

# IMPROVEMENT OF RAPID TRANSPORT AND STRUCTURAL CHANGE OF REGIONAL ECONOMY IN JAPAN

— Based on comparison between central and local areas —

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## 1. INTRODUCTION

In the last two decades a structural change of regional economy in Japan is significant, which is due to a drastic change of domestic and international industrial structure and an improvement of transport & communication networks in Japan. In particular since the 1960s Japan has made great

strides towards developing a rapid transport system. As a result, it has a high-speed transport network, consisting of airlines and the Shinkansen (Rapid Transit).

The aim of this paper is to examine structural changes of regional economy before and after an improvement of rapid transport in the 1960s and

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1970s. This work is mainly based on analyses of interregional input-output data published by the Ministry of international Trade and Industry (MITI) every five years [1] and passenger and freight flow data published by the Ministry of Transport (MOT) [2].

The study period in this paper is limited being from 1965 to 1985 because the latest data for 1990 is now being processed in MITI.

## 2. RECENT TRENDS IN NATIONAL AND REGIONAL ECONOMY

### 2-1 Trends in national economy

The leading industries for regional development in Japan, including steel, chemical and petroleum products, have been capital-intensive and resource-intensive. In the last two decades these export-oriented industries have developed rapidly; the Japanese economy grew at an annual rate of 10 per cent over this period. About 70 percent of all industry is concentrated in an area along the Pacific coast, which includes Tokyo, Osaka and Nagoya. This concentration has produced an over-centralization of the population and has caused various urban problems such as a rapid rise in

land prices, traffic congestion and housing shortages, especially in the major three metropolitan areas. There has been an outflow of the young, male labour force from local areas to these urbanized areas. Figure 1 explains an interregional migration and the net flow to the three metropolitan areas which met a peak in the 1960s.

However, since the mid-1970s the rate of growth of the Japanese economy has declined and a period of low growth has occurred. Moreover, there has been a shift from capital-intensive and resource-intensive industries to technology-intensive and processing and assembling industries such as transportation machinery and electrical appliances. The economic differential between metropolitan and local areas which was narrowing in the 1970s is now widening again.

Figure 2 explains the changes in employment ratios by industrial structure (that is, primary, secondary and tertiary) from 1970 to 1984. The number of people employed in primary industry has almost halved, from 17.4 percent to 8.9 per-

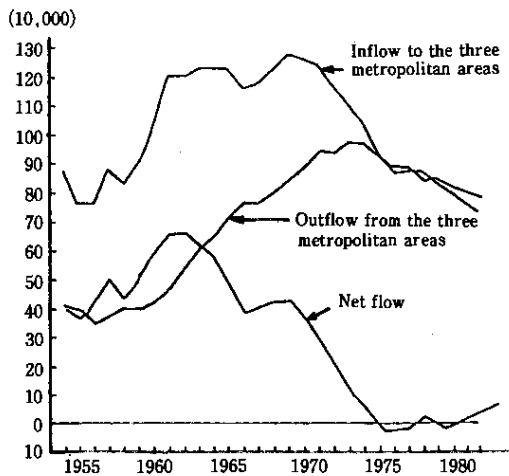


Figure 1 Interregional Migration

Note: Three metropolitan areas means Tokyo, Nagoya and Osaka areas.

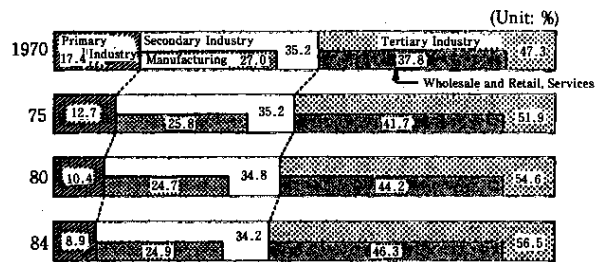


Figure 2 Changes in Employment Ratio by Industrial Sector

Note:

Primary industry .....agriculture and forestry, fisheries and aquaculture

Secondary industry .....mining, construction, manufacturing

Tertiary industry .....wholesale and retail trade, services, finance insurance and real estate, transport and communication, electricity, gas, water and steam, government

**Table 1** Changes in Industrial Production and Employment by Sector

	Industrial Production					Employment				
	1970	Share	1980	Share	1970-80 Annual Increase	1970	Share	1980	Share	1970-80 Annual Increase
Manufacturing industry	35,142	100.0 (32.7)	69,462	100.0 (37.7)	7.1	1,452	100.0 (28.8)	1,476	100.0 (27.0)	0.2
Basic materials heavy & chemical	11,382	32.4 (10.6)	19,857	28.6 (10.8)	5.7	320	22.0 (6.4)	329	22.3 (6.0)	0.3
Processing & assembling	11,263	32.0 (10.5)	31,341	45.1 (17.0)	10.8	466	32.1 (9.2)	507	34.3 (9.3)	0.8
Light	12,497	35.6 (11.6)	18,264	26.3 (9.9)	3.9	668	45.9 (13.2)	640	43.4 (11.7)	0.4

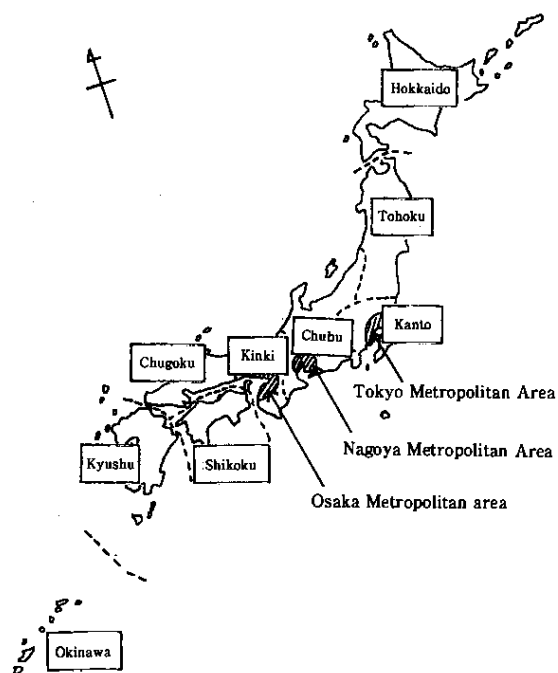
Note: Heavy & Chemical: Chemical, coal, petro, ceramic, metal, metal processing  
 Assembly: Electric, transportation, micro processing  
 Light: Food, fibre, pulp and paper  
 Share: 1975 price million yen, 10,000 persons

cent, in these fifteen years. Secondary industry has also experienced a reduction in the numbers employed, whereas the number of people employed in tertiary industries has greatly increased.

Table 1, however, shows that even with the fall in the number employed in secondary industry due to factors such as scale of operation and mechanization, in terms of real production output the relative importance of manufacturing in total industry has been increasing. This table also indicated that basic material manufacturing such as heavy and chemical industries, which played a crucial part in the era of rapid economic growth, has now been replaced in importance by processing and assembling manufacturing, such as electrical machinery. In general, manufactured goods are now designed to be as thin, light and small as possible.

