Sources of Regional Economic Growth in Japan:
A Case of Hokkaido Prefecture between 1970 and 1985[1]

By
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Abstract

This paper examines, using Hokkaido prefecture as a case, the effect of regional characteristics and government policies on the growth of regional economy in Japan. The sources of regional economic growth are investigated through the growth factor decomposition method applied to regional input-output tables. The study finds that the growth pattern of the Hokkaido economy changed conspicuously in the 1980s and this change was brought about, to a large extent, by a shift in the central government's economic policies toward a smaller government.

1. Introduction

The Japanese economy regained pre-war economic levels in the middle of the 1950s and since then enjoyed an unprecedented high economic growth, due partly to low and stable crude oil prices. But this was only until the early 1970s. The two oil crises which occurred during the 1970s changed the economic condition substantially. Not only has the economic growth rate been reduced to somewhere around 5%, half of the rate in the rapid growth period, but the structure of the economy has also changed conspicuously. While oil prices have decreased in the 1980s, the growth rate has never recovered to the level of the rapid growth period.

Changes in the economic environment and consumer preferences have had differential impacts on a regional economy corresponding to regional economic structure and resource endowments. In the process of structural adjustments, some regions reveal higher economic growth than other regions and this is in part attributable to a difference in regional industrial structure. The primary purpose of this paper is, using Hokkaido prefecture as a case, to examine the effect of regional characteristics and government policies on the pattern of regional economic growth in Japan for the period between 1970 and 1985. In order to achieve this purpose, a regional input-output (I-O) analysis was conducted using 1970, 1975, 1980, and 1985 regional I-O tables. The study period was thus divided into three subperiods: (1) 1970-75; (2) 1975-80; and (3) 1980-85. More specifically, the factor decomposition method, which was proposed by Chenery, was applied to the Hokkaido regional I-O tables to identify the sources of the regional economic growth from the demand side for each of these three subperiods.[2]

The Japanese government has constructed the nine-region interregional I-O tables (survey-based) every five years, in which one region is Hokkaido.[3] In this study, the 43-sector 1970-75-80

Table 1 Sector Classification

10 Sectors	28 Sectors
1 Agriculture, Forestry & Fishery	1 Agriculture, Forestry & Fishery
2 Mining	2 Mining
3 Manufcturing	
3-1 Light Industries	3 Food Processing
	4 Textile
	5 Wood Processing
	6 Pulp & Paper
	7 Printing/Publishing
	8 Leather Products
	9 Rubber Products
	20 Other Manufacturing
3-2 Industrial Materials	10 Chemical Products
	11 Oil & Coal Products
	12 Cement & Ceramics
	13 Iron Products
	14 Non-Ferrous Metal
3-3 Processing & Assembling	15 Metal Products
	16 Nonelectrical Machinery
	17 Electrical Machinery
	18 Transportation Machinery
	19 Precision Apparatus
4 Construction	21 Construction & Civil Engineering
5 Electricity, Gas & Water	22 Electricity
	23 Gas & Water
6 Trade	24 Trade
7 Finance & Insurance	25 Finance & Insurance
8 Services	26 Services
9 Transportation & Communication	27 Transportation & Communication
10 Unclassified	28 Unclassified

linked regional I-O table and the 45-sector 1985 regional I-O table are used to perform the factor decomposition analysis for Hokkaido (both of them are of the competitive-import type). Since the linked 1970-75-80 table is at constant 1980 prices, the 1985 table is converted into one with constant 1980 prices by using sectoral GDP deflators.[4] Furthermore, sectors are aggregated into 28 sectors, since there is a difference in sector classification between these I-O tables. However, to clarify the overall picture of the regional economic growth, the 10-sector classification is used in the text (see Table 1 for the classification).

It was not until the Meiji era that full-scale development was started in Hokkaido, the northernmost and second largest of the four main islands of Japan. With a population of 5.6 million people, and while occupying 22% of Japan's total land area, Hokkaido is the least densely populated prefecture in Japan. It still lacks social capital stock and has been suffering from chronic large out-migration. Hokkaido's manufacturing is based largely on extractive and primary industries. Fish canning, lumbering, pulp and paper manufacturing, sugar refining, and dairy processing are some of the prominent manufacturing activities. While Hokkaido is regarded as a frontier area and depends heavily on the nation's development policies and budget, it has tremendous opportunities for development and thus presents a very interesting case in analyzing

[4]Since Hokkaido does not publish real figures for sectoral GDP, national GDP deflators are used in this study. This would distort some of the relative magnitude.

regional economic development in Japan.

The paper is organized as follows. Section 2 discusses the characteristics of the Hokkaido economy and introduces some of the government policies relevant to Hokkaido. Section 3 performs a factor decomposition analysis using the Hokkaido regional I-O tables to identify the sources of regional output growth for the aforementioned three periods. Conclusions are presented in the fourth section.

2. Characteristics of the Hokkaido Economy

Hokkaido, the northernmost island of the Japanese Archipelago and the largest prefecture in Japan, is situated at latitude 41 to 45 degrees north and occupies 22% of Japan's total land area with 83.4 thousand km^2, which is about the same size as Austria (83.8 thousand km^2) and slightly smaller than South Korea (99 thousand km^2). With the population of 5.6 million people, the area is relatively sparsely populated. The population density is 68 persons per square km, and this is about 21% of the Japanese average (320 persons/km^2). Surrounded by the Pacific Ocean, the Sea of Okhotsk, and the Japan Sea, Hokkaido has a long coastline and is rich in marine resources. In addition, it contains 56 thousand km^2 of forest area and thus has an abundant supply of forest resources.

Sapporo is the largest city in Hokkaido with a population of 1.64 million people in 1990, which is followed, in terms of population size, by Asahikawa, Hakodate, Kushiro, Obihiro, Otaru, Tomakomai, and Muroran.[5] Among them, Sapporo, Otaru, Tomakomai, and Muroran are located in the Central Hokkaido Area (*Doh-Oh Chiiki*), which was designated in 1964 as a New Industrial City in line with the Comprehansive National Development Plan (KYUZENSO) formulated in 1962.[6] It was proposed that the Central Hokkaido Area should serve as a strategic regional center for industrial development in Hokkaido, and steel, pulp and paper, food processing, machinery, and other local resource-based industries were designated as desirable industries for promotion in the area. Although most of the industrial estates established in Hokkaido are located within the Central Hokkaido Area (more than 80% in terms of land area in 1985), their performance was not very satisfactory as they failed to achieve the target amount

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[5]The population of these cities is (in 1,000):

Asahikawa	364	Otaru	166
Hakodate	311	Tomakomai	160
Kushiro	209	Muroran	123
Obihiro	168		

[6]The KYUZENSO was the first comprehensive national development plan formulated under the Comprehensive National Land Development Law of 1950. The Plan, which was the national land development version of the Income-Doubling Plan of 1960, aimed at solving the problem of overcrowding, depopulation and regional disparity, and thereby achieving balanced development throughout the country. It thus attempted to disperse industrial and urban development into the whole country, especially outside the Pacific Coast Belt connecting the three overcrowded industrial areas of Tokyo, Nagoya, and Osaka. In order to realize this goal and to maximize the effectiveness of the development, the Plan adopted the *Kyoten Kaihatsu* Method (growth pole scheme), in which it was proposed that investments should be concentrated in strategic points (growth poles) selected outside the Pacific Coast Belt in the hope of inducing the development benefits to the surrounding areas. In the Plan, the country was classified into three areas in terms of development level: (1) overconcentrated areas (large metropolitan areas); (2) adjustment areas (those surrounding overconcentrated areas); and (3) development areas (underdeveloped northeast, the Japan Sea coast, and southernmost areas), where Hokkaido was designated as a development area. Under the Law for the Promotion of New Industrial City Construction (1962), one of the three laws enacted to implement the Plan, 15 sub-areas were designated as new industrial cities primarily within development areas. For a discussion of the comprehensive national land development planning up to the Third Comprehensive National Development Plan (SANZENSO), see Honjo (1978), in which the growth pole concept was introduced in connection with the *Kyoten Kaihatsu* Method. Though written in Japanese, Tadenuma (1990) provides an excellent account of the evolution of the comprehensive national development plans. Lo (1978) took up the Okayama Ken-nan New Industrial City (Southern Okayama) as a case and analyzed the growth pole approach applied to that area.

