system dynamics and interactions, and the focus is how the development trajectory was affected by the policy interventions in China's special economic and political system. The success and failures of the governmental industrial policies will be evaluated, and in particular, the key factors and reasons that determined the failure and successes will be dug.

In chapter 4, a comparison of policies for automotive industries' take-offs between Brazil, Japan and China will be conducted to demonstrate how policies and their impacts

vary across the national borders, and seek the fundamental drivers for the different impacts of similar policy options in different countries.

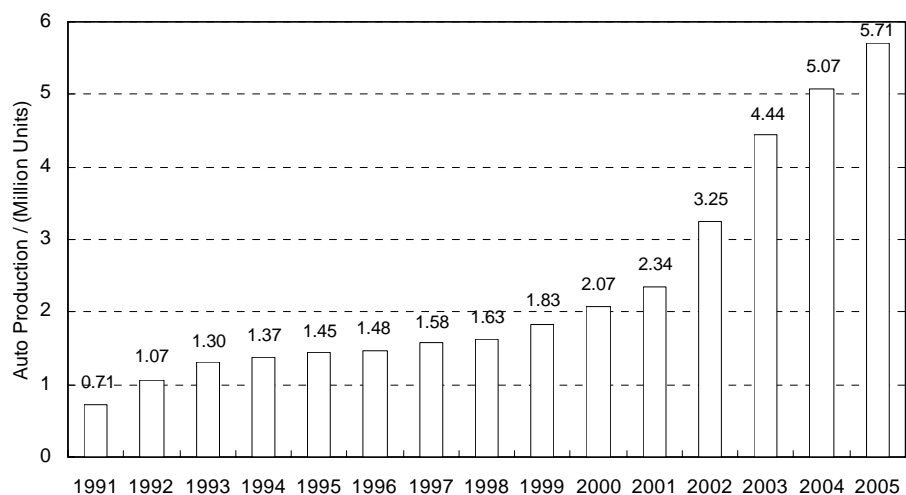
Chapter 5 concludes the thesis, proposes policy recommendations and provides ideas and directions to further the work in the future.

Chapter 2 Current Industrial Characteristics

After a long time struggling, China's automotive industry has become one of the biggest power houses for the global automotive industry. In this chapter, the current status of the industry and the industrial characteristics are analyzed.

2.1 Vehicle Production and Sales

The automobile production in China was started from the early 1950s with the help of the Soviet Union. Ever since then the vehicle production kept rising. Initially, the vehicles were produced mainly for commercial and military use. With the economic reform in the mid 1980s, the international automakers -- Volkswagen, Chrysler, Citroen, Peugeot and etc., were allowed to manufacture cars in China, but only in joint ventures with the state-owned enterprises (SOEs) as partners. Figure 2.1 shows the vehicle production volumes in China since the 1990s⁵. In general, China's vehicle production and sales have grown about 15% on average every year from 1991 to 2005. Especially, this industry started to accelerate in the late 1990s in parallel with the country's overall economic growth trends.



⁵ The sales records were close to production records because almost all the vehicles produced were sold out in the China's regulated automotive market where the demand was always larger than the supply.

Figure 2.1: Vehicle Production Volumes in China (1990~2005)

Source: China Automotive Industry Yearbooks

According to the statistical data of China Association of Automobile Manufacturers (CAAM), in 2005, 5.71 million vehicles were domestically produced, and 5.91 million (including imported automobiles) were sold in China⁶. The passenger car sales increased 21.45% to 3.97 million units in 2005, recovering from a slowed-down 15% growth in 2004 when the government implemented a few macro adjustment policies to cool the over-heated automotive industrial boom, which had a growth rate of 50~80% during the golden time from 2001 to 2004. In the first half of 2006, the skyrocketing speed came back again with a 46.9% climb-up from the same period of previous year according to the announcement of CAAM⁷. Dramatically in the past 4 years, the market size has more than doubled since 2001 when the sales were 2.73 million.

A main driver of the market growth is the shift of passenger car purchasing power from institutional buyers to strong private customers, who are becoming affluent. In 2004, the personal purchases accounted for more than 50% of car consumptions in general, and more than 70% in the urban areas⁸. More broad reasons for the recent fast growth of automotive production and sales include the overall economic take-off of China, the government policy reforms, the globalization, and many other changes of the world automotive industry.

According to the projection of Society of Automotive Engineers of China, if the overall economic growth of China continues at the current speed, the domestic automotive market size is anticipated to exceed 10 million units annually by 2010 and 16 million units by 2020, which roughly equals the current size of the U.S. market (Chen, Liu and Feng, 2004).

Although the motor vehicle production in China has been rising rapidly, the production is still mainly to serve the expansion of the domestic market. The vehicle

⁶ It is widely reported China became the No.2 largest automotive market (in terms of domestic sales) by surpassing Japan where 5.80 million new vehicles were sold in 2005. This is inexact because the difference of domestic sales between the two countries lies in the range of normal statistical errors.

⁷ Reuters, July 10, 2006

⁸ Economic Outlook, August 2004, p28

export from China has been rapidly growing in recent years, but it is still limited at the level comparative to South Korea or Brazil in the 1980s. In 2005, 5.71 million vehicles were produced in China, but only 104,115 trucks, 31,125 cars and 6,439 buses were exported⁹, and the export destinations were mainly Middle East, Southeast Asia, Latin America, Africa and other under-developed countries. But due to the pressure of mounting competition in the domestic market and the increase of installed production capacity, exports are expected to soar in the next few years. Many indigenous manufacturers as well as international joint ventures have started their plans to export cars produced in China to Europe and the United States.

2.2 Vehicle Manufacturers

2.2.1 Overview

A large base of vehicle manufacturers has been established in China over the past 50 years. In 2005, there were 117 independently registered automotive manufacturers in China. Figure 2.2 shows the evolution of the number of automotive assembly enterprises in China since 1980.

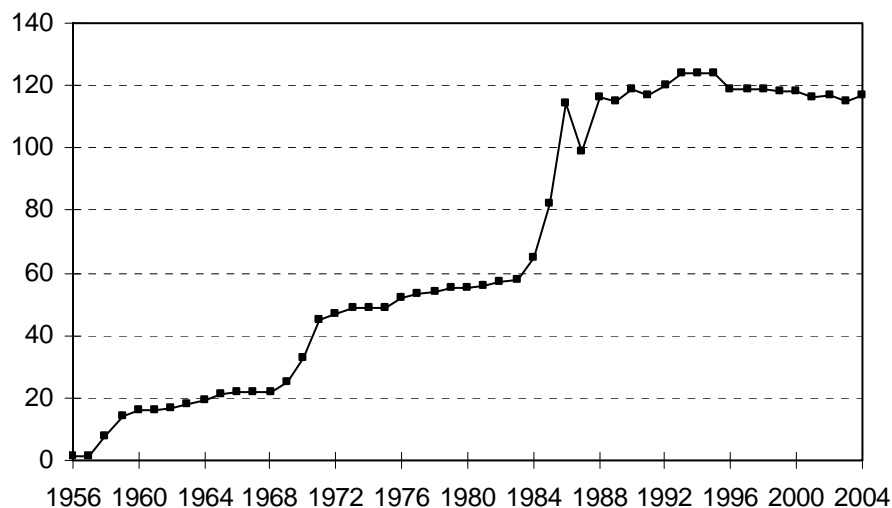


Figure 2.2: Number of Vehicle Manufacturers in China (1980~2004)

Source: China Automotive Industry Year Book (2005)

⁹ According to the 2005 data from CATARC, 710,540 special vehicles (e.g., forklift, golf vehicles and all-terrain vehicles) with an engine volume $\leq 1000\text{mL}$ were exported in 2005.

Motor vehicle production is very sensitive to economy of scale. However, China's automotive industry is observed to be the most fragmented in the world, and an extreme example of diseconomies of scale. In 2005 China's vehicle production of 5.71 million motor vehicles were spread among 117 manufacturers. It means an average volume about 49 thousand units per manufacturer. This is already much better than the situation in 1995 when 1.45 million output was spread out in more than 120 enterprises. The minimum efficient level of scale is customarily affixed at 250,000 units per year for a single operation (Baranson, 1969). However, from the data shown in Figure 2.3, only 12 individual automotive manufacturing enterprises in China operated with a volume larger than 100,000 units in 2004.

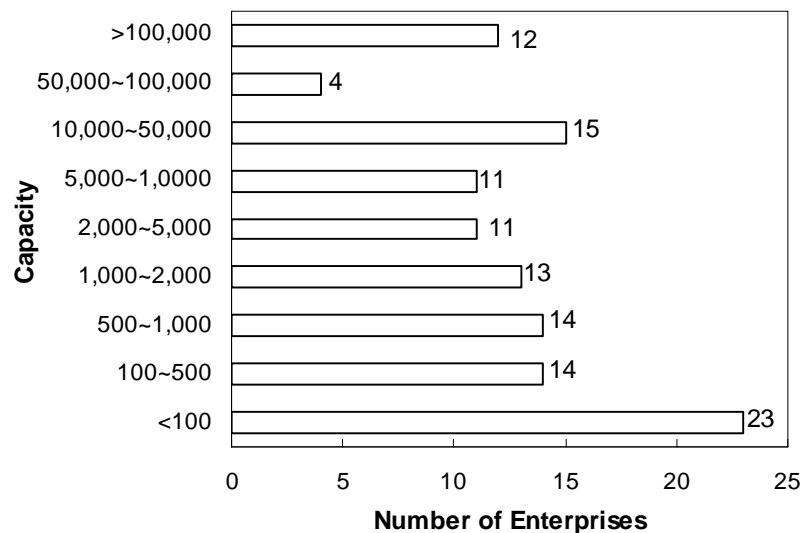


Figure 2.3: Capacity of Chinese Automakers in 2004

Source: China Automotive Industry Yearbook (2005)

From the comparison in Table 2.1, the Chinese automotive industry is the least concentrated in comparison with the automotive industries in Brazil, Japan and South Korea during their take-off years. The one-firm, two-firm and three firm ratios were calculated by dividing the industrial outputs of top one, two and three firms with the total industry's output. And, except only China, all the automotive industries in other countries have a similar trend to become more and more concentrated and consolidated over time.

Table 2.1: Industry Concentration Ratio Comparison

Country	Year	One-firm ratio %	Two-firm ratio %	Three-firm ratio %
---------	------	------------------	------------------	--------------------

Brazil	1959	24.8	42.7	60.6
	1970	56.1	74.3	91.2
Japan	1960	32.1	56.1	65.1
	1975	33.7	63.6	72.8
S. Korea	1975	54.6	77.7	96.4
	1986	71.3	88.6	97.9
China	1985	19.2	38.0	43.0
	1995	12.6	23.6	33.3
	2005	9.4	18.0	24.2

Source: Huang, 2003; 2005 numbers are calculated from CATARC 2006 data by the author.

The vehicle production in China is not only spread out by manufacturers, it is also dispersed by regionality. In 2004, there were only 3 out of 31 provinces in main land China that had no vehicle production. Table 2.2 shows the distribution of vehicle production by provinces in 2004.

Table 2.2: Vehicle Production Volumes by Province in 2004

Province	Volume	Province	Volume	Province	Volume
Jilin	64.6	Jiangxi	18.4	Henan	3
Shanghai	56	Shandong	14.7	Neimenggu	0.6
Beijing	53.9	Hebei	14.4	Xinjiang	0.2
Chongqing	43.7	Liaoning	14.2	Shanxi	0.1
Hubei	33.6	Zhejiang	10.1	Guizhou	0.1
Guangxi	28.5	Hainan	6.7	Ganshu	0.1
Guangdong	27.7	Fujian	6.6	Xizang	0
Jiangsu	24.4	Sichuan	6.3	Qinhai	0
Tianjin	22.3	Yunan	5.1	Ningxia	0
Anhui	21.8	Shanxi	5		
Heilongjiang	21.1	Hunan	4.6		

Unit: (10,000)

Source: China Automotive Industry Yearbook (2005)

This fragmented industry is composed of three major types of vehicle manufacturers:

- 1) State-owned enterprises (SOE) that, either make vehicles in their international joint ventures with foreign partners or independently, manufacture and sell cars (e.g. FAW and ChangAn).
- 2) Joint ventures between local Chinese manufacturers and multinational companies

- (e.g. FAW-VW and Shanghai GM).
- 3) Private-owned local small manufacturers which mainly produce economy vehicles for the low-end market (e.g. Geely, GreatWall and BYD).

These three types of vehicle manufacturers pose different performances, characteristics and strategies in China's automotive industry.

2.2.2 State-Owned Enterprises

Before the 1980s, all the Chinese automotive enterprises were state-owned. Over the years from the 1950s to 1980s, many big or small automotive manufacturing enterprises were established by the central government, regional governments, as well as some ministries in charge of different industries. Among all the SOEs, six groups are the most influential in the market so far.

First Automobile Works (FAW) was historically the first automotive enterprise in China, and was constructed in the mid-1950s. It is still the largest indigenous automotive group in China, and the first Chinese automaker that produced more than 1 million vehicles in one year (2004). FAW became listed at the 448th in the Fortune magazine's "Global 500 Largest Companies" in 2004, but dropped to the 470th place in 2005¹⁰. Besides the joint ventures with Volkswagen and Toyota, FAW also operates its historical independent "Liberation" truck plant and "Red Flag" sedan plant, and a few component and part suppliers.

Shanghai Automotive Industry Corporation (SAIC) was also set up in the 1950s for the "Shanghai" brand sedan during the first five-year plan era, but SAIC gave up its independent brands when they set up the joint venture with Volkswagen in the 1980s. Even though SAIC has no independent brand, in 2003 it became rich enough to the first Chinese automaker ranked in Fortune magazine's list of "Global 500 Largest Companies", and was the 475th in that list in 2005¹⁰. This corporate strength mainly comes from its strong and profitable partnership with the top two global automakers in China -- General Motors and Volkswagen. Recently, SAIC has been pursuing a few new strategies to develop its self-reliant brands, products and production.

¹⁰ People's Daily Online, July 14, 2006

Dongfeng Motor Company was constructed (initially called Second Automobile Works) in the 1960s during the Cold War era, as a backup military truck plant for FAW which is geographically close to the Soviet Union. Into the 1990s, Dongfeng met the trouble that the military truck contracts started to shrink, so the partnership with international automakers via joint ventures has become particularly important for Dongfeng. In fact, Dongfeng put most of its assets into the joint ventures, and has the largest number of joint ventures among the Chinese automakers, as well as the most complex corporate structure.

Other than the top three, ChangAn was a military machine gun producer with a history of more than one hundred years. It started automotive production with manufacturing licensed Suzuki mini vans and cars from 1984, so far has been the market leader of the mini vehicle segment since the early 1990s. Different from the other indigenous peers who currently rely on the international joint ventures, ChangAn has 2/3 of its sales from its independent plants that produce ChangAn brand cars, trucks and buses.

Beijing Automotive Industry Corporation (BAIC) located in Beijing has the advantage of being near the central government, and had the preferential opportunity to have the first international automotive joint venture in China with American Motors Company (which was subsequently taken over by Chrysler) in 1985. It was always a second-tier player until the joint venture with Hyundai was launched and performed successfully. DaimlerChrysler has also been expanding the partnership with BAIC and preparing the production of Mercedes-Benz with BAIC.

Compared with the other top 5 indigenous automotive groups, Guangzhou Automotive Industry Group (GAIG) has little experience and foundation for automotive manufacturing, but it became an important force after the Japanese Honda and Toyota gathered around Guangzhou and set up joint ventures with it. Hyundai also recently launched a new commercial vehicle joint venture with GAIG in Guangzhou. Because of the lack of independent brand and ground work for automotive manufacturing, GAIG just plays an assisting role within its joint ventures. Therefore, the trajectory of GAIG will mainly be determined by the trajectory of its partners if the joint venture requirement

remains.

With the support of their governmental owners, these big SOEs obtained rich capital investment, large operational scale, as well as built up joint venture partnerships with the strongest international automakers in the world. In this study, 71 manufacturers¹¹ in China were selected and categorized for a comparative study to investigate how the power of governmental ownership made difference in terms of capital and resource allocation. The manufacturers were categorized into three types listed in Table 2.3 below.

Table 2.3: Typology of Manufacturers by Political Ownership

Type	Political Power	Owners or Partial Owners	Examples
1	High	Central Governmental Ministries and Beijing/Shanghai Government	FAW, Dongfeng, SAIC
2	Median	Provincial/Municipal Government	GAIG, NAC, Chery
3	Low	Private or Collective Investors	Geely, BYD, Lifan

Type 1 stands for the firms owned by the central government and central governmental ministries (e.g. the former Ministry of Weapon Industry which has been transformed to several government-owned corporations). Beijing and Shanghai governments are also as powerful as the central governmental ministries. Type-1 firms have the strongest political power. Type 2 stands for the firms owned by the regional governments. Chery Automobile Company owned by the Wuhu city government is an example of this type of firms. Type-3 firms are owned by private and collective investors so as to have the lowest level of political power among all the industry players.

Net fixed asset is a measure for firms' size or capital investment, and the working capital indicates the short-term financing of a firm's current operations. The analytical results from the data of year 2005¹² indicate that the firms with higher political power own larger net fixed asset and working capital, which are the indicators of the advantage of large state-owned firms in capital allocation, as shown in Figure 2.4.

¹¹ The 71 manufacturers were selected by criteria of: 1) Net Fixed Assets >100 Million Yuan; 2) Working Capital > 10,000 Million Yuan; 3) Industrial Output Value > 10,000 Million Yuan; 4) Employees > 800 People.

¹² 2005 data are from CATARC.

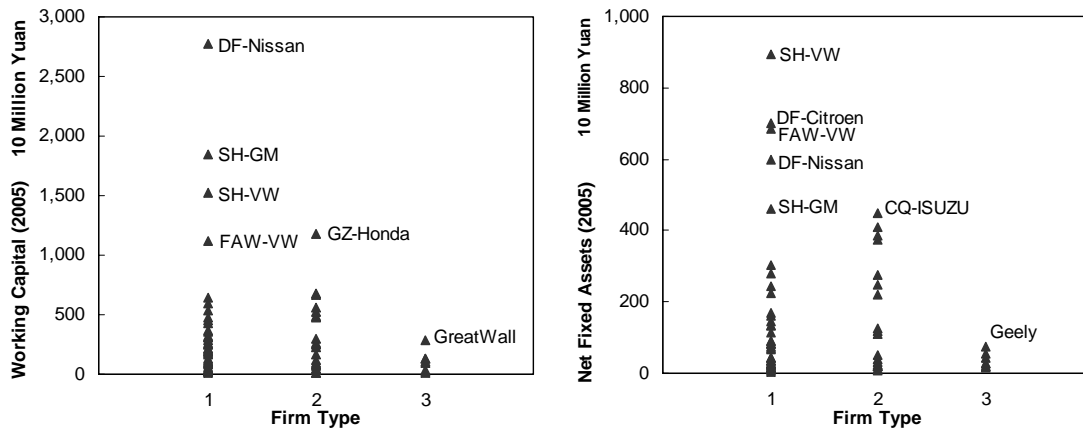


Figure 2.4: Net Fixed Assets and Working Capital by Firm Type

The global production volumes in 2004 of the international partners of each indigenous automaker were summed up to indicate the strength of partners¹³. For example, FAW has two joint venture partners – Toyota and Volkswagen. Then the sum of the productions of Toyota and Volkswagen in 2004 indicates the ability of FAW to have good partners. The major indigenous firms that have international joint ventures are chosen for this calculation. The results in Figure 2.5 below show that the rank of joint venture partners’ strength is consistent with the governmental level of the indigenous enterprise’s owner. Obviously, the Chinese big three – FAW, SAIC and Dongfeng had the preferential advantage to team up with the strongest international automakers.

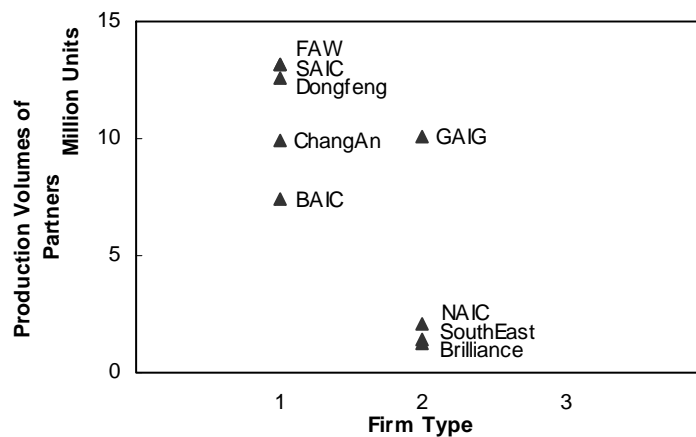


Figure 2.5: Global Volumes of International Joint Venture Partners by Firm Type

Seen from this analysis, six indigenous automotive manufacturing groups - FAW,

¹³ The original data are from “World Motor Vehicle Production 2004”, OICA Statistics Committee.

SAIC, Dongfeng, ChangAn, BAIC and GAIG – had obvious advantage for capital allocation and joint venture partnership negotiation by the power of their central governmental owners.

Obviously, with the advantages of government supports, the biggest indigenous SOEs achieved their leadership and bargaining power in the domestic automotive industry. In 2005, the top five on the sales rank in Table 2.4 had sales records that are much higher than the rest, and they are all owned by ministries at the central government level. The top five sold 3,858,086 vehicles in 2005, accounting for a 67-percent share of China’s domestic entire vehicle market. Those motor vehicles were produced in either their international joint ventures or independent plants¹⁴. In the sales rank of the first four months of 2006, the top five groups and Hafei(No.7) are all type-1 firms(central governmental level), Chery(No.6), GAIG(No.8) and Jianghuai(No.10) are type-2(regional governmental level), and Geely(No.9) is a type-3 private-owned firm.

Table 2.4: Sales of Top Ten Indigenous Automotive Industry Groups

Company	2006 (January-April)		2005		2004	
	Units	Growth %	Units	Growth %	Units	Growth %
FAW	374,200	28.8	983140	-2.4	1007471	12.1
SAIC	427,600	74.6	917513	8.1	848,542	8.5
Dongfeng	300,400	28.6	729033	39.3	523309	6.7
Changan	267,200	24.5	631142	8.9	579520	22.9
BAIC	237,700	11.2	597258	12.5	530993	57.7
Chery	101,800	97.1	189158	118.5	86568	-4.2
Hafei	98,000	11.6	230051	12.2	205115	7.6
GAIG	84,200	28.8	237150	13.2	209551	70.9
Geely	70,500	75.8	151366	56.5	96693	30.3
Jianghuai	62,600	15.1	154340	18.0	130795	35.1

Source: 2004 Data are compiled from FOURIN China Auto Weekly, 2005 data are from CATARC, and 2006 data are from Zhu, 2006; The sales of the international joint ventures are counted in the numbers.

