

# An Analysis on Structural Change of Interregional Division of Labor in China \*

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## 1. Introduction

While China is accomplishing the rapid economic development in recent years, the economic disparities between regions are expanding and are recognized as social problem. "Reform and door-opening policies" of China started in 1978, and the strategy put emphasis on the development of the coastal region, which is called "the theory of allowing individuals to grow rich first" (by Deng Xiaoping, meaning here to proceed the development of a specific region first). However, regional disparities of economy have become apparent since the second half of the 1990's, and the adjustments were made in the original strategy. "Large-scale development in the west" and "Promotion of the northeastern regions" are the concrete examples. Recently the elimination of the economic disparities is viewed as one of the requirements for "Continued economic development", and the construction of "Harmonious society" has become policy objective. China has set the course for well-balanced development strategy. However, even if the development strategy is changed to the equilibrium policy, the flow that the market made in 20 years or more cannot be changed suddenly, and also the interregional

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economic disparities are not solved in the present situation, as to be mentioned later.

There are a lot of researches that treat interregional economic disparities. First, the following literature discusses the relation of the internationalization and regional income disparities. Kanbur and Zhang (2004) confirmed the factors of interregional income disparities are different before/after the reform in 1978 using a regression analysis based on a long term time series data. Interregional income disparities before Reform are mainly caused by the share of heavy industry while those after Reform are mainly caused by the degree of decentralization and the degree of openness. Fu (2004) also investigates spillover effects of exports and FDI and finds that exports and FDI played an important role in raising income disparities between the coastal and inland regions in China. Wan, Lu, and Chen (2007), applying Shapley value decomposition method, shows that globalization constitutes substantial share of regional inequality and the domestic capital as well as economic reform emerges as the large contributors to regional inequality recently while the relative contribution of education, location and urbanization to regional inequality has been declining. Second, Ezaki and Sun (1999) and Liu and Yoon (2000) argue that the regional gaps of TFP growth explain the different economic performances across Chinese provinces. They show that the rapid economic growth of east coastal provinces has benefited much from a high TFP growth while the inland provinces have suffered from lower TFP. Third, Fang et al. (2002) states that the distortion of labor market (restrictions such as family registration system and protectionism policy of local government) affects the interregional disparities in China.

Among the preceding studies that focus on input-output relations, there is Hioki (2004). According to Hioki (2004) it is assumed that one of the factors of economic disparities between regions is that the final demand of the coastal region causes the production in the western region only slightly when the amount of production inducement is compared.

On the other hand, we pay attention to the transfer in the added value. Though the full explanation of the analysis method is to be detailed in the coming sections, it can be as follows to sum up. The

intermediate goods of that region, intermediate goods and imported intermediate goods of other regions in the country and also the added value of own region (in other words, income in the region) are input in the process in order to produce a certain final demand. However, the input of the intermediate goods of that region and the input of the intermediate goods produced in other regions in the country are likewise produced from the above four kinds of input elements. Such a chain is a process of a regional division of labor. If this chain is infinitely repeated, it will be found out to which regions (domestic regions or that of those of overseas) that the added value produced in the production activity of a certain region returns. ①

Though we need the data concerning the transfer of goods between domestic regions and the foreign trade of each region by industry in order to grasp the domestic structure of interregional division of labor, so far such statistical materials has not been prepared except for those of railway cargo in China. However, owing to Japan External Trade Organization (2003), and Ichimura and Wang (2004) the "Input-Output table between regions" of China has become available and the domestic structure of interregional division of labor in China has become comprehensible. Then, the change in the structure of interregional division of labor among regions is examined from the second half of the 1980's to 2000 in the framework of the input-output analysis in this study.

The composition of this study is as follows. Section 1 tries to grasp the trend of the economic disparities between regions from the founding of a country up to the present. Section 2 introduces the measurement model of the structure of interregional division of labor. In section 3 the analysis result of the structure of division of labor between regions is considered. In section 4, the additional analysis is made for the relation with foreign countries (especially the regions in Asia) as for the division of labor with China separated in two areas, the coastal region and the inland. The

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① Hu (2006) also takes in same view as ours of the ultimate attribution of the added value. This study is an expansion of Hu (2006) in such sense. This study views the change of the shift of the added value as the factor for the expansion of regional disparities and comparing the year 1987 and 2000.

conclusion is framed in section 5 at the end.

## 2. Trend of Income Disparities among Regions

### 2.1 The Shift of Real GRP by Region

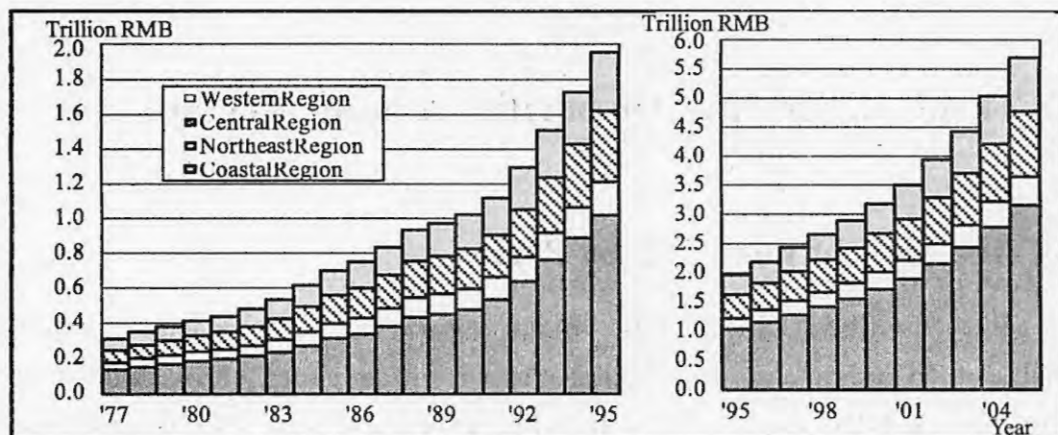
We divided China into four regions, i. e. coastal region, northeastern region, central region and western region<sup>①</sup>, and showed the trend of real GRP from 1977 before the reform and door-opening policies were adopted through very recent year of 2005. Though it would not be appropriate to take only the both ends, the annual growth rate of GDP was 11.0% on the national average in this period. When seen by region, it is 12.0% in coastal region, 9.0% in northeastern region, 10.5% in central region and 10.0% in western region. Though figures are quite large when compared to the recent growth rate of Japan, we can see the difference as much as 3% between the coastal region whose growth rate is largest and the northeastern region with the least growth rate. Consequently, the share of GRP of coastal region, northeastern region, central region and western region have changed from 42.4%, 14.2%, 22.4%, 21.0% in 1977 to 55.3%, 8.6%, 19.9% and 16.3% in 2005 respectively. In a word, Reform and door-opening policies has enlarged the size of a pie, however, it is only the coastal region that expanded its share and the shares of other regions have got smaller when we look at the relative economic scale by region.

