Its Own Built-in Urban Genes: On Spatial-cycle Path for Spatial Systems of Both Functional Urban Regions (FURs) and Functional Urban Cores (FUCs) in Japan

Tatsuhiko KAWASHIMA* and Noriyuki HIRAOKA**

CONTENTS

Abstract

The major purpose of this paper is to obtain, through the approach of the Roxy-index method, a deeper insight into the tendency of the paths of the spacial cycles which the system of the eighty-seven (87) Japanese metropolitan areas defined as functional urban regions (FURs) and (2) the system of core-cities of the FURs (FUCs) will respectively follow.

Keywords

Concentration, Deconcentration, Functional Urban Core, Functional Urban Region, Klaassen, Metropolitan Area, Roxy Index, Spatial Cycle, Urban Change, and Urban Gene

* Department of Economics, Gakushuin University, 1-5-1 Mejiro, Toshima-ku, Tokyo 171-8588, Japan.

** Research Center for Social and Public Policies, Mitsubishi Research Institute, 2-3-6 Otemachi, Chiyoda-ku, Tokyo 100-8141, Japan.

The authors are grateful for the research support of the Gakushuin University Research Institute of Economics and Management and the Grant-in-Aid for Scientific Research (B) from the Ministry of Education, Science, Sports and Culture in Japan.

1 Introduction

The values of the Roxy index, if we use them with a careful knowledge of their limitations, provide useful quantitative information on the dynamic changes in the process of spatial redistribution of various socio-economic activities. With this understanding, we apply in this paper the Roxy-index method to the analysis of the phenomena appearing in the realm of Klaassen's spatial-cycle hypothesis[1] in a broader sense.

Putting it more concretely, the major purpose of this paper is to obtain, through the approach of the Roxy-index method, a deeper insight into the developmental tendency of the spatial cycles which (1) the system of the eighty-seven (87) Japanese metropolitan areas defined as Functional Urban Regions (FURs[2]) and (2) the system of core-cities of the FURs (*i.e.*, FUCs) will respectively follow.

The basic scheme of the spatial-cycle hypothesis will be discussed in Section 2, and that of the Roxy-index method in Section 3. In Section 4 are shown the results of an empirical analysis of the systems of both FURs and FUCs in Japan. The concluding remarks are given in Section 5.

2 Spatial Cycles: Basic Scheme

The spatial redistribution patterns of the population within a metropolitan area or among metropolitan areas are expressed in Table 1 by use of spatial terminologies.

Table 1 Two-by-two Matrix: Terminologies for Spatial Redistribution Phenomena of Population

SPATIAL REDISTRIBUTION PHENOMENA / ANALYSIS	AGGLOMERATION	DEGLOMERATION
INTRA-FUR	CENTRALIZATION (URBANIZATION)	DECENTRALIZATION (SUBURBANIZATION)
INTER-FUR OR INTER-FUC	CONCENTRATION	DECONCENTRATION

As shown in this table, the spatial agglomeration and deglomeration processes are referred to as centralization (or urbanization) and decentralization (suburbanization) respectively for the study of the intra-metropolitan phenomena (*i.e.*, the intra-FUR phenomena), and concentration and deconcentration respectively for the study of inter-metropolitan phenomena (*i.e.*, the inter-FUR phenomena) or inter-FUC phenomena. Within this framework, we restrict the focus of this paper to the inter-FUR phenomena and inter-FUC phenomena, that is, the phenomena of the change in the spatial redistribution of population which takes place in the systems of FURs and FUCs.

When applied to the inter-FUR or inter-FUC analysis, Klaassen's revised paradigm[3] argues the existence of the four major recursively transmuting stages along the spatial-cycle path as given by Table 2.

Table 2 Four Stages of Spatial-cycle Path for Inter-FUR or Inter-FUC Analysis: Concentration and Deconcentration

INTER-FUR OR INTER-FUC PHENOMENA	FOUR STAGES OF SPATIAL-CYCLE PATH
CONCENTRATION	STAGE-1 ACCELERATING CONCENTRATION
	STAGE-2 DECELERATING CONCENTRATION
DECONCENTRATION	STAGE-3 ACCELERATING DECONCENTRATION
	STAGE-4 DECELERATING DECONCENTRATION

They are; ① *accelerating concentration*, ② *decelerating concentration*, ③ *accelerating deconcentration*, and ④ *decelerating deconcentration*. In what is discussed below we use the term *revived-concentration or revived accelerating-concentration*, to indicate clearly the phenomena of the re-entry step of the spatial-cycle path from the deconcentration stage into the concentration stage.

3 Roxy Index: Basic Scheme

The Roxy index[4] is an indicative instrument to identify quantitatively the stages of the spatial-cycle path. It can be used in conducting both the intra-FUR and the inter-FUR analyses of socio-economic activities observed for a system of spatial units.

For the study of spatial concentration and deconcentration of population, the mathematical formulation to define the value of the Roxy index is given in Table 3. This definition enables us to construct Table 4 which states the implication of the Roxy-index value in relation to the speed of the spatial redistribution processes of the population among FURs (*i.e.*, among metropolitan areas).

Table 3 Definition of Roxy Index: For Population Changes

$$\text{ROXY Index}$$

$$R^t \equiv \left(WAGR^t / SAGR^t - 1.0\right) \times S_c$$

$$= \left\{ \frac{\sum_{i=1}^{n} \left(d_i \times r_i^t\right)}{\sum_{i=1}^{n} d_i} \times \frac{n}{\sum_{i=1}^{n} r_i^t} - 1.0 \right\} \times S_c$$

where

R^t : Roxy Index for Period *t*

$WAGR^t$: Weighted Average of Annual Growth Ratios of Population for Period *t*

$SAGR^t$: Simple Average of Annual Growth Ratios of Population for Period *t*

S_c : Scaling Factor

r_i^t : Annual Growth Ratio in Spatial Unit *i* for Period *t*

d_i : Weighting Factor for Spatial Unit *i*

n : Number of Spatial Units

Table 4 Implications of Roxy-index Values for the Study of Dynamic Spatial Redistribution of Population among Metropolitan Areas

A	B	C	D
sign of Roxy-index value	Pattern of spatial redistribu-tion of population among metropolitan areas	State of changes in Roxy-index value	Speed of spatial redistribu-tion process of popu-lation among met-ropolitan areas
Positive	Concentration	Increasing	Accelerating
		Leveling-off	Constant
		Decreasing	Decelerating
Zero	Neutralilty from both-concentration and de-concentoration(*viz*.symmetric growth or decline(1))	Increasing	Start of ACon(2)
		Leveling-off	Continuation of neutrality
		Decreasing	Start of ADcon(3)
Negative	Deconcentration	Increasing	Decelerating
		Leveling-off	Constant
		Decreasing	Accelerating

[Sources] Constructed from Kawashima and Hiraoka (1993)

[Notes]

(1) The spatial redistribution pattern of the 'symmetric growth or decline' comprises the following three sub-patterns of BGD, BSGD and CSGD;

(i) Balanced growth or decline (BGD): The fitted growth-rate curve which is a function of the population size of the FUR, is nearly flat to reflect the constant shares of population by FURs over time.

(ii) Bell-shaped growth or decline (BSGD): The fitted growth-rate curve is bell-shaped, reflecting the 'medianization' of population over FURs.
The phenomena of 'medianization' means both of ① the increase in population share by FURs with medium population size (as compared with other FURs),and of ② the decrease in population share by FURs with larger and smaller population size.

(iii) Cup-shaped growth or decline (CSGD): The fitted growth-rate curve is cup-shaped, reflecting the 'bipolarization' of population over FURs. The phenomena of 'bipolarization' means both of ① the increase in population share by FURs with relatively smaller and larger population size, and of ② the decrease in population share by FURs with medium population size.

