THE DYNAMICS OF REGIONAL LABOUR MARKETS IN JAPAN

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ABSTRACT Two major economic transformations, viz. a rural/industrial and an industrial/service-oriented change, have affected the structure of regional labour markets in Japan. Technological change and changing attitudes towards work have been major forces in shaping the spatial patterns of these transformations. These patterns are examined with respect to their implications for the core-periphery relations. A major question in this context is to what extent there has been a tendency towards convergence or whether the forces of divergence have been stronger. Important indicators to measure the dynamic aspects of this spatial transformation process are differences in types of R & D employed, changing participation rates of males and females and the spatial patterns of job creation and job destruction. It appears that the existing pattern of core-periphery relations is rather persistent over time, with a slight tendency for the core region to incorporate some upward transitional regions and in this way, extend its spatial domain.

1. INTRODUCTION

A striking feature of the Japanese regional system is the long lasting, almost continuous dominance of its metropolitan core, which stretches from Tokyo to Osaka. Does the process of economic restructuring strengthen the existing relations and thereby reinforce the position of the core or does it also affect the core-periphery relations in a dynamic way? Restructuring involves not only changes *in situ*, but may also have consequences for interregional interdependencies. It is against this regional setting, that the two questions raised above about the regional effects of changes in participation rates and with respect to job creation and destruction will be analysed.

2. INDUSTRIAL CHANGE AND REGIONAL RESTRUCTURING

In Japan the labour force grew from 53 to 62 million people over the 1970-1990 period. Nearly all of this growth has been absorbed into the tertiary sector (see Table 1 and Figure 1). It can be observed from this figure that the share of employment in the secondary sector remained fairly stable in absolute numbers during the same period. As far as relative numbers go the share declined from 37% in 1970 to 34% in 1990. This implies not so much a shift from manufacturing towards services, as

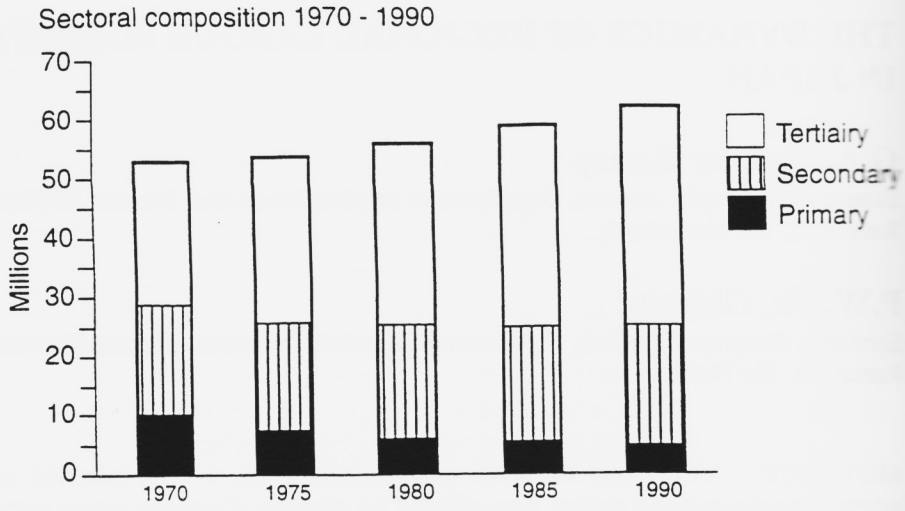

Figure 1. Sectoral Share in Total Employment, 1970-1990.

a transformation towards a service economy, while retaining a strong industrial basis. When the sectoral composition of the Japanese economy is compared with that of the other OECD countries for 1994 (OECD, 1996) the strongest similarity appears to be with the German economy (see Figure 2). The secondary sector share of countries like the UK, USA and Canada are all below 30 percent. Following Bell's (1973) criterion, viz. that an economy has become a service economy when more than 50% of its labour force is engaged in the service sector, it could be argued that the Japanese economy reached this stage after 1975. Castells and Aoyama (1994) argue however that there are two types of countries emerging. The first is the 'service economy model', in which the increase in the tertiary sector is realised at the cost of the primary and secondary sector. The second is the 'info-industrial model', in which the manufacturing sector has retained its share over the last 20 years. The emerging information society still has strong links and is to a considerable extent based upon the manufacturing activities at large. It is obvious that the Japanese economy fits this description much better than the first.

Table 1. The Percentage Changes in Sectoral Employment in Japan During 1970-1990

	1970	1975	1980	1985	1990
Primary	21	14	11	9	7
Secondary	37	35	34	33	34
Tertiary	42	51	55	57	59
Total	100	100	100	100	100

Source: Management and Coordination Agency, Population Census, 1970-1990

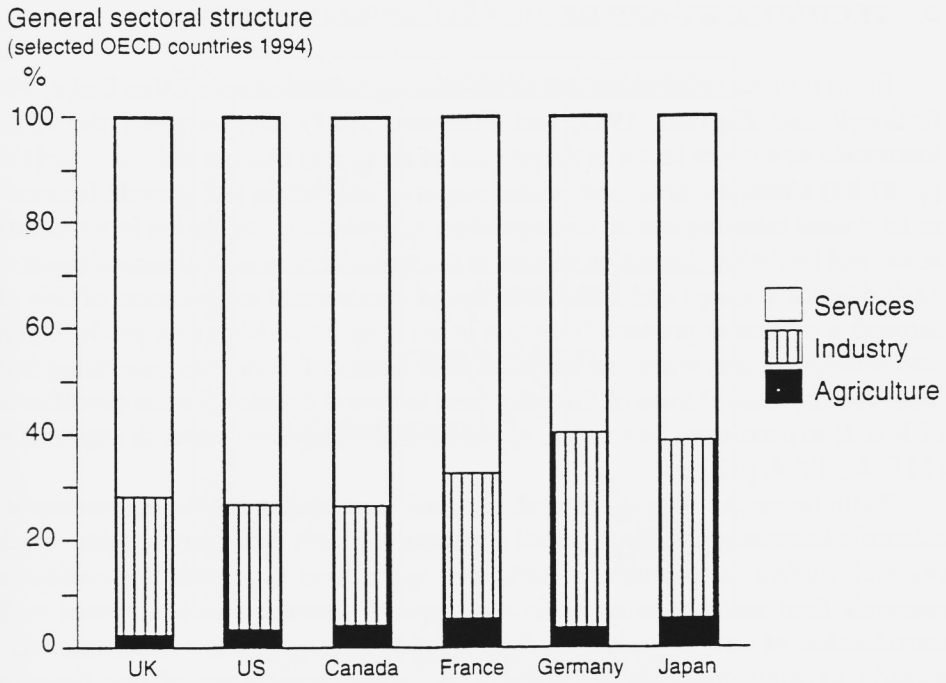

Figure 2. General Sectoral Employment Structure for Selected OECD Countries, 1994.

