

Competitiveness of the Japanese, Korean, and Chinese Automobile Industries

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1 Introduction

The automobile industry has been developing remarkably among East Asian countries—i.e., Japan, Korea, and China—in recent years. In terms of domestic production, China produced 1.83 million vehicles in 2010, more than any other country in the world. Japan was the second-largest, at 0.96 million, while Korea ranked fifth, at 0.43 million (FOURIN, 2011b). Of the top five automobile industries in that year, three are in East Asia. In 2001, Japan held second place, South Korea was in fifth place, and China was in seventh place. This momentum is not likely to slow: production in China will increase to around 25 million by the mid-2010s and is likely to exceed the output of other countries.

This study aims to analyze the international competitiveness of the Japanese, Korean, and Chinese automobile industries. In analyzing in detail the production, sales, and import–export statistics published by each country’s Automobile Manufacturer Association, we clarify the competitiveness of each country and the differences among them.¹

Many research studies have been undertaken on the competitiveness of the East Asian automobile industries (Tsuchiya et al., 2006). These studies analyze many aspects of automobile makers, such as their development, production, distribution, finance, supply chains, organizational capability, industrial policies of the government, and historical processes. There has been, however, a dearth of research on how the international competitiveness of a country’s automobile industry as a whole can be examined quantitatively. Most of the existing research touches only on production and export numbers as numerical indices of international competitiveness; furthermore, these numbers tend to be based only on the so-called Producer Country Base (as described later). This study analyzes the international competitiveness overall of the Japanese, Korean, and Chinese automobile industries.

Before starting the analysis, it is important to define some key terms.

¹This paper is based on Shioji (2008), which mainly uses and analyzes 2005 statistics. This study updates the statistics to 2010 and revises parts of that earlier work.

1.1 International Competitiveness

We analyze competitiveness in terms of both the domestic market and the global market. Therefore, in speaking of the Korean maker Hyundai Motor/Kia Motor (hereinafter, Hyundai Motor), for example, we analyze production not only in Korea—at 3.16 million vehicles (FOURIN, 2011a)—but also that in the global market (6.6 million vehicles (FOURIN, 2011b)), including those vehicles produced outside Korea.

1.2 Automaker Nationality

A “domestic automaker” is defined as follows: its world headquarters must be located in its own country, its main operations (such as development and production) must be located locally, it has its own vehicle brands and distributes them by itself, and the majority of its stock is not held by a foreign automaker.

Here, we clarify this definition with some real-world examples. In the case of Renault Samsung in Korea, a majority of its stock (70.1 percent) is held by France’s Renault, and it also has some directors from Renault. Renault and Nissan Motors of Japan have initiatives in vehicle development and production, and all the models of Renault Samsung are derivatives of Nissan and Renault models. Therefore, we define Renault Samsung as French, and not Korean. For the same reason, GM Korea is a US automaker. On the other hand, Volkswagen of Germany has initiatives through which to develop the vehicles of Shanghai Volkswagen, and so Shanghai Volkswagen is considered a German maker (holding ratio: 50 percent). Similarly, Mitsubishi Fuso Truck and Bus in Japan is considered a German automaker, because Daimler holds 100 percent of its stock.

1.3 Producer Country Base and Maker Base

In this study, we use two bases by which to evaluate a country’s vehicle production. These are the Producer Country Base (PCB) and the Maker Base (MB). For PCB, when we consider how many vehicles a country produces, we count the number of vehicles produced in its home country, ignoring whether the automakers are domestic (e.g., Hyundai Motor) or foreign (e.g., Renault Samsung). On the other hand, we do not include the number of vehicles produced by domestic makers (e.g., Hyundai Motor) in a foreign country (for example, in the US); those production numbers are included in those data of the foreign countries. The PCB is the figure typically used by each country’s Automobile Manufacturer Association, such as the Korea Automobile Manufacturers Association (KAMA) or the Japan Automobile Manufacturers Association (JAMA), and published as the domestic production of each country. For example, Korea’s PCB in 2010 was 4.27 million.