(2) The abbreviatory notation 'ACon' stands for accelerating concentration.

(3) The abbreviatory notation 'ADcon' stands for accelerating deconcentration.

As can be seen from this table, depending upon the stages of the spatial cycles, the value of the Roxy index turns out to be;

(1) positive and increasing, for the stage of accelerating concentration,

(2) positive and decreasing, for the stage of decelerating concentration,

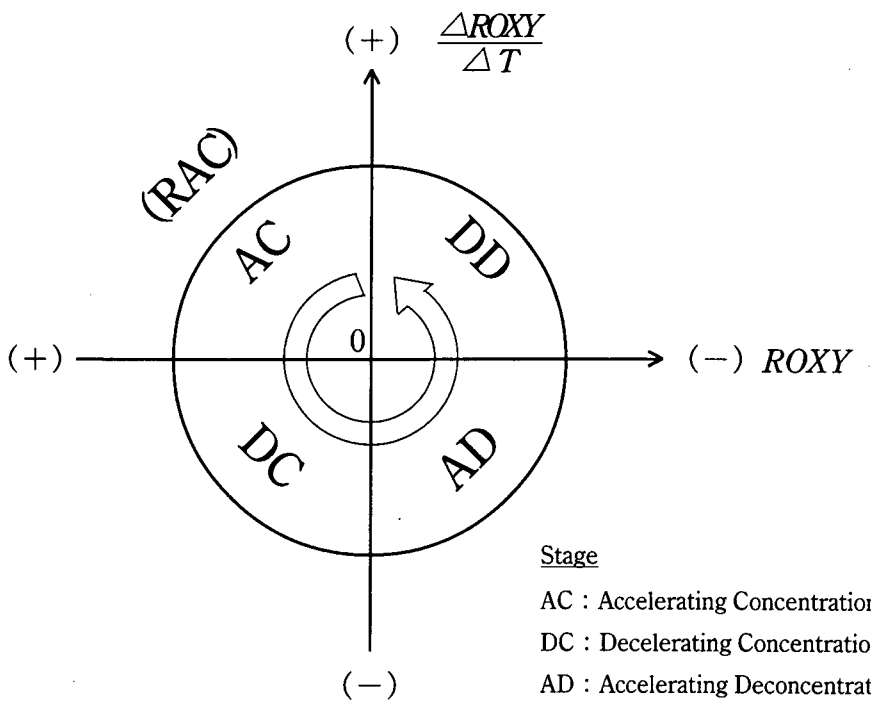
(3) negative and decreasing, for the stage of accelerating deconcentration,

(4) negative and increasing, for the stage of decelerating deconcentration, and

(5) at or in the vicinity of the value zero, for the stage at which the spatial redistribution process is neutral[5].

Based on Tables 4, we can draw Figure 1 which displays the standard spatial-cycle path in the form of a circular-cyclic curve. The axis of abscissa indicates the value of the Roxy index (ROXY), while the axis of ordinate indicates the marginal value of the Roxy index with respect to time (ΔROXY/ΔT). It is to be noted that, in order to have the circular-cyclic curve moving in a counter clockwise direction, we set the negative value toward the right of the abscissa.

Figure 1 Circular-cyclic Curve: Path of Spatial Cycles by ROXY
(For Inter-mertropolitan Analysis)



Stage

AC : Accelerating Concentration

DC : Decelerating Concentration

AD : Accelerating Deconcentration

DD : Decelerating Deconcentration

RAC : Revived Accelerating-Concentration

The aforementioned relationship between the value of the Roxy index and the spatial-cycle stage for the system of FURs can also be applied to that between the value of the Roxy index and the spatial-cycle stage for the system of FUCs.

4 Roxy-index Analysis: For the Systems of both FURs and FUCs in Japan

4.1 Population Data for FURs and FUCs

For our study, we use the data given in Tables A-1 and A-4[6] in Appendix A. Table A-1 provides the population data by FUR for each of the census years from 1947 through 1995, while Table A-4 provides the population data by FUC[7] for each of the census years. From these two tables, we obtain Tables A-2 and A-5 which provide the annual growth ratio of population for each of the between-the-census periods by FUR and FUC respectively. We also obtain Tables A-3 and A-6 which provide the estimated population levels of FUR and FUC respectively, for each of the mid-point years between the two adjacent censuses.

4.2 Values of Roxy Index and Its Marginal Values: Obtained Results

From Tables A-2, A-3, A-5 and A-6, we can calculate the values of the Roxy index (ROXY) and the marginal values of the Roxy index (ΔROXY/ΔT) for both the FUR system and the FUC system. These values are shown in Table 5 from which we can draw Figure 2.

Table 5 Values of Roxy Index and Its Marginal Values

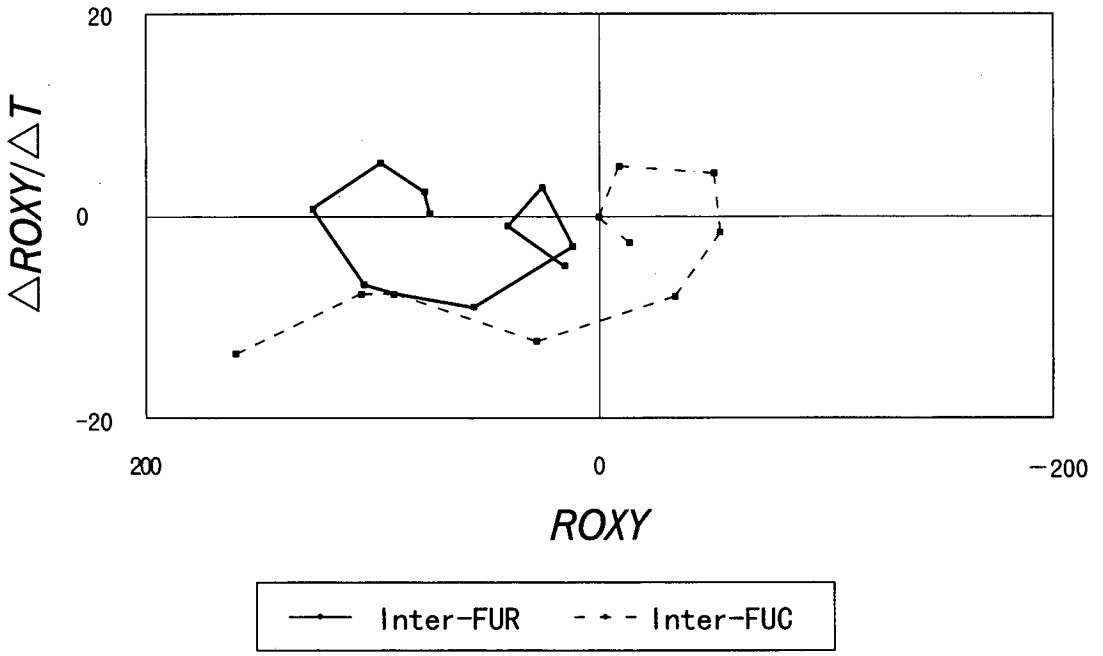
(a) For FUR System

Item	1947-50	1950-55	1955-60	1960-65	1965-70	1970-75	1975-80	1980-85	1985-90	1990-95
ROXY	74.54	76.67	96.08	126.39	104.20	56.00	11.67	24.54	40.48	15.38
ΔROXY/ΔT	0.53	2.39	4.97	0.81	-7.04	-9.25	-3.15	2.88	-0.92	-5.02

(b) For FUC System (*i. e.*, FUR-core System)

Item	1947-50	1950-55	1955-60	1960-65	1965-70	1970-75	1975-80	1980-85	1985-90	1990-95
ROXY	159.96	104.93	90.67	27.35	-32.49	-53.15	-49.45	-9.80	0.67	-12.56
ΔROXY/ΔT	-13.76	-7.70	-7.76	-12.32	-8.05	-1.70	4.34	5.01	-0.28	-2.65

Figure 2 Spatial Cycles: Inter-FUR and Inter-FUC Analyses



This figure presents us with the following;

(1) The FUR system seems to have nearly completed its concentration stage, and to be approaching the first phase of the accelerating deconcentration stage.

