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Chapter 4

China and India's Electrical and Electronics Industries: A Comparison of Market Structures*

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Abstract

There is a difference in development processes between China and India. Although the Chinese and Indian electrical and electronics industries were both in technological backwardness, it is known that the Chinese local firms have, in comparison with the Indian local firms, grown remarkably through fierce competition among themselves. In this study we will take up the Chinese and Indian TV markets as a representative product in the industries and investigate the subject of competition as a driver in the promotion of local industrial development. In this connection, we will compare market structures to validate our argument. In China, the key property lies in equal competition, as local firms with similar technological capabilities competed amongst themselves to build their unique advantages. By contrast in India, the property lies in competitive inequality, as only a few major firms dominated the market, therefore resulting in the development of fewer advantages compared to China. In addition, we compare entry barriers which form the structures, from a viewpoint of history of institutional changes in the industries.

Keywords: industrial development, market structure, entry barrier, electrical and electronics industry, television receiver (TV), China, India

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1 Introduction

Growing countries do not necessarily follow a same industrial development process. China and India both have been growing remarkably under economic liberalization after the 1980s, and their electrical and electronics industries, though both regulated before the liberalization, have also developed from then on. Despite sharing common starting points, the growth and development of the electrical and electronics industries differ significantly in both countries. In China, the industry has become one of the country's leading industries, whereas in contrast India has instead focused on the development of the software and IT enabled services, which has attracted world attention, to serve as their driving force rather than in the hardware-centered industry (Popkin and Iyengar 2007).[1]

There are previous studies on development of the electrical and electronics industry in each country. On India, Esho (1988) indicates that technological backwardness become disadvantageous for development.[2] The technological development has been suffocated by the licensing system favoring small-scale sectors before the partial liberalization in the 1980s. On the other hand, the industries in the East Asian countries and areas, in particular South Korea and Taiwan, have developed at a certain level in the early 1980s. In fact, Joseph (2004) shows that the Indian local firms have been receiving impacts from abroad after the full liberalization in the 1990s. Certainly the industry has developed after the 1980s, however the local firms have faced uphill competition with foreign-affiliated firms and imports.

However, from the Chinese perspective, things are different. Although the Chinese local firms were also in technological backwardness, Marukawa (1996, 2007), Ohara (1998), and Kimura (2006) show that they have complemented the technological deficit and realized remarkable growth. They have lacked technology to develop new products and manufacture core components in comparison with foreign-affiliated firms,

[1] The Indian development process is interested not only from the viewpoint of the Chinese pattern but also the whole East Asian one. On the contrary to India, growth of the East Asian countries and areas also tends to depend on the hardware-centered industry. Therefore a comparison between China and India would shed light on the difference between the East Asia and India.

[2] In addition, growth-inhibitive factors for whole manufacturing in India are also related to the underdeveloped state of the electrical and electronics industry. Kojima (2002) indicates inadequate infrastructure, in particular electricity shortage, as the factors. Uchikawa (2006) shows that, although the economic liberalization has inspired investments in some industries, however not inspired in the infrastructure industry.

however they have instead focused on the full utilization of purchased components for quality improvement and product differentiation, and construction of nationwide sales channels and after-sales service networks for improvement of sales forces.[3] This unique strategy was originated and cultivated through fierce competition among themselves which has had a profound impact on the development of the industry.

In comparing the experiences between India and China, the existence of competition serves as the key property and differentiator in the development of the electrical and electronics industries. In this study, we will further investigate the role of competition in the context of industrial development, and review the type of markets and environment required to foster competition.

To start, we will first compare market structures in China and India to identify differences in the property. Market structure is defined as the number of firms in a market and distribution of market share of each firm. We relate the market structures to the property of competition. Second, we will then study the subject of entry barriers as a condition of the structures. The entry barrier is cost borne only by new entrants not by incumbents. The barrier is formed by, for example, assets owned by incumbents exclusively, licenses for entry, sunk costs, and so on. Based on this framework, we take up television receiver (hereafter, TV) markets to analyze particular market structure concretely. TV is one of the most popular and representative products in the electronic and electronics industry in both countries.

