1 New Trends of Regional Employment Creation

—A Study with Respect to Analyses on Regional Structure of Unemployment

1. Objective and Method of Study

Although there was a long-term recession in Japan following the burst of the bubble economy in 1990 having reached its worst level in 2002, Japan's economy is on a strong recovery trend and Japanese companies are facing a labor shortage. Areas clearly showing an economic recovery are metropolitan areas including Aichi Prefecture where favorable auto industries are collected, but many regional areas do not enjoy the benefits of economic recovery and the gap between metropolitan areas and regional areas are widening.

Japanese government has clearly specified the regional gap problem as one of important policy issues and the Ministry of Health, Labour and Welfare has also designated seven areas where the economic recovery is slow: Hokkaido, Aomori, Akita, Kochi, Nagasaki, Kagoshima and Okinawa, and is taking policy responses to enhance support measures for those areas. In response to changing such socioeconomic conditions, the project has conducted survey research from the viewpoint of industry/employment creation as well as analyzing unemployment structure.

In addition to analyses on regional structure of employment/unemployment, survey research methods taken to analyze current regional industry/employment creation are as follows:

At first, we analyzed regional structure of unemployment and employment by prefecture and by local authority in the past 20 years based on macro data such as "census statistics" and "corporation statistics".

In tandem with such macro data analysis, we carried out a questionnaire survey of local municipalities. There were two kinds of questionnaire survey: one is of local municipalities which have been designated as industrial or employment-related special zones for one year and another one is of other municipalities. In the former case, we surveyed the employment creation effect. In the latter case, we surveyed what organization plans and implements the employment creation measures. In addition, in tandem with such macro data analysis and questionnaire survey, we conducted hearings with prefectures, local municipalities, companies entering into local areas and local companies.

2. Current Regional Employment Conditions

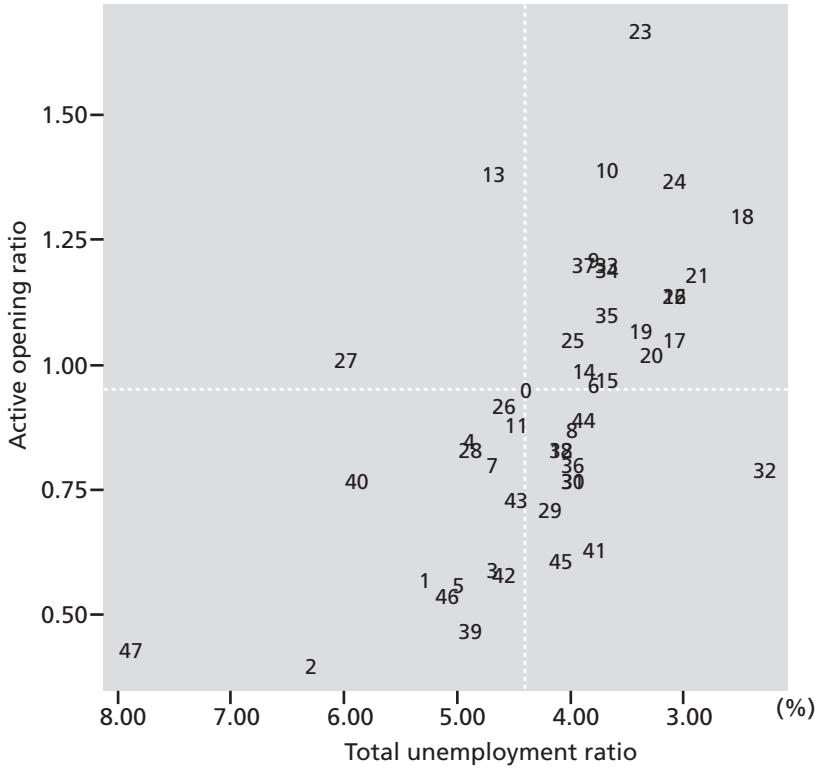
A. Regional Characteristics from the Viewpoint of Labor Supply and Demand

Since 1990, Japanese economy has been exposed to drastic changes accompanied by structural changes. Asset deflation caused by the collapse of bubble economy centered on land speculation triggered serious and long Japanese economy recession. Moreover, increased direct investment to China and other foreign countries since 1990s rapidly reduced domestic plants and workers and there was a big issue about "hollowing-out" of domestic manufacturing. Japanese economy rapidly weakened due to asset deflation and hollowing-out of domestic manufacturing caused by globalization and the unemployment rate which was about 1 to 2% before showed a sharp rise.

Total unemployment rate in 1990 was 2.1%, showed a gradual rise after that and swelled to 4.1% in 1998 when Yamaichi Securities Company, Limited, one of four major Japanese securities companies at that time, ran into financial difficulty and financial instability emerged. The unemployment rate continued to grow and swelled to 5.4% in 2002 when IT recession emerged.

Many companies faced three excesses; facilities, debts and employment, and therefore they took massive restructuring including job cuts and changed employment practices such as lifetime employment system and seniority system. Many companies introduced performance system, a personnel-system reform which emphasizes short-term performance evaluation.

Figure 1-1 Total unemployment ratio and active opening ratio by prefecture in 2005



0 Nation	16 Toyama	32 Shimane
1 Hokkaido	17 Ishikawa	33 Okayama
2 Aomori	18 Fukui	34 Hiroshima
3 Iwate	19 Yamanashi	35 Yamaguchi
4 Miyagi	20 Nagano	36 Tokushima
5 Akita	21 Gifu	37 Kagawa
6 Yamagata	22 Shizuoka	38 Ehime
7 Fukushima	23 Aichi	39 Kochi
8 Ibaragi	24 Mie	40 Fukuoka
9 Tochigi	25 Shiga	41 Saga
10 Gunma	26 Kyoto	42 Nagasaki
11 Saitama	27 Osaka	43 Kumamoto
12 Chiba	28 Hyogo	44 Oita
13 Tokyo	29 Nara	45 Miyazaki
14 Kanagawa	30 Wakayama	46 Kagoshima
15 Niigata	31Tottori	47 Okinawa

Sources: Total unemployment ratio is from "Labor Force Survey" by Ministry of Internal Affairs and Communications. Active opening ratio is from "Report on Employment Service" by Ministry of Health, Labour and Welfare
Note: Some prefecture numbers on the upper right (37, 9, 33, 34, 16, 22) are overlapped.