This does not imply that there has been no change within the manufacturing sector itself. During the 1960s and 1970s there has been a rapid transformation from a labour force characterised by a large proportion of unskilled labour, to one which is highly skilled and technologically advanced (Magaziner and Hout, 1985). A number of authors, such as Dennison and Chung (1976) and Madison (1991), have stressed the positive correlation between an increase in the level of education, technological development and economic growth. In turn, economic growth has enabled Japan to invest in Education by expanding the number of upper level secondary schools and colleges (IRDAC, 1992, p. iv). The question one could raise here, is the extent in which these developments occur predominantly in the urban core regions within the national economy and thereby reinforce the economic differences between the core and the periphery.

Although the total number of people employed in manufacturing remained stable over time, this does not imply that the spatial distribution remains unchanged. Witherick and Carr (1933, p. 102) discuss the spatial shifts in manufacturing employment over the 1960-90 period and demonstrate a strong shift between the core and the periphery. The core region, which contains Southern Kanto, Tokai and Kinki, has lost employment while the Northern Kanto plain and more peripheral regions as Tohuko and Kyushu gain in manufacturing employment.

3. TECHNOLOGY AND REGIONAL DEVELOPMENT

Since the late 1970s many authors following Schumpeter (cf. Van Duijn, 1982; Rothwell and Zegveld, 1985; and Freeman, 1987) have stressed the role of innovation as a major factor in the process of economic change. Schumpeter (1939, pp. 87-88) identified three time-related stages of innovation and growth. Innovation in its widest meaning can be distinguished in invention, innovation in a restrictive sense and imitation. Invention relates to the material or practical embodiment of a basic idea or concept and innovation to the commercial exploitation of this idea through a particular product. Imitation is the stage at which a new product comes into widespread use, when one producer after another follows the innovating firm's lead. The Japanese Bureau of Statistics uses the same division for the classification of R & D expenditures, viz. basic, applied and development research expenditures (M.C.A., 1994, p. 23).

Basic research refers to research primarily undertaken for the advancement of scientific knowledge, where a special application is only indirectly sought. Applied research differs in that here, a particular application is intended. Development research then makes use of basic and applied research and is directed to the introduction of new materials equipment, products, etc. or the improvements of already existing materials or products. A further breakdown of this three-fold classification into six categories is provided by the National Institute of Science and Technology Policy (NISTEP, 1994, pp. 3-4) of the Science and Technology Agency (STA) of the Japanese Ministry of International Trade and Industry (MITI). On a prefectural level these six categories are again summarised into three broad classes, the science and technology base, research and development activities and the fruits and contribution of science and technology (NISTEP, 1994, p. 309). The use of these measures of R & D expenditures is widely accepted as a reliable proxy of innovative activities, although Freeman (1987, p. 9) observed that this indicator does not take into account the innovations within production and engineering departments of large firms as well as part-time innovative activities in small firms, e.g. software houses. The use of the basic R & D indicator will to some extent, counterbalance this potential bias created in the applied and development statistics. However, as Patel and Pavitt (1992, p. 2) observe, it remains very difficult to measure precisely, compare and analyse technological accumulation and therefore all measures of technological activities are bound to be imperfect. With these shortcomings in mind, these three indicators will be used here in the subsequent analysis.

The link between regional development theory and innovation theory of technological change is provided by the product life cycle theory (cf. Van der Knaap and Van Geenhuizen, 1990, p.173; and Dicken, 1991). Here the three stages of the innovation process are related to different stages in the regional location of firms, viz. from core to periphery. The combination of the concept of technological change, with its associated requirements for particular skill levels and the regional context in which these can be observed suggests the following framework for the analysis (see Figure 3). The core region is associated with high skill levels and high, basic or advanced levels of technology. In contrast with this is the periphery, where generally

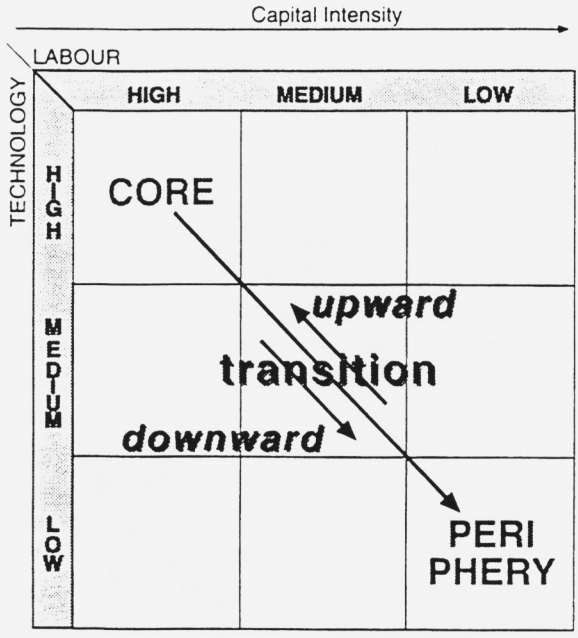

Figure 3. The Labour Technology Matrix.

low levels of skill and the least advanced types of innovation can be observed, sometimes associated with high levels of capital intensive production. Of particular interest here is the distinction made to identify a third category, viz. the transitional zones. Two types of zones can be identified: upward transitional and downward transitional. These zones are dynamic zones in which economic restructuring takes place on a more or less continuous basis. Upward transitional zones may provide functional and spatial extensions to the core region, whereas downward transitional zones tend to develop or have closer links or structural similarities with the periphery.

This approach is related to the theoretical debate about the nature of regional development over time (see also Lipshitz, 1992; Van Geenhuizen and Nijkamp, 1995, pp. 50-51). Two schools of thought have developed over the last thirty years. The first school found its roots in general equilibrium theory within economics and therefore assumes by analogy, that regional differences will disappear over time and thus will lead to a spatial convergence. The second school bases itself upon disequilibrium theory, in which it is postulated that structural differences are the normal state of affairs and even within the context of evolutionary change there is no predetermined trajectory towards convergence (cf. Boschma and Van der Knaap, 1997). From the latter perspective, regional divergence can be a logical outcome of a development trajectory. It will be interesting here to observe whether the differences between the core and periphery in Japan will diminish over time or whether they are increasing.

