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Population Concentration at the Turning Point of 1970's in Japan

by *Hidehiko Hama*

During a decade of 1970's, we have experienced a conspicuous change in the inter-regional migration of Japan's population. According to the results computed by "rank-density rule" (instead of "rank-size rule") using 47 prefectures, n-values which represent slope of a series of population density showed an upward trend of population concentration during the past eighty years. However it should be noted that since 1965 the upward tendency of n-value is going down to a stationary level.

In addition to the above-mentioned long-term trend of population movement, several important changes of the current population migration particularly different from of 1960's can be pointed out.

First, total amount of migration among minor civil divisions such as shi, machi and mura is decreasing after reaching the peak at the beginning of 1970's, because of the decline in number of young people in the national population and the economic depression since 1974.

Second, both in- and out- migration rates among prefectures are decreasing since the period 1965-70 and it has resulted in the shrinkage of net migration rate in both urban and rural areas.

Third, under these situations, the metropolitan areas are absorbing the working population from broader local regions than before. For instance, Tokyo is exerting its influence toward the western part of Japan and Osaka toward the eastern part for getting the working people they requires. This means that the metropolitan areas are becoming influential each other toward the regions ever controlled by the other metropolis.

These several changes suggest that the regional shift of Japanese population as a whole are in progress to the phase of shrinkage and equilibrium in 1970's. However, it must be noted that the population migration in 1960's were so rapid and intensive that such stream has resulted in a striking maldistribution of population in both urban and rural areas.

With these situations, the Third Comprehensive National Development Plan of 1977 was

formulated by government and is now in operation. In spite of the above-mentioned difficulties, the key object of the Plan is to promote redistribution and settlement of people living in the big cities toward local cities and towns, which may result in the new stage of urbanization in 1980's.

Growth Determinants of Japanese Cities

by Noboru Sakashita

In a recently published book, *Urban Growth Analysis in Postwar Japan* (Economic Planning Agency of Japanese Government, 1979), the author analyzed various aspects of the growth of Japanese cities after World War II. In the present article, as an excerpt from the book, author attempts to identify the factors which determine the population growth of Japanese cities by the use of discriminant function and regression analyses.

In Section 2, a general model of urban growth is presented as one of final outcomes of the whole analysis. The model simply consists of six equations, and its dynamic properties are examined to a certain extent. Strong sensitivity of the urban population growth (or decay) to the initial configuration and serial change of exogenous factors is clearly pointed out by this examination.

The results of discriminant function analysis are reported in Section 3. Eight or eighteen selected variables very well discriminates high growth cities from low growth cities. Positiveness or negativeness of the contribution made by each variables to cities' population growth is clearly identified and properly interpreted. High correlation between actual growth rates of cities' population and scores of discriminant functions attached to those cities is also recognized.

In Section 4, the results of regression analyses for sample set of all cities for which a complete set of necessary data is available as well as sample sets of categorized cities are reported. After a selective process of explanatory variables, income disparity (actually relative per capita income) is found as the most powerful explanatory factor of urban population growth. Accessibility to the great metropolitan areas, availability of social infrastructure,

and the degree of maturity of cities are defined as next influential factors.

Some concluding remarks are given in Section 5.

Urban System of Japan

by Junjiro Takahashi

Purpose of this paper is to present two concepts—urban constellation and urban axis—both of which are useful for describing macroscopic urban system. (System of cities as Berry (1964) defined.)

In terms of General System Theory, a system is defined as $S=(E, R_E)$ where E is a set and R_E is any binary relation defined on $E \times E$.

Given the above definition, an urban system can be defined as $S_v=(v, R_U)$ where v is a finite set of urban units and R_U is a relation between those urban units.

Using the attribute matrix and the interaction matrix each of which is defined as

$$A=[a_{ij}], \quad i=1, 2, \dots, n \quad R_k=[r_{ij}], \quad i, j=1, 2, \dots, n \\ j=0, 1, 2, \dots, m \quad k=0, 1, 2, \dots, h$$

S_U can be defined as $S_v=(A_j, R_k)$, where, A_j is a set of observations on n urban units in terms of j th attribute and R_k is a set of observations on K th relations between urban units.

Emphasis should be given to the special type of urban system which is defined as $S_U=(A_0, R_0)$, where A_0 is a set of observations on 0-th attribute (the locations of urban units), and R_0 is a set of observations on 0-th relations (distances between urban units). Denoting a set of locations of urban units by $L=\{l_1, l_2, \dots, l_n\}$ and distances between urban units by $D=\{d_{11}, d_{12}, \dots, d_{nn}\}$, S_v can be expressed as $S_U=(L, D)$.

Given this definition, an urban constellation is defined as follows;

$$V_c=\{l_i | l_i \in L, d_{iN} < \Delta\},$$

where d_{iN} is a distance to the nearest neighbour of i th location and Δ is a parameter.

