AN ECONOMIC ANALYSIS OF INTERREGIONAL REPERCUSSION EFFECTS *

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Abstract

The primary purpose of this paper is to examine the industrial structure of Shikoku region, which is geographically isolated from other regions, but economically highly interrelated with them in Japan. Shikoku's foremost economic problem so far has been to create a large number of jobs and to raise the level of income received by its residents, since per capita incomes have been somewhat below those found in most other regions. Particularly, in recent years, this income gap has been widespreading again.

In order to take off from the continuing lower level of economic activities in Shikoku region, we first clarify the crucial barriers to economic growth with which the Shikoku economy is now confronting. We, then, evaluate the recent growth performance, since future economic expansion builds on past trends, *ceteris paribus*. Next, we present some conceptual advances in interregional input-output analysis. Particularly our attention is paid to derive two kinds of matrix multipliers (i. e., $\partial X_1/\partial F_1$ and $\partial X_1/\partial F_2$), which show the changes in the level of output produced in Shikoku region (i. e., X_1) induced by changes in the final demand vectors in not only Shikoku region (i. e., F_1) but also the other region (i. e., F_2). By using data from the 1975 & 1965 interregional input-output tables, we offer quantitative estimates of those multipliers, and finally evaluate the interregional repercussion effects for the region under study.

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An Economic Analysis of Interregional Repercussion Effects

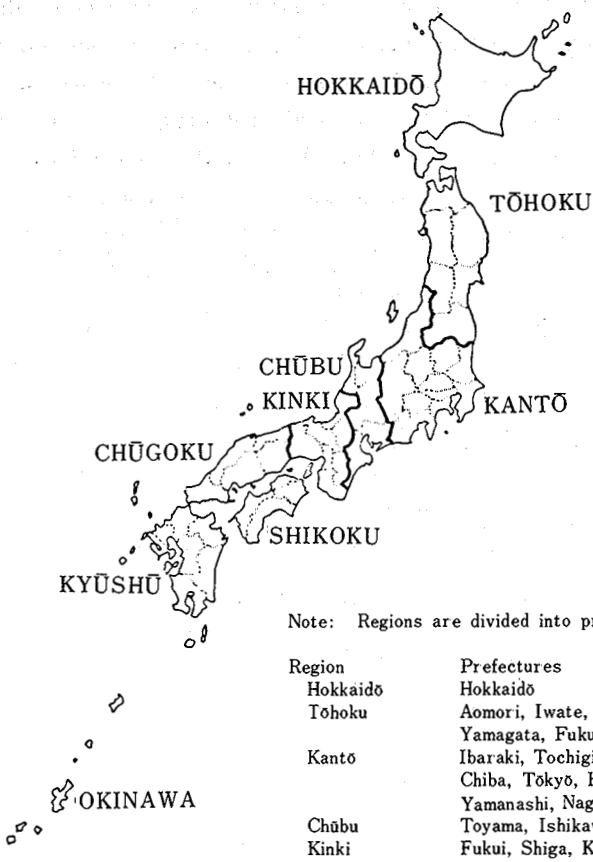
1. Industrial Structure of the Shikoku Regional Economies

The regional classification used for 1975 interregional input-output table of Japan is based on a partition of the country into nine regions. Figure 1 shows the names of these regions together with the names of urban and rural prefectures. A brief outline of each regional economy is given in Table 1. From this table, it can be seen that about 65% of the Japanese now live in the Kanto, Kinki, and Chubu regions and the products of these regions amount to 70% of the gross national product. Furthermore there is every likelihood that these shares will be maintained or even increased in the near future.

In contrast to these populous regions, the rest of the country exhibits many of the characteristics common to economically underdeveloped regions that are stagnant at a lower stage of development. Among them, we focus our attention on Shikoku region so as to consider the reason why it leads to differing rate of economic growth.

The data of Table 2 show that Shikoku is an island with an area of 18,798 square kilometers, accounting for 5.0% of the total land area of Japan. It also turns out that only 3.6% of the Japanese

Figure 1. Regional classification used for 1975 interregional input-output tables of Japan



Note: Regions are divided into prefectures as follows:

Region	Prefectures
Hokkaidō	Hokkaidō
Tōhoku	Aomori, Iwate, Miyagi, Akita, Yamagata, Fukushima
Kantō	Ibaraki, Tochigi, Gunma, Saitama, Chiba, Tōkyō, Kanagawa, Niigata, Yamanashi, Nagano, Shizuoka
Chūbu	Toyama, Ishikawa, Aichi, Gifu, Mie
Kinki	Fukui, Shiga, Kyōto, Ōsaka, Hyōgo Nara, Wakayama
Chūgoku	Tottori, Shimane, Okayama, Hiroshima, Yamaguchi
Shikoku	Tokushima, Kagawa, Ehime, Kōchi
Kyūshū	Fukuoka, Saga, Nagasaki, Kumamoto, Ōita, Miyazaki, Kagoshima
Okinawa	Okinawa

live there, and its portion of net product income is 3.3%. In terms of share in the net product income, primary industry accounts for 9.6%; secondary industry, 31.2%; and tertiary industry, 59.4%. It should be noted that the portion of the service sector has no difference between Shikoku and all Japan, but per capita income gap still exists. In fact, a resident of Shikoku received 220 thousand yen less income in 1978 than did his national counterpart. The differences in earnings accounted for about 15% of the national average.

Table 1. The Basic Structure of the Regional Economy in Japan 1975

Name of region	Area (km²)	Population (thousands)	Regional Products (100 mil. yen)	Regional Shipments (100 mil. yen)	Ratio of Regional Shipments to Regional Products (%)
Hokkaido	83,515 (22.1)	5,338 (4.8)	140,769 (4.3)	18,325	13.4
Tohoku	66,904 (17.7)	9,233 (8.2)	202,466 (6.2)	32,485	16.0
Kanto	70,729 (18.7)	41,340 (36.9)	1,252,978 (38.2)	187,333	15.0
Chubu	29,943 (7.9)	11,558 (10.3)	397,775 (12.1)	105,450	26.5
Kinki	31,466 (8.3)	19,605 (17.5)	614,772 (18.8)	136,226	22.2
Chugoku	31,767 (8.4)	7,366 (6.6)	260,843 (8.0)	61,364	23.5
Shikoku	18,798 (5.0)	4,040 (3.6)	103,179 (3.1)	27,176	26.3
Kyushu	42,112 (11.2)	12,417 (11.1)	285,786 (8.7)	39,675	13.9
Okinawa	2,249 (0.6)	1,043 (0.9)	18,762 (0.6)	1,621	8.6
TOTAL	377,643	111,940	3,277,331	609,655	18.6 *

Note: The figures in parentheses are the relative shares of the total value.
Population as of October 1, 1975.
The figure with * is the mean ratio of the total regional shipments to gross national product.

Table 2. Industrial Structure of the Shikoku Economy
(Unit: at 1975 prices)

Economic Indicators	Shikoku	All Japan	Shikoku in all Japan
Area (km²)	18,798	377,643	5.0%
Population (thousands)	4,183	115,287	3.6%
Employment (thousands)	2,029	54,737	3.7%
Net-Product Income (100 mil. yen)			
Primary Industries	4,773	75,584	6.3%
Secondary Industries	15,587	544,746	2.9%
Tertiary Industries	29,559	904,512	3.3%
TOTAL	48,120 *	1,471,584 *	3.3%
Per Capita Income (1,000 yen)	1,293	1,513	(85.5%)

Note: Figures on Population and Employment are all for 1979, while figures on Net-Product Income are for 1977.
Per Capia Income is based on 1978 data
Classification of indurtries is as follows:
Primary industries: agriculture, forestry, and fishing industries.
Secondary industries: mining, manufacturing, and construction industries
Tertiary industries: public works, commerce, and service industries.
Figures with the mark '*' exclude Imputed Interest.

Table 3 shows the Census of manufacturing industries of Shikoku region in 1978. It can be seen by this table that the industrial structure of the Shikoku region is considerably diversified, though its relative position in total value of shipments of Japan is as low as 2.7% on average.

As a matter of fact, Japanese industry has made continuous efforts to modernize production systems and fascilities. However, we still face various problems, such as difference in spatial distribution, imbalance in development between large and small enterprises, environmental disruption, and/or traffic congestion. Particularly, the resources problem highlighted through recent developments indicates reorganization of the entire economic structure. As a result, our country is changing in the new direction in which resource-saving industries and knowledge-oriented industries occupy principal positions.

The industrial structure of Shikoku region is somewhat different from this new direction. For the region is highly dependent on such resource-based industries as Chemical & allied products (the percentage of total value of shipments is 11.5%), Petroleum & coal products (8.0%), and Non-ferrous metals & products (6.3%). But, the relative share of technology-based industry, say Machinery, shows 19.7%, which is far less than 33.5% of the corresponding national average. The location quotients of those manufacturing industries are shown in Table 4, which corraborates the results of Table 3.

Table 3. Census of Manufactures for Shikoku Region, 1978

Industries	Number of establishments	Number of persons engaged	Value of shipments (mil. yen)	Percentage of total (%)	Annual percent change (%)	Relative shares of the total value of shipments (%)
Food & kindred products	5,238	52,732	606,243	13.6	5.5	3.1
Textile mill products	1,775	30,910	237,431	5.3	2.2	3.3
Apparel & other finished products	1,970	40,548	121,354	2.7	6.6	4.3
Lumber & wood products	2,118	21,666	239,740	5.4	5.4	5.6
Furniture & fixtures	2,012	18,517	134,055	3.0	5.6	5.4
Pulp, paper & paper worked products	777	21,591	414,949	9.3	1.5	8.2
Publishing, printing & allied industries	783	9,676	69,432	1.6	17.0	1.2
Chemical & allied products	140	19,620	513,047	11.5	−5.8	4.0
Petroleum & coal products	29	1,957	354,726	8.0	−11.7	4.5
Rubber products	87	3,283	24,724	0.6	−2.7	1.3
Leather & leather products	404	3,587	22,466	0.5	−7.2	2.5
Ceramics, stone & clay products	1,510	18,537	216,951	4.9	12.7	3.3
Iron & steel	205	4,864	104,145	2.3	16.8	0.8
Non-ferrous metals & products	45	5,427	278,486	6.3	−9.0	5.2
Fabricated metals products	1,737	16,185	152,310	3.4	24.4	1.7
Industrial machinery	1,106	28,424	407,119	9.1	7.5	3.0
Electrical machinery	216	13,636	169,646	3.8	14.6	1.0
Transportation equipment	554	13,084	269,160	6.0	−42.1	1.3
Precision machinery	57	1,076+X	6,252+X	X+0.1	−5.1	X+0.2
Miscellaneous mfg. industries	1,594	11,079+X	100,171+X	2.3	3.9	X+1.4
TOTAL	22,357	338,832	4,459,173	100.0	−1.9	2.7

Note: Figures in the column "X" are unpublished to protect the secret of individual establishments.