Table 2.5 shows the 2004 revenues of the leading Chinese automotive groups. The

¹⁴ By OICA Statistics Committee, the 2004 productions of the Chinese top six indigenous automotive groups without their joint venture partners are: FAW: 587,427; SAIC: 308,665; BAIC: 538,699; Changan: 418,587; Dongfeng: 442,027; GAIG: N/A

traditional Chinese ‘Big Three’ - FAW, SAIC and Dongfeng - still dominate the ranking. SAIC surpassed FAW in 2003 in terms of revenues, yet FAW regained the first place in 2004. Even though ChangAn had a No.3 sales record in 2004, but its revenue was only ranked No.6 because most of ChangAn’s products were mini cars and vans which mean the lower price per unit. Similarly, the new entrants, for example Chery and Geely, were also ranked higher in the sales table than in the revenue table because most of them chose to start with the low-end market and cut product prices in order to compete with the foreign brands.

Table 2.5: 2004 Revenues of Top Twenty Indigenous Automotive Industry Groups

Rank	Company	2004 Revenue (Billion Yuan)
1	First Automobile Works	135.64
2	Shanghai Automotive Industry Corp.	119.53
3	Dongfeng Motor Corp.	96.07
4	Beijing Automotive Industry Holding Co.	46.90
5	Guangzhou Automotive Industry Group	40.14
6	Changan Automobile Group	38.43
7	China Heavy Automobile Group	23.38
8	Brilliance Automotive Holding Co.	22.65
9	Anhui Jianghuai Automobile Group	10.78
10	Hafei Automotive Holding Co.	6.10
11	Zhengzhou Yutong Co.	5.94
12	Southeast Automotive Industry Co.	5.46
13	Chery Automobile Co.	5.11
14	Shanxi Automobile Group	5.01
15	Chongqing Isuzu Automobile Co.	3.62
16	Geely Automobile Holding Co.	3.42
17	Chongqing Hongyan Automobile Co.	3.40
18	Hunan Changfeng Automobile Co.	2.92
19	Dandong Shuguang Automobile Co.	2.86
20	Baoding Greatwall Automobile Co.	2.69

Source: Holweg, Luo and Oliver (2005)

Other than the top six state-owned automotive groups, another rising star is Chery Automobile Company owned by the Wuhu City government in Anhui Province. Different

from the traditional big Chinese SOEs, Chery sticks to an independent development strategy, particularly in the aspects of brand construction and product development. So far, Chery only produces and sells Chery-brand cars, and exports to over 30 countries. And Chery has also announced its plan to export cars to the U.S. market from 2007 initially, postponed to 2008 later. From 2004 to 2005, Chery boosted its domestic sales from 87 thousand units to 189 thousand by over 117%. In the first four months of 2006, Chery climbed up to the third place in the domestic sales rank following Shanghai-General Motors and Shanghai-Volkswagen¹⁵.

2.2.3 International Joint Ventures

The international joint venture was a favored instrument of the Chinese government to pursue technology transfer and to leap frog the industry. Since the beginning of the “Reform and Open”, the government has strictly required the foreign companies to establish joint ventures with indigenous SOEs with a share holding no more than 50% in the automotive sector. Also, the joint ventures are concentrated in the passenger car segment, partly due to the strategic significance of this sector and the fact that the knowledge for truck production was relatively advanced in the 1980s when the polices were launched. The military truck plants continued operating during the Cold War and Cultural Revolution eras.

The first joint venture was the Beijing Jeep Co. of BAIC and American Motors Company established in 1983. Afterwards, the second international joint venture Shanghai-Volkswagen was launched between SAIC and Volkswagen in 1985. Shanghai-Volkswagen is still the largest international joint venture in China with an annual capacity of 450,000 units, a size comparable to Volkswagen’s main plant in Wolfsburg, Germany. However, in 2005 Shanghai-GM surpassed Shanghai-Volkswagen and took the first place in the production volume league table. With Shanghai-Volkswagen and FAW-Volkswagen since 1991, Volkswagen group achieved a long time dominance in China’s passenger car market in the 1990s by its early-mover advantage as well as government preferential support through the partnership with the top 2 state-owned indigenous enterprises, FAW and SAIC.

¹⁵ SINA Auto, auto.sina.com.cn, various news, 2006

Before 1997, only several international automakers gained the car production license. Soon after the Chinese government lifted the ban on new passenger car entry projects in 1997, Japanese, American and European companies quickly rushed into the Chinese market. So far almost all the top global automakers have made production and sales presence in China, by teaming up with one or two local partners. Most of them rushed in after China's automotive market started to boom from 2001, the year China joined WTO. The reasons include the market stagnancy in the rest of world, global overcapacity as well as the huge market potential of China, which is the most populous country in the world. So far, GM, Honda, Hyundai and Toyota, as newcomers, have been performing well in the Chinese automotive industry. Gradually, a complex partnership structure between locals and internationals has been established, as shown in Figure 2.6 below.

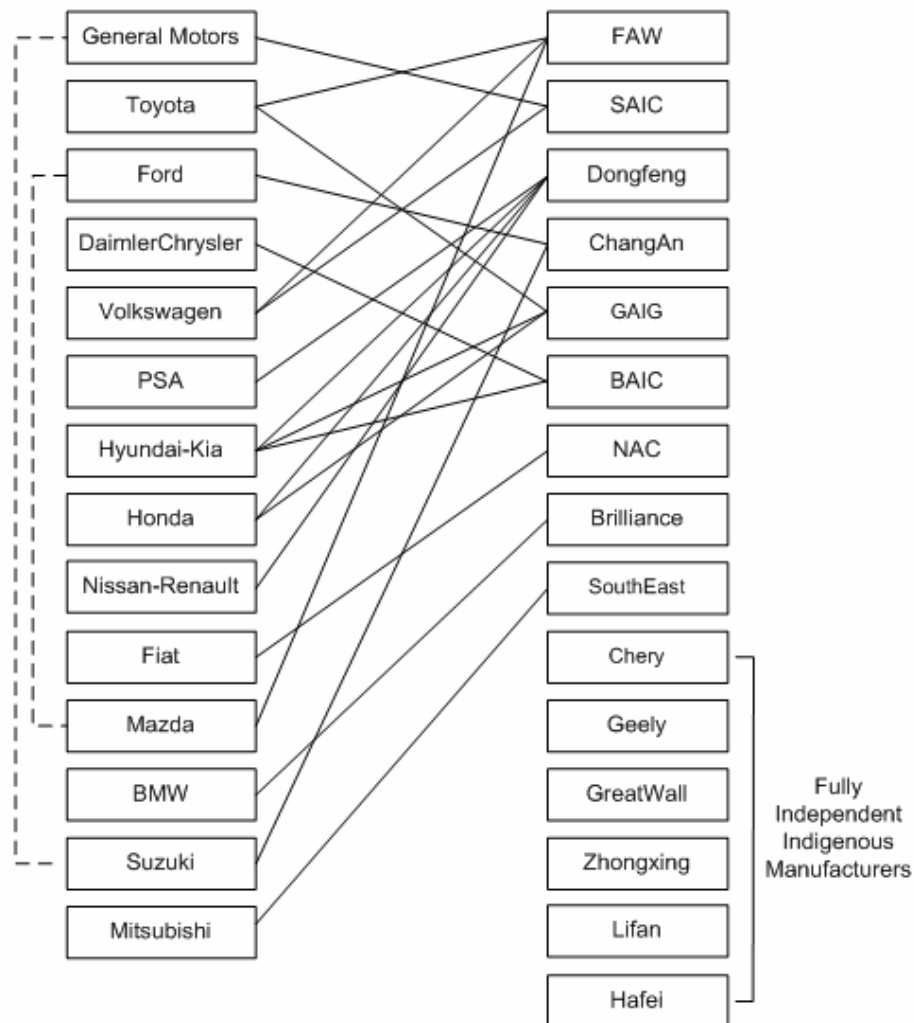


Figure 2.6: Partnership Structure in the Chinese Automotive Industry

The global automakers have posed different strategies in the automotive battle field in China. General Motors is the best positioned international automaker in China. Together with its partner SAIC, GM recently acquired several local automotive manufacturing enterprises covering the van, sedan, subcompact, and mini vehicle segments, throughout the country from North to South. Especially, General Motors' joint venture R&D center with SAIC - Pan Asia Technical Automotive Center (PATAC) is currently the largest automotive research and development center in China with more than 1,200 engineers¹⁶. General Motors has built up a full line capability locally in China and been able to turn the car design concept to development, engineering, manufacturing and market place. A few models that were designed locally and specifically for the Chinese consumers have helped the sales of General Motors soar since 2004. GM outsold Volkswagen and became the leader of international automakers in China by selling 616,556 cars and trucks in 2005. The China market has also become the largest oversea market for General Motors. And in contrast with the worldwide loss of \$10.6 billion for 2005, the China operation turned a net profit of \$327 million for General Motors¹⁷. General Motors consolidated its leader position in China by selling 453,832 units in the first 6 months of 2006, up 47% from the same period last year¹⁸.

Volkswagen enjoyed the first-mover advantage in the 1990s, and has the largest layout in China with a capacity about 1 million units per year. But recently in 2005 Volkswagen experienced the decline and an operating loss of \$144 million in China. It is the first year for Volkswagen to have a loss in China. The sales of Volkswagen slid 25 percent to 490,180, and also fell to second place behind General Motors. This decline was basically due to the slowness in responding to China's fast changing market. The easily-gained monopoly in the 1990s made Volkswagen in China less-advanced and inefficient and unable to compete with the newly-entered international competitors. Recognizing this problem, Volkswagen has reorganized its China operations so that

¹⁶ Interview with senior executives in Pan Asia Technical Automotive Center (PATAC) in Shanghai, May 9, 2006

¹⁷ Automotive News, 2006 Guide to China's Auto Market, , Crain Communications Inc. May 1st, 2006

¹⁸ Reuters, July 10, 2006

decisions on new models are now made in China rather than Germany. Also, Volkswagen is continuing expanding its facilities in China, introducing more advanced models and brands to cover the luxury and budget segments.

Honda is the largest Japanese carmaker in China, and the market leader in the mid-size sedan segment by its successful American version Accord sedan. Honda's sales of vehicles made in China rose 25.5 percent last year to 266,710 units, including some exports to Europe. Now it is adding Acura and Civic to the current lineup of Fit, Accord, CR-V and Odyssey in China. Honda is the only global automaker that has been largely exporting cars made in China to oversea markets. In 2005, 11,047 Jazz, which were made in its 65 percent owned joint venture with GAIG (25%) and Dongfeng (10%) in Guangzhou, were exported to Europe. The foreign ownership cap of 50% does not apply to the exportation-oriented joint venture.

Toyota is the second largest automaker in the world, but just a second-tier player in China. Though it is steadily making progress in China, it remains behind its global rivals, such as GM, Volkswagen, Honda and Hyundai. Toyota's total sales in China, including the sales of imported cars, rose 43.8 percent to 185,987 in 2005. With the new plants under construction with GAIG, an annual capacity of 340,000 vehicles in China will be achieved at the end of 2006.

Ford came in late and for now, remains a second-tier player even behind Toyota. In 2005, Ford's sales in China jumped 34 percent to 62,925 units, composed of Fiesta, Focus and Mondeo. Ford has been laying the foundation for a bold expansion since 2004. With ChangAn and Mazda, Ford is boosting the capacity of its Chongqing flagship joint venture plant to 200,000 units, adding Mazda 3 and Volvo S40 into the product lineup, and constructing a second 160,000-unit (annual capacity) assembly plant and a 350,000-unit engine plant in eastern city Nanjing. With Changan's acquisition for the commercial vehicle producer Jiangling Motors, Ford also strategically increased its share of Jiangling to 30%. Ford's goal is to become one of the top three international vehicle producers in China.

As a result of the strong earnings and the sustainably-growing market size in China, almost all the international automakers, including GM, Ford, Volkswagen, Toyota,

DaimlerChrysler etc., continue to add investments and expand their capacity in China.

A direct result of the rush-in of the international automakers in China is the increasing and deepening competition. Even though the total production and sales of each player keep growing in China, but their market share is shrinking. The shares of brands are shown in Figure 2.7. From 2000 to 2004, the market share of Volkswagen brands shrank from 53% to 27% rapidly¹⁹. According to China Automotive Technology and Research Center, in 2005, Shanghai-Volkswagen and FAW-Volkswagen sold 354,336 and 300,118 vehicles respectively, accounting for only 20 percent of the passenger car market (3,271,045 units) in China. Along with the shrinking share, the car price is also being rapidly cut.

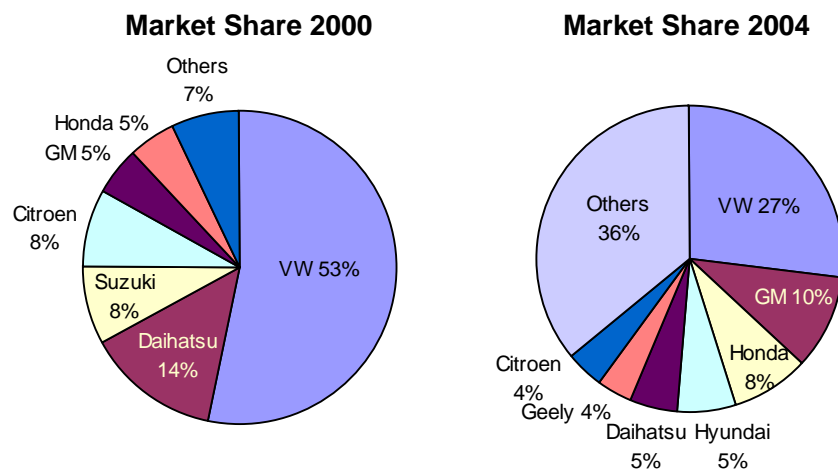


Figure 2.7: Market Share Comparison of Brands in 2000 and 2004

Source: Dunne (2005)

The joint ventures helped the transfer of manufacturing know-how and experience to Chinese manufacturers, drove the initial development of local SOEs, and fostered the growth of local suppliers. In the mean time, the international joint ventures have dominated the passenger car market. In the rank by sales in 2005 shown in Table 2.6, the international joint ventures took 12 places among the top 15 leading manufacturers. The remaining three indigenous companies on this list were FAW Xiali, Chery and Geely.

Table 2.6: 2005 Sales of Top Fifteen Passenger Car Manufacturers in China

¹⁹ From Automotive Resources Asia 2005 and the China Automotive Industry Year Books

Rank	Companies	Local Partner	2005 Sales	Yearly Growth (%)	Ratio of Sales/Production%
1	Shanghai-General Motors	SAIC	298,571	33.89	159.65
2	Shanghai-Volkswagen	SAIC	244,746	-30.93	142.67
3	FAW-Volkswagen	FAW	238,322	-20.59	145.26
4	Beijing-Hyundai	BAIC	224,661	55.92	103.45
5	Guangzhou-Honda	GAIG	203,229	9.5	114.35
6	Tianjin FAW Xiali (Indigenous)	/	190,019	46.13	147.5
7	Chery (Indigenous)	/	183,994	112.54	111.4
8	DF-Nissan Passenger Car Co.	Dongfeng	157,516	159.14	94.42
9	Geely (Indigenous)	/	149,869	56.39	89.22
10	Shenlong (Dongfeng- Citroen)	Dongfeng	140,399	57.52	87.06
11	FAW-Toyota	FAW	135,471	74.26	97.1
12	Dongfeng-Yueda-Kia	Dongfeng	105,618	77.7	112.59
13	ChangAn-Suzuki	ChangAn	90,717	-17.57	88.19
14	ChangAn-Ford	ChangAn	62,925	33.54	137.02
15	FAW-Hainan Mazda	FAW	60,057	12.88	84.44

Source: CATARC, 2006

In 2005, according to the calculation from the sales data by brands in 2005, we found that the foreign brands accounted for 75.7% (sales) of the domestic passenger car market. As compared in Table 2.7 with the other major automotive markets in the world, China market is most open to the international brands.

Table 2.7: Comparison of Foreign Brand Penetration by Region

Country or Region	Foreign Brand Penetration Rate (2004)
China	75.7% (2005)
United States	41.3 %
West Europe	26.6%
Japan	4.2%
South Korea	2.3%

Source: IMVP, ACEA, JAMA, KAMA; China result is calculated from FOURIN data 2005

Firm-level data were analyzed to compare the three types of manufacturers - the international joint ventures, semi-independent manufacturers, and independent

indigenous manufacturers²⁰ - in micro metrics that represent enterprise performances to some degree. The criteria chosen for comparison include:

- 1) Ratio of new model production over total production in 2005. This criteria indicate the ability to access (develop or introduce from outside) new products.
- 2) Capacity Utilization (the ratio of production over capacity) in 2004. Capacity Utilization rate partly indicates the efficiency of investments. It is a vital performance measure for the automotive industry which is highly capital-intensive.
- 3) Value produced per employee per year in 2005. This is an indicator of productivity.

The results in Figure 2.8 below clearly show that the international joint ventures perform far better than the indigenous manufactures, and the big SOEs' independent divisions are better than independent small domestic assemblers in terms of all the three criteria.

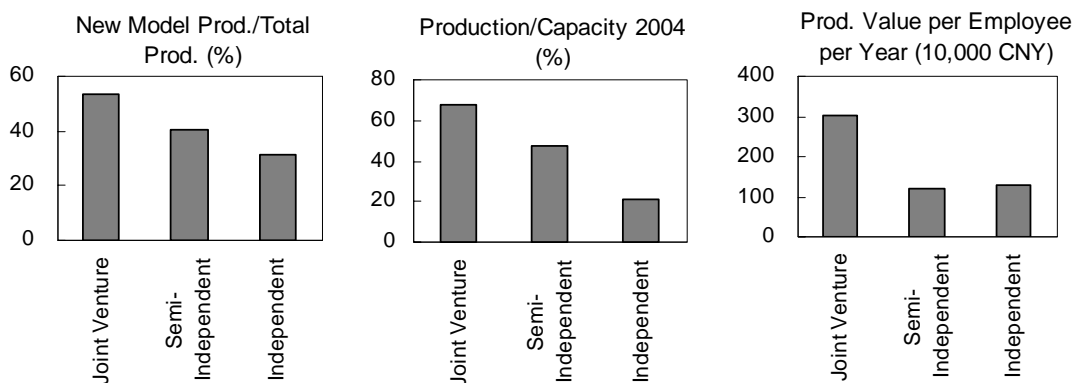


Figure 2.8: Performance Comparison by Firm Type

2.2.4 Private-Owned Local Manufacturers

The private investments were forbidden from the automotive sector by the Chinese government until the late 1990s. Then after the entry limit regulation was loosened around 1997, many domestic private capitals, which had been lobbying the government

²⁰ Type 1 International Joint Venture, 27 sample firms, e.g. FAW-VW, Shanghai-GM, Guangzhou-Honda
 Type 2 Semi-Independent, 17 sample firms, e.g. BAIC Foton, FAW Huali, ChangAn
 Type 3 Independent, 17 sample firms, e.g. Chery, Geely, GreatWall

for opening this profitable industry to them for a long time, were injected into the Chinese automotive industry, which was regarded as the most profitable industry in the past 20 years in China.

There are two major ways through which the new private investors chose to enter the Chinese automotive industry.

- 1) Transformation of motorcycle companies (e.g., Geely and Lifan). Severe overcapacity has existed in China's motorcycle industry for a few years. The expansion of automotive market provided the motorcycle companies with new business opportunities. And the experience of producing motorcycles is their advantage to make this transition.
- 2) New automotive companies funded by investors from other industries, mainly consumer electronics industry. (e.g., Bird, Aux and BYD). Having accumulated enough initial capital and been confronted with the furious competition in China's relatively mature consumer and household electronics market, a few consumer electronics companies invested in the automobile sector when the automobile market exploded after 2000. Because of the lack of automotive manufacturing experience, they mainly chose to acquire and reorganize small entire vehicle manufacturers or suppliers.

Although the private firms have entered the automotive industry, they still stay at a disadvantaged position in front of the SOEs. According to "*Selling China*", China's political and legal institutions have actually discriminated and marginalized the private firms, not only in the automotive industry, but also in most of the industries. The SOEs can easily obtain preferential low rate loans or tax exemption as well as the partnership with the strongest international automakers. As indicated in Figure 2.4, the government allocates nation's financial and economic resources to SOEs while denying the same resources to the indigenous private firms, partly because substantially, the private firms are competitors of the SOEs which are the property directly managed by the governments.

A few private firms which entered the market around 2000, for example, Aux and

Bird²¹, have already quit. They lack the experience of automotive manufacturing as well as enough financial and technological resources, and entered the market at a bad time when the competition had become very furious. So they failed to grab a sufficient share to survive among the strong SOEs and international automotive giants.

Geely is a rare case of healthy private automotive manufacturers, and has posed a strong expansion trajectory in the Chinese automotive industry. Geely was the first private automaker that was authorized to produce and sell cars in China in 1997, as well as the only private one on the top-ten list of sales in 2004 and 2005 with the other international joint ventures and SOEs. The first Geely car rolled out of the assembly line in 1998 and the automotive business become profitable from 2002. In 2003, Geely made the revenue of 4.35 billion Yuan (about US \$543 million) with a profit 130 million Yuan (about US \$16.25 million) by selling 80,058 cars (Lu, 2005).

Geely was based in Zhejiang province, and was a major motor cycle maker there. Zhejiang is the largest automotive supplier base in China. The local automotive supplier base in Zhejiang as well as the suppliers of Geely motor cycles provided a good basis for Geely to make economic cars. Geely has tried to develop car models by itself since its establishment. Without enough engineering force at the beginning, Geely imitated a few existing models for its first batch of cars. Afterwards, by advertising the slogan of “To Make Chinese Cars”, Geely successfully attracted a few experienced engineers and managers from the SOEs and International Joint Ventures, including former director of FAW R&D center, former deputy director of the technology department center of Tianjin Automotive Industry Corporation (merged into FAW group in 2002), former deputy director of Dongfeng Automotive Research Institute, former director and chief engineer of Nanjing-Fiat Engineering Center, and etc. After making rich profits during the golden time of China’s automotive market from 2000 to 2004, Geely has been able to hire technology suppliers from South Korea, Italy and Germany to originally develop Geely cars. Now Geely has 3 manufacturing plants and 6 product series, sold 151,366 domestically and exported about 7,000 vehicles in 2005. Recently in 2005, Geely announced its plan to export cars to the U.S. and Europe, and have increased its presence

²¹ Aux is a major maker of household consumer electronics and electrical device, and Bird is a famous mobile phone maker in China.

in the international auto shows, including the 2005 Frankfurt and 2006 Detroit Auto shows. Moreover, in order to raise capitals for future expansion, Geely has successfully been listed publicly on the Hong Kong Stock Exchange market since 2005 (Lu, 2005).

