CHANGES IN THE INDUSTRIAL STRUCTURE: CASE OF KITAKYUSHU CITY[1]

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1. Introduction

This paper presents statistical description developed as part of a research project that seeks a better understanding of the interplay within a specific locality of demographics, industrial structure, labor market composition, firm organization and practice, technology levels, and public policies that have the most direct bearing on the investment in the quality of the workforce. The project places particular emphasis on the extent to which both local and regional experiences differ within the country. Most of our understanding of economic changes in Japan derives from the analysis of national statistics, which reflects trends within Japan's dominant regional economies (Kanto, Kansai, and Chukyo, the three largest urban regions), suppressing the experiences of other regions in the country. It is one of those regional economies, the city of Kitakyushu, that provides the focus of our analysis.

The project's principal research efforts involve a survey of employers and their employees in the city of Kitakyushu and an analysis that focuses on identifying the characteristics of the firms that will have the most important consequences for the development of the local economy.[2] To provide a better context for understanding the results of these efforts, this paper develops a simple statistical description of the changes in industrial and occupational structure of this local economy between the period 1970 and 1990. To the extent that quality of labor refers not only to its productivity but also to its capacity to adjust to transitory and secular changes of the economy (Behrman 1991), it is of a particular interest to document these changes and also to capture the degree to which Kitakyushu's experiences differ from those of the Japanese economy as a whole. In identifying the growing and shrinking sectors of the economy, we place a particular emphasis on evaluating the restructuring effort of the large raw-material based manufacturing firms that have dominated the Kitakyushu economy since the beginning of

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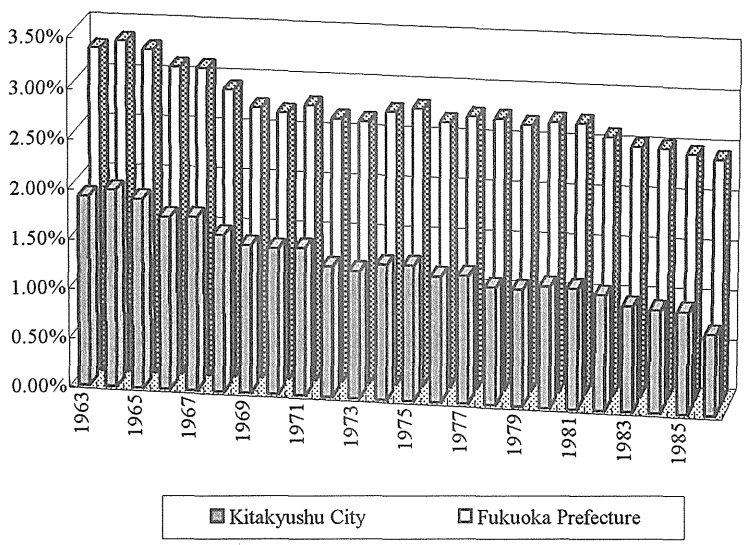
[2] See Kurosawa and Zemsky (1997) and Kurosawa (1997). The former is the paper which was actually presented at the conference held at Josai University on 25th of February, 1997.

this century.

The data used here are mainly drawn from Labor Force Survey, Establishment Census, and Census of Manufacturing published by the various government agencies. The descriptive statistical techniques employed allow comparisons of levels, growth rates, and—occasionally—location quotients that document the composition of the workforce in terms of industrial and occupational specialization. We begin with a brief overview of economic background of Japan as a whole and of Kitakyushu in particular. We then focus on the overall industrial and occupational distribution, which is followed by a more detailed analysis of changes that took place in service and manufacturing sectors by concentrating on the evolution of the employment structure, the size mix of enterprises, and the competitiveness in terms of value added. The paper ends with a summary and concluding remarks.

Figure 1: MANUFACTURING SHIPMENT VALUE AS A SHARE OF NATIONAL SHIPMENT VALUE: 1963-1986



Source: Census of Manufacturing, Ministry of International Trade and Industry.

2. Overview: Kitakyushu City versus Japan as a whole

Before World War II, Kitakyushu was one of the four largest industrial areas in Japan, and it depended on manufacturing for its economic development. This historical

reliance on manufacturing and almost complete absence of farming and other primary sector industries gave the city its unique cast. Although much of the rest of Japan drew on surplus labor from the agricultural sector to fuel economic development, Kitakyushu essentially had to recast its workforce rather than supplement it with additional workers seeking the advantages of city life.

Figure 1 depicts the share of the national manufacturing output that is produced in Kitakyushu city and Fukuoka prefecture. During the 1960s, Japan's economic boom was largely induced by stimulating the growth of heavy manufacturing industries such as steel, petrochemicals, and ship building. These industries flourished along the pacific coast of Japan, one of which was the Kitakyushu area, a convenient location for exporting and importing raw materials. During this period Kitakyushu produced between 1.5 and 1.9 percent of Japan's manufacturing output. It was these industries, however, that were severely affected by the oil crises of the 1970s and were gradually replaced as leading growth industries in the 1980s by machine manufacturing. By 1990, the city's share was more than halved, to just 0.8 percent.

The general shift away from raw-material-based heavy industry that began in the 1970s and was pushed further by the emergence of competition from newly industrialized economies (NIEs) and oil crises, was played out in Kitakyushu as well, although with consequences that were not foreseen at the time. It is in comparison with neighboring Fukuoka city that Kitakyushu's dilemmas become clearest. Fukuoka city became northern Kyushu's headquarters and the dominant player in the shift away from raw-material-based manufacturing toward advanced machinery manufacturing and service sector activities in general, and business services in particular. For example, Fukuoka saw a 35 percent growth in its business service employees between 1972 and 1981; during those same years, the number of business service employees in Kitakyushu grew by just 5 percent. A parallel shift has occurred in the size mix of establishments. Because the service sector is characterized by labor-intensive activities, it is typically characterized by medium-sized and small establishments.

In the mid-1980s, the Japanese economy was struck again by an external shock: a sudden increase in the value of the yen. Although the impact of this disturbance was short-lived for the economy as a whole, it accelerated the process of the structural shift toward service sector and high-technology activities. The growing importance of information technology, the expansion of financial markets, and the globalization of enterprises have all increased the ability of Tokyo and its environs to dominate the Japanese economy, making it the international financial center of the country. As a result, a surge of migrants again flowed to Tokyo and, as a secondary wave, toward the country's newly emerging regional

centers such as Fukuoka city.

In the 1990s, the economy has drifted into a severe recession that is largely homegrown. The simultaneous decline of the stock and real estate markets has substantially reduced the net worth of both individuals and enterprises. The country's financial system is burdened with a flood of bad loans. With the service sector providing employment to more than half the workforce, and with trade friction becoming an international embarrassment, Japan can no longer count on its businesses to export the nation out of recession. Rather, individual firms are seeking to revive their fortunes by diversifying their businesses and by reducing their labor costs, principally by dismissing part-time workers and allowing attrition and reduced hiring to shrink the size of their full-time workforces. However, adding to the already difficult situation is a rapidly aging population, which will burden the economy with higher labor costs and, in the future, higher pension costs that increasingly must be born by a younger and considerably smaller cohort of workers.