From the comparison of the TV markets, our preliminary study leads us to conclude that equality of competition serves as a key property in the development of industries. Competition among firms with almost even technological capabilities promotes industrial development. Although many Chinese local firms do not possess the same technological capabilities as those of foreign-affiliated firms, they have formed their own advantages through competition among themselves. As a result, they have expanded their market shares against the foreign-affiliated firms. By contrast in India, only a few major local firms have topped the list during the 1990s and the stable market structure has been kept, therefore the property is in inequality. And after the full liberalization in the late 1990s, the foreign-affiliated firms which had technological advantages have entered and taken over the market share. Comparison between China

[3] There is another possibility to complement the deficit. Firms specializing to develop new products and manufacture user-friendly core components have been rising, and they have backed up growth of the local firms lacking technological capabilities (Kimura 2007, and Imai and Xu 2008).

and India in the 1990s indicates a correlation between industrial development and market structure.[4]

The next section reviews development of the electronic and electronics industries in both countries. In Section 3, we show the differences of the market structures and the property of competition. In Section 4, the height of the entry barriers that form the market structures are analyzed from a historical viewpoint. Finally we make concluding remarks and note remaining problems to be solved in future.

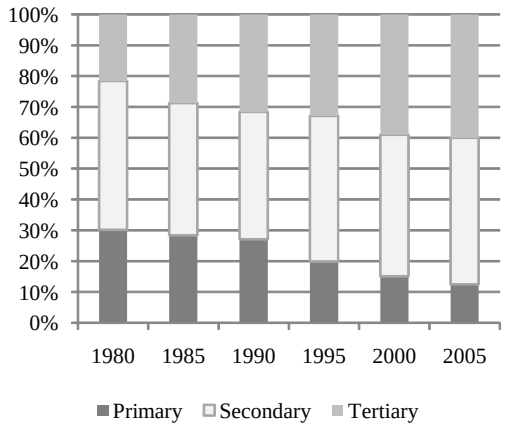
2 Industrial Development

Despite the rapid growth of China and India's economies, their development patterns are different in terms of industrial structure. In China, the economic reform and open door policy which began in 1978, successfully promoted economic growth. Similarly in India, the partial and full liberalization that began in the 1980s and the 1990s also drove economic growth. However, the ratio of secondary industry, including the electrical and electronics industry, to the whole economy in China is much higher than the ratio in India (Figure 1). It is shown that the engines of growth are different in both countries.

[4] Esho (1988) and Joseph (2004) indicates that the partial liberalization in the 1980s was favorable for incumbents and large scale firms, and it is considered that this is related the market structure in the 1990s. On the partial liberalization, Rodrik and Subramanian (2005) recognizes that, although the partial liberalization in the 1980s favored incumbents and therefore it was "probusiness" rather than "premarket" realized by the full liberalization in the 1990s, the partial liberalization has contributed the Indian growth crucially. We also need to investigate the relationship between the liberalization process and the market structure in the Indian TV market after the 1980s anew.

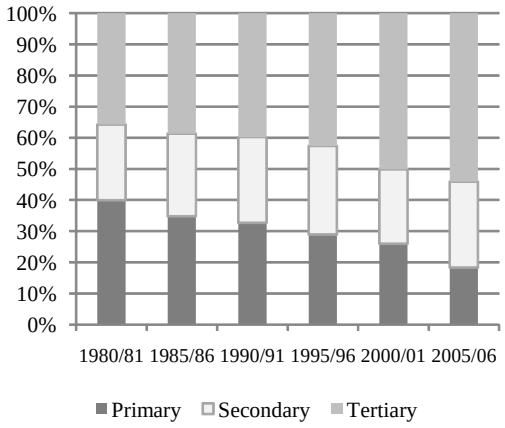
Figure 1: Industrial structures, China: 1980-2005, India: 1980/01-2005/06

(a) China



Sources: National Bureau of China. *China Statistical Yearbook.* Beijing: China Statistical Press, various year.

(b) India



Sources: For 1980/81 to 2000/01, Government of India. *Statistical Abstract India.* New Delhi: Government of India, various year. For 2005/06, Government of India. 2008. *Monthly Abstract of Statistics (October 2007).* New Delhi: Government of India.

In China, the electrical and electronics industry have developed into one of China's leading industry (Table 1). Although it is in nominal terms, growth after the mid-1990s has been rapid, and the industrial scale has expanded by about three times every five years. Consequently the ratio of value-added of the electric and electronics industry to the secondary industry has been increasing from 6.85% in 1985 to 12.88% in 2005. Therefore the industry has contributed to rapid economic growth in China.[5]

Table 1: Electronic and electronics industry in the Chinese economy

	Unit	1980	1985	1990	1995	2000	2005
Value-added of industry	100 Million Yuan	1,648.35	2,767.37	5,093.25	15,446.12	25,394.80	72,186.99
Electrical Industry	100 Million Yuan	n.a.	111.88	209.90	603.82	1,231.50	3,574.13
Ratio	%	n.a.	4.04	4.12	3.91	4.85	4.95
Electronics industry	100 Million Yuan	31.51	77.78	146.21	635.00	1,824.31	5,722.11
Ratio	%	1.91	2.81	2.87	4.11	7.18	7.93

Notes: "Value-added of industry" for 1980 to 1990 is value for net value of output.