MB, on the other hand, is a country's aggregate number of vehicles that domestic makers produced globally—not only in their home countries, but also in foreign countries. In the case of Japan, Toyota Motor² produced 8.69 million vehicles globally in 2010, and Nissan Motors produced 3.72 million; Honda produced 3.61 million. Aggregating these numbers of all Japanese domestic makers, we can derive the Japanese MB in 2010: 22.67 million. This figure consists of the domestic production of 9.63 million and the overseas production of another 13.04 million. Japan's highest MB was 23.27 million, in 2007—a figure comprising the domestic production of 11.60 million and the overseas production of 11.67 million (FOURIN, 2011b). These numbers exclude production in Japan by the subsidiary companies of foreign makers. Similarly, in the case of Korea, we exclude the production of GM Korea, Renault Samsung, SsangYong Motor, and Tata Commercial from the Korean MB production figures.

1.4 Numerical Index of Global Competitiveness

We use various figures as numerical indices by which to determine a country's global competitiveness. Among these figures, we give top priority to MB numbers.

In the case of China, however, there might be bias stemming from its enormous domestic market: China has huge production and sales numbers, but almost all the vehicles therein are produced and sold in China. Chinese makers were able to export only 0.55 million vehicles and develop the overseas production of fewer than 0.2 million vehicles in 2010.

Therefore, in our methodology, we give top priority to global production and sales by MB, and this should be complemented by other aspects. However, we still consider a country's MB global production and sales the most important numerical indices of a country's global competitiveness.

2 Production and Export Numbers

2.1 Production Country Base

Based on the PCB production figures shown in Table 1, China ranks first worldwide, while Japan and Korea rank second and fifth, respectively, as mentioned. Clearly, these three countries play an important role in world automobile production.

²This includes Daihatsu Motor and Hino Motor.

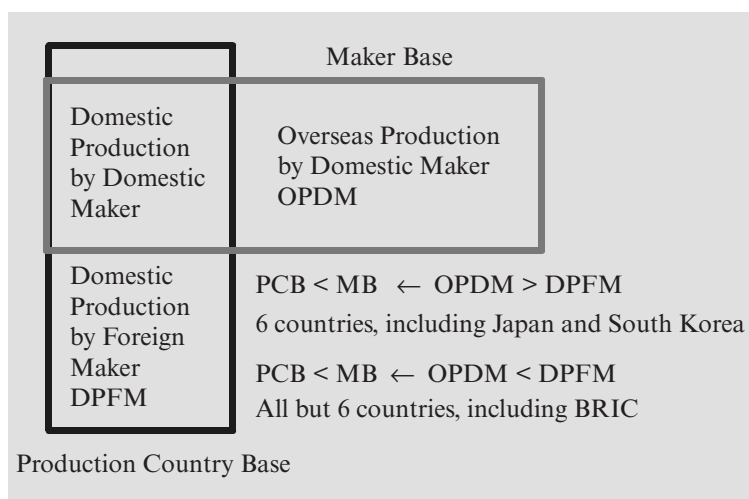
Table 1. Top Automobile Producers Worldwide, by PCB and MBE.

Country	Production Country Base		Maker Base	
	2010 (10 k)	2010 Ranking	2010 (10 k)	2010 Ranking
China	1,826	1	980	4
Japan	963	2	2,267	1
US	774	3	1,540	2
Germany	591	4	1,162	3
S. Korea	425	5	660	5
Brazil	364	6	–	–
India	352	7	160	8
Spain	239	8	–	–
Mexico	235	9	–	–
France	223	10	617	6
Top 10 subtotal	5,992	81.70%	7,386	94.50%
Global total	7,815	100.0	7,815	100

Source: Data are based on Japan Automobile Manufacturers Association, *World Motor Vehicle Statistics 2011*, March 2011; FOURIN, *FOURIN's Monthly Report on the Global Automotive Industry*, No. 310, June 2011; and FOURIN, *FOURIN's Monthly Report on the Asian Automotive Industry*, No. 51, March 2011.