### 2.2 Regional Production Structure Seen from the Interregional I-O Table

Table 1 shows composition of production in each region of China in 2000. The region where the economic scale is the maximum is coastal

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① This geographical classification is used in the policies and statistics of Chinese government. For example, in 10th 5-year Planning (2001 – 2005) the large-scale development of western area, promotion policy of the former industrial base in northeastern area and the promotion of development of central area are stated. From 11th 5-year Planning (2006 – 2010), 4-area classification that divides the nation into western district, northeastern district, central district and eastern district have been established.



**Figure 1 Real Gross Regional Product in China (1977 – 2005)**

Note: Base Year = 1978.

Source: Author's calculation based on the China Compendium of Statistics 1949 – 2004 and China Statistic Year book 2006.

**Table 1 Industrial Structure in China**

Unit: Billion RMB Yuan

	Northeast	Costal	Central	Western	Total
Primary Industry	250	1 027	585	605	2 468
Secondary Industry	1 277	7 940	2 248	1 808	13 273
Tertiary Industry	420	2 426	665	734	4 244
Total	1 947	11 392	3 498	3 147	19 984
Primary Industry	12.9%	9.0%	16.7%	19.2%	12.3%
Secondary Industry	65.6%	69.7%	64.3%	57.5%	66.4%
Tertiary Industry	21.6%	21.3%	19.0%	23.3%	21.2%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Source: IDE/JETRO (2003) "Multi regional Input-Output Table 2000".

region and accounts for such a major share of 57.0% in the national production (about 11.4 trillion yuan). On the other hand, the region where the economic scale is smallest is northeastern region with about two trillion yuan and accounts for 9.7% in the whole country. When the shares of industries by region are seen, the share of the second industry has the biggest share of 60% in each region, and primary and tertiary

industries have a share of about 20% respectively. It seems there are not so extreme differences between regions. Here we can see the picture of so-called “Factory of the World”. However, when the amount of production of the second industry is seen, it differs greatly by region. There is such a difference of 4.4 times between the coastal region where the production amount is largest and the western district.

### 2.3 Trend of Income Disparities between Regions

Next, let's see the trend of the income disparities (trend of the regional disparities of GDP per person) between regions in China. A lot of research results describe the expansion of the economic disparity occurred again in the 1990's though it reduced once in the beginning of 1980's immediately after the adoption of the Reform and door-opening policy<sup>①</sup>. We followed the income (GDP per person) disparities between provinces using long-term data from 1952 to 2004 in this study. Theil's inequality index is used as index to measure income disparities in this study<sup>②</sup>. Theil's inequality index between provinces is defined according to Akita (2003) as follows.

$$T = \sum_k \left( \frac{Y_k}{Y} \right) \ln \left( \frac{Y_k/P_k}{Y/P} \right) \quad (1)$$

However,  $Y_k$  stands for GRP of the province  $K$ ,  $Y$  for national GDP,  $P_k$  for the population of the province  $K$  and  $P$  for the overall population of the country. The index should read as follows: when the income of all persons become same (since the antilogarithm of the logarithm becomes one), then the Theil index becomes zero and also the value of Theil index gets bigger as the income disparities grow.

What this study focuses on is the disparities between regional blocks such as coastal region and inland region as well as the disparities between provinces. Here we are going to do the analysis dividing China into four regional blocks, i. e. west inland region, central region, eastern coastal

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① For example, Akita (2003), Xu et al. (2005).

② As for the index of inequality, there are Gini coefficient, coefficient of variance of income and coefficient of variance of population weight other than Theil index. It is easier to do hierarchical decomposition inequality when Theil index is used. We calculated by other indices but we had to cut the explanation because of the limitation of the space.

region, and northeastern region<sup>①</sup>. Though it is the same thing with the expression (1), Theil index comes as follows with the country divided into regional blocks:

$$T = \sum_r \sum_i \left( \frac{Y_i}{Y} \right) \ln \left( \frac{Y_i/P_i}{Y/P} \right) \quad (1')$$

Here  $Y_i$  means GRP of the  $i$  th province of the  $r$  th region.  $P_i$  means the population of the  $i$  th province of the  $r$  th region. The characteristic of the Theil's inequality index is that it can be easily divided into some phases.

$$T = \sum_r \left( \frac{Y_r}{Y} \right) \sum_i \left( \frac{Y_i}{Y_r} \right) \ln \left( \frac{Y_i/P_i}{Y_r/P_r} \right) + \sum_r \left( \frac{Y_r}{Y} \right) \ln \left( \frac{Y_r/P_r}{Y/P} \right) \quad (2)$$

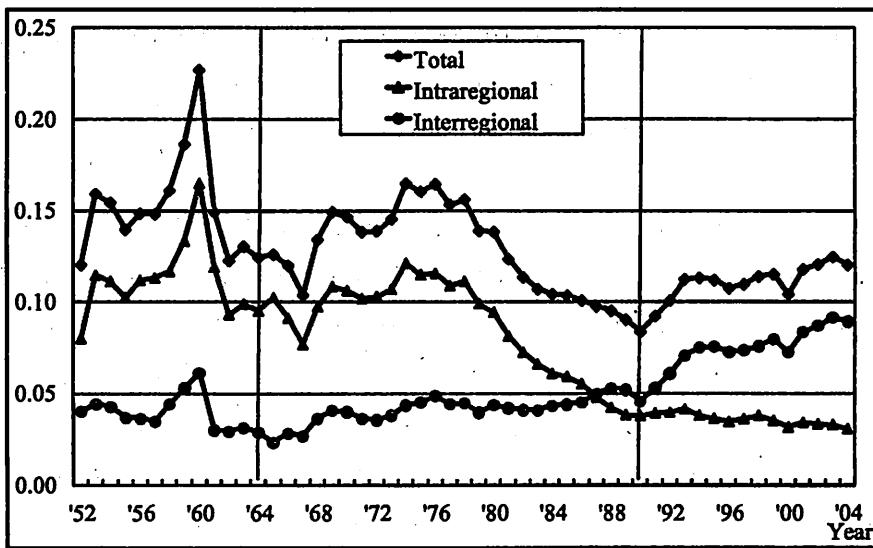
When it is divided into 2 terms, the first term in the right side shows the disparities inside the regional block and the second term shows the disparities between the regional blocks.