Although employment and unemployment conditions were getting worse due to globalization, advance of IT and technologic innovation and personnel-system reforms such as restructuring and performance system, Japanese economy bottomed in 2002 and has gradually restored economic growth. Reduced government regulations and companies' restructuring have begun to exert their effects since 2003.

Many companies settled above three excesses and achieved a rapid earnings recovery. The main reason is a drastic cost reduction to rapidly lower their breakeven point. The rapid earnings recovery has encouraged capital investment and new domestic plants have been built even in manufacturing industry in which "hollowing-out" was a concern.

Table 1-2 Percentages of employees by industry between regions with difficult and favorable employment conditions in 2004

(%)

	agriculture, forestry and fishery	Mining	Building	Manufacturing	Electricity, gas, heat supply and water	Information and telecommunications	Traffic	wholesale and retail trade	Finance and insurance	Real estate	restaurants and lodging	medical and welfare	Education and learning assistance	Combined service	Services (others)
National average	0.4	0.1	8.4	19.1	0.4	2.7	5.4	23.5	2.7	1.9	9.3	8.0	2.6	0.7	14.9
Difficult regions average	1.2	0.2	11.3	11.9	0.4	1.5	5.6	25.1	2.8	1.6	9.9	10.5	2.1	1.3	14.7
Hokkaido	1.4	0.2	11.4	10.3	0.4	1.8	6.3	24.9	2.7	1.9	10.1	9.2	2.1	1.2	16.1
Aomori	1.2	0.2	12.6	13.2	0.4	0.9	5.4	26.0	3.0	1.3	9.0	9.6	1.9	1.4	14.3
Akita	0.9	0.3	12.8	19.5	0.3	1.0	4.6	23.8	2.5	0.8	8.1	9.1	1.4	1.5	13.4
Kochi	0.8	0.3	10.8	11.6	0.4	1.3	4.6	26.4	3.0	1.2	10.4	12.9	1.9	2.1	12.4
Nagasaki	1.2	0.1	10.4	12.8	0.4	0.9	5.2	25.7	3.0	1.3	9.3	13.0	2.1	1.2	13.3
Kagoshima	1.6	0.2	10.5	14.6	0.4	0.9	4.8	24.6	2.7	1.0	9.3	12.9	2.3	1.7	12.5
Okinawa	0.4	0.1	10.4	6.1	0.5	2.5	5.3	25.5	2.5	2.4	13.6	11.0	3.1	0.7	16.1
Favorable regions average	0.5	0.1	8.8	26.1	0.4	1.2	5.1	22.1	2.4	1.2	8.4	7.6	2.0	0.9	13.1
Gunma	0.4	0.1	8.5	28.5	0.3	1.0	4.8	21.4	2.2	1.3	8.5	7.3	1.8	0.8	13.0
Tochigi	0.5	0.2	8.5	27.3	0.3	1.0	4.7	21.0	2.1	1.2	8.5	7.1	2.4	0.7	14.6
Shizuoka	0.3	0.1	7.7	29.9	0.4	1.1	5.3	20.5	2.3	1.4	9.0	6.2	2.1	0.7	13.1
Gifu	0.5	0.1	9.0	27.5	0.2	0.9	4.0	22.3	2.4	1.1	9.4	6.8	2.2	1.0	12.5
Mie	0.7	0.1	8.5	28.0	0.4	0.8	5.3	21.1	2.2	1.1	8.6	7.3	1.9	1.0	12.7
Toyama	0.7	0.2	10.7	27.1	0.7	1.3	4.7	21.4	2.4	0.9	7.3	7.3	1.5	1.0	12.8
Fukui	0.3	0.1	11.2	25.0	0.9	1.4	4.6	22.4	2.5	0.8	8.3	7.7	1.5	1.2	12.0
Okayama	0.4	0.1	9.2	22.8	0.4	1.6	6.3	23.3	2.6	1.2	7.2	9.8	2.1	1.0	12.1
Hiroshima	0.5	0.1	8.8	20.0	0.5	1.8	5.8	24.8	2.7	1.5	7.8	8.9	2.3	0.7	14.0
Kagawa	0.5	0.1	9.8	19.4	0.6	1.4	5.5	25.3	3.0	1.4	8.3	8.8	1.9	0.9	13.0

Source: "Establishment and Enterprise census in 2004" by Ministry of Internal Affairs and Communications

Such economic recovery and sustained strong economic performance turned around employment and unemployment conditions. In December 2005, the active opening ratio became higher than 100%, 103%, and the labor market has been improved. However, there has been a wide gap of the labor market between regions.

Figure 1 shows a correlation between total unemployment ratio and active opening ratio by prefecture in 2005 and tells that there is a regional disparity on employment and unemployment conditions. Aichi, Mie, Gunma, Fukui, Gifu, Tochigi, Okayama, Hiroshima, Toyama, Shizuoka and Kagawa are placed on the upper right of the figure where employment conditions are favorable (low total unemployment ratio and high active opening ratio). Employment conditions in Chukyo/Tokai centered on Aichi, Kitakanto, Hokuriku and Sanyo regions have been largely improved.