(2) The FUC system seems to be nearly at the last phase of the decelerating deconcentration, and to be proceeding to the first phase of the stage of revived-concentration[8] with, eventually, possible experience of a "mini-spatial-cycle" path prior to it.

(3) The FUC system seems, as can be easily expected, to have preceded the FUR systems along the spatial-cycle path by approximately two decades.

The aforementioned interpretations of the information derived from the spatial-cycle paradigm, are based not only on the straightforward message which we can read directly from the features of the two curves in Figure 2 but also on the rather subjective empirical regularities that have been usually detected through the Roxy-index analyses previously conducted. In this sense, the three points described above may be still weak and fuzzy on theoretical grounds for scientific justification.

5. Conclusion : Urban Genes

Having conducted our analysis, we as scientists are eager to detect the causalities which would substan-

tially govern the stages of the spatial-cycle paths if they exist. This kind of feedback from the analysis based on the casual empiricism to the analysis based on the deliberate theoretics should certainly be encouraged.

I would not want to discount in any degree the tremendous importance of this kind of scientific attitude in which we seriously try to find "external explaining variables" to explain "a specific explained variable." However, at the same time, I wonder whether there are not a few phenomena for which we can not successfully discover any specific causal relations. This may be because there are no such relations exist. As for those phenomena, it would perhaps be appropriate for us to tackle them by suspecting the possible existence of a self-embedded mechanism within the phenomena which are administered by various sorts of internal genes that we can not easily manipulate externally. This approach might contribute to open our minds to grasp the so-far-well-hidden but important factors of such phenomena.

The more I have investigated the behaviours of the spatial-cycle paths by means of the values of the Roxy index, the more I have become inclined to think that the urban system itself may have its own built-in urban genes. That is, laevorotatory spatial-cycle paths are likely to be governed by fascinating urban genes.

Notes

1) The original spatial-cycle hypothesis is a conceptual framework which considers the processes of urban growth and decline as more or less self-embedded cyclical dynamic phenomena of the urban mechanism itself. For an early discussion on the spatial-cycle hypothesis, see Klaassen and Paelinck (1979), and Klaassen, Bourdrez and Volmuller (1981).
2) The FURs in Japan have been set up several times since the first half of the 1970s, with the intention of delineating the boundaries of functionally meaningful metropolitan areas corresponding to the Standard Metropolitan Statistical Areas (SMSAs) or the Metropolitan Statistical Areas (MSAs) in the U.S.A. See Glickman (1979) for the background to the early work on delineating Japanese FURs and data arrangements for them. This paper employs the 1995-version of the FURs in Japan whose geographical boundaries are delineated by the Mitsubishi Research Institute (1999).
3) The original framework of the Klaassen's hypothesis tried to indicate the existence the intra-metropolitan spatial-cycle paths in terms of the absolute change in the population levels of spatial units comprising a specific metropolitan area. This framework has been revised and extended, without losing its original unique conceptual essence, to the implied existence of the inter-metropolitan spatial-cycles and to the use of the growth ratio of population instead of the absolute changes in population levels.
4) The basic concept of the Roxy index was initiated and applied in an empirical study by Kawashima (1978, pp.9, 13 and 14). Since then, the method of Roxy-index analysis has been furthermore developed and applied in a number of empirical studies to examine the spatial-cycle phenomena associated with the changes in the population and other social and economic variables for the various systems of spatial units. In parallel with these studies, some theoretical examinations have also been carried out on the

fundamental characteristics peculiar to the Roxy index. See Kawashima (1981, pp.10-12; and 1982, pp.26-30), for example, as one of the early-stage studies of the Roxy index. See also Appendix B for a list of publications and presentations by Kawashima (including those with co-authors) which discuss the Roxy index.

5) The neutrality of the pattern of the spatial redistributions means that the spatial-cycle stage corresponds to the phenomena of neither concentration nor deconcentration, that is, the phenomena of symmetric growth or decline as explained in the notes of Table 4.

6) The data source for Tables A-1 and A-4 is the Mitsubishi Research Institute (1999).

7) The FUC (*i.e.*, FUR-core) means the central city of the FUR where each FUR consists of its central city and suburbs.

8) More precisely speaking, it means the "revived accelerating-concentration."

References

Glickman N, 1979, *The Growth and Management of the Japanese Urban System*, Academic Press, New York, USA.

Klaassen L H, and J.H.Paelinck, 1979, "The Future of Large Towns," *Environment and Planning A*, Vol.11, No.11, pp.1095-1104.

Klaassen L H, J.A.Bourdrez and J.Volmuller, 1981, *Transport and Reurbanization*, Gower Publishing Company Limited, Hants, England.

Kawashima T, 1978, "Recent Urban Evolution Processes in Japan: Analysis of Functional Urban Regions," presented at the Twenty-fifth North American Meetings of the Regional Science Association, Chicago, Illinois, USA.

Kawashima T, 1981, "Urbanization and Metropolitan Analysis," *Shin-toshi*, Toshi Kyohkai, Tokyo, pp.1-12 (in Japanese).

Kawashima T, 1982, "Recent Urban Trends in Japan: Analysis of Functional Urban Regions," *Human Settelement System: Spatial Patterns and Trends*, T. Kawashima and P. Korcelli (eds.), International Institute for Applied Systems Analysis, Laxenburg, Austria, pp.21-40.

Kawashima T, and N.Hiraoka, 1993, "Mathematical Characteristics of ROXY Index (I) Distance and Reversed Distance Used as Weighing Factors," *Gakushuin Economic Papers* (*Gakushuin Daigaku Keizai Ronshu*), Vol.30, No.2, Gakushuin University, Tokyo, pp.255-297.

Mitsubishi Research Institute, 1999, *Toshikenbetu Jinkou Suikei Chosa* (*Population Projections by Functional Urban Region*), Tokyo (in Japanese).

Table A-1 Population of FURs: For Period 1947-1995 (The FURs are sorted by the population level in 1970.)