In time, parallel restructuring of industry was experienced by Kitakyushu, whose population was aging much faster than the national trend largely due to migration out of the city. As of 1990, Kitakyushu was still the tenth largest city in the country. Most of the city's large raw-material based manufacturing enterprises began closing down their older factories and reducing employment, seeking in the process an increase in labor productivity through better use of technology. To the extent that these enterprises were responsible for a large share of employment in the city, their downsizing had a substantial impact on the city's economy.

3. Overall industry structure

In this section, we illustrate the changes in industry environment in terms of employment composition and the distribution of establishments by number of employees across industry categories. These statistics are computed for both Kitakyushu and the nation as a whole, to highlight the particular nature of the former's experiences.

Nationally, most of the increase in the number of employed workers that was attributable to natural population growth, as well as the increase caused by workers leaving family farms, was absorbed by a rapidly expanding tertiary industry. Kitakyushu, unlike the nation at large, contained a small primary industry population to start with, and its working population remained almost invariant over time, leaving the number of workers available to non-primary industries largely unchanged.

Figure 2: NATIONAL AND KITAKYUSHU INDEX OF EMPLOYMENT GROWTH, BY INDUSTRY: 1985, 1990 (1970=100)

	NATIONAL		KITAKYUSHU	
	1985	1990	1985	1990
Primary	57.45	50.90	57.88	46.24
Secondary	111.22	117.20	81.65	80.23
Mining	45.00	30.00	35.55	26.23
Construction	134.52	149.24	110.46	112.10
Manufacturing	105.52	109.30	71.87	69.46
Tertiary	136.34	152.33	110.86	113.44
Utilities	117.86	107.14	86.87	89.64
Trans&Comm	105.86	115.74	78.66	74.42
Whole/Retail	130.24	139.82	113.70	112.80
Fin/Ins/Reale	164.39	196.21	137.27	153.86
Services	156.19	185.62	128.75	140.63
Public Admin	123.60	121.12	94.65	86.62
All Industries	114.00	122.67	98.45	99.37

Source: National figures are from Labor Force Survey, Ministry of Labor. Kitakyushu figures are from Population Census, Management and Coordination Agency.

Note: Above figures include private and public sector employment. Above indexes are computed by treating their figures in 1970 as 100.

Figure 3: NATIONAL AND KITAKYUSHU SHARE OF EMPLOYEES, BY INDUSTRY: 1970, 1990

	NATIONAL		KITAKYUSHU	
	1970	1990	1970	1990
Primary	17.42%	7.25%	2.62%	1.22%
Secondary	35.22%	33.76%	38.16%	30.92%
Mining	0.39%	0.10%	0.40%	0.11%
Construction	7.75%	9.46%	10.04%	11.37%
Manufacturing	27.08%	24.20%	27.71%	19.44%
Tertiary	47.35%	58.99%	59.22%	67.85%
Whole/Retail	19.90%	22.76%	23.69%	26.99%
Fin/Ins/RealE	2.60%	4.17%	2.84%	4.41%
Trans& Comm	6.37%	6.03%	11.59%	8.71%
Utilities	0.55%	0.48%	0.74%	0.67%
Service	14.77%	22.42%	16.96%	24.10%
Public Admin	3.17%	3.14%	3.40%	2.97%
All Industries	100.00%	100.00%	100.00%	100.00%

Source: National figures are from Labor Force Survey, Ministry of Labor. Kitakyushu figures are from Population Census, Management and Coordination Agency.

Note: Above figures include private and public sector employment.

Figure 4: LOCATION QUOTIENTS: KITAKYUSHU CITY COMPARED TO NATIONAL (MALE AND FEMALE): 1970, 1990

	TOTAL		MALE		FEMALE	
	1970	1990	1970	1990	1980	1990
Primary	0.15	0.17	0.16	0.20	0.15	0.13
Secondary						
Mining	1.02	1.10	0.96	1.09	1.02	1.10
Construction	1.30	1.20	1.19	1.19	1.48	1.21
Manufacturing	1.02	0.80	1.17	0.94	0.71	0.58
Tertiary						
Utilities	1.34	1.38	1.19	1.34	1.96	1.54
Trans&Comm	1.82	1.44	1.66	1.44	2.22	1.34
Whole/Retail	1.19	1.18	0.99	1.05	1.53	1.32
Fin/Ins/RealE	1.09	1.05	1.06	1.08	1.18	1.03
Services	1.15	1.07	0.97	0.96	1.42	1.19
Public Admin	1.07	0.94	0.87	0.87	2.05	1.24

Sources: National figures are from the Labor Force Survey, Ministry of Labor, while Kitakyushu figures are from the Population Census, Management and Coordination Agency.

Note: Location quotients are the ratio of the regional share of employment for industry A out of the national share of employment for industry A. Hence, a value of 1 implies no regional specialization compared to national average. The more the value exceeds 1, the stronger the degree of regional specialization in that specific industry. Above figures include private and public sector employment.

Perhaps what is most striking about Kitakyushu, given national trends, is the remarkably small increase in the number of workers in the service sector: only 13 percent between 1970 and 1990. Nationally, tertiary employment grew as much as 52 percent in the same 20 years—four times the rate for Kitakyushu. Nonetheless, given the level of working population that is invariant during the period, this small increase in the tertiary population contributed to a rather large increase in the share of employees engaged in such sector in Kitakyushu. As of 1990, the share of tertiary employees was 68 percent in Kitakyushu, while that of the nation as a whole was 59 percent.

Location quotients (Figure 4), which are measures of the degree of regional industry specialization in terms of employment share, reveal that Kitakyushu's specialization is concentrated in the construction, transportation, and communication sectors. When the location quotients are disaggregated by gender, the degree of specialization in manufacturing increases slightly among male workers. The female patterns are more striking, revealing strong non-specialization in manufacturing and a high degree of specialization in the service sector. This distribution of female workers being skewed towards non-manufacturing industries is also evident from the comparison of occupational

composition computed separately for each gender. In 1990, 34 percent of male workers, as opposed to 31 percent nationally, held production jobs. On the other hand, the corresponding figures for female workers were 12.5 percent in Kitakyushu and 21.3 percent nationally.

When looking at the city's industry composition in terms of establishments rather than workers, there is a surprising absence of change in distributions since the 1970s. In particular, what has not changed in Kitakyushu is the fact that a relatively small number of large manufacturing establishments account for a substantial portion of the city's manufacturing employment.

In Kitakyushu, the share of workers employed by manufacturing establishments with more than 300 workers was as much as 57 percent in 1969 compared to 31 percent nationally. The number of workers employed by large establishments started to decline in the early 1980s, however. Nonetheless, those large firms were still responsible for much larger share of manufacturing employment in the city compared to the nation as a whole in 1991 (Figure 5). Manufacturing sector's contribution to the gross city product also maintains its status as the substantive contributor to the city's economic well-being (Figure 7).