Figure 2 and Figure 3 show the calculation result of the Theil index in China. In these figures, if the graph is located in the upper area it means that the degree of inequality is large. Figure 2 shows the shift of the disparity in China nationwide, dividing it into the disparities inside the regional block and the one between the regional blocks. There seems to be three periods (fluctuation of the change) in respect of the transition of the income disparities in the whole country. We can summarize it as follows:

[ The first period ] This was the period of "the Great Leap Forward" (1958 - 1960) just after the founding of the country and its adjustment. "The Great Leap Forward" is the policy that the resources are intensively input to manufacturing in order to promote rapid industrialization of China with the reason of strengthening of leadership of the central government and the national security. "Hand-in-hand policy by region" that industrializes the some regions in the country all together is adopted during this period. The investment to the western inland region was especially strengthened; however, this policy couldn't have had a chance

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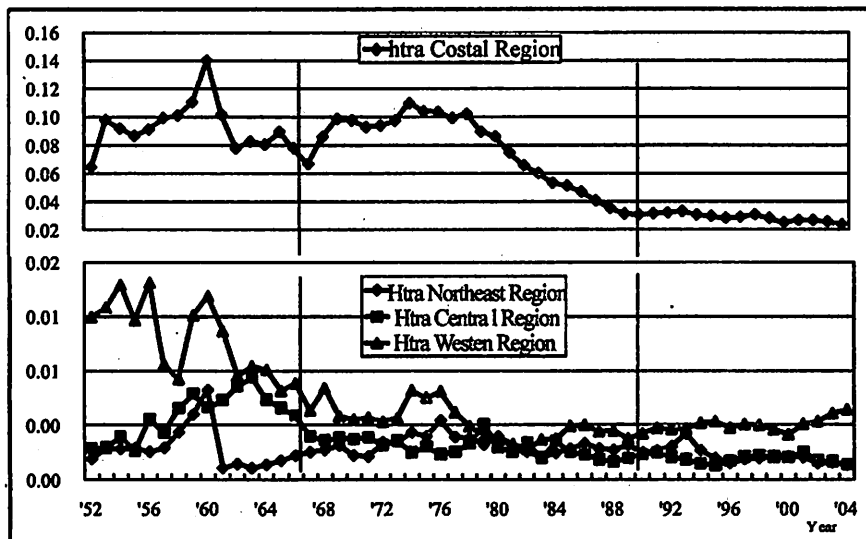
① Western district has 10 first-class administrative areas (province, government-ruled municipality, autonomous area), and central district has 6 administrative area, eastern coastal district has 12 administrative area and northeastern district has 3 administrative area. Though formal administrative area of China includes Taiwan, Hong Kong and Macau, they are excluded in the analysis of this study.



**Figure 2 Inter-regional Income Disparities in China (1952 – 2004)**

Note: Insufficiency of Statistic's data of Hainan was excluded.

source: Author's calculation is based on the China Compendium of Statistics 1949 – 2004.



**Figure 3 Intra-regional Income Disparities in China (1952 – 2004)**

Source: Same as Figure 1.

of success because of the poor industrial infrastructure at that time. In addition, because “the Great Leap Forward” had turned manpower to manufacturing, the cruel impoverishment of rural communities and also



changeable weather invited “the Great Step Backward” that led many people starve to death due to the lack of food in the farm village area. The income distribution rapidly become equal since it was in the period of economic recovery in the first half of the 1960’s after the Great Leap Forward.

[ The second period ] The latter half of the 1960’s was an age of the radical sect revival. The inequality of income in China expanded again in this period. It was assumed that in Cultural Revolution (1966 – 1976) the policy operation in the first half of the 1960’s was seen as “capitalist”, and the swing-over to “socialist” policy occurred again. If we say that the characteristic of the socialistic economic structure is that there the surplus in the farm village area was input for the industrialization of the city, the economy of Cultural Revolution is also “mini Great Leap Forward” and the income of farm villages had not expanded. Cultural Revolution ended with Mao Zedong’s death, and the economic policy shifted to “Reform and door-opening” after 1978. The income disparities had reduced in the whole country until 1990. In general, the reduction of the disparities at this time is often assumed that it is brought by the income increase in the farm village part due to the rise of agricultural productivity and the development of township and village enterprises by the economic reform (economic liberalization) in the farm village part. However, the matter of the fact is that a decrease in the disparities inside regional block was the key factor.

The trend of the disparity in the coastal region is shown in the upper part of Figure 3; it is understood that this has decreased greatly after 1978 when the Reform and door-opening policy was adopted. The Reform and door-opening policy was the policy to introduce foreign capital and expand trade to coastal region, and South China and the part of the East China region have become pioneering figures. Because of that and the disparities inside the coastal region has reduced during the catch-up process that the emerging coastal region grows and Guangzhou and Suzhou catch up with Shanghai whose income is highest<sup>①</sup>. It is expected that the disparities between regions also diminish if the western district

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① Refer to Ohnishi (2007).

will take off in the future, however, at present; such apparent tendency is not observed.

[The third period] The reform and door-opening policy produced further results in the 1990's. The income disparities have shifted to expanding trend along with it. While the disparities inside the regional block were decreasing after 1990s as shown in Figure 2, the disparities between regional blocks were expanding. In a word, provinces in rich regional blocks are increasing their income on average, while in poor regional blocks the provinces inside the blocks are left out on average. Such a "polarization" was observed Kato et al. in 2004. <sup>①</sup>

### 3. Measuring Model and Data<sup>②</sup>

The purpose of this study is to understand the change of the structure of regional division of labor in China and we see the structure of regional division of labor as "Distribution structures of added value to various places". The intermediate input is required in order to supply final product and the added value is generated in the industries concerned that supply the intermediate input whenever the intermediate input goods is input. In a word, "regional division of labor rate" is defined as the ultimate rate that the value is attributed to which industry of which region during the production process of final product.

#### 3.1 Integrated Added Value Coefficient and Integrated Import Coefficient

The idea of the regional division of labor rate is the one that applied "Integrated added value coefficient" and "Integrated import coefficient" in the input-output analysis. First of all, let's explain the meaning of these two coefficients. The integrated added value coefficient means the amount of the ultimate amount of added value included in one unit of the

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① Kato et al. (2004) calculates Gini coefficient of this period. Gini coefficient rises from 0.382 in 1987 to 0.454 in 2000.

② Refer to Fujikawa (2005) for detail.

final product. The integrated import coefficient is the ultimate amount of imports included in the one unit of final product. In the input-output table of non-competitive import type, the following two supply-and-demand accordant expressions can be formed as for domestic products and imports.

$$x = A^d x + f^d \quad (3)$$

$$m = A^m x + f^m \quad (4)$$

However, vector  $x$  and  $m$  mean the production inside the region and import, and matrices  $A^d$  and  $A^m$  stand for the input coefficient matrix of regional products and imports respectively, and  $f^d$  and  $f^m$  stand for the final demand vector for the regional products and the imports. If the balance expression of supply and demand of the expression (3) is solved for  $x$  the amount of production inside the region, we can obtain the following balance production decision expression (5).

$$x = (I - A^d)^{-1} f^d \quad (5)$$

GDP, i. e. the total of added value is obtained by multiplying the vector of added value rate  $v$  from the left side of the amount of production vector in the expression (5).

$$GDP = v(I - A^d)^{-1} f^d \quad (6)$$

The amount of the added value that one unit of the final demand to the first industry ultimately induces (in a word the ratio that remains as added value) is obtained by the following expression (7).