No.	Fuctional Urban Region	1947	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995
29	Tokyo	9, 640, 963	11, 246, 692	13, 608, 821	16, 073, 878	19, 181, 280	22, 175, 859	24, 900, 133	26, 467, 108	27, 947, 274	29, 407, 454	30, 144, 045
54	Osaka	4, 758, 708	5, 349, 856	6, 246, 229	7, 295, 321	8, 766, 376	10, 045, 799	1, 100, 775	11, 404, 103	1, 176, 303	11, 980, 012	12, 115, 741
47	Nagoya	2, 273, 482	2, 501, 832	2, 844, 819	3, 263, 971	3, 759, 656	4, 189, 574	4, 583, 980	4, 794, 035	4, 962, 454	5, 129, 569	5, 251, 940
27	Kitakanto	2, 036, 363	2, 063, 898	2, 074, 633	2, 037, 042	2, 094, 418	2, 200, 073	2, 351, 994	2, 487, 463	2, 605, 021	2, 687, 106	2, 753, 840
53	Kyoto	1, 546, 892	1, 646, 412	1, 753, 640	1, 837, 787	1, 985, 465	2, 177, 607	2, 391, 710	2, 542, 489	2, 641, 666	2, 699, 572	2, 762, 083
64	Shimonoseki-Kitakyushu	1, 375, 949	1, 551, 582	1, 744, 532	1, 856, 222	1, 845, 521	1, 815, 797	1, 860, 118	1, 903, 467	1, 912, 294	1, 864, 634	1, 852, 838
55	Kobe	1, 020, 571	1, 163, 239	1, 340, 872	1, 477, 143	1, 623, 299	1, 775, 610	1, 944, 699	2, 028, 052	2, 107, 126	2, 196, 127	2, 187, 616
75	Fukuoka	1, 109, 572	1, 231, 098	1, 356, 984	1, 420, 431	1, 464, 014	1, 598, 187	1, 838, 415	2, 044, 170	2, 197, 616	2, 343, 189	2, 482, 697
1	Sapporo	659, 519	739, 352	868, 435	1, 007, 732	1, 223, 929	1, 433, 133	1, 693, 721	1, 897, 124	2, 044, 856	2, 200, 077	2, 326, 696
62	Hiroshima-Kure	1, 009, 681	1, 067, 963	1, 141, 568	1, 193, 324	1, 308, 202	1, 409, 034	1, 573, 705	1, 637, 091	1, 797, 110	1, 844, 425	1, 890, 641
13	Sendai	989, 675	1, 059, 450	1, 109, 708	1, 139, 296	1, 180, 383	1, 264, 687	1, 407, 663	1, 529, 261	1, 624, 079	1, 709, 453	1, 803, 240
61	Okayama-Kurashiki	1, 033, 133	1, 068, 745	1, 106, 991	1, 122, 501	1, 150, 852	1, 249, 793	1, 366, 832	1, 428, 100	1, 473, 235	1, 490, 929	1, 523, 440
77	Kurume-Saga	1, 107, 251	1, 146, 371	1, 192, 069	1, 171, 739	1, 122, 927	1, 106, 207	1, 114, 887	1, 156, 890	1, 176, 696	1, 179, 083	1, 189, 799
43	Gifu-Ogaki	809, 927	844, 075	875, 929	924, 700	997, 491	1, 068, 572	1, 155, 671	1, 218, 941	1, 260, 067	1, 283, 018	1, 299, 149
34	Toyama-Takaoka	958, 345	989, 207	1, 002, 773	1, 013, 693	1, 008, 177	1, 015, 782	1, 058, 165	1, 091, 546	1, 106, 766	1, 108, 968	1, 112, 303
31	Niigata	861, 076	889, 586	909, 696	920, 097	940, 667	964, 586	1, 013, 543	1, 068, 363	1, 100, 231	1, 116, 354	1, 137, 202
80	Kumamoto	902, 714	929, 643	972, 946	966, 719	956, 624	963, 816	1, 004, 089	1, 078, 339	1, 133, 041	1, 164, 640	1, 206, 023
44	Shizuoka	634, 219	665, 090	749, 324	807, 588	874, 745	940, 111	1, 005, 437	1, 043, 081	1, 071, 188	1, 087, 825	1, 098, 010
49	Kariya-Toyota-Anjo	611, 299	639, 467	661, 827	691, 071	778, 428	926, 166	1, 054, 459	1, 152, 162	1, 232, 746	1, 314, 293	1, 376, 435
56	Himeji	722, 303	742, 128	760, 198	779, 098	824, 856	872, 026	929, 527	961, 697	985, 416	986, 762	1, 008, 941
26	Utsunomiya	798, 137	807, 883	808, 156	791, 531	796, 450	829, 659	906, 041	966, 954	1, 016, 042	1, 061, 189	1, 093, 942
45	Hamamatsu	601, 612	636, 198	686, 000	712, 076	747, 031	794, 210	856, 080	908, 702	956, 005	944, 603	1, 023, 402
46	Numazu	529, 922	548, 935	580, 496	613, 140	676, 535	747, 054	820, 432	856, 480	892, 584	920, 532	940, 973
86	Kagoshima	656, 992	695, 204	721, 874	708, 265	712, 741	720, 107	769, 412	829, 216	860, 877	866, 439	880, 018
70	Takamatsu	673, 488	698, 321	705, 187	694, 724	691, 964	709, 610	762, 919	800, 398	823, 712	828, 568	837, 023
50	Tsu-Ise-Matsusaka	658, 966	677, 941	689, 214	676, 830	675, 425	682, 248	710, 944	728, 648	745, 138	749, 894	759, 662
57	Wakayama	516, 708	533, 822	554, 443	564, 037	603, 423	638, 397	666, 644	682, 548	685, 058	679, 433	684, 919
87	Naha	—	330, 376	439, 485	520, 800	583, 324	627, 993	724, 206	780, 804	841, 242	883, 773	928, 916
69	Tokushima	602, 253	621, 930	623, 659	612, 708	604, 904	605, 661	633, 940	661, 397	676, 480	681, 652	688, 874
78	Nagasaki	421, 616	479, 012	529, 094	570, 922	586, 248	603, 188	630, 995	655, 327	670, 806	668, 085	667, 816
37	Fukui	566, 546	591, 349	592, 312	596, 402	598, 720	597, 444	623, 056	642, 309	660, 521	664, 270	674, 677
63	Fukuyama	510, 054	518, 900	522, 237	527, 725	538, 948	590, 800	643, 124	659, 498	671, 451	668, 195	671, 923
48	Toyohashi	450, 620	472, 297	497, 459	513, 431	552, 074	585, 415	634, 982	670, 292	702, 628	726, 699	746, 356
82	Oita	525, 992	535, 301	556, 306	554, 249	562, 967	583, 723	644, 666	686, 609	713, 364	728, 368	731, 300
23	Mito	518, 245	530, 272	539, 358	541, 245	551, 204	577, 604	623, 835	664, 465	696, 640	715, 938	740, 076
35	Kanazawa	465, 898	487, 544	504, 361	517, 281	540, 762	569, 897	630, 221	675, 536	708, 273	732, 013	757, 694
39	Nagano	562, 739	567, 520	563, 537	555, 104	555, 425	564, 641	588, 911	611, 969	626, 104	632, 564	644, 387
38	Kofu	590, 127	588, 737	579, 828	559, 822	544, 669	545, 283	565, 341	587, 916	603, 934	632, 671	656, 102
74	Kochi	490, 597	506, 727	516, 499	507, 319	509, 258	517, 908	550, 400	575, 523	591, 542	589, 254	591, 577
16	Yamagata	496, 558	507, 041	498, 493	493, 726	484, 010	484, 475	498, 014	521, 843	535, 009	540, 250	547, 921
25	Tuchiura-Tsukuba	500, 703	498, 546	495, 758	470, 150	464, 112	477, 386	524, 710	590, 924	632, 467	670, 449	715, 102