Table 2 Major Economic Indicators for Hokkaido and Japan

Economic indicators	Hokkaido				Japan				Hokkaido/Japan (%)			
	1970	1975	1980	1985	1970	1975	1980	1985	1970	1975	1980	1985
Land Area (1000 Square km)	83.4	83.4	83.4	83.4	377.7	377.7	377.7	377.7	22.1	22.1	22.1	22.1
Population (in 1000)	5184	5338	5576	5679	103720	111940	117060	121049	5.0	4.8	4.8	4.7
Pop. Density (Persons/Sq. km)	62.2	64.0	66.9	68.1	274.6	296.4	309.9	320.5	22.6	21.6	21.6	21.2
Income (in billion yen)	2447	5681	9640	11297	59828	126453	202847	263313	4.1	4.5	4.8	4.3
Income/Capita (in 1000 yen)	472	1064	1729	1989	577	1130	1733	2175	81.8	94.2	99.8	91.4
GDP (in billion yen)												
1. Primary Industry	335	689	826	905	3970	8098	8561	9195	8.4	8.5	9.7	9.8
2. Secondary Industry	667	1678	3025	3110	24926	59113	94577	119232	2.7	2.8	3.2	2.6
3. Tertiary Industry	1510	4270	7571	9276	32824	91534	154331	204719	4.6	4.7	4.9	4.5
Total	2512	6638	11422	13290	61720	158745	257470	333146	4.2	4.2	4.4	4.0
GDP (Sectoral Share, in %)												
1. Primary Industry	13.3	10.4	7.2	6.8	6.4	5.1	3.3	2.8	2.07	2.04	2.18	2.47
2. Secondary Industry	26.5	25.3	26.5	23.4	40.4	37.2	36.7	35.8	0.66	0.68	0.72	0.65
3. Tertiary Industry	60.1	64.3	66.3	69.8	53.2	57.7	59.9	61.5	1.13	1.12	1.11	1.14
Persons Employed (in 1000)												
1. Primary Industry	516	397	353	336	10151	7354	6111	5419	5.1	5.4	5.8	6.2
2. Secondary Industry	628	639	662	618	17897	18106	18737	19206	3.5	3.5	3.5	3.2
3. Tertiary Industry	1316	1427	1584	1670	24545	27681	30963	33593	5.4	5.2	5.1	5.0
Total	2460	2462	2598	2625	52592	53141	55811	58218	4.7	4.6	4.7	4.5
Labor Productivity (in 1000 yen)												
1. Primary Industry	648	1737	2339	2690	391	1101	1401	1697	166	158	167	158
2. Secondary Industry	1061	2627	4572	5030	1393	3265	5048	6208	76	80	91	81
3. Tertiary Industry	1148	2993	4781	5554	1337	3307	4984	6094	86	90	96	91
Total	1021	2696	4396	5064	1174	2987	4613	5722	87	90	95	88
GDE (in billion yen)	2971	6449	11122	12889	75502	152735	248970	321159	3.9	4.2	4.5	4.0

Note: 1. Figures in 1970 are from *Annual Report on Prefectural Income Statistics*, 1979 and are based on old SNA, whereas figures for 1975, 1980, and
1985 are from *Annual Report on Prefectural Accounts*, 1988 and based on new SNA. (This applies to Income, GDP, and GDE figures.)
2. GDP = Gross Domestic Product; and GDE = Gross Domestic Expenditure.
3. Income, GDP, GDE are all nominal figures (i.e., at current prices).
4. Figures in 1970 corresponding to GDP are Net Domestic Product (NDP).
5. Figures in HOKKAIDO/JAPAN columns corresponding to GDP (Sectoral Share) are Location Quotients.
6. Primary Industry = Agriculture, Forestry, and Fishery. Secondary Industry = Mining, Manufacturing, and Construction; and Tertiary Industry =
Electricity, Gas & Water, Trade, Finance & Insurance, Real Estate, Transportation & Communication, Services, and Public Administration.
Source: 1. Economic Planning Agency, *Annual Report on Prefectural Income Statistics*, 1979.
2. Economic Planning Agency, *Annual Report on Prefectural Accounts*, 1988.
3. Hokkaido Development Bureau, *General Conditions of Hokkaido Prefecture*, 1990.
4. Management & Coordination Agency, *Population Census*, various issues.

of shipment of industrial products for each of the three basic plans so far formulated (1. 1965-75; 2. 1975-80; and 3. 1980-85).[7]

Table 2 compares Hokkaido with Japan as a whole in terms of major economic indicators for the period of 1970-1985. The following are some of the characteristics of the Hokkaido economy.

First, the income of Hokkaido accounted for 4.3% of the national income in 1985, which was smaller than the population share of 4.7%, leading to a less than average per capita income (91% of the national average). It is interesting to observe that the income disparity measured by per capita income differential between Hokkaido and Japan seems to have widened since 1980, after a narrowing down period during the 1970s. As a matter of fact, this coincides with the movement of regional income inequality based on 47 prefectures in Japan. According to the coefficient of variation which measures the dispersion of the regional income per capita levels relative to the national average, regional income disparity, which showed a downward trend during the 1970s, seems to have increased since 1979 (from a bottom of 12.6% to 14.2% in 1985). There are several factors which would bring about this change. Firstly, while regions having a relatively large proportion of processing and assembling industries maintained a relatively high growth, those which lacked the development of processing and assembling industries and relied heavily on industrial material industries such as iron and steel, aluminum smelting, and petrochemical industries mostly stagnated. Secondly, regions which contain large urban areas have benefited from the so-called "Softization" of the Japanese economy which refers to the increasing importance of services in production and consumption, since the "Softization" has been most

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[7]The rate of achievement is 75%, 18%, and −3% for the first, second, and third basic plans, respectively. Recnetly, emphasis has shifted to promoting high value-added new materials industries and high-tech industries (i.e., IC industry and bioindustry), and these industries are supposed to be located in the vicinity of the Chitose airport.

prominent in large urban areas.[8] Tokyo became an international financial center and has absorbed many of these "soft" industries such as information processing, research and development, and planning. This promoted an excessive concentration of population and economic activities in the Tokyo region.[9] Tokyo's per capita income relative to the national average made a significant increase during 1980-85 (from 138% to 148%).[10] Finally, as described in detail in the next section, a cut in the central government expenditures, especially in public works, has severely affected those regions which rely very much on public works investments.[11]

Second, according to the Location Quotient (LQ) of GDP, Hokkaido specializes extensively in the primary industry as its LQ has been exceeding 2.0 constantly over the 1970-85 period. This is true even though the share of the primary industry decreased conspicuously over the period (from 13.3% to 6.8% in nominal terms). Since Hokkaido is abundant in natural resources, it is quite natural that Hokkaido specializes in those activities that are based on locally available natural resources. The labor productivity of the primary industry in Hokkaido is much larger than the national average. Hokkaido has thus a comparative cost advantage in the primary industry. On the contrary, however, it still lacks a solid base for manufacturing activities as its LQ was merely 0.38 in 1985 (see Table 3). Among manufacturing industries, local-resource-based light industries such as food processing and wood processing are relatively prominent, reflecting the abundant supply of natural resources, while the development of heavy and chemical industries is still weak (see Table 4).

Table 3 Gross Domestic Product and Its Location Quotient (LQ) in 1985

(in billion yen)

	Sector	Hokkaido	Japan	LQ
1	Agricul., Forest., Fish.	905	9949	2.30
2	Mining	111	1226	2.28
3	Manufacturing	1426	94257	0.38
	3-1 Light Industries	823	29621	0.70
	3-2 Industrial Materials	270	22616	0.30
	3-3 Processing & Assembling	333	42020	0.20
4	Construction	1557	23129	1.70
5	Elect., Gas, Water	459	11519	1.01
6	Trade	2078	43313	1.22
7	Trade	520	17782	0.74
8	Real Estate	1216	30997	0.99
9	Transport. & Commun.	928	19652	1.20
10	Services	2798	61912	1.14
11	Public Administration	960	14358	1.69
	Total	12956	328095	1.00

Source: 1. Hokkaido, *Annual Report on Hokkaido Prefectural Accounts*, 1987.
2. Economic Planning Agency, *Annual Report on National Accounts*, 1987.