The size-mix of non-manufacturing enterprises, on the other hand, has been very similar and stable, except for a slight tendency for a larger share of jobs to be held by medium-sized establishments in both Japan as a whole and in Kitakyushu City.

Figure 5: NATIONAL AND KITAKYUSHU SHARE OF WORKERS, BY ESTABLISHMENT SIZE (MANUFACTURING): 1969, 1991

	NATIONAL		KITAKYUSHU	
	1969	1991	1969	1991
1-4	6.98%	7.15%	1.58%	2.91%
5-9	8.57%	9.05%	2.92%	5.24%
10-29	17.64%	19.30%	8.80%	13.51%
30-49	8.90%	9.61%	5.81%	8.40%
50-99	11.12%	12.21%	8.86%	12.13%
100-299	15.57%	16.48%	15.10%	16.91%
300+	31.23%	26.20%	56.93%	40.89%
All sizes	100.00%	100.00%	100.00%	100.00%

Sources: Establishment Census, Management and Coordination Agency.
Notes: Figures for 1969 are based on private and public establishments, while those for all other years are for private establishments only.

Figure 6: NATIONAL AND KITAKYUSHU SHARE OF WORKERS, BY ESTABLISHMENT SIZE (NON-MANUFACTURING): 1969, 1991

	NATIONAL		KITAKYUSHU	
	1969	1991	1969	1991
1-4	23.76%	20.02%	21.40%	21.14%
5-9	13.66%	16.21%	13.50%	16.60%
10-29	20.50%	25.62%	20.67%	25.85%
30-49	9.74%	10.04%	9.34%	9.83%
50-99	10.74%	10.36%	10.39%	9.95%
100-299	11.72%	10.63%	11.17%	10.39%
300+	9.88%	7.11%	13.53%	6.24%
All sizes	100.00%	100.00%	100.00%	100.00%

Sources: Establishment Census, Management and Coordination Agency.
Notes: Figures for 1969 are based on private and public establishments, while those for all other years are for private establishments only. Shares include primary industry.

Figure 7: NATIONAL AND KITAKYUSHU SHARE OF GROSS DOMESTIC PRODUCT AND GROSS CITY PRODUCT, BY INDUSTRY: 1970, 1989

	NATIONAL		KITAKYUSHU	
	1970	1989	1970	1989
Primary	6.12%	2.58%	1.70%	0.75%
Secondary				
Mining	0.85%	0.27%	0.70%	0.39%
Construction	7.70%	9.50%	7.50%	8.11%
Manufacturing	35.99%	28.90%	37.60%	30.79%
Tertiary				
Utilities	2.12%	2.88%	3.00%	4.64%
Trans&Comm	6.88%	6.56%	12.70%	9.95%
Whole/Retail	14.36%	12.73%	13.10%	13.73%
Fin/Ins/RealE	12.30%	16.89%	9.70%	11.91%
Service	9.64%	15.33%	11.00%	14.18%
Gov't Services	6.32%	7.79%	5.40%	7.46%
Priv. NonProfit	0.99%	1.99%	0.90%	2.16%
Total GDP	100.00%	100.00%	100.00%	100.00%

Sources: Kokumin Keizai Keisan Nenpo, Economic Planning Agency. Kitakyushu-Shi no Shimin Keizai Keisan, Kitakyushu City, Planning Agency, Statistics Bureau.

As we have seen, the national trend in industry composition has been characterized by an expanding service sector, which has absorbed most of the increase in the labor force. Kitakyushu, in contrast, has experienced little increase in the size of its workforce that is engaged in non-primary industries, while internally, there has also been some shift away from manufacturing into the service sector.

Underneath these changes in Kitakyushu were many stages of rationalization and modernization process of the large raw-material-dependent manufacturing firms on the one hand and slow accumulation of business services on the other. In the following sections, we examine these changes in more detail by concentrating our analysis on two sectors of industry: service and manufacturing.

4. Tertiary Industry

In Japan, sectors of the economy remain that have thus far failed to achieve the same productivity increases realized by the manufacturing industry. These industries, which include distribution (retail, wholesale, and transportation), construction, and consumer services, produce mainly non-tradable goods, so they tend to be shielded against international competition. They also frequently manage to organize among themselves to protect their domestic markets by cultivating leading politicians. Yet these sectors employ more than 60 percent of Japan's working population, a share that continues to increase. Raising the labor productivity of these industries would make workers available for other sectors of Japan's economy.

In this section, we focus on the changes over time of the tertiary industry as a whole. Our larger purpose is the measurement of the extent to which these characteristics or inefficiencies can be said to describe distributions across Japan as a whole and within Kitakyushu in particular.

The service sector as a whole grew by as little as 13 percent between 1970 and 1990, but has come to constitute as much as 70 percent of working population in Kitakyushu. Given the slow growth of Kitakyushu's workforce, even this modest growth in the service sector yielded the largest job growth for the city during this period. By further categorizing the service sector into three groups, namely, personal services, business services, and specialized services,[3] we observe that, in both nation as a whole and in Kitakyushu, employment growth was particularly high for commercial, specialized, and real

[3] Personal services include hotels, laundry, automobile repairs, car parks, rental, and leisure services, and commercial services include information, advertising, cooperative association, and other business services, but not rental services of business equipment, which are included in consumer services. Lastly, specialized services include legal, accounting, architectural, private tutorial, medical, hygiene, educational, cultural, social welfare, and other unclassified services.

estate services. As of 1986, the number of workers engaged per 1000 population in the city was not very different from the national averages, with slightly more accumulation in consumer service, special service, and transport sectors. Compared with the other ten largest cities in Japan, however, Kitakyushu has much lower service sector employment, particularly in the business services category, which includes financial and commercial services. The number of employees per 1000 of city population working at private and public establishments engaged in the service sector as a whole was 489.4 in Fukuoka City and just 335.4 in Kitakyushu in 1986. The comparable figures for finance-related business services such as finance/insurance and wholesales were 63.3 in Kitakyushu and 127.5 in Fukuoka City.[4] On the other hand, roughly the same share of Kitakyushu's workforce is engaged in consumer services.

In addition to above analysis, statistics drawn from the Census of Commerce can provide additional insight to the circumstances of the distribution sector: wholesale and retail industry. There has been a shift away from Kitakyushu to Fukuoka of an entire wholesale function. Compared to that of the other 10 largest cities in the country, the number of workers per wholesale store is smaller, and has declined more rapidly in Kitakyushu. Also, the wholesale sales volume has grown only half as much compared to other largest cities over the last 20 years. Even compared with the national average, wholesale sales per worker are significantly lower for each store size, in particular, at stores with more than 100 workers (Figure 9).[5]

The retail trade in Kitakyushu, on the other hand, is more like retail elsewhere in Japan, where the number of employees per store (including the self-employed) averages just three. The averages for Kitakyushu are only slightly lower than the national averages with regard to store size, sales per store, and sales per worker. The number of retail stores per 1000 population is slightly higher in Kitakyushu: 15.5 stores, as opposed to 13 stores per 1000 population across Japan in 1988. Across all regions, there is a slow but consistent tendency for retail stores to increase in size. Note that restaurants and drinking places, which are mostly small "mom and pop" operations, are not included in the retail industry. These types of businesses are particularly numerous in Kitakyushu and would have significantly lowered the average sales per employee if they had been included.