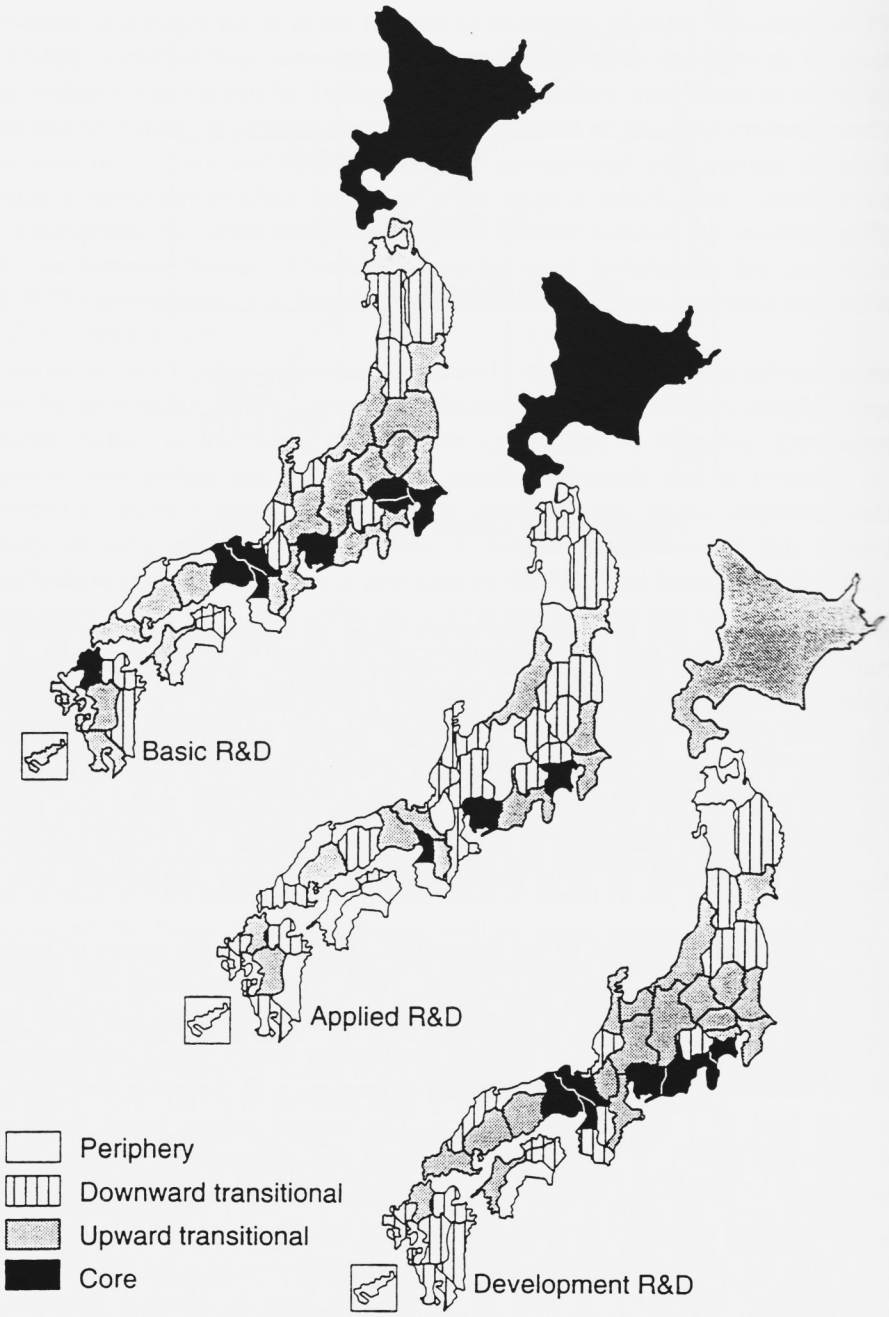

Figure 4. Core-Periphery Patterns for Three R & D Indicators, 1992.

Using the three R & D indicators for 1992, viz. basic, applied and development research, the 47 prefectures of Japan are classified into four categories, i.e. core, upward and downward, transitional and periphery. The regions are ranked on the basis of the magnitude of the technology indicators and allocated using the natural breaks in the frequency distribution displayed. The results are shown in Figure 4.

The basic technology indicator is constructed on the basis of two proxies: the number of student by region and the inflow and outflow of students. The number of students reflects the potential social innovation power as a crude measure for the acceptance and generation of inventions. the inflow versus outflow provides an indication of the relative attraction of a region and is probably linked to the presence of educational institutions of which those with a high status are located in a core area. The spatial distribution of this indicator shows a close correspondence with the large urban and metropolitan areas in the Pacific belt, with Tokyo, Kyoto/Osaka and Aichi in the first, second and third positions. The second position of Osaka next to Tokyo reflects the bi-polar structure of the Japanese urban system. This is also incorporated in the *nigan-refu* policy of the government that is aimed at a simultaneous development of the West and East axis of Japan (National Development Plan, 1987). The spatial pattern of the basic indicator shows a rather close similarity with the core periphery map (see Figure 5) which also includes a resource frontier, developed by Witherick and Carr (1993, p. 168, Figure 9.9). The second indicator measures the degree of applied technology and is a combination of four proxy variables, viz. the amount of science and technology expenditure, the number of both public and private research institutions, the number of researchers and the number of universities, both national, public and private. This indicator measures the degree to which technology can be invented and is rather similar to indicators which measure input statistics of R & D as opposed to output indicators. When the spatial pattern of the development indicator is compared with the pattern of the basic R & D indicator, then one may observe a shift between the core and periphery. The core area consists of fewer prefectures and is more concentrated around the three largest metropolitan areas. At the same time there is an increase in the number of downward transitional and peripheral prefectures.

The third indicator is the development indicator, which reflects the results of technological change and its orientation towards applications. It consists of three proxies, viz. the number of patents, the total number of protection rights and the number of venture companies. As far as the core areas are concerned there are no noticeable differences from the previous patterns, although the prefectures located in the Pacific belt provide a good location for development expenditures. More of the prefectures can be categorised in the upward transitional classification.

Finally, the combined effect (see Figure 5) reinforces the position of the three largest metropolitan areas into the core with Niigata and Sendai in the upward transitional group and the downward transitional group consisting of the remainder of Northern Honshu, prefectures in the Japanese Alps, Shikoku and southern Kyushu.

The classification discussed above will now provide the basis for the analysis of structural changes in the regional labour markets and the amount of job creation and