21	Koriyama	441, 568	457, 902	459, 248	467, 937	467, 232	475, 504	495, 726	521, 795	539, 759	554, 788	573, 538
30	Hiratsuka-Atsugi	277, 740	286, 314	302, 091	313, 064	377, 377	475, 388	600, 696	701, 078	785, 926	861, 090	905, 827
51	Yokkaichi	365, 413	379, 139	389, 379	408, 306	443, 697	743, 219	519, 297	544, 952	565, 916	589, 929	613, 680
71	Matsuyama	360, 502	381, 086	402, 980	416, 521	436, 590	465, 355	516, 310	558, 558	587, 128	603, 903	623, 512
15	Akita	393, 644	418, 479	440, 054	447, 400	446, 356	457, 220	479, 226	505, 875	515, 874	517, 064	523, 324
19	Fukushima	405, 043	419, 350	427, 216	421, 350	421, 177	426, 914	442, 335	459, 432	467, 801	472, 537	478, 270
40	Matsumoto	392, 520	395, 441	392, 431	390, 675	389, 881	396, 733	417, 813	437, 407	451, 477	458, 813	472, 116
32	Nagaoka	410, 174	419, 149	415, 770	407, 971	400, 189	392, 944	395, 537	402, 442	404, 263	403, 529	404, 989
2	Hakodate	326, 379	347, 975	366, 511	364, 700	371, 790	380, 973	397, 525	413, 772	413, 240	399, 932	395, 824
83	Miyazaki	327, 933	346, 969	359, 629	366, 243	363, 106	373, 223	407, 600	450, 334	473, 420	487, 474	506, 123
3	Asahikawa	250, 323	275, 392	309, 091	331, 582	355, 621	370, 766	385, 982	416, 089	424, 551	415, 696	416, 332
12	Morioka	286, 233	310, 241	336, 204	354, 530	361, 260	368, 429	395, 976	430, 886	453, 538	465, 806	482, 346
11	Hachinohe	270, 784	296, 269	320, 378	345, 982	351, 345	363, 199	375, 842	390, 303	392, 942	390, 197	390, 897
79	Sasebo	367, 578	401, 991	440, 392	431, 574	376, 486	358, 101	359, 503	362, 739	363, 855	356, 959	357, 551
24	Hotachi	278, 045	290, 165	307, 257	337, 438	348, 979	350, 591	362, 088	373, 580	383, 004	382, 373	383, 517
22	Iwaki	331, 222	358, 185	368, 712	361, 544	348, 134	340, 318	342, 893	355, 775	364, 314	369, 725	374, 841
10	Hirosaki	317, 639	337, 582	353, 532	352, 319	341, 951	338, 683	342, 772	355, 096	352, 682	345, 935	345, 742
60	Matsue	300, 499	310, 760	318, 864	314, 586	307, 120	306, 960	315, 031	327, 198	335, 024	335, 195	335, 954
76	Omuta	305, 384	344, 288	355, 159	353, 562	333, 013	303, 850	296, 925	297, 175	295, 866	281, 882	272, 677
9	Aomori	218, 540	243, 565	269, 031	280, 186	288, 949	302, 095	324, 320	347, 667	352, 224	341, 450	345, 746
20	Aizumakamatsu	324, 275	326, 275	327, 969	317, 146	300, 862	284, 506	278, 365	282, 529	284, 170	283, 189	282, 504
33	Jyoetsu	319, 612	316, 698	313, 270	303, 042	292, 084	276, 781	271, 106	271, 768	270, 936	265, 372	264, 138
28	Oyama	249, 642	248, 607	246, 831	242, 390	251, 249	273, 608	301, 466	320, 563	334, 097	344, 244	352, 746
66	Yamaguchi	279, 058	286, 036	293, 319	286, 201	272, 872	270, 844	281, 556	295, 967	311, 518	314, 695	320, 642
52	Hikone	266, 460	265, 636	260, 833	254, 170	254, 355	257, 757	270, 172	273, 142	285, 443	293, 073	300, 418
67	Tokuyama	205, 963	211, 110	218, 359	223, 234	235, 576	248, 837	270, 828	279, 026	279, 975	274, 034	270, 441
59	Yonago	237, 443	243, 943	252, 043	246, 699	241, 187	238, 311	246, 336	258, 142	262, 503	260, 350	260, 703
4	Muroran	138, 171	154, 767	173, 048	201, 221	227, 200	238, 137	242, 935	241, 407	229, 402	207, 933	201, 089
6	Obihiro	162, 875	173, 384	205, 644	211, 942	224, 767	233, 838	242, 575	259, 983	272, 811	274, 614	281, 834
58	Tottori	237, 930	244, 532	250, 077	244, 126	235, 793	231, 803	235, 653	243, 508	249, 296	252, 139	252, 302
5	Kushiro	120, 509	150, 106	179, 901	214, 175	231, 363	230, 782	246, 546	257, 509	259, 000	252, 561	246, 732
65	Ube	198, 798	223, 097	237, 024	242, 216	220, 085	211, 317	221, 867	229, 750	237, 276	237, 402	237, 017
84	Miyakonojo	227, 308	236, 968	242, 965	235, 410	220, 967	207, 860	208, 502	223, 369	227, 624	226, 177	228, 988
41	Ueda	219, 822	218, 178	211, 189	205, 648	202, 615	202, 741	209, 243	217, 107	223, 588	227, 513	232, 741
14	Ishinomaki	190, 473	200, 407	201, 954	203, 126	200, 230	202, 489	208, 260	213, 691	215, 387	212, 081	209, 555
72	Imabari	186, 462	195, 912	197, 005	197, 005	195, 903	193, 183	193, 183	195, 798	205, 013	208, 360	209, 865
81	Yatsushiro	200, 238	208, 751	218, 274	216, 785	204, 196	193, 631	189, 805	192, 426	190, 692	185, 629	181, 743
73	Niihama	177, 897	189, 539	195, 425	197, 286	194, 550	193, 238	200, 684	203, 450	206, 228	203, 463	202, 534
36	Komatsu	160, 463	164, 948	162, 349	164, 099	168, 318	176, 621	188, 020	196, 855	202, 772	203, 702	206, 279
18	Sakata	179, 529	185, 421	187, 651	184, 317	176, 342	170, 361	168, 870	173, 832	171, 552	169, 260	167, 682
68	Iwakuni	155, 672	159, 909	172, 884	176, 855	174, 351	170, 145	174, 149	175, 886	173, 394	169, 497	167, 198
85	Nobeoka	131, 058	148, 602	163, 043	167, 564	163, 819	165, 107	170, 140	173, 434	172, 776	165, 883	160, 906
17	Tsuruoka	178, 613	183, 060	188, 610	178, 133	168, 933	162, 037	158, 731	161, 809	161, 147	159, 103	157, 697
42	Iida	193, 163	194, 525	185, 123	173, 789	165, 306	158, 557	158, 682	161, 789	176, 934	175, 888	175, 517
8	Tomakomai	70, 163	81, 885	96, 632	110, 816	131, 320	150, 868	182, 864	203, 526	208, 642	207, 462	214, 813
7	Kitami	93, 001	101, 309	111, 514	118, 254	121, 174	121, 883	126, 413	136, 217	138, 855	136, 167	137, 325
	Total	56, 941, 106	61, 723, 389	67, 352, 585	72, 282, 857	78, 670, 465	85, 433, 554	93, 090, 574	98, 198, 038	102, 330, 456	105, 369, 407	107, 623, 158