$$GDP(1) = v(I - A^d)^{-1} \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \quad (7)$$

When the amount of the added value that the production of one unit of the final product ultimately induces at the same time for the overall industry is considered, the expression (8) is obtained (the left side is a line vector).

$$GDP(1,2,\dots,n) = v(I - A^d)^{-1} \begin{bmatrix} 1 & & 0 \\ & \ddots & \\ 0 & & 1 \end{bmatrix} = v(I - A^d)^{-1} \quad (8)$$

This concept is "Integrated additional value coefficient"  $\tau^d$ . In the expression (8'), the vector  $v$  of the expression (8) is expressed by the product of the diagonal matrix  $\theta$  and the aggregated vector  $\iota$ .

$$\tau^d = v(I - A^d)^{-1} = \theta(I - A^d)^{-1} \quad (8')$$

On the other hand, when the import input coefficient is multiplied instead of added value rate diagonal matrix, the amount of import that the production of one unit of final demand ultimately requires is calculated. The expression (9) is “Integrated import coefficient”. Here,  $A^m$  is import coefficient matrix.

$$\tau^m = [1 \quad \dots \quad 1]A^m (I - A^d)^{-1} = \iota A^m (I - A^d)^{-1} \quad (9)$$

By the way, if the integrated added value coefficient and the integrated import coefficient of each industry are totaled, it becomes just one.

$$\tau^d + \tau^m = \iota (\theta + A^m) (I - A^d)^{-1} = \iota (I - A^d) (I - A^d)^{-1} = \iota \quad (10)$$

This means the price of the initial final goods can be divided into the added value part and the import part.

### 3.2 Regional Division of Labor Rate on the Added Value Basis<sup>①</sup>

Let's define “regional division of labor rate” used in the analysis of this study. The regional division of labor rate is an expansion of the idea of the integrated added value coefficient and the integrated import coefficient described in the section 3.1 for the inter-regional input-output table. The return destination of the added value would be either the home country or foreign country in input-output table of one country; however, in the inter-regional input-output table the return destination of added value can be obtained by region. The acquisition rate of such a regional added value is “regional division of labor rate on the added value basis” defined as follows.

The number of sectors of the interregional input-output table is expressed as  $n$ , and the number of endogenous region as  $r$ . In the interregional input-output table, the input coefficient matrix ( $A$ ) of the endogenous region will become the square matrix of  $nr$  rows and  $nr$

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① Hasebe (2002) focuses on the intermediate goods input directly and indirectly in each production process for “General input standard” and defines the international division of labor as the composition ratio according to the home city of the goods. Here the input of the added value is not covered. On the other hand, we cover the regional division of labor in one country and not international division of labor. In “added value basis” regional division of labor is defined as the attribution of the added value by region. The added value is important factor of input during the production process.

columns, which includes the import input from outside the region or export input to outside region; accordingly the division of labor rate by industry of each region is defined as matrix  $T$  ( $r$  rows  $nr$  columns) as follows. Added value coefficient matrix  $\theta$  is the one that the added value coefficient vector of each region is arranged diagonally and is a matrix with  $r$  rows  $nr$  columns. Each row of "Row industry" of matrix  $T$  shows the division of labor rate in the concerned row region.

$$T = \theta (I - A)^{-1}, \theta = \begin{bmatrix} v_1 & & 0 \\ & \ddots & \\ 0 & & v_r \end{bmatrix}, v_k = [v_k^1 \ \cdots \ v_k^n] \ (k = 1, \dots, r) \quad (11)$$

Next, we'll define the division of labor rate of foreign countries  $\tau_m$  (the rate of added value that leaks to foreign countries) that is exogenous sector. Here  $a_m$  is the input coefficient row vector ( $nr$  columns) of the import input from foreign countries.

$$\tau_m = a_m (I - A)^{-1} \quad (12)$$

When the division of labor rate of endogenous sector of the expression (11) is added to the rate of overseas leakage of the expression (12), it becomes just 1 as in the section 3. 1. This means the price of final goods produced in a certain region is distributed completely to various places (including foreign countries).

### 3.3 Data of Input-Output Table

As for the measurement of the structure of regional division of labor, we used two interregional input-output tables as follows. One is Chinese interregional input-output table of the year 1987 (hereinafter, referred to as "Table 1987"). This is a result of a joint research of Development Research Center (DRC) of China and International Centre for the Study of East Asian Development (ICSEAD) in Kitakyushu City. This table is basically prepared based on regional input-output table of all of Chinese administrative district and the distribution data between each administrative section made by Traffic Division Statistics Department and related sections. The other is Chinese interregional input-output table of the year 2000 (hereinafter referred to as "Table 2000"), which is also a result of a joint research of Institute of Developing Economies and a Chinese State Information Center. Though this table also refers input-

output table of each Chinese administrative district, it uses the both methods of survey/non-survey as for trade between regions.

Table 2 shows the regional division used in this study. Table 1987 has seven regional divisions, and Table 2000 has eight regional divisions. The reason that two tables have different regional divisions is that Table 2000 has divided northern coastal region in Table 1987 into metropolitan area (Beijing and Tianjin) and other northern coastal region (Hebei, Shandong). Here we integrated Table 2000 according to the classification of Table 1987. However, the adjustment is impossible as for Inner Mongolia. Though Inner Mongolia belongs to Huabei (northern China) district in Table 1987, it is classified into the northwestern district in Table 2000. Though Inner Mongolia is classified into different regions in two tables, its share in national GDP is only about 1.5%

**Table 2 Regional Division in this study**

1987 I-O table in Ichimura & Wang and this study	Description ( Province, Autonomous and municipality included)
1. Dongbei	Heilongjiang, Jilin, Liaoning
2. Huabei	Beijing, Tianjing, Hebei, Shandong, Neimenggu
3. Huadong	Jiangsu, Shanghai, Zhejiang
4. Huanan	Fujian, Guangdong, Hainan
5. Huazhong	Shanxi, Heinan, Anhui, Hunan, Jiangxi, Hubei
6. Xibei	Qinghai, Xinjiang, Ganshu, Shanxi, Ningxia
7. Xinan	Sichuang, Guangxi, Chongqing, Xizhang, Yuannan, Guizhou
2000 I-O table in IDE/JETRO	Description ( Province, Autonomous and municipality included)
1. Northeast region	Heilongjiang, Jilin, Liaoning
2. Metropolitan municipalities	Beijing, Tianjing
3. North costal	Hebei, Shandong
4. Central costal	Jiangsu, Shanghai, Zhejiang
5. South costal	Fujian, Guangdong, Hainan
6. Central region	Shanxi, Henan, Anhui, Hunan, Jiangxi, Hubei
7 Northwest region	Neimenggu, Qinghai, Xinjiang, Ganshu, Shanxi, Ningxia
8. Southwest region	Sichuang, Guangxi, Chongqing, Tibet, Yunnan, Guizhou

Source: Ichimura and Wang (2004) for 1987 and IDE/JETRO (2003) for 2000.