### 2 - 2 Trends in regional economy

In this paper Japan is classified into two areas, central and local areas, depending on development



**Figure 3** Zoning System and Metropolitan Areas

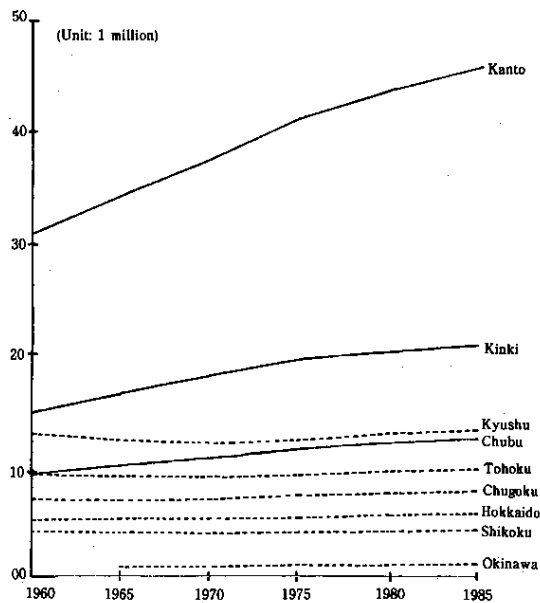


Figure 4 Trends in Population in Each Region

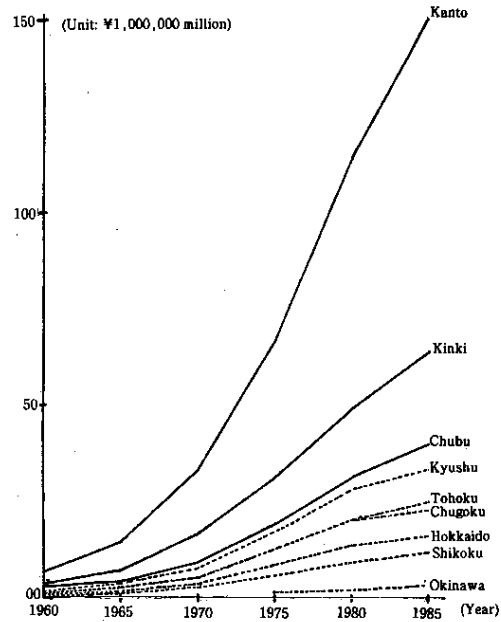


Figure 6 Trends in Final Demand in Each Region

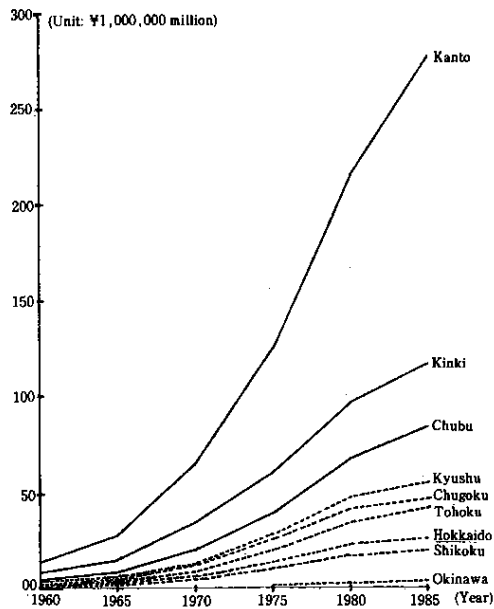


Figure 5 Trends in Industrial Production in Each Region

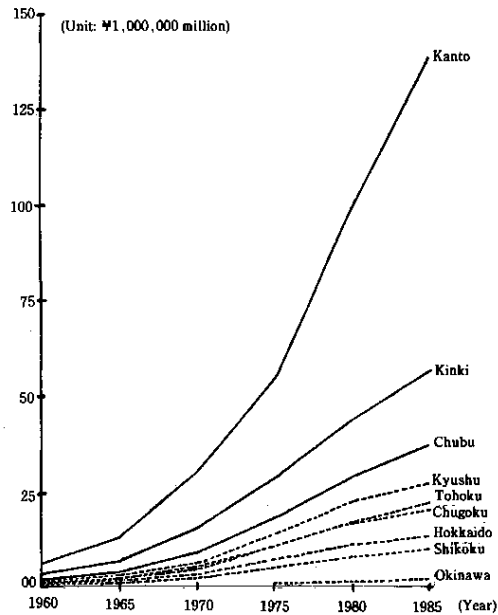


Figure 7 Trends in Total Value-added in Each Region

tendencies of regional economy. The central area consists of Kanto, Kinki and Chubu, which corresponds to the middle part of Japan (the so-called central regions). This area includes the Tokyo, Osaka and Nagoya metropolitan areas. The area

consists of the remaining six regions (the so-called local regions). Figure 3 shows the zoning system of these regions.

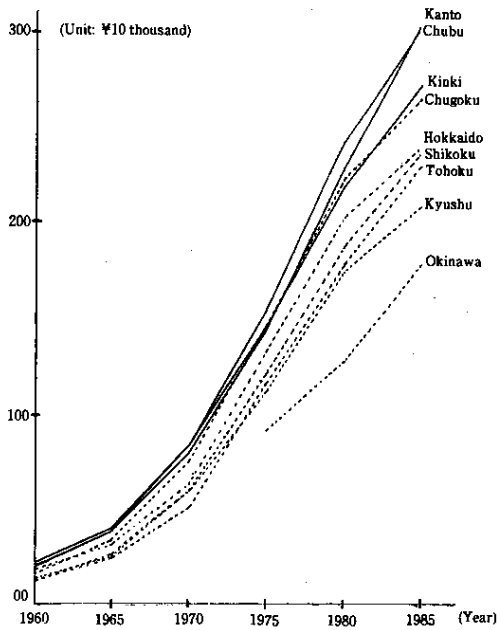


Figure 8 Changes in per capita Value Added in Each region

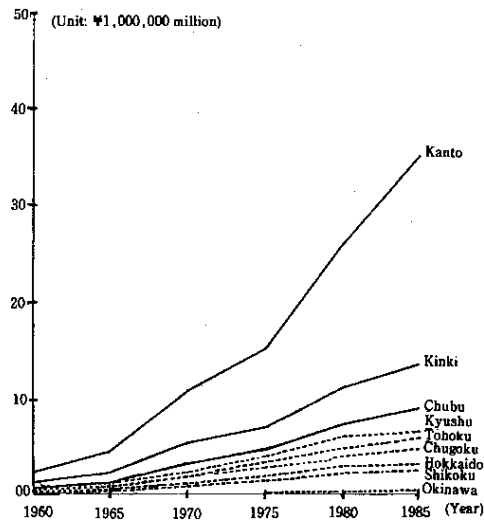


Figure 10 Trends in Returns to Capital in Each Region

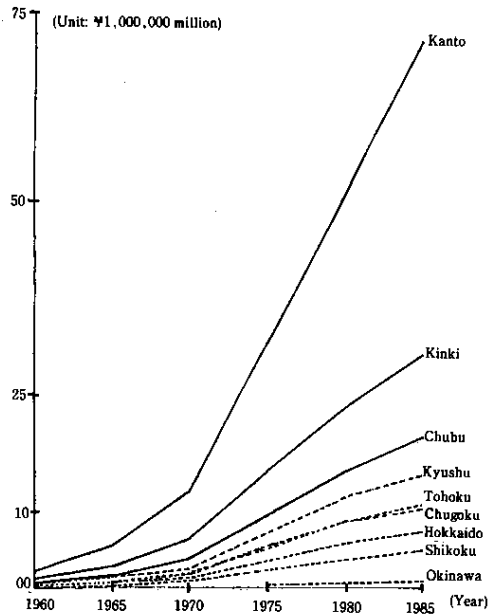


Figure 9 Trends in Returns to Labor in Each Region

In order to understand general trends in each regional economy, some basic indices as shown in Figures 4 to 10 are useful. At first, Figure 4 explains trends in population in each region. The in-

