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**The Role of International Technology Transfer in the Chinese
Automotive Industry**

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The Role of International Technology Transfer in the Chinese Automotive Industry

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Abstract

The so called Independent Chinese Automobile Manufacturers (ICAMs), such as CHERY, Geely and BYD, emerged at the end of 1990's as new entrants to Chinese passenger vehicle market and have achieved remarkable growth. The phenomenon of these autonomous Chinese Automakers is drawing increasing attention not only from academia but also from business and government circles.

This paper attempts to clarify the relationship between emergence of ICAMs and International Technology Transfer. Many scholars indicate the use of outside supplies (of engines and other key-parts), as a sole reason for high-speed growth of ICAMs. However, the internal approach, at a level of how companies act, is also necessary to outline all the reasons and factors that might contribute to the process. This paper, based on organizational view, starts from historical perspective and clarifies the internal dynamics of the ICAMs.

The key phenomenon to be considered in the context of internal effects is a long term undersupply in China's automobile market since 1949. It is important for two reasons: 1) insufficient amount of investment from the Government and 2) weak technological capabilities. This paper will focus mostly on the latter one giving an answer to the question "what role has international technology transfer played in the emergence of ICAMs (e.g. CHERY, Geely)?"

This paper provides a brief analysis of the history of Chinese automobile industry within three main phases: Closed Autonomous Development Period (1949-1984), Transition Period (1985-2000) and Global Economic Period (2001-). Then, the focus is made on the transition period and a phenomenon which could be called as " capability lock out" for autonomous development based on independent design as well as innovations in R&D (research & development), which can be attributed to Chinese automobile makers engaged in joint ventures. However, in conclusion it becomes clear that as a result of direct or indirect spillover from joint ventures, ICAMs began to construct the core competitive abilities they needed autonomously.

Keywords

MNE, Technology transfer, Automobile industry, China

I . Introduction

The purpose of this study is to investigate the chaotic but progressive emergence of *Independent Chinese Automobile Manufacturers* (ICAMs) as well as to provide an academic view on the relations between the emergence of ICAMs and international technology transfer from the point of view of both the firms involved in joint ventures (JV) with major foreign automobile manufacturers (i.e. VW etc.) and Chinese domestic automobile manufacturers (i.e. FAW etc.).

Many economists have documented the relations between international technology transfer and development of Chinese automotive industry. For example, Guo and Zhang (2008) have found out that the technological transfer from the multinational companies has not brought substantive improvement to Chinese passenger vehicle industry, but only caused a tendency toward even more dependency on the foreign technological transformation. Focusing on the change of multinational corporations' investment behavior during different periods of time, Lei and Xu (2006) have concluded that multinational corporations' investment behavior have changed from monopoly to competition which helped to improve the international competitiveness of China's automobile industry. A similar conclusion can also be found in Jia (2004).

However, most studies have focused on the transferring side (multinationals) but not on the recipient side (Chinese companies). Furthermore, the findings of above mentioned studies show that a natural expectation of international technology transfer existed in China, which is similar to the belief that the competitiveness of China's automobile industry has been upgraded through advanced technology transfer and investment behavior transformation. However, as far as industrialization can not be spontaneous and caused just by outside ripple effect, this paper will consider more closely the inner nature of "Chinese learning mechanism", in addition to the role international technology transfer has played in the growth of independent Chinese automobile manufacturers. They are regarded as new forces of Chinese branding.

Furthermore, to clarify the research questions mentioned above this paper will attempt to answer the following research questions: (1) How did ICAMs enter the passenger vehicle market and why? Why does their emergence look like chaotic but progressive for Chinese automobile industry? (2) What role has international technology transfer played before and during the ICAMs' emergence process? What effects did international technology transfer have on ICAMs' competitiveness building, if any? (3) Which barriers have been the most important for international technology transfer from automotive Sino-foreign joint ventures to ICAMs? These questions are followed by another one, whether these indispensable key factors necessary for ICAMs to grow into world-class automakers are available in current situation.

To answer the above mentioned research questions, this paper was divided into the following

three parts. First of all, we distinguish between independent and non-independent Chinese automakers. Here we deal with the background and origins of ICAMs, and outline the key factors that affected their emergence especially in the passenger vehicle market. Though new entries were forbidden by the industrial policy even few years after promulgation of *Auto Industry Policy (1994)*, some Chinese indigenous enterprises entered the passenger vehicle market successfully. For example, CHERY and Geely can be regarded as such a kind of new players. At same time, we deal with the question what has changed after ICAMs' emergence. Second, we review the history of international technology transfer into Chinese auto industry by the end of 1990s. Finally, we analyze the dynamic changes of relationship between international technology transfer and the ICAMs' growth.

II. Definition of ICAMs: What does “Independent” mean?

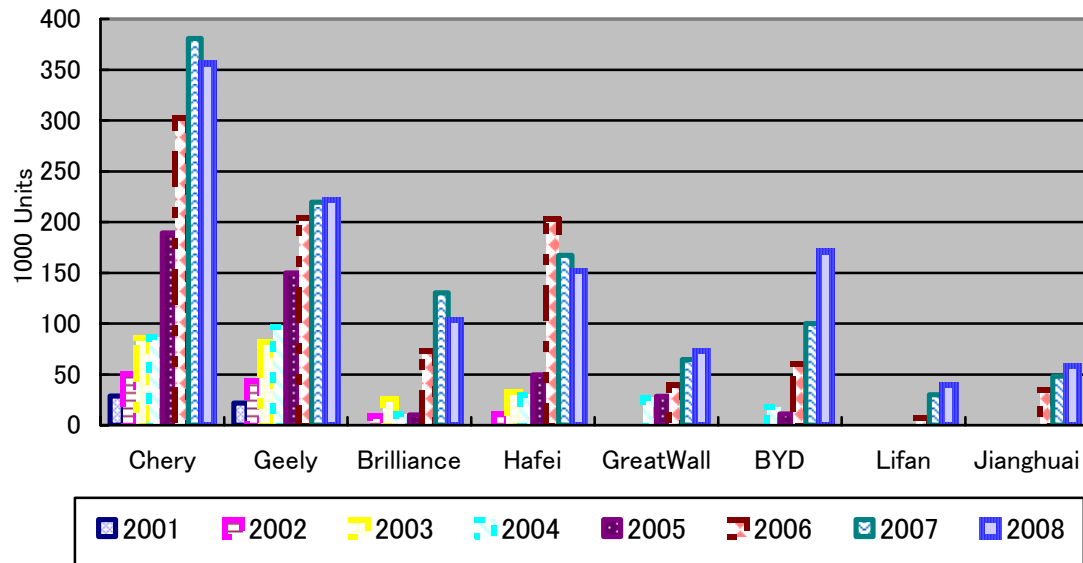
Let us give an overview of an Independent Chinese Automobile Manufacturer (ICAM). If an automaker (1) has developed its own indigenous brand, and (2) all the technologies needed for R&D and manufacturing process were *not* introduced through a form of joint venture with foreign companies, we use the term “ICAMs”. For example, CHERY Automobile, Geely Automobile, Great Wall Motors, Zhongxing Auto etc. can be regarded as representatives of ICAMs.

In contrast with them, *Non-independent* Chinese Automakers simply introduced their foreign joint venture partners' existing models as their own new ones. Such companies as Beijing Motors, Guangzhou Motors etc were provided with brands, passenger vehicle models and all the necessary technologies, and thus were dependant on their foreign partners.