Another promising private car maker is Lifan, which is the largest private motor cycle producer in China. Lifan entered the automotive industry by the way of acquiring several local small truck and special vehicle makers in 2004. At that time, a few private investors have begun to quit. Lifan's confidence comes from its successful experience in the motor cycle industry. Its car manufacturing plant was established one year ago in Chongqing near the ChangAn Ford joint venture plant, but just obtained the car production permission from the central government in early 2006. The inspection process took about 2 years. Lifan also persists in a self-reliant strategy, and Lifan 520, the first sedan model currently sold in the market, was a wholly indigenously self-developed model. Its designs and developments were sourced from various domestic university laboratories, automotive research centers, technological suppliers and designers. According to the statement of a Lifan executive, due to the competition and stagnancy of China's economic car market segment, the current Lifan cars are targeted at the consumers in the small cities of China and South Eastern Asian market. In fact, a large amount of Lifan motor cycles are being sold in South Eastern Asia where Lifan has a sophisticated sales and distribution network. Also surprisingly, according to New York Times, Lifan is negotiating to acquire the joint venture engine plant of BMW and DaimlerChrysler in Brazil²². Lifan's ambition to compete with the established automakers in this competitive industry is well illustrated by its strange slogan engraved on the wall toward the highway out of its flagship assembly plant in Chongqing: "Why Are We Needed Since Hondas and Santanas Are Everywhere?" These entrepreneurial private firms clearly know where they stand and keep thinking about what they should do for breaking into the competitive and established automotive industry.

These private firms, together with Chery, Brilliance and other newly entrants, have some general similarities and are different from the large SOEs. Because of being tiny, intrepid and ambitious, these young and independent Chinese automotive companies are

²² New York Times, Feb 17, 2006

called “young tigers” by the international media.

2.3 The Rise of Independent Indigenous Manufacturers

Those young tigers mostly entered the automotive market after 1997 when the ban on new entry was lifted by the government. The fast growth of China’s economy and the skyrocketing domestic automobile market provided these young and tiny companies with a fantastic surviving environment. They have broken into an industry highly driven by the scale and experience, and some of them have thrived among the large state-owned automakers and their foreign partners. Table 2.8 shows the production and sales of the major notable “young tigers” in 2004 and 2005. Chery and Geely are obviously the leaders, and the both have been among the top ten car makers in China by sales since 2004.

Table 2.8: Production and Sales of “Young Tigers”

Company	2005		Growth		2004	
	Production (Units)	Sales (Units)	Production (%)	Sales (%)	Production (Units)	Sales (Units)
Chery	185,588	189,158	133.3	118.5%	79,565	86,568
Geely	149,532	151,366	63.0%	56.5%	91,744	96,693
Brilliance	109,505	122,646	-0.9%	23.2%	110,505	99,572
GreatWall	67,657	64,569	23.2%	17.2%	54,904	55,091
ZhongXing	25,450	25,153	-7.6%	-10.5%	27,536	28,114
BYD	11,236	11,171	-34.8%	-37.6%	17,245	17,900
LiFan	7,836	6,099	569.7%	414.2%	1,170	1,186
ChunLan	1,369	1,311	-59.0%	-60.0%	3,339	3,279

Source: CATARC, 2006

Among those “Young Tigers”, Chery and Brilliance are SOEs. They are grouped with other indigenous private automakers instead of with such large SOEs as FAW, SAIC and Dongfeng because they have posed different strategies and trajectories from those long-time established SOEs, and been operating as entrepreneurially as a private firm.

The young tigers take many strategies on the opposite of the big SOEs and the

international joint ventures. First, they all have their own brands and develop their own products independently by all means. They attracted engineers from the laggard state-owned companies, developed car models under its own managerial control by a combination of ways, including joint development, R&D job outsourcing or reverse engineering. For example, in order to cut the costs of product development, Geely, Chery and etc. similarly developed their initial products by reverse engineering approaches. After accumulating plenteous capital, they have been able to outsource the tasks of new product development to experienced foreign companies, or to jointly develop new products with them. Generally speaking, the obvious strategy of young tigers is to build their own brands which can generate future value, and to develop their engineering force and technical capabilities via reverse engineering or joint R&D activities with specialized automotive technology suppliers.

Second, their products are mostly budget cars priced very cheaply and aimed at the low-end market, because low end cars require less sophisticated technologies, and are also more appropriate for the Chinese consumers' purchasing ability. Those cheap cars are favored by the price-sensitive Chinese consumers, most of who are buying their first car.

In addition, the "young tigers" are dedicated to expanding internationally (Luo, 2005a). Compared with the joint ventures which are managed in accordance with the international partners' global strategies, they have more flexibility and autonomy to explore oversea markets in the global range. Although the current exports of the "young tigers" mostly go to the markets of the less developed countries due to the limited quality and brand power of their products, they have been preparing to enter the developed countries' competitive markets as well. Chery and Geely have announced their plans to sell cars in the United States and Europe. For the example of Chery, it has been dedicated to exports since its official establishment. From the first export deal of 1,000 cars to Syria, Chery has exported cars to more than 30 countries, and sold about 18,000 cars in oversea markets in 2005. In January 2005, Chery signed a contract with the American company Visionary Vehicles LLC for exporting to the United States. Their first-step plan is to sell 5 models and 250,000 cars from 2007. The introduction has been postponed to 2008 later. Chery and Visionary Vehicles have worked together with an innovative business plan to

collect capital to support Chery for developing and producing U.S.-targeted car models. To make this ambitious venture happen, they aim to involve the potential dealers as investors and shareholders. They also aim to attract international banks and investors to be stakeholders. Strikingly billionaire investor George Soros is said to invest \$200 million to back Chery to design, develop, produce and distribute cars in the United States, according to Automotive News²³. Now, both Chery and Geely are in the process of improving their products to meet the stringent safety and environment criteria and get approvals from regulators of those developed countries, such as Department of Transportation and Environment Protection Agency in the United States. Some other “young tigers”, including GreatWall, Zhongxing and Brilliance, are concentrating on exploring the European and Russian markets where the economic cars are more popular than in the United States.

Besides direct exports, the “young tigers” are also setting up CKD plants jointly with local partners in other developing countries. For example, Zhongxing has three plants in Egypt, Viet Nam and Turkey and plans to build more in North Africa and South America to assemble its self-owned brand of pickups and SUVs (Sport Utility Vehicle). Chery assembles cars in Iran and Russia. Assembling automobiles in developing countries may help skip the import tariff and enjoy even cheaper land and labor than those in China. The CKD plants, which add local employments, are also welcomed by the governments of those underdeveloped countries.

The development strategies in common of the “young tigers” are summarized in the casual networks in Appendix A.

The emergence of these young and independent companies, as well as their self-reliant strategies for brand construction, product development and exportation, has generated strong effects of externality over the rest of the industry. The fast development of young tigers and the corresponding favor from the public and the media have made the central government aware of the importance of self reliance for China’s automotive industry. In the new “Automotive Industry Policy” released on June 1st 2004, the government promised to support companies with self-reliant operations and self-

²³ Alysha Webb and Gail Kachadourian. “China’s New Heavy Hitter”, Automotive News, June 12, 2006

developed products with intellectual property, and companies that are dedicated to exporting. This policy transformation has driven the big SOEs to develop independent operations by various ways. For example, the strategy of SAIC is to establish its own independent competitiveness in product technologies by acquiring foreign experienced companies with poor financial conditions and good product development capabilities. SAIC has taken over 48.92% share holdings of Ssangyong Motors (South Korea's fourth largest automaker) with US\$500 million as well as the intellectual property rights of two car models and several engines with 67 million British Pounds from MG Rover (Holweg and Oliver, 2005). Different from SAIC, FAW is pursuing to strengthen its truck brand "Liberation" and sedan brand "Red Flag" which are both self-developed and have a 50 year history. So FAW chooses to apply its own R&D capability to develop its own brands with the help from the foreign partners including Volkswagen and Toyota. Moreover, with the pressure from the exportation pursuits of the young tigers, the government also pressures its SOEs to export or to operate globally. For example, FAW exported more than 10,000 self-branded vehicles in 2004, including "Liberation" trucks and "Red Flag" sedans. Moreover, the joint ventures, for example Guangzhou Honda, also have begun to export small amounts to Europe and other regions.

Another extreme case, which may demonstrate the SOEs' changing strategies from indolent to ambitious, is the Nanjing Automobile Corporation²⁴. This small SOE has little influence even in China's domestic automotive industry, but purchased the 83-year old MG Rover for £53 million in 2005²⁵. More surprisingly, on July 12, 2006, it announced their ambition to become a global enterprise through a complex plan to build sedans at Nanjing of China, MG roadsters at Longbridge in England and TF coupes at Ardmore of Oklahoma in the United States from 2007, backed by capitals from the state and local governments as well as private investors²⁶.

The "young tigers" burgeoned and grew up during the boom of China's automotive

²⁴ Nanjing Automobile Corporation is small company owned by the Nanjing local government, and assembles trucks and Fiat cars (in 35,832 units in 2005).

²⁵ Rover brand is still owned by BMW group and the intellectual property rights of Rover 25 and 75 models and a few engines are own by SAIC.

²⁶ Greg Migliore. "Nanjing Automobile to build MGs at 3 sites, including Oklahoma", Automotive News, July 12, 2006

industry from 2001 to 2004, and have become a positive power to optimize the competition environment and accelerate the maturation process of China's automotive industry. However, currently they have to face the mounting competition in China's automotive market. Also, their ambitious expansion is testing the managerial capabilities of these automotive novices although they operate well so far.

2.4 Technological Capabilities

2.4.1 Historical Lack of Technological Capabilities

China's automotive industry started with the technological assistance from the Soviet Union in the 1950s, and First Automobile Works was an example of the help from the Soviet Union. However during the 1960s, the relationship between China and the Soviet Union worsened. Then the Soviet Union withdrew 1,390 experts, terminated 3,343 contracts, ended their assistance and asked China to pay back all the debts. So China had to rely on her own resources for the later industry development. Afterwards, the Cultural Revolution started, and China's economy and industries degenerated. Therefore, when the era entered the 1980s, the technological capabilities of the SOEs were still stagnant at the level as low as that in the 1950s, although many military truck plants were constructed during the cold war era from 1960 to 1980²⁷.

So far, even though China no longer relies on vehicle imports, it still relies on the indraught of foreign design and core technological know-how. Since the early 1980s when China started the economic reform, governmental policies, such as the joint venture regulation and local content rate rule, had been implemented to foster technology transfer from the international automotive makers, and to develop indigenous R&D capabilities. The government also required the joint ventures and the SOEs to set up R&D centres and conduct product development activities. Most of them complied and have established R&D centres of their own. However, there is very limited product development activity in these centres, according to the observations of IMVP researchers during their visits

²⁷ During the same time of the Culture Revolution, frequent border conflicts between China and the Soviet Union, India took place. In 1965 China became involved in the Vietnam War, supporting North Vietnam against USA. In preparation for wars, China set up a series of heavy and medium truck plants. These factories were located in the mountain areas (away from the borders) and included the Second Automobile Works, the Sichuan Automobile Works and the Shanxi Automobile Works, and etc.

China in 2005 (Matthias, Luo and Oliver, 2005). And it seems that the function of most of these R&D centres is to act as showcases of compliance with governmental policies. The policies are seen to fail. So far, the historical lack of R&D capabilities still manifests itself in the SOEs' reliance on their international joint venture partners or license providers who have product designs as well as production know-how, and also in the reverse engineering activities of the independent young indigenous manufacturers. As indicated in Table 2.7 about the penetration rate of foreign brands, the car models made and sold in China are still mainly introduced from outside.

In particular, on the other hand, without experienced partners and easy access to car models, the R&D activities at the small independent automakers are more practical and profit-driven, and historically were mostly based on reverse engineering of existing models and components in the past few years.

2.4.2 Intellectual Property Issues

Unlike the international joint ventures that have easy access to the product model warehouse of the international automotive giants, the independent young Chinese car makers, mostly young tigers, had to struggle for good products to manufacture, without mature product development capabilities at their initial growth stage. During the period of market explosion from 2000 to 2004, in order to rapidly capture the market share, the young Chinese automakers took reverse engineering approaches to develop cars and put into the market very quickly. Afterward, a few intellectual property disputes arose, and a number of young tigers, including Geely, Chery, Shuanghuan, Great Wall and etc, have been accused of copyright infringement, patent right infringement or unfair competition issues for their reverse engineered car models.

The first case was related to Shuanghuan Automobile Company in Hebei province. In November 2003, Honda filed a lawsuit with the People's Senior Court of Beijing against Shuanghuan, alleging the Laibao SRV of Shuanghuan copied its CR-V, and asking for a compensation of 100 million Yuan (US \$12 million). But no hearing was ever reportedly held at the court. Nissan also claimed that the Sing SUV of Great Wall Motor Company copied the design of its Frontier pickup sold in the United States. However, Great Wall Motor Company owned a few design and application patents for its products including the

Sing SUV, and retorted that its products were developed and produced on its own, instead of copies of others²⁸. The most famous case was that General Motors sued Chery in 2004 for Chery's QQ subcompact as a copy of GM Chevrolet Spark (also called Daewoo Matiz in other countries), as shown in Figure 2.9, and had also filed lawsuits trying to prevent Chery from selling QQ in various markets, including Asia and Eastern Europe. Chery QQ has outsold GM Spark since the beginning with an earlier lunch time, much cheaper price and even better quality evaluation from J.D. Power than the Spark (Luo, 2005a).



QQ

Spark

Figure 2.9: Chery QQ and GM Chevrolet Spark

It was difficult for General Motors to win this case as Chery had been granted the design patent of QQ and a few technical patents as well in early 2003, while GM Spark design was never patented in China, so was not protected by China's intellectual property laws. Both companies reached a settlement resolving all related legal disputes on Chery QQ and GM Spark in 2005²⁹. Details are not open to the public.

Regardless of the results for these lawsuits, the intellectual property dissensions have been decreasing. The reason is not that the government tightened intellectual property protection, but the reverse engineering is gradually being given up. After accumulating enough capital and experience, the “young tigers” have already been able to conduct original product development with the cooperation of international automotive technology suppliers from Italy, Germany, Japan, Austria and etc. For example, Chery has been locally designing cars with Pininfarina from Italy and developing Chery badge engines collaboratively with AVL from Austria.

2.4.3 Strategies to Technological Independence

²⁸ China Daily, December 18, 2004

²⁹ Xinhua News, November. 18, 2005

Although the independent indigenous technological capabilities were not successfully established in the past 20 years of initial development of the industry, the indigenous automotive manufacturers have accumulated rich capital that could help them develop R&D capabilities and loose the reliance on foreign designs in the future. After 2000, driven by the ambitious government that promotes indigenous technologies, as well as the pressure of market competition, most of the Chinese companies, have started to take measures to develop or “acquire” technological capabilities by all means. Based on interviews and literature reviews, the strategies of the indigenous automakers to develop technological capabilities are summarized into three major types:

1) Self-reliant “Learning By Doing”

Most of the young independent companies, for example Chery and Geely, started with reverse engineered products, but now are expanding to joint product developments with international technology companies like AVL, Pininfarina, Ricardo and Bertone (Luo, 2005a). They keep the managerial power in the R&D projects and expect to train local engineers through such a process of “leaning by doing” with cooperation from outside. For example, with AVL Chery has jointly developed 18 up-to-date engine models, from 0.8L to 4.2L at Chery R&D centre at Wuhu City, of which all meet the Euro IV emission standard. Especially, Chery fully owns the intellectual property of these engines.

2) Hybrid of “Technology Transfer” and “Learning By Doing”

Some large SOEs which have international joint ventures, for example FAW and ChangAn, have this dual strategy. They produce foreign models in joint ventures, license foreign models to produce in their independent plants, and also further develop the licensed models in their fully-owned R&D centres. For the example of FAW, they try to obtain know-how through technology spilled over from foreign partners, and also expect the learning effects of doing the job by themselves. The “Red Flag” model was developed independently, but on the basis of a licensed Audi 100 platform. The latest version of “Red Flag” will be based on the Toyota Crown platform³⁰. The independent and historical “Liberation” trucks have been locally developed on licensed technologies from European companies, such as AVL and Deutz. FAW ambitiously intends to establish its truck

³⁰ From the interview with senior managers at Toyota Technical Center in Tianjin, China, May 11, 2006

division as a global commercial vehicle maker, rivalling with Mercedes-Benz and Volvo³¹.

3) Self-reliant “Buy-in”

SAIC is a unique example to buy not only technologies, but also “capabilities”. In 2003, SAIC took over 48.92% share holdings of Ssangyong Motors, and aims to utilize the technology force of Ssangyong to develop Shanghai badge cars. Moreover, it bought the Rover 25/75 car models and ten engines for £67 million in 2004 from MG Rover, then employed previous Rover engineers and Ricardo of England to help develop Shanghai badge models based on Rover product technologies.

There are also many indigenous manufacturers that still rely entirely on foreign designs, and that have no actual move to develop independent technological capabilities. Dongfeng and GAIG are of this type. Partly because of the internal financial limit within Dongfeng, and the historical lack of automotive production experience in GAIG, the joint venture operations are managed by the foreign partners, and the Chinese partners seem to only play an assistant role.

Meanwhile, besides the bottom-up initiative of the companies to develop their technological capabilities, the Chinese government also has its top-down strategy that is aimed to jump over the current stage of traditional automotive technologies, which require a long time for the immature Chinese companies to learn, and aimed to gain an early-mover advantage when the automotive industry is revolutionized again. The governmental policy makers think, in the domain of the next generation electric and hydrogen vehicle technologies, which have the potential to boost the revolution of automotive industry, almost all the vehicle models are still prototypes in laboratories. Hence China is at the same starting line with other countries, and the Chinese companies are not far behind. Developing the next generation vehicles from now on may give China the chance to leap frog its automotive industry to the international level when the era of electrical or hydrogen vehicles comes. Therefore, the central government has been sponsoring, supporting and encouraging the universities, national laboratories and automotive companies to develop hybrid vehicles and fuel cell hydrogen vehicles under

³¹ FOURIN China Auto Weekly, “New Regulation on Operating Rate: Freezing Expansion through Government Measure”, July 3, 2006

its huge national project “Electrical Vehicles R&D and Commercialization” via the administration of the Ministry of Science and Technology. This national-wide project is being conducted to develop China’s own new energy vehicle technologies for the next generation with an ultimate intention to commercialize these technologies through the government-led efforts.

Some local automakers, such as Chery, FAW, ChangAn and Dongfeng, have been dedicated to developing electrical and hybrid vehicles. Especially, ChangAn has announced its tentative plan to produce and market its self-designed hybrid vehicles from 2007. Shanghai municipal government commanded SAIC, SAIC-VW and SAIC-GM to produce certain amounts of hybrid vehicles by all means from 2008. At the same time, the fuel cell hydrogen research and development are conducted mainly in the national labs located at universities, for example Tsinghua University in Beijing for heavy duty fuel cell bus and Tongji University in Shanghai for fuel cell cars. And, a demonstration and testing hydrogen bus fleet, which is consisted of three Mercedes-Benz Citaro buses and three locally-developed ones, has started to operate commercially in the 2008 Olympic Garden area in Beijing (Luo, 2004).

2.5 Motorization and Future

Over the last two decades, with the fast growing Chinese automotive industry is the increasing automobile ownership. Figure 2.10 shows the rapid growth of vehicles in use in China from 1990 to 2002. In 2004, the registered vehicles on the roads reached 27.42 million, of which the private owned accounted for 49.8%. The privately-owned motor vehicles grew about 22% per year over the past two decades.

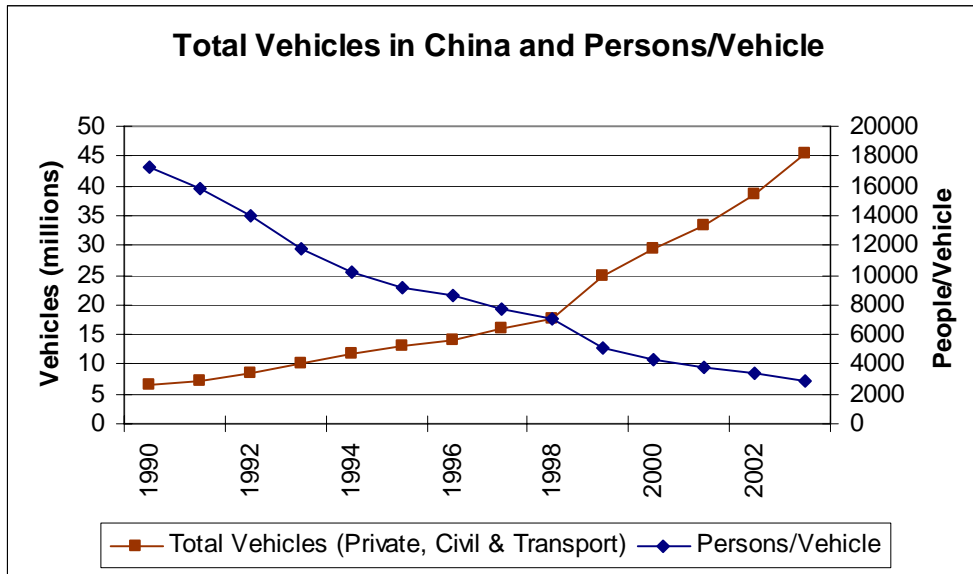


Figure 2.10: Vehicles in Use in China (1990~2002)

Source: Winebrake, Rothenberg and Luo (2006)

The continuing growth of the overall economy and the marketization reform (which means less governmental intervention) may guarantee the sustainability of domestic vehicle demand growth. On one hand, as people become more affluent in China, the desire to own a private vehicle will increase (Gan, 2003). On the other hand, more people may buy affordable economic cars which were restricted in China because of the government is making efforts to lift the regional restrictions on economic car purchase and use. On January 4, 2006, six government agencies³² jointly released a policy “Encouraging the Use of Efficient and Clean Light Weight Cars” requiring all the national or regional discriminative restrictions on the use of economic cars should be abolished by March 2006. Figure 2.11 indicates the trend of increasing economic car consumption, compared with the forecast demand in India, which is dominated primarily by private customers.

³² The six agencies include: National Reform and Development Commission, Ministry of Construction, Ministry of Public Security, Ministry of Finance, Ministry of Supervision, State Environmental Protection Administration.

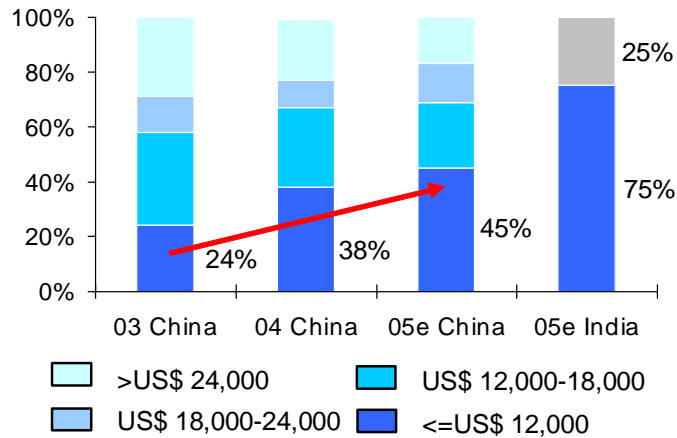


Figure 2.11: Price Segments of Motor Vehicle Sales in China (2003~2005)

Source: Nakamura (2005)

Based on the current growth rate, the demand for entire automobiles in China is expected to climb up to 6.4~6.6 million units in 2006. A far future outlook done by China National Development Research Center (NDRC) predicted that, the total demand for 2020 would vary from 16.9 to 23.6 million units with regard to the GDP growth ranging from 6% to 8%, including a demand for cars ranging from 14.51 million to 20.43 million (Chen, Liu and Feng, 2004).