crease of population in three central regions is larger compared with that in local regions. Among them an increase in Kanto is significant. Then, the change of industrial production in each region has a clear tendency as shown in Figure 5. The difference between central and local areas is becoming large and the production level in Kanto has increased drastically. Figure 6 shows a trend of final demand in each region, which has a very similar pattern to Figure 5. Nearly half of industrial production is spent to satisfy final demand in each region. In the input-output framework, total final demand equals total value added plus imports. Therefore, we can understand that trends in total value-added in each region as shown in Figure 7 are similar to that of final demand. Figure 8 shows changes in per capita value added in each region. As mentioned in 2-1, the disparity of per capita value added including income, which was becoming small in the 1970s, has been enlarged from the beginning of the 1980s. The value added contained two important elements: (1) returns to labor such as wages and salaries, and (2) returns to capital such as profits and dividends. Figures 9

and 10 show trends in returns to labor and that to capital, respectively. As a whole, the former returns are larger compared with the latter ones.

### 3. IMPROVEMENT OF RAPID TRANSPORT AND INTERREGIONAL FLOW

#### 3-1 A brief history of rapid transport

"Today, there is a pressing need to multipolarize national land, to build the foundations for a well-balanced development of regional economic society, and to build a high-speed, key traffic network which sustains a broad range of exchange activities among people. To this end, the construction of additional Shinkansen (rapid transit) lines, expressways, airports and other high-speed traffic facilities is under way." [3]

An above indication might be true. Transport problems must be considered together with problems of regional economy. The first plan of rapid transport in Japan was for a "bullet train", with a maximum speed of 200 kilometres per hour, between Tokyo and Shimonoseki. The construction of this system started in 1940. However, it stopped in 1943 because of the Second World War, and the plan was abandoned. After the war, "the business express Kodama", which connected Tokyo and Osaka in 1958, was the fastest train. Its average speed was eighty-two kilometres per hour and it took six and a half hours to cover the 500 kilometres involved.

In 1957 the Tokaido Shinkansen plan was decided, and opened in 1964 between Tokyo and Osaka. Its maximum speed was 200 kilometres per hour and the trip time was four hours. Currently it takes less than three hours with maximum speed of 220 kilometres per hour, and the line extends to Fukuoka. Through the construction of Tohoku and Joetsu Shinkansen, the network now totals 1832 kilometres. Figure 11 explains present and future Shinkansen plans.

Air transport has a large share for long trips over about 500 kilometres. The demand for air transport has been increased as socio-economic activities are enlarged over a broader geographical range and income level rises. However, air services are concentrated mainly in major metropolitan areas to connect central regions with local regions. This situation is shown in Figure 12, which explains trends in the number of domestic air passengers.

Most of the present high-speed transport network, including Shinkansen lines, major airports as well as the expressway network has been constructed since 1960s. In the previous three de-

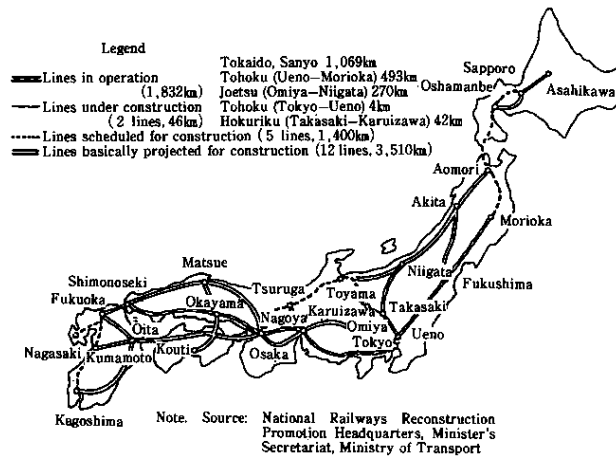


Figure 11 Nationwide Shinkansen Network  
Source: Reference [3]

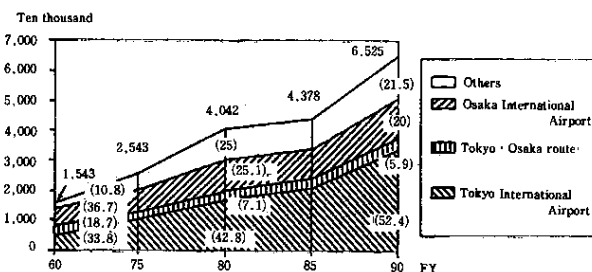
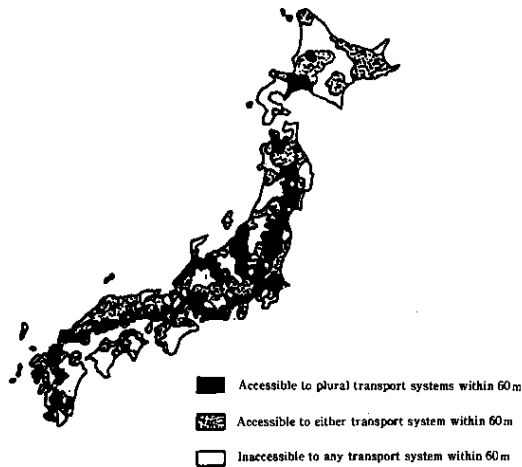


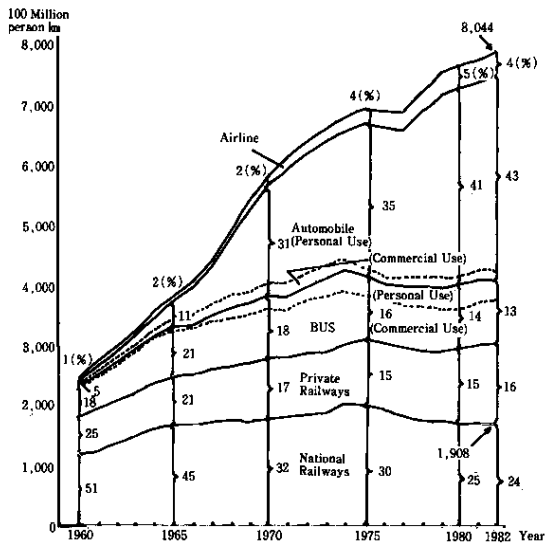
Figure 12 Trends in the Number of Domestic Air Passengers Source: Reference [3]

Notes. (1) Source: Based on data supplied by the MOT  
(2) Figure shown in ( ) indicates percentage of total



**Figure 13** Accessibility to High-Speed Transport System Source: Reference [3]

Note. This is the map as of March 31, 1989, based on a "Survey on the Nationwide Transport Volume A Day" by the Planning and Coordination Bureau, National Land Agency



**Figure 14** Changes in Passenger Transport

acades, the overall transport service has been improved, which realized active interregional movement and industrial transactions. The Ministry of Transport aims at expanding, as far as possible, the range of one-day travel throughout the country by eliminating regional gaps in high-speed

**Table 2** Changes in Modal Share for Passenger Transport (Unit: million)

Mode	Year	1965	1985	1985/1965
Japan National Railway (JNR)		6,725	6,944	1.03
Private Railways		9,076	12,048	1.33
Automobile		14,863	34,679	2.33
Ship		115	117	1.02
Airline		5.3	43.8	8.26
Total		30,786	53,832	1.75

transport services. Figure 13 explains this idea to develop and improve traffic arteries to provide access to plural high-speed transport systems within one hour from any place in Japan.