2.2 Maker Base

Next, in examining MB production (Table 1), we find there to be many differences between PCB and MB. Remarkably, there are five countries whose MB production is much lower than their PCB production: China, Brazil, India, Spain, and Mexico. The reason for this discrepancy is that domestic makers' total production does not include a major share of each country's PCB production: foreign automakers build assembly plants in these five countries and they constitute large production shares. On the other hand, the domestic makers within these five countries do not have overseas production bases; even if they do have factories in foreign countries, their numbers are too small to compensate for the loss from foreign makers' production in these countries.

Figure 1. Production Country Base and Maker Base.

As shown in Figure 1, when Domestic Production by Foreign Makers (DPFM) exceeds Overseas Production by Domestic Makers (OPDM), MB production will be smaller than PCB production.

From Figure 1, we see that the MB production of each of Brazil, Spain, and Mexico is very low compared, to their respective PCB production figures. The MB production of these three countries all approach zero. The situation in India is not so extreme; its MB production is about one-third of its PCB production.

China has witnessed a gradual closing of this gap, but we still find such trends there. As shown in Figure 2, China's PCB production in 2010 was 18.26 million vehicles; however, of these, around 8.56 million vehicles were produced under license from foreign makers (FOURIN, 2011b). The production of Chinese domestic makers' original brand, by MB, stood at around 9.70 million vehicles in 2010.

However, production by Chinese domestic makers in foreign countries remains at low levels. Shanghai Motor bought SsangYong Motor in 2005, but withdrew in 2009. Similarly, Shanghai Motor did not restart full-scale assembly at MG-Motor (MG Rover), which it had previously purchased, until 2010. Even if we include the production of 0.14 million automobiles at Volvo, which was bought by Geely, Chinese total overseas MB production amounted to less than 0.2 million in 2010. Therefore, MB production by China globally was at around 9.9 million in that year, as shown in Figure 2.

Next, we consider countries whose MB production is higher than their PCB production. In these countries, total domestic production by domestic makers accounts for a large share of each country's PCB production. In addition, the

Figure 2. Automobile Production in China.

Chery Geely BYD, FAW SAIC, Dongfeng	Less than 0.05 million (Overseas) + Volvo/MG-Motor
Shanghai VW (Germany) Beijing Hyundai (South Korea) TFTM (Japan) Shanghai GM (US)	Maker Base (MB) 9.90 million in 2010 Global Production by Chinese Production Country Base (PCB) 18.26 million in 2010 Domestic Production in China

domestic makers' total overseas production is so large that they can compensate for the vehicles produced by foreign automakers within their home countries. In Table 1, we find five such countries (Japan, the US, Germany, Korea, and France). We can also add Italy, which does not appear in Table 1. At present, only these six countries, among 200 countries or areas worldwide, have a MB production figures that exceed their PCB production figures.

The PCB and MB production figures of Korea and Japan are shown in Figures 3 and 4, respectively.

2.3 Exports

From Table 2, in 2010, we can see that the world's largest exporter of automobiles was Japan (4.84 million), followed by France (4.80 million), Germany (4.48 million), Korea (2.77 million), and Spain (2.08 million). There are two East Asian countries among the top five.

2.4 Export Surplus and Trade Specialization Index

Here, we examine export surplus and trade specialization index figures, to evaluate the competitiveness of Korea and Japan. From Table 3, Japan (3.46 million)

Figure 3. Automobile Production in Korea.