[8]For the "Softization" of the Japanese economy, see Tachi (1985).
[9]The Tokyo region includes Tokyo and the three surrounding prefectures: Kanagawa, Saitama, and Chiba. Net in-migration to the Tokyo region increased from 275 thousand for 1975-80 to 509 thousand for 1980-85. On the other hand, Hokkaido has been experiencing net out-migration since 1960. Net out-migration from Hokkaido increased from 16 thousand for 1975-80 to 83 thousand for 1980-85.
[10]However, the excessive concentration of population and economic activities created the so-called Tokyo problem: a rapid increase in land prices, traffic congestion, air pollution, and so on. For a discussion of the Tokyo problem, see Mera, Miyao, and Sakashita (1988).
[11]Mera (1989) advanced a hypothesis that the recent rejuvenation of the Tokyo region is due for the most part to the shift in the central government's economic policies toward a smaller government (i.e., decreasing growth rate of public expenditures, privatization of public enterprises, and deregulation of private economic activities), supported by the existence of economies of scale in the region. If this is true, then the policy shift from a large government (interventionist) to a smaller government (market oriented) seems to be the principal factor for reversing the declining trend in regional income disparity.

**Table 4 Gross Domestic Product and Its Location Quotient (LQ)
for Manufacturing Industries in 1985**

(in billion yen)

	Sector	Hokkaido	Japan	LQ
1	Food Processing	368	10018	2.43
2	Textile	7	3085	0.15
3	Wood Processing	146	2564	3.76
4	Chemical Products	24	7027	0.23
5	Oil & Coal Products	53	3027	1.16
6	Cement & Ceramics	121	3058	2.61
7	Iron & Non-Ferrous Metal	72	9505	0.50
8	Metal Products	93	4275	1.44
9	Nonelect. Machinery	88	11036	0.52
10	Elect. Machinery	43	13753	0.21
11	Transp. Machinery	107	11097	0.64
12	Precision Apparatus	2	1858	0.08
13	Other Manufacturing	302	13954	1.43
	Total	1426	94257	1.00

Source: 1. Hokkaido, *Annual Report on Hokkaido Prefectural Accounts*, 1987.
2. Economic Planning Agency, *Annual Report on National Accounts*, 1987.

Third, in heavy and chemical industries, Hokkaido relies significantly on industrial material industries.[12] According to Table 5, which presents a change in the structure of industry in terms of real gross output (at 1980 constant prices), the share of industrial materials industries was still larger than that of processing and assembling industries in 1985, though it decreased to 7.8% from 10.2% in 1975 and the decrease was covered partially by an increase in the share of processing and assembling industries. As described further in the next section, the two oil crises which occurred in the 1970s facilitated a structural shift in heavy and chemical industries toward processing and assembling industries such as electrical machinery and automobile industries. In accordance with the Third Hokkaido Comprehensive Development Plan which was formulated in 1970,[13] Hokkaido embarked upon the construction of two large-scale coastal industrial estates, one in East Tomakomai, located 60 km south of Sapporo City and facing the Pacific Ocean with a total area of 11,000 ha and the other in the Ishikari Bay Area, to the north of Sapporo City and facing the Japan Sea, with an area of 3,000 ha. However, due to the oil crises, the construction of oil refining and petrochemical plants planned in the East Tomakomai Industrial Estate has been delayed. In East Tomakomai, the construction of an automobile engine plant and oil storing bases (public and private) was already completed. On the other hand, most of the firms which started to operate in the Ishikari Bay Area are related to housing and construction industries. Another industrial estate, the Sorachi Core Industrial Estate, which was started together with the above two industrial estates and is located midway between Sapporo and Asahikawa with a total area of about 300 ha, was designed for machine and metal industries and supposed to accommodate 10,000 workers.[14]

[12]Heavy and chemical industries consist of industrial materials industries and processing and assembling industries (or machine industries).

[13]Hokkaido Comprehensive Development Plans have been formulated occasionally since 1950 by the Hokkaido Development Agency under the Hokkaido Development Law which was enacted in 1950 along with the Comprehensive National Land Development Law. (The Hokkaido Development Agency is an external organization of the Prime Minister's Office which is responsible for the formulation of comprehensive development plans in Hokkaido, and its Director General is a Minister of State.) The Third Hokkaido Comprehensive Development Plan was formulated in line with the New Comprehensive National Development Plan (SHINZENSO) of 1969. The SHINZENSO proposed, with the aim of diffusing development opportunities over the whole national land, large-scale development projects such as the construction of new networks of trunk railway lines, expressways, and communications and the establishment of large-scale industrial bases around the new networks, especially in the remote areas of Japan.

[14]All these industrial estates are located in the Central Hokkaido Area (*Doh-Oh Chiiki*).

Table 5 Total Gross Output by Industry at Constant 1980 Prices (Percentage Share)

(%)

	Sector	1970	1975	1980	1985
1	Agricul., Forest. & Fish.	13.4	9.5	7.9	8.7
2	Mining	2.2	1.4	1.4	1.2
3	Manufacturing	30.9	28.6	27.6	27.2
	3-1 Light Industries	17.0	14.5	13.9	14.4
	3-2 Industrial Materials	9.7	10.2	9.7	7.8
	3-3 Processing & Assembling	4.2	3.8	4.1	5.0
4	Construction	12.1	14.8	14.6	11.5
5	Electricity, Gas & Water	1.8	2.1	2.6	2.9
6	Trade	7.5	9.7	10.8	10.8
7	Finance & Insurance	6.5	8.6	7.6	9.1
8	Services	18.8	19.5	21.0	20.9
9	Transport. & Communicat	4.6	3.8	4.8	6.3
10	Unclassified	2.4	2.0	1.6	1.6
	Total	100.0	100.0	100.0	100.0

Source: 1. MITI, *1970-75-80 Linked Regional I-O Table*, 1986.
　　　　2. MITI, *1985 Regional I-O Table*, 1990.

Fourth, compared with Japan as a whole, the Hokkaido economy depends highly upon government sectors. According to real GDE figures in 1985, about 28% of the total GDE was due to government sectors in Hokkaido (government consumption expenditure plus government fixed capital formation), which is much larger than Japan's figure of 16% (see Table 6). This implies that the Hokkaido economy is very sensitive to government policies, especially development policies by the central government, since Hokkaido relies heavily on national subsidies (*Kokko Shishutsukin*) for its public works expenditures.[15] The construction industry has been playing an important role in the Hokkaido economy reflecting high dependence on public works investments by the central government (see Table 3). Financially, Hokkaido is not very healthy as its local tax revenue falls far short of its government expenditures necessary to maintain standard local public services. The reason is that while local tax revenue depends very much on the local income level (especially, corporate income), necessary government expenditures are determined to a considerable extent by the population size and area. Local allocation tax (*Chiho Koufuzei*), which is transferred from the central government to local governments to make up for local deficits, accounts for 25% of the total revenue in Hokkaido prefecture in 1988 (536 billion yen out of a total revenue of 2.127 trillion yen), which is much larger than the national average figure of 17%.[16]

[15]About 10% of public works expenditures by the central government is channeled to the Hokkaido region through the Hokkaido Development Agency. In 1990, around 770 billion yen was allocated to the Hokkaido region out of the total public works expenditures of 7,250 billion yen. For the system of national subsidies to local governments (*Kokko Shishutsu-kin*), see, for example, Atoda and Hashimoto (1991).

[16]The amount of local allocation tax for a local government is determined based on the difference between the Standard Fiscal Demand (*Kijun Zaisei Juyou*) and the Standard Fiscal Revenue (*Kijun Zaisei Shunyu*), where the Standard Fiscal Revenue is calculated by the following formula (since fiscal 1989 when the new consumption tax was introduced):

Standard Fiscal Revenue = a (LT + NCTL) + NTL,

where LT = local tax revenue,
　　　 NCTL = national consumption tax revenue transferred to local government (*Shohi Joyozei*),
　　　 NTL = national tax revenue transferred to local government (*Chiho Joyozei*), and
　　　 a = 0.8 for prefectures and 0.75 for cities, towns, and villages.