Sources: National Bureau of China. *China Statistical Yearbook.* Beijing: China Statistical Press, various year.

[5] Although exports of the electrical and electronics products from China have been expanding remarkably and exports of them by the local firms also have been increasing after the late 1990s, however major exporters are still foreign-affiliated firms. In addition, we are here concerned with growth of the Chinese and the Indian local firms against a backdrop of each native market, therefore we concentrate on the Chinese and the Indian markets not on overseas markets.

By contrast, the significance of the electrical and electronics industry in the Indian economy has not grown as rapidly compared to China (Table 2). Growth between the mid-1980s to the mid-1990s has been rapid, however the pace has slowed in the late 1990s. Consequently, the ratio of value-added of the electric and electronics industry to the secondary industry has increased to 5.16% in 1980/81 to 6.02% in 2005/06, however the ratio has declined after a peak, 8.25% in 1995/96, in the observation period. Because the ratio of the secondary industry to the economy in India is smaller than the ratio of China in the first place, the significance of the industry is much smaller than that in China. It is known that the difference between the Chinese and Indian industrial structures has emerged after the 1990s.

Table 2: Electronic and electronics industry in the Indian economy

	Unit	1980/81	1984/85	1990/91	1995/96	2000/01	2005/06
GDP from manufacturing	Crore Rupee	18,962	31,081	93,384	211,659	324,519	544,870
Electrical and electronics industry	Crore Rupee	978	1,658	7,483	17,464	18,038	32,822
Ratio	%	5.16	5.33	8.01	8.25	5.56	6.02

Note: Although "Electrical and electronics industry" is utilized "electrical machinery" in the statistics, coverages are almost same.
Sources: Government of India. *National Accounts Statistics.* New Delhi: Government of India, various year.

3 Market Structure

3.1 Degree of Concentration

To investigate a background of the difference, next we see the market structures in both countries (Tables 3 and 4).[6] A representative measure on market structure is a degree of concentration. The Herfindahl-Hirschman Index (hereafter, HHI) is a measure of concentration, and it is calculated by squaring market share of each firm in a market and then summing them.[7] In China, the HHI for top five in 1993 is 454.8, and the HHI for top 10 in 2005 is 882.2. By contrast in India, the HHI for top five in 1993/94 is 651.2, and the HHI for top 10 in 2005/06 is 1093.2. The measures of both years in China are lower than in India, therefore it shows more competitive in the Chinese market.

[6] The Chinese TV market is supposed by color TV market, because color TV has been prevailing in both urban and rural markets after the 1990s. The Indian TV market is supposed by color and black and white (hereafter, B&W) TV markets, because B&W TV also has been sold well still in India at least in the 1990s.

[7] For example, if there are three firms and each share is 50%, 30%, 20%, then the HHI is 3,800 ($=50^2+30^2+20^2$).

Table 3: Market Share in China, 1993-2005

(Unit: %)

	1993	1994	1996	1997	1998	1999	2001	2003	2004	2005
Konka	13.4	11.0	12.2	15.1	13.7	15.9	12.7	16.5	15.5	15.7
Changhong	4.2	5.0	20.5	25.0	33.7	13.2	16.5	15.5	14.5	13.9
TCL	n.a.	n.a.	6.2	9.5	7.8	11.0	14.1	12.7	13.5	13.1
Skyworth	n.a.	n.a.	n.a.	4.4	2.6	4.5	8.2	10.3	12.3	11.5
Hisense	1.9	n.a.	n.a.	3.1	5.6	8.5	9.9	8.9	10.4	7.9
Haier	n.a.	n.a.	n.a.	n.a.	7.9	7.8	6.8	6.1	6.7	6.2
Sony (Japan)	n.a.	3.5	5.5	n.a.	2.3	3.6	3.3	3.0	3.2	3.5
Sanyo (Japan)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1.3	3.2	3.9	3.3
Panasonic (Japan)	10.7	14.7	13.3	6.7	2.3	n.a.	1.9	1.9	2.0	2.9
Philips (Netherlands)	n.a.	n.a.	n.a.	4.5	2.4	n.a.	3.2	2.4	2.7	2.5
Xoceco	3.3	n.a.	2.7	3.8	2.0	6.5	3.0	3.0	2.9	n.a.
SVA	4.2	3.7	2.7	4.5	2.0	2.8	2.7	3.0	2.7	n.a.
LG Electronics (S. Korea)	n.a.	n.a.	n.a.	n.a.	3.6	n.a.	2.2	3.5	2.3	n.a.
Toshiba	2.1	n.a.	4.2	n.a.	2.1	n.a.	3.0	2.7	2.0	n.a.
Panda	11.2	11.0	4.6	3.9	5.6	2.9	2.6	n.a.	n.a.	n.a.