Based on this definition, more than 20 enterprises (or brands) can be recognized as ICAMs. Because of the existing industry protection policy (which also served as a strict new entry restriction for the passenger vehicle market), most of ICAMs had to adjust and unintentionally concentrated on trucks (including pickup trucks) and SUVs (Sport Utility Vehicle) as their main products. Another important problem faced by ICAMs as newcomers was weak design and innovation capabilities, especially in case of advanced engines and system integration. Until now, only eight ICAMs have successfully started passenger vehicle manufacturing¹. They are CHERY, Geely, BYD, Brilliance, Lifan, GreatWall, Hafei and Jianghuai (See FIGURE 1).

¹ In 2001, Chinese government amended *Motor Vehicles and Trailers—Types—Terms and Definitions* from GB 3730.1-1988 to GB 3730.1-2001. Under this amendment the definition of PASSENGER CAR is updated as including basic passenger car (i.e. sedan or saloon), MPV (Multi Purpose Vehicle), SUV (Sport Utility Vehicle) and crossover vehicle. For this reason, some local Chinese SUV or MPV manufacturers, regarded as commercial vehicle manufacturers under former definition, become passenger car manufacturers since the amendment was approved. In this paper, we do not cover these cases, we are concerned only with the companies which are permitted to manufacture basic passenger car (i.e. sedan or saloon). That is why we just focus on these eight passenger vehicle manufacturers.

FIGURE 1 The Sales of Passenger Car by ICAMs



Source: *Automotive Information* 2002 – 2009, China Automotive Technology & Research Center (CATARC)

FIGURE 1 shows that only few ICAMs have reached suitable scale (supposing that a level of 50,000 units per year is the minimum). Moreover, most of ICAMs’ annual sales are still comparable to those of Sino-foreign Joint Venture Companies (See TABLE 1).

In some sense, the word “independent” means “technically isolated” in most cases of ICAMs. In comparison with Sino-foreign joint venture enterprises, most ICAMs from the very beginning had no sufficient resources for designing new models and skills in manufacturing. Therefore, we can say that Sino-foreign joint venture enterprises surpass ICAMs in such aspects as technology, qualified human resources, facilities and capital.

However most of Sino-foreign joint ventures lack one important characteristic - “autonomous brand”- which makes introducing new models almost impossible. Besides, it provides the *Non-independent* Automakers (most of which are state-owned enterprises) with no opportunity to bring up their own inner-competitiveness, because most of them are engaged only in assembling process. For this reason, Chinese media claimed that the state-owned automakers became satisfied with current state of affairs, keeping the assembling of foreign models from imported parts, but not trying to launch their own brands. As a result, most of state-owned automakers supported by central government and protected by the industrial policy from the competition with new entrants, have fully enjoyed being joint ventures and lost the ability to become “independent”. In the other words, they have finally become *non-independent*.

TABLE 1 Sales of Top 10 Passenger Vehicle Manufacturer in Chinese Market, 2001-2008 (in 1000Units)

	2001		2002		2003		2004		2005		2006		2007		2008	
1	Shanghai Volkswagen	241	Shanghai Volkswagen	301	Shanghai Volkswagen	396	Shanghai Volkswagen	354	SAIC-GM	325	SAIC-GM	406	SAIC-GM	495	FAW-Volkswagen	499
2	FAW-Volkswagen	125	FAW-Volkswagen	208	FAW-Volkswagen	298	FAW-Volkswagen	300	Shanghai Volkswagen	250	Shanghai Volkswagen	349	FAW-Volkswagen	461	Shanghai Volkswagen	478
3	Tianjin Automobile	80	SAIC-GM	111	SAIC-GM	201	SAIC-GM	252	FAW-Volkswagen	240	FAW-Volkswagen	345	Shanghai Volkswagen	456	SAIC-GM	445
4	SAIC-GM	58	Tianjin FAW	95	Guangzhou Honda	117	Guangzhou Honda	202	Beijing Hyundai	234	CHERY	302	CHERY	381	FAW TOYATO	366
5	DPCA	53	DPCA	85	Tianjin FAW	114	Beijing Hyundai	144	Guangzhou Honda	230	Beijing Hyundai	290	Guangzhou Honda	295	CHERY	356
6	Guangzhou Honda	51	Chang'an Suzuki	65	DPCA	103	Tianjin FAW	130	Tianjin FAW	190	Guangzhou Honda	260	FAW TOYATO	282	Dongfeng Nissan	351
7	SAIC CHERY	28	Guangzhou Honda	59	Chang'an Suzuki	100	Chang'an Suzuki	110	CHERY	189	FAW TOYATO	219	Dongfeng Nissan	272	Guangzhou Honda	306
8	Geely Automobile	22	SAIC CHERY	50	SAIC CHERY	85	Geely Automobile	97	Dongfeng Nissan	158	Geely Automobile	204	Beijing Hyundai	231	Beijing Hyundai	295
9	—	—	Aeolus Automobile	41	Geely Automobile	76	DPCA	89	Geely Automobile	150	Dongfeng Nissan	203	Geely Automobile	220	Geely Automobile	222
10	—	—	Geely Automobile	40	Aeolus Automobile	65	CHERY	87	DPCA	140	DPCA	201	Chang'an Ford	218	Chang'an Ford	205

Note: 1/ In June 2002, when China FAW Group Corp acquired Tianjin Automotive Xiali Co., the abbreviation of Tianjin Automotive Xiali Co. was changed to Tianjin FAW.

2/ Since SAIC sold its stock back to Chery in 2004, the abbreviation of CHERY changed from SAIC-CHERY to CHERY.

3/ The sales of Geely Automobile is a sum of all its related subsidiaries, including SMA (Shanghai Maple Guorun Automobile).

4/ Sales of crossover vehicles are not counted.

5/ DPCA is the abbreviation of Dongfeng Peugeot Citroen Automobile Co., Ltd.

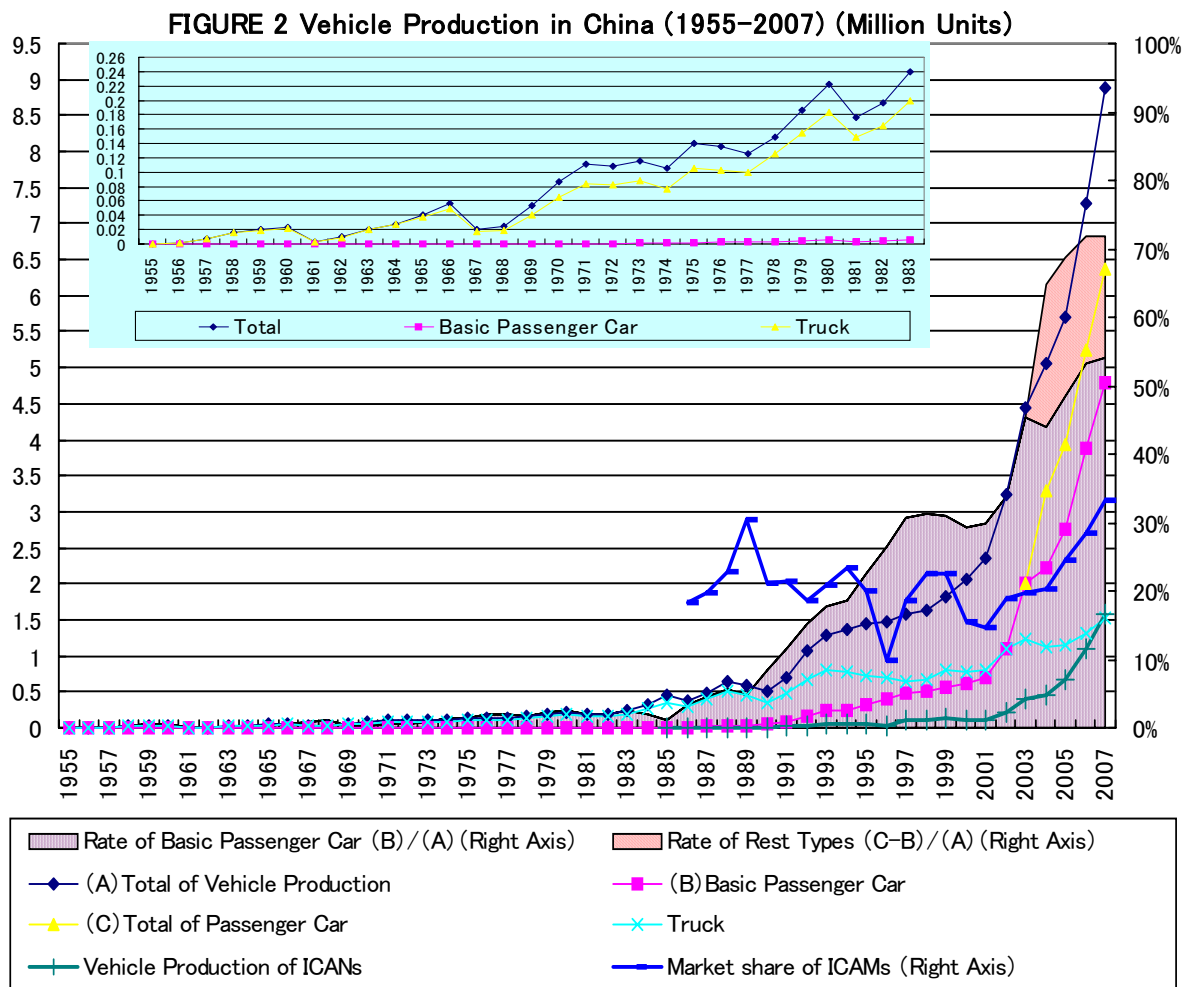
6/ Since the data-sources for 2001 and 2002-2008 are different, there may be inconsistency some inconsistency in the figures for 2001 and after 2001.