These measures of sales per employee, however, may not be an accurate measure of efficiency in the wholesale and retail sectors. The costs of the inputs have not been controlled for and could in fact have doubled or tripled the final figures, given Japan's multi-layered wholesale system (Ito (1992)).

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[4] These figures are taken from the Establishment Census.

[5] Although the high sales per person for large wholesale stores for the nation as a whole are overstated by the inclusion of large-scale trading companies.

Figure 8: RETAIL SALES PER WORKER: 1964-1988

Source: Census of Commerce, Ministry of International Trade and Industry; Consumer Price Index, Management and Coordination Agency.
Note: Figures are in 1966 yen, and have been deflated by the Retail Price index of 1966.

Figure 9: WHOLESALE SALES PER WORKER: 1964-1988

Source: Census of Commerce, Ministry of International Trade and Industry; Consumer Price Index, Management and Coordination Agency.
Note: Figures are in 1966 yen, and have been deflated by the Retail Price index of 1966.

Figure 10: NATIONAL AND KITAKYUSHU SHARE OF WORKERS ENGAGED IN TERTIARY ACTIVITY, BY OCCUPATION: 1970, 1985

	NATIONAL		KITAKYUSHU	
	1970	1985	1970	1985
Prof&Tech	11.84%	15.53%	10.41%	14.61%
Managerial	4.81%	4.02%	4.25%	3.50%
Clerical	21.51%	23.50%	20.79%	21.69%
Sales	23.96%	22.47%	22.20%	24.17%
Trans&Comm	7.84%	5.98%	9.56%	7.01%
Production	14.12%	13.79%	17.24%	14.66%
Protective Services	2.41%	2.30%	2.13%	2.08%
Personal Services	13.28%	12.18%	13.36%	12.19%
Total	99.77%	99.77%	99.94%	99.91%

Source: Population Census, Management and Coordination Agency.
Notes: Tertiary industry include utilities, transportation, communication, wholesale, retail, finance, insurance, real estate, protective and personal services, and public administration industry categories. Private and public combined. The percentages above do not add up to 100 since agriculture and mining categories are excluded.

These figures may also be overstated due to "people on loan" in the retail stores, who are "seconded" from the manufacturers and excluded from the retail store's payroll. This situation occurs often in large department stores. In this sense, value added per worker is a better indicator. Unfortunately, such a measure for this sector is not available at the level of prefecture or city.

The occupations of workers employed in the service sector are also an important indicator of the quality of jobs available in the region (Figure 10). A particularly large share of Kitakyushu's service sector employment is classified as sales; a correspondingly smaller share belongs to the clerical, managerial, and professional occupational categories. The number of managerial jobs has in fact decreased by 8 percent between 1970 and 1985 (the comparable figure for the nation as a whole was an increase by 15 percent). In addition, the fact that the share of professional and technical workers in the service sector is smaller and has been increasing at a rate lower than the national average implies that there are still relatively few knowledge-intensive service sector jobs available in Kitakyushu City.

5. Manufacturing

We turn next to the manufacturing sector. To further investigate composition

changes, we disaggregate the data into two categories of heavy manufacturing and one category of light manufacturing.

Figure 11: NATIONAL AND KITAKYUSHU SHARE OF MANUFACTURING SHIPMENT VALUES, BY INDUSTRY: 1965, 1975, 1989

	NATIONAL			KITAKYUSHU		
	1965	1975	1989	1965	1975	1989
Raw Material	41.52%	42.26%	35.60%	79.88%	68.88%	63.92%
Chemical	8.86%	8.19%	2.83%	13.31%	14.74%	16.49%
Ceramic	3.50%	3.77%	3.39%	10.07%	6.05%	4.03%
Steel	9.10%	8.87%	5.77%	45.85%	36.44%	31.45%
Metal	4.68%	5.16%	5.59%	4.07%	3.35%	5.02%
Assembly	26.55%	29.78%	42.64%	6.69%	16.61%	21.86%
Gen. Machinery	7.45%	8.33%	9.96%	3.35%	12.39%	13.13%
Electric	7.80%	8.49%	17.09%	2.25%	2.57%	7.66%
Transport	10.00%	11.61%	14.06%	1.09%	1.63%	0.93%
Light	31.93%	27.95%	21.76%	13.38%	14.51%	14.21%
Food	0.1317	0.1187	7.34%	0.102	0.103	4.55%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Census of Manufacturing, Ministry of International Trade and Industry.
Notes: Raw Material Type includes lumber and wood, pulp and paper, chemical, petroleum, plastic, rubber, ceramic, steel, non-ferrous, and fabricated metal industries. Assembly Type includes general, electrical, transport, and precision machinery industries. Light Type includes manufacturing industries not belonging to the two former categories. Figures for 1981 onwards exclude establishments with less than 4 workers.

Figure 12: NATIONAL AND KITAKYUSHU SHARE OF MANUFACTURING EMPLOYMENT, BY INDUSTRY: 1965, 1975, 1989

	NATIONAL			KITAKYUSHU		
	1965	1975	1989	1965	1975	1989
Raw Material	33.61%	31.71%	30.36%	70.17%	56.75%	50.22%
Chemical	4.89%	4.08%	3.58%	8.67%	7.58%	7.09%
Ceramic	4.99%	4.94%	4.16%	7.65%	6.95%	5.20%
Steel	4.79%	4.48%	3.06%	36.47%	28.19%	22.18%
Metal	6.62%	7.57%	7.46%	9.86%	6.47%	8.38%
Assembly	26.31%	30.99%	38.45%	14.47%	26.02%	28.55%
Gen. Machinery	8.71%	9.75%	10.46%	8.00%	16.43%	15.05%
Electric	8.58%	10.75%	17.77%	3.98%	6.78%	11.32%
Transport	7.07%	8.37%	8.29%	2.48%	2.73%	1.78%
Light	40.07%	37.29%	31.18%	15.15%	17.23%	21.23%
Food	1.14%	10.37%	9.86%	8.21%	7.52%	8.16%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Census of Manufacturing, Ministry of International Trade and Industry.

Figure 13: NATIONAL AND KITAKYUSHU SHARE OF EMPLOYMENT IN STEEL AND CHEMICAL INDUSTRY, BY ESTABLISHMENT SIZE: 1970, 1986

	NATIONAL		KITAKYUSHU	
	1975	1986	1975	1986
1-9	3.17%	4.22%	0.44%	0.93%
20-29	7.60%	9.62%	1.55%	2.73%
30-99	13.47%	17.29%	2.65%	7.64%
100-299	16.57%	19.03%	8.70%	12.61%
300+	59.19%	49.84%	86.65%	76.09%
All sizes (10+)	100.00%	100.00%	100.00%	100.00%

Sources: Establishment Census, Management and Coordination Agency.
Notes: Figures are for private establishments only. Employment figures broken down by establishment size in Kitakyushu were available for a limited number of industries only.