### 3-2 Domestic passenger and freight flow

Both passenger and domestic freight transport in Japan has been increased during the high-growth period in the 1960s and 1970s. Passenger transport increased 7.7% annually and freight transport rose at an annual rate of 8.4%.

Figure 14 and Table 2 explain changes in passenger transport. The modal share of automobiles increased significantly and the growth rate of air transport is distinguished even if number of air passengers is small relatively.

As shown in Figures 3 to 4, air and railway transport including Sinkansen are useful, which connect central regions and local regions. Especially, the flow between north local areas and south local areas has increased.

## 4. DOMESTIC TRADE IN REGIONAL ECONOMY

### 4-1 Interregional transactions in each region

Interregional transactions involves purchases from outside the regions, which consists of imports from other regions within the country and those from outside the country. In this chapter the

**Table 3 Passenger Flow by All Means of Transport** (Unit: million)

Origin \ Destination	North Local Area			Central Area			South Local Area			Total		
	1965	1985	1985/1965	1965	1985	1985/1965	1965	1985	1985/1965	1965	1985	1985/1965
North Local Area	2,538	5,388	2.12	16	44	2.79	0.2	3.6	2.04	2,533	5,433	2.13
Central Area	—	—	—	23,605	39,830	1.69	20	47	2.25	23,641	39,921	1.69
South Local Area	—	—	—	—	—	—	4,354	8,436	1.94	4,378	8,484	1.94
Total	—	—	—	—	—	—	—	—	—	30,786	53,832	1.75

**Table 4 Passenger Flow by JNR** (Unit: million)

Origin \ Destination	North Local Area			Central Area			South Local Area			Total		
	1965	1985	1985/1965	1965	1985	1985/1965	1965	1985	1985/1965	1965	1985	1985/1965
North Local Area	500	300	0.60	15	300	19.48	1.7	0.3	0.15	516	315	0.61
Central Area	—	—	—	5,421	5,732	1.06	16.0	47.2	2.96	5,452	6,079	1.12
South Local Area	—	—	—	—	—	—	740,857	501,956	0.68	756	546	0.73
Total	—	—	—	—	—	—	—	—	—	6,725	6,943	1.03

**Table 5 Passenger Flow by Air Transport** (Unit: million)

Origin \ Destination	North Local Area			Central Area			South Local Area			Total		
	1965	1985	1985/1965	1965	1985	1985/1965	1965	1985	1985/1965	1965	1985	1985/1965
North Local Area	95.1	2,474.7	26.0	481.1	3,938.1	8.2	0.0	115.9	—	576.2	6,528.7	11.3
Central Area	—	—	—	3,594.6	6,553.9	1.8	1,018.9	10,701.0	10.5	5,094.6	21,193.0	4.2
South Local Area	—	—	—	—	—	—	591.5	5,237.3	8.9	1,610.4	16,054.2	10.0
Total	—	—	—	—	—	—	—	—	—	7,281.2	43,776.0	6.0

**Table 6 Freight Transport in 1965 and 1985** (Unit: 1,000 tons)

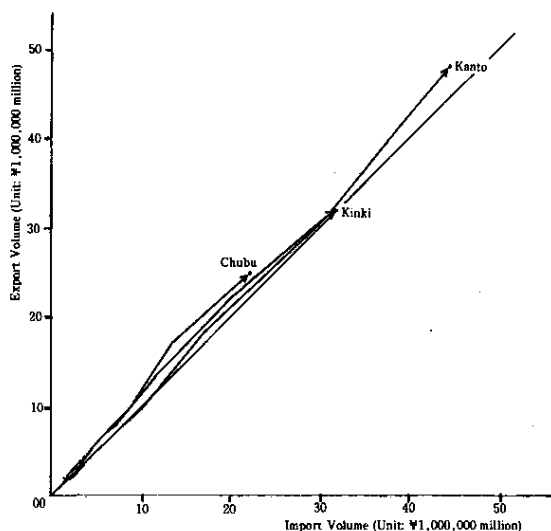
	Railways			Shipping			Automobiles			Total		
	1965	1985	85/65	1965	1985	85/65	1965	1985	85/65	1965	1985	85/65
1. Agriculture and fisheries	16	2	0.13	6	10	1.67	152	238	1.57	176	251	1.43
2. Forestry	13	0.3	0.02	8	5	0.63	189	164	0.87	212	169	0.80
3. Mining	69	14	0.20	86	186	2.16	596	1,361	2.30	747	1,562	2.09
4. Metals and Machinery	7	0.8	0.11	31	96	3.10	192	627	3.27	232	724	3.12
5. Chemicals	48	28	0.58	91	219	2.40	341	768	2.25	482	1,015	2.11
6. Paper, pulp, textiles and food products	14	4	0.29	9	9	1.00	176	398	2.26	99	411	2.07
7. Others	27.2	17.5	0.64	7.9	20.3	2.57	547	1,509	2.76	583	1,549	2.66
Total	198	68	0.34	242	549	2.27	2,193	5,067	2.31	2,634	5,685	2.16

former type of import is treated and the latter one is discussed in the next chapter.

Figures 15 and 16 explain how domestic trade in each region has changed from 1960 to 1985. The trends in the central regions (Kanto, Kinki and Chubu) are shown in Figure 15 and those in local regions are shown in Figure 16. The difference of domestic transactions between central and

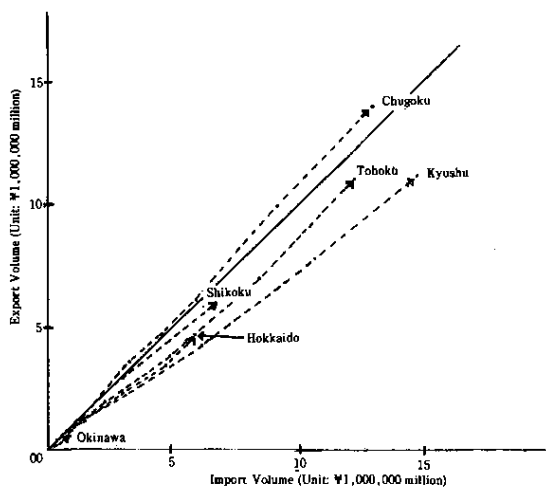
local areas is significant. Central regions have 2 larger volume of domestic trade and their exports exceed imports within the country. On the other hand, local regions have generally the opposite tendency being that export is exceeded by import. Local regions are classified into three groups of I (Chugoku, Tohoku, Kyushu), II (Shikoku, Hokkaido) and III (Okinawa), considering the total volume of interregional trade in each region.





**Figure 15** Changes in Domestic Trade in Each Region (Central Area)

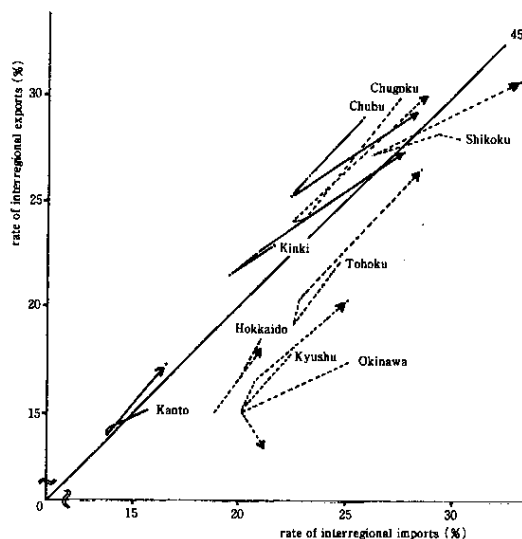
Note: The arrows represent changes from 1960 to 1965, to 1970, to 1975, to 1980 and to 1985.