However, it is still far for the Chinese automotive market to be saturated according to the growing posture, market size and strength of China's overall economy. So far, the total highway mileage of China has reached the No.2 in the world only after United States, but the ratio of vehicles/mileage is only 1/3 of the U.S., 1/5 of Japan, 1/6 of Germany and 1/12 of South Korea. Figure 2.10 also has shown the downward trend of the number of people per private-owned vehicle in China, which has decreased from 3,700 people per vehicle in 1985 to 85 people per vehicle in 2003. In comparison, the United States has approximately 1.3 people per vehicle so far. If China reaches this amount, there would be about *1 billion* vehicles operating in China (Winebrake, Rothenberg and Luo, 2006). Also, if every 100 people buy one automobile in a year, this country's vehicle sales increment will be 13 million. The market potential is huge if the growth trend continues.

Although China's overall economic growth will undoubtedly continue in the short

and medium term according to the current trend as well as the political and societal stability, the growth sustainability in the automotive sector is unclear because of many determinants, such as auto financing, oil price, taxation as well as other governmental interventions.

2.6 Chapter Summary

This chapter is an overview of the current characteristics of the Chinese automotive industry.

The industry production and sales have been growing in the past two decades by about 15% year on year, and are expected to develop as sustainable as the overall economy of China. However, through the past two decades when the government tried to leap frog the industry for indigenous capabilities, the industry has been gradually structured with fragmentation and a convoluted Chinese-characterized complexity composed of various types of manufacturers and stakeholders: the foreign-invested joint ventures with the advantage of technology and brand, the large SOEs with the advantage of government support, and the “young tigers” with independence and ambition. Foreign brands are dominating, especially in the passenger car market, because of the historical lack of technological capabilities and brand power of the indigenous enterprises. Generally, the fragmentation and diseconomy of scale of the industry, in particular, imply the inefficiency under the splendid cover of the market prosperity since 2001.

In the next chapter, we will systematically analyze how the industry has evolved to be the current situation under the interventions from the government through a comprehensive set of industrial policies.

Chapter 3 Industrial Evolution with Policy Interventions

The complex industrial structure and characteristics were formed through the past decades with the interventions from the government through its automotive industry policies (Appendix B and C). This comprehensive set of industrial policies is associated with issues about international trade, foreign investment, technology transfer, and etc. In this chapter, the policies and their dynamic impacts on the evolution of the Chinese automotive industry are analyzed systematically.

3.1 The Policies

The Chinese policy makers in the 1980s set the automotive industry as one of their pillar industries, and expected it to pull the development of this country's overall economy. Unlike Brazil and Mexico, they had no interest in turning China into an expansion base of the global automotive giants, and expected to use policy tools to leap frog its indigenous automotive firms onto the world level of advanced financial and technological strength. However, the difficulty for this ambitious goal is that, both technology and capital were scarce in the domestic automotive industry when the whole country just started to recover from the turmoil and disaster of the Cultural Revolution. Therefore, the government pinned its hope on the technology transfer and spillover from the developed countries. Then for the automotive industry, a complex set of industrial policies and regulations were implemented with the goal to protect the domestic market from foreign competition, to attract FDI at the same time, and to foster the technology know-how to diffuse from the international automakers to Chinese enterprises. The policies are lengthy but the key issues are introduced below.

Trade Barriers

Traditional trade barriers, such as high import tariff, restrictive annual quota and importation license, were adopted in order to protect the supported SOEs with a relatively easy environment. Trade barrier is commonly used in the developing countries to protect their immature industries. The import tariff had been historically high in the range of 200

to 300 percent in the 1980s and 100 to 200 percent in the early to mid-1990s (Huang, 2003).

Joint Venture Regulation

The government offered preferential policies, such as cheap land use, tax exemption and etc, to lobby for FDI. However, they only allow the international automotive manufacturers to make engines and finished cars in joint ventures with the Chinese local manufacturers, with no more than 50 percent share holdings. Also, the foreign companies can have at most two local partners. The policy makers expected the joint venture format could enforce the in-house technology spillover to take place. Affiliated requirements and encouragements include setting up R&D divisions within the joint venture, making products at the international technology levels, intending to export and giving the indigenous suppliers equal privileges for sourcing contracts.

Local Content Rule

To complement the joint venture requirement, the international joint ventures are required to have a local content rate above 40% in the first year of production, and to increase the rate to 60 percent and 80 percent in the 2nd and 3rd years (KPMG, 2004). Local content rule is commonly used in the developing countries to restrict imports as a non-tariff barrier and stimulate the development of domestic industries. In China, however, the pursuit for local content rate was distorted. Some indigenous brands and independent plants of the original SOEs were regrouped, and became the component and part suppliers to serve the international joint ventures. Some SOEs at that time decided to give up indigenous brands and existing independent car making operations that were regarded as outdated and hopeless, and to focus on supporting and serving the international joint ventures. The policy makers regarded foreign cars produced in China with a high content rate of local-produced parts as Chinese indigenous cars.

Entry Limit

In order to form the economy of scale from the beginning, the central government limited the industry entry, and only gave the franchise of making cars to several

supported SOEs, particularly the Chinese "Big Three, Small Three and Min two"³³. And the international automakers were allowed to manufacture cars only with those authorized SOEs in their joint ventures before 1997. Actually, only Volkswagen, PSA, Chrysler and Suzuki gained the right to produce cars before 1997 because the policy makers considered that China did not need too many passenger cars and having Volkswagen, Citroen and Peugeot in China was already enough. They were worried about that too many companies entering the industry would bring overcapacity like that in the U.S. automotive industry. Meanwhile, indigenous private investment was forbidden in automobile production although allowed in other business like textile, television and etc, because the government regarded the automotive industry as a pillar industry that most needs its central planning.

There were also some other specific policies implemented at that time. In the past two decades, these industrial policies were generally in favor of the SOEs, and generated complex outcomes, of which some are positive and the others are negative. The SOEs that had international joint ventures from the beginning have been cash-rich and gained know-how spilled over from their joint venture partners to some extent. However, the overall industry is still inefficient and far below the international competitiveness level, industrial-wide economy of scale failed to be formed, and indigenous technological capabilities were insufficient to support independent growth.

3.2 Establishment of Industrial Fragmentation

3.2.1 Fragmentation by Departmentalism and Regionalism

In Chapter 2, we have seen the Chinese automotive industry is highly fragmented in terms of the number of manufactures, geographical distribution and the ownership of manufacturers. This fragmentation leads to inefficiency of the scale-sensitive automotive production.

The number of manufacturers grew with a linkage to the historical stages the new

³³ The 'Big Three' were First Automotive Works, Shanghai Automotive Industrial Corporation and Dongfeng Motor Company, the 'Small Three' were Beijing Automotive Industrial Corporation, Tianjin Automotive Industrial Corporation and Guangzhou Automotive Industrial Corporation, and the 'Mini Two' were Changan and Guizhou Aviation (Xia, 2002).

China has experienced since 1949. In this study, we summary there have been three major waves of automotive manufacturing establishments as illustrated in Figure 3.1.

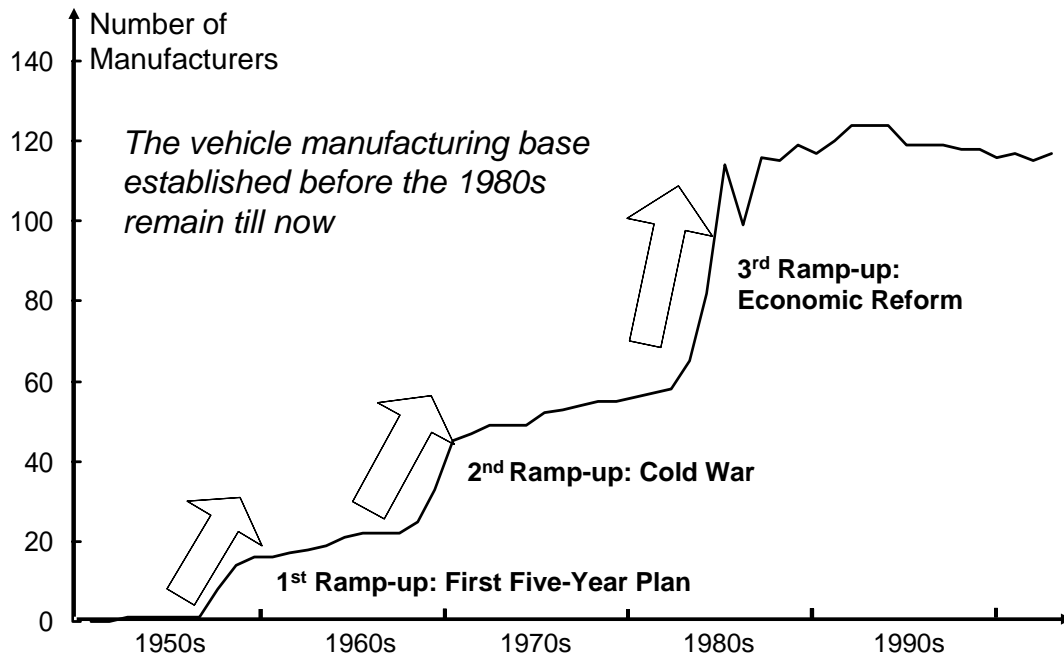


Figure 3.1: Accumulation of Automotive Manufacturers over Time

Source: Original data are from China Automotive Industry Yearbooks; analyzed by the author

The first wave was in the period of China’s first five-year plan. In the 1950s, First Automobile Works was established by the central government. At the same time, a few regional automotive plants, such as Shanghai Automobile Works (later SAIC) and Beijing Automobile Works (later BAIC), were constructed by the municipal or provincial governments.

The second wave of state-owned motor vehicle plant establishments came for the increased military demand during the period of Cold War and military conflicts with India on the west border, the Soviet Union on the north border and with United States in Vietnam. The Second Automobile Works (Dongfeng), Sichuan Automobile Works, Shanxi Automobile Works and so on were established in the 1960s mainly to produce military trucks, and were located in mountain areas of central China for security purpose.

The third wave came in the mid-1980s with the economic reform. The government officially set the automotive industry as one of the pillar industries in 1986, and

implemented a few policies to protect this industry and foster its development. Many military plants that produced weapons, as well as the plants that belong to the aerospace and aeronautic administrations, were transformed to produce automobiles during this period of time in order to survive after the Cold War without as many military contracts as before in that peaceful era. With their diversified origins, a large number of automotive plants established during this period of time were controlled by many different government ministries. In the late 1980s, the international joint venture, including Beijing Jeep (with Chrysler), Dongfeng Citroen, Tianjin Daihatsu, Guangzhou Peugeot and etc were also established.

From the late 1980s, the entry to this industry was limited in order to foster economies of scale. The government prohibited passenger car projects other than in the supported SOEs which included the so-called “Big Three, Small Three & Mini Two”. However, actually a large base of state-owned automotive assembly enterprises, as well as several joint ventures between the selected SOEs and international automakers, has been established since the 1950s. By the end of 1990s, the central government loosened the industrial entry limit in line with China’s obligations to WTO. Thus more international automakers and especially, another major type of manufacturers - indigenous private firms, entered this industry to capture the fast growing demand for automobiles in China.

Furthermore, these automotive enterprises are also fragmented in terms of regionality as introduced in Chapter 2. Table 2.2 has shown only three provinces (Tibet, Qinhai and Ningxia) in China had no automotive production in 2004. Compared with the United States having Detroit, China does not have such a relatively dominant automotive capital, but a few automotive cities. The major clusters are around the key regional industrial centers – Changchun, Shanghai, Beijing, Hubei, Chongqing and Guangzhou. Although we see six distinct clusters, in fact automotive production facilities spread out at every corner of this country, as shown in Figure 3.2. The dark dots stand for the international joint ventures, and the grey for indigenous automakers. The numbers in the boxes are the vehicle production volumes in the related regions in 2004.

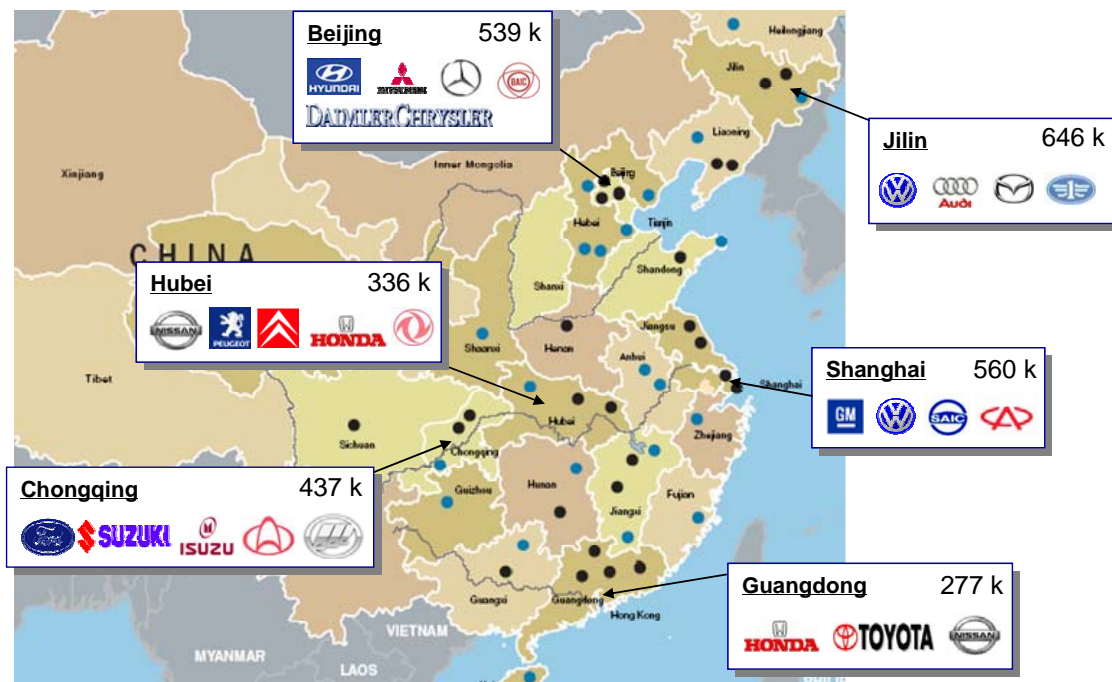


Figure 3.2: Clusters of Vehicle Manufacturers in China

Source: Map is from Automotive News 2006 Guide to China's Auto Market, and Clusters are summarized by the author

The diversified ownership is the major reason associated with the large number of manufacturers and the fragmentation by regionality. The Changchun region was chosen for FAW (First Automobile Works) by the central government in the 1950s because it is geographically close to the Soviet Union. On the other hand, Shanghai's automotive industry was the effort of its municipal government based on the local manufacturing base. Beijing, as the country's capital, used to enjoy being favored by policies. Early in 1983, it is just in Beijing where China's first international joint venture - Beijing Jeep Co., was established with American Motors Company and BAIC, very soon after the country started its economic reform. Today, Beijing is the largest regional personal car market in China. Mercedes Benz's new joint venture has been building C- and E-Class sedans in Beijing to feed the demand of governmental officials in China's capital. The Hubei Province is listed as one of the centers because of Dongfeng (also called Second Automobile Works), which was established among the mountains in Hubei during the Cold War era as a backup of FAW for security and military reasons. The various small automotive enterprises in Chongqing were mainly transformed from the military plants

belonging to the previous Ministry of Weapon Industry, which were also located far inside the Chinese territory for military security during the Cold War era. To survive in an era without wars, many such military plants have to transform to produce civil products, such as automobiles, motor cycles, engineering machinery as well as household electronics. In Guangzhou, the local government aimed to develop automotive industry after the economic reform began. After Peugeot's unsuccessful venture (1985~1997) as an initial try, the arrivals of Japanese carmakers - Honda, Toyota and Nissan put Guangzhou to the forefront of China's automotive industry. Hyundai is also constructing a joint venture with GAIG for commercial vehicles near Guangzhou.

As the history tells us, all these facilities spread over the country's territory belong to different governmental bureaus or administrations. In another word, the fragmentation is not only materialized by regionality and the huge number of manufacturers, but also the political involvement in the ownership of enterprises. The ownerships of major indigenous automotive groups in China are listed in Table 3.1. As a matter of fact, the political ownership to some extent determined the geographical distribution of automotive production facilities in China.

Table 3.1: Ownerships of Chinese Indigenous Automotive Industry Groups

Indigenous Automotive Groups	Ownership
First Automotive Works	Central Government
Dongfeng Motor Corporation	Central Government
ChangAn Automotive Corporation	China Weapon and Arming Group (Central Government)
Shanghai Automotive Industry Corp.	Shanghai Municipal Government
Beijing Automotive Industry Corp.	Beijing Municipal Government
Guangzhou Automotive Industry Group	Guangzhou Municipal Government
Hafei Motor Co. Ltd	China Second Group of Aeronautic Industry (Central Government)
Chery Automobile Co. Ltd	Wuhu Municipal Government
Great Wall Motor Co. Ltd	Private
Geely Holding Corporation	Private
Lifan Industry Corporation	Private

Source: Company websites and various sources

The reasons for the fragmentation are revealed together mainly by the governmental

mechanism that affected the ownership structure and corporate activities in China.

First, the industrial protectionism regulations and policies made inefficient enterprises highly survivable and profitable. In the 1980s, in order to foster and protect its immature indigenous automotive industry, the government implemented very high tariff rates and restrictive import quota among all the comparable developing countries. And the permission of automotive production also needed to be authorized by the central government, facially to pursue a scale economy. With the high price margin, the automakers in China could break even by only producing about 10,000 units, compared with the commonly recognized standard of 250,000 units for assembling a single model type (Huang, 2003). All these governmental policies in the 1980s and 1990s resulted in an inefficient but rather profitable automotive industry. Thus, almost all the industrial administrations (for example, the Ministry of Weapon Industry, the Ministry of Aeronautic and Aerospace Industry, the Ministry of Machinery Industry and etc.) and municipal or regional governments tried to produce cars within their affiliated enterprises during the 1980s to 1990s. Especially, many of the military plants, which lost contacts after the Cold War era, tried to turn their manufacturing operations, which are located in different regions all over the country, into automotive production plants. The State Planning Committee (SPC), the nation's economic regulator which has been renamed to National Development and Reform Commission (NDRC), on behalf of the central government, was dedicated to regulating automotive production in the big automotive groups for economy of scale from the beginning. However, these government agencies and local governments have relatively equivalent and independent political power and influence with SPC. The power of SPC was limited, and the actual effects of the automotive policies were distorted.

To summarize, the large base of manufacturers were established and owned by different governmental administrations before the central planning system began to manage and adjust the automotive industry purposely. The profitable automotive business attracted a big number of state-owned entrants from the 1980s, and most of them still inefficiently remain in the business with the profits made due to the market protection. This is the reason for the large number of manufacturers. Because the manufacturing enterprises for other use owned by different central government agencies and different

regional governments were originally dispersed, the automotive industry was inevitably scattered geographically when these plants turned into automotive operations. This is the reason for the fragmentation by regionality. Although the government tried to foster the economy of scale to be formed, the measures were taken later than the large base of manufacturers had been established. Furthermore, the central power was not strong enough to guarantee the policies to work at the local governments. Therefore, the fragmentations still remain because of the regionalism of regional governments and the departmentalism of the governmental administrations that have decentralized and equivalent political power. The causal relationships are summarized in Figure 3.3 below.

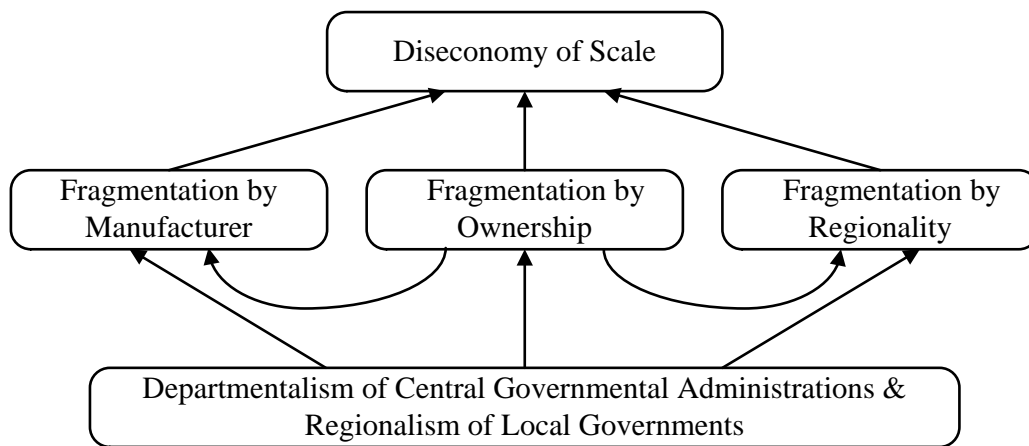


Figure 3.3: Reasons for Diseconomy of Scale

Based on the current ownership structure involved with fragmented but strong political power of various ambitious local governments and central government ministries, large-scale regrouping (merger and acquisition) is still difficult to take place across different political administrations. In the past six years, the observed merger or acquisitions were very few, including only FAW acquiring Tianjin Automotive Industry Corporation, SAIC acquiring Liuzhou Wulin Motors with GM, and Changan controlling Jiangling Motors with Ford. Assuming the current political regulation system unchanging, it would take longer time for China to consolidate its automotive industry to the level of the U.S than the time for the U.S. automotive industry, although deepening consolidation is predictable along with the general industrial maturation process.

3.2.2 Case of Development under Regionalism -- Chery Automobile Company

As analyzed above, part of the reasons for the fragmentation is that, the regional

governments sought to develop their own local automotive production to drive the local economic development because of the profits that could be easily made in the protected domestic automobile market. Chery is a typical case of development under regionalism.

Since 2005, Chery Automobile Company, the largest fully independent Chinese automaker, has become world-famous for its self-reliant development strategies and the ambition to export cars to the U.S. market. Starting with producing and selling imitated cars from 2001, Chery has been dedicated to exportation, and has exported to more than 30 countries since then. It also assembles cars in Iran and Russia. From 2005, Chery started to work with Visionary Vehicles in the United States on the well-known venture to export cars the United States. Chery's domestic sales soared 118.5% to 189,158 units from 2004 to 2005, since its announcement on the U.S. exportation venture. This 6 years old company has moved up to top three among the domestic passenger car companies in the first four months of 2006.