Hyundai/Kia Daewoo Bus	Hyundai/Kia Subsidiaries in China, USA, India, Turkey, Russia, Czech, Slovakia (Overseas)
GM Korea (US) Renault Samsung (France) Ssang Yong (India) Tata Commercial (India)	Global Production by Korean Maker Base (MB) 6.60 million in 2010 Domestic Production in Korea Production Country Base (PCB) 4.27 million in 2010

Figure 4. Automobile Production in Japan.

Toyota, Nissan Honda, Mazda Mitsubishi, Subaru Daihatsu, Hino Isuzu, Suzuki	At around 50 countries 13.15 million (only overseas)
Mitsubishi Fuso (Germany) 76 k UD Trucks (France) 30 k	Maker Base (MB) 22.67 million in 2010 Production Country Base (PCB) 9.63 million in 2010

Table 2. Automobile Exports of Top 10 Countries, 2010.

Country	Production Country Base		Maker Base	
	2010 (10 k)	2010 Ranking	2010 (10 k)	2010 Ranking
Japan	484	1	503	6
France	480	2	234.1	1
Germany	448	3	75.8	4
S. Korea	277	4	74.9	5
Spain	208	5	—	—
Mexico	192	6	—	—
US	111	8	1,540	2
China	55	9	980	4
Brazil	77	10	—	—
India	58	11	16.4	—
Total top 10	2,390		32.7	
Export Ratio: Export ÷ Production				
Source: Data are based on Japan Automobile Manufacturers Association, <i>World Motor Vehicle Statistics 2011</i> , March 2011; <i>FOURIN, FOURIN's Monthly Report on the Global Automotive Industry</i> , No. 310, June 2011; and <i>FOURIN, FOURIN's Monthly Report on the Asian Automotive Industry</i> , No. 51, March 2011.				

holds first place in terms of export surplus, followed by France (2.67 million) and Korea (2.08 million). Korea holds third place, ranking above Germany, as Korea's imports (0.07 million) are extremely small compared to its exports (2.77 million).

Moreover, Korea is the number one country in terms of trade specialization index, which is calculated as follows: $[\text{Export} - \text{Import}] \div [\text{Export} + \text{Import}]$. The closer to 1.0 a country's index value is, the more specialized its exports are; the closer to -1.0 this index value is, on the other hand, the more specialized the country is in imports. Korea's index is extraordinarily high, at 0.94; at 0.92, Japan also has a high index, ranking second worldwide.

However, as shown in Table 4, the US, Italy, and UK have import surpluses of 4.58 million, 1.16 million, and 0.87 million, respectively, and their trade specialization indices are -0.67, -0.6, and -0.258, respectively. These figures indicate these countries' weakness in terms of international automobile trade competitiveness.

Table 3. Export Surplus and Trade Specialization Index.

Country	Export Surplus (10 k)	Ranking	Trade Specialization Index	Ranking
Japan	346	1	0.915	2
France	267	2	0.525	3
S. Korea	208	3	0.937	1
Spain	118	4	0.371	4
Germany	112	5	0.185	–
Trade Specialization Index = (Export – Import) ÷ (Ex + Im) (In terms of the number of the vehicles)				
Source: Data are based on Japan Automobile Manufacturers Association, <i>World Motor Vehicle Statistics 2011</i> , March 2011; <i>FOURIN, FOURIN's Monthly Report on the Global Automotive Industry</i> , No. 310, June 2011; and <i>FOURIN, FOURIN's Monthly Report on the Asian Automotive Industry</i> , No. 51, March 2011.				

Table 4. Import Surplus and Trade Specialization Index.

Country	Export Surplus (10 k)	Ranking	Trade Specialization Index
US	458	1	–0.674
Italy	116	2	–0.604
UK	87	3	–0.258
Russia	49	4	–0.903
China	26	–	–0.191
China is –0.57 in terms of monetary amounts.			
Source: Data are based on Japan Automobile Manufacturers Association, <i>World Motor Vehicle Statistics 2011</i> , March 2011; <i>FOURIN, FOURIN's Monthly Report on the Global Automotive Industry</i> , No. 310, June 2011; and <i>FOURIN, FOURIN's Monthly Report on the Asian Automotive Industry</i> , No. 51, March 2011.			