An urban constellation is derived from the following procedure;

- 1) Plotting each l_i as a point on the base map.
- 2) Measuring d_{iN} , with identification of the nearest neighbour of each l_i .

3) Connecting the point by straight lines within a constant Δ .

Fig 3 a ~ i are the urban constellations of Japan derived from the procedure, which is applied to 643 *DID* (urban units) derived from National Census, 1970 of Japan, and *Fig 6, a ~ d* are the urban axes which are the first components extracted from each urban constellation ($\Delta=30$ km) by applying the principal component Analysis.

Spatial Structure in the National Capital Region

by *Masashi Kaneda*

Atsuhiko Takeuchi

In order to clarify spatial structure in major cities, there have been introduced or advocated a number of spatial concepts, among which "Concentric Zone Concept" by E. W. Burgess (1925), "Sector Concept" by H. Hoyt (1939), and "Multiple-nuclei Concept" by C. H. Harris & E. L. Ulman (1945) are the most typical ones. As is evident even from these concepts, what are important for really grasping the spatial structure in major cities is, in the first place, the setting up of a visual angle from the center to the periphery, and in the second, the setting up of an observation zone consisting of two factors of "sector" and "belt." Here, therefore, the spatial structure of the National Capital Region Consisting of Tokyo, Kanagawa, Saitama, Chiba, Ibaraki, Gunma and Yamanashi prefectures is analyzed from the above stated visual points covering the four major items such as population, percentage of employed persons by industrial sectors, manufacturing industry, and central managerial function. This time, however, the Sector-Belt zone is represented by administrative divisions because of various restrictive factors.

(1) Spatial Structure from Population Viewpoint

In order to make clear the population distribution in the National Capital Region, the night-time population per city, town and village by the 1975's national census was converted into logarithm, and classified into six steps comprising order No. I to order No. VI as indicated by the legend to draw up a map as shown in Fig. 2-1-a. Also a similar map (Fig. 2-1-b) was drawn up for 1965 in order to see the general trends during the past 20 years.

What has become clear from these two maps is that there is a high order spatial zone belt

(No. I~No. II) running from the center to the peripheral area and continuing to the medium order spatial zone belt (No. III~No. V), and further that there exist high order space in the form of a dotted line centering on those prefectures and cities as Ibaragi, Tochigi, Gunma and Yamanashi which surround the Tokyo Metropolitan Region, and in the narrow belt zone in between these prefectures or in the hinterland, there is distributed the low order space (No. VI). Viewing them by sector, the sector with its axis on the Tokai Trunk Line forms a high order space up to the longest distance, and the next may be the sector with its axis on the Chuo Line, and the sector running along the Sobu Line.

The high order spatial area may be counted as far as about 50 km radius from the heart of the Capital City, while the peripheral area extending to 50 km~80 km radius surrounding this high order spatial zone may continue to exist as the medium order spatial zone.

The past two decades from 1955 to 1975 were the era of spatial expansion for the Tokyo Metropolitan Region. But due to the extension of the frontier of the high order space to the limit of the commuter zone, it is judged that any further expansion of the peripheral area of the Tokyo Metropolitan Region has reached nearly to its limit.

In order to see the internal structure of the Tokyo Metropolitan Region, a map (Fig. 2-2) showing the daytime and resident population ratio was drawn up based on the national census of 1975. It may be possible by this map to picturize the doughnut phenomenon of major cities.

(2) Spatial Structure Viewed from Industrial Structure

In order to analyze the industrial structure in the Tokyo Metropolitan Region, a map of percentage of employed population of the primary industry (Fig. 3-1-a and Fig. 3-1-b) and that of the secondary industry (Fig. 4-1-a and Fig. 4-1-b) were drawn up based on the national census of 1975 and 1955. The distribution of the employed population of the primary industry indicated quite a marked change during these two decades. This was because that the spatial expansion in major cities was brought about by the accelerated change of land use from agricultural purpose to urbanization purpose, and thus this urbanization triggered the emergence of an active deagrarian phenomenon contributing to the buildup of employment structure. On the other hand, the industrialization of the National Capital Region during the past two decades was quite remarkable. The years from 1955 to 1965 were the era when the Keihin Industrial Zone expanded to the southern Kanto Region, while the years from 1965 to 1975 were the era when it expanded into the northern Kanto Region. Those automotive and electric equipment related industries played the principal role in leading the industrialization.

of these areas of the Kanto Region which offered excellent land space for large scale plants and factories for manufacture of finished products.

Compared with the successful advance of plants and factories into the northern Kanto's three prefectures during 1965-1975, Yamanashi was very unsuccessful showing quite little advance of plants in this area. Here, the gap by sector was also evident.

(3) Spatial Distribution of Central Managerial Function

Constant expansion of the Tokyo Metropolitan Region is vividly shown by the growth of population, industry, commerce, etc. Meanwhile, central managerial function is increasing its aggregation into the heart of the Metropolis. The political central managerial function was kept aggregating in the center of the Capital City because of its administrative characteristics.