On the other hand, Okinawa, Aomori, Kochi, Hokkaido, Fukuoka, Nagasaki, Kagoshima, Akita and Iwate are placed on the lower left of the figure where employment conditions are the worst (high total unemployment ratio and low active opening ratio). There are many regions with difficult employment conditions in Hokkaido, Tohoku, Shikoku and Kyushu. Thus there is a regional disparity on employment and unemployment conditions and the economy recovery has not spread across a wide area.

Such regional disparity is largely caused by uneven distribution of industries. Table 1 verifies differences of regional industrial structures and compares the percentage of employees by industry between regions with difficult and favorable employment conditions except metropolitan areas.

Looking at percentages of total employees in difficult and favorable regions, industries with high percentage in the difficult region are agriculture, forestry and fisheries (0.7 percentage points), construction (2.5 percentage points), wholesale and retail trade (3.0 percentage points), eating and drinking place, accommodations (1.5 percentage

Table 1-3 Year-to-year comparison of the number of employees by industry

(%)

Term		Total industry	Construction	Manufacturing	Wholesale and retail trade	Medical, healthcare and welfare	Other Services
2003	I	-0.1	0.0	-0.6	-0.1	0.3	-0.1
	II	0.3	-0.3	-0.6	-0.2	0.8	0.0
	III	-0.2	-0.4	-0.1	0.0	0.4	0.0
	IV	0.3	-0.2	-0.2	-0.1	0.6	0.0
2004	I	0.4	-0.3	-0.6	0.1	0.7	0.4
	II	0.7	0.0	-0.4	-0.3	0.3	0.9
	III	0.4	-0.4	-0.3	-0.1	0.6	0.6
	IV	0.1	-0.6	-0.6	-0.1	0.6	0.6
2005	I	0.0	-0.5	-0.4	0.2	0.3	0.3
	II	0.7	-0.2	-0.2	0.1	0.6	0.5
	III	0.9	-0.3	-0.2	0.1	0.3	0.9
	IV	1.3	-0.4	0.3	0.1	0.2	0.8

Source: "Labor Force Survey" by the Bureau of Statistics of Ministry of Internal Affairs and Communications

points), medical, health care and welfare (2.9 percentage points), services (not elsewhere classified) (1.6 percentage points), etc. On the other hand, an industry with high percentage in the favorable region is manufacturing (14.2 percentage points) only.

For this reason, it may be no exaggeration to say that the industrial structure difference between difficult and favorable regions from the viewpoint of the number of employees is a difference of the percentage of manufacturing industry. In regions with difficult employment conditions, the share of manufacturing industry is low but the share of tertiary industries such as wholesale and retail trade, eating and drinking place and accommodations, services (not elsewhere classified) and the share of government-dependent industries such as construction related to public investments and medical, health care and welfare related to medical and nursing insurances are high.

B. Employment Recovery in Manufacturing Industry

The industrial structure difference between regions with difficult and favorable employment conditions was largely caused by a difference of the percentage of manufacturing industry, and even recent employment recovery is largely influenced by manufacturing industry.

As Japanese economy bottomed in 2002 and is back on a track to recovery, employment which had decreased for more than 10 years has recently increased. Looking at a trend in the number of employees since 2002, it bottomed in 2002 and has increased year by year. Job openings for recent high school graduates which had drastically decreased also bottomed in 2003 and have increased.

Moreover, looking at a trend in the number of employees by industry since 2003 (on a year-to-year comparison; see Table 2), it has continued to rise on a year-over-year basis in total industry since the period of October to December 2003. The service industry shows the most prominent increasing tendency followed by medical, health care and welfare. In the former case, the employment has increased in line with increase of service economy, but in the latter case, medical, health care and welfare, the employment has increased by introducing a nursing insurance system and sweeping relaxation of regulations.

Under such circumstances, manufacturing industry which had consistently decreased the number of employees increased it in the period of October to December 2005 and largely contributed to

Table 1-4 The number of employees and value-added amounts of manufacturing industry

Industry	Number of employees			Value-added amount (2005)	
	2005	Compared with 2003 (%)	Composition ratio (%)	Compared with 2003 (%)	Composition ratio (%)
Total manufacturing	8,534,938	-1.4	100.0	5.4	100.0
Food	1,132,379	-2.4	13.3	-2.4	8.1
Beverage, cigarette and feed	107,557	-4.7	1.3	-4.8	2.8
Textile, apparel and fiber products	440,107	-12.5	5.2	-12.2	2.0
Timber, wood product and furniture	301,704	-6.9	3.5	-5.5	1.9
Pulp, paper and paper converting	217,480	-4.8	2.5	-2.5	2.5
Printing	370,389	-5.8	4.3	-3.3	3.2
Chemical, petroleum and coal products	367,637	-1.1	4.3	0.6	11.4
Plastics (other than noted elsewhere)	450,450	0.9	5.3	7.1	4.2
Rubber products	128,433	1.9	1.5	2.3	1.3
Ceramic, soil and stone products	309,239	-5.7	3.6	-1.2	3.6
Steel	216,377	2.7	2.5	44.4	5.9
non-ferrous metal	135,380	1.2	1.6	22.5	1.8
Metallic products	709,726	-1.1	8.3	0.5	5.9
Machinery	1,028,432	4.0	12.0	15.6	11.6
Electric equipment	567,637	-2.7	6.7	4.3	6.3
Info-communications equipment	206,777	-9.3	2.4	4.1	3.1
Electronic parts/devices	494,457	-1.7	5.8	9.4	6.5
Machines for export	953,807	7.3	11.2	5.9	14.4
Precision machines	156,921	-2.0	1.8	5.8	1.6
other manufacturing	240,049	-3.7	2.8	5.4	2.0

Source: "Establishment and Enterprise Census Report" by the Bureau of Statistics of the Ministry of Internal Affairs and Communications

favorable turn of the labor market. Construction industry, however, has continued to show a decreasing trend due to cost reduction for public works caused by financial difficulties.