However, none would easily believe the fact that it was illegal when Chery was initially constructed by Wuhu³⁴ local government in 1997. The Wuhu city government decided to develop the local economy with a lead from the automotive production in the early 1990s. They bought an assembly line of Ford in UK in 1996, but their automotive production project was overruled by the central government which implemented strict industry entry limits in the 1990s. So the Wuhu city government initially set up the so-called Anhui Automotive Part Industrial Company (AAPIC), and secretly started to manufacture cars since 1999. In 1999, the first batch of cars was sold to the local taxi companies in Wuhu city with the coordination of the local government. Afterwards, in 2000, the central government found AAPIC's unauthorized car production, and commanded it to shut down. In order to survive, AAPIC joined SAIC with a cost of demising 20% of its registered asset (US\$42 million) to SAIC. Then the company began to use the name "SAIC-Chery Automobile Company" as a subsidiary of SAIC. The fact was that, Chery kept its organizational independence except the name, based on the mutual agreement between SAIC and Chery. Afterwards, Chery itself obtained the permission for producing cars in 2003, and later SAIC shed its share holdings of Chery

³⁴ Wuhu is a small city in Anhui province, a relatively poor agricultural province to the west of Shanghai.

because of the intellectual property disputes between Chery and General Motors -- SAIC's most important joint venture partner (Luo, 2005a).

Since the beginning, Chery has been an operation of the Wuhu local government for the purpose for its local industrialization. Although the project was forbidden by the central government, it had the surreptitious support from the local and even the Anhui provincial governments. In fact, Xialai Zhan, the Wuhu assistant mayor in 1997 and the mayor afterwards, stayed as the president of AAPIC and subsequent Chery from 1997 to 2004, even though government officers are not allowed to take business responsibilities in China. Xialai Zhan was famous as "Red Hat Business Man", and was forced to step down in year 2004. So far, because of the successful operations from 2001 to 2005, the central government has turned around its attitude and been supporting Chery with preferential loans and governmental contacts. So far, Chery is still one hundred percent owned by the Wuhu local government.

Obviously, the regionalism of the Wuhu local government gave the birth of Chery. In China's governmental system, many regional governments operate rather independently to seek ways for local interests. Industrial policies sometimes may not be actually carried out at the city or even provincial levels. There are also many other similar small regional automotive production enterprises owned by different levels of governments and ministries for their interests, and most of them operate inefficiently but could make profits to remain in the business. For those who make little profit, their government owners may also support them to survive with capital and resource indraught. Nevertheless, Chery is a rare successful case of regionalism.

3.2.3 Case of Multifaceted Strategies of SOEs -- ChangAn Automobile Co.

ChangAn Automotive Corporation poses an epitome of the complex and changing development strategies of China's large state-owned automotive companies under a changing political and economic environment.

ChangAn, based in Chongqing -- the industrial center of western China, sold 631,142 motor vehicles in 2005 as the fourth largest indigenous automaker. So far, ChangAn has two joint ventures with Ford and Suzuki as well as a few independent subsidiaries in the north, east and south of China. ChangAn's history traces back to a machine gun factory

established in the Dynasty Qing. It continued to produce machine guns under the Ministry of Weapon Industry after the new China was established in 1949. Similar with other military factories located in the inner China that sought to survive in the peaceful era of “Economic Reform and Open”, ChangAn started its automotive production with the licensed Suzuki mini vans and cars from 1984. Since then ChangAn has been the market leader in the mini vehicle segment. When international automakers were entering China, ChangAn was selected as one of the “Mini Two” to establish international joint ventures. The first joint venture was created with Suzuki in 1993 to continue ChangAn’s strength in the mini car segment. ChangAn established the joint venture with Ford in 2001 which promises to become increasingly important to both. Besides the collaboration with joint venture partners, ChangAn also has posed an ambitious independent expansion strategy. By acquiring Hebei ChangAn, Nanjing ChangAn and Jiangling Motors after 2000 across the territory of China, ChangAn has become the fourth largest indigenous automaker in China. Different from other big SOEs which rely on the international joint ventures, 2/3 of ChangAn’s sales in 2005 came from its independent subsidiary plants. ChangAn has been expanding a huge independent R&D center and multi independent subsidiary plants, which produce ChangAn brand cars, trucks and buses.

Compared with Chery’s short history and simple ownership and strategy, ChangAn’s corporate structure and strategies are comprehensive, multifaceted, and evolving with the changes of the political and economic environment in China. As a military enterprise originally owned by the former Ministry of Weapon Industry, ChangAn transformed to make cars for civil use in the 1980s. Afterwards, it was selected to be protected and to build international joint ventures perhaps because of its consanguinity with the central government. At the same time of cooperating with the international automakers, ChangAn has also developed its independent capabilities by the turn of the last century. This is why ChangAn has multi types of subsidiaries, and dual strategies -- learning from the global automakers through the joint ventures as well as learning by doing in its independent strategies, although the efforts were very limited.

Generally speaking, along with the evolution of the eras, ChangAn has built up a comprehensive set of operations, as well as a complex set of strategies. The complexity of ChangAn’s corporate structure and strategy just reflects the complexity and changing

fact of the economic and political environment in the automotive industry in China.

3.3 FDI, Technology Spillover and Limitations

The comprehensive policies embody some basic intentions that materialize the leap-frog and catch-up ambition of the policy makers, including:

- 1) Protect the immature indigenous firms by trade barriers, e.g. tariff and quota.
- 2) Create “economy of scale” from the beginning by allocating resources only to favored state-owned companies and their joint ventures.
- 3) Take advantage of the spillover effects in international joint ventures to develop indigenous management techniques and technological capabilities.

The policies’ “protection” part is similar with other developing countries, but the “development” part is quite unique. To regulate FDI in only the format of joint ventures is a policy instrument innovation of the Chinese government. And the local content rule, as an additive, also aimed to reinforce the spillover effects from the foreign side to the local suppliers. The basic motivation is that, in order to develop and even catch up, the immature indigenous firms need not only protection, but also assistance from outside, according to the reality of lacking the necessary industrialization experience.

In China, this strategy is well-known as “Bargaining Market for Technology”. It means, the government uses China’s huge market potential to attract FDI, but what they want is the technology know-how from the international automakers. Similar strategy was also used for some other industries to develop without historical industrialization base.

The intended functioning routines of these policies are systematically summarized in Figure 3.4.

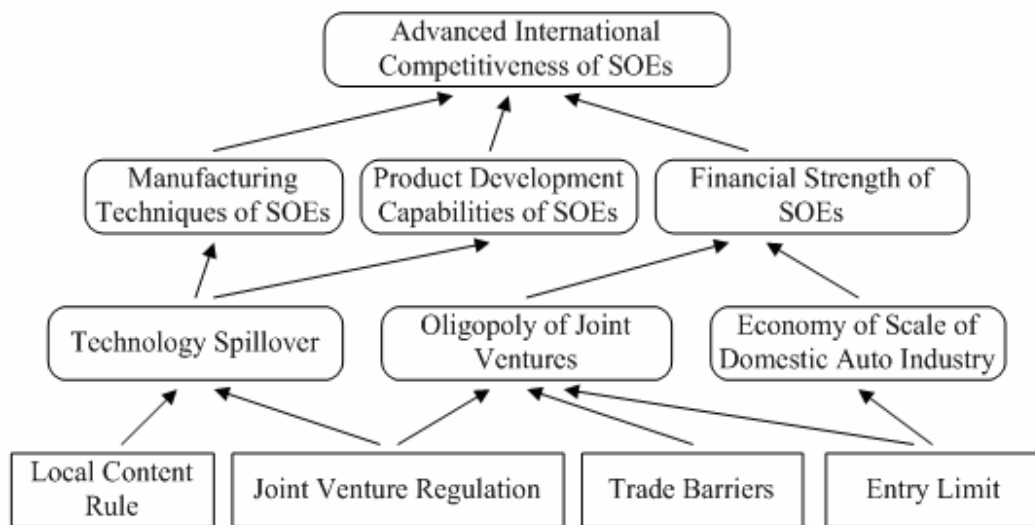


Figure 3.4: Intended Routines of the Government Policies

However, the later actual development routines were distorted away from this road map. The system dynamics casual routines in Figure 3.5 show how the governmental policies failed to cultivate technological capabilities of the indigenous state-owned firms by their purposely-designed industrial policies.

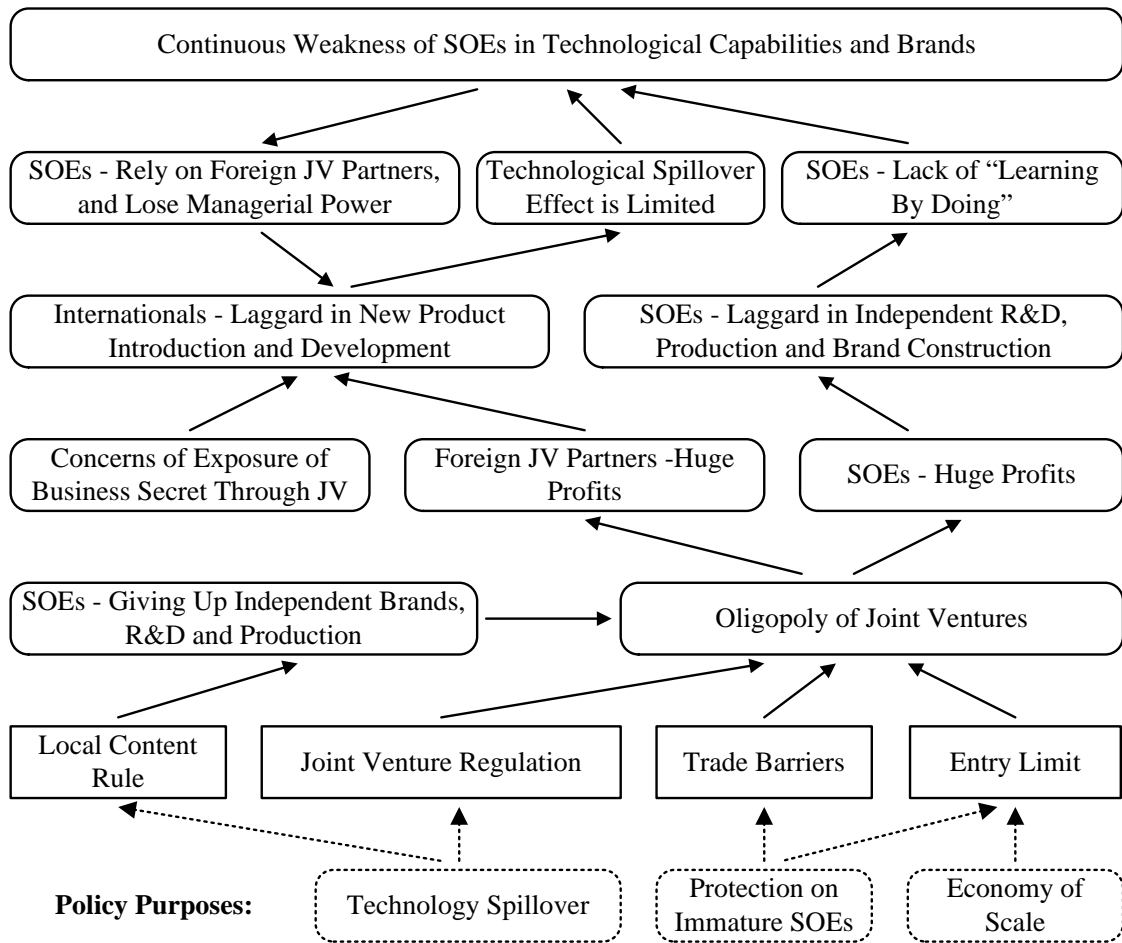


Figure 3.5: Actual Routines for Failure of the Government Policies

3.3.1 The Policies Created Oligopoly

The trade barriers, entry limit and joint venture regulation as well as the follow-up measures for the local content rate pursuit worked together and generated the oligopoly of the stated-owned enterprises.

The entry limit regulated many private investors out of the automotive production business. Also, many automotive groups that created international joint ventures gradually gave up their existing brands and merged their independent plants into the joint ventures to supply parts, in order to solely pursue local content rate of joint ventures. For example, SAIC had its independent sedan brand “Shanghai” before establishing the joint venture with Volkswagen, but its leaders gave up the independent brand, and regrouped all the former existing passenger car and truck divisions into the joint venture as internal component and part suppliers. They regarded the cars with high local content rate as

Chinese indigenous cars, and strictly required the local content rate of the cars produced in the joint venture. Then, the former famous Chinese sedan brand “Shanghai” was given up and then disappeared. Meanwhile, the local content rate of Santana sedan (Passat B2) of Shanghai-Volkswagen was forced to increase from 2.7% in 1987 to 90% in 1997. The policy makers regarded Santana as a successful indigenous Chinese car since it has a high local content rate. Therefore, the pursuit for local content rate also indirectly contributed to the oligopoly of the international joint ventures.

Especially in the passenger car market, the market power was gradually controlled by the international joint ventures, especially Shanghai Volkswagen, FAW-Volkswagen and Dongfeng-Citroen in the 1980s and 1990s, because of the products they have in hand.

Given the market power from the oligopoly, both the local partners (e.g. FAW, SAIC and Dongfeng) and their international joint venture partners (e.g. Volkswagen and Citroen) made huge profits by collusively fixing the high price for cars sold in China. Shanghai-Volkswagen earned net profits US\$723 million by selling only 230,000 Santana sedans (Passat B2, an outdated model) in 1998 and 1999³⁵. Also, a Goldman Sachs study indicated that 80% of Volkswagen’s global earnings amazingly came from China in the first half of year 2003³⁶. Those numbers indicated the rather big price margins of the car products, and huge profits the joint ventures made within the protected uncompetitive environment of the Chinese automotive market from the late 1980s to the early 2000s.

3.3.2 Oligopoly Held Back R&D Activities within International Joint Ventures

In nature, oligopoly hinders technology innovations. The same in the Chinese automotive industry, the foreign partners of the joint ventures collusively adopted the strategy of postponing the update of the product line and keeping selling outdated models even in a fast growing market. In 1999, in the Chinese car market there were only about 10 foreign brands and 20 outdated models that were 5~10 years older than those in the developed countries’ markets (Lu, 2005). As the outdated models kept selling well at remarkably high prices in the protected uncompetitive Chinese automotive market, extending the life cycle of existing products fit with the business interest of all the

³⁵ 21st Century Economics Report, December 27, 2003

³⁶ New Beijing Daily, January 15, 2004

companies.

Also, this complex cross-holding partnership structure, as shown in Figure 2.6 resulted in the exposure of product technologies and manufacturing techniques to even competitors of each other, who share the same venture partners in China (Tierney, 2003). For example, Nissan, PSA, Honda and Kia have joint ventures with Dongfeng, Volkswagen, Toyota and Mazda build cars with FAW, while Volkswagen and General Motors share the same partner SAIC. Given this odd network of partnerships, it is hard to protect intellectual property right in this industry. Therefore, the international automakers always hesitate to bring in their advanced technologies to the joint ventures in China.

Furthermore, in nature, the foreign firms would never really help local Chinese firms understand their key product technologies, because the local firms also could become their potential competitors in the future. Conversely, in fact international automakers tended to hide their advanced technologies as business secret in the joint venture operations. Obviously, they had no interest doing advanced research and development in China. In an interview of IMVP researchers in May 2006 at the Pan Asia Technical Automotive Center (PATAC) in Shanghai, the joint venture R&D center of GM and SAIC, a senior GM executive mentioned they have a “firewall” policy in this joint venture R&D center to prevent the engineers of Chinese citizenship from touching some protected information and devices.

The oligopoly market environment and the cross-holding joint venture structure reduced the international automakers’ naturally limited incentive to conduct R&D activities in the joint ventures located in China.

On the other hand, the Chinese managers in the joint ventures could not prevent this situation from happening. They had no bargaining and managerial power in the decision making process on product technologies and production management because they had few self-owned brands and little basic know-how about product technology and manufacturing management.

Therefore, product development activities in the joint ventures were limited in the past two decades. The local engineers in joint ventures learned some basics, but had few chances to join in advanced product development activities.

3.3.3 Oligopoly Weakened Incentives for Independent R&D of SOEs

In the mean time when the product technological know-how was not transferred actively by the international automakers, the indigenous state-owned automotive enterprises, mostly the “Big Three and Small Three”, also dramatically lost the motivation to conduct their independent product R&D and production activities.

Because the government only allowed the foreign automakers to make cars with its SOEs, the international automakers competed intensely for a good local partner that could guarantee a share in this protected profitable market. Also because the local private investors were regulated out of this game, with their franchise obtained from the government, the only important thing the Chinese SOEs needed to do for guaranteeing good profits was to pick up a good foreign partner. Afterwards, by sharing the profits of the international joint ventures that dominated the market, the SOEs earned a lot of money easily without making any significant cooperative or independent efforts. For example, SAIC gained a net profit about US\$689 million in 2003 according to Fortune 2004, better than many international automotive giants, such as Ford and DaimlerChrysler in that year³⁷. It had no independent brands and assembly plants other than two joint ventures with Volkswagen and General Motors, but it was amazingly listed as one of the “Fortune Global 500 Largest Companies” in 2003 and 2005. SAIC became rich only because it had the right to make cars in China, and shared it with Volkswagen and General Motors, the 2 strongest international players in China.

With the protection of the government, it was so easy for the SOEs to make money to the extent that they actually refused to take risk to invest on independent product research and development that could be barren. Gradually, these indigenous SOEs lost the motivation of conducting independent original product development activities, and even some of them began to focus on capital operations, such as SAIC. Then, they went deep to rely on the indraught of foreign car models to manufacture.

This situation conversely reinforced the lack of technological capabilities of these

³⁷ The net profits of major global automakers in 2003: Toyota: \$8,923 million; Hyundai: \$1,400 million; GM: \$3,822 million; DaimlerChrysler: \$564 million; Ford: \$495 million; GM China: \$437 million. (from the financial reports on company websites)

Chinese enterprises as well as their reliance on the international joint venture partners, and fixed them in an adjunctive position within the joint ventures. Thus the joint ventures were actually used as international automakers' production bases for the Chinese local market.

3.3.4 Positive Effects of International Joint Ventures

Although the policies failed to completely establish independent technological capabilities of the indigenous SOEs, and lost the control of the Chinese passenger car market to the international automakers, they also had positive roles matching with the original policy goals.

First of all, the governmental policies did transfer the manufacturing techniques to the locals via joint ventures to some degree. Many Chinese local experts, engineers and work force gained experience and understanding in the joint venture plants. Afterwards, many of these experienced managers and engineers transferred to the later-established self-reliant indigenous automotive firms, such as Chery and Geely, and helped their initial start-up. For instance, Chery president Mr. Tongyao Yin was the manager in the FAW-Volkswagen Jetta plant before he moved to Wuhu, and Geely vice president Mr. Yang Nan was the CEO of Shanghai-Volkswagen (Lu, 2005).

Second, the local automotive part industry was developed under the policy forcing the localization of foreign-introduced models. The local suppliers obtained experience from dealing with foreign firms to improve technology, quality and management to meet their requirements of the international joint ventures. Also, the ability of the local suppliers to supply cheap and qualified components and parts is one of the important factors which make it possible for the immature Chinese young tigers to compete with the international joint ventures by making cheap budget cars in the recent years.

Third, the policies protected the indigenous SOEs and fostered their financial strength. One example is again SAIC as a "Fortune Global 500 Largest" company. In that protected era and environment, the SOEs accumulated enough capitals and assets which would help their future expansion plans. Without the protection, SAIC would not have the financial capability to acquire the 48.92% share of Ssangyong Motors, 10% of Daewoo in 2003, and the entire car and engine intellectual property of MG Rover.

Through the past 20 years of development characterized mainly by the trade protection and the joint venture regulation, the indigenous automotive firms have become rich, but their technological capability is still underdeveloped, and the passenger car market has been occupied by foreign brands. The SOEs are continually dependent on the indraught of products and technologies from their international partners, while a few emerging independent firms, e.g. Chery and Geely, are struggling to cultivate their own product development capabilities through a way from reverse engineering to R&D outsourcing and self-reliant product development. Generally speaking, the reliance on international joint ventures resulted in the industry-wide lack of technological capabilities.

3.4 Infant Industry Theory and Missing of “Learning By Doing”

3.4.1 Key Element Behind Protection -- Efficiency Improvement

As is known to all, simple trade protections on immature industry generates societal dead weight loss, especially the consumers would suffer, even though protected firms and the government may gain benefits. However, the infant industry theory is not simply about protectionism that is against free trade. It is actually a complement of the “free trade” doctrines. In particular, the key element of the infant industry argument is the presence of positive learning effects that improve productive efficiency during the protected period of time. However, in the forgoing sections, we have seen the protection of the governmental policies hindered the learning activities in China’s domestic automotive industry in the past two decades. Therefore, the policies failed to fulfill the key issues of the infant industry theory.

A microeconomics analysis is given below to demonstrate the key role of learning effects for a successful application of the infant industry theory. Similar analyses on the effects of tariffs and quotas can be found in microeconomics text books (Pindyck and Rubinfeld, 2001; Suranovic, 1997).

The supply and demand curves for a product in a certain country are shown in Figure 3.6 below. Assuming there is no trade barrier between the domestic and international markets, the free trade price in the world market is P_w , and the consumers in this country will consume D_w at price P_w . In this graph, P_w is lower than the intersection of the supply

curve with the price axle. It indicates the domestic producers are unable to produce this product as cheaply as those firms in other developed countries. So, no domestic production would exist in front of the international low price and competition, and the product will be imported at a full quantity D_w that the consumers need. In this case, the domestic industry is a relatively infant one which could not exist if there is no government measure to protect and stimulate its initial growth.

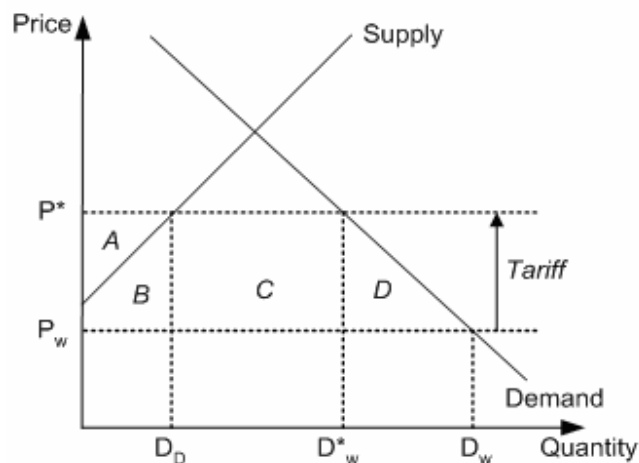


Figure 3.6: Welfare Effect of Tariff on Supply-Demand Curves

When an import tariff, which equals $P^* - P_w$, is imposed in order to protect the infant industry, this protection raises the domestic price to P^* . The increase of domestic price will stimulate the domestic production from nothing to the level of D_D , and decrease the domestic demand to D^*_w . Then, the import would fall from D_w to $D^*_w - D_D$.