Note: Notice that the share of each year cannot be compared directly, because the source for each year is different.

Sources: For 1993 to 2004, Marukawa (2007). For 2005, Sinomonitor International. 2006. *2006 CMMS Zhongguo Pinpai Fazhan Baogao: Jiadian, IT, Shuma [2006 CMMS Chinese Brand Development Report: Home Appliance, IT and Digital Appliance]*. Beijing: Sinomonitor International (Chinese).

Table 4: Market Share in India, 1992/93-2006/07

(a) 1992/93-2000/01

(Unit: %)

	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01
Videocon	17.97	17.5	21.0	25.4	24.9	20.6	20.7	23.6	23.2
BPL	13.07	15.2	20.3	22.4	21.2	18.3	16.9	17.7	14.6
LG (S. Korea)							3.3	7.2	9.6
Mirc	5.38	7.0	10.5	10.5	8.4	9.1	10.0	10.0	9.0
Samsung (S. Korea)							6.1	7.0	8.2
Philips (Netherlands)	5.21	6.7	10.9	7.6	9.5	6.6	5.6	5.5	3.3
Hotline Wittis							1.1	2.8	2.8
Sharp (Japan)	3.45	4.5	5.6	3.4	3.6	2.8	2.8	3.1	2.7
Dixon								2.4	2.6
Panasonic (Japan)							1.7	2.0	2.3
Import	0.1	0.1	0.6	1.1	0.3	0.4	0.7	0.3	0.2

Notes: The item includes spares and kits for TV. And number of firms for shares before 2000/01 and after 2001/02 are different in the statistics, therefore the tables are splited.

Sources: Centre for Monitoring Indian Economy. *Industry: Market Size & Shares.* Mumbai: Centre for Monitoring Indian Economy, various year.

Table 4: Market Share in India, 1992/93-2006/07 (continued)

(b) 2001/02-2006/07

(Unit: %)

	2001/02	2002/03	2003/04	2004/05	2005/06
LG (S. Korea)	10.8	13.6	16.7	20.5	20.4
Videocon	21.7	20.3	21.2	23.2	19.9
Samsung (S. Korea)	8.6	11.9	14.0	12.0	12.5
Mirc	9.5	10.8	9.4	9.5	9.2
Philips (Netherlands)	4.0	4.1	3.5	4.5	4.7
Trend	2.0	1.9	1.9	2.1	3.3
Panasonic (Japan)	1.5	1.1	1.1	1.2	1.3
Indo Count				0.7	1.2
Sharp (Japan)	2.4	1.9	1.3	1.0	0.9
Salora	1.5	1.7	0.9	0.7	0.5
BPL	12.8	5.2	4.8	1.5	0.4
Import	0.3	0.4	2.0	4.6	7.8

Notes: Same as those for Table 4 (a). And, in addition to top 10 in 2005/06, the table also includes BPL.

Sources: Same as those for Table 4 (a).

3.2 Property of Competition

3.2.1 China

Next we extract the property of competition from a firm-level viewpoint. At first, the property in the Chinese market is characterized by homogeneousness in the market structure. In China, many major firms such as, Konka, Changhong, TCL, Skyworth, Hisense, Haier, and Panda, have been unable to differentiate and become the dominant market leaders in the industry (Table 3 mentioned above). During the 2000s, the top four firms had 10% to 15% of the market share between them. Moreover the rank is unstable, for example, Panda ranked second in 1993, however it does not belong to the top group at present.

Consequently, the property in China is the equality of competition. Because the major local firms have kept almost equal competitive relationship as shown in the structure, consequently they have grown together and expanded their market shares against the foreign-affiliated firms. Through the competition, they have built their unique capabilities as mentioned in Introduction. Equality is the property of competition in the Chinese market.

3.2.2 India

By contrast, the Indian market structure is not homogeneous as the Chinese one, namely

there exist a disparity between a few major firms and the other. Despite a multitude of companies in the TV market, the major local firms such as Videocon, BPL, and Mirc, have steadily kept their market share during the 1990s (Table 4a mentioned above). They had grown as of the early 1990s , and the position has not been shaken.[8]

Consequently, the property in India is the inequality of competition. From the stable market structure, it is considered that the competition in the 1990s has been limited in coverage of the Indian local firms. In fact, the major firms did not compete with each in terms of market shares as experienced in China, and local new entrants that would become major subsequently have not appeared. The effect of competition shown in China has not appeared in India.