**Figure 16** Changes in Domestic Trade in Each Region (Local Area)

Note: The arrows represent changes from 1960 to 1965, to 1970, to 1975, to 1980 and to 1985.

In order to consider the degree of relative dependency of each regional economy upon other regions, Figure 17 is useful, whose vertical and horizontal axes explain rates of interregional exports and imports, respectively. These rates show



**Figure 17** Trends in Interregional Transactions

Note: 1. The arrows represent changes from 1970 to 1975, to 1980, and to 1985.

2. The rate of interregional imports mean the amount of imports divided by the total amount demanded in each region (intermediate and final demands).

3. The rate of interregional exports means the amount of exports divided by the total amount produced in each region.

the relative share of trade activities in total regional economy. From this point of view, Kanto is rather independent from other regions and its economy is relatively closed within its region. This is due to its huge regional economy even though absolute volume of trade is rather large. Then, other central regions (Kinki and Chubu) and neighboring regions to the central area (Tohoku, Chugoku and Shikoku) have also active interregional trade. However, in the remaining three regions of Hokkaido, Kyushu and Okinawa, interregional trade is not very distinguished, which should be understood in a different way. That is, an absolute volume of trade is small in itself.

#### 4-2 Regional distribution of domestic trade

Tables 7 and 8 show regional share for export to each region and import from each region in

Table 7 Changes in Regional Share for Export to Each Region

(Unit: %)

Imported \ Exported	Hokkaido		Tohoku		Kanto		Chubu		Kinki		Chugoku		Shikoku		Kyushu		Okinawa		Domestic Total	
	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985	1975	1985	1965	1985
Kanto	54.7	49.6	59.2	58.2	—	—	<u>43.3</u>	<u>50.8</u>	<u>38.2</u>	<u>41.0</u>	<u>36.7</u>	<u>40.7</u>	<u>31.3</u>	<u>35.2</u>	40.1	37.9	<u>35.6</u>	<u>35.9</u>	<u>29.7</u>	<u>31.6</u>
Chubu	<u>11.5</u>	<u>14.0</u>	<u>11.3</u>	<u>11.9</u>	25.7	25.3	—	—	22.0	21.9	12.4	11.9	<u>9.6</u>	<u>12.0</u>	<u>11.9</u>	<u>12.0</u>	12.5	12.1	16.4	16.2
Kinki	<u>17.4</u>	<u>18.5</u>	<u>16.3</u>	<u>16.5</u>	35.7	29.8	31.0	26.4	—	—	30.9	28.3	<u>33.1</u>	<u>29.2</u>	29.5	25.5	<u>17.7</u>	<u>21.7</u>	23.8	21.0
Central Area	83.6	82.1	86.8	86.6	61.4	55.1	<u>74.3</u>	<u>77.2</u>	<u>60.2</u>	<u>62.9</u>	<u>80.0</u>	<u>80.9</u>	<u>74.0</u>	<u>76.4</u>	81.5	75.4	<u>65.8</u>	<u>69.7</u>	69.9	68.8
Hokkaido	—	—	<u>4.3</u>	<u>5.4</u>	6.2	5.1	2.7	2.2	3.4	2.6	1.6	1.2	2.7	1.1	<u>1.0</u>	<u>1.5</u>	1.6	0.5	3.6	3.1
Tohoku	<u>9.6</u>	<u>9.8</u>	—	—	<u>11.4</u>	<u>16.9</u>	4.3	3.5	5.1	4.5	2.2	1.9	3.0	1.5	<u>1.5</u>	<u>2.4</u>	3.7	1.9	<u>6.0</u>	<u>7.3</u>
Chugoku	<u>3.4</u>	<u>3.7</u>	4.7	3.5	9.9	8.5	9.1	8.0	<u>13.6</u>	<u>14.3</u>	—	—	14.3	13.9	<u>13.4</u>	<u>15.1</u>	9.8	7.3	9.4	9.2
Shikoku	1.5	1.2	1.5	1.1	<u>3.5</u>	<u>4.2</u>	4.1	3.1	6.9	6.0	<u>3.8</u>	<u>5.0</u>	—	—	<u>2.7</u>	<u>4.8</u>	4.8	2.3	3.9	4.0
Kyushu	<u>1.8</u>	<u>3.2</u>	<u>2.7</u>	<u>2.8</u>	<u>7.4</u>	<u>9.7</u>	<u>5.5</u>	<u>5.9</u>	10.8	9.3	12.4	10.7	<u>6.2</u>	<u>6.9</u>	—	—	<u>14.3</u>	<u>18.4</u>	<u>7.1</u>	<u>7.3</u>
Okinawa	—	0.0	—	0.6	—	0.5	—	0.1	—	0.4	—	0.3	—	0.2	—	0.8	—	—	—	0.3
Local Areas	<u>16.4</u>	<u>17.9</u>	<u>13.2</u>	<u>13.4</u>	<u>38.6</u>	<u>44.9</u>	25.7	22.8	39.8	37.1	20.0	19.1	26.0	13.6	18.5	24.6	34.2	30.3	<u>30.1</u>	<u>31.2</u>
Domestic Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 8 Changes in Regional Share for Import from Each Region

(Unit: %)

Exported \ Imported	Hokkaido		Tohoku		Kanto		Chubu		Kinki		Chugoku		Shikoku		Kyushu		Okinawa		Domestic Total	
	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985	1975	1985	1965	1985
Kanto	50.5	48.5	<u>55.5</u>	<u>68.1</u>	—	—	46.2	45.4	44.0	41.5	30.9	27.1	<u>26.5</u>	<u>30.8</u>	<u>30.8</u>	<u>38.5</u>	<u>34.5</u>	<u>37.3</u>	29.4	29.2
Chubu	10.7	10.3	10.3	7.0	<u>20.9</u>	<u>23.5</u>	—	—	18.7	18.4	13.9	12.7	15.1	11.5	<u>11.1</u>	<u>11.8</u>	13.0	7.6	<u>14.4</u>	<u>14.6</u>
Kinki	20.9	17.5	18.8	13.0	28.3	26.9	29.6	28.0	—	—	<u>31.6</u>	<u>32.3</u>	38.5	31.4	33.5	26.4	28.0	20.1	22.0	20.8
Central Area	82.1	76.3	<u>84.6</u>	<u>88.1</u>	<u>49.2</u>	<u>50.4</u>	75.8	73.4	62.7	59.9	76.4	72.1	80.1	73.7	<u>75.4</u>	<u>76.7</u>	75.5	65.0	65.8	64.6
Hokkaido	—	—	7.6	5.3	8.7	6.2	<u>3.3</u>	<u>3.4</u>	3.5	3.5	1.7	1.6	1.8	1.2	<u>1.2</u>	<u>1.7</u>	2.2	0.4	4.7	3.9
Tohoku	<u>8.5</u>	<u>14.2</u>	—	—	<u>14.2</u>	<u>15.0</u>	<u>4.9</u>	<u>5.9</u>	<u>4.9</u>	<u>6.3</u>	3.5	3.0	2.8	2.2	<u>2.7</u>	<u>3.1</u>	2.6	1.8	<u>7.1</u>	<u>8.1</u>
Chugoku	4.2	3.3	3.6	2.3	12.0	11.1	7.4	6.4	12.6	11.7	—	—	<u>9.5</u>	<u>10.8</u>	17.0	12.6	11.9	7.0	9.7	8.7
Shikoku	3.1	1.5	2.0	0.9	<u>4.4</u>	<u>5.0</u>	<u>2.4</u>	<u>3.3</u>	<u>5.8</u>	<u>6.2</u>	<u>6.2</u>	<u>6.8</u>	—	—	<u>3.6</u>	<u>4.2</u>	4.0	3.5	<u>4.2</u>	<u>4.5</u>
Kyushu	<u>2.2</u>	<u>4.6</u>	<u>2.1</u>	<u>3.2</u>	<u>11.5</u>	<u>11.6</u>	<u>6.2</u>	<u>7.2</u>	<u>10.5</u>	<u>11.8</u>	<u>12.1</u>	15.9	<u>5.8</u>	<u>11.7</u>	—	—	<u>3.7</u>	<u>22.3</u>	<u>8.5</u>	<u>9.7</u>
Okinawa	—	0.1	—	0.2	—	0.7	—	0.4	—	0.6	—	0.6	—	0.4	—	1.7	—	—	—	0.5
Local Areas	<u>17.9</u>	<u>23.4</u>	15.4	11.9	50.8	49.6	<u>24.2</u>	<u>26.6</u>	<u>37.3</u>	<u>40.1</u>	23.6	27.9	19.9	26.3	24.6	23.3	<u>24.5</u>	<u>35.0</u>	<u>34.2</u>	<u>35.4</u>
Domestic Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