Table A-2 Annual Growth Ratio of Population by FUR: For Each Between-the-census Period

No.	Functional Urban Region	1947-50	1950-55	1955-60	1960-65	1965-70	1970-75	1975-80	1980-85	1985-90	1990-95
29	Tokyo	1.0527	1.0389	1.0339	1.0360	1.0294	1.0234	1.0123	1.0109	1.0102	1.0050
54	Osaka	1.0398	1.0315	1.0315	1.0374	1.0276	1.0183	1.0072	1.0062	1.0037	1.0023
47	Nagoya	1.0324	1.0260	1.0279	1.0287	1.0219	1.0182	1.0090	1.0089	1.0066	1.0047
27	Kitakanto	1.0045	1.0010	0.9963	1.0056	1.0099	1.0134	1.0113	1.0093	1.0062	1.0049
53	Kyoto	1.0210	1.0127	1.0094	1.0156	1.0186	1.0189	1.0123	1.0077	1.0043	1.0046
64	Shimonoseki-Kitakyushu	1.0409	1.0237	1.0125	0.9888	0.9968	1.0048	1.0046	1.0009	0.9950	0.9987
55	Kobe	1.0446	1.0288	1.0195	1.0190	1.0181	1.0184	1.0084	1.0077	1.0083	0.9992
75	Fukuoka	1.0353	1.0197	1.0092	1.0061	1.0177	1.0284	1.0214	1.0146	1.0129	1.0116
1	Sapporo	1.0388	1.0327	1.0302	1.0396	1.0321	1.0340	1.0229	1.0151	1.0147	1.0113
62	Hiroshima-Kure	1.0189	1.0134	1.0089	1.0186	1.0150	1.0150	1.0224	1.0079	1.0188	1.0052
13	Sendai	1.0230	1.0093	1.0053	1.0071	1.0139	1.0217	1.0167	1.0121	1.0103	1.0107
61	Okayama-Kurashiki	1.0114	1.0071	1.0028	1.0050	1.0166	1.0181	1.0088	1.0062	1.0024	1.0043
77	Kurume-Saga	1.0116	1.0078	0.9966	0.9915	0.9970	1.0016	1.0074	1.0034	1.0004	1.0018
43	Gifu-Ogaki	1.0139	1.0074	1.0109	1.0153	1.0139	1.0158	1.0107	1.0067	1.0036	1.0025
34	Toyama-Takaoka	1.0106	1.0027	1.0022	0.9989	1.0015	1.0082	1.0062	1.0028	1.0004	1.0006
31	Niigata	1.0109	1.0045	1.0023	1.0044	1.0051	1.0099	1.0106	1.0059	1.0029	1.0037
80	Kumamoto	1.0098	1.0091	0.9987	0.9979	1.0015	1.0082	1.0144	1.0099	1.0055	1.0070
44	Shizuoka	1.0261	1.0181	1.0151	1.0161	1.0145	1.0135	1.0074	1.0053	1.0031	1.0020
49	Kariya-Toyota-Anjo	1.0152	1.0069	1.0087	1.0241	1.0354	1.0263	1.0179	1.0136	1.0129	1.0093
56	Himeji	1.0091	1.0048	1.0049	1.0115	1.0112	1.0129	1.0068	1.0049	1.0003	1.0045
26	Utsunomiya	1.0041	1.0001	0.9959	1.0012	1.0082	1.0178	1.0131	1.0100	1.0087	1.0061
45	Hamamatsu	1.0188	1.0152	1.0075	1.0096	1.0123	1.0151	1.0120	1.0102	1.0079	1.0057
46	Numazu	1.0118	1.0112	1.0110	1.0139	1.0200	1.0189	1.0086	1.0083	1.0062	1.0044
86	Kagoshima	1.0139	1.0076	0.9962	1.0013	1.0021	1.0133	1.0151	1.0075	1.0013	1.0031
70	Takamatsu	1.0121	1.0020	0.9970	0.9992	1.0050	1.0146	1.0096	1.0058	1.0012	1.0020
50	Tsu-Ise-Matsusaka	1.0095	1.0033	0.9964	0.9996	1.0020	1.0083	1.0049	1.0045	1.0013	1.0026
57	Wakayama	1.0109	1.0076	1.0034	1.0136	1.0113	1.0087	1.0047	1.0007	0.9984	1.0016
87	Naha	—	1.0587	1.0345	1.0229	1.0149	1.0289	1.0152	1.0150	1.0099	1.0100
69	Tokushima	1.0108	1.0006	0.9965	0.9974	1.0003	1.0092	1.0085	1.0045	1.0015	1.0021
78	Nagasaki	1.0435	1.0201	1.0153	1.0053	1.0057	1.0091	1.0076	1.0047	0.9992	0.9999
37	Fukui	1.0144	1.0003	1.0014	1.0008	0.9996	1.0084	1.0061	1.0056	1.0011	1.0031
63	Fukuyama	1.0057	1.0013	1.0021	1.0042	1.0185	1.0171	1.0050	1.0036	0.9990	1.0011
48	Toyohashi	1.0158	1.0104	1.0063	1.0146	1.0118	1.0164	1.0109	1.0095	1.0068	1.0054
82	Oita	1.0059	1.0077	0.9993	1.0031	1.0073	1.0201	1.0127	1.0077	1.0042	1.0008
23	Mito	1.0077	1.0034	1.0007	1.0037	1.0094	1.0155	1.0127	1.0095	1.0055	1.0067
35	Kanazawa	1.0153	1.0068	1.0051	1.0089	1.0106	1.0203	1.0140	1.0095	1.0066	1.0069
39	Nagano	1.0028	0.9986	0.9970	1.0001	1.0033	1.0085	1.0077	1.0046	1.0021	1.0037
38	Kofu	0.9992	0.9970	0.9930	0.9945	1.0002	1.0073	1.0079	1.0054	1.0093	1.0073
74	Kochi	1.0108	1.0038	0.9964	1.0008	1.0034	1.0122	1.0090	1.0055	0.9992	1.0008
16	Yamagata	1.0070	0.9966	0.9981	0.9960	1.0002	1.0055	1.0094	1.0050	1.0020	1.0028
25	Tuchiura-Tsukuba	0.9986	0.9989	0.9894	0.9974	1.0057	1.0191	1.0241	1.0137	1.0117	1.0130
21	Koriyama	1.0122	1.0006	1.0038	0.9997	1.0035	1.0084	1.0103	1.0068	1.0055	1.0067