Fiscal Power Index (*Zaiseiryoku Shisu*), which is the ratio between Standard Fiscal Revenue and Standard Fiscal Demand, is around 0.4 for Hokkaido. On the other hand, total amount of national treasury disbursements for local allocation tax (*Chiho Koufuzei Koufukin*) is estimated by the following formula (since fiscal 1989):

National Treasury Disbursements for Local Allocation Tax
= 0.32 (IT + CT + LT) + 0.24 CNT + 0.25 TBT,

where IT　 = income tax,
　　　 CT　 = corporate tax,
　　　 LT　 = liquor tax,
　　　 CNT = consumption tax (excluding *Shohi Joyozei*), and
　　　 TBT = tobacco tax.

Necessary adjustments are made whenever the total disbursement is not equal to the total required amount. For the system of local allocation tax, see, for example, Takabayashi (1991).

Table 6   Gross Domestic Expenditure at Constant Prices Component Share and Location Quotient (LQ)   (%)

Economic Indicators	Hokkaido				Japan				Hokkaido/Japan (LQ)			
	1970	1975	1980	1985	1970	1975	1980	1985	1970	1975	1980	1985
Private Consump. Expend.	57.0	62.8	58.5	64.1	54.8	57.2	53.7	55.8	1.04	1.10	1.09	1.15
Govern. Consump. Expend.	14.5	15.5	13.7	13.6	9.7	9.9	9.4	9.3	1.50	1.56	1.45	1.46
Private Fixed Capital	18.5	24.7	24.8	19.7	26.4	23.4	22.7	23.2	0.70	1.05	1.09	0.85
Govern. Fixed Capital	14.4	15.2	17.7	14.9	8.3	9.1	9.4	7.1	1.74	1.67	1.89	2.10
Inventory Increase	2.4	1.8	1.1	0.2	3.2	0.3	0.9	0.8	0.74	5.36	1.23	0.23
Exports — Imports	-15.2	-24.0	-23.9	-18.2	-2.3	0.0	3.9	3.8				
Exports	30.2	34.6	33.1	34.4	9.6	12.9	16.6	16.9	3.15	2.69	2.00	2.04
Imports	45.5	58.6	57.0	52.6	11.9	12.8	12.6	13.1	3.83	4.56	4.51	4.01
Others	8.6	4.0	8.1	5.7	0.0	0.0	0.0	0.0				
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	1.00	1.00	1.00	1.00

Source: 1. Economic Planning Agency, *Annual Report on Prefectural Accounts*, 1988.
   2. Economic Planning Agency, *Annual Report on National Accounts*, 1985 and 1987.
   3. Hokkaido, *Annual Report on Hokkaido Income Statistics*, 1982.

Finally, Hokkaido's trade structure reflects its basic economic conditions: an abundant supply of natural resources and a relatively low level of industrialization. In other words, Hokkaido is exporting primary commodities and food and wood products, while it imports high value-added items such as machines and chemical products. Using Hokkaido regional I-O tables, import ratio and export ratio are calculated (interregional as well as international), where import ratio = imports/(total regional demand) and export ratio = exports/(total output). Tables 7 to 10 provide the results obtained for the period of 1970-85. As shown in Table 10, more than 50% of the total domestic demand for manufacturing industries was satisfied by interregional imports in 1985 (almost 60% when international imports are included). It is interesting to note also that interregional import ratio increases as one moves from light industries (42%) to industrial material industries (51%) and to processing and assembling industries (70%). In contrast, interregional export ratio decreases as one moves from light industries (47%) to industrial material industries (29%) and to processing and assembling industries (23%). This pattern remained unchanged over the 1970-85 period. This clearly indicates Hokkaido's backwardness in industrial development. Of particular interest in this connection is that Hokkaido has been suffering from a chronic regional trade balance deficit, especially a large trade deficit in the manufacturing industry. In 1985, the total regional deficit amounted to 2.007 trillion yen (at 1980 constant prices), which was more than 30% of the total imports, while the trade deficit in the manufacturing industry was 2.61 trillion yen and this was more than 50% of the manufactured imports.

3. The Sources of Regional Economic Growth

Viewed from the demand side, the growth of a region is brought about by a mixture of the following factors:

(1) Changes in regional (internal) demand such as regional final private and public consumption expenditures, regional private and public fixed capital formation, and an increase in regional inventory;

(2) Changes in regional exports, where regional exports include interregional exports (i.e., exports to other parts of the country) and foreign or international exports; and

(3) Regional import substitution (i.e., substitution of regionally produced goods and services for imported (domestic and/or foreign) goods and services).

Without any supply constraints, an increase in demand, whether it originates inside or outside the region, will induce an increase in regional output to meet the change, though some of the effects will leak through interregional and foreign imports. Increasing public works investment by

Table 7 Export Ratio and Import Ratio in 1970 (International and Interregional)

(%)

	Sector	INT.NAT. Export Ratio	INT.REG. Export Ratio	INT.NAT. Import Ratio	INT.REG. Import Ratio
1	Agricul., Forest. & Fish.	0.58	33.87	7.07	9.76
2	Mining	0.28	59.12	52.07	3.73
3	Manufacturing	3.71	32.41	4.15	43.06
	3-1 Light Industries	2.57	41.44	4.32	35.24
	3-2 Industrial Materials	4.14	26.03	4.92	42.95
	3-3 Processing & Assembling	7.35	10.86	2.68	57.42
4	Construction	0.00	0.00	0.00	0.00
5	Electricity, Gas & Water	0.15	0.00	0.00	0.00
6	Trade	1.10	2.48	0.02	10.37
7	Finance & Insurance	0.04	0.03	0.21	7.67
8	Services	0.05	2.12	0.18	1.28
9	Transport. & Communicat.	1.74	21.03	1.69	5.24
10	Unclassified	1.89	0.00	2.45	0.00
	Total	1.45	17.39	3.39	18.35

Note: INT.NAT. = International and INT.REG. = Interregional.
   INT.NAT. Export Ratio = International Exports/Total Output,
   INT.REG. Export Ratio = Interregional Exports/Total Output,
   INT.NAT. Import Ratio = International Imports/Total Regional Demand,
   INT.REG. Import Ratio = Interregional Imports/Total Regional Demand.

Table 8 Export Ratio and Import Ratio in 1975 (International and Interregional)

(%)

	Sector	INT.NAT. Export Ratio	INT.REG. Export Ratio	INT.NAT. Import Ratio	INT.REG. Import Ratio
1	Agricul., Forest. & Fish.	0.61	36.17	9.47	15.06
2	Mining	0.18	59.63	81.94	0.78
3	Manufacturing	4.27	34.23	4.97	46.13
	3-1 Light Industries	2.01	42.02	6.11	40.46
	3-2 Industrial Materials	4.82	31.48	4.79	42.61
	3-3 Processing & Assembling	11.37	12.05	3.19	61.62
4	Construction	0.00	0.00	0.00	0.00
5	Electricity, Gas & Water	0.00	0.00	0.00	0.00
6	Trade	0.51	5.14	0.70	10.05
7	Finance & Insurance	0.01	1.56	0.30	5.44
8	Services	0.02	5.55	0.24	2.23
9	Transport. & Communicat.	1.02	16.48	1.54	10.94
10	Unclassified	3.40	0.73	5.29	0.14
	Total	1.44	16.43	5.20	18.66

Note: INT.NAT. = International and INT.REG. = Interregional.
   INT.NAT. Export Ratio = International Exports/Total Output,
   INT.REG. Export Ratio = Interregional Exports/Total Output,
   INT.NAT. Import Ratio = International Imports/Total Regional Demand,
   INT.REG. Import Ratio = Interregional Imports/Total Regional Demand.