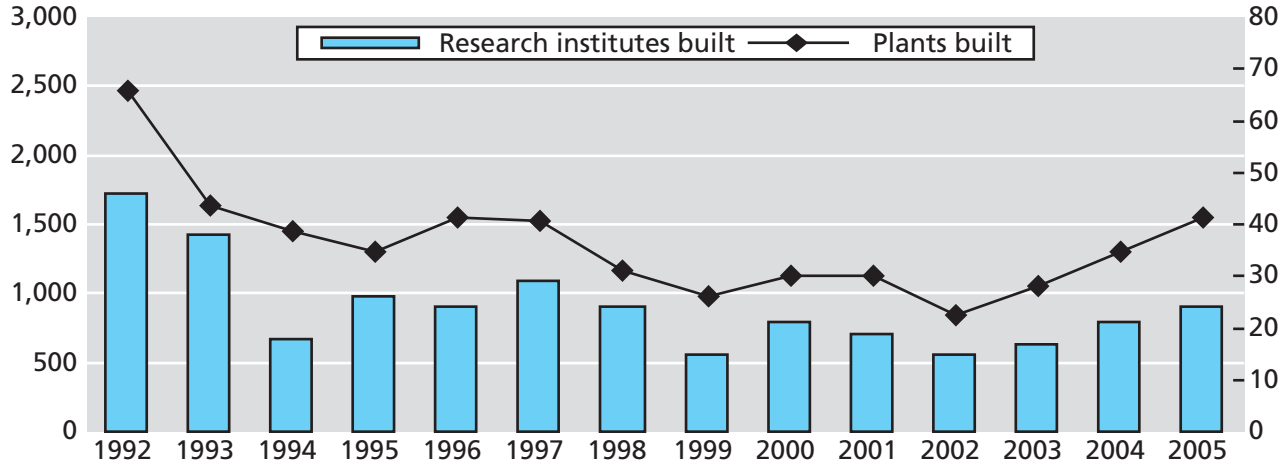
Looking at resurgent manufacturing industry from the viewpoints of the number of employees and value-added amounts (see table 3), it is polarized between industries showing a contractive tendency and returning to a growth track. The former matured and weakened industries are textile, lumber, etc., and industries returning to a growth track are steel, nonferrous metal, machinery, electronic parts, transport equipment, etc.

The matured and weakened industries such as textile and lumber have decreased both the number of employees and value-added amounts and are less competitive in price against products imported from Asian countries including China, and it is impossible to restrain the contractive tendency. The general management strategy is to survive in the field of small-lot productions such as high quality goods and luxury grocery items, not mass-produced goods.

On the other hand, industries returning to a growth track have achieved a large growth with value-added amounts and some have increased the number of employees. Steel, nonferrous metal, machinery and transport equipment industries have increased both the number of employees and value-added amounts. These industries are all strongly-related to car industry, thus there is an inter-industrial relationship mechanism that the increased car production has increased production of related equipment and parts.

Specifically, the inter-industrial relationship on increased car production requires the steel industry to increase production of high-tensile steel plates for

Figure 1-5 Trend of the number of built domestic plants and research institutes



Source: "Plant Location Trend Survey" by Ministry of Economy, Trade and Industry

automotive body and the nonferrous metal manufacturing industry to increase production of special steel to be used for underbody. The car industry itself also requires the machinery manufacturing industry to increase production of machine tools to actively make capital investments for increased production. These industries have returned to a growth track by such car production-led inter-industrial relationship.

Meanwhile, both car and electronics industries are Japan's major export industries, but the electronics industry has not increased the growth potential unlike car industry. The electronics industry such as electric machines, info-communications equipment and electronic parts are still showing a decreasing trend of the number of employees and the growth rate of value-added amounts is not very high except electronic parts.

In the electronic industry, there are strong competitors, South Korea, Taiwan and China, and the price competition is very severe in a large area of products. Therefore, except electronics parts maintaining a strong position in capacity for technologic development and share of the market, the profit has not increased very much unlike increased production. Instead companies which were too late to cost reduction are operating deep in the red even though the production has increased.

C. Manufacturing Industry's Return to Home

As shown above, recent employment recovery is largely caused by manufacturing industry's increased employment after its decline as well as increased employment in sustainable service industry. The employment recovery in the manufacturing industry is largely influenced by a strong trend of building new domestic plants, not overseas as well as facility expansion of existing plants. In addition, not only plants but also new research institutes have been actively built.

Figure 2 shows a trend of the number of built domestic plants and research institutes. The number of built plants had drastically decreased since 1992, bottomed in 2002 and has increased after that. The number of research institutes has also increased since 2002 after its decline though its decreasing trend was unlike plants.

Although an employment-creating effect by building new research institutes is limited, the building of new plants is highly likely accompanied by a large employment-creating effect and highly likely turns around regional employment at a stretch. As a result of a newly built Toyota Motors' assembly plant in Kyushu, 3,000 persons were newly employed. In addition, many car-associated parts manufacturers have entered into the periphery of the plant. There has been a great ripple effect of car plants.

Such trends of plants and research institutes returning to home are largely influenced by highly-developed and accelerated technologic innovation and product development. If we can afford to spend certain time for technologic innovation and product development, a system to separate development from production e.g., development in Japan and mass production in foreign plants such as China is effective.