The local economic central managerial function, which, though is represented by the head offices and branch offices of private business, has come to bear more weight in Tokyo since many of their head offices which used to exist in Osaka have moved to Tokyo after World War II.

This time, however, analyses were conducted on the distribution features of research institutions in the Tokyo Metropolitan Region. The outcome of the analyses indicated that there were a total of 2,320 research institutions throughout the country in 1974, of which 21.3% is located in Tokyo to undertake a great task of development and distribution of research related information.

As described above, the spatial structure of the National Capital Region is considered to have been formed by the combined work between the centripetal force to the direction of the heart of Tokyo from all directions of the entire land of this nation and the centrifugal force to all directions of the entire land of the nation from the heart of Tokyo. It may be one of the future problems to clarify the very roots of these dynamic forces. But it may be essential to analyze not only the role of Tokyo's political central function, but also those of economic central function and cultural & social central functions which are organically linked with political central function. In this significance, for such urban structural model as described at the outset of this paper, it may become necessary to introduce an entirely new spatial concept reflecting every realistic aspect of the existing conditions.

On the Future of Osaka-Kyoto-Kobe Polycentric Metropolis

by Seiji Komori

Around 1970 there were twenty-five metropolitan centres in the world each with a population of over four millions. Among them, Osaka-Kyoto-Kobe has a very unique feature. Instead of concentrating all the metropolitan functions into a single, highly centralized city, there are one real giant centre and two smaller but still big centres. This polycentric type of metropolis has special interest for geographers and regional planners.

These three centres remain physically separated despite their closeness, while metropolitan functions normally found in one city are distributed among them. Thus, manufacturing, trading, financial and mass communication functions are firmly fixed in Osaka, cultural and educational functions are traditionally established in Kyoto, the wide range of port activities, as well as the heavy industry that accompanies it, developed in Kobe.

The unique advantage of the polycentric metropolitan region lies in its flexible basis so that changes in technology and society can be accommodated smoothly. However, recent trends suggest that relationships between three centres change drastically. Moreover, their national significance as centres of manufacturing, of commerce, of culture, is falling considerably.

When the comparison is made, it is obvious that Kyoto and Kobe are no more superior in most services than regional capital, for instance, Hiroshima or Fukuoka. Osaka loses its dominant role as a seat of headquarters offices of big industrial and trading corporations. Many of these firms moved to Tokyo. It follows as a logical consequence that the highly paid, more prestigious head-office jobs have become increasingly disappeared in Osaka.

It may be advantageous to have a greater concentration of control and decision-making functions in this polycentric metropolitan region, though it suffers much less problems of traffic congestions or long commuter journeys and apparently work with no less efficiency than single centred metropolis.

The role of Inland Provincial Cities in Regional Policy of Japan

—Putting stress on the comparative approach to the industrial characteristics of nucleus cities in basins—

by Yoshiei Itoh

This paper is intended to make clear the following two problems:

- ① How the roles of provincial cities have changed according to the development of Regional Policy in Japan ?
- ② What industrial characteristics is suitable in provincial cities to attain the aims of Regional Policy ?

The first device of Regional Policy in Japan was the National Project of Multiple Purpose Land Development (1962). However this project left the provincial cities out of its consideration.

In 1969, The New National Project of Multiple Purpose Land Development was presented. In this new project, the provincial cities had been taken an active part to function the living centers of wide scale-communities. So the public investment was mainly put into the improvement of living environment in the cities and their surroundings.

The Third National Project has worked out in 1977. In this project, the provincial cities have been playing the leading part. Because the main theme of The Third Project is the dispersion of population which has been too much concentrating on big cities (Tokyo, Osaka and Nagoya), it may be the most effective policy to develop the provincial cities and to lead the population from big cities to these cities. To do so, the public investment must be put into the improvement not only of living environment but also of productive environment of the cities.

The main item of productive environment is the economic activities of the cities which have been growing with their histories.

When we observe the economic activities of provincial cities (especially nucleus cities in basin), we can find the three groups according with the industrial characteristics. And these

characteristics correspond to the scale of the cities.

① The 1st group (population: 200,000~300,000);

The cities in this group generally keep or somewhat exceed the national average in Wholesale, Retail and Food dispensing business. But the level of The Manufacturing Industry are $\frac{1}{2}$, compared with the national average. So, it must be important to develop the manufacturing industries to lead the population from the big cities to these type of cities.

② The 2ed group (population: 60,000~12,000);

The cities in this group exceed the national average in Retail and Food dispensing business, but are fairly week in Manufacturing Industry and Wholesale. So the development policies are required to these two activities in this type of cities.

③ The 3rd group (population: 30,000~50,000);

The cities in this group extremly exceed the national average in Retail only. And other activities are extremly below compared with national average. As the industrial structure of the cities in this group is the most imbalance, it is urgent to enforce the policy which this imbalance of industrial structure in these cities.