Table 4. Location Quotient for Manufacturing Industries in Shikoku, 1975

Industries	Location Quotient w. r. t. number of employments	Component Ratios of total number of employments (%)	Location Quotient w. r. t. value of Shipments	Component Ratios of total value of Shipments
Food & kindred products	1.32	14.5	1.02	11.8
Textile mill products	1.02	9.7	1.02	5.0
Apparel & other finished products	1.86	9.9	1.47	2.5
Lumber & wood products	1.56	7.0	1.90	5.5
Furniture & fixtures	1.70	5.0	1.69	2.7
Pulp, paper & paper worked products	2.04	6.2	2.64	8.7
Publishing, printing & allied indurtries	0.53	2.7	0.39	1.3
Chemical & allied products	1.19	5.9	1.40	11.4
Petroleum & coal products	1.43	0.8	1.82	10.8
Rubber products	0.47	0.8	0.50	0.6
Leather & leather products	1.39	1.2	1.20	0.6
Ceramics, stone & clay products	0.88	5.3	1.03	3.9
Iron & steel	0.23	1.1	0.29	2.6
Non-ferrous metals & products	0.98	1.9	1.83	5.5
Fabricated metals products	0.54	5.1	0.62	3.3
Industrial machinery	0.97	9.7	1.11	9.2
Electrical machinery	0.27	2.9	0.32	2.7
Transportation equipment	0.66	6.2	0.83	9.5
Precision machinery	0.13	0.4	0.07	0.1
Miscellaneous mfg. industries	0.57	3.3	0.51	2.0
TOTAL	0.91	100.0	—	100.0

2. Growth and Change in the Shikoku Regional Economies

Since future economic expansion builds on past trends, to effectively plan for economic growth, it is necessary to evaluate the recent growth performance of the region under study. Thus the task of this section will be to examine briefly the Shikoku economy's growth record.

Growth rates have by no means been uniform throughout the country. Table 5 shows the difference in the average annual rates of growth between Shikoku and the nation as a whole. As shown in this table, the developmental stages for Shikoku region can be grouped roughly into three periods.

Table 5. Difference in the Average Rates of Growth (Real)

	Shikoku	All Japan
1955～1965	7.4	9.2
1965～1970	11.3	11.6
1970～1973	8.4	7.8
1973～1978	2.8	3.2

The first period from 1955 to 1970 is characterized by a rapid growth era not only in Shikoku but also in the rest of the country. It was during this period that new industrial sites began to be constructed near large cities, and a remarkable industrial growth, particularly in the chemical, metal, and engineering industries, was also in process. The second period was from 1970 to 1973, when the quickend pace of economic activity in Shikoku accelerated closing of the relative income gap. In 1965, for example, the average resident of Shikoku region had an income approximately 80% of his

national counterpart, various factors including rapid national economic expansion in 1960's accelerated the regional economic growth. Hence, by the early of 1970's the per capita income level had risen to almost 90% of the Japanese average. Table 6 shows this kind of transition briefly. But, the so-called "oil crisis" which occurred in the fall of 1973 changed considerably the domestic as well as international economic conditions.

Table 6. Change in the Dominant Economic Indicators

	1965	1970	1973	1978
Population (thousands)				
Shikoku	3,975	3,904	3,973	4,121
All Japan	98,275	103,720	109,104	115,174
Shikoku as a percent of all Japan	4.05	3.77	3.62	3.57
Per Capita Income (thousands yen)				
Shikoke	539	963	1,171 *	1,293 *
All Japan	669	1,100	1,329 *	1,513 *
Shikoku as a percent of all Japan (%)	80.6	87.5	88.1	75.5

Note; Figures with "*" are estimated by the New System of National Accounts.

Since our economic structure was highly dependent on overseas sources of raw materials, this meant a sharp deterioration in terms of trade. As such, the regional economy became even worse and noticeably less stable than it had been in the 1960's. In fact, Shikoku's rate of growth remarkably slowed down in the late of 1970's, which was presumably due to the harsh recession of ship building industries. As a result, the relative income gap has been

opening again during the third period, started from the year of 1973 onwards.

Table 7 shows the change in the value of manufacturing shipments during 1965 through 1978. Due to the decline in the growth rate, the various problems came to unravel themselves. The first of them is the imbalance in development between large and small enterprises. The second problem is the lack of intersectoral linkages within the region under study. The third problem is the fact that such underdeveloped region as Shikoku lag behind in pro-

Table 7. Change in the Value of Manufacturing Shipments
(Unit: at 1975 prices)

	1965	1970	1973	1978
Value of shipments (100 mil. yen)				
Shikoke	12,594	26,844	36,209	41,950
All Japan	496,302	1,013,064	1,337,552	1,541,518
Relative shares(%)	2.54	2.65	2.71	2.72
Number of persons engaged (thousands)				
Shikoku	288	346	366	339
All Japan	9,941	11,680	11,961	10,890
Relative shares(%)	2.90	2.96	3.06	3.11
Value of shipments per person(thousands yen)				
Shikoku	4,373	7,758	9,893	12,375
All Japan	5,003	8,673	11,183	14,155
Relative shares(%)	87.4	89.5	88.5	87.4

viding with sound infra-structures. The fourth problem is the need for adjustments in employment, particularly providing care for an aging population in the future. The last but not least problem is the heightend difficulty of public finance. With a slower growth

rate, we can no longer expect the traditionary large natural increments in tax revenues, nor sufficient amounts of subsidy for the sake of relatively underdeveloped regions in Japan. In short, we are just facing the time of transition from rapid growth to prolonged slower growth, and hence obliged to consider how to maintain the vitality of the Shikoku regional economies.

3. Economic Analysis of Interregional Repercussion Effects

Since multiplier impacts are important outputs expected from region-oriented economic development program, we shall consider the intersectoral multipliers for developmental planning policy. For convenience we assume an economic system which consists of only two regions (i. e., Shikoku as region 1 and the rest of the country as region 2, respectively). Then, the interregional input coefficient matrix can be written as follows:

$$A = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix}$$

where

A_{11} A_{12} are submatrices of coefficients showing the input requirements of the first region's products in region 1 and region 2, respectively. Similar explanations can be given to A_{21} and A_{22}.

If X_1 denote the column vector of outputs produced in region 1, X_2 denote the column vector of outputs produced in region 2, and if F_1 and F_2 denote the column vectors of final demands in region 1 and region 2, respectively, then the following demand-supply equilibrium equations hold:

$$X_1 = A_{11} X_1 + A_{12} X_2 + F_1 \tag{1}$$

$$X_2 = A_{21} X_1 + A_{22} X_2 + F_2 \tag{2}$$

Now, looking at the equation (1) of the first region, we have:

$$X_1 = (I - A_{11})^{-1} A_{12} X_2 + (I - A_{11})^{-1} F_1 \tag{3}$$

Here, on putting

$$(I - A_{11})^{-1} = B_{11} \tag{4}$$

We can rewrite the above equation (3) as follows:

$$X_1 = B_{11} A_{12} X_2 + B_{11} F_1 \tag{5}$$

Note that the term, B_{11}, may be called the "internal matrix multiplier" as to region 1, since it can be obtained simply by taking $\partial X_1 / \partial F_1$ in equation (5).

Incidentally, if we take $\partial X_1/\partial X_2$ in the same equation (5), we have

$$\frac{\partial X_1}{\partial X_2} = B_{11} A_{12} \tag{6}$$

which represents the change in total output in region 1 induced by the change in total output in region 2. Since this term, $B_{11} A_{12}$, is also a useful economic measurement as a partial multiplier, we may call it the "coefficient matrix of inducement to production" of region 2 on region 1.

Furthermore, in order to take account of the interregional repercussion effects in the context of two-region economic system, we shall derive two important multipliers: $\partial X_1/\partial F_1$ and $\partial X_1/\partial F_2$. Namely, they show the changes in the level of output produced in region 1 induced by changes in the final demand vectors in region 1 and region 2, respectively. Using the "internal matrix multiplier" for region 2, i. e., $B_{22} = (I - A_{22})^{-1}$, we can first rewrite the equation (2) as follows:

$$X_2 = B_{22} A_{21} X_1 + B_{22} F_2 \tag{7}$$

Next, if we substitute this relation (7) for the X_2 of the right-hand side of equation (5), then it becomes:

$$X_1 = B_{11} A_{12} (B_{22} A_{21} X_1 + B_{22} F_2) + B_{11} F_1 \tag{8}$$

Furthermore, rearranging this equation (8) yields the following one:

$$X_1 = (I - B_{11} A_{12} B_{22} A_{21})^{-1} B_{11} F_1 + (I - B_{11} A_{12} B_{22} A_{21})^{-1} B_{11} A_{12} B_{22} F_2 \tag{9}$$

Therefore, if we put

$$(I - B_{11} A_{12} B_{22} A_{21})^{-1} = K_{11}^2 \tag{10}$$

then, the above equation (9) can be expressed simply as

$$X_1 = K_{11}^2 B_{11} F_1 + K_{11}^2 B_{11} A_{12} B_{22} F_2 \tag{11}$$

Note that the term, K_{11}^2, may be called the "external matrix multiplier" for region 1.