30	Hiratsuka-Atsugi	1.0102	1.0108	1.0072	1.0381	1.0473	1.0479	1.0314	1.0231	1.0184	1.0102
51	Yokkaichi	1.0124	1.0053	1.0095	1.0168	1.0130	1.0188	1.0097	1.0076	1.0083	1.0079
71	Matsuyama	1.0187	1.0112	1.0066	1.0095	1.0128	1.0210	1.0159	1.0100	1.0057	1.0064
15	Akita	1.0206	1.0101	1.0033	0.9995	1.0048	1.0094	1.0109	1.0039	1.0005	1.0024
19	Fukushima	1.0116	1.0037	0.9972	0.9999	1.0027	1.0071	1.0076	1.0036	1.0020	1.0024
40	Matsumoto	1.0025	0.9985	0.9991	0.9996	1.0035	1.0104	1.0092	1.0064	1.0032	1.0057
32	Nagaoka	1.0072	0.9984	0.9962	0.9962	0.9964	1.0013	1.0035	1.0009	0.9996	1.0007
2	Hakodate	1.0216	1.0104	0.9990	1.0039	1.0049	1.0085	1.0080	0.9987	0.9935	0.9979
83	Miyazaki	1.0190	1.0072	1.0037	0.9983	1.0055	1.0178	1.0201	1.0100	1.0059	1.0075
3	Asahikawa	1.0323	1.0234	1.0141	1.0141	1.0084	1.0081	1.0151	1.0040	0.9958	1.0003
12	Morioka	1.0272	1.0162	1.0107	1.0038	1.0039	1.0145	1.0170	1.0103	1.0054	1.0070
11	Hachinohe	1.0304	1.0158	1.0155	1.0031	1.0067	1.0069	1.0076	1.0013	0.9986	1.0004
79	Sasebo	1.0303	1.0184	0.9960	0.9731	0.9900	1.0008	1.0018	1.0006	0.9962	1.0003
24	Hitachi	1.0143	1.0115	1.0189	1.0067	1.0009	1.0065	1.0063	1.0050	0.9997	1.0006
22	Iwaki	1.0264	1.0058	0.9961	0.9925	0.9955	1.0015	1.0074	1.0048	1.0030	1.0028
10	Hirosaki	1.0205	1.0093	0.9993	0.9940	0.9981	1.0024	1.0071	0.9986	0.9961	0.9999
60	Matsue	1.0113	1.0052	0.9973	0.9952	0.9999	1.0052	1.0076	1.0047	1.0001	1.0005
76	Omuta	1.0408	1.0062	0.9991	0.9881	0.9818	0.9954	1.0002	0.9991	0.9904	0.9934
9	Aomori	1.0368	1.0201	1.0082	1.0062	1.0089	1.0143	1.0140	1.0026	0.9938	1.0025
20	Aizuwakamatsu	1.0021	1.0010	0.9933	0.9895	0.9889	0.9956	1.0030	1.0012	0.9993	0.9995
33	Jyoetsu	0.9970	0.9978	0.9934	0.9927	0.9893	0.9959	1.0005	0.9994	0.9959	0.9991
28	Oyama	0.9986	0.9986	0.9964	1.0072	1.0172	1.0196	1.0124	1.0083	1.0060	1.0049
66	Yamaguchi	1.0083	1.0050	0.9951	0.9905	0.9985	1.0078	1.0100	1.0103	1.0020	1.0038
52	Hikone	0.9990	0.9964	0.9948	1.0002	1.0027	1.0094	1.0022	1.0088	1.0053	1.0050
67	Tokuyama	1.0083	1.0068	1.0044	1.0108	1.0110	1.0171	1.0060	1.0007	0.9957	0.9974
59	Yonago	1.0090	1.0066	0.9957	0.9955	0.9976	1.0066	1.0094	1.0034	0.9984	1.0003
4	Muroran	1.0385	1.0226	1.0306	1.0246	1.0094	1.0040	0.9987	0.9899	0.9805	0.9933
6	Obihiro	1.0211	1.0347	1.0061	1.0118	1.0079	1.0074	1.0140	1.0097	1.0013	1.0052
58	Tottori	1.0092	1.0045	0.9952	0.9931	0.9966	1.0033	1.0066	1.0047	1.0023	1.0001
5	Kushiro	1.0760	1.0369	1.0355	1.0156	0.9995	1.0133	1.0087	1.0012	0.9950	0.9953
65	Ube	1.0392	1.0122	1.0043	0.9810	0.9919	1.0098	1.0070	1.0065	1.0001	0.9997
84	Miyakonojo	1.0140	1.0050	0.9937	0.9874	0.9878	1.0006	1.0139	1.0038	0.9987	1.0025
41	Ueda	0.9975	0.9935	0.9947	0.9970	1.0001	1.0063	1.0074	1.0059	1.0035	1.0046
14	Ishinomaki	1.0171	1.0015	1.0012	0.9971	1.0022	1.0056	1.0052	1.0016	0.9969	0.9976
72	Imabari	1.0166	1.0011	0.9989	0.9972	1.0027	1.0092	1.0032	1.0014	0.9957	0.9956
81	Yatsushiro	1.0140	1.0090	0.9986	0.9881	0.9894	0.9960	1.0027	0.9982	0.9946	0.9958
73	Niihama	1.0214	1.0061	1.0019	0.9972	0.9986	1.0076	1.0027	1.0027	0.9973	0.9991
36	Komatsu	1.0092	0.9968	1.0021	1.0051	1.0097	1.0126	1.0092	1.0059	1.0009	1.0025
18	Sakata	1.0108	1.0024	0.9964	0.9912	0.9931	0.9982	1.0058	0.9974	0.9973	0.9981
68	Iwakuni	1.0090	1.0157	1.0046	0.9972	0.9951	1.0047	1.0020	0.9972	0.9955	0.9973
85	Nobeoka	1.0428	1.0187	1.0055	0.9955	1.0016	1.0060	1.0038	0.9992	0.9919	0.9939
17	Tsuruoka	1.0082	1.0060	0.9886	0.9895	0.9917	0.9959	1.0038	0.9992	0.9975	0.9982
42	Iida	1.0023	0.9901	0.9874	0.9900	0.9917	1.0002	1.0039	1.0181	0.9988	0.9996
8	Tomakomai	1.0528	1.0337	1.0278	1.0345	1.0281	1.0392	1.0216	1.0050	0.9989	1.0070
7	Kitami	1.0289	1.0194	1.0118	1.0049	1.0012	1.0073	1.0151	1.0038	0.9961	1.0017
	Average	1.0180	1.0100	1.0047	1.0045	1.0062	1.0117	1.0096	1.0058	1.0018	1.0027