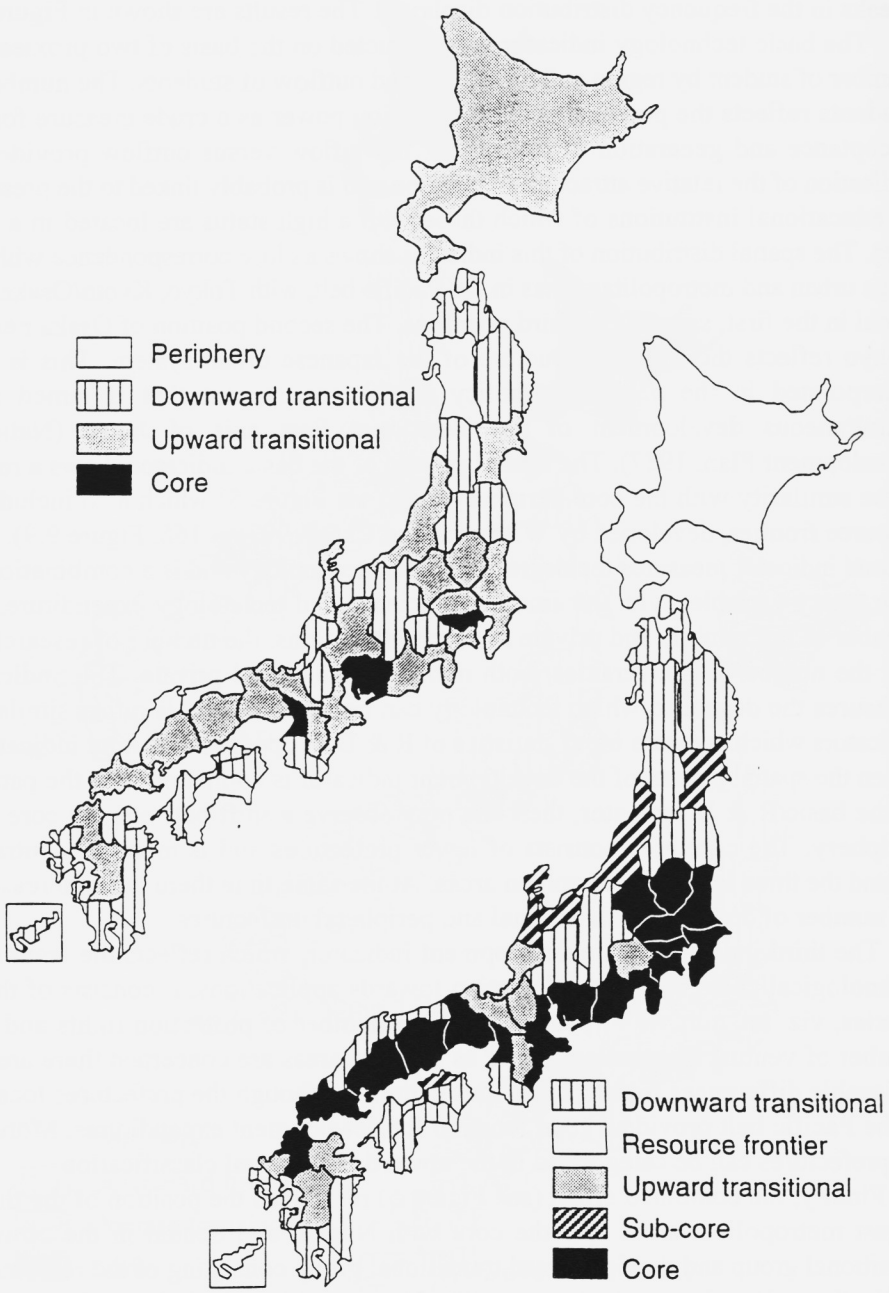

Figure 5. The Classification of Prefectures on the Basis of the Core-Periphery Principle (A - authors' calculation; B = Witherick and Carr).

job destruction which took place during the 1970-1995 period. The distinction between core, intermediate and periphery is based on 1992 data and is thus assumed to be stable over time. This allows us to observe the extent of spatial variation in the other two variables.

4. LABOUR MARKET DYNAMICS AND REGIONAL CHANGE

The population of Japan has grown rapidly from almost 70 million in 1960 to around 125 million in 1995. This rate of growth cannot be immediately applied to estimate the growth of the active labour force. A major factor in this is the demographic composition of the population and its changes over time. In addition to this one can observe considerable variations in the size of the labour force caused by changes in the rate of participation of the total labour force, as well as for the male and female components separately. In addition to this, it is not only the rate of participation which determines the total size of the labour force, but also the rate and volume of unemployment which have to be taken into account.

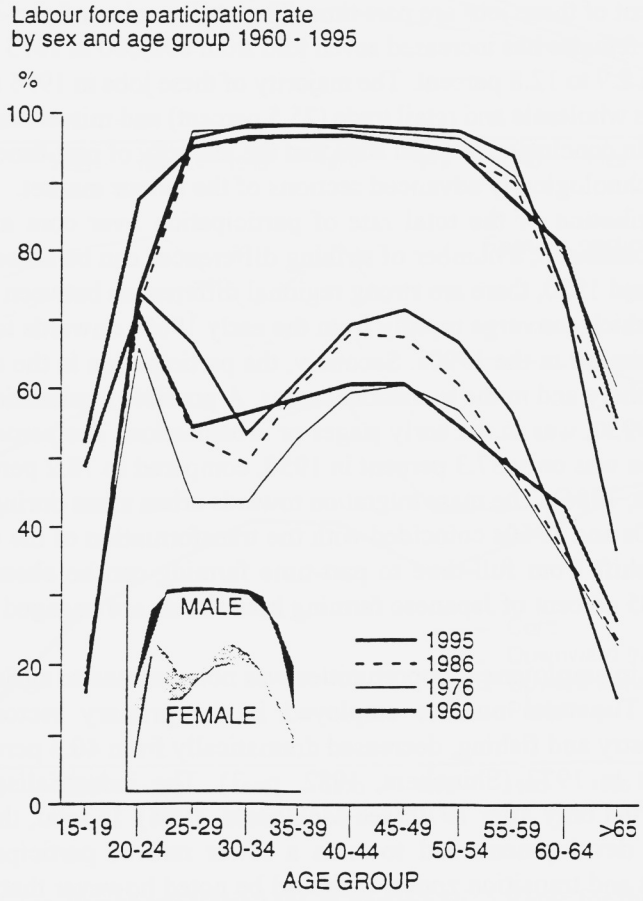

Figure 6. Age Specific Male and Female Participation Rates.

In contrast to the growth of the population at large the total size of the labour force is growing at a much slower rate, which is reflected in a declining rate of participation from 69.2 in 1960 to 63.1 in 1995 (J.I.L., 1995). One should note that the participation rate in Japanese labour statistics is defined as the ratio of the population of 15 years and above to the total population and is not restricted to the population in the 15-64 year age group. Thus one of the factors which explains the declining rate is the increase in the population younger than 15 years. Another factor is the changing rate of participation of the male labour force. This change is caused on the one hand by a decline in the number of workers older than 65 years and on the other hand by a sharp drop in the 65-69 year age group. In contrast to this is the increase in the rate of female participation over time since the 1950s (see Figure 6).

It is remarkable though that the M-shape of this curve is very consistent over time compared to a similar development in participation rates in other industrialised nations, where this feature gradually dissolves after 1980. The implication of the continuing presence of the 'child-gap' is the exit of young women and re-entry around the age of 35, leading to a much lower overall participation than would have otherwise been the case. In addition to this, one has to take into account the fact that almost 70 percent of these jobs are part-time. The total number of part-time jobs for both males and females has increased seven fold from 698,600 in 1975 to 4,902,300 in 1995 or from 2.9 to 12.8 percent. The majority of these jobs in 1995 can be found in sectors such s wholesale and retail trade (25.5 percent) and miscellaneous services (12.4 percent). In conclusion one can state that the majority of part-time jobs are not found in the technologically advanced sections of the labour market.