The static welfare effect of the import tariff is shown in Table 3.2.

Table 3.2: Welfare Effects of Tariff

Consumer Surplus	- A - B - C - D
Producer Surplus	+ A
Government. Revenue	+ C
Net National Welfare	- B - D

In this situation, consumer surplus is negative. It indicates that consumers are harmed due to the high price, which is induced by the tariff and protection. However, the infant domestic producers may gain a chance to operate because of the protection. In particular, employment is created domestically in an industry that did not even exist before the tariff

was imposed. However, even though producers and the government earn revenues, the net national welfare under the import tariff is negative. The deadweight loss was because the suffering of consumers outweighs the gains of producers and the government. This demonstration shows the negative effects of a pure tariff protection.

Then, we suppose, the domestic industry improves its own production efficiency during the temporary import tariff protection. When the cost is reduced so that the domestic price decreases to the international price, the domestic producers no longer need the protection, and then the tariff is removed³⁸. In Figure 3.7, the efficiency improvement is represented as a downward shift of the supply curve from Supply to Supply'. In this situation, the domestic price equals the world price P_w . The consumer demand would return to the original amount D_w , but the domestic industry has been able to serve a portion D_D of the total demand, in comparison with the original situation when all the consumer demand was served by imports.

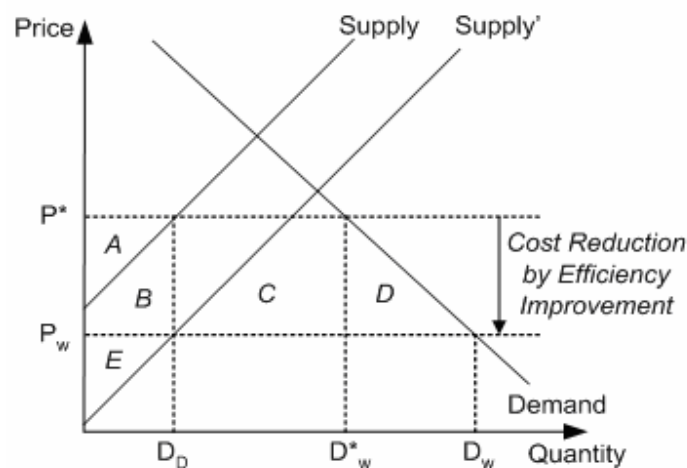


Figure 3.7: Effect of Efficiency Improvement on Supply-Demand Curves

The effects of the efficiency improvement and tariff removal are calculated relative to the original equilibrium before the tariff was implemented, and the results are listed in Table 3.3. When reaching this ideal stage, the consumers and government have no loss or gain. However, domestic producers gain a positive surplus +E, as illustrated in Figure 3.7, because they have improved to be able to produce at a cost lower than the free trade price.

³⁸ Suranovic (1997) gave the same assumption that the domestic price decreases right to the international price, in order to simplify the analytical case.

Therefore, the domestic industry makes an overall gain of +E, the same as the producer surplus.

Table 3.3: Welfare Effects of Efficiency Improvement and Tariff Removal

Consumer Surplus	0
Producer Surplus	+ E
Government. Revenue	0
Net National Welfare	+ E

With a limited period of tariff protection and the efficiency improvement, the domestic industry grows from non-existence to be able to survive in front of the international competition. Other trade policy measures like quota have similar effects.

This example shows that, the protection of an infant industry is harmful in a short run, but if the protection may stimulate domestic production and efficiency improvements, then the long run overall effects may outweigh the short-run loss. Therefore, the key element that determines the success of the application of infant industry theory to develop an industry is whether the efficiency improvement could be stimulated during the protection.

3.4.2 Missing of “Learning By Doing”

Back from the simplified analytical case to the complex reality in the Chinese automotive industry. The government designed the development policies based on the infant industry theory. However, the protection function was emphasized while the protected domestic firms’ learning activities were limited. Therefore, the SOEs still cannot compete with the international competitors after a protection of 20 years.

By investigating the top three rows of the flow diagram in Figure 3.5, it is found that the technological capabilities and brands of SOEs are affected by two parts of factors. As illustrated in Figure 3.8, the part on the left composes a reinforcing loop, and is controlled by the motivation of the international partners of the joint ventures. This formed a basically unchangeable situation because the international partners of the joint ventures in nature have no motivation to foster the technological spillover to their local partners that could become competitors in the future. So, only if the “learning by doing” effect is fostered, the current stagnant situation of SOE’s limited capability could be changed. As a

matter of fact, the successful catch-up stories of the automotive industries in Japan and South Korea have shown the power of “learning by doing”. However, in the Chinese automotive industry, the catch-up policies were focused on fostering technology spillover, while they addressed very little for fostering “learning by doing”.

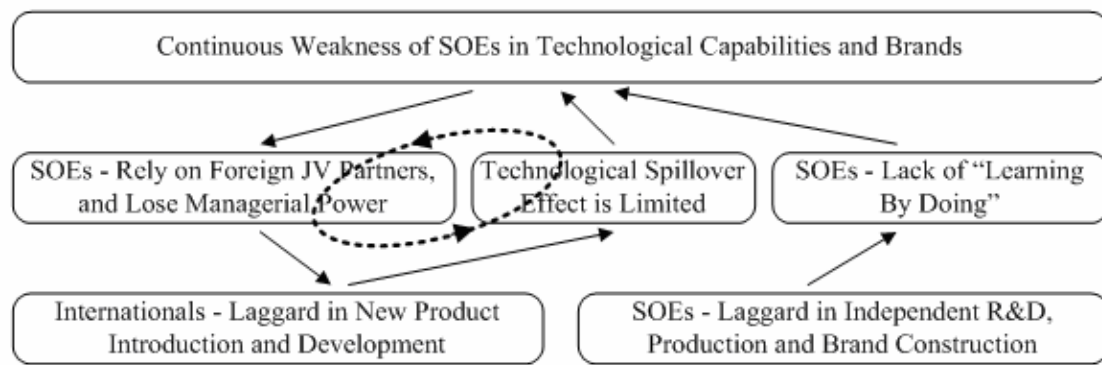


Figure 3.8: Reinforcing Loop Limiting Technological Spillover Effect

Both technology spillover and “learning by doing” have positive effects on capability development in the immature industries that aim to catch up. The technology spillover takes place naturally via foreign invested operations because the foreigners need to train the locals about how to use specific machineries, how to solve problems in the manufacturing process, how to improve quality, and etc. These kinds of trainings are necessary, and technology spillover is inevitable in this process.

Technology spillover is straight forward and theoretically efficient for latecomers to learn, however it has a nature limit and cannot achieve complete technological capability and know-how of the learners. First, the investors from the developed countries have the nature to hide the core of their advanced technologies to keep their competitive advantage. Second, even if the advanced investors would teach, spillover is still not enough for completely forming independent capabilities due to the nature of “tacitness of technology” (Amsden, 2001). “Tacitness of technology means that technology or technological knowledge, which has complex systematic contents, are not codifiable and cannot be documented transparently”. Automotive engineering is obviously a complex tacit capability.

In order to fully understand a product technology and master the way to develop and produce it, a process of “learning by doing“ is necessarily needed to complement the

limitation of technology transfer or spillover. The successful stories of Japan (Wang, 2001) and South Korea are good evidences (Steers, 1999). Compared with technology spillover, “learning by doing” is complicated and time-consuming, but it is also a must for accomplishing the development of independent capabilities, such as the capability to develop new generation product like T-Model of Ford, or innovative management approach like “Toyota Production System”. Such truly independent and original capabilities can only be fully created with indigenous innovative characteristics in the process of “DOING”.

The degree of applying technology spillover or learning by doing or both depends on how much the initial experience the developing countries already have in the infant industry. For instance, after the World War II, Japanese started its automotive industry independently through a sole way of learning by doing directly. They initially knocked down American cars, studied them and designed cars by imitation, and gradually formed independent capabilities to develop and manufacture cars successfully by their own approaches. Japanese did not acquire much through technology transfer. But on the other side, in South Korea the industrialization experience was weak after the World War II and the Korea War. The automotive industry in South Korea started to develop in the late 1960s with the form of joint ventures with foreign automakers. After accumulating know-how in the cooperation process, afterwards the Korean gave up this way, and began “learning by doing”. For a less developed country with little industrialization experience, a development strategy combining the promotions for both technology transfer and learning by doing would be appropriate. Both Japan and South Korea were latecomers in the take-off periods of their automotive industries, and have successfully developed their own technological capabilities. But they chose different ways to go based on the different industrialization experience they had when they started to develop. In their stories of success, the similarity is both of them necessarily have a procedure of “learning by doing”.

China’s initial industrialization experience was poor and similar with South Korea’s at the beginning of their economic growth. In China’s automotive industry, the governmental policies did foster technology spillover in the joint ventures. Many experts, engineers and work force have been trained and experienced with the techniques needed

to accomplish their jobs in the joint venture manufacturing plants. However, till now the Chinese indigenous automakers still have no independent product development capabilities like what Toyota and Hyundai have achieved, because the industrial policies also cumbered the introduction of advanced products, and counteracted the motivation of “learning by doing”.

3.5 Institutional Failure of “Regulatory Capture”

From the analysis above, we have understood that the lack of learning effects is mainly because of the lack of motivation of SOEs for “learning by doing” activities. Why didn’t “learn by doing” happen? By tracing downwards in the flow diagram in Figure 3.5, it is found that all the nodes and routines converge at the “oligopoly of the joint ventures”. The oligopoly was formed as an integrated effect of the comprehensive set of industrial policies. We will further analyze the deeper institutional reasons for the oligopoly than the policies on the surface.

Obviously, all the government polices were in favor of the SOEs, especially the Chinese “Three Big and Three Small”. The government in nature used regulations to limit any competition toward the SOEs³⁹. The indigenous private investment was forbidden from the automotive industry until 1997, so the internal competition was avoided. Meanwhile, the outer international competition was limited by the high trade barriers. And foreign firms were also forced to share their earning and knowledge with the SOEs by the policies and regulations. Therefore, as a matter of fact, whom the government truly protected were only the SOEs, instead of the entire indigenous industry. What the government policies were designed for were not the public benefits, but the benefits of the SOEs. In section 2.2.2, we have concluded the advantage of SOEs to allocate capital and resources by their political power. This also accords with the conclusions that Professor Yasheng Huang analyzed and proved in his book “Selling China” (Huang, 2003). “China’s limited economic resources are largely allocated to the least efficient firms – SOEs, while denying the same resources to China’s most efficient

³⁹ The government thought Shanghai-Volkswagen, Dongfeng-Citroen and Guangzhou-Peugeot might compete with each other and improve in this process. However, competition was limited, in comparison with their collusion of setting high price and delaying product upgrade.

firms – private firms. SOEs were beset with internal inefficiencies, while private firms lacked resources and property rights to grow and develop. China’s political institutions have marginalized the efficient private firms. The discrimination against private firms and the preference for SOEs generated the uncompetitiveness of China’s corporate sector in the 1980s and much of the 1990s”. The automotive industry is a typical case of this situation.

This may be caused by the essence that the state-owned automotive enterprises actually represent the interest of the governments. Nowadays, the presidents of SOEs are also regarded as government officials, and are appointed by the government. For example, the previous president of Dongfeng was the vice head for automotive industry in the Ministry of Machinery Industry before he joined Dongfeng, and then after he left Dongfeng he became the mayor of Wuhan City where Dongfeng is based. This situation under China’s political and economical environment shows a distorted extreme case of the institutional failure of “regulatory capture”⁴⁰ in the Chinese automotive industry.

In this “regulatory capture” failure, the government created an imperfect competition environment by means of limiting industry entry, imposing trade barriers, shifting costs to joint venture partners, etc. However, this uncompetitive environment actually bred the inertia of the SOEs, and then these coddled SOEs failed to catch up healthily. Generally speaking, the institutional failure is the underlying cause for the market failure that, the competence, especially technological capabilities, of indigenous industry failed to advance in the past 20 years. This is also the key point that makes difference between China’s and Japan’s development trajectories. Japan protected efficient private firms that have strong motivations for learning by doing, while China’s governmental regulators protected the enterprises owned by them selves.

In the transition of China’s economy from planning to market-driven, the central government has been shifting their adjustment tools from political order and central planning to market power. However, the political ownership of some market players,

⁴⁰ The theory of “regulatory capture” was set out by Richard Posner, an economist and lawyer at the University of Chicago, who argued that “Regulation is not about the public interest at all, but is a process, by which interest groups seek to promote their private interest ... Over time, regulatory agencies come to be dominated by the industries regulated.” From Dictionary of Economics.com, 2006

especially the SOEs, still collides with market-based economic principles, and generates market failures. In China's automotive industry, the historical wide existence of the SOEs in a reforming market-driven economy generated this Chinese version "regulatory capture", an extreme case of this theory. Theoretically, "regulatory capture" means the regulators are captured by the interests that they supposed to regulate (Laffont and Tirole, 1991; Levine and Forrence, 1990). In China's automotive industry, the interests the regulators are supposed to regulate are the interests of themselves, because the policies are made by the government, and the stated-owned enterprises are also owned by the government. The industrial policies initially were to develop the industry for the public interest, but in actuality the regulation was only for the sake of the SOEs.

The analysis has indicated that the automotive industrial policies tried to follow the basic principles of the infant industry theory, but the strong control of governments on the market players through their ownership is the major cause for the fragmentation and inefficiency of the industry, as well as the failure of independent capability development of the indigenous automotive firms. Therefore, a straight-forward solution for this failure is to shed off the government ownership in the current SOEs.

Actually, by keeping an appropriate stake in the company holdings may help the government play a right level of influence for the corporate operations. According to the Western industries' experience, it is unnecessary to completely privatize the current SOEs. For example, Volkswagen is still 13.7% owned by the State of Lower Saxony, and Renault is also 15.7% owned by French State⁴¹. However, holding too much may increase over-intervention effects and reduce the robustness of modulations between government and the industry, like what has happened in China's automotive industry.

The Chinese central government has been attempting to privatize and publicly list (in the stock market) many SOEs, and to loosen the relationships between government and companies in many industries. However, this has not happened in the automotive sector. It is perhaps because the government still regards the automotive industry as a pillar industry which should be held in hand firmly.

⁴¹ Automotive News Europe (2005). "Guide to Global Automotive Partnerships", Crain Communications Inc, 2006

3.6 Regulation Liberation and Effects

The Chinese government started to reform its automotive industrial policies and loosen the regulations over the industry in line with its WTO obligations. Accordingly, a few transformative changes have taken place.

Although the joint venture format is still a must for FDI in the automotive industry, local content rate is no longer required. Trade barriers have been lowered in line with China's WTO obligations. The historical automotive import quota was cancelled, and the tariff rate for imported entire cars was decreased to 30% on January 1st, 2005, and scheduled to drop to 25% by July 1, 2006. The tariff for automotive components and parts has been lowered to 30% (Luo, 2005a). More foreign and indigenous private investors have been allowed to operate automotive business in China, as shown in Figure 2.7, especially in the passenger car market. Almost all the major global car companies have entered the Chinese automotive market, and more considerably diversified car models have been introduced, in comparison with that oligopoly era before 2000 when there were very few models available. These changes have increased the competition in the domestic market, and driven the companies, including the state-owned firms, international joint ventures as well the private firms to improve their product quality and design, decrease costs, and lower the price. The improving product attractiveness stimulated the car-buying enthusiasm of potential consumers, and served as a major driver for the growing private automotive consumption, as illustrated in Figure 3.9, which demonstrates the major factors that drive the market growth.

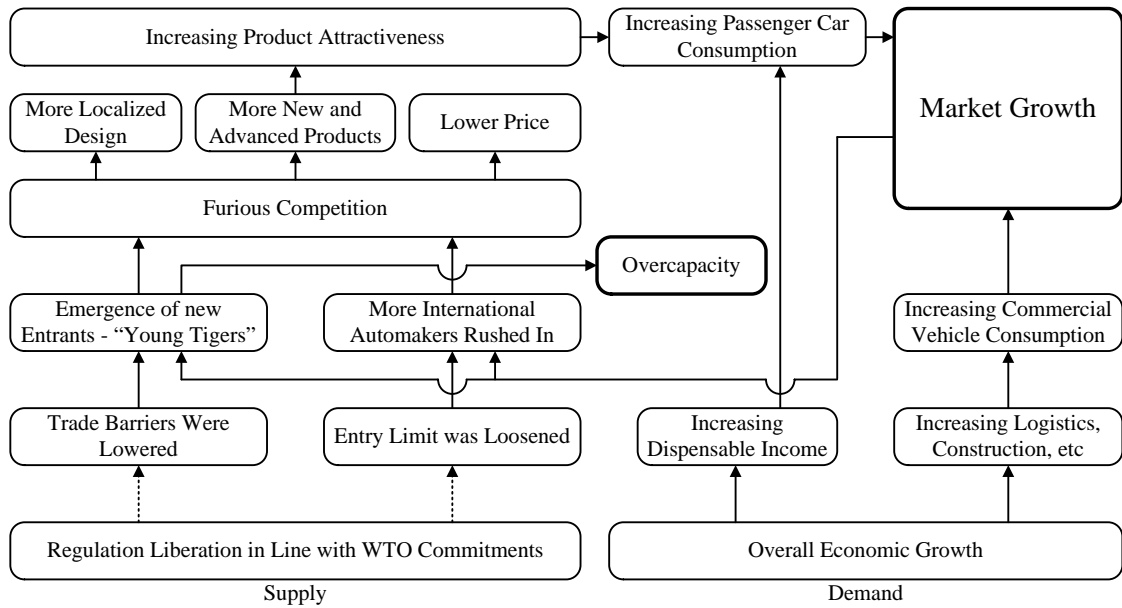


Figure 3.9: Effects of Regulation Liberation and Economic Growth

Especially, due to the intensifying competition, the international automakers have been conducting more local design and development jobs in China, in order to respond to the fast changing and expanding market environment. For example, the new 2006 Buick LaCrosse China version is a model completely designed and developed by PATAC in Shanghai, the joint venture R&D center of GM and SAIC. On the other hand, with the encouragement from the government, the SOEs which relied on the joint ventures also started to actively “pull” the spillover effect within the joint ventures. In an interview during the visits of IMVP researchers in May 2006, a Chinese manager of the ChangAn-Ford joint venture mentioned that they have a rule in place to rotate the indigenous engineers sent from ChangAn’s independent R&D center to the joint venture’s engineering center back to ChangAn every four years. Based on these observations, deeper technological spillover effect is expected to take place in the joint ventures.

Moreover, by accumulating the earnings during the golden time of market boom from 2000 to 2004, the independent young indigenous automakers have been able to originally develop their models independently or by cooperating with international designers or technological suppliers. They are enthusiastic in self-reliant product development, and pursue a way to technological independence through “learning by doing”. With these changes, there have been 89 indigenous passenger car brands as well

as 191 models in China's automotive market in 2005 (Wei, 2005).

Besides the positive changes that are happening on the supply side (manufacturer), the overall economic growth also serves as a key driver for the recent market growth from the demand side (consumer), as shown in Figure 3.9. The increase in disposable income in the metropolitan areas, and the establishment of an affluent middle class, make it happen that the private purchasing has become the mainstream of automotive consumption. It has been seen that the population of about 200 million people in the "developed China" (the eastern and coastal area of China, especially the big cities) has entered the era when family car could prevail. Moreover, the fast overall economic development and industrialization also stimulated the demand increase for commercial vehicles, which contributes to the recent automotive market growth as well.

In the mean time, side effects also emerge. As a result of the fast market growth and the strong earnings in China, almost all the international automakers, including General Motors, Ford, Volkswagen, Toyota, DaimlerChrysler etc., as well as the indigenous automotive groups, have been expanding their capacities in China. This has induced a rather low capacity utilization rate in the Chinese automotive industry. For the capital-intensive automotive industry, capacity utilization is a vital performance measure, and very sensitive for determining companies' financial turnouts (Holweg and Pil, 2004). As shown in Table 3.4, the capacity utilization in the entire industry is around only 50~60%, far below the average utilization in the Western automotive industry around 80% (Holweg, Luo and Oliver, 2005). And the capacity utilization rate of the ambitious expanding young tigers is incredibly as low as 20%.

Table 3.4: Capacity Utilization Rate in 2004

Type of Automaker	Capacity Utilization Rate
International Joint Venture Plants	70.1%
Independent Plants of Top Five SOEs	50.4%
Young Tigers	20.2%
Industry Average	51.3%

Source: Matthias, Luo and Oliver (2005)

However, most manufacturers are still increasing their facilities in China. Perhaps

from their views, the sustainable growth prospect outweighs the short-term adverse financial implications of overcapacity. For example, Volkswagen plans to add an investment about €6 billion, and to double its annual production capacity to 1.6 million cars in China by 2008. GM also plans to spend over US\$ 3 billion to more than double its annual production capacity to 1.3 million vehicles by 2007. Local carmaker Geely is also planning to increase its capacity from 210,000 to 650,000 by 2007 (KPMG, 2004). Figure 3.10 is a collection of the announcements on capacity expansions through 2003 to 2004 from the major automotive manufacturers in China. On the other side, the central government has been considering a policy to regulate surplus production by forbidding companies with less than 80% capacity utilization rate to establish new plants (FOURIN, 2006).

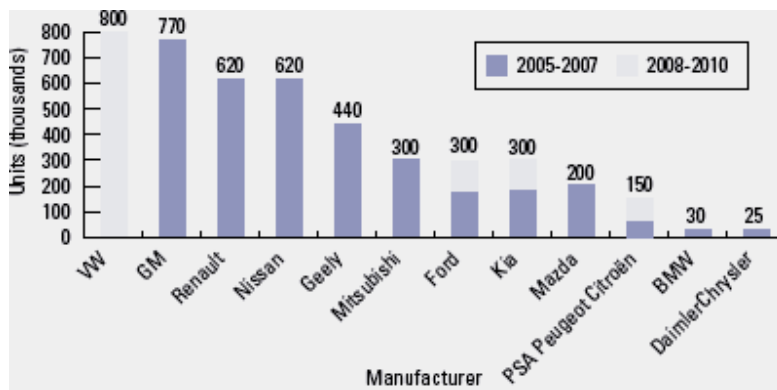


Figure 3.10: Planned Additional Production Capacities until 2010

Source: KPMG (2004); Data were collected by KPMG from company news releases through 2003 to 2004

To summarize, the increasing liberation of regulations and the country's overall economic growth have driven the current market growth and the trend in the indigenous automakers to promote both technology spillover and learning by doing.

3.7 Chapter Summary

This chapter is a dynamic and systematic analysis on the reasons for how the government policies created the current industrial characteristics in the past two decades.