The evident of the limited effect of competition is shown in the market structure after the late 1990s. After the stable structure, new entrants came from abroad not from domestic after the full liberalization in the 1990s (Table 4b mentioned above). Entries of foreign-affiliated firms and imports have shaken the structure with the major local incumbents. In the 1990s, South Korean firms, Samsung and LG, expanded their shares. The whole South Korean share was 9.4% in 1998/99, however increased to 32.8% in 2006/07. In addition, decreasing import duty, competitive pressures by import also increased in particular after 2004/05.[9] Incumbents faced harder competition before they build their own competition power.

3.3 Existence of Competition

At the end of this section, we confirm whether competition has existed or not, with changes of prices and profit rates. When prices and profit rates are decreasing, it shows firms are competing with each other.

The prices of the electronic and electronics products in China have been decreasing continuously after the economic boom in the mid-1990s (Table 5). The prices decreased even in years, 1996, 1997, 2004 and 2005, when the general index increased.

[8] Because the structure in the 1990s was formed already in the beginning of the 1990s, we need to investigate, growth processes of the Indian major local firms, the market structure, and property of competition in the 1980s as a future issue.

[9] Shiino (2006) indicates that many electronics goods have been imported by Indian traders recently.

Table 5: Index of retail prices in China, 1993-2005

(previous year = 100)

	1993	1994	1995	1996	1997	1998	1999
General index	113.2	121.7	114.8	106.1	100.8	97.4	97.0
Eelectronic and electoronics product	107.0	106.7	100.7	98.7	95.6	93.9	94.0
Color TV	rise of about 10%	rise of 0.4% for 21-inch	decline of 1.9% for 21-inch, decline of 3% for 25-inch	decline of 11.6% for 25-inch	rise of 15% for 21-inch	decline of 14.4% for Changhong (2919PK)	decline of 36.2% for Changhong (D2965A)

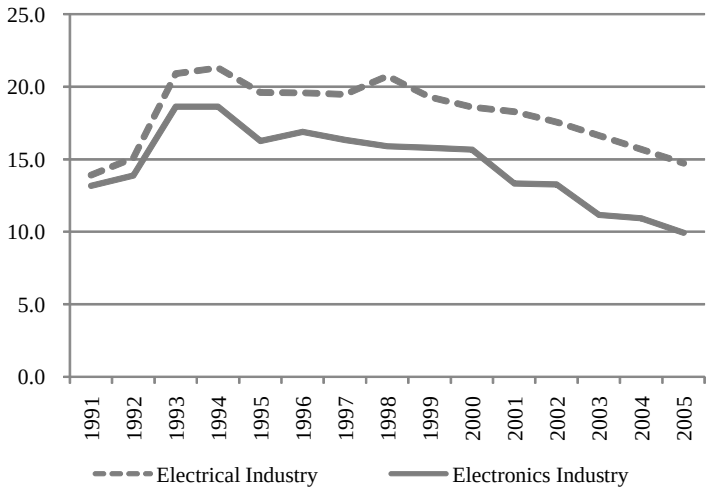
	2000	2001	2002	2003	2004	2005
General index	98.5	99.2	98.7	99.9	102.8	100.8
Eelectronic and electoronics product	93.6	93.9	94.2	94.2	94.7	96.3
Color TV	decline of 22.2% for Changhong (D2965A)	decline of 13.9% for Changhong (C3419PD)	decline of 28.8% for Changhong (C3419PD)	decline of 3.0% for Changhong (C3419PD)	n.a.	n.a.

Note: "Electronic and electronics product" after 2003 includes audio apparatus.

Sources: "Zhongguo Wujia Nianjian" Bianjibu. *Zhongguo Wujia Nianjian [China Prices Yearbook]*. Beijing: Zhongguo Wujia Chubanshe, various year (Chinese).

The profit rates of the electrical and electronics have also been decreasing (Figure 2).[10] Although the profit rates of the electrical industry and the electronics industry increased from 1991 to 1994 against the backdrop of increasing prices, however the rates have been decreasing steadily since 1995.

Figure 2: Profit rate in China, 1991-2005 (%)



Notes: Gross income on sales is (Sales revenue - Cost of sales)/Sales revenue x 100.
Sources: Same those as Table 1.