When distribution of the total rate of participation over core areas and the periphery are considered, a number of striking differences can be noted (see Figure 7.). Firstly, around 1950, there are strong regional differences between the core and the periphery, which converge rapidly from the early 1960s onwards to continue to become rather similar in the 1990s. Secondly, the participation in the core is lower than in the periphery and in the transitional areas. A possible explanation is the fact that Japan in 19950, was in the early stages or urbanisation. The percentage of the urban population was only 37.3 percent in 1950, compared to 78.2 percent in 1990 (see also Kuroda, 1986). The mass migration towards urban areas during the second half of the 1950s and 1960s coincided with the transformation of the countryside. Here, a major shift from full-time to part-time farming can be observed. At the moment about 85 percent of Japanese farming households are engaged in part-time farming.

The decline in employment opportunities was not confined to agriculture in its narrow sense. The total number employed in the primary sector, including agriculture, forestry and fishing, decreased dramatically from 40.5 percent in 1955 to 11.9 percent in 1977 (Shinohara, 1982, p. 3). The industrialisation of the countryside started only after 1970 (see McDonald, 1996). In total, the combined effect of these developments led towards a lower rate of participation in the peripheral areas and transition zones. It should be noted however that the upward transitional regions have experienced the smallest rate of change over time.

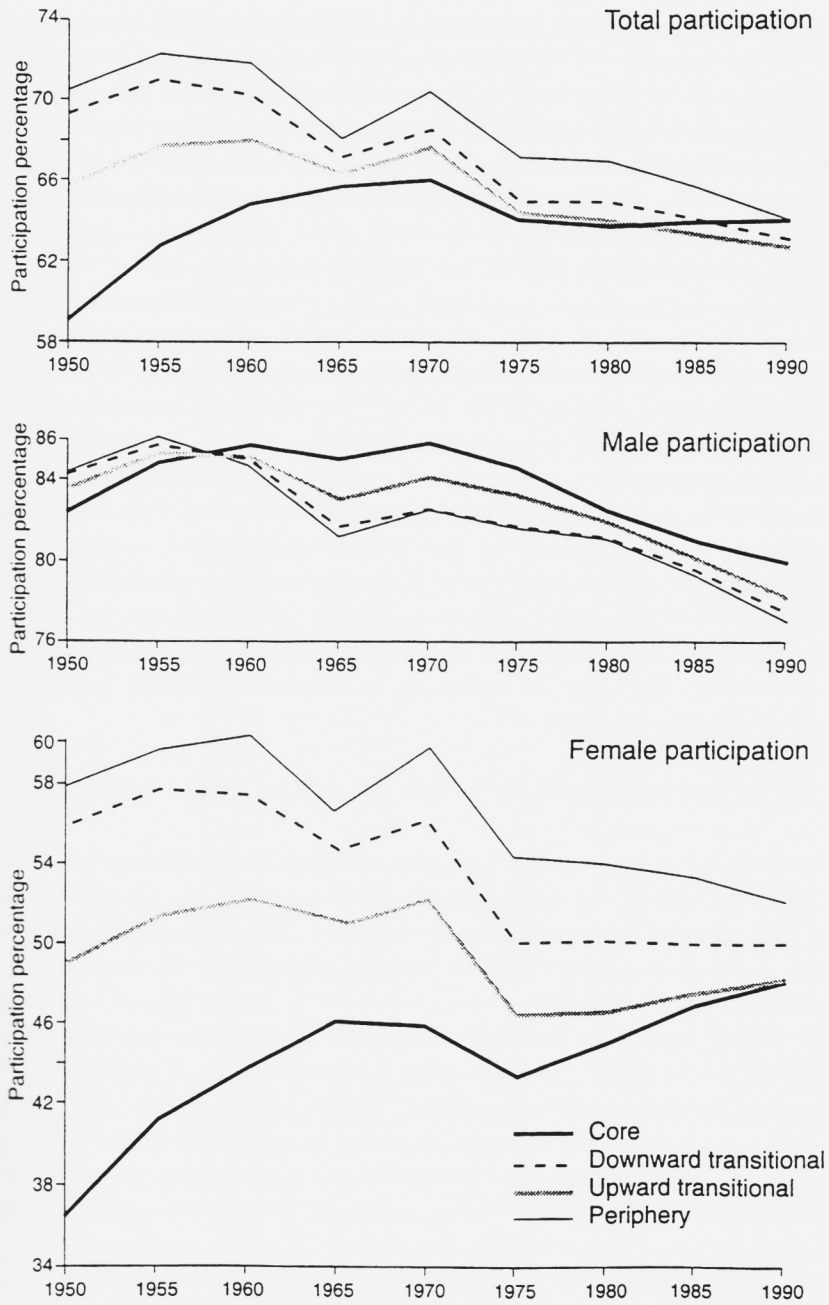

Figure 7. Core-Periphery Variations in Participation Rates for the Total Labour Force, Males and Females, 1950-1990.

The total participation rates reflect of course the combined effect of male and female participation and one may observe some interesting differences between these two (see Figure 7b, c). First, the differences between male participation rates across core and periphery are rather small during the 1950s and this remains so in the 1990s, with the exception of the core region. Secondly, the participation rates in the core were below those of the other regions until the 1960s when they increased and became the highest in the country. Although there was a slight tendency towards divergence during the second half of the 1960s and early 1970s, this disappeared again in the 1980s. Thirdly, the general decline in national participation rates commented upon above can also be observed in the strong and continuous decline of the male participate rates over all the regional types since 1970.

Development of the female participation rates follows a different trajectory, the early stages of which, until 1965, are clearly reflected in the overall rates. This tendency towards convergence continued very strongly during the 1980s until quite small differences were achieved in the 1990s. Two additional comments have to be made at this point. The first concerns the rather low participation rates in the core regions, which consistently remain below the rates in the other regions. The second point relates to the rather sharp decline in the 1970-75 period. This decline may be attributable to the echo-effect of the 1947-49 baby-boom, which has, as a consequence, the strong temporary exit of females from the labour market.

The dynamics of the labour market are not only associated with the supply side caused by variations in demographic composition and social and cultural differences of the population, but also by variations in demand related to changes in the (regional) production structure.

5. REGIONAL PATTERNS OF JOB CREATION AND DESTRUCTION

The structural changes in the economy which occurred during the 1970s and 1980s had their effects on the occupational structure of the labour market, the sectoral and regional composition of the industry. The changes thus involve both functional and regional dynamics. The functional dynamics are usually expressed through occupational mobility, which can result in either upward or downward mobility. This is especially the case in Japanese firms, where job rotation exists, commonly known as *shukko,* which implies that workers can be shifted to different jobs, locations, divisions and companies (cf. Shapira, 1993, pp. 241-242; Wiltshire, 1995). This out-placement is not only occurring at retirement times, but may also take place in periods of structural reorganisation and involve suppliers or even unrelated companies. The *shukko* worker continues to receive seniority, wages and benefits as if still employed at the parent company. Thus job security does not imply occupational or spatial stability. The system allows for considerable shifts within this context, which can also be observed on a more aggregate level.