(Table 1987) and 1.4% (Table 2000). Since they don't make input-output table for Tibetan Autonomous Region, it is not included in southwestern region of both 1987 and 2000 tables<sup>①</sup>. However, we consider it does not affect much for the result of our study since the economic scale of Tibet is relatively small compared in national level (its share of GDP is 0.16% in 1987 and 0.14% in 2000).

Table 3 shows the industrial classification used in this study. As for the industrial classification Table 1987 has 9 industrial sectors while Table 2000 has 30 industrial sectors, we rearranged 30 sectors of Table 2000 according to 9 sectors of Table 1987.

**Table 3 Industry Classification in this study**

	Industry classification in this study for 1987 I-O		Industry classification of 2000
1	Agriculture	1	Agriculture
2	Mining	2	Coal mining and processing
		3	Crude petroleum and natural gas products
		4	Metal ore mining
		5	Non-ferrous mineral mining
3	Light industry	6	Manufacture of food products and tobacco processing
		7	Textile goods
		8	Wearing apparel, Leather, furs, down and related products
		9	Sawmills and furniture
		10	Paper and products, printing and record medium reproduction
4	Energy industry <sup>1)</sup>	11	Petroleum processing and coking
		24	Electricity, steam and hot water production and supply
		25	Gas production and supply
		26	Water production and supply
5	Heavy industry	12	Chemicals
		13	Nonmetal mineral products
		14	Metals smelting and pressing
		15	Metal products

① Refer to Ichimura and Wang (2004) for detail.

(Continued)

	Industry classification in this study for 1987 I-O		Industry classification of 2000
5	Heavy industry	16	Machinery and equipment
		17	Transport equipment
		18	Electric equipment and machinery
		19	Electric and telecommunication equipment
		20	Instruments, meters, cultural and office machinery
		21	Maintenance and repair of machine and equipment
		22	Other manufacturing products
		23	Scrap and waste <sup>2)</sup>
6	Construction	27	Construction
7	Trade & transport	28	Transport and warehousing <sup>3)</sup>
8	Wholesale and retail trade	29	Wholesale and retail trade
9	Services	30	Services

Notes:

- 1) Including petroleum processing and coking, electricity, gas and water supply.
- 2) Neither scrap nor waste is in multi-regional I-O 1987.
- 3) Communication belong to Serves in 2000 table.

Source: same as Table 2.

Lastly, both Table 1987 and Table 2000 calculate import from foreign countries in "Competitive import type". In a word, the import from abroad is included in each cell of the input-output table. Since it is impossible to obtain accurate rate of regional division of labor as it is, we divided into domestic production and import, and reedited it to the interregional input-output table of non-competitive import type in this study. Suppose the import of a certain region is not re-exported to other regions (the principle is that if it is re-exported to other regions, it should be assumed from the beginning that it is included in the import of the region where it is going to be re-exported), and the cell that is in the same row of the in-regional trading part of the region concerned is the same import ratio, domestic production and import were divided.



## 4. Examination of the Calculation Result

Here, we apply the “regional division of labor rate on the added value basis” of the expression (11) and “rate of imports on the added value basis” of the expression (12) as detailed in the section before to the interregional input-output table of China of the year 1987 and 2000, and follow the trend of the structure of division of labor in China. As aforementioned, “regional division of labor rate” and “rate of imports” on the added value basis is the ultimate rate of attribution of the added value in the process of producing the final products. Therefore, when the supplying district of the final goods procures the intermediate goods (in an ultimate sense) from other regions and foreign countries, the leakage of the added value will increase.

Table 4 shows the division of labor rate in the heavy chemical industry sector from the calculation results using 9-sector multi-regional input-output table of China. The table can be detailed as follows. If we look at the table in vertical direction, the rate of the value of the final products that the region at the top of the table supplied will ultimately return to which region is shown. On the diagonal line, “the rate of remaining in own region” is shown. The shaded part means the regions whose rate of remaining in own region is decreasing from 1987 to 2000. “Total of the place outside region in the same country” at the second line from the bottom is the rate of attribution (rate of leakage) of the added value to other regions in the country. Those in bold type show the regions where it was increased. The line at the very end means the rate of leakage of the added value to foreign countries. Those shown in bold type mean the regions where it was increased (actually it rose in all regions).

Table 4 Regional division of labor in Heavy and Chemical Industries

To \ From		Dongbei	Huabei	Huadong	Huanan	Huazhong	Xibei	Xinan
		Dongbei	1987	76.8	8.6	4.5	3.4	3.2
	2000	69.8	2.7	1.6	0.9	1.3	2.0	0.9

(Continued)

To \ From		Dongbei	Huabei	Huadong	Huanan	Huazhong	Xibei	Xinan
		Huabei	1987	9.4	66.9	9.7	6.0	5.9
	2000	6.6	69.5	7.5	4.3	7.2	7.3	4.1
Huadong	1987	4.6	8.2	64.2	10.6	11.8	6.3	5.9
	2000	3.9	4.0	57.4	5.6	5.4	4.2	3.7
Huanan	1987	0.7	1.3	3.8	58.9	1.6	0.6	2.5
	2000	1.7	1.3	3.3	47.0	2.6	2.3	3.7
Huazhong	1987	4.4	9.5	9.1	6.1	71.6	3.4	3.4
	2000	4.3	5.0	8.6	6.4	72.4	7.7	6.2
Xibei	1987	0.4	0.8	1.0	0.9	1.0	75.4	2.8
	2000	1.3	1.7	1.4	0.9	2.8	66.8	2.0
Xinan	1987	0.6	1.2	1.9	4.9	2.1	6.7	79.4
	2000	0.8	0.7	1.5	3.0	1.8	2.6	73.4
Subtotal of off-diagonal regions	1987	20.1	29.6	29.9	32.0	25.5	22.5	17.8
	2000	18.7	15.4	23.9	21.0	21.1	26.2	20.6
Foreign countries	1987	3.2	3.5	5.9	9.1	2.8	2.0	2.7
	2000	11.5	15.1	18.7	31.9	6.6	7.0	6.0
Total	1987	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	2000	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Author's calculation based on Ichimura and Wang (2004) and IDE/JETRO (2003).

#### 4.1 The Remaining Rate of Added Value to Outside Region

The first impression is that "the remaining rate of added value in own region is low in China". The highest Figure in the table was the one in Southwestern region in 1987, which was still not so high Figure of 79.4%. On the other hand, the lowest rate was Huanan (Southern China) district in 2000 with the low rate of 47.0%. More than half of the added value will leak from its own region. It is found as general trend that the remaining rate of added value in own region is low in the advanced industrial area such as Huabei (Northern China), Huadong (Eastern China) and Huanan (Southern China) districts in coastal

regions (It is 69.5% , 57.4% , and 47.0% in 2000 respectively).