[10] The profit rate for China is here gross income on sales as noted at Note of Figure 2. Notice that the gross income includes sales and general administrative expenses.

The prices of the electrical and electronics industry in India have also been decreasing during the period between 1995 and 2005, although it is not known that changes of prices before the mid-1990s. (Table 6). The price of color TV decreased to half, and the prices of the other products also decreased remarkably.

Table 6: Retail prices in India, 1995 and 2005

	1995 (Rupee)	2005 (Rupee)	Rate of change (%)
Color TV (21-inch)	18,000	9,000	-50
Video/DVD player	12,000	2,800	-77
Mini stereo system	24,000	12,000	-50
Headphone stereo system	1,000	400	-60
Wireless headphone	4,000	2,500	-38
Mobile phone	25,000	4,000	-84
Car audio	18,000	6,500	-64
Camcorder	40,000	22,000	-45

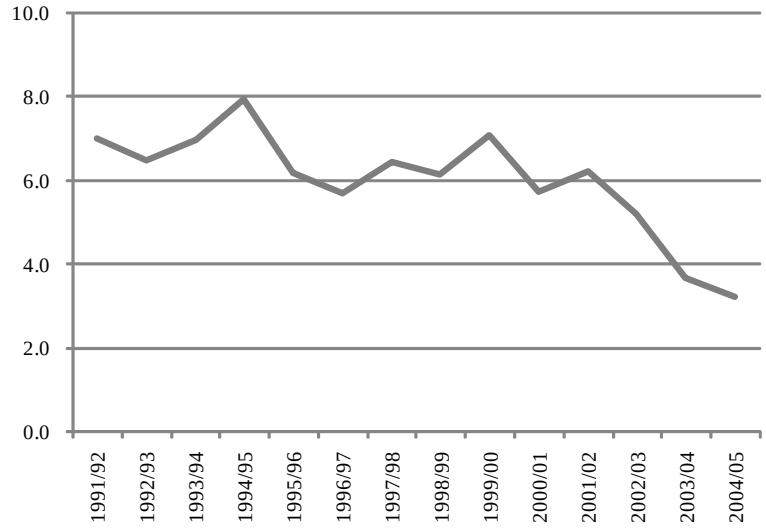
Source: Singh, Bhuwan B., Victor Chua, and Yuichi Okamoto. 2006. "Seicho Ichijirushii Indo Minsei Denshi Kiki Shijo no Genjo [Current Condition of Booming Consumer Electronics Market in India]." *JEITA Review*, 7 (5): 2-7 (Japanese).

The profit rates of the electronic and electronics are also decreasing after the mid-1990s (Figure 3).[11] Although the rates were about 7% in the early 1990s, however they have been decreasing gradually. The rates were about 6% in the late 1990s and were dropping sharply in the 2000s.[12]

[11] The profit rate for India here is operating profit on sales as noted at Note of Figure 3. The operating profit is gross income – sales and general administrative expenses. Therefore notice that it is impossible to compare the rates in Figures 2 and 3.

[12] At the firm-level statistics after 1997/98, Asaka (2007) shows that Videocon and Mirc have kept their net profit margin, although the margins have not been on the rise. On the contrary, he shows that BPL has dropped its net profit margin, because it has expanded much business. BPL also has dropped the shares as shown in Table 4.

Figure 3: Profit rate in India, 1993/94-2004/05 (%)



Notes: Operating profit on sales is Operating profit/Gross sales.
Sources: Centre for Monitoring Indian Economy (CMIE). *Industry: Financial Aggregates & Ratio.* Munbai: CMIE, various years.

Consequently, it is confirmed that competition in China and India has been increasing since at least the mid-1990s, despite the differences in the market structures and the property of competition in both countries.[13]

4 Entry Barrier

4.1 China

4.1.1 Competition Condition Formed Historically

We see entry environment as competition condition from a brief history of institutional changes in the electrical and electronics industry.[14] China and India have been in the liberalization, therefore the market structures have been influenced by the processes of the institutional changes. At first, we show that the entry barrier has been low in China relatively.

[13] It is needed to confirm the prices and the profit rates before the mid-1990s further.
[14] In addition, whether firms can purchase core component or not also constitute a factor of the entry barrier. In China, however, because a lot of local firms could purchase CRT, therefore the factor has not become the barrier (Marukawa 1996).

Before the economic reform, entry was restricted by the government, because China was in planned economy and the industry was developed as a defense industry for national security reasons. Therefore military goods, such as radar, wireless communication equipment and so on were placed greater emphasis by the government over consumer products. And early production capacity was formed by supports of former Soviet Union and so on during the First Five-Year Plan (1953-57).