As above, quality and quantity of required labor force greatly differ depending on businesses even in manufacturing industry. The increased regional employment depends heavily on what type and which companies or plants to be invited. If an assembly plant mass-producing digital electronic products is invited, irregular employments such as contract and temporary employments will have a high proportion of increased labor force. In addition, prices of products rapidly decline due to rapid technologic innovation and intensified international competition and therefore it is highly possible that merger, abolishment or overseas transfer of plants happens quite often. Therefore, it is unlikely that this type of plant invitation secures stable job opportunities in the region.

On the other hand, an invitation of machining plants and assembly plants for complex products has a smaller risk such as merger, abolishment and transfer of plants, an increased regular employment is expected and it is highly possible that this provides stable job opportunities in the region. If educational institutions such as universities, technical colleges and industrial high schools and job training institutions can establish a structure which responds appropriately to technological and personnel needs of companies moving into the region, it is highly possible that this promotes increased employment by inviting companies and plants.

In this section, regional differences of unemployment and employment rates by prefecture which control population attributes such as sex and age and attributes on labor supply and demand such as academic background and industrial structure were measured, and the factors causing such differences were examined by a basic technique. The results are summarized as below:

i. Nominal differences of regional unemployment rate showed a trend of expansion from 1990 to 2000. However, regional differences which control regional labor supply and demand greatly narrowed in both 1990 and 2000 and it showed that regional differences have narrowed over a decade. Especially, regional differences of industrial structure tell many of dispersions of prefectural differences.
ii. As for differences of regional unemployment rate after the control, the effect of regional characteristics was largely controlled in 1990, but in 2000 after the collapse of bubble economy, regional differences of actual wages and unemployment rate due to regional declining demand have widened.
iii. Prefectural differences of non-labor force rate after removal of population attribute are strongly correlated with differences of unemployment rate after control. It is recognized that in regions with a higher unemployment rate or regions where the unemployment grew over the decade, "job-seeking demotivation effect", an effect of letting job seekers give up job-seeking activities in the labor market, is greater.
iv. As far as young people's job-seeking demotivation effect, there was no clear relationship between regional unemployment conditions and a rate of young people Not in Education, Employment or Training (NEET) in 1990, but it was recognized that the higher the unemployment rate was in the region after control, the higher the rate of NEET became in 2000. This trend is stronger in regions where the unemployment rate grew over the decade. The worse the labor market condition becomes, the more the young people become NEET.

Analysis results in this section that regional differences of unemployment rate greatly narrow after removal of the effect of labor supply and demand attribute indicate that Japan's regional unemployment issues arise from "regional characteristics", uneven distribution of labor force and industries, and it means that employment measures based on the situation in each region are necessary to solve regional employment issues.

3. Attribution analysis of prefectural differences of unemployment

According to public statistics counted by region, employment and unemployment conditions in each region show cyclic fluctuation repeatedly and the level of the differences continues to be flat. There are structural regional differences. In this section, regional differences of unemployment and employment rates by prefecture which control population attributes such as sex and age and attributes on labor supply and demand such as academic background and industrial structure were measured, and the factors causing such differences were examined by a basic technique.

A. Effect of labor supply and demand attributes

At first, estimate the following linear unemployment rate function before measuring prefectural differences of unemployment rate:

$$u_i = \alpha_0 + \alpha_1 X + \alpha_2 D_i + \varepsilon_i \quad \cdots\cdots\cdots\cdots \quad (1)$$

Where u_i is averaged unemployment rate of Group i calculated by labor force conditions by residential prefecture, sex, age and academic background, X_i is labor supply and demand attributes of the group (female dummy, age dummy, academic background dummy and percentage of employees by industry in each group), D_i is prefecture dummy, α_0 is constant term and ε_i is error term.

Explanatory variables used here are as follows: for age group, a dummy variable consisting of five categories, 15 to 24 years old, 25 to 34 years old, 35 to 54 years old, 55 to 64 years old and 65 years old or older, is used. The academic background dummy consists of four categories, elementary school and junior high school graduates, high school graduates, junior college and technical college graduates and university and graduate school graduates. The percentage of employees by industry in employees of each group is introduced as an index of regional differences of labor demand structure. Specifically, the ratio of employees in manufacturing industry is used as an index of low labor turnover rate and tight labor market and the ratio of employees in service industry and the ratio of employees in wholesale and retail trade and restaurants are used as a factor of high labor turnover ratio and to be likely to occur frictional unemployment.[1]

Data used for estimation are from census figures in 1990 and 2000 which can calculate prefectural unemployment rate by sex, age and academic background.[2] Since public statistics of census figures do not clearly specify academic background and labor force conditions of students in schools, samples are limited to graduates.[3]

By estimating the unemployment rate function in Formula (1) by the method of least squares, the estimation coefficient dispersion of the prefecture dummy can be considered as prefectural differences

Table 1-6 Prefectural differences of unemployment rate (WASD)

Removed variable	1990	2000
Full-Control	1.830	0.571
Age	1.711	3.776
Sex	6.079	9.343
Academic background	7.024	9.022
Industry	9.344	12.940
No-Control	9.322	12.905

Note: See this paper and Footnote 7 for more details on Weight Adjusted Standard Deviation (WASD)

1 Looking at the correlation between active opening ratio and the composition ratio of industrial employees by prefecture and age in 1990 and 2000,the ratio of manufacturing industry shows a significant correlation with active opening ratio in both years (0.516 in 1990 and 0.323 in 2000), but there is no significant correlation with the ratio of service industry. Although the ratios of wholesale and retail trade and restaurants show a sequential correlation with active opening ratio, industrial job turnover is high and the effect on increasing or decreasing unemployment rate is uncertain. However, there is a critical opinion against the effect of industrial structure on static regional differences (*Sotodate*, 1999). This section will only discuss the effect of industrial structure on unemployment rate by definition with industrial tight labor market and job turnover.