The regional remaining rate of the added value increased only in Northern China and Huazhong (Central China) districts and it decreased drastically in other districts as for the change through 1987 to 2000. A great decrease of 11.9% point was marked in the Southern China district.

We can see the rate of division of labor of added value of each district of Japan in 2000 from Table 6. The coastal region of China corresponds to "Pacific belt zone" that the regions once called in Japan (Kanto, Chubu and Kinki areas) and the regional remaining rate of each area is 82.6% , 71.1% , 77.3% , respectively, which all exceed 70%. The remaining rate of added value tends to become higher when the region becomes larger in Japan<sup>①</sup>. Though Eastern China and Southern China regions are far larger than Kanto, Chubu and Kinki regions of Japan, Their remaining rate of added value are obviously low compared with Japan.

## 4.2 The Rate of Leakage of Added Value Outside the Region

Let's divide the leakage of the added value outside the region into the leakage to foreign countries and the one to other regions in the country and examine the detail.

First of all, it is found that the leakage rate of the added value to foreign countries is in uptrend throughout China. Especially, the overseas leakage rate in the coastal regions of Huabei (northern China), Huadong (eastern China) and Huanan (southern China) districts is growing rapidly and its level is considerably high. More specifically, it expanded rapidly in 1987 to 2000 from 3.5% to 15.1% in northern China district, 5.9% to 18.7% in eastern China district and 9.1% to 31.9% in southern China district. The leakage rate to foreign countries of districts in Japan shown in Table 6 is marking less than 9% even in a

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① Let's take the relation between square footage of Tokyo, Kanto and all country and the rate of import (= import/GDP) as example. In year 2000, the square footage of Tokyo was 2 103km<sup>2</sup> and its rate of import was 12% , Kanto area was 67 656km<sup>2</sup> and its rate of import was 9% , and the all country was 377 923km<sup>2</sup> and the rate of import was 6%. Though they are one example the import rate becomes lower as the land become larger. In other words the remaining rate of added value in own region become larger (ref: "Regional input-output table" "Statistical Yearbook of Tokyo" "Statistics of Japan" Ministry of Internal Affairs and Communications).

high district. Japan is known as “processing trade nation” so far and it is imagined that the input of the imported raw materials is comparatively large. However, China actually has become “processing trade nation” that has far exceeded Japan in the 1990’s.

As we look at regions, the overseas leakage rate rises especially in southern district where it is said to be with high level of economic openness, and the leakage rate to foreign countries is larger than the leakage rate to other regions in the country in 2000 in southern China. It can be found from this that the production structure was that after 1990s the most of manufacturing of foreign capital that proceeded to coastal regions imports large part of parts and components from own country and they assemble them in China to make final products. Oppositely, in the inland regions such as central China, northwestern China and southwestern China districts the overseas leakage rate is obviously low though it rose from 1987 to 2000. In 2000, it was 6.6% in central China district, 7.0% in the northwestern district, and 6.0% in the southwestern district.

Next, let’s take a look at the leakage rate to other regions in the country. It is only two regions whose leakage rate to other regions rose from 1987 to 2000; they are northwestern district (rise from 22.5% to 26.2%) and the southwestern district (rise from 17.8% to 20.6%). On the other hand, the leakage rate to other regions in the country has decreased greatly in three districts of coastal region. It is a decrease from 29.6% to 15.4% in northern China district, from 29.9% to 23.9% in eastern China district and from 32.0% to 21.0% in southern China district. The decrease of the leakage rate to other regions in the country can also be seen in northeastern China and central China districts.

The outline of the trend of production structure of each district is that there can be found the trend that the import input from overseas is expanded in the manner that the input from other regions in the country is substituted (in a word, decreased). And, the remaining rate of the added value in own region is decreasing in many districts since the effect of expanding import input is larger. However, the exception in the trend is the northwestern district and the southwestern district in the western region. In western region the leakage of the added value to foreign

countries is increasing while the increase of leakage to other regions in the country is large as well.

The economic growth of each district in China is characterized by the expansion of the import brought by the introduction of foreign capital; it is once again realized that the quantitative side of the expansion is supported by the imported input goods.

### 4.3 Interrelations of the Regions in the Country

Then the interrelation between regions in the country is examined. When we look at the figures in Table 4 of the year 2000, the leakage share from southern China district to coastal region was 9.9% (4.3% in northern China district and 5.6% in the eastern China district). On the other hand, the leakage from the southern China district to northeastern district was 0.9%, and 6.4% to central China district and also 3.9% to western district (northwestern 0.9% and southwestern 3.0%). In a word, the domestic leakage of southern China stays as far as coastal region and the leakage to inland region is not that much. It is a basically similar trend as for the relations of northern China and eastern China between coastal regions and other regions. It is 5.3% from northern China district to coastal region, 2.7% to northeastern district, 5.0% to central China district and 2.4% to western China district. Also it is 10.8% from eastern China district to coastal region, and 1.6% to northeastern district, and 8.6% to central China district, and 2.9% to western district.

On the other hand, in northeastern district and western district the most of added value leaks to coastal region. For instance, the leakage share total of the northeastern district to coastal region is 12.3%, which is larger than 4.3% to central China district and 2.1% to western district. Northwestern and southwestern regions have basically similar structures. In northwestern district the leakage rate is 13.8% to coastal region, 2.0% to northeastern region, 7.7% to central China. In southwestern district it is 11.5% to coastal region, 0.9% to northeastern district, and 6.2% to central China.

What we can obtain from the above observation is that the dependence of coastal region to the inland which is geographically close

is comparatively advanced ( for instance, eastern/southern China and central China ), while the leakage of the added value from inland region to coastal region is large, however, the opposite is only slight. It is considered that this difference of input-output relation structure is the background to bring economic discrepancy.

## **5. Interrelations with Foreign Countries**

### **5.1 International Division of Labor with Foreign Countries**

It is found from the analysis in the section 4 that the relation of dependence with foreign countries is quite important in Chinese economy in recent years, especially in the coastal region. The interrelation with foreign countries is clarified by “Asian international input-output table 2000 between regions of Japan and China” published from IDE/JETRO in March, 2007 to verify it more in detail. This international input-output table includes eight regions of Japan, seven regions of China, and Asian nations and regions. Here, for the clear confirmation of the division of labor structure in China and foreign countries, it is classified here that the “coastal region” of China refers to northern China, eastern China, and southern China districts while northeastern district, central China district, northwestern district, southwestern district are “inland region”. Moreover, since the objective of this section is to grasp roughly the structure of international division of labor, the sectors of industries are integrated into 1 sector.