Table 9 Export Ratio and Import Ratio in 1980 (International and Interregional)

(%)

	Sector	INT.NAT. Export Ratio	INT.REG. Export Ratio	INT.NAT. Import Ratio	INT.REG. Import Ratio
1	Agricul., Forest. & Fish.	0.64	34.81	11.20	11.40
2	Mining	0.38	46.00	74.05	1.77
3	Manufacturing	2.38	33.63	4.45	48.62
	3-1 Light Industries	1.30	41.32	5.17	40.97
	3-2 Industrial Materials	3.00	28.99	4.31	44.06
	3-3 Processing & Assembling	4.62	18.33	3.58	65.57
4	Construction	0.00	0.00	0.00	0.00
5	Electricity, Gas & Water	0.00	0.21	0.01	0.46
6	Trade	0.34	4.12	0.03	4.56
7	Finance & Insurance	0.26	0.13	0.41	3.04
8	Services	0.02	5.75	0.36	2.99
9	Transport. & Communicat.	4.15	16.94	3.27	6.37
10	Unclassified	9.07	1.33	5.36	0.60
	Total	1.12	15.23	4.68	18.96

Note: INT.NAT. = International and INT.REG. = Interregional.
INT.NAT. Export Ratio = International Exports/Total Output,
INT.REG. Export Ratio = Interregional Exports/Total Output,
INT.NAT. Import Ratio = International Imports/Total Regional Demand,
INT.REG. Import Ratio = Interregional Imports/Total Regional Demand.

Table 10 Export Ratio and Import Ratio in 1985 (International and Interegional)

(%)

	Sector	INT.NAT. Export Ratio	INT.REG. Export Ratio	INT.NAT. Import Ratio	INT.REG. Import Ratio
1	Agricul., Forest. & Fish.	0.09	33.00	12.53	13.14
2	Mining	0.27	31.21	75.39	0.70
3	Manufacturing	2.43	37.08	4.99	53.73
	3-1 Light Industries	1.20	46.62	6.54	41.64
	3-2 Industrial Materials	3.33	28.84	5.51	50.78
	3-3 Processing & Assembling	4.56	22.72	2.84	69.59
4	Construction	0.00	0.00	0.00	0.00
5	Electricity, Gas & Water	0.00	0.52	0.00	0.25
6	Trade	0.36	20.44	0.04	25.57
7	Finance & Insurance	0.14	0.03	0.06	5.66
8	Services	0.04	5.68	0.26	2.84
9	Transport. & Communicat.	2.54	24.06	2.63	14.42
10	Unclassified	2.13	26.11	7.10	2.12
	Total	0.93	18.65	5.09	24.10

Note: INT.NAT. = International and INT.REG. = Interregional.
INT.NAT. Export Ratio = International Exports/Total Output,
INT.REG. Export Ratio = Interregional Exports/Total Output,
INT.NAT. Import Ratio = International Imports/Total Regional Demand,
INT.REG. Import Ratio = Interregional Imports/Total Regional Demand.

a regional government, most of which is financed by the central government as a subsidy, is a good example of a demand-side activity originating within the region and triggering the regional output growth, whereas an increase in the exports of consumption goods to satisfy the needs of consumers outside the region is an example of a source of regional growth which is initiated externally.

Strictly speaking, regional import substitution is not a demand-side growth factor, but a factor which brings about regional growth through the reduction of goods and services supplied from the outside of the region. In order to maintain a supply of necessary goods and services to meet a demand previously satisfied by imports, the regional production is encouraged in this process. Import substitution has, in essence, the same effect on the regional economy as an increase in exports, which leads to an increase in sales by producers within the region. The idea of import substitution is, however, to promote regional production to reduce demand leakage in the mechanism of a regional multiplier, rather than to satisfy demand increase.

Regional input-output tables provide a consistent framework within which one can identify the sources of regional output growth from the demand side. This section examines, by using a series of the Hokkaido regional I-O tables (at constant 1980 prices), the sources of real output growth in Hokkaido. An I-O analysis in the section relies on the factor decomposition method which was developed by Chenery. For the factor decomposition method and its applications, see: Chenery (1980); Chenery and Syrquin (1979); Chenery (1986); Kubo, Robinson and Syrquin (1986); Urata (1987); Fujita and James (1987); and Akita (1991). But, the applications are all for the growth of a country, not for the growth of a region in a country.

3.1. Factor Decomposition Method Applied to Regional I-O Tables

The factor decomposition method used in this paper is based on the following balance equation for the regional input-output accounts:

$$X = W + D + E - M \tag{1}$$

where X, W, D, E, and M are vectors of gross regional output, regional intermediate demand, regional final demand, exports, and imports, respectively, and in which each element of the vectors designates an industrial sector of the regional economy. It should be noted that in a regional I-O table, exports and imports include interregional and foreign (international) exports and imports.

Using $W = AX$ where A is a matrix of input-output coefficients and $M = \hat{m} (W + D)$ where $\hat{m}$ is a diagonal matrix of import coefficients (= import ratios = imports/(total regional demand)), equation (1) can be rewritten as

$$X = (I - \hat{m}) (AX + D) + E \tag{2}$$

or

$$X = \hat{p} (AX + D) + E \tag{3}$$

where $\hat{p}$ is a diagonal matrix of regional supply ratios ($= I - \hat{m}$). The system in equation (3) can be solved for X to yield the regional production needed to satisfy a specific level of regional and export demand with a given technology embodied in the input-output coefficient matrix, A, and import structure represented by the diagonal matrix, $\hat{p}$.

$$X = (I - \hat{p}A)^{-1} (\hat{p}D + E) \tag{4}$$

or

$$X = B (\hat{p}D + E) \tag{5}$$

where B is the regional Leontief inverse $(B = (I - \hat{p}A)^{-1})$.

Equation (5) can be used to solve the change in gross regional output, ΔX, in terms of changes in regional and export demand and changes in the two sets of structural parameters, $\hat{p}$ and A. After some algebraic manipulations, the change in gross regional output can be written as:

$$\Delta X = X_t - X_0$$
$$= B_0 \left[(\hat{p}_t - \hat{p}_0) (A_t X_t + D_t) + \hat{p}_0 (A_t - A_0) X_t + \hat{p}_0 (D_t - D_0) + (E_t - E_0) \right] \qquad (6)$$

where subscripts 0 and t designate the base year and the terminal year, respectively. The change in the gross regional output is thus decomposed into the following four factors:

(a) Import substitution (IS),[17] or the total (direct and indirect) effect on regional output from each sector of increasing the proportion of regional demand in all sectors that is supplied from regional production ($= B_0(\hat{p}_t - \hat{p}_0) (A_t X_t + D_t)$),

(b) Technological change (TC),[18] or the total effect (direct and indirect) on regional output from each sector of changing input-output coefficients throughout the regional economy ($= B_0 \hat{p}_0 (A_t - A_0) X_t$),

(c) The expansion of domestic demand (DD), or the total (direct and indirect) effect on regional output from each sector of the expansion of regional demand in all sectors ($= B_0 \hat{p}_0 (D_t - D_0)$), and

(d) Export expansion (EE), or the total (direct and indirect) effect on regional output from each sector of increasing exports in all sectors ($= B_0 (E_t - E_0)$).

The factor decomposition equation in (6) is obtained by using the base year structural parameters, $\hat{p}_0$ and B_0, and the terminal year volume weights, X_t and D_t. However, we can also derive a factor decomposition equation based on the base year volume weights, X_0 and D_0, and the terminal year structural parameters, $\hat{p}_t$ and B_t, as follows:

$$\Delta X = B_t \left[(\hat{p}_t - \hat{p}_0) (A_0 X_0 + D_0) + \hat{p}_t (A_t - A_0) X_0 + \hat{p}_t (D_t - D_0) + (E_t - E_0) \right] \qquad (7)$$

In this study, we used a simple average of the above two factor decomposition equations. Moreover, the expansion of regional final demand (DD) is further decomposed into household consumption (DD1), government consumption (DD2), capital formation (DD3), and change in inventory (DD4), whereas the expansion of exports (EE) is divided into international exports (EE1) and interregional exports (EE2). Likewise, import substitution (IS) is decomposed into international import substitution (IS1) and interregional import substitution (IS2). The factor decomposition equation will thus be:

$$\Delta X = (IS1 + IS2) + TC + (DD1 + DD2 + DD3 + DD4) + (EE1 + EE2) \qquad (8)$$

where each component is a simple average of the corresponding components in equations (6) and (7).