Eventually, taking partial derivatives of X_1 with respect to F_1

and F_2 in equation (10), we can obtain the aforementioned multipliers as follows:

$$\frac{\partial X_1}{\partial F_1} = K_{11}^2 B_{11} \tag{12}$$

$$\frac{\partial X_1}{\partial F_2} = K_{11}^2 B_{11} A_{12} B_{22} \tag{13}$$

Moreover, if we express

$$K_{11}^2 B_{11} = B_{11}^2 \tag{14}$$

we can find interesting properties in it. For expression (14) can be converted in the following way:

$$\begin{aligned} B_{11}^2 = K_{11}^2 B_{11} &= (I - B_{11} A_{12} B_{22} A_{21})^{-1} (I - A_{11})^{-1} \\ &= \{(I - A_{11})(I - B_{11} A_{12} B_{22} A_{21})\}^{-1} \\ &= \{I - (A_{11} + A_{12} B_{22} A_{21})\}^{-1} \end{aligned} \tag{15}$$

Thus, if we define anew

$$A_{11} + A_{12} B_{22} A_{21} = A_{11}^2 \tag{16}$$

then, B_{11}^2 is readily found to be $(I - A_{11}^2)^{-1}$.

Let us consider the meaning of the left-hand side of the above definition (16), according to the economic causal process. The production activity in region 1, to begin with, needs its own goods-input (A_{11}). At the same time, region 1 also needs a certain amount of the second region-goods-input (A_{21}) to support its production. And this supply for region 1 from region 2 induces the effect of production activity on region 2 (B_{22}). To realize this production activity, region 2 needs in turn a certain amount of the first region-goods-input (A_{12}). Thus, we can find that the input coefficient to region 1 eventually becomes augmented by $A_{12} B_{22} A_{21}$.

In this sense, we may call A_{11}^2 in expression (16) the "augmented input coefficient." And if we use this concept, B_{11}^2 in equation (15) may be given a new interpretation. Namely, it shows the ultimately total effect of repercussions, in which the above-defined "augmented

input coefficient"(A_{11}^{2}) plays the role of interregional repercussion factor.

Now, let us give some interpretations to our calculated results for those matrix multipliers. Industrial classification used in this section is shown in Table 8, and our calculated results are tabulated in Table 9 through Table 15.

First of all, take note of the "internal matrix multiplier" of Shikoku region, which was defind by epuation (4). As shown by the figures in Table 9, those industrial sectors which induce *relatively* large repercussion effects within the region are Primary nonferrous metal manufacturing, Pulp, paper & paper products, and Chemicals.

In addition, the industrial sectors whose sensitivity of dispersion (i. e., the row sum in Table 9) shows *relatively* high value are Agriculture, forestry & fisheries, Coal, lignite & mining, and Finance, real estate & other services. This means that those industries are likely to be much affected by an expansion in any system of industries of Shikoku region. It should be noted, however, that the power of dispersion (i. e., the column sum in Table 9) of those industries does not show a high value at all.

Table 8. Industrial Classification used for Input-Output Analysis

1. Agriculture, forestry & fisheries
2. Coal, lignite & mining
3. Food and kindred products
4. Textile products
5. Lumber & wood products
6. Pulp, paper & paper products
7. Leather, leather products & rubber products
8. Chemicals
9. Petroleum & coal products
10. Ceramic, clay & stone products

11. Primary iron & steel manufacturing
12. Primary non-ferrous metal manufacturing
13. Metal products
14. Machinery (not electric)
15. Electric machinery
16. Transportation equipment
17. Precision machinery
18. Miscellaneous manufacturing
19. Construction
20. Electricity, gas, water & sanitary services
21. Wholesale & retail trade
22. Finance, real estate & other service
23. Transportation & warehousing
24. Unallocated

Note: Though "Coal & lignite" was originally separated from "Mining" in officially published table (composed of 25-industry-group), we have consolidated those two sectors into one, denoted by 2, in this table.

Table 9. Internal Matrix Multiplier for the Shikoku Region, (1975)

—— $(B_{11}) = (I - A_{11})^{-1}$ ——

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.145918	0.004429	0.434165	0.082003	0.368201	0.048451	0.036538	0.006537	0.004742	0.003435	0.003024	0.003711
2	0.007520	1.019609	0.008294	0.005506	0.007249	0.025859	0.007941	0.059208	0.679171	0.198745	0.072412	0.492047
3	0.050343	0.001249	1.061937	0.004888	0.017283	0.003660	0.004090	0.003246	0.001350	0.001144	0.000693	0.001391
4	0.002951	0.001582	0.001904	1.075672	0.003648	0.001607	0.011496	0.001050	0.001339	0.001257	0.000782	0.001192
5	0.002811	0.003122	0.004109	0.002271	1.084886	0.085917	0.001923	0.003799	0.002711	0.002930	0.003828	0.002701
6	0.014145	0.003532	0.017220	0.005721	0.014773	1.410053	0.010191	0.028679	0.003697	0.016337	0.002515	0.003942
7	0.000226	0.000540	0.000205	0.001806	0.000266	0.000195	1.016002	0.000208	0.000402	0.000207	0.000149	0.000316
8	0.012455	0.005516	0.010669	0.016556	0.012425	0.022297	0.025342	1.222853	0.006797	0.005098	0.015552	0.008931
9	0.009733	0.026851	0.008673	0.005567	0.007803	0.020109	0.008120	0.071906	1.058961	0.046342	0.023128	0.031225
10	0.002418	0.000688	0.003345	0.000764	0.001329	0.002021	0.003771	0.003185	0.000900	1.114960	0.012540	0.036018
11	0.000451	0.001336	0.000516	0.000377	0.000651	0.000532	0.000529	0.000579	0.001132	0.001302	1.097133	0.000925
12	0.000468	0.000948	0.002193	0.000557	0.001345	0.000905	0.000767	0.007942	0.000934	0.000864	0.007352	1.555227
13	0.001420	0.004000	0.003982	0.001148	0.004087	0.001999	0.003751	0.001431	0.003733	0.001355	0.001038	0.002422
14	0.009080	0.005901	0.008275	0.005444	0.006950	0.007611	0.006196	0.010260	0.008693	0.012727	0.005311	0.007555
15	0.000520	0.005889	0.000656	0.001533	0.000668	0.001807	0.000744	0.009434	0.006742	0.004954	0.003603	0.010414
16	0.010835	0.091296	0.010166	0.007860	0.012656	0.012141	0.008823	0.011656	0.064105	0.028997	0.011805	0.048723
17	0.000112	0.000314	0.000155	0.000201	0.000163	0.000285	0.000157	0.000276	0.000290	0.000226	0.000132	0.000297
18	0.002286	0.002164	0.004155	0.005060	0.003878	0.035328	0.008590	0.004956	0.002529	0.002949	0.001406	0.002480
19	0.003071	0.003615	0.003055	0.003756	0.003034	0.005745	0.002599	0.006277	0.004444	0.006267	0.003870	0.006280
20	0.006567	0.016623	0.012559	0.014341	0.016464	0.084322	0.015558	0.064353	0.018177	0.064889	0.068853	0.112973
21	0.026642	0.055704	0.040706	0.032551	0.048134	0.028603	0.037428	0.025907	0.043919	0.038870	0.021558	0.040940
22	0.049527	0.100713	0.071341	0.124015	0.074446	0.143627	0.081978	0.125133	0.111463	0.091883	0.050412	0.123328
23	0.024092	0.045223	0.030627	0.020306	0.040047	0.037787	0.026769	0.033529	0.050932	0.081361	0.024004	0.054571
24	0.011880	0.036154	0.032348	0.033438	0.030254	0.046407	0.038827	0.032337	0.037431	0.025026	0.027307	0.027406

	13	14	15	16	17	18	19	20	21	22	23	24
1	0.003106	0.002652	0.009610	0.003969	0.044460	0.013876	0.023185	0.003497	0.003833	0.012778	0.002683	0.046152
2	0.037366	0.009222	0.012832	0.005176	0.014572	0.011630	0.044941	0.112274	0.004937	0.005014	0.017673	0.052944
3	0.000855	0.000791	0.001448	0.000877	0.002887	0.002411	0.001916	0.001081	0.002695	0.010233	0.001109	0.005889
4	0.001379	0.000905	0.001093	0.001996	0.007898	0.003346	0.004361	0.001017	0.001220	0.000975	0.002433	0.010196
5	0.002935	0.003214	0.021996	0.005248	0.002177	0.017055	0.057638	0.003347	0.003496	0.005094	0.002190	0.011402
6	0.004004	0.003453	0.013319	0.002914	0.008069	0.084349	0.005935	0.003132	0.012919	0.015392	0.003231	0.040078
7	0.000301	0.001118	0.000462	0.002782	0.003824	0.000747	0.000187	0.000196	0.000103	0.000125	0.000318	0.001943
8	0.007816	0.002735	0.005161	0.003537	0.003216	0.058973	0.003846	0.002921	0.001912	0.009932	0.001597	0.014347
9	0.012049	0.004624	0.004653	0.003635	0.005599	0.009963	0.011988	0.122515	0.005855	0.004359	0.025327	0.030475
10	0.009786	0.001336	0.003043	0.001098	0.002338	0.002562	0.088393	0.002719	0.000615	0.001818	0.000818	0.006144
11	0.023562	0.030897	0.004740	0.011410	0.017416	0.000773	0.004143	0.000526	0.000322	0.000280	0.000922	0.003099
12	0.084767	0.010883	0.026691	0.003053	0.025966	0.005702	0.003421	0.000733	0.000394	0.001018	0.000439	0.003931
13	1.010322	0.004347	0.003755	0.005622	0.002131	0.000988	0.030711	0.001638	0.001803	0.000907	0.001254	0.007909
14	0.003701	1.044179	0.004734	0.007498	0.004689	0.005763	0.014588	0.003577	0.001399	0.002562	0.001985	0.005305
15	0.001625	0.005810	1.033210	0.004872	0.001662	0.003355	0.003641	0.013206	0.000571	0.001880	0.000970	0.003132
16	0.010790	0.005182	0.005679	1.015226	0.009340	0.009695	0.017984	0.018820	0.017673	0.006183	0.070558	0.094344
17	0.000154	0.001301	0.000999	0.001542	1.026811	0.000326	0.000262	0.000499	0.000648	0.001065	0.000265	0.001209
18	0.002261	0.003359	0.006375	0.002857	0.005621	1.028573	0.002944	0.002125	0.003427	0.008166	0.002536	0.014185
19	0.002716	0.001952	0.002863	0.002024	0.003053	0.002697	1.002480	0.023761	0.003833	0.015435	0.006866	0.003906
20	0.027631	0.013153	0.012743	0.007475	0.015598	0.023092	0.017190	1.014254	0.012838	0.012556	0.014941	0.032320
21	0.028023	0.034021	0.030718	0.036426	0.031415	0.034766	0.043726	0.017713	1.023759	0.021928	0.019918	0.098470
22	0.067565	0.065608	0.102997	0.064722	0.088361	0.100024	0.083565	0.093248	0.151147	1.072450	0.094042	0.166482
23	0.027809	0.018585	0.016299	0.021929	0.017895	0.022653	0.037982	0.022404	0.015718	0.010893	1.065095	0.072349
24	0.030718	0.018636	0.023201	0.031896	0.051146	0.032394	0.032832	0.030383	0.013504	0.025988	0.018408	1.013721