Table 5 shows the calculation result of the division of labor rate between regions. First of all, it is understood that as for Japan and the United States the rate of attribution of the added value to own country is 90 percent or more (93.7% for Japan, and 93.0% for U. S. ) and they have highly autonomous industrial structure. On the other hand, the attribution rate of the added value of coastal region of China, ASEAN 5 and South Korea and Taiwan( P. R. C. ) is about 70 percent, and it is lower than Japan-U. S. Moreover, the regional attribution rate of the inland region in China is comparatively high with 85.1% . This is

expressed as isolated rather than highly autonomous. The observation results are summarized as follows:

**Table 5 Value-added international division of labor (2000, 1 sector)**

To \ From	China		ASEAN 5	Korea/ Taiwan	Japan	US
	Costal	Inland				
Costal	70.6	8.5	0.8	0.7	0.2	0.2
Inland	7.9	85.1	0.2	0.2	0.1	0.0
ASEAN 5	1.2	0.3	71.0	1.7	0.5	0.3
Korea/Taiwan(P. R. C. )	3.2	0.6	2.1	76.8	0.4	0.3
Japan	2.8	0.8	5.2	4.0	93.7	0.6
US	1.5	0.4	3.5	3.0	0.8	93.0
ROW	12.8	4.2	17.2	13.6	4.4	5.7
Subtotal of Eastern Asian	7.2	1.7	7.3	5.8	0.9	1.2

Notes: Eastern Asian include ASEAN5 (Indonesia, Malaysia, the Philippines, Singapore and Thailand), Korea, Taiwan(P. R. C. ), Japan and China.

Seven regions of China were integrated into two regions in a coastal region and inland region according to the analysis.

Source: Author's calculation based on IDE/JETRO (2007).

### [ Coastal region of China ]

As for the leakage rate of the added value to other regions, the one to ROW is high excluding the domestic inland region. This might be reflecting a rise of the demand for energy in recent years and sudden rise of price<sup>①</sup>. On the other hand, in eastern Asian region the leakage rate to Japan, South Korea and Taiwan(P. R. C. ) is also high, and it can be presumed that the intermediate input from these countries and regions plays the key role to the production in coastal region.

### [ Inland region of China ]

As for the inland region of China, it is understood that the intermediate goods procurement from foreign countries is a little. Among the leakage rate of the added value the one to a domestic coastal regions is rather larger. In a word, the relation between the inland region and the

<sup>①</sup> The rise of crude oil has started around 1988. Price of crude oil Tokyo-Dubai per barrel was 12.2 dollars in 1998, 17.1 dollars in 1999 and it doubled in two years in 2000 to 26.2 dollars.

coastal region in China is similar to the relation between the coastal region of China and foreign countries.

[ Eastern Asian region ]

Also in ASEAN 5 and Asian regions of South Korea and Taiwan ( P. R. C. ), ROW is large as for the place that the leakage of the added value goes. Moreover, it is characteristic that the dependence to Japan is high. As for the relation between China the receiving ratio of added value is larger than offering ratio.

[ Japan - U. S. ]

Japan and the United States have received a lot of added value from the eastern Asian nations including Chinese coastal regions. It is an important part supply base.

## 5.2 The Relations of the Division of Labor with Regions in Japan

Let's take up the relation between China and Japan in detail in addition as for the division of labor with the foreign country. In Table 6, Japan is divided into eight regions, i. e. Hokkaido, Tohoku, Kanto, Chubu, Kinki, Chugoku, Shikoku, and Kyushu /Okinawa. As it can be found in Table 6 the division of labor between China and Japan has occurred mainly between coastal region of China and Kanto, Chubu, Kinki of Japan.

Table 6 Division of Labor between China and Japan (2000, 1 sector)

From \ To	China		Japan								ROA	U. S. A
	Costal	Inland	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Sikoku	Kyushu & Okinawa		
Costal	70.6	8.5	0.1	0.1	0.2	0.3	0.3	0.2	0.1	0.2	0.8	0.2
Inland	7.9	85.1	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.0
Hokkaido	0.0	0.0	77.9	0.8	0.6	0.4	0.4	0.3	0.2	0.3	0.0	0.0
Tohoku	0.1	0.0	1.3	72.9	1.8	1.0	0.8	0.8	0.8	0.6	0.1	0.0
Kanto	1.2	0.4	9.6	13.1	82.6	11.9	7.6	9.1	9.0	8.5	2.2	0.3
Chubu	0.4	0.1	2.1	2.3	2.7	71.1	3.4	2.9	2.5	2.4	0.5	0.1
Kinki	0.7	0.2	2.4	2.6	3.1	5.7	77.3	5.8	5.9	3.6	1.0	0.1



(Continued)

From \ To	China		Japan								ROA	U. S. A
	Costal	Inland	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Sikoku	Kyushu & Okinawa		
Chugoku	0.2	0.1	0.7	0.9	1.1	1.5	1.9	68.8	2.5	1.9	0.3	0.0
Sikoku	0.0	0.0	0.3	0.5	0.5	0.7	0.8	1.2	70.1	0.7	0.1	0.0
Kyushu & Okinawa	0.2	0.1	0.6	0.9	1.2	1.2	1.5	2.6	1.6	76.6	0.3	0.0
ROA	4.4	0.9	0.3	0.8	0.9	0.8	0.9	1.5	0.9	0.7	76.3	0.6
U. S. A	1.5	0.4	0.5	0.4	1.0	0.7	0.7	0.5	0.4	0.5	3.2	93.0
ROW	12.8	4.2	4.2	4.5	4.2	4.6	4.1	6.4	5.9	3.8	15.1	5.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Notes: This section analyzes the division of labor relation between China and Japan. The data of regions in Japan is divided based on Table 4. And ASEAN5, Korea and Taiwan (P. R. C.) were integrated as rest of Asia (ROA).

Source: Author's calculation is based on IDE/JETRO (2007).

If we list some of the leakage of the added value from coastal region of China to Japan that are comparatively large in Figure are 1.2% to Kanto, 0.4% to Chubu, and 0.7% to Kinki. In coastal region of China the income of 2.8% point flows to Japan and its destinations are chiefly these three regions. In a word, since the labor-intensive process has moved from these regions of Japan to coastal region of China, it is a reflection of the increase of raw material supply to Chinese production base.

Oppositely, the leakage of the added value from Japan to coastal region of China is 0.2% in Kanto, 0.3% in Chubu, and 0.3% in Kinki. It is understood that it is smaller than the flow of the income from China to Japan.

## 6 Conclusion

The reform and door-opening policies attracted foreign direct

investment to the coastal region and has expanded export. High economic growth has been achieved especially after the 1990's. The intention of Chinese government was primary to expand the economic success in the coastal region to the inland region. However, the plan of "the theory of allowing individuals (here, in a sense, specific regions) to grow rich first" doesn't go with reality, and it shows no sign that the income disparities of the coastal region and the inland region are reducing. In this study, we focus on the geographical disparities of the production structure, in other words the regional distribution structure of the added value and examined the background of the regional disparities of income.