Source: 'Annual vehicle Sales and Production of China 2001 (2001 Nian 1-12 Yuefen Qiche Shengchan Xiaoshou Qingkuangbiao)' INTERNAL COMBUSTION ENGINE PARTS, CHINA INTERNAL COMBUSTION ENGINE INDUSTRY ASSOCIATION, Vol1 2002, pp.41-44; Automotive Information 2002 – 2009, China Automotive Technology & Research Center (CATARC).

III. Background of ICAMs' Emergence: What Stimulated New Entry?

This section gives an insight to the history of Chinese automobile industry. Known as one of the key industries of Chinese economy, automobile industry had been strictly controlled by the central government until the Reform and Open Policy were launched in 1979. At that time, every production activity related to automotives (such as R&D, manufacturing, delivery), was based on the annual plan issued by the central government, and no independence or management rights were given to the automakers.

In this context, the growth of Chinese automobile industry was mostly based on self-reliance policy. Therefore, the main product lines were trucks and buses. The usage of passenger vehicles was limited for official business purposes, and was not promoted until 1987 being regarded as a “capitalist lifestyle”. So people had to wait until 1989 when the first family-cars (or we can call them private car) were released. From Figure 2, we can see that in comparison with trucks the production of basic passenger vehicles increased very slowly until 1989.



Source: *HISTORY OF CHINA AUTOMOTIVE INDUSTRY 1901~1990*, China Communications Press, 1996; *Automotive Information 2002 – 2009*, China Statistical Yearbook 2001~2008.

At a first glance, Chinese central government did not promote passenger vehicle manufacturing until 1987. In 1983 and 1984 the permission to launch joint venture projects had been given to Beijing-AMC and Shanghai-Volkswagen respectively, which was somewhat contradicting to the policy of product-restriction. Giving this permission the central government hoped to achieve the objective of import-substitution.

As a result of Self-reliance Policy, being in effect for approximately 30 years before Reform and Open Policy, Chinese automobile industry became completely isolated from the rest of the world. For this reason, the vehicles produced by Chinese automakers could not satisfy the user needs of quantity and quality. After 1980, the import rush was on, and that was especially true for the passenger vehicles. Indeed, the passenger vehicles had been imported since 1950s², however the volume of import increased rapidly in 1980th that crossed over central government's imagination. For example, during the period of 1981-1986, a total number of 183,000 passenger vehicles (of total value 850 million US dollars) were imported. In comparison, the average annual production by domestic automakers was only 4000 units. Import of passenger vehicles became the main category of the country's expenditures in foreign currency.

For this reason, Chinese government decided to launch an import substitution mechanism. In 1987, the government issued "*Notice from State Council of PRC on the Reinforcement of Controlling the Importation of Passenger Vehicles*" to authorize China Faw Group Corporation (FAW), Shanghai Automotive Industry Corporation (SAIC), Dongfeng Automobile Company, Beijing Automotive Industry Corporation, Tianjin Automotive Industry Corporation and Guangzhou Automotive Industry Corporation as the only domestic players for passenger vehicle manufacturing³. Through 1980s and 1990s, Chinese government reinforced the limitation of new entrants to the passenger vehicle market by successive issuing of numerous acts related to the industry. For example, "*Notice on the Regulations of Controlling the Number of Passenger Vehicle Manufacture (1988)*", "*Decisions Concerning the Main Points of China's Current Industrial Policy (1989)*", "*Outline of State Industry Policies for the 1990s(1994)*" and "*Automotive Industry Policy(1994)*".

As a result, in early 1990s Chinese automobile market changed into an oligopoly led by few authorized players and strictly protected by both industrial policy and high import duties. All the authorized players were intended to raise productivity through joint ventures with foreign corporations. The objectives of import substitution have met with partial success. However, the

² For example, Chinese government imported 60 Benz cars in 1956.-Chen Zutao and Ouyang Min, *My car life*, People Press,2005,p81-82.

³ State Council of PRC, "*Notice on the Regulations of Controlling the Number of Passenger Car Manufacture (Chinese Pinyin: Guanyu Yangge Kongzhi Jiaocheng Shengchandan de Tongzhi)*", 1988.

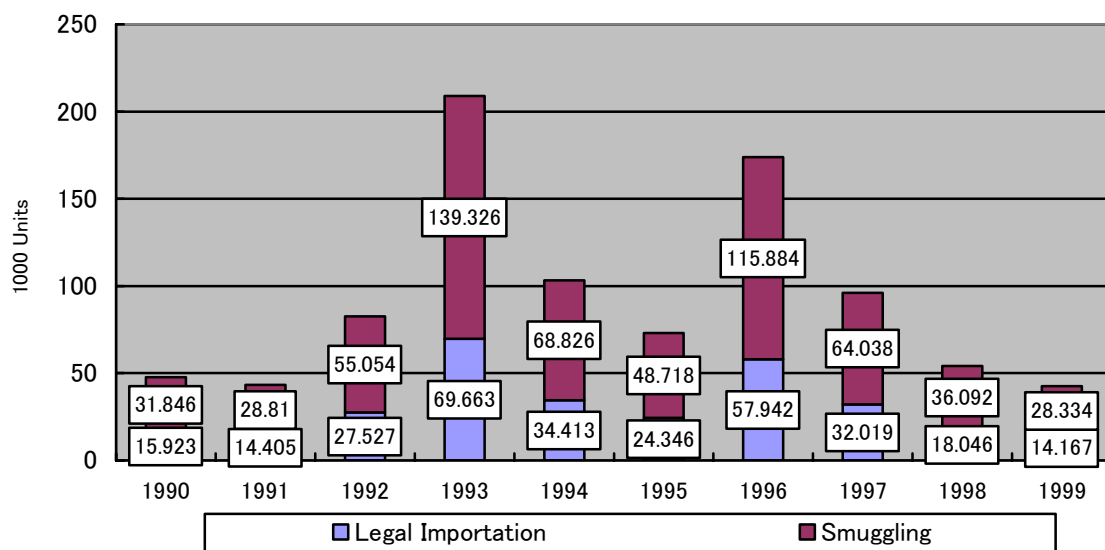
price of products made by these joint ventures was much higher than the normal level in the rest of the world, and extremely higher than the income level of a normal Chinese household (See TABLE 2).