Figure 14: NATIONAL AND KITAKYUSHU INDEX OF GROWTH OF EMPLOYMENT IN STEEL AND CHEMICAL INDUSTRY, BY ESTABLISHMENT SIZE: 1986 (1975=100)

	NATIONAL	KITAKYUSHU
	1986	1986
1-9	109.08	97.00
10-29	103.77	81.18
30-99	105.14	133.65
100-299	94.06	67.05
300+	68.97	40.61
All sizes	81.92	46.25

Sources: Establishment Census, Management and Coordination Agency.
Notes: Same as in Figure 13.

The two categories of heavy manufacturing are: (1) raw-material-dependent (including chemicals, oil, coal, steel, and non-ferrous metals) and (2) assembling-processing (including all the machinery industries). We observe changes in the composition for each of these categories in terms of the size mix of firms, number of employees, shipments, and value added. We also investigate changes in the occupational contents of jobs involved in each industry category.

The pattern found in Kitakyushu for the distribution of establishments is similar to the national average. In terms of the distribution of sales and employees, however, Kitakyushu's experience differs from national trends in that, for these distributions, the large raw-material-dependent enterprises dominate, although the extent to which they dominate

has been lessening. In 1989, raw-material manufacturing sector was responsible for 64 percent of the total value of shipment and 50 percent of manufacturing employment in Kitakyushu. The comparable national figures were just 36 and 30 percent, respectively. Moreover, in 1991, share of workers employed by manufacturing establishments with more than 300 workers was 41 percent compared to 26 nationally. Although the size composition within all the raw-material dependent industries is not available, for steel and chemical industries combined, as much as 76 percent of workers were employed by establishments with more than 300 workers in 1986 in Kitakyushu, when the corresponding national figure was just 50 percent.

Figure 15: KITAKYUSHU SHARE OF OUTPUT SALES, BY FORM OF PRODUCTION, FOR SMALL AND MEDIUM MANUFACTURING FIRMS: MARCH, 1988

	Ordered	Subcontracted	Others
Steel	46.10%	32.20%	21.60%
Fabricated Metal	61.80%	33.10%	5.10%
General Machine	59.30%	33.20%	7.50%
Electrical Machine	64.00%	30.00%	6.30%

Source: Tokutei Chiiki Shindan Houkokusho (1988), Kitakyushu City.
Notes: Firms employing no more than 300 workers.

Figure 16: KITAKYUSHU SHARE OF FIRMS, BY NUMBER OF BUYERS, FOR SMALL TO MEDIUM SIZED MANUFACTURING FIRMS: MARCH, 1988

	1	2-3	4-5	6-9	10+
Steel	47.40%	21.10%	21.10%	0.00%	10.40%
Fabricated Metal	33.30%	16.70%	12.50%	25.00%	12.50%
General Machine	13.60%	27.30%	36.40%	4.50%	18.20%
Electrical Machine	31.30%	37.50%	25.00%	6.20%	0.00%
All of Above	30.90%	24.70%	23.50%	9.90%	11.00%

Source: Same as in Figure 15.

Large manufacturing firms are also dominant in that they are the suppliers of most of the small and medium-sized manufacturing firms in Kitakyushu. In 1988, the city's own survey revealed that 76 to 95 percent of sales among steel, fabricated metal, and general and electrical machinery firms employing fewer than 300 workers were either subcontracted or ordered by other parental firms (Figure 15). In addition, more than 55 percent of those small and medium-sized firms took orders from fewer than three companies (Figure 16), indicating their reliance on a relatively few parental firms. This pattern was particularly

acute in the steel industry, in which more than 70 percent of smaller firms took orders from fewer than three firms.

Nonetheless, the downsizing of large firms has been substantial in Kitakyushu, particularly in raw-material-dependent firms. For instance, the share of workers employed by steel and chemical establishments with more than 300 workers dropped from 87 percent to 76 percent between 1975 and 1986, which translates to as much as 59 percent decline in the number of workers. The corresponding national share changed from 59 percent to 50 percent, which translates to 31 percent decline in the number of workers. Meanwhile, general and electrical machinery industries have been steadily increasing their share both in employment and output, even though they are still much smaller than the national average.

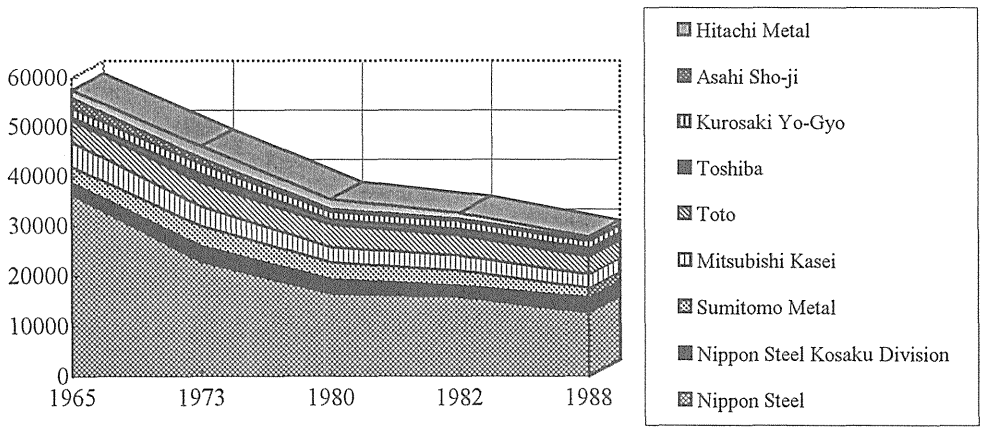
To the extent that workers affected by the downsizing process account for a substantial portion of the city's workforce, it is important to bear in mind what sort of provisions those corporations have made to accommodate their surplus workers and the extent to which these efforts helped shape the resulting industrial structure of the local economy. Here, the experience of Nippon Steel,[6] still Kitakyushu's dominant employer, has particular relevance.

During the 1970s, the oil crises led Nippon Steel to adopt a rationalization and modernization strategy that dictated the closing down of smaller furnaces and their replacement with fewer, larger furnaces to increase labor productivity. Then, in the mid-1980s, increasing competition from NIEs, coupled with growing trade friction and the high value of the yen, forced Nippon Steel to further cut back steel production while maintaining its worker productivity by concentrating full operations at a limited number of modernized furnaces. In Kitakyushu, the result was a reduction in the regular workforce from 43,700 workers in 1963 to 14,700 workers in 1984. In part, these worker reductions were accomplished by early retirements and relocation of workers to other plants, but the major portion of them required Nippon Steel to transfer workers to other divisions engaged in different business activities or to "second" them to subsidiaries and suppliers. In 1987, the company announced its plan to diversify its business into new fields, including electronics, information technology, urban development, community service, leisure, chemicals, advanced materials, engineering services, and biotechnology. In doing so, they emphasized their strategy of keeping their existing workers so that their skills, which included materials processing and process control, and their expertise in training and managing workers would not be wasted. This utilization strategy has since been followed by other large steel companies, such as Sumitomo Metals and Kawasaki Steel (see Figure 17, which shows similar downsizing of the nine largest manufacturing factories in the city).