Table 10. External Matrix Multiplier for the Shikoku Region, (1975)

—— $K_1^2 = (I - B_{11}A_{12}B_{22}A_{21})^{-1}$ ——

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.000691	0.000136	0.000919	0.000943	0.000661	0.000450	0.000660	0.000349	0.000069	0.000157	0.000257	0.000055
2	0.000472	1.000708	0.000479	0.001022	0.000472	0.000386	0.001289	0.001432	0.000341	0.001224	0.003743	0.000677
3	0.000227	0.000048	1.000440	0.000231	0.000182	0.000078	0.000192	0.000130	0.000024	0.000052	0.000089	0.000019
4	0.000146	0.000101	0.000086	1.005052	0.000205	0.000093	0.001521	0.000114	0.000037	0.000095	0.000135	0.000029
5	0.000095	0.000098	0.000117	0.000203	1.000619	0.000527	0.000368	0.000234	0.000052	0.000124	0.000197	0.000042
6	0.000476	0.000296	0.000586	0.001001	0.000845	1.002253	0.002422	0.001398	0.000185	0.000486	0.000502	0.000120
7	0.000013	0.000027	0.000011	0.000058	0.000013	0.000010	1.000100	0.000025	0.000013	0.000022	0.000044	0.000009
8	0.001029	0.000400	0.000653	0.006198	0.000794	0.000717	0.004498	1.003782	0.000210	0.000506	0.000647	0.000197
9	0.000603	0.000923	0.000576	0.001290	0.000564	0.000475	0.001608	0.001806	1.000452	0.001251	0.004873	0.000361
10	0.000046	0.000044	0.000084	0.000075	0.000058	0.000032	0.000115	0.000098	0.000020	1.000576	0.000378	0.000060
11	0.000047	0.000120	0.000056	0.000069	0.000077	0.000035	0.000110	0.000085	0.000054	0.000183	1.002184	0.000035
12	0.000165	0.000283	0.000188	0.000319	0.000221	0.000131	0.000478	0.000595	0.000118	0.000248	0.001203	1.001413
13	0.000028	0.000063	0.000033	0.000055	0.000041	0.000031	0.000054	0.000059	0.000032	0.000056	0.000099	0.000024
14	0.000062	0.000098	0.000063	0.000156	0.000058	0.000053	0.000141	0.000127	0.000041	0.000102	0.000259	0.000039
15	0.000023	0.000033	0.000019	0.000078	0.000020	0.000018	0.000068	0.000064	0.000015	0.000035	0.000084	0.000020
16	0.000117	0.000096	0.000225	0.000240	0.000139	0.000087	0.000221	0.000200	0.000046	0.000153	0.000417	0.000076
17	0.000002	0.000002	0.000002	0.000005	0.000002	0.000002	0.000004	0.000004	0.000001	0.000003	0.000005	0.000001
18	0.000064	0.000053	0.000072	0.000180	0.000093	0.000114	0.000320	0.000148	0.000027	0.000056	0.000087	0.000020
19	0.000015	0.000012	0.000015	0.000064	0.000017	0.000019	0.000053	0.000040	0.000006	0.000019	0.000048	0.000010
20	0.000144	0.000137	0.000137	0.000566	0.000169	0.000228	0.000555	0.000443	0.000069	0.000209	0.000569	0.000152
21	0.000128	0.000122	0.000142	0.000477	0.000155	0.000145	0.000382	0.000284	0.000059	0.000179	0.000441	0.000080
22	0.000339	0.000284	0.000342	0.001595	0.000392	0.000450	0.001242	0.000899	0.000140	0.000419	0.001007	0.000213
23	0.000170	0.000205	0.000191	0.000525	0.000198	0.000194	0.000490	0.000407	0.000097	0.000305	0.000620	0.000121
24	0.000091	0.000078	0.000096	0.000415	0.000111	0.000133	0.000334	0.000238	0.000039	0.000118	0.000316	0.000053

	13	14	15	16	17	18	19	20	21	22	23	24
1	0.000233	0.000293	0.000454	0.000354	0.000260	0.000488	0.000266	0.000182	0.000053	0.000219	0.000123	0.000451
2	0.003182	0.002237	0.002693	0.002170	0.001671	0.001031	0.001236	0.000970	0.000153	0.000247	0.000532	0.001373
3	0.000077	0.000089	0.000105	0.000110	0.000074	0.000115	0.000063	0.000064	0.000014	0.000072	0.000041	0.000148
4	0.000144	0.000185	0.000194	0.000323	0.000431	0.000253	0.000163	0.000109	0.000048	0.000046	0.000142	0.000449
5	0.000181	0.000268	0.000522	0.000293	0.000194	0.000459	0.000260	0.000135	0.000042	0.000088	0.000085	0.000295
6	0.000498	0.000808	0.001508	0.000982	0.001134	0.003193	0.000637	0.000372	0.000190	0.000472	0.000257	0.001363
7	0.000036	0.000064	0.000038	0.000119	0.000043	0.000020	0.000021	0.000037	0.000005	0.000005	0.000027	0.000051
8	0.000598	0.000723	0.001076	0.001178	0.000863	0.002754	0.000569	0.000402	0.000124	0.000630	0.000286	0.001387
9	0.003631	0.002094	0.001322	0.002257	0.001311	0.001205	0.001244	0.001314	0.000187	0.000306	0.000701	0.001539
10	0.000323	0.000249	0.000317	0.000237	0.000195	0.000094	0.000260	0.000056	0.000015	0.000024	0.000032	0.000174
11	0.001588	0.000981	0.000363	0.000975	0.000459	0.000072	0.000414	0.000148	0.000026	0.000018	0.000084	0.000266
12	0.002175	0.002493	0.005689	0.001906	0.002405	0.000535	0.000939	0.000287	0.000073	0.000097	0.000197	0.000892
13	1.000081	0.000070	0.000063	0.000087	0.000046	0.000041	0.000047	0.000095	0.000012	0.000013	0.000043	0.000088
14	0.000201	1.001357	0.000308	0.000994	0.000297	0.000104	0.000142	0.000120	0.000019	0.000030	0.000091	0.000247
15	0.000074	0.000178	1.000510	0.000185	0.000069	0.000048	0.000070	0.000042	0.000007	0.000012	0.000029	0.000080
16	0.000355	0.000273	0.000323	1.000279	0.000207	0.000168	0.000158	0.000131	0.000023	0.000047	0.000155	0.000214
17	0.000004	0.000013	0.000007	0.000013	1.000011	0.000003	0.000003	0.000003	0.000001	0.000001	0.000002	0.000005
18	0.000081	0.000155	0.000254	0.000204	0.000122	1.000222	0.000082	0.000067	0.000019	0.000045	0.000046	0.000154
19	0.000043	0.000039	0.000051	0.000041	0.000032	0.000039	1.000022	0.000016	0.000004	0.000009	0.000015	0.000032
20	0.000537	0.000495	0.000705	0.000493	0.000421	0.000465	0.000264	1.000173	0.000041	0.000093	0.000117	0.000363
21	0.000377	0.000384	0.000408	0.000397	0.000267	0.000273	0.000197	0.000162	1.000032	0.000066	0.000113	0.000280
22	0.000891	0.000893	0.001159	0.000941	0.000747	0.000915	0.000489	0.000363	0.000086	1.000209	0.000304	0.000743
23	0.000531	0.000494	0.000539	0.000504	0.000361	0.000373	0.000286	0.000274	0.000058	0.000093	1.000984	0.000409
24	0.000267	0.000244	0.000282	0.000259	0.000194	0.000254	0.000186	0.000101	0.000023	0.000054	0.000077	1.000203