Model	Price(Year)	Rate of Price Via GDP per Capita*(= 6079 RMB)
Audi 100	289,000 ('94)	45.54
Rex	62,800 ('94)	10.33
Hongqi CA7560	520,000 ('95)	85.54
Xiao Hongqi	220,000 ('97)	36.19
Cherokee2021	188,000 ('97)	30.93
Santana 2000	165,000 ('97)	27.14
Santana	135,000 ('97)	22.21
Jetta	135,000 ('97)	22.21
Fukang (Citr�en ZX)	135,000 ('97)	22.21
Peugeot 505	135,000 ('97)	22.21
Charade	66,500 ('97)	10.94
Alto	60,000 ('97)	9.87

Note: * means data of 1997.
Source: Chen Jin, *Growth strategies of the Chinese automotive manufacturers*, Sinzansha Publisher Co., Ltd., 2000, P64, National Bureau of Statistics of China.

For this reason, in the early 1990s, the automobile demand was mainly supported by state officials or state-owned companies, not by households. The high price of vehicles was the most important factor restraining household demand at that time. The average price of most vehicles was higher than 130,000 RMB which is 20 times more than the GDP per Capita in 1997. In addition, smuggling passenger vehicles in 1990s greatly exceeded the legal import (See FIGURE 3).

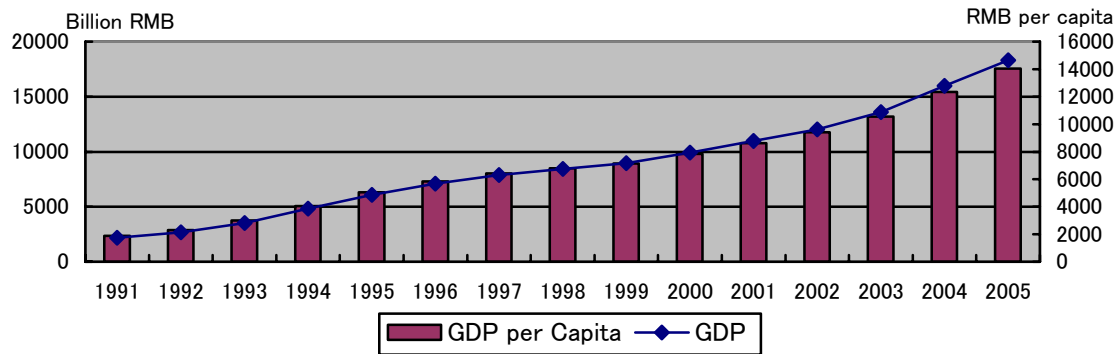
FIGURE 3 The Importation of China though 1990s



Source: Zheng Zuoshi, *Qiche Fengzi Lishufu (The Madman for Automobile: LiShufu)*, China Citic Press, 2007, P75.

Generally speaking, the motorization of a country is quite smooth, after its GDP per Capita surpasses 1000 US dollars. After 1994, both Chinese GDP and GDP per Capita showed a rapid growth (See FIGURE 4).

FIGURE 4 GDP and GDP per Capita of China after 1990s



Source: National Bureau of Statistics of China.

TABLE 3 Possibility Analysis on China's Motorization					
The beginning of motorization in depended countries					
	U.S.A		Germany		Japan
Period of speeding up	1910s~20s		1950s		1960s
Price of public car [Ⓐ]	550 Dollars Ford Model T		4500 DM VW1200Exp		410,000~430,000 Yen Corolla, Sunny
Annual average per capita income [Ⓑ]	500 Dollars average of 1914-23		3800 DM (1958)		380,000 Yen (1966)
Ⓐ/Ⓑ	1.1		1.2		1.1
Case study of China around 2000					
Price of promotion car by joint venture ^①	About 100,000 RMB (Toyota Vios 105,000 RMB, Honda Fit 99800 RMB)				
Price of ICAMs' vehicles ^②	About 40,000 RMB (Geely Haoqing 29990~42990 RMB)				
	China	Peking	Tianjin	Shanghai	Guangdong
GDP per Capita(RMB) ^③	8622	25523	20154	37382	13730
①/③	11.60	3.92	4.96	2.68	7.28
②/③	4.64	1.56	1.98	1.07	2.91
Source: <i>Weekly economist</i> , Vol.2004.9.28, P25, National Bureau of Statistics of China Author edited.					

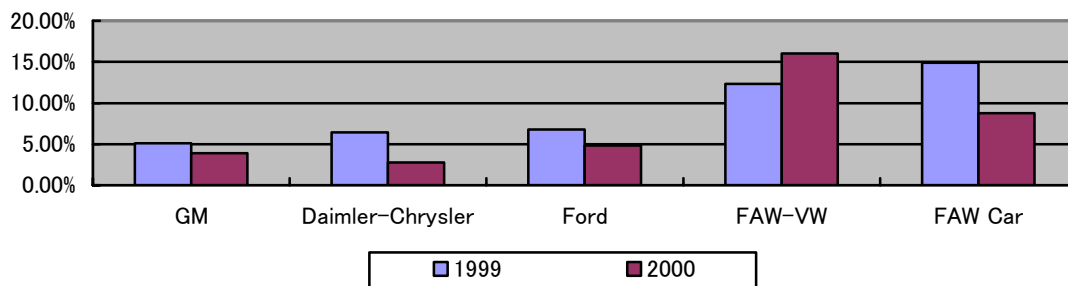
Meanwhile, in the late 1990s, Chinese market attracted attention of most world automakers who revealed their plans to enter this market with a high potential to growth. In 1998 and 1999, Honda and GM used their last opportunity to enter Chinese market successfully, before the country's entry to WTO. Honda founded a joint venture with Guangzhou Auto, and GM in

cooperation with its partner Shanghai Auto located one of the plants in Shanghai.

In the middle of the year 2000, when Chinese GDP per Capita came close to 1000 US dollars, the government and most joint venture automakers started paying attention to the production of “Family Cars (or Public Cars)”. Many automakers planed to promote products worth 100,000 RMB and specified as “Family Cars” to influence motorization in China. However in 2001 the income level of Chinese households was still at a low level, and only in some advanced areas like Shanghai, Peking and Tianjin, motorization became possible (See TABLE 3).

The foreign companies were not the only ones to recognize the opportunities of Chinese market in late 1990s – Chinese domestic companies recognized them as well. Particularly, in 1990s, the high rate of profits in the industry of passenger vehicles attracted all domestic companies, which had potentiality and capability (See FIGURE 5). Additionally, the high prices for joint ventures’ products and high potential demand from households gave domestic producers the best chance to enter the segment of vehicles priced under 100,000RMB, which joint venture automakers did not intend to develop (See TABLE 3).

FIGURE 5 Profit Margin in U.S and in China



Note: Here, Profit margin is counted by the rate of total profit via total sales.

Source: Gan Chunhui, Dai Rong, Li Surong, *The industrial organization analysis of Chinese car industry*, <http://ati.nstl.gov.cn/car/baogao/images/2005/12/8/38816.doc>.