3.2. Major Findings

Tables 11 through 13 provide the results obtained by using the factor decomposition method described above, in which each entry presents absolute growth for each growth factor and for each sector. In order to see the regional characteristics of growth performance for the study period, Table 14 is also presented, which compares Hokkaido with Japan in terms of real GDE growth.

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[17]Import substitution in this analysis is defined for each sector by the increase in the proportion of total supply that is provided by regional production.

[18]Technological change in this analysis is defined by the change in input-output coefficients throughout the regional economy.

Table 11 Sources of Growth (Absolute Growth) 1970–1975

(in 100 million yen)

Sector	IS1	IS2	TC	DD1	DD2	DD3	DD4	EE1	EE2	Total	Growth
1 Agriculture	-640	-1474	-2231	1417	5	342	-11	-38	332	-2297	-2.30
2 Mining	-1442	408	67	112	4	130	-61	25	167	-591	-3.72
3 Manufacturing	-725	-2812	-189	4135	43	3058	-553	921	3486	7361	2.89
3-1 Light Industries	-575	-1641	29	2873	14	743	-489	-115	992	1831	1.35
3-2 Industrial Material	-17	-516	-281	853	22	1644	73	633	2228	4641	5.51
3-3 Process. & Assembl.	-134	-656	62	408	7	671	-137	402	265	888	2.56
4 Construction	-30	3	-34	436	7	9551	-5	3	68	10000	8.90
5 Elect., Gas & Water	-110	-41	377	545	290	170	-12	9	28	1255	7.53
6 Trade	-208	-79	855	4732	11	1211	-75	-5	869	7312	10.25
7 Finance & Insurance	-119	212	1987	3657	14	410	-26	16	477	6628	10.65
8 Services	-119	-400	710	6109	155	501	-26	4	1717	8652	5.31
9 Transport. & Commun.	-46	-444	-140	832	8	344	-17	-36	-150	351	0.97
10 Unclassified	-205	-81	-647	431	14	485	-26	79	183	233	1.23
Total	-3644	-4707	754	22404	550	16201	-810	979	7176	38904	4.56

Note: Growth is the average annual growth rate of sectoral output (in percentage).

Table 12 Sources of Growth (Absolute Growth) 1975–1980

(in 100 million yen)

Sector	IS1	IS2	TC	DD1	DD2	DD3	DD4	EE1	EE2	Total	Growth
1 Agriculture	-310	524	-549	267	65	91	-233	-35	-59	-240	-0.26
2 Mining	581	-131	49	51	13	51	38	-7	-134	511	3.40
3 Manufacturing	398	-185	1262	1836	356	2138	46	-1119	3215	7947	2.71
3-1 Light Industries	349	-161	212	802	183	376	262	-170	1813	3666	2.47
3-2 Industrial Material	178	300	691	532	115	914	-260	-500	476	2445	2.37
3-3 Process. & Assembl.	-128	-324	359	503	57	848	44	-449	926	1836	4.48
4 Construction	5	58	-479	179	43	5047	-2	8	22	4882	3.18
5 Elect., Gas & Water	69	14	537	592	196	105	1	9	225	1747	7.32
6 Trade	177	1277	1150	2468	145	599	-34	-17	222	5985	5.65
7 Finance & Insurance	32	611	-1788	1484	164	233	-5	59	-56	733	0.87
8 Services	-10	-201	1776	4779	2749	326	-4	30	856	10301	4.92
9 Transport. & Commun.	-136	447	564	674	648	226	-7	404	753	3574	8.12
10 Unclassified	24	9	-712	179	73	-34	-31	198	115	-179	-0.92
Total	832	2422	1809	12508	4451	8782	-229	-471	5159	35261	3.38

Note: Growth is the average annual growth rate of sectoral output (in percentage).

Table 13 Sources of Growth (Absolute Growth) 1980–1985

(in 100 million yen)

Sector	IS1	IS2	TC	DD1	DD2	DD3	DD4	EE1	EE2	Total	Growth
1 Agriculture	-315	-199	918	-214	13	23	313	-116	1259	1680	1.77
2 Mining	-143	148	175	3	0	-94	13	-14	-739	-651	-4.26
3 Manufacturing	-870	-707	-658	666	34	-1838	363	-181	2225	-966	-0.31
3-1 Light Industries	-707	-272	-184	-137	33	-367	107	-63	2641	1050	0.65
3-2 Industrial Material	-342	-584	-855	266	7	-1269	211	-195	-1507	-4266	-4.16
3-3 Process. & Assembl.	178	148	380	538	-6	-202	45	78	1091	2250	4.42
4 Construction	-4	-117	-311	172	3	-7137	5	-8	102	-7294	-4.76
5 Elect., Gas & Water	-58	-159	214	599	190	-161	8	-9	62	687	2.24
6 Trade	-49	-5603	-768	2799	15	-1068	72	-23	4435	-190	-0.15
7 Finance & Insurance	24	-1278	1957	2505	-4	-387	27	-50	683	3477	3.70
8 Services	16	-420	-1768	1415	596	-514	20	-27	569	-113	-0.05
9 Transport. & Commun.	43	-1145	2163	1423	-558	-387	22	-120	1951	3391	5.49
10 Unclassified	-72	-188	-661	142	4	-162	38	-271	1037	-133	-0.72
Total	-1428	-9669	1261	9511	292	-11725	879	-817	11585	-112	-0.01

Note: Growth is the average annual growth rate of sectoral output (in percentage).

Table 14 Gross Domestic Expenditure at Constant Prices (Annual Average Growth Rate)

(%)

Extenditure Item	Hokkaido			Japan		
	70-75	75-80	80-85	70-75	75-80	80-85
Private Consump. Expend.	6.09	3.91	2.93	5.55	3.80	2.88
Govern. Consump. Expend.	5.48	2.84	2.09	5.15	4.04	2.78
Private Fixed Capital	10.21	5.56	-0.55	2.18	4.51	4.91
Govern. Fixed Capital	5.23	8.68	-1.54	6.61	5.83	-2.15
Inventory Increase	-1.53	-5.15	-28.63	-33.31	27.08	4.89
Exports and Imports						
Exports	6.89	4.49	2.77	10.94	10.56	7.82
Imports	9.45	4.84	1.11	6.27	4.78	1.78
Total	4.05	5.40	0.86	4.64	5.13	3.82

Source: 1. Economic Planning Agency, *Annual Report on Prefectural Accounts*, 1988.
2. Economic Planning Agency, *Annual Report on National Accounts*, 1985 and 1987.
3. Hokkaido, *Annual Report on Hokkaido Income Statistics*, 1982.

Though there are notable differences in the pattern of output growth between the three subperiods (1970-75, 1975-80, and 1980-85), household consumption (DD1) has been the primary source of the total output growth throughout the study period. For 1970-75 and 1975-80, household consumption accounted for 58% and 35% of the total output growth, respectively. In terms of relative magnitude, the expansion of interregional exports (EE2) was the largest contributor to the total output growth for 1980-85 and household consumption came next.[19] However, this is attributable mostly to the sudden export expansion of the trading sector. While it is not certain why this happened during this period, there was a concurrent rapid increase in the interregional imports in the trading sector which more than offset the export increase (see Tables 9 and 10).

In the 1970s, capital formation (DD3) and the expansion of interregional exports (EE2) came next after household consumption in order of contribution to the total output growth. Capital formation accounted for 42% and 25% of the total growth for 1970-75 and 1975-80, while the expansion of interregional exports explained 18% and 15%, respectively. There are, however, two major differences in the pattern of total output growth between 1970-75 and 1975-80. First, while there was an import substitution effect (IS1 and IS2) for 1975-80, no such effect was observed for 1970-75. Second, government consumption (DD2) was also prominent for 1975-80 by accounting for 13% of the total output growth, but not for 1970-75. In sum, the growth of 1970-75 was led to a large extent by regional domestic demand as it accounted for 99% of the total growth. On the other hand, the sources of growth became diversified for 1975-80, though domestic demand still claimed the largest share (72%).