2 Therefore, the sample size per one survey year is: 47 (prefectures) ×2 (sexes) ×5 (age categories) ×4 (academic background categories)=1,880.

3 Missing samples of students in schools hold 1.4% in 1990 and 1.6% in 2000. By limiting samples, national average of unemployment rate slightly increases from 3.01 to 3.01% in 1990 and from 4.72 to 4.80% in 2000.

Table 1-7 Differences of unemployment rate between prefectures

	1990			2000			Changes over a decade	
	Real difference	Estimation 1	Estimation 2	Real difference	Estimation 1	Estimation 2	Real difference	Estimation 2
Hokkaido	0.62	0.47	-1.06	0.05	0.08	-1.42	-0.57	-0.36
Aomori	1.46	1.11	0.29	0.66	0.56	-0.19	-0.80	-0.48
Iwate	-0.39	-0.56	-0.37	-0.74	-0.78	-0.59	-0.35	-0.21
Miyagi	-0.28	-0.31	-0.81	0.18	0.17	-0.67	0.46	0.15
Akita	-0.30	-0.12	-0.22	-0.46	-0.33	-0.61	-0.15	-0.39
Yamagata	-1.28	-1.20	-0.41	-1.43	-1.41	-0.33	-0.15	0.08
Fukushima	-0.60	-0.68	0.08	-0.48	-0.56	0.35	0.12	0.27
Saitama	-0.34	-0.12	0.67	-0.01	0.10	0.69	0.33	0.02
Chiba	-0.35	-0.13	-0.12	-0.02	0.15	-0.45	0.33	-0.33
Tokyo	0.10	0.25	-0.68	0.14	0.31	-1.13	0.04	-0.46
Kanagawa	-0.03	0.32	0.33	0.11	0.33	-0.24	0.14	-0.57
Ibaragi	-0.64	-0.71	0.27	-0.51	-0.57	0.62	0.13	0.35
Tochigi	-0.76	-0.95	0.24	-0.64	-0.78	0.60	0.11	0.36
Gunma	-0.56	-0.76	0.36	-0.64	-0.85	0.70	-0.08	0.35
Yamanashi	-0.60	-0.65	0.80	-0.97	-0.98	0.64	-0.36	-0.16
Nagano	-1.29	-1.39	0.28	-1.67	-1.93	0.11	-0.38	-0.17
Niigata	-1.00	-1.13	-1.08	-0.91	-1.03	-0.77	0.09	0.31
Toyama	-1.03	-1.03	-0.36	-1.32	-1.64	-0.36	-0.29	0.00
Ishikawa	-0.76	-0.94	-1.06	-1.10	-1.22	-0.91	-0.34	0.15
Fukui	-1.13	-1.34	-0.21	-1.69	-2.05	-0.61	-0.56	-0.40
Gifu	-0.98	-1.25	-0.27	-1.03	-1.37	0.22	-0.05	0.49
Shizuoka	-0.66	-0.89	0.09	-0.97	-1.28	0.38	-0.31	0.29
Aichi	-0.55	-0.69	0.07	-0.07	-0.90	0.39	-0.15	0.32
Mie	-0.42	-0.76	-0.07	-0.89	-1.17	0.02	-0.47	0.08
Shiga	-0.86	-0.88	0.53	-1.08	-1.14	1.06	-0.22	0.53
Kyoto	-0.15	-0.11	-0.27	0.22	0.37	0.29	0.37	0.56
Osaka	1.24	1.27	0.88	2.34	2.29	1.93	1.11	1.05
Hyogo	0.33	0.37	0.33	0.65	0.75	0.95	0.32	0.62
Nara	-0.15	0.17	0.27	0.23	0.71	1.02	0.38	0.75
Wakayama	0.41	-0.06	-0.22	0.20	0.03	-0.07	-0.21	0.15
Tottori	-0.54	-0.51	0.15	-1.19	-1.57	-0.83	-0.65	-0.98
Shimane	-1.07	-1.31	-1.18	-1.81	-2.22	-2.13	-0.74	-0.95
Okayama	-0.08	-0.08	0.63	-0.40	-0.41	0.43	-0.32	-0.20
Hiroshima	-0.46	-0.51	-0.25	-0.46	-0.47	-0.27	0.00	-0.02
Yamaguchi	-0.18	-0.28	-0.26	-0.69	-0.78	-0.69	-0.52	-0.43
Tokushima	0.87	0.82	1.21	0.15	0.16	0.80	-0.72	-0.41
Kagawa	0.09	0.15	0.18	-0.02	-0.07	0.20	-0.10	0.02
Ehime	0.64	0.50	0.86	0.25	0.22	0.61	-0.39	-0.25
Kochi	1.74	1.26	0.12	0.57	0.31	-0.91	-1.17	-1.03
Fukuoka	1.48	1.66	0.42	1.17	1.36	-0.05	-0.31	-0.47
Saga	-0.26	-0.40	-0.59	-0.32	-0.26	-0.49	-0.07	0.10
Nagasaki	0.48	0.23	-1.04	0.10	0.14	-1.23	-0.38	-0.19
Kumamoto	0.17	0.19	-0.30	-0.32	-0.13	-0.69	-0.49	-0.40
Oita	0.32	0.43	-0.02	-0.30	-0.23	-0.63	-0.62	-0.61
Miyazaki	0.36	0.23	-0.29	0.24	0.28	-0.45	-0.12	-0.16
Kagoshima	0.37	0.50	-0.03	0.16	0.22	-0.58	-0.21	-0.55
Okinawa	4.73	4.04	1.58	4.71	4.12	1.43	-0.02	-0.15