The changes in sectoral, occupational and regional patterns are examined here following the approach outlined by Davis and Haltiwanger (1992) (see also Blanchflower and Burgess, 1966). This method allows us to distinguish between prefectures, industries and jobs separately, as well as to take into account the pair-

Table 2. Indicators for Employment Dynamics: Job Creation and Destruction in Absolute Numbers

	Net Difference	Gross Result	Destruction	Creation	Average No. Jobs 1970-95	Region
01 Hokkaido	-6,314	134,690	70,502	64.188	2,659,985	3
02 Aomori	7,001	11,768	2,384	9,385	710,662	2
03 Iwate	10,456	83,373	36,458	46,914	757,316	2
04 Miyagi	58,224	58,224	0	58,224	1,018,205	1
05 Akita	-7,134	14,544	10,839	3,705	648,183	2
06 Yamagata	1,904	11,0801	4,588	6,492	648,183	2
07 Fukushima	17,753	21,185	1,716	19,469	1,031,969	2
08 Ibaraki	76,474	76,474	0	76,474	1,274,892	3
09 Tochigi	41,430	41,430	0	41,430	921,461	3
10 Gumma	30,924	38,918	3,997	34,921	950,026	3
11 Saitama	324,700	324,700	0	324,700	2,675,442	3
12 Chiba	263,667	263,667	0	263,667	2,304915	3
13 Tokyo	136,546	156,406	9,930	146,476	5,919,577	4
14 Kanagawa	318,577	318,577	0	318,577	3,410,574	3
15 Niigata	6,193	23,371	8,589	14,742	1,275,525	2
16 Toyama	6,271	12,273	3,001	9,272	582,456	2
17 Ishikawa	16,742	19,406	1,332	18.074	577,691	3
18 Fukui	6,837	10,695	1,929	8,766	429,679	2
19 Yamanashi	15,047	19,541	2,247	17,294	415,623	2
20 Nagano	16,187	33,121	8,467	24,654	1,135,378	2
21 Gifu	27,221	34,385	3,582	30,803	1,015,030	3
22 Shizuoka	85,301	85,301	0	85,301	1,806,947	3
23 Aichi	170,043	170,043	0	170,043	3,188,030	4
24 Mie	27,176	33,146	2,985	30,161	845,199	3
25 Shiga	30,797	36,889	3,046	33,843	555,379	2
26 Kyoto	34,724	34,724	0	34,724	1,211,808	3
27 Osaka	142,718	142,718	0	142,718	3,968,066	4
28 Hyogo	65,563	76,895	5,666	71,229	2,407,726	3
29 Nara	44,043	44,043	0	44,043	542,172	3
30 Wakayama	1,067	11,536	5,235	6,302	502,606	2
31 Tottori	1,707	3,771	1,032	2,739	318,380	1
32 Shimane	-3,575	8,423	5,999	2,424	410,878	1
33 Okayama	14,356	22,482	4,063	18,419	942,464	3
34 Hiroshima	33,186	33,186	0	33,186	1,358,561	3
35 Yamaguchi	2,993	5,986	1,496	4,489	769,310	3
36 Tokushima	-2,553	7,577	5,065	2,512	398,824	2
37 Kagawa	-105	18,821	9,463	9,358	507,598	2
38 Ehime	5,904	26,185	10,141	16,045	721,096	2
39 Kochi	-626	9,501	5,063	4,437	406,716	1
40 Fukuoka	97,656	97,656	0	97,656	2,065,000	3
41 Saga	6,229	12,375	3,073	9,302	419,030	2
42 Nagasaki	3,642	11,241	3,800	7,442	698,525	2
43 Kumamoto	16,126	21,652	2,763	18,889	844,881	3
44 Oita	437	25,182	12,373	12,810	570,457	2
45 Miyazaki	11,495	13,183	844	12,339	549,338	2
46 Kagoshima	-22,026	41,006	31,516	9,490	458,404	2
47 Okinawa	27,485	39,029	5,772	33,257	458,404	2
Total	2,162,469	2,162,469	28,892	459,991	57,622,625	

Source: The Population Censusses 1970-1995.

Table 3. Indicators for Employment Dynamics: Relative Job Creation and Destruction

	% Created	% Destroyed	% Gross Mutations	% Pure Reallocation	% Pure Reallocation Within Industries	% Pure Reallocation Between Industries	Region
01 Hokkaido	2.41	2.65	5.06	4.83	2.27	2.55	3
02 Aomori	1.32	0.34	1.66	0.67	0.33	0.34	2
03 Iwate	6.19	4.81	11.01	9.63	4.31	5.32	2
04 Miyagi	5.72	0.00	5.72	0.00	0.00	0.00	3
05 Akita	0.60	1.77	2.37	1.21	0.60	0.61	1
06 Yamagata	1.00	0.71	1.71	1.42	0.70	0.72	2
07 Fukushima	1.89	0.17	2.05	0.33	0.17	0.17	2
08 Ibaraki	6.00	0.00	6.00	0.00	0.00	0.00	3
09 Tochigi	4.50	0.00	4.50	0.00	0.00	0.00	3
10 Gumma	3.68	0.42	4.10	0.84	0.42	0.42	3
11 Saitama	12.14	0.00	12.14	0.00	0.00	0.00	3
12 Chiba	11.44	0.00	11.44	0.00	0.00	0.00	3
13 Tokyo	2.47	0.17	2.64	0.34	0.17	0.17	4
14 Kanagawa	0.34	0.00	9.34	0.00	0.00	0.00	3
15 Niigata	1.16	0.67	1.83	1.35	0.66	0.68	3
16 Toyama	1.59	0.52	2.11	1.03	0.51	0.52	2
17 Ishikawa	3.13	0.2	3.36	0.46	0.23	0.23	3
18 Fukui	2.04	0.45	2.49	0.90	0.44	0.45	2
19 Yamanashi	4.16	0.54	4.70	1.08	0.53	0.55	2
20 Nagano	2.17	0.75	2.92	1.49	0.73	0.76	2
21 Gifu	3.03	0.35	3.39	0.71	0.35	0.36	3
22 Shizuoka	4.72	0.00	4.72	0.00	0.00	0.00	3
23 Aichi	5.33	0.00	5.33	0.00	0.00	0.00	3
24 Mie	3.57	0.35	3.92	0.71	0.35	0.36	3
25 Shiga	6.09	0.55	6.64	1.10	0.54	0.55	2
26 Kyoto	2.87	0.00	2.87	0.00	0.00	0.00	3
27 Osaka	3.60	0.00	3.60	0.00	0.00	0.00	4
28 Hyogo	2.96	0.24	3.19	0.47	0.23	0.24	3
29 Nara	8.12	0.00	8.12	0.00	0.00	0.00	3
30 Wakayama	1.25	0.14	2.30	2.08	1.01	1.07	2
31 Tottori	0.86	0.32	1.18	0.65	0.32	0.33	1
32 Shimane	0.59	1.46	2.05	1.18	0.58	0.60	1
33 Okayama	1.95	0.43	2.39	0.86	0.43	0.44	3
34 Hiroshima	2.44	0.00	2.44	0.00	0.00	0.00	3
35 Yamaguchi	0.58	0.19	0.78	0.39	0.19	0.20	3
36 Tokushima	0.63	1.27	1.90	1.26	0.62	0.64	2
37 Kagawa	1.84	1.86	3.71	3.69	1.77	1.91	2
38 Ehime	2.23	1.41	3.63	2.81	1.35	1.46	2
39 Kochi	1.09	1.24	2.34	2.18	1.06	1.12	1
40 Fukuoka	4.73	0.00	4.73	0.0	0.00	0.00	3
41 Saga	2.22	0.73	2.95	1.47	0.72	0.75	2
42 Nagasaki	1.07	0.54	1.61	1.09	0.54	0.55	2
43 Kumamoto	2.24	0.33	2.56	0.65	0.32	0.33	3
44 Oita	2.25	2.17	4.41	4.34	2.08	2.25	2
45 Miyazaki	2.25	0.15	2.40	0.31	0.15	0.15	2
46 Kagoshima	1.15	3.81	4.96	2.30	1.13	1.17	2
47 Okinawa	7.25	1.26	8.51	2.52	1.23	1.29	2
Total	0.80	0.05	0.85	0.10	0.05	0.05	