1965 and 1985, respectively. For example, the share of transactions from Kanto in Table 7 is 54.7% of total domestic trade in Hokkaido in 1965. The percentages in the same column are, of course, summed up to 100%.

Figure 18 presents the dominant flow between regions which is distinguished in Tables 7 and 8. The transactions among three regions in the central area is significant and the flow based on Kanto is predominant. In local regions trade between

neighboring regions is relatively large such as Hokkaido & Tohoku, Chugoku & Shikoku, Chugoku & Kyushu and Kyushu & Okinawa.

Figure 19 explains changes in regional transactions from 1965 to 1985. The real lines correspond to parts underlined in Tables 7 and 8 at the same time. The regional share has been increased from 1965 to 1985 at these parts. As a whole, the sphere for regional transactions is becoming large. The trade between central and local regions such

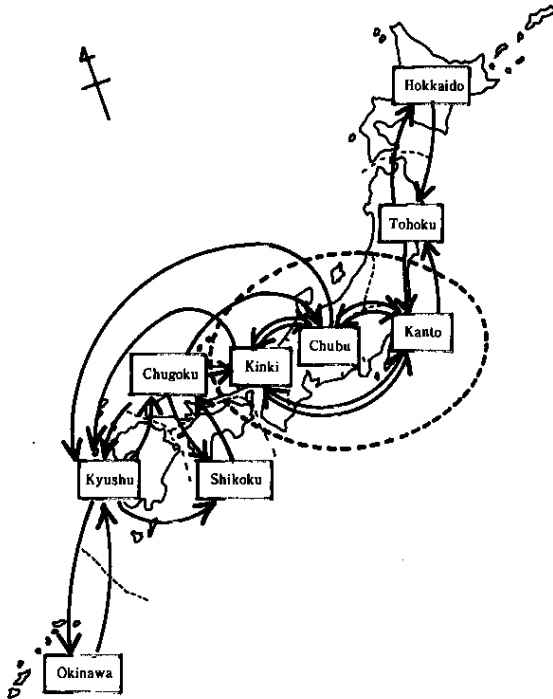


Figure 18 Dominant Interregional Flow in 1965 and 1985

as Kanto & Kyushu, Kanto & Shikoku and Hokkaido & Kyushu is significant, which has been mainly achieved by the improvement of rapid transport networks including Shinkansen and air transport.

Then another important feature indicated in this figure is that transactions based on Kinki decreased and this region is likely to be isolated from surrounding regions. As shown in Figures 6 and 7, relative power of regional economy in Kinki has become small since the middle of the 1960s, when the Tokaido Shinkansen was first operated connecting Kinki and Kanto. After this operation, a large number of head offices of private companies in Kinki moved to Kanto.

#### 4-3 Industrial Production induced by final demand

Industrial production in each region is induced by final demand in its own region and other regions. Final demand is usually classified into

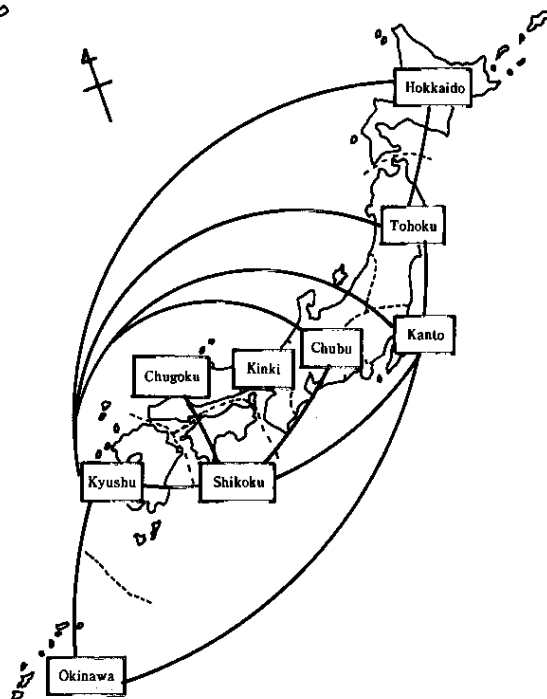


Figure 19 Changes in Regional Transactions from 1965 to 1985

Note: Solid lines connect two regions whose industrial transactions have been increased from 1965 to 1985.

three types; (1) consumption: purchases by consumers and governments, (2) export: the sales made by firms to purchasers outside the region and outside the country, and (3) investment: sales to other activities of investment goods. Tables 9 – 12 explain production induced by final demand (total), consumption, export and investment in each region, respectively.

As shown in Table 9, percentage of production induced by final demand in each region is relatively large in central regions, especially in Kanto. The production increase in Kanto brought about by other regions is rather large, and by contrast, inductive effects among local regions are small.