[6] This information was obtained from interviews with the Nippon Steel officials.

Although "seconded" workers are mostly no longer on the payroll of the parent company, newly established firms or divisions are often joint ventures or subsidiaries. Therefore, subsidiaries usually maintain some ties with the original company in terms of technology, human resources, and initial capital. There is also a frequent interchange of managerial staff among these enterprises and their subsidiaries.

Figure 17: EMPLOYMENT IN 9 LARGEST MANUFACTURING FIRMS IN KITAKYUSHU CITY: 1965-1988



Source: Kitakyushu-shi Keizai no Genjyou (1991), Kitakyushu-City, Economics Bureau.

Indeed, some of Kitakyushu's recent growth in manufacturing jobs created by small to medium-sized firms are the new subsidiaries and joint venture firms that are the result of major firms' diversification strategy, as in the case of Nippon Steel. They are smaller in scale but for the most part engage in high-technology production, often with their own research and development facilities at the site. Most of the other small and medium-sized firms are typically parts manufacturing suppliers for the large enterprises, with lagging technologies. The differences in technology use between these firms and the firms they supply are diverging. For example, the city's 1988 survey of manufacturing firms with fewer than 300 workers, quoted earlier, reported that only 26 percent of these firms had invested in new technology in the past three years and that only 30 percent were using word processors. The same survey reported that just 30 percent of these firms were planning to diversify their business activities (principally by developing new products) and to increase their capital investments in near future.

The process of rationalization and restructuring carried out by the large heavy-manufacturing firms have not only served to diversify the city's skewed industry structure,

but has also managed to produce higher value added products and to increase labor productivity. A transition in the nature of the products manufactured in Kitakyushu can be seen by the ratio of value added to shipment value (Figure 18). A view of this ratio over time shows that each type of manufacturing industry followed one of various transitory paths, depending on their susceptibility to external shocks. Among assembly-type industries, the ratio of value added to shipment value has been high in Kitakyushu—about 0.44—since 1965. These industries are generally associated with high value-added production. Recently, however, this ratio has started to decline. Raw-material-type manufacturing, on the other hand, has achieved a large increase in this ratio despite experiencing a slowdown due to the oil crises in the early 1970s. Other light manufacturing industries, such as the food industry, also exhibited significant growth. Considering that the raw-material-type manufacturing sector accounts for a large proportion of the city's manufacturing production, an increase in the value added to shipment value ratio in manufacturing as a whole has largely been due to success in the restructuring of this sector, particularly at the large chemical and steel firms.

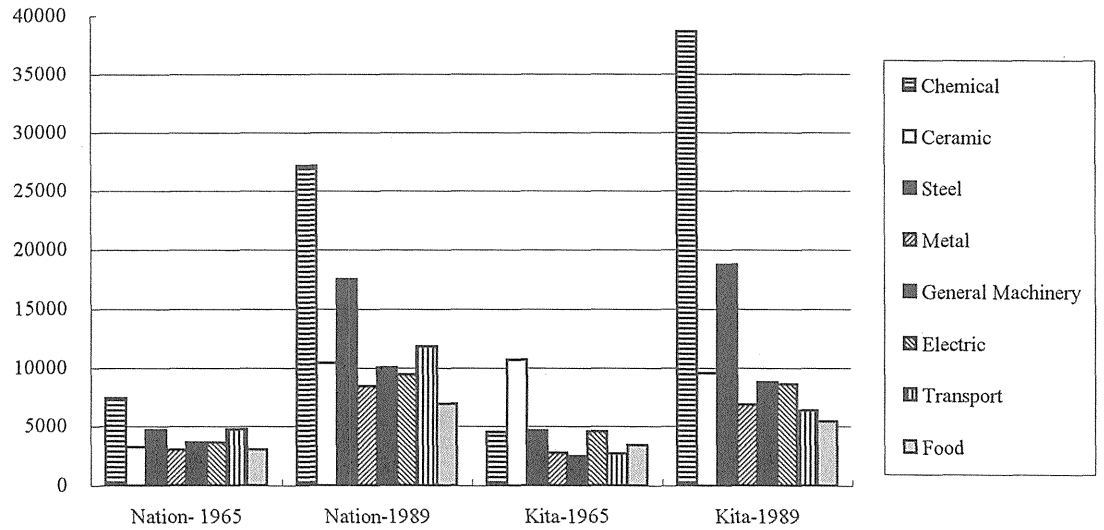
Figure 18: NATIONAL AND KITAKYUSHU RATIO OF VALUE ADDED TO SHIPMENT VALUE, BY INDUSTRY: 1965, 1975, 1989

	NATIONAL			KITAKYUSHU		
	1965	1975	1989	1965	1975	1989
Raw Material	0.31	0.29	0.39	0.28	0.20	0.47
Chemical	0.39	0.36	1.31	0.19	0.23	0.58
Ceramic	0.44	0.44	0.49	0.05	0.40	0.43
Steel	0.24	0.22	0.35	0.24	0.12	0.46
Metal	0.41	0.43	0.43	0.44	0.49	0.40
Assembly	0.37	0.37	0.35	0.44	0.57	0.39
General Machinery	0.41	0.44	0.40	0.39	0.61	0.35
Electric	0.38	0.38	0.37	0.53	0.42	0.44
Transport	0.32	0.29	0.27	0.41	0.45	0.43
Light	0.31	0.36	0.39	0.26	0.36	0.48
Food	0.25	0.29	0.35	0.18	0.27	0.34
All Industries	0.33	0.33	0.37	0.29	0.28	0.45

Source: Census of Manufacturing, Ministry of International Trade and Industry.

Notes: Raw Material Type includes lumber and wood, pulp and paper, chemical, petroleum, plastic, rubber, ceramic, steel, non-ferrous, and fabricated metal industries. Assembly Type includes general, electrical, transport, and precision machinery industries. Light Type includes manufacturing industries not belonging to the two former categories. Figures for 1981 onwards exclude establishments with less than 4 workers.