2.5 Differences between Japan/Korea and China

As noted, Japan and Korea are highly competitive in the export market; China, however, is completely different. As already mentioned, China produced 18.26 million vehicles in 2010, but most of those vehicles were sold domestically: China exported only 0.55 million vehicles in 2010. The expansion of domestic production is mostly dependent on domestic demand. On the other hand, China imported 0.81 million vehicles in 2010; its import surplus is therefore 0.26 million in terms of the number of vehicles. In monetary terms, however, China's imports (USD 26.7 billion) are five times greater than its exports (USD 5.5 billion), because the average unit price of the imported vehicles is expensive (USD 33,000), while that of the exported vehicles is quite inexpensive (USD 10,000). China's trade specialization index is -0.191 in terms of the number of vehicles and -0.659 in monetary terms.

Therefore, China is completely different in terms of global competitiveness. China, which is deeply dependent on domestic demand, is quite different from Japan and Korea in this respect, as these two latter countries are not only leveraging their domestic markets but also penetrating foreign markets by both exporting vehicles and building overseas production bases.

3 Use in Operation, and Diffusion Ratio

3.1 Use in Operation

In terms of building global competitiveness, it is an important condition that domestic sales be large enough to leverage economies of scale. Domestic sales are closely related to use in operation (i.e., vehicle population). If we learn more about the vehicle population of each country, we can estimate annual domestic sales by dividing the vehicle population by the average number of replacement years.³ Therefore, the larger the vehicle population of a country, the larger its annual sales would be; that country can then achieve the basic conditions for global competitiveness.

With this as a given, what are the factors that determine a country's vehicle population? The main factors are population, income level, and the proportion of automobiles among all transport vehicles. For example, as shown in Tables 5 and 6, the US has an eminently high vehicle population (248.6 million) because of its large population (314.7 million), high income level (GDP per capita of

³The average number of replacement years differs among countries, but is usually in the range of 10–15 years. In this study, we standardize the period to 13 years.

Table 5. Use in Operation, among Top 10 Countries.

Country	Use in Operation (10 k)	Ranking	Share (%)
US	24,856	1	26.9
Japan	7,381	2	8.4
China	6,118	3	3.4
Germany	4,463	4	5.5
Italy	4,132	5	4.3
Russia	3,951	6	3.5
France	3,749	7	4
UK	3,522	8	3.9
Brazil	2,964	9	2.6
Spain	2,763	10	2.8
Top 10 total	63,899		65.4
S. Korea	1,733	14	1.7
Global total	96,526		100.0

Source: Data are based on Japan Automobile Manufacturers Association, *World Motor Vehicle Statistics 2011*, March 2011; *FOURIN, FOURIN's Monthly Report on the Global Automotive Industry*, No. 310, June 2011; and *FOURIN, FOURIN's Monthly Report on the Asian Automotive Industry*, No. 51, March 2011.

USD 47,300), and high dependence on automobiles. The US share of the world vehicle population (965.3 million) is 25.8 percent; if we divide its vehicle population of 248.6 million by 13 years, we get a figure of 19.1 million vehicles per year. This figure is several times greater than that of any other country, and it will allow the US to build a solid base by which its automobile industry can become globally competitive.

It is not well known that Japan is the second-largest country in terms of vehicle population. Japan has 73.8 million vehicles in use, because of its large population (127.5 million) and high income level (GDP per capita of USD 42,820).

China's vehicle population, at 61.2 million, is approaching that of Japan; although China's income level is quite low (USD 4,380), the population is overwhelmingly large (1.35 billion). Its vehicle population will continue to increase as China continues to grow economically.

Table 6. Diffusion Ratio of Automobile Production, among Top 10 Countries.