However, in the 1970s, the Chinese government began encouraging the production of consumer goods because problem of excess production capacity for the military goods. For example, Changhong started to produce B&W TV in 1972 and color TV in 1985. Through transformation of production from military goods to consumer ones, they entered into new product lines, in particular TV, in the electrical and electronics industry. Therefore, there may have been a story that the transformed firms have dominated the industry since then.

In the 1980s, however, the Chinese local governments set up firms one after another, and in addition to firms transformed from defense industry, many new firms entered the TV market after the economic reform.[15] In the top four firms occupying a more than 10% share as of 2005 in Table 3, the three firms except Changhong were established in the 1980s. The Chinese central government tried to let a few registered firms manufacture color TV, however the local government introduced a lot of production lines from abroad. All of the above factors led to the development of fierce competition. Although market entry was led by the local government mainly not by private, the condition for competitive market was set through such investment.[16]

In addition they were homogeneous in technological know-how for manufacturing TV. They equally did not have enough experiences for assembling TV and facilities for internalizing CRT. Therefore, although some firms might have experiences for manufacturing some electronic and electronics industry, however they are equally nearly new comers as manufactures of TV.

Against the backdrop of market expansion in the 1990s, they have competed among the local firms and foreign-affiliated firms, and they have formed competition power through fierce completion. In China, although it was led by local government, many homogeneous firms have “freely” entered, therefore adequate competition that

[15] On the Chinese TV manufactures, see Marukawa (1996).

[16] Although we need to review an impact of entries led by the local governments on the Chinese long-term economic growth, at least, the entries have promoted the industrial development at this moment.

promote to form competition power has occurred.

4.1.2 Growth of Market Size

Although market size is not a direct factor deciding entry barrier, size is related to space for survivable when there exists scale economies through fixed cost.

The size of the Chinese market is about 39 million set. The urban market was expanded in the 1990s in particular, penetration rate of color TV excesses one set per household (Table 7). The urban market has matured, rural market also expanded in the 1990s.

The large size of market relaxed the effect of existence of incumbents in China. And entry and competition decreased the price, it had effect to market expansion. There is an interaction between market expansion and competition.

Table 7: Penetration of electronic and electronics products in China, 1990-2007

(Unit: %)

	1990	1995	2000	2005	2007
Urban households					
Washing machine	78.4	89.0	90.5	95.5	96.8
Refrigerator	42.3	66.2	80.1	90.7	95.0
Color TV	59.0	89.8	116.6	134.8	137.8
Air conditioner	0.3	8.1	30.8	80.7	95.1
PC			9.7	41.5	53.8
Mobile phone			19.5	137.0	165.2
Rural households					
Washing machine	9.1	16.9	28.6	40.2	45.9
Refrigerator	1.2	5.2	12.3	20.1	26.1
B&W TV	39.7	63.8	53.0	21.8	12.1
Color TV	4.7	16.9	48.7	84.1	94.4
Air conditioner		0.2	1.3	6.4	8.5
PC			0.5	2.1	3.7
Mobile phone			4.3	50.2	77.8

Source: Same as those in Table 1.

4.2 India

4.2.1 Competition Condition Formed Historically

In turn we see that the entry barrier in India was higher in comparison to that of China.[17]

[17] As mentioned at Note 12, purchase of CRT is important for the entry barrier. Gupta (2006) indicates that "suppliers enjoy high bargaining power." Videocon and BPL have integrated to manufacture CRT, it is needed to evaluate the internalization of the core component in competitive power.

During the early stages of India's electrical and electronics industry in the 1960s, foreign-affiliated firms dominated the Indian market.[18] For example, Philips (Netherlands) dominated the TV market and IBM (US) with the computer market.

In the latter half of the 1960s and the 1970s, however, the industry in India was also started to develop as a defense industry. In 1966 the Bhabha Committee (Electronics Committee) recommended to put emphasis on local public and small-scale sectors. For whole firms, to restrict entry and growth of large-scale firms and foreign-affiliated firms, Monopolies and Restrictive Trade Practice Act (MRTPA) and Foreign Exchange Regulation Act (FERA) were launched in 1969 and in 1973, respectively. For the electrical and electronics industry, the government established the Department of Electronics for administration in 1970, Electronic Commission for policymaking in 1971, and a mid- and long-term plan for electronics industry in 1975. Therefore large-scale investment was not allowed freely.