Since 1997, CHERY and Geely planed to enter passenger vehicle market with main products priced under 100,000RMB, which was 1/2 or 2/3 price of existing similar models produced by joint venture automakers. Though these domestic companies were not authorized as automakers due to the limitations in automobile industrial policy enacted in 1994, before China’s entry to WTO (1997-2003), they nevertheless tried to enter the market by gaining support from local governments (like CHERY), or by taking over small state-owned automakers (like Geely). However, both strategies could just give the domestic companies an authorization to produce buses and trucks, but not passenger vehicles. Under such conditions, some companies tried to produce and sell passenger vehicle models legally registered as microbuses⁴.

⁴ For further detail, can see Zejian Li(2007), Relation between Chinese Auto-Product Management and

IV. Competitiveness Strengthening Strategy of ICAMs: How Did They Build Their “Knowledge”? (CHERY & Geely’s Case Study)

As we mentioned before, in late 1990s the market of vehicles priced under 100,000 RMB was neglected by joint venture automakers and potential demand from households supported by gradual growth of GDP per Capita gave domestic companies an opportunity to enter it. On the other hand, the entry of domestic automakers into the low-end market (where the product price is less than 100,000 RMB) coupled with their intention to produce a cheap product provoked price competition among manufacturers. Moreover, the low-price strategy has further escalated competition in the whole market and caused a phenomenon of price drop and rapid market expansion.

Since 2000, Chinese passenger vehicle market became one of the world's fastest-growing automobile market—the annual sales of new vehicles grew from 2.06 million units in 2000 to 7.27 million units in 2006, showing a 23.4% average annual growth rate—and attracted automakers from all over the world with its potential for growth and profits. Due to this growth numbers of domestic automakers, including CHERY and Geely have expanded rapidly (See FIGURE 1).

Based on the survey of more than 100 Chinese firms since 2005, this section explores the question of how ICAMs managed to build their “knowledge”. This time, we especially focus on the role the international technology transfer has played in the ICAMs’ competitiveness strengthening process. First, let us provide more details about CHERY and Geely.

CHERY, officially known as CHERY Automobile Co., Ltd., “was founded in 1997 by five of Anhui's local state owned investment companies with an initial capitalization of RMB 1.752 billion. Plant construction commenced on March 18, 1997, in Wuhu (City), Anhui Province, China. The first car was produced on December 18, 1999. This represents a milestone in Chinese manufacturing history because it was the first car produced by a totally Chinese owned and managed company”⁵. CHERY had sold 3,810,000 units in 2007 in contrast with just 87,000 units in 2004. In 2007, CHERY Automobile sold 119,800 units in overseas markets, including Russia. Overseas expansion, especially in Russia, Southeast Asia, and Middle East, has become a very important determinant of growth for CHERY.

Geely, official known as Geely Group Co., Ltd., was founded on November 6, 1986. “Geely made its debut in manufacturing parts of refrigerator-evaporator, which was located in Huangyan, Luqiao, Taizhou city, Zhejiang Province. In 1989, Geely entered the production of

Entry to the Automobile Industry of Domestic Companies, Chery and Geely, *THE JOURNAL OF ASIAN MANAGEMENT STUDIES* NO.13, pp.207-220, June 2007.

⁵ http://www.cheryglobal.com/about_chery.jsp.

advanced decoration materials and manufactured the first magnalium bent board in China. In April 1994, Geely set its foot in motorcycle industry, and the same year in June it manufactured the first scooter motor in China. The total sales volume reached 60,000 units in 1995 and 200,000 units in 1996, thus Geely became the main motorcycle manufacturer in China”.⁶

“In May 1996, Geely Group Co., Ltd was organized. In March 1997, Geely entered the High-education industry. Now the Group has three colleges, including Beijing Geely University – one of the private-owned universities possessing an independent right to authorize High Education Diploma in Beijing city”.⁷

“In 1997, Geely set its foot in automobile industry. On August 8, 1998, the production of first Geely Car was launched in Linhai City, Zhejiang Province. On November 9, 2001 and December 26, 2001, China State Economic and Trade Commission (hereafter as SETC) had approved Geely Automobile JL6360, HQ6360, MR6370, and MR7130 series to be listed in SETC automobile products public catalogue. Geely automobile became the first private enterprise approved as an automobile manufacturer in China”⁸.

Parameters	HQ6360	TJ7101
Photo		
Maker	Geely	Tianjin Xiali
Length-Width-Height(mm)	3650/1615/1410	3680/1615/1385
Wheelbase (mm)	2340	2340
Engine	376Q	TJ376QE
Engine displacement (cc)	993	993
Weight(Kg)	1170	815
Source: Li Zejian (2007), Relation between Chinese Auto-Product Management and Entry to the Automobile Industry of Domestic Companies, CHERY and Geely, <i>THE JOURNAL OF ASIAN MANAGEMENT STUDIES</i> NO.13, pp.207-220, June 2007.		

Most of CHERY and Geely’s first generation products were thought to be a copy (or imitation) of existing vehicles or a hodgepodge of different products (See TABLE 4 & TABLE 5), especially that was true for the exterior design. This placed both companies under the scrutiny of intellectual property disputes with foreign automakers. However, as we will see below, this point of view was mainly based on the empirical observations and was strongly affected by visual likeness.

⁶ <http://www.geely.com/english/about/intro.htm>.

⁷ <http://www.geely.com/english/about/intro.htm>.

⁸ <http://www.geely.com/english/about/intro.htm>.

What is the cause of such a resemblance between ICAMs' products and other existing models? The new entry limitations forced domestic companies to take an unusual way to enter passenger vehicle market. Without sufficient technology accumulation needed for original R&D, qualified human resources and capital, ICAMs, including CHERY and Geely, sought to design new models using reverse engineering tools, outsourcing of design or introducing technology and know-how through product line acquisition. However, as we have already mentioned above, unoriginal design caused numerous intellectual property rights problems before 2003.

TABLE 5 QQ(CHERY) V.S. Matiz (GM-Daewoo)		
Parameters	QQ	Matiz
Drive System	FF	FF
Length-Width-Height(mm)	3550/1508/1491	3495/1495/1482
Wheelbase (mm)	2348	2340
Engine	SQR372MPI/DA-465QMPI	M-Tec/B1OS1
Engine Displacement (cc)	812/1051	796/995
Weight (kg)	850	840
Top Speed (km/h)	≤ 135	140
Tire	175/60R13 77H	155/65R13
Suspension (Front)	MacPherson Strut	MacPherson Strut
Suspension (Rear)	Independent Suspension	Non-independent Suspension
Fuel Consumption (L/100km)	4.2 (60km/h)	4.0 (90km/h)
Source: Li Zejian (2006), <i>The Growth Strategy of Emerging Chinese Domestic Automakers: Focus on CHERY and Geely</i> , Master's Thesis, Kyoto University, March 2006. (MIMEO).		

Therefore, to avoid conflicts with foreign automakers, it became extremely important to enhance original design and concept for all ICAMs. Here we use the case of Chery to show how ICAMs managed to increase the original capabilities of product design and R&D. The same phenomenon can also be traced in Geely's case.

(a) High Quality Proficient Experts Headhunting

The first stages of knowledge acquisition (especially design and R&D know-how) included hiring of Chinese engineers working for major global automakers and related companies through headhunters and other types of intermediaries.

Besides, a number of foreign experts were also invited to work in China. For example, CHERY has invited about 30 overseas experts with broad experience in such companies as GM, Ford, Visteon, Daimler Chrysler, Du Pont, TRW, and Motorola. These experts brought advanced technologies and know-how to CHERY and then diffused their knowledge throughout the whole company by means of the on-the-job training. That was especially effective in the case of young engineers who can absorb the useful knowledge directly and quickly.