Table 11. Calculated Results for Matrix Multiplier (1975)

$$--\partial X_i/\partial F_i = K_{1\,1}^{2} B_{1\,1}--$$

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.146805	0.004671	0.435507	0.083150	0.369256	0.049296	0.037320	0.007077	0.005005	0.003732	0.003382	0.003980
2	0.008234	1.020733	0.009210	0.006838	0.008154	0.026836	0.009506	0.061307	0.680363	0.200579	0.076816	0.493909
3	0.050640	0.001330	1.062522	0.005179	0.017592	0.003835	0.004320	0.003440	0.001438	0.001241	0.000816	0.001482
4	0.003162	0.001762	0.002106	1.081157	0.003982	0.001836	0.013147	0.001252	0.001516	0.001445	0.000980	0.001362
5	0.002961	0.003291	0.004322	0.002542	1.085640	0.086795	0.002352	0.004162	0.002897	0.003154	0.004096	0.002892
6	0.014862	0.004104	0.018248	0.007040	0.016072	1.413689	0.012906	0.030691	0.004345	0.017188	0.003258	0.004569
7	0.000247	0.000584	0.000229	0.001875	0.000292	0.000223	1.016113	0.000251	0.000447	0.000249	0.000207	0.000360
8	0.013843	0.006243	0.012029	0.023563	0.013912	0.023867	0.030303	1.227772	0.007589	0.006006	0.016511	0.009780
9	0.010624	0.028230	0.009780	0.007229	0.008892	0.021300	0.010056	0.074515	1.060449	0.048302	0.028826	0.032762
10	0.002491	0.000775	0.003475	0.000868	0.001431	0.002108	0.003914	0.003338	0.000989	1.115642	0.012986	0.036192
11	0.000544	0.001589	0.000643	0.000493	0.000802	0.000658	0.000689	0.000752	0.001377	0.001610	1.099586	0.001148
12	0.000760	0.001545	0.002588	0.001029	0.001775	0.001314	0.001393	0.008896	0.001520	0.001407	0.008838	1.557853
13	0.001462	0.004084	0.004041	0.001221	0.004154	0.002070	0.003821	0.001526	0.003827	0.001451	0.001167	0.002518
14	0.009191	0.006126	0.008412	0.005654	0.007082	0.007758	0.006386	0.010481	0.008906	0.012939	0.005648	0.007765
15	0.000556	0.005952	0.000698	0.001630	0.000711	0.001856	0.000827	0.009535	0.006806	0.005020	0.003711	0.010490
16	0.011004	0.091454	0.010489	0.008160	0.012888	0.012339	0.009090	0.011953	0.064273	0.029240	0.012306	0.048957
17	0.000114	0.000318	0.000159	0.000207	0.000167	0.000289	0.000162	0.000282	0.000294	0.000231	0.000138	0.000301
18	0.002380	0.002258	0.004280	0.005281	0.004026	0.035540	0.008944	0.005172	0.002628	0.003053	0.001527	0.002578
19	0.003093	0.003636	0.003083	0.003831	0.003063	0.005783	0.002659	0.006334	0.004466	0.006298	0.003929	0.006311
20	0.006780	0.016861	0.012821	0.015015	0.016759	0.084763	0.016194	0.064981	0.018430	0.065229	0.069546	0.113383
21	0.026826	0.055905	0.040953	0.033114	0.048395	0.028901	0.037872	0.026321	0.044133	0.039158	0.022096	0.041210
22	0.050017	0.001200	0.071962	0.125871	0.075118	0.144514	0.083396	0.126408	0.111980	0.092572	0.051656	0.124014
23	0.024359	0.045574	0.030987	0.020960	0.040421	0.038226	0.027366	0.034154	0.051309	0.081901	0.024787	0.055029
24	0.012011	0.036286	0.032520	0.033922	0.030442	0.046663	0.039209	0.032676	0.037572	0.025218	0.027691	0.027585

	13	14	15	16	17	18	19	20	21	22	23	24
1	0.003416	0.003014	0.010163	0.004388	0.044844	0.014520	0.023603	0.003775	0.003957	0.013075	0.002889	0.046803
2	0.040933	0.011820	0.015823	0.007587	0.016604	0.013007	0.046685	0.113596	0.005250	0.005436	0.018516	0.054882
3	0.000957	0.000902	0.001581	0.001008	0.003000	0.002569	0.002025	0.001175	0.002731	0.010330	0.001176	0.006098
4	0.001575	0.001134	0.001337	0.002371	0.008438	0.003678	0.004620	0.001188	0.001304	0.001061	0.002641	0.010793
5	0.003167	0.003530	0.022591	0.005583	0.002433	0.017632	0.058001	0.003547	0.003579	0.005228	0.002329	0.011818
6	0.004695	0.004439	0.015082	0.004065	0.009481	0.088075	0.006888	0.003743	0.013289	0.016063	0.003697	0.041929
7	0.000346	0.001190	0.000507	0.002909	0.003877	0.000777	0.000222	0.000245	0.000114	0.000136	0.000359	0.002015
8	0.008656	0.003654	0.006498	0.004917	0.004436	0.062302	0.004786	0.003598	0.002235	0.010781	0.002135	0.016318
9	0.016107	0.007119	0.006256	0.006163	0.007310	0.011577	0.013803	0.124226	0.006228	0.004865	0.026380	0.032664
10	0.010150	0.001623	0.003393	0.001361	0.002571	0.002689	0.088744	0.002810	0.000647	0.001863	0.000881	0.006375
11	0.025262	0.032018	0.005162	0.012461	0.017972	0.000898	0.004696	0.000750	0.000385	0.000333	0.001103	0.003522
12	0.087227	0.013638	0.032709	0.005124	0.028628	0.006431	0.004642	0.001267	0.000562	0.001222	0.000849	0.005183
13	1.010421	0.004431	0.003832	0.005721	0.002194	0.001048	0.030784	0.001755	0.001825	0.000929	0.001314	0.008027
14	0.003954	1.045626	0.005087	0.008540	0.005044	0.005923	0.014814	0.003761	0.001452	0.002623	0.002170	0.005697
15	0.001714	0.006008	1.033747	0.005071	0.001749	0.003422	0.003735	0.013271	0.000588	0.001902	0.001020	0.003247
16	0.011197	0.005503	0.006046	1.015539	0.009601	0.009921	0.018218	0.019002	0.017723	0.006260	0.070762	0.094648
17	0.000159	0.001316	0.001006	0.001555	1.026823	0.000331	0.000267	0.000503	0.000650	0.001066	0.000269	0.001217
18	0.002367	0.003538	0.006659	0.003082	0.005775	1.028841	0.003066	0.002225	0.003465	0.008232	0.002613	0.014399
19	0.002766	0.001998	0.002920	0.002070	0.003093	0.002746	1.002512	0.023784	0.003840	0.015448	0.006888	0.003951
20	0.028250	0.013726	0.013527	0.008026	0.016110	0.023668	0.017568	1.014509	0.012924	0.012699	0.015134	0.032830
21	0.028461	0.034464	0.031181	0.036867	0.031749	0.035118	0.044014	0.017940	1.023826	0.022032	0.020091	0.098664
22	0.068615	0.066649	0.104307	0.065779	0.089291	0.101167	0.084284	0.093777	0.151329	1.072761	0.094501	0.167530
23	0.028454	0.019176	0.016929	0.022513	0.018366	0.023155	0.038431	0.022793	0.015837	0.011047	1.066216	0.072977
24	0.031029	0.018921	0.023523	0.032187	0.051391	0.032710	0.033032	0.030529	0.013553	0.026069	0.018527	1.014006

Table 12. Calculated Results for Matrix Multiplier (1975)

$$-\!-\!-\partial X_i/\partial F_2 = K_{11}^2 B_{11} A_{12} B_{22} -\!-\!-$$

	1	2	3	4	5	6	7	8	9	10	11	12
1	0.002791	0.001021	0.009198	0.002704	0.007333	0.002896	0.001753	0.001276	0.000870	0.000706	0.000627	0.000758
2	0.001475	0.005635	0.001578	0.002279	0.001692	0.002549	0.002359	0.006164	0.004851	0.007995	0.010318	0.021529
3	0.002305	0.000365	0.002755	0.000583	0.001095	0.000433	0.000761	0.000574	0.000312	0.000227	0.000220	0.000265
4	0.000326	0.000640	0.000312	0.016697	0.001056	0.000405	0.004873	0.000364	0.000505	0.000458	0.000318	0.000345
5	0.000272	0.000776	0.000444	0.000455	0.008623	0.003997	0.000552	0.000660	0.000633	0.000600	0.000478	0.000628
6	0.001207	0.001935	0.001983	0.002064	0.003006	0.034041	0.003441	0.003626	0.001715	0.002453	0.001196	0.001303
7	0.000035	0.000250	0.000040	0.000152	0.000072	0.000055	0.000900	0.000080	0.000188	0.000082	0.000109	0.000102
8	0.002184	0.001927	0.002208	0.017530	0.002126	0.003909	0.008641	0.021522	0.001842	0.002317	0.001562	0.001497
9	0.001994	0.007641	0.001987	0.002856	0.002071	0.003019	0.002994	0.008215	0.006594	0.006342	0.013601	0.004878
10	0.000157	0.000295	0.000257	0.000170	0.000196	0.000201	0.000319	0.000348	0.000264	0.006093	0.001018	0.002038
11	0.000120	0.000992	0.000152	0.000142	0.000254	0.000160	0.000178	0.000226	0.000745	0.000522	0.006321	0.000392
12	0.000349	0.001764	0.000517	0.000652	0.000741	0.000609	0.000711	0.001660	0.001422	0.001064	0.002980	0.059719
13	0.000130	0.000638	0.000135	0.000138	0.000354	0.000165	0.000120	0.000173	0.000481	0.000218	0.000245	0.000333
14	0.000216	0.000751	0.000293	0.000416	0.000317	0.000421	0.000316	0.000494	0.000603	0.000532	0.000648	0.000731
15	0.000063	0.000256	0.000071	0.000209	0.000077	0.000128	0.000136	0.000288	0.000208	0.000178	0.000220	0.000520
16	0.001285	0.000756	0.000826	0.000610	0.000715	0.000644	0.000488	0.000837	0.000649	0.000962	0.001137	0.002247
17	0.000006	0.000015	0.000008	0.000013	0.000009	0.000014	0.000009	0.000014	0.000013	0.000011	0.000012	0.000019
18	0.000210	0.000330	0.000334	0.000426	0.000584	0.001124	0.001335	0.000599	0.000325	0.000240	0.000212	0.000272
19	*0.000046*	*0.000090*	*0.000070*	*0.000180*	*0.000086*	*0.000191*	*0.000109*	*0.000184*	*0.000077*	*0.000116*	*0.000129*	*0.000292*
20	0.000368	0.001021	0.000503	0.001514	0.000713	0.002585	0.001076	0.001935	0.000845	0.001226	0.001533	0.005005
21	0.000472	0.000941	0.000749	0.001338	0.001064	0.001254	0.000895	0.001213	0.000802	0.001065	0.001186	0.002107
22	0.001057	0.002046	0.001558	0.004533	0.002048	0.004627	0.002644	0.004045	0.001770	0.002405	0.002689	0.005844
23	0.000615	0.001538	0.000894	0.001394	0.001170	0.001709	0.001107	0.001670	0.001350	0.001909	0.001646	0.002994
24	0.000322	0.000575	0.000417	0.001175	0.000619	0.001428	0.000721	0.001051	0.000495	0.000687	0.000858	0.001354