In the 1980s, Indira Gandhi and Rajiv Gandhi implemented partial liberalization. In the early 1980s, preferential treatment for incumbents and large-scale investments started. In 1981, Components Policy was launched, and the Indian government de-licensed components manufactures partially. Although the licensing system was kept in the TV industry, Color TV Policy was launched in 1983, restriction of production capacity was liberalized.[19] During the late 1980s, in addition to the preference, alliance with foreign-affiliated firms was also allowed partially.[20] In the 1980s, the TV industry was not liberalized fully, therefore there remained unevenness in growth of the local firms under the licensing system with preference for incumbents and large-scale investment.

After the 1990s, Narasimha Rao implemented full scale liberalization. This was started from New Industrial Policy in 1991, however the electrical and electronics industry has not been allowed then. The white goods industry was de-licensed in 1993, and color TV belonging to entertainment electronics was de-licensed in 1996 at last. Although the entry have de-licensed in 1996, as shown in Table 4, the rank of the major local firms have kept stable. For the local new entrants, it is considered that the partial

[18] On the development of the Indian electrical and electronics industry, see Esho (1988) and Joseph (2004).

[19] Other policies include a policy to promote the electronics industrial development in 1983 and Telecommunication Policy to allow private firms to entry the communication equipment market in 1984.

[20] In the late 1980s, Computer Policy and Computer Software Policy were implemented to liberalize the industries partially in 1985 and in 1987, respectively. In addition, the licensing system was also liberalized partially by Integrated Policy in 1987.

liberalization gave incumbents and large-scaled firm preferential as a kind of the entry barriers. On the contrary, entries of foreign-affiliated firms and imports have shocked to the structure with the major local incumbents. Consequently it is considered that the effect of competition shown as in China have not appeared in India. And consequently, after the entry of foreign-affiliated firms, local firms dropped their shares.

4.2.2 Growth of Market Size

Despite India's large population, the size of the market is only half of China's. In addition, product penetration of electronic and electronics goods are not so high in comparison to China. The penetration rate of color TVs both in urban and rural was 17% in 2001/02.[21] According to income class, the penetration rates in the rich class (more than 10 lakh rupee) accounting 0.4% of household and the middle class (2-10 lakh rupee) accounting 5.7% are 99% and 73%, respectively. However the rates of the aspirers class (90,000-200,000 rupee) accounting 21.9% and the deprived class (less than 90,000 rupee) accounting 71.9% are 40% and 5%, respectively.

Consequently in India, space for growth of new entrants was, by contrast, smaller than China. Therefore there is a possibility that the market size become a restriction for growth of the new entrants.

5 Concluding Remarks

We showed the relation between the industrial developments and the properties of competition based on the market structures in China and India, and the relation between the market structures and the entry barriers based on the institutional changes. Firstly the summary is as follows.

In China, economic reform started at a stage where only a few dominant incumbents existed, allowing for easier market entry. As a result, a multitude of new entrants led by the local governments entered the TV market, against the backdrop of the market expansion. Although limited technological capabilities and know-how, these new players formed their own advantages through competition in the homogeneous market structure, and as a result have expanded their market shares against the

[21] Cited from the website of NCAER (National Council of Applied Economic Research)'s website (http://www.ncaer.org/downloads/PPT/TheGreatIndianMarket.pdf), accessed on 16th October, 2008.

foreign-affiliated firms. Equal competition and similar starting conditions promoted industrial development.

In contrast, India's TV industries already had established local firms prior to liberalization, creating a much higher barrier for market entry of new players. Under this market structure, the impact of competition to foster and strengthen the local firms was limited. As a result, foreign-affiliated firms entered the market after liberalization in the 1990s, and have expanded their market shares. The lack of competition, or unequal competition, did not promote the industrial development so much in comparison with the Chinese industry.

In conclusion, the development of the local firms against the foreign-affiliated firms depends on the existence of the effect of competition among the local firms. Although the local firms lack technological capabilities in comparison with the foreign-affiliated firms, the Chinese local firms were able to form their own advantages through competition amongst themselves. And, the condition of competition has been formed as the entry barrier through the institutional changes historically.

However further investigation is required. At first we must study the Indian market situation in the 1980s and growth processes of the Indian major local firms. The situation in the early 1990s has kept through the 1990s, therefore we have to know the origin of the situation in the 1990s, which was formed in the 1980s. Next we have to expand our coverage in time and sectors. The Indian electrical and electronics industry has entered high-growth phase in the 2000s (Uemura and Iwadare 2007), therefore we have to know what impact have occurred to the Indian market and the local firms. In addition, we have to generalize our conclusion to the other electrical and electronics goods and the other industries. Because our conclusion is still tentative, we need to make further investigation to confirm the difference between China and India.

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