Notes: 1) Difference means the difference from national average weighted by labor force population (unit: %).
2) Real difference is a difference from national average of unemployment rate by prefecture except students in schools.
3) Sex, age and academic background dummies are controlled in Estimation 1. Industrial employees composition ration is controlled as well as Estimation 1 in Estimation 2.

of unemployment rate. In this case, differences when using all explanatory variables (full-control), when either one of explanatory variables is missed and when using a prefecture dummy only (non-control) are compared. Weight Adjusted Standard Deviation (WASD) adjusted by labor force population share in each region was used as an index of the estimation coefficient dispersion of the prefecture dummy.[4] Calculation results are shown in Table 4:

Looking at WASD of No-Control, it was 9.322 in 1990 and 12.905 in 2000 showing that recent regional differences of unemployment was large. However, looking at Full-Control removing all effects of labor supply and demand attributes, it was 1.830 in 1990 and 0.571 in 2000 showing that controlled regional differences largely narrowed in both years (reduction rate of standard deviation was 80.4% in 1990 and 95.6% in 2000). In addition, results of Full-Control showed that recent regional differences of unemployment were narrower than before.

Combined with Table 4, it is understood which variables have an impact on regional differences. In 1990, the standard deviation became largest when the percentage of employees by industry was removed from Full-Control, followed by academic background, sex and age dummies in order. The impact of industrial structure variables was also largest in 2000, but followed by sex, academic background and age dummies in order. It tells that the impact of academic background attribute on narrowed regional differences weakened. This may be reflection on recently narrowed differences of unemployment rate between academic backgrounds due to high unemployment rate of highly-educated people such as graduates of universities and graduate schools.

B. Level of controlled differences

Table 4 shows that many of nominal differences of unemployment rate are caused by regional differences of labor supply and demand structure. It should be noted that when removing industrial structure factors, the regional differences largely narrow. Therefore, the level of regional differences of unemployment rate is examined when controlling sex, age and academic background (Estimation 1) and adding the percentage of employees by industry to explanatory variables with it (Estimation 2) as below. Since Estimation 1 and 2 normalize variables of estimated regional dummies (based on Nagano's lowest unemployment rate), the difference from averaged value weighted by prefectural labor force population.[5] The calculation results are shown in Table 5.

Looking at differences after removing the effect of labor supply attribute (Estimation 1), among younger people and people who are not highly educated, and in regions where unemployment rate is relatively higher, differences of unemployment rate after control is narrower than real differences. For instance, the real unemployment rate in Aomori in 1990 was 1.46 percentage points higher than national average, but after controlling the effect of raising net unemployment rate caused by sex, age and academic background factors, the differences narrow by about 0.3 percentage points. On the other hand, in Tokyo, Osaka, Fukuoka and their surrounding regions, since there are many younger people and highly-educated people who push unemployment down, the differences after control widen as a result. In the case of Tokyo in 1990, the real differences were 0.10 percentage points and differences after control became 0.25 percentage points.

According to the result of Estimation 1, there are still many regions where the difference from national average is more than 1 point. Estimation 2 shows differences of unemployment rate when controlling the effect of reducing unemployment rate by the ratio of manufacturing industry and the effect of increasing unemployment rate by the ratio of tertiary industry

4 WASD $= [\Sigma_j(s_j\beta_j - \Sigma_j s_j\beta_j)^2 - \Sigma_j s_j\delta_j^2]^{\frac{1}{2}}$ This is a difference index used heavily for positive analysis of wage differences between industries. s_j is a labor force weight of Prefecture j, β_j is an estimate constant and δ_j is a standard error. In this section, covariance between variables are not considered as same as *Krueger and Summers (1988)* who analyzed wage differences between industries.

5 The regional difference is calculated as $d_i = \hat{\beta}_i - (\Sigma_j s_j\hat{\beta}_j)$ where d_i is a difference of unemployment in Prefecture i and $\hat{\beta}$ is an estimate constant of the regional dummies. The second term of the right-hand side is a prefectural labor force weight (s_j) showing an average of weighted regional dummy coefficient.

(wholesale and retail trade, eating and drinking place, and other services). According to the result, in regions where there are relatively more employees in the manufacturing industry and fewer employees in the tertiary industry, the unemployment rate after control increases. For instance, in the case of Aichi where manufacturing industries centered on car industry are accumulated and labor demand is strong (in 2000), the differences from averaged unemployment rate before and after controlling the industrial structure were -0.90 and 0.39 respectively, and the difference between them, 1.29, is considered as decreased unemployment rate due to slide towards manufacturing industry. Such trend is especially shown in Kitakanto, Koshin and Tokai regions, Yamagata and Fukushima in Tohoku regions, Shiga, Chugoku region (except Shimane and Yamaguchi) and Shikoku region (except Kochi) in western Japan.

On the other hand, in regions which are largely biased toward tertiary industry such as wholesale and retail trade, eating and drinking place, and other services, there is an effect of increasing unemployment rate by the industrial structure and the differences after control narrow as a result. Particularly, Okinawa where the ratio of employees in manufacturing industry is the lowest and the ratio of service industry is the highest in the nation strongly shows this trend. By controlling a relative slide towards tertiary industry, the difference from national average becomes less than half. Those regions have metropolitan areas which are centers of the surrounding areas such as Hokkaido, Miyagi, Tokyo, Kyoto, Osaka and Fukuoka. Other regions, Aomori, Kochi and prefectures in Kyushu, also have an effect of increasing unemployment ratio caused by industrial structure. It is believed that the slide towards tertiary industry generates structural and frictional unemployment caused by a large turnover average by definition of the analysis. It may be important for such regions to strengthen matching functions through job placement services as one of measures to decrease regional unemployment rate.