TABLE 6 List of High Level Proficient Experts in CHERY		
Name	Post	Job Experience
Oversea Chinese Experts – about 30 people		
Xu, M	Director of Automotive Engineering Institute of CHERY, Chief Leader of R&D	Engine Expert, Ph.D. of Engineering (Hiroshima University), Worked for GM, Ford, Visteon
Xin, J	Vice Director of Automotive Engineering Institute of CHERY, Leader of Engine Durability & Hybrid Car	Worked for Honda (U.S.A)
Gu, L	Vice Director of Automotive Engineering Institute of CHERY, Leader of Digital Crash Test	Crash Test Expert, Ph.D. of Modern Mechanics (University of Science and Technology Beijing, Northwest University), Worked for Ford
Yuan, T	Vice President (Parts Procurement)	Studied in Beijing University of Aeronautics and Astronautics, Ph.D. of Engine (Centre National de la Recherche Scientifique)
Qi, G J	Vice Director of Automotive Engineering Institute of CHERY, Leader of Automotive Body-In-White	Worked for DaimlerChrysler AG
Sun, G C	Vice President (CFO)	Worked for DuPont (China) as CFO
Yuan, Y B	Chassis Research	Worked for TRW Automotive
Li, M	Electronic Driving Research	Worked for Motorola
Zhu, X C	Transmission Research	Back to CHERY from Australia
Gu, Y	Vice President of CHERY Subsidiaries (Die & Molt)	Worked for Fuji Japan
Chinese Experts from FAW – about 150 people		
Kang, L M	Chief Engineer, Engine Project Manager	FAW
Hu, F	Vice Chief Engineer, Project Leader of Engine Co-project with AVL	Gratitude from Automotive Engineering (Tsinghua University), FAW, Retired from DongFeng Motors in 1995
Feng, J Q	Vice Chief Engineer, Designer of CAC372 Engine for QQ0.8L	The First Engine Designer of New China, He Designed 6102 Gasoline Engine for JieFang 141 Truck
Foreign Experts – about 40 people		
Terada, S	Plant Manager, Operation Management	Worked 30 years for Mitsubishi Motors as Plant Manager
Kawano, K	Director of Plant KAIZEN	Worked 40 years for Mazda Motors
Kim, U S	Vice Chief Engineer	Ricardo Company
German Experts	Manufacturing Technology Support	Unknown
Others Domestic Engineers		
Lu, J H	Vice President (R&D)	Gratitude from Automotive Manufacturing (Tsinghua University)
Li, F	Vice President (Sales)	Worked for Foton Motors sales Co. as Vice President
Total		
In 2006, CHERY had 18,000 employees, including nearly 4000 engineers. Furthermore, 1,500 engineers were directly involved in R&D.		
Note: Each rank/title corresponds to 2004 year's position. Source: Li Zejian (2008), Analysis on the competitiveness of Chery Automobile: focus on aspect of reinforcement in R&D, <i>Annals of the Society for Industrial Studies, Japan</i> (23) [2007], pp.103-115, June 2007.		

In addition to 30 foreign experts, CHERY has also invited more than 150 Chinese experts and engineers from FAW, which was supposed to hire more engineers than any other state-owned

automaker. These highly skilled professionals started the work in R&D and manufacturing departments of CHERY. By the end of 2006, CHERY had 18,000 employees, including 20% (which is approximately 4000 people) of engineers, and 1500 of them were directly related to R&D. (See TABLE 6)

(b) Joint-Development Project and Design Outsourcing

Besides to the human resource policy, the most important methods for CHERY to acquire technology and know-how were co-operation projects on joint-development and design outsourcing. Most of ICAMs were similar to CHERY's case. They preferred the tie-up cooperation in joint development and introduced the necessary knowledge from foreign professional engineering corporations.

For instance, in 2001, CHERY started joint development project on 18 high level engines with AVL, which is the world's largest privately owned and independent company for the development of powertrain systems with internal combustion engines as well as instrumentation and test systems⁹. In the above-mentioned case of joint development CHERY wanted to acquire not just 18 ready-made engines, but also the knowledge on how to design an original high level engine and improve its properties continuously.

A special training program for CHERY's specialists was organized by AVL and a group of guest engineers was sent to AVL to acquire technical knowledge of processes. After hard daily work they had to recall all the details, record them and report to CHERY's head office. Based on the working records of these guest engineers, CHERY has established its own development standards and launched the development of an original engine by its own.

For the design outsourcing, CHERY chose way of taking the cooperation with outsourcing destination by sending a team of CHERY engineers to that company and let their engineers work with CHERY engineers together. As soon as CHERY's engineers were able to understand and master certain parts of a project they were entrusted to fulfill these functions by themselves, and only the operations they could not comprehend were outsourced. Having repeated this process several times, CHERY acquired more knowledge, technologies and know-how needed for enhancing original design capabilities.

(c) Original Affiliated Supplier Chain Construction

When CHERY and Geely made their first attempt to enter passenger vehicle market with the first generation product they depended on existing part suppliers subordinated to joint venture

⁹ <http://www.avl.com/wo/webobsession.servlet.go?app=bcms&page=view&nodeid=400013015>.

automakers. For example, in 2002 Geely relied on the parts from Tianjin Xiali's suppliers at a maximum rate of 95% to produce Haoqin¹⁰. CHERY procured parts from the suppliers affiliated with ShanghaiVW for its first generation sedan product which called WindCloud.

However, the procurement of essential parts from competitor's affiliates put CHERY and Geely into dilemma because they had to compete with the companies from which they procured essential parts, like engines or chassis. As new entrants they depended on low-price strategy to gain competitiveness in passenger vehicle market, but relatively high prices of parts from competitor reduced potential profit. This stimulated CHERY and Geely to build their own affiliated network of suppliers as quickly as possible.

By the end of 2004, there were approximately 200 part suppliers which had business relationship with Geely. Meanwhile, Geely gained 50% control in 100 companies and successfully founded their own stable system of part suppliers. As a result, the dependence on supplies from Tianjin Xiali' affiliates decreased from 95% to 1% in 2004.

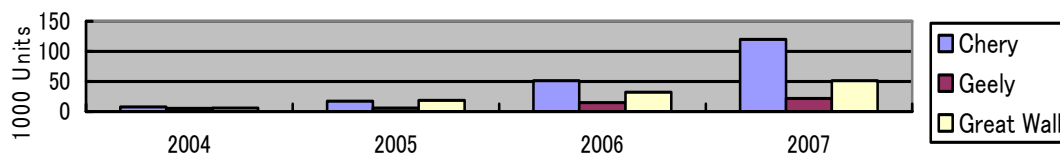
Using the above-mentioned methods gave ICAMs an opportunity to enhance original design capabilities and made them close to the target of gaining more competitiveness. What is remarkable that ICAMs were not at the same growth level; they entered the market at different moments and had various management structures. However, the necessity to gain and enhance original R&D capabilities was apparent for all of them. Under the severe competition between both joint venture automakers and forerunners there has no room in passenger vehicle market for new local participants, such as CHERY and Geely, especially because their strategy was to copy and market the existing low-end models.

V. Discussion: The Role of International Technology Transfer





ICAMs demonstrated rapid growth rates not only in domestic market also in international market. In 2007, ICAMs reached 31% share of domestic market, which was the highest record in history. CHERY is a good example with the sales of 3,810,000 units in 2007, compared with just 87,000 units in 2004. In 2007, CHERY also sold 119,800 units to overseas markets, including Russia. (See FIGURE6)





¹⁰ Sun Zhishan, Jili Liantiao Shangde Jingzhengli (Geely's competitiveness on supplier chain), CHINA LOGISTICS, pp53, 2007 vol.7.