Based on the causal analysis conducted in this chapter, the industry-wide fragmentation is directly due to the regionalism of local governments and the

departmentalism of the different governmental administrations that have automotive production operations. The oligopoly of international joint ventures disinclined the indigenous firms to develop independent technological capabilities. Without learning effects and enough capability developments, the industrial policies based on the infant industry theory failed to build strong competitiveness of indigenous firms and led to the market dominance of the foreign automakers through the joint ventures. Especially, “regulatory capture” was found the major institutional reason for failures of the industrial policies. In another word, the industrial policies are “captured” to favor only the SOEs, instead of the public and the industry, because the policies are made by the government, and the SOEs are also owned by the government. Therefore, the limited resources and supports are allocated to the inefficient SOEs, while the efficient but tiny private firms have to struggle in front of the strong international joint ventures. Although the catch-up responsibility of China’s automotive industry is more likely to be taken on by the independent self-reliant indigenous automakers, it is difficult to happen without necessary support at their immature stage.

Generally speaking, the wide existence of SOEs and their complex ownership structures generated the complexity of the industry and the difficulty for traditional industrial policy tools based on infant industry theory to develop China’s immature automotive industry. Also, positive changes have been happening in China’s automotive industry with the liberation of regulations and the country’s overall economic development. However, an efficient catch-up trend is still unseen in a near future because the institutional characteristics are still unchanging in the automotive sector.

In the next chapter, a comparative study between several countries is conducted to further the analysis about the key elements of the infant industry theory and the effects of the policy applications of the theory across the countries with different characteristics, in order to understand the key but underground factors determining the success or failure of the applications of infant industry theory.

Chapter 4 Cross-Country Comparison

The basic principles of infant industry theory are applied widely in the industrial policies in many developing countries. However, similar policies generated different outcomes. The analyses in forgoing chapters have found that the governmental institutions and political environment in China are a major determinant factor for the effectiveness of the industrial policies. In this chapter, we will compare the policies, economic and political environments, and the policy impacts in the automotive industries of Brazil, Japan and China in order to further the exploration for the fundamental factors that determine the success or failure of the policies based on the infant industry theory. Especially, it is meaningful to compare the three countries because:

- The three countries were typical latecomers to the automotive industry. This is especially true of Spain which is similar to Brazil, and South Korea which is similar to Japan in terms of development strategy and trajectory. China is a combination of the both types.
- Japan and China's governments had a similar policy intention that was to develop the indigenous capability of domestic firms.
- Brazil and China's governments had a similar catch-up strategy that was to take advantage of the foreign investments.
- Similar general trade policies were used to protect the domestic automotive industries in the three countries.

The time periods compared in this study are the first 20 to 30 years of the initial automotive industry take-offs stimulated by the governmental policies in these countries. During their different take-off periods, the automotive industries in these countries grew from infant to a rather mature and stable stage.

4.1 Brazilian Automotive Industry -- FDI and Import Substitution

The Brazil government started to develop its automotive industry from 1956 when

Jucelino Kubitschek⁴² became the president of Brazil. In order to turn Brazil from an agriculture country to an industrialized country, he implemented an ambitious plan to increase the industrial output, create employments, and substitute import for industrial goods, in order to make “fifty years of progress in five”. In this plan for national economic leap-frog and fast industrialization, the automotive industry was selected as one of the core industries to initiate, promote and pull the country’s overall industrialization. The economic plan in the automotive industry sector was materialized by the means of import tariffs, currency reevaluations and other policies to protect the domestic industry, as well as absorbing FDI in order to bring in financial and technological resources. The five years of Kubitschek’s presidency were also the first five years of the initial growth of the Brazilian automotive industry.

On one hand, since the mid-1950s, stringent trade barriers, such as high tariffs, had been imposed to protect the domestic market in consistence with the import substitution strategy of the government. In the 1970s, the Brazilian automotive industry had formed rather big scale and capability. Facing the energy crisis and huge debt, the government took detailed measures to promote export while continuing restricting import. For example, since 1972, the export had been subsidized at a rate 26%~36%, and supported with preferential loans. On the other hand, only companies that exported could have the right to import, and could only import 1/3 value of their exports (Ding, 1985). Under those policies, Brazil exported vehicles with a value of approximate 1 billion US dollars, and the exports reached the record of 417,000 units by the year of 1979 (Lai, 2001).

On the other hand, FDI was promoted by the government to bring in technologies, experience and capitals into the automotive sector, facing the small domestic market size, poor industrial experience, and limited capital and technology resources. For example, during the initial establishment year, sales tax and equipment import tax were exempted, and preferential loans were offered for foreign-invested automotive companies. And, foreign investors could have 100% share of the companies. Since the 1950s, Volkswagen, General Motors, Ford and Fiat were the first wave of investors.

⁴² Juscelino Kubitschek de Oliveira (1902~1976) was the President of Brazil from 1956 to 1961. Wikipedia, June 2006.

But conditions and restrictions were also implemented together with these supports for FDI to manufacture automobiles in Brazil. For example, the foreign-invested companies were commanded to have local content rate about 35%~50% initially and increase it to 95% in three years (Lai, 2001). Otherwise, the company would be ruled out of the business. When the production volume reached a level high enough, import would be forbidden and the equipment for new expansion of plants must be locally produced. Also, no more than 12% of the profits were allowed to be transferred out of Brazil. And the profits made by FDI companies were encouraged to re-invest in Brazil (Ding, 1985).

On a rather poor foundation of industrial experience, a fast industrial growth was fostered by these policy measures. As shown in Figure 4.1, the automotive production volume grew from 134,051 units in 1960 to 1,165,174 units in 1980, No.10 in the world, and accounted 12% of the Brazilian national industrial output value (Ding, 1985). The automotive industry became a real pillar industry for the economy in Brazil. Although there were obvious fluctuations in the 1980s, the overall industrial strength has leaped up to a relatively mature stage.

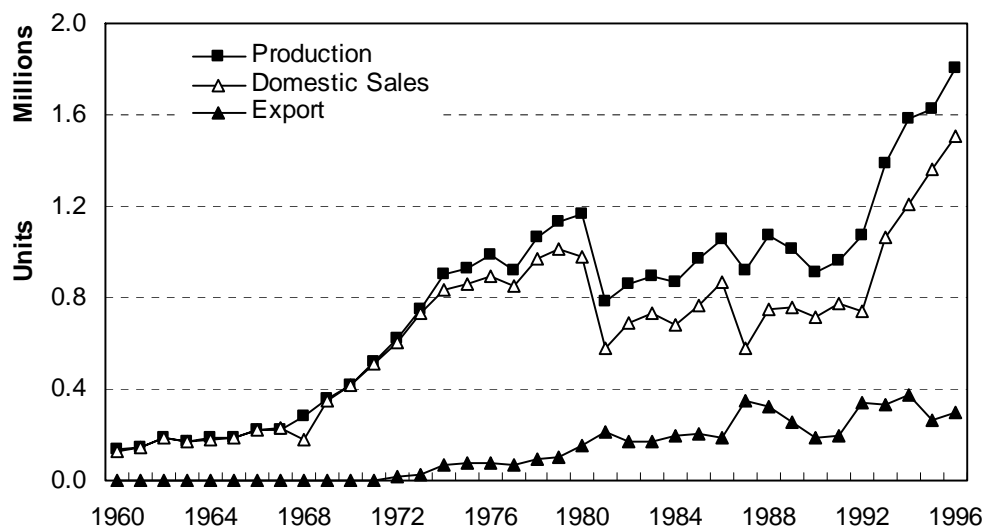


Figure 4.1: Vehicle Production, Domestic Sales and Exports in Brazil (1960~1996)

Source: AAMA, World Motor Vehicle Data, 1998,

Another success is the government's ethanol program from 1975 to date. By law, all the gasoline in Brazil contains a minimum of 25 percent ethanol. With government subsidies on ethanol cars until the mid-1990s, nowadays most cars in Brazil have run on

either ethanol or dual-fuel (ethanol or gasoline) engines. In 2005, 80% of the cars produced in Brazil were dual-fuel⁴³. Ethanol fuel can be produced from sugarcane, which is widely available in Brazil, at a lower cost than traditional gasoline. Since its inception in 1975, the ethanol program has displaced imported oil worth \$120 billion (Morris, 2005). This popularity of ethanol cars in Brazil is a success of the government policies to promote industrial development with local characteristics.

However, most of the cars, including the cars with ethanol or dual-fuel engines, are still mainly produced with foreign technologies and brands. The Brazilian indigenous automakers, such as Gurgel, Agrale, Engesa, Scania and Mafersa, have very limited production and sales volumes, as well as technological capabilities. The current Brazilian automotive industry is 95%, in terms of assets, controlled by the FDI, and domestically produced car models are still outdated and sold at high prices. The industry, especially the indigenous firms, is still in lack of the international-level competence. Even though these problems are there, the governmental industrial policies should still be regarded as successful because the initial purpose to substitute import and industrialize the country has been realized.

4.2 Japanese Automotive Industry -- Learning By Doing and Catching Up

After the World War II, the Japanese government implemented comprehensive industrial policies to recover its economy. Japan had extensive industrialization experience before the World War II, but it was a latecomer compared with West Europe and America in the automotive sector. At that time, the automotive industry was selected by the government as a strategic industry to foster, and the industrial policies applied in the automotive industry clearly followed the infant industry theory that had successfully been used by United States and Germany to catch up with Britain by the turn of the 19th century. The automotive industrial policies in Japan from 1955 to 1985 created a classical case of the application of the infant industry theory in the automotive industry.

On one hand, the Japanese government provided active supports directly to the

⁴³ "Ethanol Fuel in Brazil", Wikipedia, June 2006

indigenous companies in the forms of preferential loans, tax reduction as well subsidies (equipment or financial subsidy). For example, the national banks in Japan offered preferential loans 90 billion Yen in 1953, 133 Billion Yen in 1954, and 163 Billion Yen in 1955, which accounted 20%, 19.3% and 24.9% of the fixed investments to the indigenous automotive firms in the three years. From 1961 to 1965, 32.1% of the preferential loans for the manufacturing industries went into the automotive sector (Zhang, Liu and Lu, 2004). Tax reductions were conducted through the “Special Tax Act”. Based on this act, from 1951 to 1959, 18.4% of the new investment of 63.45 billion Yen was applied as depreciation so as to save the corporate tax for the companies. Afterwards, the level of supports decreased along with the maturation of the indigenous firms (Shi, 2005).

Meanwhile, a few protectionism trade policies were also implemented in order to isolate the domestic market from the foreign competition after defining the automotive industry as a national capital to protect. The concrete measures include the forbiddance of FDI, import tariff, import quota, as well as some non-tariff/quota barriers. Before the mid-1960s, the import tariff was over 40%, first value-based, later unit-based.

The government interventions through industrial policies led to the competition between the indigenous big companies, industrial scale economy, and the wide range of improvements in management and technologies for catch-up, and etc. The growth of competitiveness of Japanese automotive industry, and the dynamically adjusted industrial policies demonstrated a perfect and successful practice of the infant industry theory.

The speed of the Japanese firms to improve their production efficiency and to lower costs was very high. When the domestic firms reached a certain level of competitiveness by the end of the 1960s, the protectionism policies started to loose. Afterwards the restriction on FDI was lifted in 1973. With this trend, the internal preferential loans and subsidies were also given up by the government. The domestic market was no longer protected. Figure 4.2 below shows the relationship between the import tariff and the industry’s international competitiveness. The indicator of international competitiveness is the export rate (export/total production).

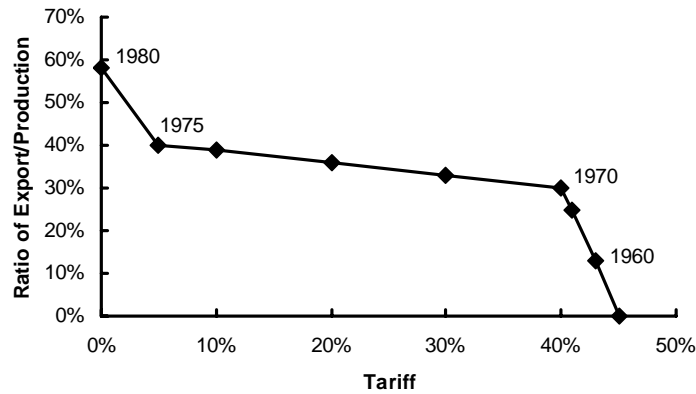


Figure 4.2: Import Tariff Adjusted with Exportation Rate in Japan
Source: Shi (2005)

The Japanese automotive industry took off from 1955, and was widely regarded as becoming mature in the mid-1980s. From 1955 to 1985, the automotive production jumped 160 times in Japan. The continuous rise of vehicle production, sales and exports from 1955 to 1985 is shown in Figure 4.3. Then, declines took place from the late 1980s.

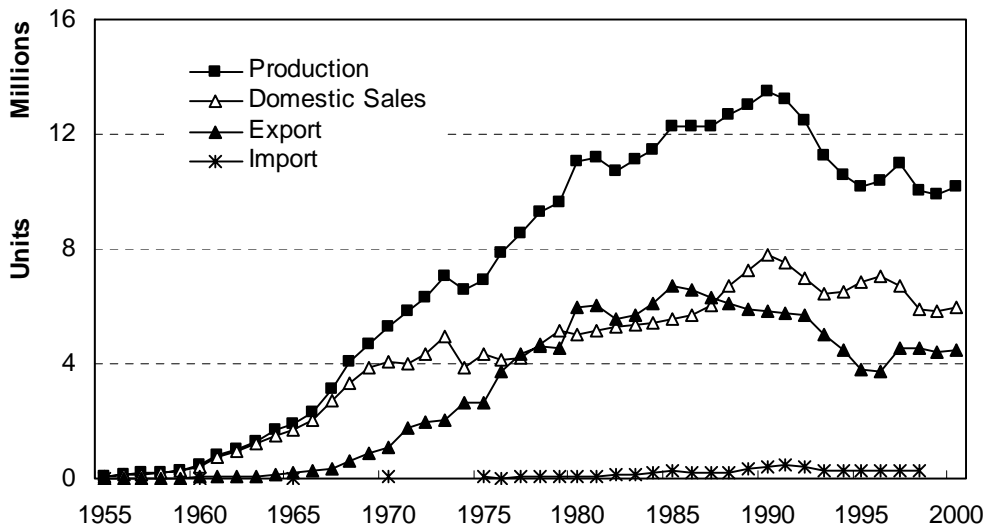


Figure 4.3: Vehicle Production, Domestic Sales, Exports and Imports in Japan (1955-2000)
Source: Japan Automobile Manufacturers Association (JAMA)

The import into the Japanese domestic vehicle market has remained negligible from the beginning, as shown in Figure 4.3. Although the vehicle tariff has been reduced to zero, it is still difficult for the U.S. automakers to improve their access to the Japan market. And the actual reasons include not only the improved competitiveness of Japan-

made cars over the cars made by the U.S. and European automakers, but also some strict non-tariff barriers⁴⁴.

The success of Japan's industrial policies was obvious. In 1955, the vehicle production was only 69,000 units, 0.28% of which were exported, and the output value contributed only 2.9% for the manufacturing industries. Japan became a major leader of the global automotive industry after 30 years of rapid catch-up. In 1985, Japan produced 12.27 million automobiles, 54.8% of which were exported. The export amount ranked No.1 in the world. Meanwhile, the imports were only about 50 thousand units though import tariff has been lifted. In 1985, the automotive industrial output value accounted for 11.8% of the total output value of manufacturing industries. 7.65 million People worked in the automobile or automobile-associated industries, and accounted for 7% of the total employment among the manufacturing industries. The progress from 1955 to 1985 is given in Table 4.1. The automotive industry played a particularly important role to drive the recovery of the economy in Japan after the World War II.

Table 4.1: The Japanese Automotive Industry Leap from 1955 to 1985

Year	1955	1985
Employment	1,270	7.65 million
Production	69 thousand	12.27 million
Export Rate (Export/Production)	1.8%	54.8%
Import Rate (Import/Production)	10.5%	1.0%
Prod. Value Contribution Ratio in Manufacturing Industries	2.91%	11.8%
Export Contribution Ratio in Manufacturing Industries	0.28%	26%

⁴⁴ A broad range of non-tariff barriers are in place to keep Japan as a closed market with 0% tariff. For example, unique safety and emission standards are imposed on imported cars, and require imported cars to do expensive modifications. And the certification of imported vehicles is costly & difficult. A few vehicle sale-related taxes, including consumption tax, annual engine-displacement based tax and acquisition tax based on vehicle size and use, impact more on imported motor vehicles than domestic vehicles. The discriminatory standards and taxes unfairly increased the final sale prices of imported cars. Moreover, restricted distribution arrangements also prevail in Japan between Japanese automakers and domestic dealers, and prevent dealers establishing contractual relationships with foreign automakers. In addition, the Japanese government's sophisticated currency manipulation (weak Yen policy) also gave exporters huge subsidies while discouraging imports into Japan's domestic market. There are also many other non-tariff barriers that increase the costs of selling imported cars in Japan. See Statement of The Automotive Trade Policy Council, Committee on Ways and Means, U.S. House of Representatives, 2005 (<http://waysandmeans.house.gov/hearings.asp?formmode=view&id=3798>) and Statement of Mustafa Mohatarem, Ph.D., Chief Economist, General Motors, Testimony Before the House Committee on Ways and Means, September 28, 2005 (<http://waysandmeans.house.gov/hearings.asp?formmode=view&id=3798>)

Employment Contribution Ratio in Manufacturing Industries	2.56%	7%
Investment Contribution Ratio in Manufacturing Industries	2.85%	20%

Source: Foreign Trade Status 1967, Ministry of Finance of Japan; Industry Statistics Table 1997, Ministry of Economy, Trade and Industry of Japan.

4.3 Comparison of Automotive Industries in Brazil, Japan and China

A comparative study is conducted with various factors concerned in the aspects of economic and political environment, industrial policy and its intention, impact and development trajectory in the three representative countries - Brazil, Japan and China. Together with the data, information and findings analyzed in the foregoing chapters about China, the comparison and findings are summarized in Table 4.2.

Table 4.2: Summarization of the Cross-country Policy Comparison

	Brazil	Japan	China
Economic and Political Environment			
Take-off Periods	1956~1980	1955~1985	1985~2005
Foundation of Industrialization Experience	Poor	Good	Limited experience in the truck sector with the help from the Soviet Union in the 1950s.
Market Environment	Steady domestic market development	Domestic market explosion and military vehicle demand from the Korean War	Domestic market explosion since "Econ Reform and Open"
Major Market Players	FDI, with few indigenous firms	Indigenous Private Firms	Int'l JVs in passenger car industry and SOEs
Role of Government	Centralized order	Centralized management and coordination	Decentralized management in form of orders, Regionalism, Departmentalism
Policies			
Basic Intentions	Industrialization, import substitution and creating employment	To develop the industry with self-reliant capability	To develop the industry with self-reliant capability
Basic Strategies	Protection + FDI	Protection + In-house competition + Learning by Doing	Protection + Forced Spillover from FDI ("Bargaining Market for Technology")
FDI	Favored	Forbidden	Favored

Protected Objects	<i>FDI</i>	<i>Indigenous Private Firms</i>	<i>Joint Ventures b/w SOEs and FDI; Indigenous private firms were ruled out</i>
Policy Support for Indigenous Capability Development	<i>Unseen</i>	<i>Subsidy, tax reduction and low rate loan</i>	<i>Joint ventures must have technical centers</i>
Import Tariff:	<i>High</i>	<i>High</i>	<i>High</i>
Policy Impacts			
Competition	<i>Oligopoly of FDI</i>	<i>Strong competition b/w indigenous private firms</i>	<i>Oligopoly of IJVs and SOEs</i>
Learning Effects	<i>Weak</i>	<i>Successful Learning by Doing</i>	<i>Weak</i>
Indigenous Technological Capabilities	<i>Underdeveloped</i>	<i>World Level</i>	<i>Underdeveloped</i>
Indigenous Brands	<i>Weak</i>	<i>World Level</i>	<i>Weak</i>
Market Share of the Indigenous Brands	<i><5% in 2003</i>	<i>>95% in 2004</i>	<i><30% of passenger car market and gather at low end in 2005</i>
Industrial Size (Production)	<i>1.17 million units in 1980</i>	<i>12.27 millions units in 1985</i>	<i>5.71 million units in 2005</i>
Industrial Importance	<i>12% of the overall industrial output in 1980</i>	<i>11.8% of manufacturing industries in 1985</i>	<i>3% of the overall industrial output in 2005</i>
Export	<i>25% in 1994</i>	<i>54.8% in 1985</i>	<i>3% in 2005</i>
Overall Evaluation	<i>Succeed in goal – Policy purposes have been achieved although indigenous capability was underdeveloped</i>	<i>Succeed in goal - Protection stimulated take-off, then the indigenous firms grew from tiny to be globally-competent</i>	<i>Fail in goal - Indigenous firms became cash-rich but still weak in core competitiveness (technology and brand)</i>

Source: Summarized and compiled from various sources

The three countries had different industrial foundations when they started to use the industrial policies to drive the automotive industry to take off. When the Cultural Revolution in China was ended in the late 1970s, the very little experience of the Chinese automotive enterprises was mostly concentrated in the truck manufacturing sector when the industrial policies were first enacted. Both China and Brazil had little industrialization experience while the industrialization experience of Japan accumulated prior to World

War II still existed even though the facilities were almost destroyed in the War. That is partly the reason why Japan had the confidence to solely develop the domestic industry on its own, while China and Brazil pinned the hope on FDI and its associated spillover effects.

Market demand is an important prerequisite for developing scale economy. In these three countries, the market booms during their industrial take-off periods supported the automotive enterprises to develop. From 1955 to 1980, the registered vehicles in Brazil increased 42 times from 337,385 to 37,873,898 vehicles, the same 42 times from 900,797 to 37,873,898 in Japan. Especially, the market size boomed 180 times in Japan from 1950 to 1970 (Shi, 2005). All the domestic Japanese companies continued to invest and expand production capacities during that time in order to capture the market shares. Similar market size expansion exists in China due to the overall economic growth. If the domestic market size is small, different strategy should be made like what was in South Korea.

All the three countries selected automotive industry as a break-in point to foster, and expected its strong association and spillover potential could help pull the overall economic growth. However, although the ambition to develop was the same and the trade policies were similarly implemented, the policy intentions and strategies varied across the countries. The governments in Japan and China addressed their intentions to develop indigenous technological capabilities, while the Brazilian regulators only expected the automobiles could be manufactured, and employment opportunities and tax incomes could be generated domestically. The later strategy of FDI promotion and import substitution exactly followed the policy intention of the Brazilian government in the 1950s. For Japan, with good industrialization foundation, they insisted in an in-house self-reliant capability development strategy. The joint venture regulation on FDI in China integrated the need for help from outside at that poor foundation and the ambition to obtain indigenous know-know directly and quickly.