In the 1970s, the Japanese economy was faced with a succession of problems and changes, which eventually matured into a stage of stable growth in contrast to the nearly two decades of unprecedented rapid growth. The following are some of the problems and changes which occurred in the 1970s.[20]

(1) The Japanese government was forced to switch to the floating exchange rate system in February 1973 in the aftermath of the so-called "Nixon shocks" which took place in August 1971. This marked the end of the fixed exchange rate system, which had been maintained since April 1949 with an exchange rate of 360 yen to the US dollar. After the introduction of the new system, the yen appreciated substantially to the US dollar though there were fluctuations (from 308 yen per dollar in 1973 to 210 in 1980).

(2) The outbreak of the first oil crisis in October 1973 brought about a four-fold increase in the dollar price of crude oil. Combined with an extraordinarily "easy money" situation which had been prevalent until early 1973, this triggered rampant inflation in the 1973-74 period.[21] The Japanese economy fell into the so-called "trilemma of inflation, recession, and balance of payments deficits."[22] Later, the second oil crisis took place in 1979 and the standard price of crude

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[19]It is not possible to calculate the percentage share of each factor in the total output growth, since this period experienced a negative growth.

[20]For a discussion of the structural changes and problems faced by the Japanese economy in the 1970s, see, for example, Saxonhouse (1979), Nakamura (1981), Komine (1981), Miyazaki (1982), Kosai and Ogino (1984), Patrick and Rosovsky (1985), and Kosai (1986).

[21]Expansive monetary and fiscal policies were adopted from late 1970 until early 1973 to stem the recession following the so-called "Izanagi" boom, to achieve international payments balance, to counteract the impact of the "Nixon shocks," (i.e., buying up dollars on a large scale to avoid a revaluation of the yen) and to try to realize the "Plan for Rebuilding the Japanese Archipelago" (officially "Basic Economic and Social Plan") by Prime Minister Tanaka who took office in July 1972. These policies created an excessive liquidity in the money supply. The money supply of M_2 increased sharply at an annual rate of 26.5% in 1972 and 22.7% in 1973.

[22]The government decided to switch to tight monetary and fiscal policies in the first half of 1973. While they lasted until the first quarter of 1975, they eventually succeeded in bringing inflation under control. The official discount rate recorded an all-time high rate of 9% in December 1973, which continued until March 1975. However these tight monetary policies produced such side-effects as a decline in profit rates and an increase in unemployment. The Japanese economy experienced a negative real growth (-0.4%) in 1974 for the first time since World War II.

oil was raised again to more than 30 dollars a barrel in 1980 from around 14 dollars. Though the shock was not so severe as the first oil crisis and was absorbed rather quickly,[23] the Japanese economy could no longer enjoy cheap imported energy resources which had prevailed in the rapid growth period.[24]

(3) By the early 1970s, Japanese industries had been sufficiently competitive internationally under the fixed exchange rate system, thereby creating a continued large trade surplus, and the balance of payments no longer served as a constraint on economic growth.[25] At the same time, the Japanese economy had become such a large factor in world trade that its policies became matters of major concern to all countries.

(4) The Japanese fiscal policy was drastically changed in 1975. In the rapid growth period, tax revenue increases were sufficient to permit balanced budgets. From 1974 onward, however, the government was faced with revenue shortages. While expenditures increased because of inflation, tax revenues remained flat as corporate tax receipts declined due to a sudden drop in corporate profits and indirect taxes stagnated after the first oil crisis. In order to cover the fiscal deficits, a large amount of deficit financing bonds (*Akaji Kokusai*) had been constantly issued since 1975 along with an issue of national bonds financing public works expenditures (*Kensetsu Kokusai*).[26] Deficit financing bonds reached 7.3 trillion yen in 1980, which accounted for about 17% of the total government revenue.

(5) In the 1970s, investments for improving the living conditions and preserving the environment increased gradually, and the proportion of direct investments in production capacity declined. This resulted in a large increase in net investment necessary to maintain the growth.

These problems and changes have had a profound but differential impact on the Hokkaido economy. The growth rate dropped sharply after 1980, and Hokkaido experienced virtually zero growth during 1980-85 (0.86% annually in terms of real GDE). This contrasts significantly with the performance of the Japanese economy as a whole during the same period, in which the annual average growth rate of GDE was maintained at 3.8%, though it was slightly less than the rate in the 1970s (see Table 14).

There are two major factors which brought about this stagnation in Hokkaido. First, the

[23]Suzuki (1981) attributed the better performance of the Japanese economy after the second oil crisis to the transformation of monetary policy since 1975. The main changes made in monetary policy were: (1) focusing of the policy objective on price stability (rather than full employment and the balance of payments); (2) application of $M_2 + CD$ (money supply plus certificate of deposit) as an intermediate target (i.e., appropriate control over the money supply); and (3) lifting of restrictions on interest rates. The growth of $M_2 + CD$ has been quite stable at around 11% since 1977, and despite the rapid rise in the wholesale price index (more than 20% in the first half of 1980), the growth rate of the consumer price index kept relatively low even after the second oil crisis (about 8% in 1980).

[24]After the two oil crises, however, a remarkable conservation of oil has been achieved. The conservation was carried out, for example, by a reduction in the oil input per finished output, a switch to goods that consume less oil, and a shift to alternative energy sources (Miyazaki, 1982).

[25]In the rapid growth period, the major constraint on Japan's economic growth was its balance of payments position. When the balance of payments deficits grew in a boom and foreign exchange reserves began to fall, a tight monetary policy was chosen to curb domestic demand; thereby reducing imports on the one hand, while expanding export capacity on the other. Further economic expansion was thus temporarily sacrificed, whereas the balance of payments began to improve. However, tight monetary measures in 1969 were taken in a period when a balance of payments surplus continued to exist in a boom (the latter part of the "Izanagi boom"), and their objective was to curb inflation. As described in (2) in the text above, easy monetary measures were introduced in late 1970 in order to reduce a balance of payments surplus (while keeping the fixed exchange rate at 360 yen), but this resulted in excess liquidity and inflation. The balance of payments went into the red after the first oil crisis. However, it turned again to a surplus in the 1977-1978 period because of a rapid increase in exports, during which the yen appreciated substantially from 300 yen to less than 200 yen to the dollar.

[26]Based on the Special Law on Public Finance, deficit financing bonds of 250 billion yen were issued in 1965 for the first time since World War II to cover the fiscal deficits resulting from the 1965 recession. This marked the end of the balanced budget principle which had prevailed since the economic stabilization plan by Joseph Dodge (the Dodge Plan) in 1949.

Japanese industrial structure underwent a substantial change after the first oil crisis. In the rapid growth period, heavy and chemical industrialization was the engine of the growth, wherein basic materials industries had been developed in tandem with processing and assembling industries (machine industries) through interindustrial linkages.[27] However, the sharp rise in energy prices changed this pattern greatly. Combined with the stagnation of domestic demand due to the falling growth rate, the development of basic industrial materials industries, such as aluminum smelting, oil refining, petrochemical, and iron and steel, stagnated and the profitability of these industries was significantly impaired.

Being a highly energy-intensive manufacturing industry, the aluminum smelting industry lost ground in Japan and was thrown into a process of large-scale structural adjustment.[28] In 1978, the aluminum smelting industry was designated as a structurally depressed industry under the Industry Stabilization Law.[29] The aluminum smelting capacity, which once peaked at an annual capacity of 1.64 million tons in 1978, was reduced, by scrapping plants, to 0.71 million tons a year in 1983.[30] Nippon Light Metals Co. Ltd. shut down its Tomakomai plant in Hokkaido, which had an annual capacity of 134 thousand tons at a peak. Due to sluggish demand from the construction industry (the mainstay industrial user), together with increasing imports of steel products, especially from Korea and Taiwan, the iron and steel industry also became stagnant in the 1980s.[31] Nippon Steel, the largest producer in the world with eight iron and steel making plants, drastically reduced its iron and steelmaking capacity in the 1980s and plans to close down some of the old blast furnaces, including one at Muroran in the Central Hokkaido Area.