FIGURE 6 Car Export Top 3



There is no doubt that the expansion demonstrated not only in domestic but also in overseas markets, especially in Russia, Southeast Asia, and Middle East became possible due to the growth of Chery's original capabilities in design and R&D. However, at same time, global automakers have achieved considerably more expansion through the establishment of Sino-foreign joint ventures (SEE TABLE7).

TABLE 7 Global Automakers' Operations in China					
Global Automaker (Sales, locally produced passenger vehicles in 2007&2008)	Sino-Foreign Joint Venture				
 <table border="1"> <tr> <td>2008</td> <td>2007</td> </tr> <tr> <td>35,164</td> <td>32,249</td> </tr> </table>	2008	2007	35,164	32,249	JV: BMW Brilliance Automotive Ltd. Models produced: BMW 3 series, 5 series Ownership: BMW AG 50% Brilliance China Automotive Holdings 50%
2008	2007				
35,164	32,249				
DAIMLER <table border="1"> <tr> <td>2008</td> <td>2007</td> </tr> <tr> <td>14,356</td> <td>6,882</td> </tr> </table>	2008	2007	14,356	6,882	JV: Beijing Benz-DaimlerChrysler Automotive Co. Models produced: Mercedes-Benz C class, E class Ownership: Beijing Automotive Industry Holding Co. 50% DaimlerChrysler AG (DCAG) 39% Northeast Asia Ltd. 11%
2008	2007				
14,356	6,882				
 <table border="1"> <tr> <td>2008</td> <td>2007</td> </tr> <tr> <td>11,200</td> <td>9,277</td> </tr> </table>	2008	2007	11,200	9,277	No longer has any JV, but licensed two companies to produce its vehicles Models produced: Chrysler 300C, Grand Voyager, Sebring; Dodge Caravan Ownership: Chrysler LLC 100%
2008	2007				
11,200	9,277				
 <table border="1"> <tr> <td>2008</td> <td>2007</td> </tr> <tr> <td>-</td> <td>15,525</td> </tr> </table>	2008	2007	-	15,525	No longer has any JV Models produced: No models produced in China Ownership: Fiat no longer has any JV's in China.
2008	2007				
-	15,525				
	JV: Shanghai General Motors Corp. Models produced: Buick Excelle, Excelle HRV, LaCrosse, Park Avenue, Regal; Cadillac SLS Ownership: SAIC Motor Corp. 50% General Motors 50% JV: Shanghai GM Dongyue Motors Co. Models produced: Chevrolet Aveo, Cruze, Epica, Lova Ownership: Shanghai General Motors 50% Shanghai Automotive Co. 25% General Motors China 25% JV: Shanghai GM (Shenyang) Norsom Motors Co.				

<table border="1"> <thead> <tr> <th>2008</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>485,545</td> <td>528,260</td> </tr> </tbody> </table>	2008	2007	485,545	528,260	<p>Models produced: Buick GL8</p> <p>Ownership: Shanghai General Motors 50% Shanghai Automotive Co. 25% General Motors China 25%</p> <p>JV: SAIC-GM-Wuling Automobile Co.</p> <p>Models produced: Chevrolet Spark; Wuling Hongtu, Rongguang, Single & Double pickup, Sunshine, Xingwang</p> <p>Ownership: Shanghai Automotive Co. 50% General Motors China 34% Wuling Automotive 16%</p>
2008	2007				
485,545	528,260				
	<p>JV: Jiangling Motors Corp.</p> <p>Models produced: Ford Transit, New Generation Transit; JMC Baodian, Baowei, Qingka</p> <p>Ownership: Jiangling Holding Co. 41% Ford Motor Co. 30% Other 29%</p>				
<table border="1"> <thead> <tr> <th>2008</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>161,758</td> <td>180,476</td> </tr> </tbody> </table>	2008	2007	161,758	180,476	<p>JV: Changan Ford Mazda Automobile Co.</p> <p>Models produced: Ford Fiesta, Focus, Mondeo, S-Max; Mazda2, Mazda3; Volvo S40, S80L</p> <p>Ownership: Ford Motor Co. 50% Changan Automotive Co. 35% Mazda Motor Co. 15%</p>
2008	2007				
161,758	180,476				
	<p>JV: Honda Automobile (China) Co.</p> <p>Models produced: Honda Jazz (for export)</p> <p>Ownership: Honda Motor Co. 55% Guangzhou Automobile Industry Group Co. 25% Honda Motor Investment Co. 10% Dongfeng Motor Group Co. 10%</p>				
<table border="1"> <thead> <tr> <th>2008</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>470,033</td> <td>422,345</td> </tr> </tbody> </table>	2008	2007	470,033	422,345	<p>JV: Dongfeng Honda Automobile (Wuhan) Co.</p> <p>Models produced: Honda Civic, CR-V</p> <p>Ownership: Dongfeng Motor Corp. 50% Honda Motor Co. 40% Honda Motor Investment Co. 10%</p> <p>JV: Guangzhou Honda Automobile Co.</p> <p>Models produced: Honda Accord, Fit, New City, Odyssey</p> <p>Ownership: Guangzhou Automobile Industry Group Co. 50% Honda Motor Co. 40% Honda Motor Investment Co. 10%</p>
2008	2007				
470,033	422,345				
	<p>JV: Beijing Hyundai Motor Co.</p> <p>Models produced: Hyundai Accent, Elantra, Elantra HDC, Sonata, Sonata Lingxiang, Tucson</p> <p>Ownership: Hyundai Motor Co. 50% Beijing Automotive Industry Holding Corp. 50%</p>				
<table border="1"> <thead> <tr> <th>2008</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>450,163</td> <td>345,425</td> </tr> </tbody> </table>	2008	2007	450,163	345,425	<p>JV: Dongfeng Yueda Kia Automobile Co.</p> <p>Models produced: Kia Carnival, Cerato, Cerato H/B, DYK Sportage, Optima, Rio</p> <p>Ownership: Kia Motors 50% Dongfeng Motor Industry Investment Co. 25% Jiangsu Yueda Co. 25%</p>
2008	2007				
450,163	345,425				
	<p>JV: Hunan Changfeng Motor Co.</p> <p>Models produced: Liebao, Liebao Feiteng</p> <p>Ownership: Changfeng Group 50% Others 34% Mitsubishi Motors Corp. 16%</p>				
<table border="1"> <thead> <tr> <th>2008</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>21,170</td> <td>41,475</td> </tr> </tbody> </table>	2008	2007	21,170	41,475	<p>JV: Soueast (Fujian) Motor Co.</p> <p>Models produced: Delica, Freeca, Galant, Lancer, Landio, Lioncel, New Space Wagon, Veryca</p> <p>Ownership: Mitsubishi Motors Corp. 25% Fujian Motor Industry Group 50% Taiwan China Motor Corp. 25%</p>
2008	2007				
21,170	41,475				