	13	14	15	16	17	18	19	20	21	22	23	24
1	0.000501	0.000539	0.000990	0.000634	0.000820	0.002712	0.002154	0.000586	0.000396	0.001475	0.000422	0.001861
2	0.005080	0.003292	0.007307	0.003225	0.002711	0.002527	0.003087	0.005837	0.000763	0.000832	0.001936	0.004459
3	0.000163	0.000167	0.000235	0.000195	0.000224	0.000374	0.000285	0.000199	0.000141	0.000686	0.000151	0.000776
4	0.000285	0.000277	0.000408	0.000530	0.000953	0.000634	0.000597	0.000299	0.000178	0.000168	0.000347	0.001435
5	0.000434	0.000512	0.001329	0.000551	0.000741	0.002859	0.004250	0.000493	0.000282	0.000544	0.000295	0.001132
6	0.001120	0.001356	0.002502	0.001702	0.006518	0.021889	0.001781	0.001104	0.001146	0.002189	0.000906	0.006008
7	0.000097	0.000167	0.000099	0.000541	0.000200	0.000051	0.000060	0.000088	0.000021	0.000026	0.000080	0.000219
8	0.001176	0.001135	0.001879	0.001744	0.002279	0.008129	0.001404	0.001205	0.000476	0.001370	0.000683	0.003038
9	0.004582	0.003087	0.002489	0.002903	0.002050	0.002707	0.002822	0.008339	0.001015	0.000994	0.002648	0.005615
10	0.000605	0.000383	0.000801	0.000382	0.000306	0.000252	0.001322	0.000188	0.000052	0.000110	0.000099	0.000645
11	0.001963	0.001894	0.000691	0.001399	0.000624	0.000151	0.000744	0.000329	0.000074	0.000080	0.000216	0.000602
12	0.006147	0.003554	*0.018118*	*0.003762*	*0.003935*	*0.001439*	*0.001688*	*0.001254*	*0.000235*	*0.000365*	*0.000544*	*0.001775*
13	0.000216	0.000136	0.000145	0.000275	0.000104	0.000120	0.001426	0.000246	0.000075	0.000082	0.000115	0.000274
14	0.000334	0.005420	0.000713	0.001985	0.000780	0.000372	0.000721	0.000353	0.000092	0.000142	0.000293	0.001251
15	0.000136	0.000324	0.002020	0.000506	0.000144	0.000149	0.000230	0.000160	0.000036	0.000049	0.000094	0.000320
16	0.000595	0.000440	0.000845	0.000478	0.000408	0.000548	0.000492	0.000659	0.000129	0.000180	0.001063	0.000825
17	0.000008	0.000045	0.000018	0.000036	0.000082	0.000012	0.000011	0.000009	0.000018	0.000007	0.000009	0.000028
18	0.000214	0.000316	0.000711	0.000536	0.000542	0.001588	0.000400	0.000185	0.000117	0.000219	0.000152	0.000700
19	0.000078	0.000069	0.000130	0.000069	0.000085	0.000166	0.000072	0.000067	0.000022	0.000039	0.000085	0.000106
20	0.001092	0.000834	0.001875	0.000830	0.001042	0.002090	0.000738	0.000635	0.000226	0.000358	0.000464	0.001149
21	0.000717	0.000811	0.001056	0.000786	0.000682	0.001121	0.000859	0.000655	0.000216	0.000319	0.000475	0.001158
22	0.001645	0.001658	0.003036	0.001652	0.002230	0.003964	0.001664	0.001576	0.000641	0.001233	0.001504	0.002516
23	0.001036	0.000936	0.001346	0.000890	0.000879	0.001442	0.001114	0.001006	0.000383	0.000410	0.008739	0.001637
24	0.000453	0.000450	0.000689	0.000440	0.000533	0.001153	0.000506	0.000460	0.000129	0.000226	0.000350	0.000705

Above conclusions are all based on the internal matrix multiplier only. Actually, however, production activity in Shikoku region does not end with the amount of its internal matrix multiplier. Furthermore, it always induces industrial activity in other region. Therefore, we shall next interpret our numerical results of interregional repercussions. Table 10 shows the calculated results for the "external matrix multiplier" which was defined by equation (10). Clearly, they indicate the Shikoku's feedback effects through other region.

Although the diagonal elements are more influencial than the off-diagonal elements in the external matrix multiplier, they do not much differ in unity, excepting a few industries such as Textile products, Chemicals, Pulp, paper & paper products, and Primary iron & steel manufacturing. Therefore, so far as we consider the interregional feedback effects of Shikoku region, the external matrix multiplier turns out to be quite small in value, and hence, the changes in the level of output produced in Shikoku region induced by changes in the final demands in the same region (i.e., $\partial X_1/\partial F_1 = K_{11}^2 B_{11} = B_{11}^2$ in Table 11) are mainly determined by the corresponding internal matrix multiplier (i.e., B_{11} in Table 9). This conclusion can well be corroborated by comparing Table 9 with Table 11.

Finally, what about the changes in the output level of Shikoku region accruing from the changes in the final demands in other region (i.e., $\partial X_1/\partial F_2 = K_{11}^2 B_{11} A_{12} B_{22}$)? As shown by the figures in Table 12, the multipliers of this type take on different values according to each industrial sector. Above all, it can be clarified that such industries as Primary nonferrous metal manufacturing, Chemicals, Pulp, paper & paper products, Coal, lignite & mining, and Petroleum & coal products of Shikoku region are much affected by

the changes in final demand in other region. As a result, the inter-regional repercussion effects of their own productive activities are further enlarged due to this comparatively strong inducing relationship with other region. These empirical findings well coincide with our initial anticipations that the Shikoku regional economies are highly dependent on other region's economic activities.

The changes in repercussion effect in the past decade can be made clearer if the figures in Tables 9 to 12 are compared with the figures in Tables 13 to 15. As a result, we may state the following points:

1) So far as our calculated results for the internal matrix multiplier are concerned, *intraregional* repercussion effects of Shikoku region are generally small in scale, and come to show even decreasing-trend over time.

2) Particularly, the remarkable decreases in repercussion effects are generated in such industries as Primary iron & steel manufacturing, and Textile & food products.

3) This fact tells us the weakness of intraregional repercussion effects of Shikoku region as well as the importance of inter-regional relationship with other region for developmental planning policy.

Table 13. Internal Matrix Multiplier for the Shikoku Region (1965)

——$(B_{11})=(I-A_{11})^{-1}$——

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.163695	0.014359	0.537628	0.140543	0.535263	0.085997	0.128266	0.025415	0.021986	0.011445	0.006761	0.006754
2	0.004940	1.049055	0.016678	0.003314	0.004158	0.012348	0.006958	0.037814	0.386846	0.140448	0.061045	0.397163
3	0.051434	0.000698	1.073709	0.007477	0.024125	0.004463	0.013039	0.003068	0.001111	0.000672	0.000357	0.000356
4	0.007617	0.002504	0.004837	1.155956	0.011646	0.003499	0.102333	0.002946	0.002106	0.004938	0.001160	0.001512
5	0.002507	0.003919	0.004382	0.002210	1.058723	0.045345	0.002062	0.003742	0.005757	0.003515	0.008399	0.002304
6	0.005159	0.022222	0.015098	0.003808	0.007744	1.407681	0.011682	0.040594	0.012373	0.024632	0.003075	0.009601
7	0.000124	0.000502	0.000138	0.000890	0.000244	0.000186	1.014469	0.000259	0.000237	0.000187	0.000311	0.000262
8	0.023485	0.007290	0.023527	0.037076	0.015778	0.048662	0.057094	1.216471	0.012078	0.008728	0.006224	0.013462
9	0.008111	0.037408	0.007828	0.005275	0.007117	0.019356	0.010938	0.034466	1.025858	0.044443	0.014258	0.021715
10	0.002229	0.001093	0.004073	0.000632	0.001883	0.002365	0.005041	0.002232	0.000920	1.159528	0.016022	0.010207
11	0.000618	0.001205	0.000742	0.000479	0.000795	0.000821	0.001354	0.001277	0.000899	0.002106	1.238608	0.000803
12	0.000243	0.000615	0.000311	0.000363	0.000556	0.000605	0.000523	0.006203	0.000703	0.001540	0.010356	1.262760
13	0.001587	0.003287	0.005411	0.000654	0.005971	0.001888	0.006140	0.001597	0.002478	0.001423	0.002384	0.001681
14	0.007573	0.011908	0.007654	0.005953	0.008073	0.008853	0.013153	0.015742	0.009594	0.012209	0.012940	0.008344
15	0.000978	0.009684	0.001360	0.002370	0.001015	0.003475	0.001753	0.010677	0.005676	0.006453	0.005170	0.009674
16	0.007202	0.019779	0.007522	0.004966	0.008554	0.007440	0.006226	0.007494	0.009377	0.013236	0.007349	0.013078
17	0.000241	0.000234	0.000207	0.000152	0.000191	0.000305	0.000238	0.000316	0.000203	0.000244	0.000150	0.000176
18	0.001504	0.002041	0.003155	0.002101	0.003076	0.017702	0.004799	0.002936	0.001947	0.001823	0.000980	0.001312
19	0.008395	0.012967	0.007550	0.005572	0.008564	0.010034	0.006553	0.013018	0.008195	0.014028	0.006644	0.009304
20	0.005105	0.040760	0.010573	0.016063	0.013577	0.081790	0.020273	0.051463	0.019515	0.070941	0.063101	0.057854
21	0.016880	0.027226	0.025736	0.025060	0.030281	0.019816	0.025196	0.018880	0.014797	0.026538	0.041980	0.022593
22	0.029556	0.070436	0.039542	0.058458	0.050914	0.101959	0.075234	0.105306	0.061069	0.081831	0.054170	0.057480
23	0.021822	0.025570	0.034374	0.027969	0.033321	0.051574	0.028865	0.041224	0.020176	0.064705	0.039553	0.052239
24	0.027361	0.047787	0.039152	0.017826	0.017492	0.052589	0.053204	0.067891	0.051205	0.034869	0.011080	0.021556