C. Correlation with Other Regional Characteristics

As above, it was considered that regional differences greatly narrow when controlling the labor supply and demand structure. However, this section's approach considers regional dummies only and does not clarify detailed regional factors. As shown in Table 5, there are some regions where differences between 1990 and 2000 after control widened. It is also necessary to consider the factor.

Therefore, we will consider correlations between controlled regional differences and various regional attributes which are not considered yet. As regional economic indicators, we will consider (i) a difference between the growth rate of real gross prefectural product per capita (natural logarithm) and the growth rate of real GDP per capita (%) in the previous five years, (ii) difference from the national average of growth rate of Industrial Production Index in the previous five years (%), (iii) a difference from the national average of "real" minimum wage by region revised in last October (natural logarithm)[6], (iv) a yearly moving-in excess rate based on total prefectural population weighted by the prefectural population (%), (v) a difference between the prefectural employees ratio by industry and natural average ratio (specialization coefficient) and (vi) Hirshman-Herfindhl index which indicates the degree of specialization of industrial structure compared

6 Regional Difference Index of Consumer Prices (nation total = 100) except imputed rent from "Nationwide Price Statistics Survey" by the Ministry of Internal Affairs and Communications in 1987 and 1997 was used to calculate regional real minimum wages. However, it is arguable that how much regional minimum wages have an impact on the labor market. In fact, according to *Abe (2001)*, although there is a sequential correlation between regional minimum wages and part-time workers' averaged wages, the difference between part-time workers' wages and minimum wages are dependent heavily on the prefecture, especially among D-ranked prefectures where the minimum wages are the lowest. In this section, therefore, minimum wages are used as a surrogate index of regional differences of averaged wages, not a variable to be politically controlled.

with national average.[7]

Since the number of pages is limited, we only introduce regional variables which show a significant correlation with regional differences after control at the level of 5%.

As for differences of the growth rate of per-capita real GDP, the correlation coefficient between the economic growth rate of regional real GDP and regional differences of unemployment rate from 1995 to 2000 was -0.2938 (significant correlation), and it was clarified that regional differences of declining demand in the late 1990s when Japan's economy was seriously going down causes recent differences of unemployment rate.

There is also a significant sequential correlation between differences of regional real minimum wage and differences of unemployment rate in 2000 (correlation coefficient is 0.5753). The minimum wage is higher in regions which have metropolitan areas, but nominal unemployment rate may be higher in those regions due to commuters from other prefectures. Therefore, regional differences of unemployment rate after controlling sex, age and industrial structure factors from data based on workplace in 2000 were calculated separately. The correlation coefficient with regional differences of real minimum wage is 0.5181 so there is still a significant correlation.[8] Although academic background factor is not controlled due to limited workplace data, there is still a sequential correlation between controlled differences and differences of real wages even allowing for commuting distance.

As for specialization coefficient by industry, regions which are strongly specialized in tertiary industry (less specialized in primary industry) show higher unemployment rate than national average, and such trend was especially pronounced in 2000. However, there was no significant correlation between Hirshman-Herfindhl index which indicates a yearly moving-in excess rate and relative specialization trend of regional industrial structure and regional differences of unemployment rate in both years.

Next, the expansion (or narrowing) factor of regional differences of unemployment rate after control from 1990 to 2000 was considered. As a result, the correlation coefficient between regional differences of real economic growth rate and differences of unemployment rate after control from 1990 to 2000 was -0.3295 so there is a significant inverse correlation between them. Particularly, it was clarified that in Kinki region such as Hyogo, Kyoto and Osaka with continued high unemployment rate, the relative regional economic downturn was serious over a decade and the differences of unemployment rate became most widened. As for changes in other regional economic indicators in the same period, there was no significant correlation with differences of unemployment rate. The correlation coefficient with differences of the growth rate of real minimum wage from 1989 to 1999 was negative and insignificant (-0.0343) so we cannot say that increased regional minimum wage through 1990s widened regional differences of unemployment rate. In Kinki region where the unemployment rate increased after control, the growth rate of real minimum wage over a decade was rather less than national average. Therefore, it can be interpreted that since unemployment rate increased due to declining demand without change in real minimum wage, an above mentioned significant correlation emerged in 2000.

For above reasons, as for regional differences of unemployment rate after control estimated in the previous session, the effect of regional characteristics is mostly controlled in 1990, but recently since the

7 Specialization coefficient $f_{ij} = p_{ij} / p_i$, where p_{ij} is a composition ratio of employees of industry i in Prefecture j and p_i is a national average composition ratio of industry i. Hirshman-Herfindhl index $RS_j = \Sigma_j | p_{ij} - p_i |$ is a value between 0 and 2. If this value is larger, the degree of specialization of industrial structure in Prefecture j is relatively higher than national average. If this value is nearly 0, the industrial structure is similar to national average. Regions where industrial distribution narrows or there is a strong specialization trend are subject to the impact of such industry's demand. Some people have pointed out that they are at higher risk of high unemployment rate (*Krugman (1993)*).

8 The unemployment rate based on workplace was calculated as number of people who are without jobs divided by (number of people who are without jobs + number of employees at workplace). Please note that due to the limitation of survey items of census, the trial calculation values are based on a strongish assumption that "Jobless people seek their jobs only in their residential places" in this section.

collapse of bubble economy, regional differences of unemployment rate caused by regional differences of real wage costs and regional differences of declining demand in the period of low growth have widened.

This session's analysis result that after removal of the effect of labor supply and demand attribute, regional differences of unemployment rate largely narrow indicates that Japan's regional unemployment issues are caused by "regional characteristics", regionally-skewed distribution of labor force and industries and means that employment measures based on the situation in each region are necessary to solve regional employment issues. Regional industry and employment measures are currently advanced by local governments such as prefectures and municipalities with progress in decentralization. It will be necessary to verify the availability of each measures based on individual cases in the future.

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