Therefore, FDI was banned in Japan, but favored in Brazil and China. Regarding who were protected and supported, they are very different in the three countries. In Brazil, foreign-invested companies were the main body of the automotive industry. In Japan, it is

the indigenous private firm. However in China, again it is a little more complicated as the major players protected and favored by the government were the joint ventures between the foreign companies and local SOEs. The government promoted the international joint ventures, but banned domestic private investments and independent FDI. Obviously, what the government truly intended to protect and foster were the SOEs. The support that FDI obtained was indirectly through their local joint venture partners. And the private firms had no chance to produce cars in China until 1997.

Because of the simple policy intention to bring FDI into the domestic market to make cars at home, the Brazilian government invested no serious effort to promote indigenous technological capability development. Even though the ethanol or dual-fuel cars are successfully promoted in Brazil, the technology providers are still the major international automakers. In China, due to the preference of the government, the support and promotions for R&D activities were only given to the joint ventures. In Japan, the situation was clear that the indigenous private firms were supported to pursue original R&D.

After the first 20~30 years of protection and fostering, the automotive industries in the three countries experienced different trajectories. The Brazilian industrial policies achieved its goal. The automotive industry has accounted about 12% of total industrial output value of the nation, and generated millions of employment opportunities by the 1980s. Although the export still cannot compete with those of Japan and South Korea, at least the import has been successfully substituted by domestic productions. The automotive industry development drove the Brazilian overall economy. Although the indigenous technological capability has not been established, and the Brazil-made cars are still almost foreign brands, these facts were actually not pursued in the initial policy purposes. In this study, because they reached the initial goals, the Brazilian automotive industrial policies were justified as successful although they did not follow the track which the infant industry theory designs.

The development of Japan's automotive industry was a perfect application of the infant industry theory that has been widely written in textbooks. The Japanese government did all the theory says, and achieved all the theory expects. With the

protection that was later lifted when becoming unnecessary, the Japanese indigenous firms, such as Toyota, Honda and Nissan, have grown from tiny to be globally-competent. Especially, many unique innovations in production management techniques and product technologies were created in their “learning by doing” process to pursue independent capabilities. These capabilities belong to themselves, and can sustain their future growth. This is truly a growth process from infant to mature.

The China case in this study was complicated in terms of both the economic and political environments and the policies. The hybrid policy of joint venture regulation is a presentation of their hybrid strategic purpose. The government wanted a short cut to achieve independent capabilities through the spillover and learning effects in the joint ventures. In the first 20 years of implementations, the industrial policies in China have not achieved the initial goal – to foster the indigenous firms to be able to play with the major international automakers on the same stage. The protected indigenous SOEs have become cash-rich, but still weak in core competitiveness, in particular technology and brand, and still have to rely on technology indraughts from outside.

As we have analyzed in Section 3.4.2, “learning by doing” is crucial for fully accomplishing the independent capabilities of the learners. By looking at the trajectories of the Japanese and Brazilian automotive industries, we can clearly see that the “learning-by-doing” pursuit made the difference in the formations of these two industries, though their trade protectionism polices were generally similar. In terms of China, the government tried to use a comprehensive set of policies to pursue independent capabilities, but the indigenous firms did not pursue “learning by doing” well.

Let us use an analog to summarize the growth stories of the automotive industries in the three countries. The simple logic is that, an infant bird who sits on the back of other flying birds is not truly flying, and if it never practices flying by itself, it will never be able to fly. The Japanese automotive firms (which were infant birds) successfully learned how to fly with the protection of their “bird mother” (the government), so they can now fly. The Brazilian mother bird (the government) regarded the birds that fly to its nest (international automakers) as its own babies. For the Chinese, the mother bird (government) shares the nest and food with a bigger bird (international automakers), and

wants it to teach its favored infant baby bird (SOEs) how to fly. However, the bigger bird pretends to teach, but does not want the baby bird to fully learn flying because the bigger bird wants to stay in the nests and keep enjoying the food. On the other hand, the baby bird (SOEs) was lazy to learn how to fly due to the dotage of its mother (government), also because it can always go out into the air by sitting on the back of the bigger bird. Nonetheless, an infant bird will never be able to fly without practicing independently.

Back to the actual world, as a matter of fact, the difference of the prevalence of “learning by doing” between Japan and China was further due to the difference of the targets protected by the industrial policies. The Japanese policies supported the entrepreneurial private companies, while the Chinese policies supports were focused on the inefficient SOEs tied with the governments. Private firms are market-driven, and operate according to the market theories, while SOEs are driven by the government. The system of SOEs and industrial policies is not robust because it lacks the ability to self adjust, as opposed to the positive interactions between the governmental policies and the private firms that could complement each other.

In the Chinese automotive industry, the major market players - the SOEs, are actually part of the government system, and the government is the manager or controller for them. In Japan, the government cannot control the major players - the private firms, instead, the government played a role of coordinator or assistant in the industry where the private firms determine their own strategies. This judgment could be demonstrated by the story about the “grouplization” plan of the Japanese government in 1961 (Zhang, Liu and Lu, 2004).

In 1961, the Ministry of International Trade and Industry (MITI) of the Japanese government planed to group the domestic companies into three categories: two mass production enterprises, three luxury passenger car enterprises, and one light weight vehicle enterprise, for the purpose to create a scale economy⁴⁵. But this tentative plan was given up because of the strong oppositions from the private companies. At that time, finally the Japanese government neither forced the firms to merger, nor limited private

⁴⁵ The later policy of “Three Big, Three Small and Mini Two” in China was similar with this tentative grouplization policy in Japan.

investors to enter the automotive industry. This story indicated the pilot role of government, but the corporate strategy was always decided by the firm itself. Afterwards, in the Japanese automotive industry, several big business groups were formed naturally by market forces instead of the government administration. The system of coordination and cooperation between the government and private sectors successfully balanced and bridged the need from the private sector and the supply from the government in Japan. Rather than an order or control, the industrial policy worked as a tool of the government to complement the weakness or inefficiency of the market force, especially in the aspect of fostering industrial leap frog.

Without the market force to drive, the SOEs in China had little motivation to learn by doing, so they are still incapable of doing independent product development, and have to continually rely on the international automakers under the governments' joint venture regulation.

4.4 Chapter Summary

This chapter compared the industrial policies for development purpose, the environments of use, as well as the final policy impacts in the automotive industry across three representative countries -- Brazil, Japan and China.

Through the comparison, it is found that, the difference of attitudes toward “learning by doing”, which is crucial for independent capability development, led to the distinct development trajectories of the automotive industries in the three countries, although similar protections were used to foster the industry take-off. Based on the comparative analysis, the institutional difference of the market players is justified as the substantial reason for the success and failures of the industrial policies of the three countries. The major market players are international automakers in Brazil, private firms in Japan, and SOEs and their joint ventures with the international automakers in China. This conclusion has reinforced the findings in foregoing chapters.

Chapter 5 will conclude this thesis, propose policy recommendations and provide ideas and directions for future work.

Chapter 5 Conclusions, Policy Recommendations and Future Work

5.1 Conclusions

A systematic analysis on China's evolving automotive industry was conducted to understand the dynamics between governmental policies and industry developments as well as the influence of economic and political environments.

The overall industrial characteristics were analyzed in chapter 2 and summarized as below:

- The motor vehicle market grew rapidly in the past two decades, and the trend has shown the huge potential of sustainability;
- The Chinese automotive industry is fragmented, and diseconomy of scale exists;
- Political power determines the allocation of capital and resources to SOEs;
- Historical lack of technological capabilities remains, and the reliance of SOEs on foreign partners' product indraught continues;
- Foreign brands dominate the passenger car market;
- Private-owned firms started to emerge after the liberation of regulations.

Through 20 years of protection and fostering, the government policies failed to establish a mature indigenous industry that has a competitiveness at the international level. The industrial policies were designed in accordance with the ideas of infant industry theory, but the practice was unsuccessful in the case of China's automotive industry.

The industrial policies in China had strong interactions with the economic and political environments of the automotive industry in transition. Therefore, a systematic causal analysis was conducted to explore the essential reasons for the distorted policy impacts on the industrial evolution. The major findings include:

- Before 1997, all the indigenous automotive manufacturers were owned by various governmental agencies and different levels of local governments. Over time, the regionalism of local governments and the departmentalism of agencies of the central government led to the fragmentation and diseconomy in China's automotive industry.
- The infant industry theory is based on a dynamic view. Static protection induces negative effects and dead weight loss for the industry and the nation, but the protection may also generate the chance for immature firms to survive, and to stimulate domestic capability development and efficiency improvements. The purpose of the theory is to develop the infant industry, and the internal improvement of indigenous capabilities is the key to achieve this purpose.
- In the Chinese automotive industry, the oligopoly of the international joint ventures generated by the protection weakened the motivation of the SOEs to learn through the technology spillover process, and to learn by “doing” independently. Since the necessary learning effects for capability development were limited, the policies failed to complete a successful catch-up of the infant industry.
- The deeper reason for the oligopoly and the passiveness of SOEs was found as an institutional failure - “regulatory capture” - what the government regulators protected are the enterprises of their own. The governmental ownership in the market players is the fundamental reason for the failure of industrial policies for a development pursuit.
- The liberation of protectionism regulations since the late 1990s had positive effects on the market maturation and sustainable growth. However, due to the unchanged institutional features, in particular the strong governmental ownership within the industry players, an efficient catch-up trend is still unseen in a near future.

The cross-country comparative study in Chapter 4 supports these findings above. The successful “learning by doing” served as the major driver for Japan's automotive industry to develop its indigenous capabilities, and to rapidly catch up in the 20 years since the

mid-1950s. And the healthy competition in the domestic market encouraged the innovative capability development in terms of production techniques and product development. The institutional difference makes the difference of policy impacts between Japan and China. The Japanese government protected efficient private-owned firms that have modulating actions in response to the industrial policies and market environment changes, while the government in China protected inefficient enterprises that represent the government's own interest. Unlike the decentralized management over the automotive industry across ministries and regional governments in China, MITI in Japan had strong power to oversee the industry, and played a successful coordinating role in stead of a controller's role.

5.2 Policy Recommendations

Given the failures of the industrial policies, the institutional deficit of the government structures with the industry, and the economic and political environment, several measures are proposed based on the analysis and findings.

- The ownership structure of the current SOEs should be reformed. The government needs to reduce its holdings in SOEs by ways of privatizing or listing publicly, for the purpose of loosening the ties between government and companies in the industry. This may increase the modulation actions of the companies towards the industrial policies, and reduce the chance for the regionalism and departmentalism of government agencies to play negative effects.
- A powerful government unit that could oversee the current agencies owning automotive enterprises, similar with MITI⁴⁶ in Japan, should be constructed to coordinate the conflicts between policies and the industrial characteristics, and the conflicts between the government and the industry players. It may also be useful to promote the mergers and acquisitions between the inefficient companies that belong to different governmental administrations in the current fragmented

⁴⁶ MITI - Ministry of International Trade and Industry was the single most powerful agency in the Japanese government. At the height of its influence, it ran Japan as a centrally-managed economy, funding research and directing investment. In 2001, its role was taken over by the newly created METI - Ministry of Economy, Trade, and Industry. Wikipedia, June 2006.

automotive industry in China.

- The governmental policies should be adjusted to be fair to both the SOEs and the private-owned but efficient firms, if the SOEs continue to remain in the industry. The government should leave the market to determine which enterprises are more promising and deserve growth. Especially, private firms are market-driven and able to mitigate the possible negative effects of the industrial policies. Conversely, SOE is just part of the government system, and has no power or mechanism to correct the possible mistakes of the government.
- The government should encourage and support the self-reliant research and development activities (learning by doing), as well as innovations in production techniques and product technologies with concrete benefits, such as tax reduction, subsidy or preferential loan. Independent capability development is crucial for the catch-up of indigenous industry and the future independent development without the product indraught from joint venture partners.

Finally, we would emphasize that, these recommendations are theoretical and subject to many practical conditions in actual use, and the impact would take some time to happen in such a complex and large scale industry.

Generally speaking, appropriate degree of governmental protection and fostering is necessary for China's immature indigenous automotive industry. However, it should not be forgotten that the purpose to protect is to nurture the capability development. Without this to be achieved, sole protection would generate harmful effects on the industry and especially the consumers. It is also important to notice, even though industrial policy is important, it should not act like a military order that replaces the market power. Instead, its role should be a measure to complement the deficit of pure market mechanism in optimizing resource allocation and nurturing immature firms, as well as a bridge between the government and the industry. Especially, for an automotive industry with a production and demand volume about 6 million and a growth rate of 15% per year, the government should play a role of an architect to establish a fair and harmonious competitive environment, an arbiter on conflicts and problems, rather than a regulator or controller.

5.3 Future Work

The research approaches and findings still could be improved in the future, especially in the following aspects:

- In the current study, a large amount of data has been widely used to illustrate the corporate and industrial characteristics, but the causal analysis is still basically qualitative, and based on existing facts and judgments from outside sources or personal knowledge accumulation. The conclusions and findings may be more solid if quantitative system dynamics analysis could be conducted in the future.
- Due to limited time and resources, data and information used in this study were mainly from readings and yearbooks. If wider and deeper interviews, surveys and data collections could be done in the future and deepened to corporate level, the understanding on company performances and strategies could be furthered.
- A cross-industry comparison could be helpful as well. Some other industries, such as China's television industry, have successfully caught up with the international level, and formed strong competitiveness. To analyze the industrial policies used in these industries and their impacts could be beneficial for improving the industrial policies in the automotive sector.
- China's automotive industry has entered a new stage very different from two decades ago. Both the industry and the policies are changing rapidly. To follow up those changes and related impacts may help understand the actions of infant industry theory in new economic and political environments.

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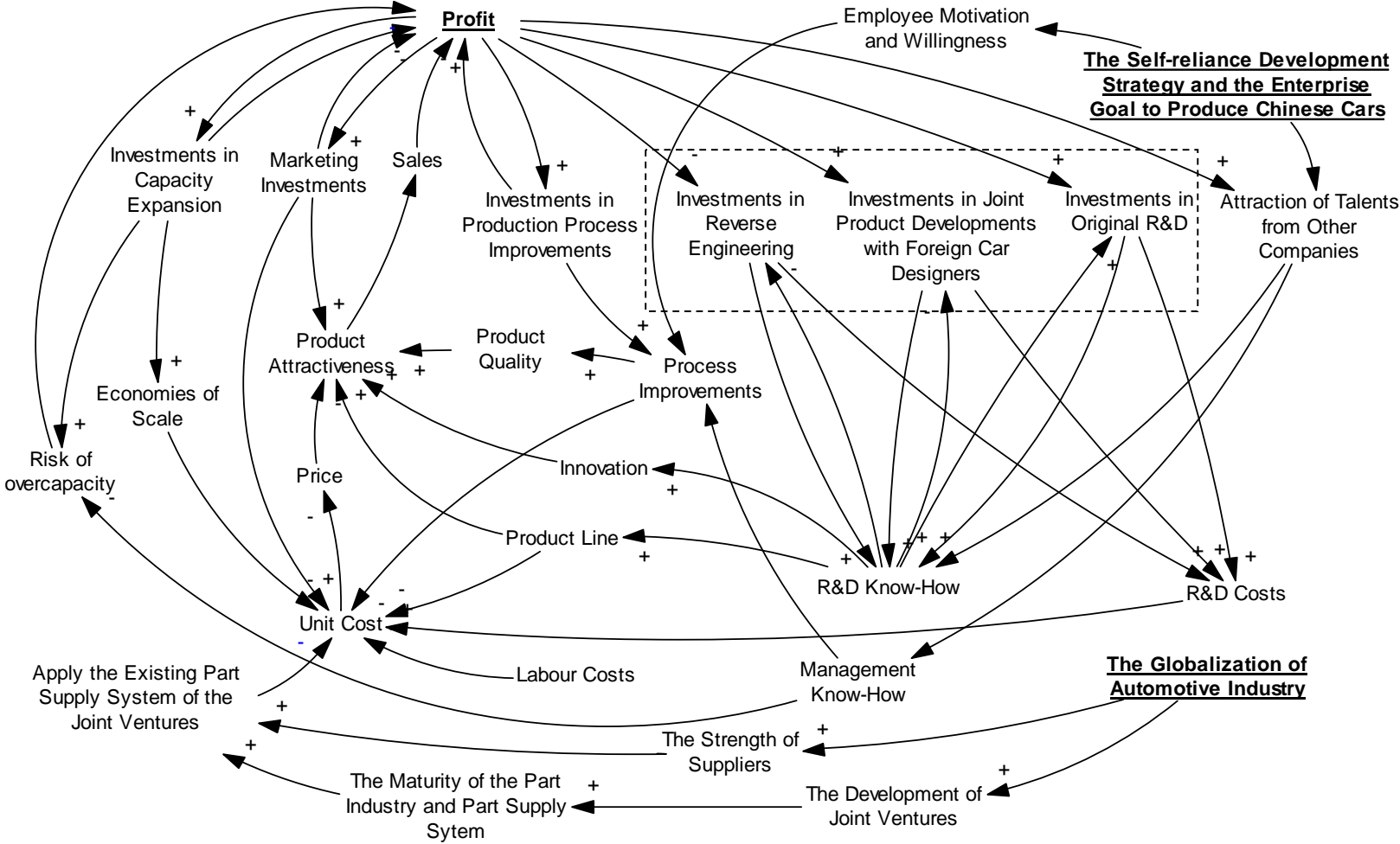
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Appendix A: Networks of Development Strategies of Young Tigers



Source: Luo, 2005a

Appendix B: Summary of the Chinese Automotive Industry Policy 1994

1	Policy Objectives	To open up domestic and foreign markets; promotion of large scale production; concentration of the industry, eliminating small scale, dispersed operations
2	Product Approval	Automotive enterprises must submit future product plans for approval; products which are not approved cannot be sold, imported or used
3	Enterprise Organization	Formation of automotive industry groups to attain critical mass; state support for enterprises which exceed certain production volumes and R&D effort
4	Technology Policy	Encouragement of independent product development
5	Investment Policy	Encouragement of automotive enterprises to raise development funds from various sources; trans-regional and trans-departmental investment to support increased industry concentration
6	Foreign Investment Policy	Encouragement of joint ventures with foreign partners who meet certain conditions (e.g. technology must be 1990s standards; R&D facilities must be established; foreign partner must have independent product patents and trademarks, and have a good-capital raising ability)
7	Import Management Policy	Restriction of imports; entry points limited to four seaports; prohibition of imports of used vehicles
8	Export Management Policy	Expansion of exports as production rises; priority loans for enterprises whose exports exceed 3-8% of annual sales volume for passenger cars
9	Localization Policy	Prohibition of knock-down kits; preferential tax rates for enterprises with high localisation rates
10	Consumption and Pricing Policy	Encouragement of individual ownership of automobiles; prices of civilian vehicles (except saloons) to be decided by enterprises according to market demand. Prices of saloons to follow the state guide price.
11	Policies on Related Industries and Social Insurance	Co-ordination and development of supporting industries (metals, materials, capital equipment, electronics, rubber, plastics and glass). Infrastructure development
12	Industry Policy Planning and Project Management	Localities and departments to support the Industry Policy; no new complete car facilities to be approved during 1994-95

Source: The State Planning Committee of China (1994). "Automotive Industry Policy".

Appendix C: Summary of the Chinese Automotive Industry Policy 2004

1	Policy Objectives	<p>Insisting on the principle of combing market theory and government macro planning;</p> <p>Promotion of the harmonious development of the automotive and associated industries;</p> <p>Driving industrial structural adjustment;</p> <p>Enhancing economy of scale and concentration of the industry;</p> <p>Encouragement of self-reliant product development and local brand development, aiming to build up a few famous brands and world-level (top 500) automotive groups before 2010;</p> <p>To become one of the major global automotive production countries and to export in big volume;</p> <p>Fostering the development of local suppliers, and encouraging the participation of global competition.</p>
2	Development Planning Management	<p>The National Development and Reform Commission (NDRC) makes the mid/long term strategic plan for the industry in accordance with this policy;</p> <p>The big automotive enterprises (with > 15% market share) should make the strategic plans of their own in according with the strategic plan of NDRC with the authorization of NDRC.</p>
3	Technology Policy	<p>Insisting on the principle of combing technology transfer and self-reliant product development;</p> <p>Encouragement of light duty and fuel-efficient cars;</p> <p>Promotion of the R&D and commercialization of battery-powered electrical vehicles, hybrids and fuel cell vehicles;</p> <p>Promotion of the use of alternative fuels including methanol, ethanol, natural gas and etc.</p>
4	Industrial Structure Adjustment	<p>Encouragement of formation of big automotive groups (with > 15% market share) or alliance;</p> <p>Encouragement of global cooperation and operation of local automotive enterprise;</p> <p>Encouragement of international acquisition or merger;</p> <p>Separation of the part division from assemblers;</p> <p>Setting up regulations for withdrawing.</p>
5	Entry Management	<p>To constitute 'Bylaw of Motor Vehicle Management';</p> <p>To constitute compelling automotive product standard criteria for safety, emission, fuel efficiency and etc.;</p> <p>To uniform the management systems for the entries of automotive enterprises and products.</p>
6	Brand Strategy	<p>To encourage self-property products, emphasize intellectual property protection, and improve local brand reputation;</p> <p>Encouragement of strategic planning on local brand development and protection;</p> <p>All the automotive parts and assemblies produced in China should be labeled with brands and production locations.</p>

7	Product Development	Encouragement and support of establishments of R&D centres in automotive enterprises for improving independent product innovation capabilities; Encourage the involvement of assemblers and suppliers in national R&D projects.
8	Part Industry	Encouraging suppliers into the product development activities within assemblers; To form advanced R&D and manufacturing capability and enter the international market; To encourage various sources of funds entering the part industry.
9	Distribution and Sales Network Development	Encouragement of learning mature international automotive sales modes; Encouragement of the establishment of local brand product sales and service systems; Passenger car sales and service should be licensed from manufactures and distributed by brands from 2005, all autos from 2006.
10	Investment	Chinese share holding in whole car assembly enterprises must be no less than 50%, but not applying to exportation-targeted projects; Investment on establishing new automotive assembly enterprise must be no less than 2 billion Yuan.
11	Import Management	Support on localization of foreign products; Restriction of imports; Entry points limited to four seaports and two land ports; Prohibition of bonded service for imported automobiles in bonded areas of the import ports from 2005; Prohibition of imports of used vehicles.
12	Automotive Consumption and Use	Encouragement of automobile credit consumption; Improving the automobile insurance policies Encouragement of well regulated used car circulation and transactions; Encouragement of private car consumption; Prohibition of extra administration fee and government foundation raising; Encouragement of light duty, low emission and efficient cars. Prohibition of the discriminative policies on non-local produced automobile products; Encouragement of private investments on parking plots and other infrastructures. To constitute national uniform automotive emission standards. To constitute national uniform motor vehicle registration, inspection and management system.

Source: China National Development and Reform Commission (2004). "New Automotive Industry Policy".