Source: The Population Censusses 1970-1995.

wise interaction between them. Basically, two types of patterns can be identified: a plus category, which refers to employment growth over a specific period, i.e. 'job creation' takes place and a minus category, where job loss can be observed and is called 'job destruction.' Although both categories here are called gross changes, following Davis and Haltiwanger, in essence, they do not represent the gross flows, but are the result of net changes for each prefecture/industry/job (see Tables 2 and 3). As the method allows us to differentiate between changes in industry and between regions their separate effect can be studied as well (see Tables 4 and 5). The term gross in these sub-tables refers to the absolute change in losses and gains in employment.

In Table 5, the labour market dynamics are displayed for the 1970-90 period by five year intervals. In both 1975-80 and 1985-90, employment creation was quite strong, with a peak for the last period, e.g. almost 5 million jobs were created in all industries. In this period gross changes were the largest, while the net changes were the smallest. Job destruction on the other hand was most severe in the 1970-75 period when about 4 million jobs were lost. The fact that the net changes are positive, on average, indicate that the number of jobs in industry have increased. This is also supported by the results of Table 5b, which shows that the number of persons employed has increased on average by 2.2 million every five years.

Sectoral mobility (Table 5c) is much higher than interregional mobility (Table 5e). However, compared to occupational mobility (Table 4f), one may note that this type of change is larger than sectoral change.

These results suggest as a preliminary conclusion that, in the context of economic restructuring, occupational changes are largest, followed by changes in industrial employment and regional employment.

Table 4a. Summary Employment Dynamic Indicators by Core-Periphery Region: Unweighted

Area Indicator	% Creation	% Destruction	% Gross Mutations	% Pure Reallocations	ID Within Industries	ID Between Industries
Core	3.802	0.056	3.858	0.112	0.056	0.056
Upward	4.606	0.279	4.885	0.536	0.260	0.276
Downward	2.558	1.215	3.772	2.079	0.993	1.086
Periphery	0.786	1.199	1.985	1.304	0.640	0.664

Source: Population Censusses, 1970-1995

Table 4b. Summary Employment Dynamic Indicators by Core-Periphery Region: Weighted

Area Indicator	% Creation	% Destruction	% Gross Mutations	% Pure Reallocations	ID Within Industries	ID Between Industries
Core	3.512	0.076	3.588	0.152	0.076	0.076
Upward	5.454	0.340	5.794	0.680	0.338	0.342
Downward	2.415	1.268	3.742	2.595	1.269	1.327
Periphery	0.760	1.311	2.071	1.521	0.750	0.771

Source: Population Censusses, 1970-1995

Table 5. Indicators for Labour Market Dynamics (1970-1990) x 1000 Persons

	1970	1975-1980	1980-1985	1985-1990	Average
a. Industry x Prefecture					
Creation	4,122	4,396	4,115	4,849	4,370
	-3,795	-1,915	-1,303	-1,811	-2,206
Destruction					
Gross	7,917	6,311	5,418	6,660	6,577
Net	327	2,481	2,811	3,037	2,164
b. Occupation x Prefecture					
Creation	3,939	4,712	3,703	5,432	4,446
	-3,888	-1477	-1,945	-1,403	-2,178
Destruction					
Gross	7,827	6,190	5,648	6,835	6,625
Net	51	3,235	1,757	4,029	2,268
c. Between Industries					
Creation	3,651	3,867	3,765	4,094	3,844
	-3323	-1386	-953	-1057	-1,680
Destruction					
Gross	6,974	5,252	4,718	5,151	5524
Net	327	2,481	2,811	3,037	2,164
d. Between Occupations					
Creation	3,318	4,336	2,932	5,021	3,902
	-3,267	-1,101	-1,174	-992	-1,634
Destruction					
Gross	6,586	5,437	4,106	6,012	5,535
Net	51	3,235	1,757	4,029	2,268
e. Between Prefectures (on basis of 1xP)					
Creation	1,054	2,630	2,854	3,279	2,454
	-727	-149	-43	-241	-290
Destruction					
Gross	1,781	2,779	2,897	3,520	2,744
Net	327	2,481	2,811	3,037	2,164
f. Between Prefectures (on basis of OxP)					
Creation	1,094	3,280	2,475	4,272	2,780
	-1,043	-45	-718	-243	-512
Destruction					
Gross	2,136	3,325	3,193	4,515	3,293
Net	51	3,235	1,757	4,029	2,268

Source: The Population Census 1970-1990

To analyse the regional pattern in more detail, a simple index (R) has been constructed on the basis of the ratio between jobs destroyed versus jobs created. If R = 0, no jobs have been destroyed and jobs have only been created. Such a result is feasible as the method employed does not deal with flows of jobs over time in a longitudinal sense, but is in essence, comparing stocks at different points in time and the flows thus represent changes in the stocks. Although this is not an ideal approach, it provides some additional insight into the nature of the regional changes over time