Figure 19: NATIONAL AND KITAKYUSHU VALUE ADDED PER WORKER, BY MANUFACTURING INDUSTRY: 1965, 1989



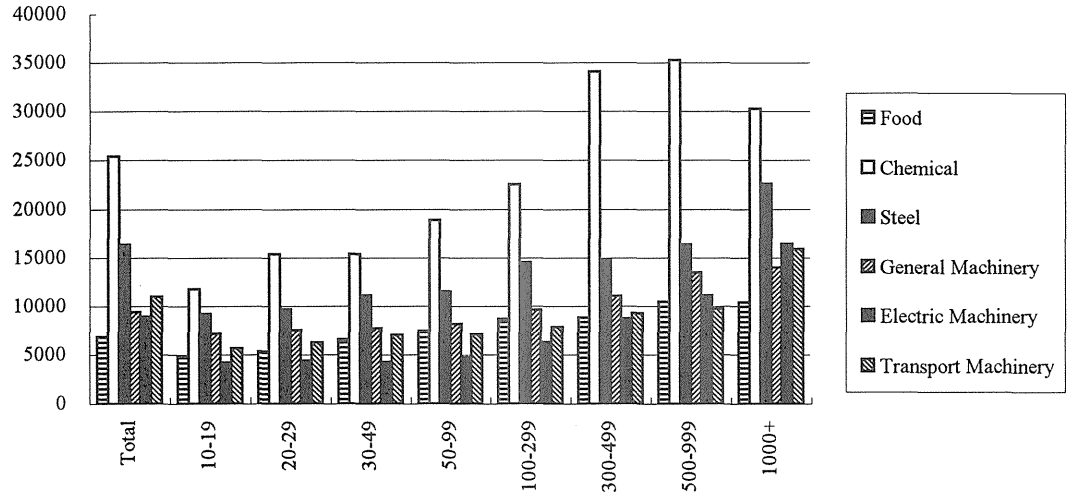
NATIONAL KITAKYUSHU

Source: Census of Manufacturing, Ministry of International Trade and Industry; Consumer Price Index, Management and Coordination Agency.
Note: Figures are in thousand 1985 yen, and have been deflated by the Retail Price Index.

These large raw-material-type manufacturing firms also succeeded in increasing value added per worker. The size breakdown shows that the level of value added per worker is substantially higher than the national average in chemical and steel industries for establishments with more than 100 workers (Figures 20-21). Meanwhile, productivity of smaller establishments are about the same or even lower than the national average, signifying a large difference in the level of technology between small and large firms in this sector.

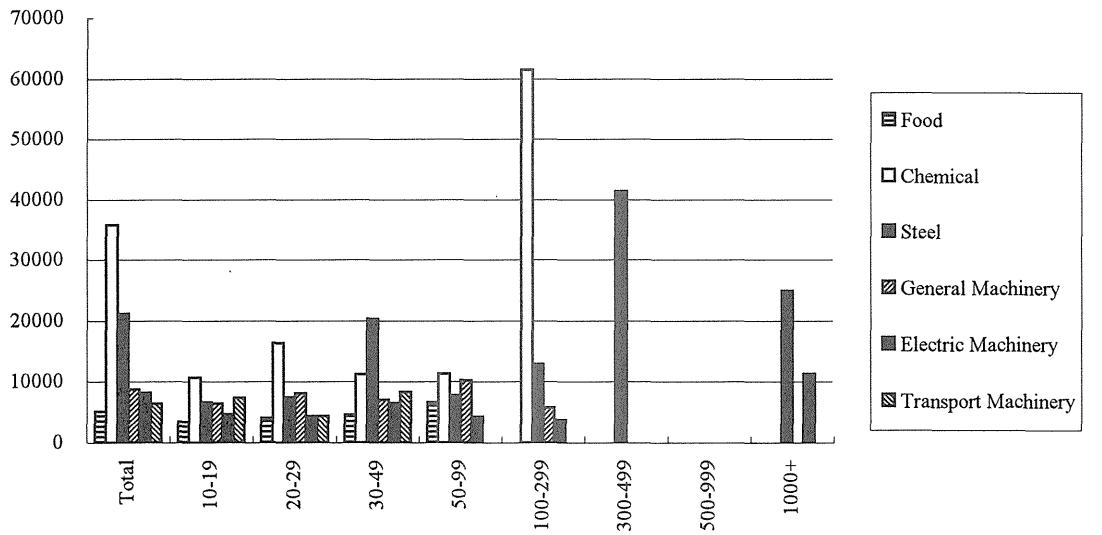
Assembly-type manufacturing industries, despite their relatively high value added to shipment value ratio, had lower labor productivity in 1990 in Kitakyushu than in Japan as a whole. Comparing the productivity level for each firm size category, we see that in Kitakyushu City, transport machinery firms are smaller, with no firm having more than 100 workers.

Figure 20: NATIONAL VALUE ADDED PER WORKER, BY ESTABLISHMENT SIZE: 1988



Source: Same as in Figure 19.
Note: Figures are in thousand 1985 yen, and have been deflated by the Retail Price Index.

Figure 21: KITAKYUSHU CITY'S VALUE ADDED PER WORKER, BY ESTABLISHMENT SIZE: 1990



Source: Same as in Figure 19.
Note: Figures are in thousand 1985 yen, and have been deflated by the Retail Price Index. There exists Chemical firms that employ more than 1000 workers, although their value added was not available in 1990.

This is likely to be the major reason that the transport machinery firms possess low labor productivity, since the mass-production technology benefits from economies of scale, achieving high labor productivity while producing not so high value-added products. The recent introduction of another large car manufacturing plant in the area[7] may attract suppliers and related firms to locate in the city or may help existing firms to derive skill transfer in terms of technological or human capital development.

Figure 22: NATIONAL AND KITAKYUSHU SHARE OF WORKERS ENGAGED IN MANUFACTURING INDUSTRY, BY OCCUPATION: 1970, 1985

	NATIONAL		KITAKYUSHU	
	1970	1985	1970	1985
Prof&Tech	2.95%	4.81%	3.57%	6.07%
Managerial	5.03%	4.50%	3.76%	4.16%
Clerical	11.98%	12.78%	14.47%	14.99%
Sales	2.90%	4.67%	2.12%	4.45%
Trans&Comm	1.73%	1.16%	2.51%	1.30%
Production	74.17%	71.45%	72.02%	68.18%
Protective Services	0.41%	0.21%	0.81%	0.40%
Personal Services	0.72%	0.31%	0.65%	0.40%
Total	100.00%	100.00%	100.00%	100.00%

Source: Population Census, Management and Coordination Agency.

Corresponding changes in the quality of jobs available in the manufacturing industry in terms of occupational composition are depicted in Figures 22-23. First of all, the number of professional and technical jobs in manufacturing has grown considerably between 1970 and 85 across the nation. In Kitakyushu City, as expected, the share of professional and technical workers among manufacturing industries is higher than in Fukuoka Prefecture or in the nation as a whole, unlike the situation in tertiary industry. This is probably the result of the employment structure within the industry, which is dominated by raw-material-type industries such as chemical and steel manufacturers that produce high-value-added products with much higher labor productivity than the national average. These industries, which are made up of a few large firms, have been operating in the area for a long time and have gone through many stages of rationalization. As a result, they have developed a highly skilled workforce that, coupled with advanced technology,

[7] Nissan's new assembly plant in Karita-cho, just south of Kitakyushu City, produces about 40,000 cars per month. Toyota started operation of its new assembly plant in Miyata-cho in December 1992; this plant is also situated to the south of the city. For Toyota, this is the first major production plant away from its original location in Nagoya.

efficiently manufactures high-value-added products. As observed in Figure 23, the downsizing of this industry prior to 1985 took place mostly in terms of production jobs, leaving professional jobs on site. Even though the ideal statistics are not available, it is likely that the assembly-type manufacturing sector in Kitakyushu, which has a particularly low value added per worker and is principally made up of small firms, has few professional and technical positions compared with its national counterparts.