	<p>JV: Zhengzhou Nissan Automobile Co. Models produced: Nissan MPV, NT400 Cabstar, Paladin, Pickup, Rich, SUV Ownership: Dongfeng Motor Group Co. 51% Dongfeng Motor Co. 29% Nissan Motor Co. 20%</p>				
<table border="1"> <thead> <tr> <th>2008</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>361,015</td> <td>281,520</td> </tr> </tbody> </table>	2008	2007	361,015	281,520	<p>JV: Dongfeng Motor Co. /Dongfeng Nissan Passenger Vehicle Co. Models produced: Nissan Bluebird Sylphy, Geniss, Livina, Qashqai, Teana, Tiida, X-Trail Ownership: Nissan (China) Investment Co. 50% Dongfeng Motor Group Co. 50%</p>
2008	2007				
361,015	281,520				
	<p>JV: Dongfeng Peugeot Citroen Automobile Co. Models produced: Citroen C2, C-Elysee, C-Quatre, C-Triomphe, Picasso, New Xsara; Peugeot 206, 207, 307 Ownership: PSA Peugeot Citroen 50% Dongfeng Motor Industry Investment Co. 50%</p>				
	<p>JV: Jiangxi Changhe Suzuki Automobile Co. Models produced: Liana, Landy, North Star (Suzuki Wagon R+) Ownership: Changhe Group 51% Suzuki Motor Corp. 25% Suzuki Motor China Investment Co. 21% Okaya 3%</p>				
<table border="1"> <thead> <tr> <th>2008</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>178,853</td> <td>160,849</td> </tr> </tbody> </table>	2008	2007	178,853	160,849	<p>JV: Chongqing Changan Suzuki Automobile Co. Models produced: Suzuki Alto, Gazelle, Swift 1.3, Swift 1.5, SX4 Ownership: Changan Automobile Co. 51% Suzuki Motor Corp. 25% Sojitz Corp. 14% Suzuki Motor (China) Investment Co. 10%</p>
2008	2007				
178,853	160,849				
	<p>JV: Tianjin FAW Toyota Motor Co. Models produced: Toyota Corolla EX, Vios Plant 1 Toyota Crown, Reiz Plant 2 Toyota Corolla Plant 3 Ownership: Toyota Motor Corp. 40% FAW Xiali Automobile Co. 30% First Auto Works 20% Toyota Motor Investment Co. 10%</p>				
<table border="1"> <thead> <tr> <th>2008</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>543,106</td> <td>455,140</td> </tr> </tbody> </table>	2008	2007	543,106	455,140	<p>JV: Sichuan FAW Toyota Motor Co. Models produced: Toyota Coaster, Prado Ownership: FAW Group 50% Toyota Motor Corp. 45% Toyota Tsusho Corp. 5%</p> <p>Changchun Fengyue Company of SFTM Models produced: Toyota Land Cruiser, Prius Ownership: FAW Group 50% Toyota Motor Corp. 45% Toyota Tsusho Corp. 5%</p> <p>JV: Guangqi Toyota Motor Co. Models produced: Toyota Camry, Yaris Ownership: Guangzhou Automobile Industry Group Co. 50% Toyota Motor Corp. 31% Toyota Motor Investment Co. 19%</p>
2008	2007				
543,106	455,140				
	<p>JV: FAW-Volkswagen Automotive Co. Models produced: Audi A4L, A6L; VW Bora classic, New Bora, Golf, Magotan, Jetta, Sagitar Ownership: China FAW Group Corp. 60% Volkswagen AG 20% Volkswagen Investment Co. 10% Audi AG 10%</p>				
<table border="1"> <thead> <tr> <th>2008</th> <th>2007</th> </tr> </thead> <tbody> <tr> <td>983,436</td> <td>898,588</td> </tr> </tbody> </table>	2008	2007	983,436	898,588	<p>JV: Shanghai Volkswagen Automotive Co.</p>
2008	2007				
983,436	898,588				

	Models produced: VW Lavida, Lingyu, Passat, Touran, Polo, Cross Polo, Santana, Santana Vista; Skoda Fabia, Octavia	Ownership: Shanghai Automotive Industry Corp. 50% Volkswagen AG 40% Volkswagen Investment Co. 10%
Source: PricewaterhouseCoopers, 2009 <i>GUIDE TO CHINA'S AUTO MARKET</i> , http://www.nxtbook.com/nxtbooks/crain/an2537706532BMMMPB_china/		

If we take a look at the sales of 14 global automakers in Chinese market we can see that in 2008 Volkswagen was the top seller with approximately 1 million units. The following four players - TOYOTA, GM, HONDA, and HYUNDAI - sold 500 thousand units, a half of Volkswagen's. In addition, NISSAN sold 361 thousand units, approximately the same volume as that of CHERY. In 2008, CHERY, the top ICAM automaker, reported a slight decrease in sales of cars (356 thousand units in 2008 and 379 thousand units in 2007). Geely, the second largest ICAM automaker, sold 221 thousand units in 2008.

From the data presented we can say that despite the rapid expansion ICAMs achieved in recent years, global automakers operating Sino-foreign joint venture still keep domination over them. The economic activities performed by the above-mentioned Sino-foreign joint ventures remain the key factor in Chinese market. Therefore, we would suggest that their operations, regarded as a main pattern of international technology transfer to China, have strong and consistent effect on the development of Chinese automotive industry.

Having discussed the case of CHERY, we outlined the methods by which ICAMs acquired original capabilities on design and R&D. The role that international technology transfer played in this process can not be ignored. In this section we analyze the role of both direct and indirect international technology transfer (SEE TABLE8).

TABLE8 the Role of International Technology Transfer in Chinese Automotive Industry

		Receiving Side	
		Positive Effect	Negative Effect
Spreading Side	Indirect Pathway (Spillover)	CHERY, Geely (R&D, Manufacturing, Sales)	
	Direct Pathway	Type1 Sino-foreign JV (Manufacturing, Sales)	state-owned automakers (R&D)
		Type2 CHERY, Geely (R&D, Manufacturing)	

Note: Type1 refers Interior Technology Transfer in NMEs. Type2 refers Technological Consulting and Outsourcing.

First, we should mention that it is impossible to provide absolutely clear borders isolate positive and negative effects of international technology transfer. Therefore TABLE8 is based only on an empirical analysis.

As we have found out, before GM was permitted to locate Shanghai General Motors Corp, a JV between GM and SAIC Motors Corp, the other global automakers (i.e. Volkswagen and Peugeot) were purely profit-motivated to work in the Chinese market. For this reason, only insignificant knowledge related to R&D was transferred with their products. Consequently, local state-owned automakers started to look for short-term profits and were satisfied with this position. Even though technologies were rarely transferred in this period, skills in manufacturing, part supply and sales were developed due to foreign direct investment. We consider it as a positive effect as type 1 in TABLE8.

By contrast, this kind of FDI also caused a suspension of R&D activities by existing local passenger vehicle automakers. For example, SAIC Motors Corp had to abandon the original product of its SHANGHAI brand, in order to meet localization standards of SANTANA. After the founding of Shanghai GM, the competition between Sino-foreign JVs quickly escalated. Some R&D projects carried out by Sino-foreign JV project were only limited to product adaptation and localization. Due to the absence of original passenger vehicle R&D projects within Sino-foreign JVs and state-owned automakers, engineers directly involved in R&D shifted to ICAMs, such as CHERY and Geely. We consider this as a negative effect of international technology transfer as type 1 in TABLE8.

Additionally, we consider it as a positive effect of a spillover of technological and R&D capabilities to ICAMs. For example, Kaking Technology Co., Ltd. is a good case to explain this effect. Kaking Technology Co., Ltd., as a subsidiary of CHERY, undertook over 60% of CHERY's design work before 2005. The founders of this company are former team-members of Dongfeng Technology Center which had undertaken R&D projects for XiaoWangzi and modification works for Citroen Elysee. The former is an original passenger vehicle product of Dongfeng Motor Co. and the latter is a product manufactured by Dongfeng Peugeot Citroen Automobile Co.

Based on the spillover from Sino-foreign joint ventures ICAMs acquired basic technological capabilities in R&D, manufacturing and sales. As we have mentioned before, after CHERY had successfully entered passenger vehicle market, they preferred to use the Type 2, as technological Consulting and Outsourcing (SEE TABLE8) as a main way to improve their technological capabilities in R&D and manufacturing.

As a conclusion of the whole analysis we would suggest that even though international technology transfer (as an important external factor) had a number of positive effects on ICAMs' development, the building of managerial capabilities for system integration (as an internal factor) became the main aim for all ICAMs.

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