	13	14	15	16	17	18	19	20	21	22	23	24
1	0.005382	0.006678	0.011255	0.007076	0.254878	0.032252	0.044035	0.006497	0.003342	0.008769	0.003839	0.120846
2	0.006746	0.007116	0.017479	0.002294	0.005634	0.011330	0.051095	0.030609	0.003395	0.003077	0.009928	0.004905
3	0.000284	0.000341	0.000566	0.000395	0.011438	0.003282	0.002036	0.000318	0.000878	0.000602	0.000208	0.005483
4	0.001782	0.002262	0.003017	0.002767	0.096755	0.009699	0.006756	0.001719	0.000221	0.001958	0.005155	0.025116
5	0.003354	0.005691	0.011248	0.013264	0.004379	0.009461	0.073325	0.003736	0.003667	0.009299	0.002865	0.007736
6	0.002948	0.003160	0.015771	0.002280	0.062693	0.109917	0.006501	0.003021	0.010572	0.012986	0.002176	0.029900
7	0.000467	0.000905	0.000327	0.005829	0.000818	0.000758	0.000253	0.000143	0.000168	0.000167	0.000751	0.000920
8	0.005890	0.003284	0.009033	0.002963	0.011864	0.118618	0.004758	0.003266	0.001311	0.005321	0.001309	0.019975
9	0.007806	0.005300	0.006271	0.002368	0.005167	0.008415	0.011715	0.062689	0.006897	0.003228	0.025023	0.007037
10	0.004842	0.003042	0.004762	0.001316	0.001715	0.004033	0.048365	0.002640	0.001011	0.001857	0.000502	0.002914
11	0.019561	0.055046	0.009925	0.012092	0.019254	0.001431	0.004163	0.000837	0.000395	0.000361	0.001394	0.004071
12	0.006297	0.005595	0.044737	0.001405	0.006021	0.006536	0.001184	0.001452	0.000153	0.000544	0.000227	0.000821
13	1.021277	0.005560	0.003442	0.008521	0.002394	0.003129	0.027711	0.001559	0.002061	0.001347	0.002047	0.004568
14	0.004918	1.078019	0.008319	0.031171	0.008801	0.007803	0.019045	0.005698	0.001439	0.002047	0.005343	0.004343
15	0.001360	0.007627	1.027588	0.002933	0.002525	0.003923	0.005041	0.030552	0.000797	0.001804	0.000952	0.007235
16	0.005983	0.005963	0.005783	1.010819	0.006476	0.005405	0.013616	0.005815	0.022176	0.003427	0.099628	0.018404
17	0.000147	0.000725	0.000585	0.001046	1.008434	0.000317	0.000305	0.000611	0.000263	0.001603	0.000403	0.001839
18	0.001278	0.001932	0.004840	0.001115	0.003569	1.019833	0.003015	0.001079	0.002424	0.012961	0.001263	0.006498
19	0.005226	0.004626	0.005309	0.005214	0.006684	0.007138	1.004908	0.030191	0.012089	0.030821	0.005912	0.006006
20	0.014278	0.014540	0.010473	0.008943	0.014800	0.021978	0.013244	1.008881	0.015087	0.010190	0.008764	0.023018
21	0.025526	0.022758	0.024552	0.027770	0.032688	0.026144	0.035662	0.007113	1.013548	0.014331	0.015462	0.022998
22	0.056439	0.057874	0.088046	0.044456	0.068331	0.093285	0.063914	0.055081	0.150603	1.070937	0.056676	0.124930
23	0.030635	0.029973	0.026725	0.019862	0.035568	0.035366	0.048971	0.026242	0.035548	0.016638	1.031934	0.040312
24	0.026487	0.026509	0.034931	0.006590	0.039584	0.036006	0.019594	0.028536	0.004060	0.017526	0.011777	1.008560

Table 14. External Matrix Multiplier for the Shikoku Region (1965)

$$-- K_{11}^{2} = (I - B_{11} A_{12} B_{22} A_{21})^{-1} --$$

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.000426	0.000123	0.000679	0.001272	0.000670	0.000560	0.000626	0.000438	0.000068	0.000157	0.000142	0.000234
2	0.000152	1.000148	0.000232	0.000737	0.000188	0.000200	0.000423	0.000492	0.000046	0.000308	0.000325	0.002457
3	0.000105	0.000016	1.000198	0.000204	0.000093	0.000056	0.000134	0.000094	0.000008	0.000016	0.000015	0.000022
4	0.000149	0.000063	0.000078	1.004306	0.000162	0.000167	0.001422	0.000102	0.000015	0.000076	0.000050	0.000081
5	0.000044	0.000049	0.000068	0.000165	1.000317	0.000237	0.000114	0.000143	0.000028	0.000068	0.000067	0.000090
6	0.000222	0.000176	0.000316	0.000934	0.000347	1.002161	0.000734	0.001164	0.000127	0.000273	0.000137	0.000223
7	0.000007	0.000010	0.000007	0.000036	0.000008	0.000009	1.000071	0.000014	0.000003	0.000012	0.000012	0.000025
8	0.000867	0.000331	0.000740	0.011243	0.000786	0.001372	0.003598	1.002156	0.000144	0.000316	0.000250	0.000380
9	0.000139	0.000153	0.000176	0.000766	0.000160	0.000235	0.000404	0.000432	1.000049	0.000277	0.000246	0.000444
10	0.000020	0.000016	0.000059	0.000068	0.000036	0.000027	0.000069	0.000049	0.000005	1.000277	0.000087	0.000080
11	0.000010	0.000019	0.000021	0.000041	0.000028	0.000015	0.000048	0.000021	0.000005	0.000048	1.000166	0.000029
12	0.000128	0.000198	0.000260	0.000469	0.000250	0.000173	0.000398	0.000646	0.000053	0.000214	0.000470	1.006883
13	0.000006	0.000008	0.000011	0.000033	0.000013	0.000012	0.000020	0.000016	0.000003	0.000011	0.000010	0.000028
14	0.000031	0.000034	0.000037	0.000219	0.000038	0.000054	0.000097	0.000074	0.000009	0.000047	0.000073	0.000102
15	0.000013	0.000012	0.000015	0.000122	0.000014	0.000023	0.000047	0.000036	0.000004	0.000015	0.000015	0.000069
16	0.000019	0.000014	0.000028	0.000131	0.000027	0.000038	0.000059	0.000048	0.000005	0.000024	0.000023	0.000094
17	0.000002	0.000002	0.000003	0.000010	0.000002	0.000004	0.000006	0.000005	0.000001	0.000003	0.000003	0.000005
18	0.000027	0.000021	0.000032	0.000124	0.000036	0.000070	0.000139	0.000080	0.000008	0.000021	0.000018	0.000030
19	0.000018	0.000010	0.000022	0.000162	0.000022	0.000039	0.000063	0.000046	0.000004	0.000017	0.000014	0.000064
20	0.000066	0.000043	0.000078	0.000615	0.000081	0.000203	0.000251	0.000210	0.000019	0.000074	0.000068	0.000366
21	0.000051	0.000036	0.000065	0.000451	0.000068	0.000103	0.000186	0.000123	0.000014	0.000058	0.000058	0.000193
22	0.000157	0.000095	0.000177	0.001454	0.000186	0.000364	0.000586	0.000434	0.000038	0.000139	0.000123	0.000435
23	0.000096	0.000081	0.000131	0.000717	0.000133	0.000224	0.000324	0.000263	0.000028	0.000129	0.000120	0.000408
24	0.000079	0.000042	0.000089	0.000760	0.000089	0.000179	0.000286	0.000206	0.000018	0.000062	0.000051	0.000173

	13	14	15	16	17	18	19	20	21	22	23	24
1	0.000265	0.000351	0.000461	0.000551	0.000287	0.000665	0.000648	0.000113	0.000043	0.000197	0.000148	0.000387
2	0.001516	0.001563	0.002650	0.001076	0.000744	0.000593	0.000800	0.000124	0.000041	0.000112	0.000242	0.000405
3	0.000028	0.000036	0.000044	0.000082	0.000033	0.000091	0.000060	0.000012	0.000004	0.000024	0.000015	0.000061
4	0.000138	0.000202	0.000214	0.000531	0.000540	0.000239	0.000227	0.000043	0.000035	0.000063	0.000155	0.000580
5	0.000124	0.000195	0.000248	0.000277	0.000090	0.000244	0.000337	0.000042	0.000019	0.000073	0.000076	0.000116
6	0.000291	0.000479	0.000878	0.000566	0.000680	0.001955	0.000546	0.000092	0.000062	0.000514	0.000147	0.000666
7	0.000028	0.000043	0.000034	0.000122	0.000015	0.000015	0.000021	0.000013	0.000003	0.000004	0.000025	0.000016
8	0.000562	0.000796	0.001344	0.001296	0.001362	0.002491	0.000912	0.000170	0.000120	0.000763	0.000410	0.001836
9	0.000621	0.000485	0.000528	0.000516	0.000253	0.000391	0.000427	0.000170	0.000042	0.000099	0.000378	0.000241
10	0.000189	0.000162	0.000229	0.000150	0.000070	0.000068	0.000392	0.000013	0.000009	0.000017	0.000020	0.000073
11	0.000561	0.000415	0.000209	0.000422	0.000109	0.000036	0.000182	0.000013	0.000006	0.000008	0.000037	0.000051
12	0.003337	0.003864	0.007253	0.002239	0.001767	0.001020	0.001347	0.000103	0.000049	0.000132	0.000223	0.000724
13	1.000029	0.000030	0.000032	0.000033	0.000013	0.000018	0.000026	0.000010	0.000003	0.000005	0.000013	0.000013
14	0.000172	1.000685	0.000254	0.000540	0.000107	0.000089	0.000129	0.000028	0.000008	0.000025	0.000082	0.000086
15	0.000050	0.000113	1.000213	0.000096	0.000038	0.000043	0.000050	0.000009	0.000003	0.000011	0.000019	0.000041
16	0.000077	0.000086	0.000124	1.000081	0.000048	0.000060	0.000058	0.000011	0.000005	0.000015	0.000153	0.000040
17	0.000007	0.000023	0.000016	0.000027	1.000026	0.000006	0.000007	0.000002	0.000001	0.000003	0.000006	0.000006
18	0.000040	0.000120	0.000214	0.000146	0.000053	1.000109	0.000068	0.000013	0.000006	0.000036	0.000025	0.000062
19	0.000050	0.000059	0.000092	0.000056	0.000042	0.000060	1.000043	0.000007	0.000003	0.000016	0.000020	0.000039
20	0.000266	0.000301	0.000486	0.000262	0.000202	0.000287	0.000192	1.000029	0.000014	0.000073	0.000063	0.000171
21	0.000185	0.000206	0.000270	0.000204	0.000127	0.000156	0.000142	0.000032	1.000012	0.000041	0.000066	0.000113
22	0.000376	0.000496	0.000742	0.000502	0.000359	0.000544	0.000351	0.000063	0.000031	1.000151	0.000185	0.000349
23	0.000375	0.000427	0.000586	0.000406	0.000248	0.000328	0.000292	0.000061	0.000028	0.000083	1.001149	0.000216
24	0.000154	0.000190	0.000282	0.000205	0.000157	0.000261	0.000152	0.000029	0.000014	0.000073	0.000070	1.000167