On the contrary however, the performance of processing and assembling industries like electrical machinery and passenger automobiles was quite different. Less dependent on imported raw materials and blessed with further technological improvements, their international competitiveness has strengthened markedly and they have made rapid advances (though they included some depressed industries like shipbuilding). In other words, a structural change in the heavy and chemical industries occurred in such a way as to increase the proportion of processing and assembling industries. The Hokkaido economy, depending a great deal on basic materials industries, especially

[27]Kosai and Ogino (1984, p.60) attributed the development of heavy and chemical industries, not merely to the result of deliberate government policies, but to the following three factors: (1) abundance of skilled labor; (2) abundance of harbors and coastal areas suitable for the industries; and (3) relatively young capital stock which was maintained by a constant supply of new capital equipments embodying new technologies.

[28]For details of the structural adjustment in the aluminum industry, see Tanaka (1988) and Sheard (1991).

[29]Under the Industry Stabilization Law (one of four laws within the framework of the Law on Temporary Measures for Stabilization of Specified Depressed Industries which became effective in 1978), a total of 14 industries (including the aluminum smelting industry) were designated as depressed industries. They were shipbuilding, cardboard, open hearth and electric furnaces, continuous nylon fibers, discontinuous acryl fibers, continuous and discontinuous polyester, urea, ammonia, ferro-silicon, hydrous phosphoric acid, cotton spinning, worsted yarn spinning, and aluminum smelting. The Law, aimed at suspension or scrapping of capacity in the designated industries, expired in 1983 and was replaced by the Law on Temporary Measures for the Structural Improvement of Specified Industries (the Structural Improvement Law), in which the shipbuilding industry was dropped in the list and replaced by the petrochemical industry. For details of the Industry Stabilization Law and the related adjustment assistance measures, see Peck, Levin, and Goto (1987) and Sekiguchi and Horiuchi (1988).

[30]The amount of capacity to be scrapped was decided according to the Basic Stabilization Plan prepared under the Industry Stabilization Law. Before the Law, the Aluminum Industry Committee was established in 1975 within the Industrial Structure Council (MITI). The Committee prepared reports on measures to restructure the industry. In compliance with the Plan formulated on the basis of recommendations by the Committee, most of the smelting plants were closed down and some smelting companies shifted their operations overseas, thereby becoming importers of ingot. Despite the large-scale scrapping of capacity, however, the rate of capacity utilization declined during 1977-81 (from 73 to 58%). This contrasts with the other designated depressed industries which experienced a rise in the rate of capacity utilization during the same period.

[31]See, for instance, Industrial Bank of Japan (1984).

such declining industries as iron and steel, aluminum smelting, and oil refining, has thus been affected adversely by this change. As Table 13 illustrates, the manufacturing industry recorded a negative output growth during 1980-85, and this was due to a large output decrease in the basic industrial materials industries. Though there was a relatively high output growth in processing and assembling industries, it was not sufficient to cover the decrease.

The second factor was related to a change in the Japanese fiscal policy. Faced with revenue shortages after the first oil crisis, the government decided in 1975 to start issuing deficit financing bonds (*Akaji Kokusai*) to cover the fiscal deficit. At the same time, to recover from the recession the government adopted a radical stimulative policy, in which national bonds (*Kensetsu Kokusai*) were issued substantially to meet increased public works expenditures.[32] The total amount of national bonds issued (*Akaji Kokusai* plus *Kensetsu Kokusai*) grew rapidly and reached 10 trillion yen in 1978 (from 2.2 trillion yen in 1974), which was more than 30% of the total government revenue.

In order to cope with the situation, the government decided to start drastic administrative and fiscal reforms in 1981.[33] In line with these reforms, which aimed at reducing the fiscal deficit and stopping the issue of deficit financing bonds by the 1984 fiscal year, public works expenditures by the central government were completely frozen.[34] Highly dependent on the central government expenditures, the Hokkaido economy has thus been affected severely by this freeze. As Table 13 illustrates, the expansion of capital formation (DD3) turned negative for 1980-85, and this is due mostly to a radical cut in the public works expenditures. The construction industry, which relies heavily on public works investments, stagnated during the period and experienced a negative growth.

It should be noted that according to Table 14 private fixed capital formation also recorded a negative growth in the period (− 0.55% annually), and this contrasts sharply with Japan as a whole, in which private fixed capital formation experienced a relatively high growth (4.9% annually). Private fixed capital formation was, in fact, one of the major factors which sustained the stable growth for 1980-85 in Japan. On the contrary, as Table 13 indicates, the stagnation of private investments seems to have influenced adversely the manufacturing industry in Hokkaido (especially, industrial material industries).

4. Conclusions

The primary purpose of this study was, using Hokkaido prefecture as a case, to investigate the effect of regional characteristics and government policies on the growth of the regional economy. It has been found that the growth pattern of the Hokkaido economy changed conspicuously in the 1980s and this change was brought about, to a large extent, by a shift in the central govern-

[32]Under the easy monetary policy to stimulate domestic economy, the official discount rate was gradually lowered in 1975 to 6.5% from 9%. In 1977, it was again lowered to 4.25% and eventually dropped to 3.5%. The easy monetary policy was maintained until April 1979.

[33]In 1981, the Second Provisional Commission on Administration was established by the Suzuki cabinet to promote administrative and fiscal reforms. The reforms were however carried out extensively by the Nakasone cabinet which was formed in 1982.

[34]In the 1982 fiscal year, the zero ceiling method was introduced in the annual budget formulation to curb central government general expenditures. Furthermore, in the following fiscal year, the minus ceiling method was adopted, in which general expenditures were in principle cut by 5% (10% for consumption expenditure and 5% for capital expenditure from the 1984 fiscal year). Despite these radical measures however, the target of terminating the issue of deficit financing bonds by the 1984 fiscal year (set by the Suzuki cabinet) was not achieved. The Nakasone cabinet changed the target to the 1990 fiscal year and carried out a series of privatization programs including the Japan National Railways and Nippon Telegraph and Telephone. The ratio of national bonds to total government revenue dropped to 8.4% in 1990 from 34.7% in 1979.

ment's economic policies toward a smaller government. It should be noted also that heavy reliance on such declining industries as aluminum smelting, iron and steel, cement, paper and pulp, shipbuilding, sugar refining, and fertilizer has aggravated the economic condition in Hokkaido.

Since the first oil crisis, the Japanese economy has undergone a substantial structural change. In order to recover from the recession, while faced with revenue shortages, the central government was forced to issue a large amount of national bonds. But, plagued with chronic large public debt, the government started to restrain its expenditure growth with administrative and fiscal reforms. Public works expenditures were frozen in the first half of the 1980s. Dependent highly on public works expenditures, the Hokkaido economy has thus been severely influenced by this freeze. First, the construction industry has been affected directly and has recorded a large output decrease. Second, the industrial materials industries also became stagnant in Hokkaido, due in part to the sluggish construction industry. In Japan, most of the industrial materials industries lost ground owing to the sharp increase in energy prices and have undergone large-scale adjustments, centering on capacity reductions. This too had a negative impact on the Hokkaido economy.

A straightforward policy implication drawn from this observation is that in order to maintain the stable growth, Hokkaido needs to reduce the weight of its public investments. There are several ways to achieve this. First, Hokkaido should promote direct foreign trade with neighboring countries such as China, the Soviet Union, and North and South Korea. According to the regional I-O tables, international export ratio is very low. This means that there is an ample opportunity for the expansion of direct foreign trade. Second, it should also encourage interregional exports so as to reduce the regional balance of trade deficit, especially the large trade deficit in the manufacturing industry. It should be reminded that a large regional balance of trade deficit necessitates a large financial transfer from the central government. Third, it should specialize in those high-tech industries for which it has a comparative advantage domestically as well as internationally. Since Hokkaido is relatively abundant in natural resources and has a solid industrial base for the food processing industry, the bioindustry seems to be a good candidate for promotion. Fourth, it should facilitate a favorable investment climate for those manufacturing activities which conform to the pattern of comparative advantage. Finally, it should vigorously pursue import substitution policies for the manufacturing industry, although this should be done within the framework of comparative advantage. There seems to be large amount of unnecessary manufactured imports for which regionally produced goods could be substituted.

Of course, these are not mutually exclusive, but should be carried out simultaneously. Of great importance here is that public investments should be utilized effectively so as to encourage private investments which are conducive to the development of Hokkaido. Blessed with an extensive developable land area, Hokkaido needs, in this connection, to strive for an efficient spatial allocation of its economic resources.

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