In the production structure of the coastal region, the leakage rate of the added value to foreign countries is extremely high. This can be understood naturally where the result of the reform and door-opening policies, that is, foreign capital introduction and expansion of the trade. It is also true that the import of the raw material of high quality from foreign countries contributes to technological improvement of the production in China. However, there is also the weakness in the expansion of the production in the coastal regions where the leakage of income is large due to imported raw materials at the same time the export is expanded. On the other hand, when the relation between the coastal region and the inland region is seen, the input ratio of coastal region from other domestic regions is in a decreasing trend. In this sense, the development of the coastal region cannot promote the development of the inland region. If the "the theory of allowing individuals to grow rich first" expected the expansion of demand in the coastal region to boost the production in inland regions, it was a bringdown.

The input structure of inland region of China was comparatively autonomous structure that the remaining rate of added value was high. This synchronizes with the fact that foreign capital introduction is small. In a word, it is almost isolated economy where the market cultivation is not advanced. The intermediate goods procurement from overseas is small, and the input from the domestic coastal region is larger, when the input from outside region is compared. In a word, there is structure that the income leaks to domestic coastal region. As the conclusion obtained from the input-output analysis in this study, such asymmetry in the

industrial structure is one factor to cause economic disparities.

If the difference of the foreign capital introduction and the trade dependence is the factor of the income disparities between the coastal region and the inland region, the inducement of the foreign capital to inland region (in a word, expansion of the reform and door-opening policies toward foreign countries) would be considered as one of the prescription. The maintenance of infrastructure such as the factory site, the energy supply, and the means of transportation, etc. to attract foreign companies is important while promoting the financial move from the forerunner regions to late-started regions.

However, as Kato (2008) points out, it should be considered that it might be a necessary condition but not a sufficient condition. The key to success of the foreign capital introduction policy of coastal region is localization of the imported technology from foreign countries, as what happened in Japan in the high growth period. However, the geographical disparity of the average years of school attendance of workers is not reducing as it is stated in Lin (2001). In this situation the human capital where the technology is accumulated would not be thick and catch-up of the productivity to other developed regions could not be achieved. Moreover, in inland region it is important that the township and village enterprises that still have government-run business quality become activated in the market economy, and become the supporter of new technological absorption.

Moreover, as Kwan (2006) points out, it seems to be a disadvantage to inland region that the domestic trade between provinces got rather weaker in the period of reform and door-opening policies. That is, due to the transfer of authority from the central government to provinces, each province adopted the policy to conserve provincial profit and the trade between provinces has been decreased. It is necessary to establish the united market that would ensure the free flow of human, goods, and money in the country, in other words the construction of the domestic division of labor structure based on the comparative advantage between regions while promoting open-door policies to overseas for the correction of regional economic disparities.

## References

[ 1 ] Akita, Takahiro ( 2003 ). Decomposing Regional Income Inequality in China and Indonesia Using Two-stage nested Theil Decomposition Method [ J ]. The Annals of Regional Science, 37 : 55 - 77.

[ 2 ] Ezaki, Mitsuo, Sunlin ( 1998 ). Growth Accounting in China for National, Regional, and Provincial Economies: 1981 - 1995 [ N ]. Working Paper Series ( International Center for the Study of East Asian Development/ICSEAD ) Vol. 98 - 17.

[ 3 ] Fang Cai, Dewen Wang, Yang Du ( 2002 ). Regional disparity and economic growth in China: The impact of labor market distortions [ J ]. China Economic Review, 13 : 197 - 212.

[ 4 ] Fu, Xiaolan ( 2004 ). Limited linkages from growth engines and regional disparities in China [ J ]. Journal of Comparative Economics, Vol. 32, No. 1 : 148 - 164.

[ 5 ] Fujikawa, Kyoshi ( 2005 ). Introduction to Input-Output Analysis. Nipon-hyoron-sha. ( in Japanese )

[ 6 ] Hasebe, Yuichi ( 2002 ). Trade and economic growth in Eastern Asia: An analysis for economic interdependency using 1985 - 90 - 95 Asian International Input-Output Tables [ J ]. Yokohama journal of social sciences, 7(3) : 125 - 145. ( in Japanese )

[ 7 ] Hioki, Shiro ( 2004 ). Regional disparity and trickling-down effect from Coastal region to inland region in China [ M ]. Bulletin of the Japan Association for Comparative Economic Studies, Vol. 41, No. 1, pp27 - 38. ( in Japanese )

[ 8 ] Hu, Qiuyang ( 2006 ). Connection structure between areas in China [ J ]. Input-Output Analysis, Vol. 14, No. 2 : 17 - 29. ( in Japanese )

[ 9 ] Kanbur, Ravi, Zhang Xiaobo ( 2004 ). Fifty Years of Regional Inequality in China: A Journey through Revolution, Reform and Openness [ M ]. UNU - WIDER Research papers, Vol. 2004/50.

[ 10 ] Kwan, Chihung ( 2006 ). Promotion of domestic FTA, flying geese pattern, and ODA to reduce regional disparity. in JCER & CCS ( eds. ) Economic structure reform of China - toward sustainable growth. Ch. 2, Nihon-keizai Shinbun-sha. ( in Japanese ).

[ 11 ] Kato, Atsuyuki. (2008) . Regional Inequality in China. RIETI ( Research Institute of Economy, Trade & Industry, IAA ), Columns & Essays240 ( in Japanese ) . [http://www.rieti.go.jp/jp/columns/a01\\_0240.html](http://www.rieti.go.jp/jp/columns/a01_0240.html)

[ 12 ] Liu, Bai-Yang, Yong Bong Joon (2000). China's Economic reform and regional Productivity differentials [ J ]. Journal of economic development, Vol. 25, No. 2 :23 -41.

[ 13 ] Lin, Yang Ping (2001) . Regional income inequality for China. Nihon-keizai hyoron-she. ( in Japanese )

[ 14 ] Ohnishi, Hiroshi (2007) . Forming Kuznets Curve among Chinese Provinces [ J ]. The Kyoto Review, 76(2) :155 - 163.

[ 15 ] Xu, Jianhua, Lu, et al (2005) . Spatial and temporal scale analysis on the regional economic disparities in China [ J ]. Geographical Research, Vol. 24, No. 1 :57 -67. ( in Chinese ).

[ 16 ] Wan, Guanghua, Lu Ming, et al (2007). Globalization and Regional Income Inequality: Empirical Evidence from within China [ J ] . Review of Income and Wealth, 53(1), 35 -59.

## **Statistical Data**

IDE/JETRO (2003) Multi regional Input / Output Table 2000, Statistical data series No. 86.

IDE/JETRO (2007) Transnational Interregional Input / Output Table between China and Japan 2000, AIO Series No. 68.

Ichimura, S. and Wang, H. J. (2004) Interregional Input-Output Analysis of the Chinese Economy, Sobunsha ( in Japanese ).

National Bureau of Statistics (2005) China compendium of statistics: 1949 -2004, China Statistics Press.