Country	Use in Operation per 1,000 persons (Vehicles)	Population (Millions)	GDP per Capita (USD)
US	790	314.7	47,284
Japan	580	127.2	42,820
China	45	1,345.8	4,382
Germany	543	82.2	40,631
Italy	690	59.9	34,059
Russia	280	140.9	10,437
France	602	62.3	41,019
UK	572	61.6	36,120
Brazil	153	193.7	10,816
Spain	615	44.9	30,639
Top 10 total	263	2,433.2	
S. Korea	359	48.3	20,591
Global total	141	6,829	

Source: Data are based on Japan Automobile Manufacturers Association, *World Motor Vehicle Statistics 2011*, March 2011; *FOURIN, FOURIN's Monthly Report on the Global Automotive Industry*, No. 310, June 2011; and *FOURIN, FOURIN's Monthly Report on the Asian Automotive Industry*, No. 51, March 2011.

With regard to projections of China's vehicle population, if the country's GDP per capita reaches USD 10,000, the vehicle population will reach a level of around 200 vehicles per 1,000 persons. We extrapolate this figure from Table 6, which shows that Russia (USD 10,400) has 280 vehicles per 1,000 persons and Brazil (USD 10,800) has 153 vehicles per 1,000 persons.

If China will reach the level of 200 vehicles per 1,000 persons, the vehicle population will be 300 million, based on a population of around 1.5 billion. If we divide 300 million vehicles by 13 years, annual sales will be 23.1 million vehicles. This figure is sufficiently large for China's automobile industry to achieve economies of scale solely through domestic demand.

Regarding Korea, its population (48.3 million) is larger than that of Spain but smaller than that of the UK (61.6 million) or France (62.3 million); however, it approximates the average Western European population size. Based on this

population size, Korea will be able to expand its vehicle population in the future to that of the Western European standard. However, the country's income level is low at present, and the Korean vehicle population (17.3 million) is about one-half that of Western European countries.

3.2 Domestic Sales: A Springboard for Global Competitiveness

As explained, one of the preconditions for automakers in expanding their global sales is that they have their own sufficiently large domestic market and, at the same time, they command a relatively high market share there. Generally, if they cannot sell in the domestic market, it would be difficult to export to the overseas market. Moreover, such conditions would make it much more difficult to build overseas production bases.

From Table 7, we see that China's domestic sales in 2010 (18.06 million vehicles) ranked it first worldwide. According to the aforementioned perspective, however, Chinese domestic makers account only for approximately half of its domestic market, as seen in Figure 2; the other half is supplied by foreign makers who assemble and sell vehicles in China. Domestic sales in Japan are the third-largest worldwide (4.96 million vehicles); Japanese domestic makers in 2010 accounted for more than 95 percent of domestic sales. However, domestic sales in Korea are not very small (1.56 million vehicles); Korean domestic makers account for more than 80 percent of domestic sales. Japanese and Korean automakers have acquired an eminently high market share in their relatively large domestic markets—and, as mentioned, this is one of the preconditions for global sales expansion.

3.3 Import Sales and Import Ratio: Extremely Low in Japan and Korea

From the import volume and import ratio figures in Table 8, one can clearly recognize a feature common to all three of China, Japan, and Korea: their extremely low import ratios. Compared to European countries—whose ratios range from 45 to 85 percent—those of China, Japan, and Korea are 4.6, 3.5, and 4.8 percent. Automakers who are located domestically account for sales shares exceeding 95 percent; however, makers that are located domestically are not necessarily domestic makers. In China, around one-half of all domestic sales are accounted for by foreign makers who are located and produce the vehicles in China.

Why, then, are the import ratios of these three countries so low? The reasons are completely different between China and Japan/Korea. In China, imported vehicles in the 1990s numbered between 30,000 and 80,000 per year, due to prohibitively high duties and the restrictions imposed on automobile imports

Table 7. Domestic Sales, among Top 10 Countries.