However, the pattern of effects is different according to three types of final demand. The

**Table 9** Production induced by Final Demand (Total) in Each Region (Unit: %)

From \ To	Its own		Kanto		Chubu		Kinki		Others	
	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985
Kanto	74.2	76.3	—	—	6.2	6.0	9.1	7.0	10.5	10.7
Chubu	62.4	62.6	16.1	18.6	—	—	11.0	9.2	10.5	9.6
Kinki	66.9	63.1	13.2	16.0	6.7	7.4	—	—	13.2	13.5
Hokkaido	60.2	63.9	19.6	16.9	5.2	5.3	7.6	6.7	7.4	7.2
Tohoku	58.1	60.0	21.7	21.5	5.6	5.3	7.8	6.8	6.8	6.4
Chugoku	55.7	58.6	16.7	17.4	5.9	5.6	12.6	10.4	9.1	8.0
Shikoku	55.9	54.4	14.6	17.0	5.1	5.9	13.8	11.7	10.6	11.0
Kyushu	65.5	62.3	13.7	14.8	4.7	5.2	9.9	8.9	6.2	8.8
Okinawa	—	64.0	—	12.8	—	4.6	—	7.4	—	11.2

**Table 10** Production induced by Consumption in Each Region (Unit: %)

From \ To	Its own		Kanto		Chubu		Kinki		Others	
	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985
Kanto	73.9	78.3	—	—	6.3	5.0	8.7	5.9	11.1	10.8
Chubu	62.6	64.5	16.0	17.2	—	—	9.8	8.7	11.6	9.6
Kinki	65.9	65.2	12.2	14.1	6.8	6.9	—	—	15.1	13.8
Hokkaido	56.8	66.8	21.8	15.9	5.4	4.6	8.0	6.2	8.1	6.6
Tohoku	57.3	63.6	22.0	20.0	6.0	4.4	7.7	6.0	7.0	6.0
Chugoku	57.7	61.9	16.5	15.3	6.2	4.5	11.0	9.9	8.6	8.4
Shikoku	56.9	59.2	15.1	14.4	5.4	5.0	12.1	10.7	10.5	10.7
Kyushu	65.8	65.7	13.2	13.0	5.0	4.3	9.4	8.0	6.6	9.0
Okinawa	—	68.5	—	11.2	—	3.8	—	6.3	—	10.2

**Table 11** Production induced by Export in Each Region (Unit: %)

From \ To	Its own		Kanto		Chubu		Kinki		Others	
	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985
Kanto	80.0	79.5	—	—	4.7	5.2	6.5	6.3	8.8	6.8
Chubu	69.1	69.3	10.8	16.1	—	—	9.9	7.1	10.2	7.5
Kinki	73.3	70.5	9.1	12.0	5.9	6.0	—	—	11.7	11.5
Hokkaido	79.5	78.3	11.7	9.8	2.2	3.3	3.4	3.8	3.1	4.9
Tohoku	63.3	63.6	21.5	19.6	4.2	4.7	5.6	7.0	5.4	5.1
Chugoku	55.8	68.0	13.0	13.3	5.3	5.3	14.1	8.0	11.8	5.4
Shikoku	60.1	59.2	9.8	14.7	4.9	5.1	14.6	10.7	10.6	10.3
Kyushu	76.7	70.7	7.4	11.8	2.8	3.7	8.7	6.8	4.4	7.0
Okinawa	—	76.3	—	8.4	—	2.7	—	5.0	—	7.6

**Table 12** Production induced by Investment in Each Region

(Unit: %)

From \ To	Its own		Kanto		Chubu		Kinki		Others	
	1965	1985	1965	1985	1965	1985	1965	1985	1965	1985
Kanto	70.7	70.2	—	—	7.2	8.6	10.9	9.5	11.2	11.7
Chubu	56.3	52.8	20.1	23.3	—	—	14.2	12.1	9.4	11.8
Kinki	62.3	53.7	18.1	22.9	7.6	9.7	—	—	12.0	13.7
Hokkaido	56.3	56.9	20.7	19.4	6.2	7.0	9.0	8.0	7.9	8.7
Tohoku	51.9	50.5	24.2	25.3	6.4	7.5	9.8	8.7	7.7	8.0
Chugoku	47.1	46.3	20.6	24.1	6.4	7.9	16.5	13.0	9.4	8.7
Shikoku	46.6	42.5	17.1	23.2	5.9	8.3	18.9	14.2	11.5	11.8
Kyushu	56.7	51.6	17.9	20.0	5.8	7.8	13.0	11.4	6.6	9.2
Okinawa	—	55.8	—	15.7	—	6.1	—	9.4	—	13.0

**Table 13** Major Commodities imported to Japan

(Unit: ¥1,000,000 million)

	1975		1985	
1 Mining		7,536(37.0%)	Mining	13,243(35.0%)
2 Agriculture, forestry and fisheries	3,000(15.0%)		Agriculture, forestry and fisheries	3,852(10.0%)
3 Food products	1,578( 8.0%)		Food products	2,392( 6.0%)
4 Transport	1,232( 6.0%)		Petroleum and coal products	2,350( 6.0%)
5 Others	(34.0%)		Others	(43.0%)
Total	20,488(100.0%)		Total	37,402(100.0%)

**Table 14** Major Commodities exported from Japan

(Unit: ¥1,000,000 million)

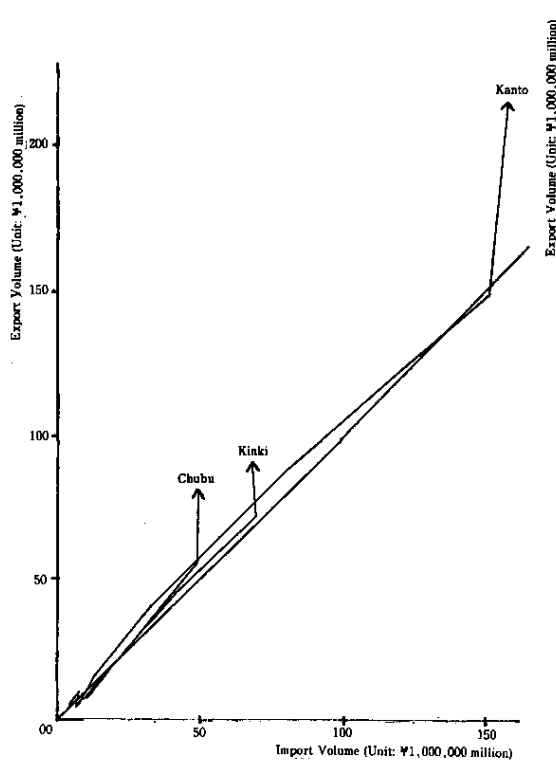
	1975		1985	
1 Transportation machinery	4,103(21.0%)		Transportation Machinery	11,652(25.0%)
2 Steel	2,871(14.0%)		Electrical machinery	9,780(21.0%)
3 Transport	2,431(12.0%)		General machinery	5,261(11.0%)
4 General machinery	1,928(10.0%)		Transport	3,921( 8.0%)
5 Electrical machinery	1,908(10.0%)		Steel	3,064( 6.0%)
6 Chemicals	1,269( 6.0%)		Commerce	2,969( 6.0%)
7 Commerce	818( 4.0%)		Chemicals	2,170( 5.0%)
8 Others	(23.0%)		Others	(18.0%)
Total	19,895(100.0%)		Total	47,536(100.0%)

ratio of production brought about in its own region is relatively high by export and consumption, and that is low by investment. In particular, about 80% of production induced by export in Kanto remains in Kanto.