Figure 23: NATIONAL AND KITAKYUSHU INDEX OF GROWTH FOR WORKERS ENGAGED IN MANUFACTURING INDUSTRY, BY OCCUPATION: 1985 (1970=100)

	NATIONAL 1985	KITAKYUSHU 1985
Prof&Tech	168	124
Managerial	92	81
Clerical	110	76
Sales	166	153
Trans&Comm	70	38
Production	99	69
Protective Services	53	36
Personal Services	45	44
All Occupations	103	73

Source: Population Census, Management and Coordination Agency.
Notes: Above indexes are computed by treating their figures in 1970 as 100.

6. Summary

Kitakyushu City, unlike the nation as a whole, has changed its number of workers available to non-primary industries little in the last 20 years largely due to the basic demographic factors we described earlier: the fact that the city had experienced accelerated rates of out-migration of young workers leaving the remaining population to age faster, and that there were only few primary industry workers who could potentially engage in secondary or tertiary activities to help fuel the expansion of the economy. Nevertheless, the employment share has shifted gradually from manufacturing to service sector industries. As a result, the growth rate of the service sector population, although responsible for the largest growth in the city in last 20 years, has been much lower than that of other large cities in the nation, which had concomitant growth in their overall working populations. In

those cities, the enormous expansion of the service sector absorbed most of the growth in the labor force.

Nationally, assembly-type manufacturing, which includes many high-technology industries as well as mass-production car manufacturing firms, has the largest employment share and the highest labor productivity. In Kitakyushu City, however, these firms are responsible for a much smaller share of the manufacturing industry, are much smaller in scale, and have much lower labor productivity than the national average. Instead, it is few large raw-material-dependent manufacturing firms that have dominated the city's employment and value added since the beginning of this century. This made the city's manufacturing employment sensitive to the economic climate experienced by these firms, such as exchange rate and oil price fluctuations. Pressured by these external disturbances, the large raw-material based manufacturing firms have gone through a substantial rationalization accompanied by a drastic downsizing over the last 20 years. To this day, however, they are still the dominant industry in the city from various viewpoints. They have achieved the highest value added to shipment value ratio, as well as the highest productivity in the city; indeed, these figures are much higher than the national average. They also have more workers engaged in knowledge-intensive jobs than the nation at large. Moreover, most small and medium sized manufacturing firms in the city are parts suppliers for them, and hence, are still somewhat dependent on the economic circumstances of these large firms.

The process of rationalization carried out by the large raw-material-dependent firms created a vast number of surplus workers. Most of these workers, however, did not immediately enter the pool of unemployed but were absorbed by the enterprise's or its group's internal labor market. As a result, smaller establishments of subsidiaries or joint ventures were created, most of which engage in high-technology manufacturing (such as development of new materials, electronics, and robotics), or in service activities. A large gap in technological ability exists between them and the other small and medium-sized manufacturing firms that are the suppliers of the large enterprises.

The emergence of the high-technology-oriented venture firms in Kitakyushu provided a demand for high-technology activities that extended to the tertiary industry, business service sectors in particular. Nonetheless, the employment accumulation in business service industry, despite its recent remarkably high growth in employment share, is much smaller than that of the other large cities in the nation. Moreover, contents of jobs in the service sector is still not as knowledge intensive as is portrayed in the national picture. Despite the city's relatively large share of specialized service sector, the city still lacks professional and technical jobs, as well as managerial jobs. It is interesting to note, however, that the story is different when we focus only on female workers: the share of

female workers engaged in service sector jobs is much higher than in the nation as a whole, and the share of professional workers is much higher compared with national average, or even with Fukuoka City.

7. Concluding Remarks

As seen, the city's industrial development has been largely dependent on a small number of large heavy manufacturing enterprises that, with the help of public policies, have so far succeeded in the gradual downsizing and diversification of industry activities to high-technology and other tertiary activities in their quest for further production efficiencies and in their pursuit of robust markets. What makes them hold the edge to higher productivity may be economies of scale, the efficient match between human capital investment strategies and other technological strategies of the firms, better worker training, better work organization, or, simply, better workers, since larger firms are able to recruit workers from all over the country, which is often not possible in smaller firms.

On this issue, some insights can be drawn from the results of our survey conducted towards 44 firms in the city of Kitakyushu. According to this survey, the group of large raw-material-dependent manufacturing firms are indeed found to have high technology levels and innovative, participatory work organizations and employment systems. They are also found to conduct a large amount of formal training in general and teamwork training in particular.[8] As expected, they exhibited the highest growth in sales over the last three years of all the groups of firms in the sample. Their prospects for future sales growth, however, was rather pessimistic, and the growth in capital and equipment, as well as employee size has been sluggish. In this respect, it is doubtful whether the economic strength or the traditional importance of their parent companies can be counted upon to lead the expansion of this local economy which is experiencing rapid changes in its industrial structure.

In this paper, we have also seen the importance of the implication behind the restructuring process of the large raw-material based manufacturing firms, its expansion to service sectors in particular, because it leads to further development of business activities across all sectors of the economy. Even though the recent trend of their downsizing has induced changes in the vulnerable character of the industry by diversifying their employment structure into activities other than heavy manufacturing, the result of our survey

[8] Refer to Kurosawa and Zemsky (1997) for details.

shows that these newly created firms have not necessarily shown a consistent record of success.

A rapid shift away from heavy manufacturing toward service sector enterprises, and a concomitant shift toward small and medium-sized enterprises together makes it uncertain whether the productivity improvements of the past, made possible by automation and advanced robotics, coupled with substantial investments in work-related training and education, will likely be matched in the future. The answering of this question has been made more complicated by a basic change in the technological nature of work, the progress in information technology in particular. These changes, as well as rapid aging of the workforce, increasing reliance on part-time, elderly, and female workers, and increased international competition, are spurring changes in the training, employment, and organizational strategies vis-a-vis capital investment strategies that the Japanese have relied on for more than four decades to sustain their economic competitiveness.

There are already enough indications in the responses of our Kitakyushu survey to suggest that the traditional patterns could indeed be changing. It is intriguing to find that a group of establishments that had the most consistent record of growth was small to medium sized establishments in non-manufacturing sectors. In particular, those are enterprises that appear to be much more aggressive—one might say almost "unJapanese" in how they recruit, train, and manage their workforces. They are much more likely to hire (as opposed to train for) the skills they need. This means that they are more likely to turnover their workforces, just as they are more likely to consider ability as opposed to seniority when awarding pay increases and promotions. The success of these establishments may mean real changes are ahead for the Japanese economy and workforce.

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