Country	2010 Domestic Sales		
	Domestic Sales	Ranking	Share (%)
China	1,806	1	26.0
US	1,177	2	17.0
Japan	496	3	7.1
Brazil	357	4	5.1
Germany	320	5	4.6
India	303	6	4.4
UK	229	8	3.3
France	271	7	3.9
Italy	217	9	3.1
Russia	211	10	3.0
Top 10 subtotal	5,387		72.8
S. Korea	154	12	2.1
Global total	7,403		100.0
Source: Data are based on Japan Automobile Manufacturers Association, <i>World Motor Vehicle Statistics 2011</i> , March 2011; <i>FOURIN, FOURIN's Monthly Report on the Global Automotive Industry</i> , No. 310, June 2011; and <i>FOURIN, FOURIN's Monthly Report on the Asian Automotive Industry</i> , No. 51, March 2011.			

prior to the country's entry to the World Trade Organization (WTO). After China's entry to the WTO in 2001, the Chinese government reduced the tariff to 25 percent; however, this rate is still high compared to the European (10 percent), US (2.5 percent for cars and 25 percent for light trucks), Japanese (0 percent), and Korean (8 percent) tariffs. China's 25-percent tariff acts as a substantial import barrier. China's annual imports remained in the range of 600,000–900,000 vehicles in the 2000s; this is why China's import quantity and import ratio have been low.

However, the reasons for Japan's and Korea's low numbers differ completely from those for China. In both countries, foreign makers consider the luxury market important; however, both markets mostly consist of compact vehicles. As a result, their luxury markets are small. Foreign makers cannot acquire a

Table 8. Import and Import Ratio of Top Countries.

Country	Imports (10 k)	Ranking	Import Ratio (%)
US	569	1	53.7
Germany	246	2	60.7
UK	212	3	85.1
Italy	154	4	65.3
France	121	5	44.5
China	81	6	4.5
Russia	55	7	26.3
Brazil	49	8	13.8
Japan	16	—	3.5
India	—	—	—
Subtotal	1,503		
S. Korea	7	—	4.8

Source: Data are based on Japan Automobile Manufacturers Association, *World Motor Vehicle Statistics 2011*, March 2011; *FOURIN, FOURIN's Monthly Report on the Global Automotive Industry*, No. 310, June 2011; and *FOURIN, FOURIN's Monthly Report on the Asian Automotive Industry*, No. 51, March 2011.

large market share in Japan and Korea, which is why import ratios remain low in these countries.

By making their import ratios low, both Japanese and Korean makers can acquire high market shares within their respective countries—which is, again, one of the preconditions, for global competitiveness.

4 Conclusion

Our conclusions are as follows. First, from the viewpoint of global competitiveness, Japan and Korea differ from China. Japan's and Korea's automobile industries are highly competitive, while China's is not. Chinese manufacturers are excessively dependent on the Chinese domestic market, and they are very weak in terms of exports and overseas production.

Second, the global competitiveness of the Japanese and Korean automobile industries has stemmed from the large size of their home markets and their high market shares there; both countries have relatively low percentages of imports in their respective home markets. The number of vehicles sold and the total vehicle population in the Japanese and Korean home markets are comparable to those in major Western European countries. Japanese and Korean automakers can use their domestic market as a springboard by which to penetrate the global market; moreover, they are very strong in the area of exports. Therefore, with high domestic sales, accompanied by a large volume of exports, they can enjoy economies of scale.

Third, although China is the biggest automobile manufacturer in terms of PCB, Chinese manufacturers rely heavily on their domestic market. Moreover, approximately one-half of China's market is held by foreign manufacturers, owing to the relatively weak technology development capability of Chinese domestic manufacturers.

Many aspects remain to be studied, to derive a full analysis of the international competitiveness of the Japanese, Korean, and Chinese automobile industries. For example, we need to analyze these three countries' penetration into the markets of developed countries (e.g., the US), their overseas production, and the like. Further research is required to address these issues.

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