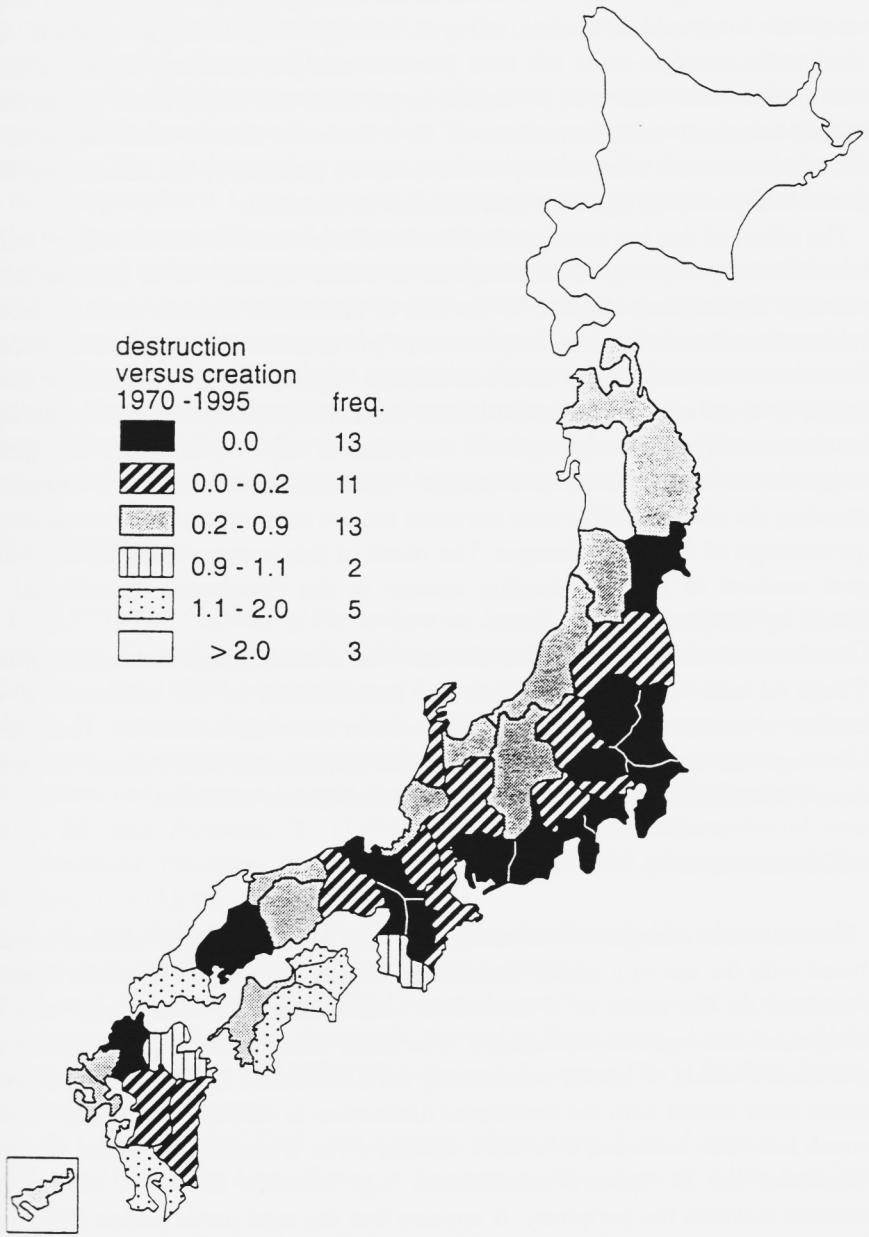

Figure 8. Regional Patterns of the Ratio (R) Between Job Creation and Destruction, 1970-1995

(see Figure 8). An *R*-value of zero can be observed for the metropolitan spill-over prefectures in the Tokyo metropolitan area, such as Ibaraki, Chiba, Saitama and Kanagawa, as well as in the intermediate zone between Nagoya and Osaka. Also some 'free-standing' metropolitan areas in the North (Miyagi, with Sendai) and in the West (Hiroshima and Fukuoka), enjoyed the highest rates of job creation. A value of R=1 indicates that there are both job loss and job creation, but these different forces cancel each other out. *R*- values larger than one imply more job destruction than job creation, whereas values of R>2 indicate that at least twice as much destruction occurs. It is especially in the northern periphery, but also in the West on Shikoku and southern Kyushu, that this can be oberved.

The effect of this job creation and destruction process for the core area, transition zones and the periphery is summarised in Table 4a and 4b. In the last table the percentage figures are weighted by the size of the labour force in each prefecture. It is evident from this table that the process of job creation has been rather successful in the core areas and the upward transitional regions. These regions are the most dynamic in terms of changes on the labour market. The periphery in contrast appears to be the least dynamic region, from the point of view of the gross changes. This theory does not hold for the reallocations. Pure reallocation of jobs is calculated by subtracting the absolute difference between the job creation and job destruction from the percentage of the gross changes. The result of this comparison indicates that the largest amount of job reallocation occurs in the downward transitional areas, followed by the peripheral regions.

Reallocation may occur within the between sectors. From the results presented in Table 4a and 4b, it appears that the contribution of the reallocation within industries is somewhat higher than reallocation between industries. This indicates that the regional component is of considerable importance with respect to its ability to absorb structural changes within the regional labour markets.

6. CONCLUSIONS

The structural changes which occurred in the Japanese labour market have been analysed with the use of a labour-technology matrix. This three-by-three matrix has ben created on the basis of a three-fold classification of technology into basic, development and applied technology. The other dimension of the matrix is based upon a classification of labour concerning the differences in skill levels. These two concepts were linked with the traditional distinction in core and periphery. This dual approach has been extended by a third category, fiz. a transitional zone, which may be characterised as upward transitional, e.g. towards the core, or downward transitional towards the periphery. It appears that the total participation rate contains a strong composition effect. For male participation the differences between core and periphery remain small over time (1950-90). The participation rates of the core, which were the lowest at the beginning of this period, around 1960, reversed their positions vis-a-vis the periphery and subsequently remained the highest. There is a strong spatial difference in the female participation rates concerning core, transitional areas and the periphery. The rates in the downward transitional area are,

and remain rather similar to those in the periphery. Over time however, a clear convergence between the core and periphery may be observed.

The dynamics on the regional labour markets can be separated into two components, viz. job creation and job destruction. A spatial analysis of the pattern of job creation and destruction reveals that within industrial change is stronger than between industrial change. This suggests that the intra-regional dynamics are stronger than the shifts between regions. At the same time the pattern of job creation in excess of job loss is closely related to the metropolitan core regions and their surroundings. The job destruction occurs predominantly in the downward transitional areas and the periphery. Labour market dynamics in these regions reflect to a large extent, reallocations within and between industries.

With regard to the developments of participation rates as one aspect of the labour market, one could note a convergence between the core and periphery. However, the core periphery distinction remained very consistent, considering the pattern of job creation and destruction. It could be concluded that, despite the considerable efforts to diminish these differences through various regional policies, the core-periphery differences have reinforced the core region. The spatial extent of these regions has been extended over time to incorporate some of the upward transitional regions.

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