## 5. FOREIGN TRADE IN REGIONAL ECONOMY

### 5-1 Regional growth and foreign trade

The growth of a region is usually tied to the success of its export base. An increase for the region's exports, which is brought by an increase of demand and a significant reduction in processing



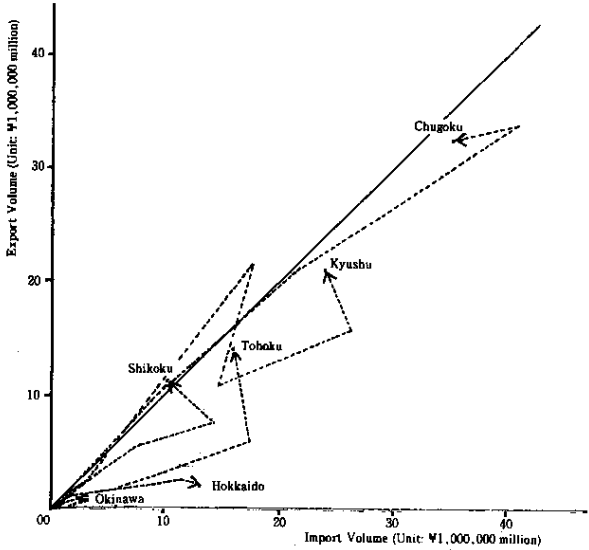
**Figure 19** Changes in Foreign Trade in Each Region (Central Area)

Note: The arrows represent changes from 1960 to 1965, to 1970, to 1975, to 1980 and to 1985.

or transfer costs, has resulted in a multiple effect on the region, inducing increased investment not only in the export industry but in all other kinds of economic activities as well.

Tables 13 and 14 show changes of major commodities for foreign trade in Japan. As shown in Table 13, major commodities imported have changed little, most of which are occupied by mining, agriculture, forestry, fisheries and food products. The percentage of three major commodities is more than 50%.

On the other hand, commodities for export have changed a little from 1975 to 1985. Its share of capital- and resource- intensive industries such as steel and chemicals has grown a little and technology-intensive and processing and assembling industries such as transport machinery, elec-



**Figure 20** Changes in Foreign Trade in Each Region (Local Area)

Note: The arrows represent changes from 1960 to 1965, to 1970, to 1975, to 1980 and to 1985.

trical machinery and general machinery enlarged their share. The percentage of these machineries was 57.0% of the total exports in 1985.

### 5 - 2 Foreign trade in regional economy

The constituent rations of import and export volumes depend upon industrial structure in each region. As a whole, export volume exceeds import volume in central regions including Kanto, Kinki and Chubu as shown in Figure 19. This tendency appeared at the beginning of the 1980s, when the yen was appreciated against the dollar. Then, Figure 20 shows the opposite situation, that is export is exceeded by import in local regions such as Hokkaido, Tohoku, Chugoku, Shikoku, Kyushu and Okinawa. Chugoku region has rather large volumes for export and import with foreign countries among local regions.

In order to understand foreign trade in each region, regional distribution of seven major commodities for export are analysed as shown in Table 15. The ratio of total exports from central area and local area is 83.0%: 17.0%, although that of total production is 71.8%: 28.2%.

Table 15 Regional Distribution of Major Export Commodities in 1985 (Unit: ¥1,000,000 million)

Items	Region							Local Total	Domestic Total			
	Kanto	Chubu	Kinki	Central Total	Hokkaido	Tohoku	Chugoku			Shikoku	Kyushu	Okinawa
1 Transportation machinery	8,509 (51%)	5,401 (81%)	1,853 (31%)	15,761 (59%)	259 (6%)	543 (6%)	1,252 (124%)	143 (238%)	577 (79%)	26 (8%)	2,804 (86%)	18,565 (63%)
2 Electrical machinery	7,546 (78%)	1,872 (30%)	3,053 (59%)	12,471 (67%)	135 (11%)	1,644 (45%)	703 (31%)	278 (140%)	1,119 (11%)	7	3,891 (38%)	16,362 (60%)
3 General machinery	4,206 (60%)	1,746 (37%)	2,222 (71%)	8,174 (59%)	208 (5%)	368 (16%)	635 (31%)	298 (13%)	634 (26%)	23	2,170 (22%)	10,344 (51%)
4 Transport	6,269 (25%)	2,003 (32%)	2,721 (29%)	10,993 (28%)	742 (6%)	822 (6%)	1,248 (28%)	575 (13%)	1,616 (22%)	151	5,159 (17%)	16,152 (24%)
5 Steel	7,803 (12%)	3,114 (9%)	5,931 (15%)	16,848 (12%)	493 (8%)	525 (11%)	4,140 (12%)	127 (8%)	2,755 (14%)	24	8,068 (13%)	24,916 (12%)
6 Commerce	10,704 (12%)	2,390 (20%)	4,095 (17%)	17,189 (14%)	757 (1%)	973 (18%)	883 (17%)	392 (11%)	1,399 (7%)	103	4,511 (11%)	21,700 (14%)
7 Chemicals	8,218 (12%)	2,628 (9%)	3,707 (13%)	14,553 (12%)	179 (1%)	556 (4%)	2,711 (8%)	771 (14%)	1,324 (11%)	10	5,554 (9%)	20,107 (11%)
Others	85,118 (5%)	27,268 (4%)	36,131 (7%)	148,517 (5%)	9,635 (1%)	13,969 (2%)	15,435 (2%)	7,102 (2%)	16,781 (2%)	1,235	64,132 (2%)	212,649 (4%)
Total	138,371 (13%)	46,422 (18%)	59,713 (15%)	244,506 (16%)	12,408 (2%)	19,400 (7%)	27,007 (13%)	9,686 (11%)	26,205 (8%)	1,579 (6%)	96,289 (9%)	340,795 (14%)

Note: Each cell has three levels of columns (upper, middle and lower), which indicate an amount of total production, an amount for export and its ratio, respectively.

In processing and assembling industries including transportation, electrical and general machineries, central regions occupy more than 80% of domestic production and export. On the other hand, central regions share in only 70% of capital- and resource-intensive industries such as steels and chemicals, which are supplied from Chugoku and Kyushu regions as well.

Processing and assembling industries usually include microelectronics (computers, word processors), mechatronics (industrial robots, car), which are the so-called 'high-technology' industries expanding rapidly. There has been a remarkable advance in technological innovation centred in the field of electronics, giving expectations for a high level of economic efficiency and creating a demand for industry as a whole. The number of 'high-technology' industrial establishments has greatly increased since 1980, especially in and around the Kanto region. There are also minor concentrations in the Kinki and Chubu regions. Technology-intensive products have usually high added value, which contributes significantly to regional growth.

## 6 CONCLUSIONS

The major purpose of this paper is to examine structural changes of regional economy before and after improvement of rapid transport in the last two decades. Some simple analyses are carried out through direct comparisons among interregional input-output data in Japan. The regional economy is influenced by changes in international and domestic economies as well as transport improvement. Therefore, of course, further work is required to distinguish and clarify these factors. Major results obtained in these practical analyses are summarized as follows:

(1) From 1965 to 1985, interregional trade in Japan has been activated and the geographical sphere for each regional economy is enlarged.

(2) Regional transactions between central and local regions have been increased, although production share in central area is becoming large and local economy is becoming obliged to live upon central area.

(3) Changes in Kanto (including Tokyo) are distinguished, where technology-intensive industries such as transport, electrical and general machineries have been concentrated and they have usually high added value and most of them are exported to foreign countries. Their contribution to the growth of regional economy in Kanto is significant.

(4) Even if the potentiality of Kinki is still large, its relative share of domestic economy is transferred to the Kanto region. This transfer began in the mid-1970s, when the Tokaido Shinkansen was first operated and the Japanese economy was linked directly with the international economy as a whole.

Finally, Tokyo is now a typical city where all kinds of urban functions including political power, economy, information and culture are concentrated. This concentration has stimulated the Japanese economy in the period of rapid economic growth. However, various conditions surrounding Japan were changed drastically when the foreign trade surplus in Japan strained relationships with other countries. On the other hand, other regions besides Kanto, especially local regions have various problems because of excessive concentration as clarified in this paper.

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