Table 15. Calculated Results for Matrix Multiplier (1965)

——$\partial X_1/\partial F_1 = K_{11}^2 B_{11}$——

	1	2	3	4	5	6	7	8	9	10	11	12
1	1.164287	0.014591	0.538664	0.142136	0.536286	0.086971	0.129191	0.026084	0.022189	0.011753	0.007011	0.007177
2	0.005204	1.049349	0.017104	0.004262	0.004530	0.012793	0.007611	0.038584	0.387054	0.140962	0.061576	0.400440
3	0.051575	0.000728	1.073989	0.007738	0.024294	0.004572	0.013227	0.003200	0.001138	0.000707	0.000386	0.000401
4	0.007862	0.002648	0.005070	1.160988	0.011983	0.003839	0.104297	0.003167	0.002211	0.005120	0.001268	0.001694
5	0.002583	0.004011	0.004507	0.002429	1.059108	0.045740	0.002238	0.003967	0.005836	0.003643	0.008513	0.002469
6	0.005537	0.022590	0.015703	0.005040	0.008354	1.410981	0.012760	0.042268	0.012717	0.025165	0.003354	0.010084
7	0.000135	0.000519	0.000154	0.000936	0.000261	0.000205	1.014551	0.000284	0.000248	0.000209	0.000332	0.000303
8	0.024795	0.007966	0.025082	0.050412	0.017400	0.051148	0.062378	1.219521	0.012643	0.009493	0.006739	0.014315
9	0.008334	0.037650	0.008160	0.006236	0.007428	0.019814	0.011532	0.035096	1.026030	0.044883	0.014642	0.022415
10	0.002267	0.001130	0.004162	0.000724	0.001947	0.002427	0.005140	0.002317	0.000947	1.159871	0.016148	0.010333
11	0.000644	0.001251	0.000787	0.000539	0.000847	0.000863	0.001429	0.001327	0.000929	0.002187	1.238833	0.000867
12	0.000531	0.001090	0.000818	0.001048	0.001041	0.001100	0.001211	0.007316	0.001028	0.002053	0.011189	1.271740
13	0.001597	0.003300	0.005429	0.000696	0.005992	0.001911	0.006169	0.001622	0.002487	0.001441	0.002401	0.001724
14	0.007632	0.011980	0.007734	0.006229	0.008155	0.008967	0.013311	0.015871	0.009643	0.012304	0.013059	0.008515
15	0.001000	0.009708	0.001390	0.002519	0.001045	0.003521	0.001825	0.010734	0.005693	0.006483	0.005198	0.009775
16	0.007235	0.019809	0.007575	0.005130	0.008605	0.007516	0.006317	0.007572	0.009399	0.013287	0.007392	0.013219
17	0.000245	0.000238	0.000212	0.000164	0.000196	0.000312	0.000247	0.000325	0.000206	0.000250	0.000156	0.000186
18	0.001548	0.002081	0.003217	0.002259	0.003141	0.017824	0.004974	0.003055	0.001977	0.001868	0.001016	0.001373
19	0.008424	0.012988	0.007590	0.005769	0.008606	0.010102	0.006646	0.013087	0.008211	0.014059	0.006669	0.009396
20	0.005213	0.040850	0.010725	0.016810	0.013732	0.082135	0.020645	0.051775	0.019587	0.071078	0.063218	0.058367
21	0.016962	0.027293	0.025856	0.025606	0.030404	0.020003	0.025466	0.019067	0.014848	0.026642	0.042075	0.022875
22	0.029805	0.070621	0.039885	0.060213	0.051265	0.102596	0.076087	0.105944	0.061215	0.082097	0.054386	0.058135
23	0.022000	0.025741	0.034647	0.028876	0.033593	0.052025	0.029368	0.041662	0.020303	0.064995	0.039790	0.052888
24	0.027484	0.047869	0.039322	0.018740	0.017662	0.052900	0.053623	0.068192	0.051272	0.034988	0.011171	0.021821

	13	14	15	16	17	18	19	20	21	22	23	24
1	0.005709	0.007123	0.011824	0.007693	0.255508	0.033137	0.044842	0.006697	0.003459	0.009047	0.004087	0.121416
2	0.008376	0.008909	0.020398	0.003489	0.006613	0.012127	0.052088	0.030899	0.003513	0.003269	0.010328	0.005464
3	0.000320	0.000388	0.000624	0.000486	0.011532	0.003406	0.002119	0.000341	0.000892	0.000636	0.000237	0.005575
4	0.001968	0.002530	0.003302	0.003351	0.097794	0.010066	0.007083	0.001818	0.000149	0.002067	0.005408	0.025871
5	0.003502	0.005927	0.011539	0.013568	0.004539	0.009782	0.073723	0.003816	0.003717	0.009404	0.002985	0.007902
6	0.003336	0.003778	0.016840	0.002935	0.063779	0.112409	0.007228	0.003247	0.010776	0.013644	0.002452	0.030830
7	0.000500	0.000955	0.000367	0.005956	0.000843	0.000781	0.000283	0.000161	0.000175	0.000174	0.000790	0.000944
8	0.006653	0.004354	0.010717	0.004459	0.014863	0.121909	0.006077	0.003689	0.001647	0.006321	0.002025	0.022498
9	0.008493	0.005887	0.006897	0.002945	0.005611	0.008961	0.012265	0.062934	0.006997	0.003381	0.025493	0.007394
10	0.005048	0.003233	0.005016	0.001483	0.001815	0.004127	0.048794	0.002681	0.001034	0.001893	0.000544	0.003009
11	0.020147	0.055515	0.010157	0.012542	0.019390	0.001488	0.004387	0.000873	0.000418	0.000381	0.001481	0.004145
12	0.009855	0.009967	0.052636	0.003892	0.008093	0.007874	0.002874	0.001921	0.000328	0.000810	0.000753	0.001782
13	1.021309	0.005596	0.003479	0.008557	0.002416	0.003154	0.027744	0.001574	0.002066	0.001354	0.002065	0.004587
14	0.005111	1.078778	0.008608	0.031748	0.008966	0.007934	0.019220	0.005754	0.001471	0.002088	0.005492	0.004467
15	0.001418	0.007756	1.027817	0.003038	0.002587	0.003982	0.005105	0.030574	0.000806	0.001821	0.000984	0.007290
16	0.006073	0.006068	0.005927	1.010911	0.006557	0.005490	0.013695	0.005841	0.022192	0.003452	0.099798	0.018465
17	0.000155	0.000750	0.000603	0.001075	1.008463	0.000326	0.000315	0.000615	0.000265	0.001607	0.000412	0.001847
18	0.001328	0.002073	0.005074	0.001274	0.003657	1.019975	0.003103	0.001109	0.002442	0.013008	0.001309	0.006584
19	0.005282	0.004696	0.005413	0.005277	0.006756	0.007217	1.004964	0.030207	0.012099	0.030844	0.005941	0.006060
20	0.014574	0.014895	0.011021	0.009236	0.015125	0.022355	0.013492	1.008952	0.015130	0.010293	0.008872	0.023254
21	0.025732	0.023001	0.024860	0.027996	0.032901	0.026355	0.035844	0.007172	1.013579	0.014391	0.015562	0.023156
22	0.056872	0.058467	0.088895	0.045017	0.068959	0.094007	0.064375	0.055222	0.150691	1.071146	0.056951	0.125416
23	0.031084	0.030507	0.027417	0.020331	0.036006	0.035842	0.049394	0.026387	0.035651	0.016779	1.033182	0.040653
24	0.026666	0.026739	0.035260	0.006821	0.039875	0.036351	0.019795	0.028599	0.004099	0.017626	0.011886	1.008793

4. Concluding Remarks

This paper has sought to analyze the industrial structure of Shikoku region, which is geographically isolated from other regions, but economically highly interrelated with them in Japan.

In order to take off from the continuing lower level of economic activities, we first clarified the crucial barriers to economic growth with which the Shikoku economy is now confronting. We, then, evaluated the recent growth performance, since future economic expansion builds on past trend, *ceteris paribus*.

Keeping those empirical findings in our minds, we also presented some conceptual advances in interregional input-output analysis. We, then, applied our formulae to the data from the 1975 & 1965 interregional input-output tables. From our calculated results, we have arrived at the following conclusions. First, with respect to our internal matrix multiplier, *intraregional* repercussion effects of Shikoku region are generally small in scale. Second, most industries in Shikoku are likely to be much affected by the changes in final demand in other region.

Thus, for the purpose of further closure of the per capita income gap, powerful pushing towards raising the multiplier effects in intraregional as well as interregional repercussions is most keenly required. In other words, it should be taken to keep improving the infra-structures of Shikoku region, (particularly the construction of interprefectural highways) as the most desirable measures for sound regional developmental program.

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