Table A-3 Estimated Population of FURs: For Mid-point Year between Two Adjacent Censuses

No.	Functional Urban Region	1947-50	1950-55	1955-60	1960-65	1965-70	1970-75	1975-80	1980-85	1985-90	1990-95
29	Tokyo	10, 412, 922	12, 371, 508	14, 790, 082	17, 558, 974	20, 624, 291	23, 498, 550	25, 671, 667	27, 197, 123	28, 668, 069	29, 773, 472
54	Osaka	5, 045, 632	5, 780, 694	6, 750, 426	7, 997, 095	9, 384, 309	10, 512, 449	11, 200, 624	11, 582, 176	11, 871, 025	12, 047, 685
47	Nagoya	2, 384, 926	2, 667, 819	3, 047, 197	3, 503, 057	3, 968, 798	4, 382, 342	4, 687, 831	4, 877, 518	5, 045, 320	5, 190, 394
27	kitakanto	2, 050, 084	2, 069, 259	2, 055, 752	2, 065, 531	2, 146, 596	2, 274, 766	2, 418, 780	2, 545, 563	2, 645, 745	2, 720, 268
53	Kyoto	1, 595, 876	1, 699, 166	1, 795, 205	1, 910, 199	2, 079, 318	2, 282, 149	2, 465, 947	2, 591, 603	2, 670, 462	2, 730, 649
64	Shimonoseki-Kitakyushu	1, 461, 129	1, 645, 231	1, 799, 511	1, 850, 864	1, 830, 599	1, 837, 824	1, 881, 668	1, 907, 875	1, 888, 314	1, 858, 727
55	Kobe	1, 089, 572	1, 248, 901	1, 407, 359	1, 548, 498	1, 697, 747	1, 858, 232	1, 985, 938	2, 067, 211	2, 151, 166	2, 191, 867
75	Fukuoka	1, 168, 757	1, 292, 509	1, 388, 345	1, 442, 058	1, 529, 630	1, 714, 098	1, 938, 565	2, 119, 505	2, 269, 235	2, 411, 935
1	Sapporo	698, 296	801, 298	935, 494	1, 110, 582	1, 324, 407	1, 557, 988	1, 792, 540	1, 969, 605	2, 121, 047	2, 262, 501
62	Hiroshima-Kure	1, 038, 413	1, 104, 152	1, 167, 159	1, 249, 443	1, 357, 682	1, 489, 095	1, 605, 085	1, 715, 235	1, 820, 614	1, 867, 390
13	Sendai	1, 023, 968	1, 084, 288	1, 124, 405	1, 159, 658	1, 221, 808	1, 334, 261	1, 467, 203	1, 575, 957	1, 666, 219	1, 755, 720
61	Okayama-Kurashiki	1, 050, 788	1, 087, 700	1, 114, 719	1, 136, 588	1, 199, 303	1, 307, 003	1, 397, 130	1, 450, 492	1, 482, 056	1, 507, 097
74	Kurume-Saga	1, 126, 641	1, 168, 997	1, 181, 860	1, 147, 073	1, 114, 536	1, 110, 539	1, 135, 694	1, 166, 751	1, 177, 889	1, 184, 429
43	Gifu-Ogaki	826, 825	859, 855	899, 984	960, 406	1, 032, 420	1, 111, 268	1, 186, 884	1, 239, 333	1, 271, 491	1, 291, 058
34	Toyama-Takaoka	973, 654	995, 967	1, 008, 218	1, 010, 931	1, 011, 972	1, 036, 757	1, 074, 726	1, 093, 130	1, 107, 866	1, 110, 634
31	Niigata	875, 215	899, 585	914, 882	930, 325	952, 601	988, 813	1, 040, 592	1, 084, 180	1, 108, 263	1, 126, 730
80	Kumamoto	916, 080	951, 048	969, 828	961, 658	960, 213	983, 746	1, 040, 552	1, 105, 352	1, 148, 732	1, 185, 151
44	Shizuoka	659, 164	716, 488	777, 911	840, 496	906, 839	972, 225	1, 024, 086	1, 057, 031	1, 079, 464	1, 093, 207
49	Kariya-Toyota-Anjo	625, 189	650, 551	676, 291	733, 450	849, 090	988, 233	1, 102, 228	1, 191, 773	1, 272, 867	1, 345, 005
56	Himeji	732, 148	751, 109	769, 590	801, 651	848, 113	900, 318	945, 475	973, 484	986, 089	997, 790
26	Utsunomiya	802, 995	808, 019	799, 800	793, 987	812, 885	867, 009	936, 002	991, 194	1, 038, 370	1, 077, 441
45	Hamamatsu	618, 663	660, 630	698, 916	729, 344	770, 259	824, 565	881, 999	932, 053	975, 113	1, 008, 900
46	Numazu	539, 345	564, 495	596, 595	644, 058	710, 921	782, 884	838, 262	874, 346	906, 450	930, 696
86	Kagoshima	680, 952	708, 414	715, 037	710, 499	716, 415	744, 351	798, 754	844, 898	863, 654	873, 202
70	Takamatsu	685, 792	701, 746	699, 936	693, 343	700, 731	735, 782	781, 434	811, 971	826, 136	832, 785
50	Tsu-Ise-Matsusaka	668, 386	683, 554	682, 994	676, 127	678, 828	696, 448	719, 742	736, 847	747, 512	754, 762
57	Wakayama	525, 195	544, 035	559, 219	583, 398	620, 664	652, 368	674, 549	683, 802	682, 240	682, 170
87	Naha	—	381, 045	478, 418	551, 176	605, 247	674, 386	751, 973	810, 460	852, 245	906, 063
69	Tokushima	612, 012	622, 794	618, 159	608, 793	605, 282	619, 539	647, 523	668, 896	679, 061	685, 253
78	Nagasaki	449, 399	503, 431	549, 610	578, 534	594, 658	616, 935	643, 046	663, 021	669, 444	667, 950
37	Fukui	578, 815	591, 830	594, 353	597, 560	598, 082	610, 116	632, 609	651, 351	662, 393	669, 453
63	Fukuyama	514, 458	520, 566	524, 974	533, 307	564, 279	616, 407	651, 260	665, 448	669, 821	670, 056
48	Toyohashi	461, 331	484, 715	505, 382	532, 402	568, 500	609, 695	652, 398	686, 270	714, 562	736, 462
82	Oita	530, 626	545, 702	555, 277	558, 591	573, 251	613, 438	665, 307	699, 859	720, 827	729, 833
23	Mito	524, 224	534, 796	540, 301	546, 202	564, 250	600, 275	643, 830	680, 362	706, 223	727, 907
35	Kanazawa	476, 598	495, 881	510, 780	528, 891	555, 138	599, 300	652, 485	691, 711	720, 045	744, 743
39	Nagano	565, 124	565, 525	559, 305	555, 264	560, 014	576, 648	600, 329	618, 996	629, 326	638, 448
38	Kofu	589, 432	584, 266	569, 737	552, 194	544, 975	555, 221	576, 518	595, 871	618, 136	644, 280
74	Kochi	498, 597	511, 590	511, 888	508, 288	513, 565	533, 907	562, 821	583, 478	590, 397	590, 414
16	Yamagata	501, 772	502, 749	496, 104	488, 844	484, 242	491, 198	509, 789	528, 385	537, 623	544, 072
25	Tuchiura-Tsukuba	499, 623	497, 150	482, 784	467, 121	470, 702	500, 489	556, 834	611, 343	651, 181	692, 416
21	Koriyama	449, 661	458, 575	463, 572	467, 584	471, 350	485, 510	508, 593	530, 701	547, 222	564, 085
30	Hiratsuka-Atsugi	281, 994	294, 097	307, 529	343, 720	423, 557	534, 382	648, 949	742, 291	822, 650	883, 175
51	Yokkaichi	372, 213	384, 225	398, 730	425, 634	458, 220	495, 723	531, 970	555, 335	577, 798	601, 687
71	Matsuyama	370, 651	391, 880	409, 695	426, 437	450, 743	490, 171	537, 019	572, 665	595, 456	613, 629
15	Akita	405, 872	429, 131	443, 712	446, 878	451, 755	468, 094	492, 370	510, 850	516, 469	520, 185
19	Fukushima	412, 134	423, 265	424, 273	421, 263	424, 036	434, 556	450, 802	463, 598	470, 163	475, 395
40	Matsumoto	393, 978	393, 933	391, 552	390, 278	393, 292	407, 137	427, 498	444, 386	455, 130	465, 417
32	Nagaoka	414, 637	417, 456	411, 852	404, 061	396, 550	394, 238	398, 975	403, 351	403, 896	404, 258
2	Hakodate	337, 004	357, 123	365, 604	368, 228	376, 353	389, 161	405, 567	413, 506	406, 532	397, 873
83	Miyazaki	337, 317	353, 242	362, 921	364, 671	368, 130	390, 033	428, 435	461, 733	480, 396	496, 711
3	Asahikawa	262, 558	291, 755	320, 139	343, 391	363, 115	378, 298	400, 753	420, 299	420, 100	416, 014
12	Morioka	297, 995	322, 962	345, 245	357, 879	364, 827	381, 954	413, 062	442, 067	459, 631	474, 004
11	Hachinohe	283, 240	308, 088	332, 934	348, 653	357, 223	369, 466	383, 004	391, 620	391, 567	390, 547
79	Sasebo	384, 400	420, 754	435, 961	403, 090	367, 178	358, 801	361, 117	363, 297	360, 391	357, 255
24	Hitachi	284, 040	298, 589	321, 994	343, 160	349, 784	356, 293	367, 789	378, 263	382, 688	382, 945
22	Iwaki	344, 440	363, 410	365, 110	354, 776	344, 204	341, 603	349, 275	360, 019	367, 010	372, 274
10	Hirosaki	327, 459	345, 465	352, 925	347, 096	340, 313	340, 721	348, 880	353, 887	349, 292	345, 838
60	Matsue	305, 586	314, 786	316, 718	310, 831	307, 040	310, 959	321, 057	331, 088	335, 109	335, 574
76	Omuta	324, 253	349, 681	354, 360	343, 134	318, 097	300, 368	297, 050	296, 520	288, 789	277, 241
9	Aomori	230, 713	255, 982	274, 552	284, 534	295, 449	313, 010	335, 791	349, 938	346, 795	343, 591
20	Aizuwakamatsu	325, 273	327, 121	322, 512	308, 897	292, 570	281, 419	286, 439	283, 348	283, 679	282, 846
33	Jyoetsu	318, 152	314, 979	308, 114	297, 513	284, 330	273, 929	271, 437	271, 352	268, 140	264, 754
28	Oyama	249, 124	247, 717	244, 600	246, 780	262, 190	287, 199	310, 868	327, 260	339, 133	348, 469
66	Yamaguchi	282, 525	289, 655	289, 738	279, 457	271, 856	276, 148	288, 672	303, 643	313, 102	317, 655
52	Hikone	266, 048	263, 224	257, 480	254, 268	256, 061	263, 897	271, 653	279, 225	289, 233	296, 723
67	Tokuyama	208, 521	214, 704	220, 783	229, 322	242, 116	259, 600	274, 896	279, 500	276, 989	272, 232
59	Yonago	240, 671	247, 960	249, 357	243, 927	239, 745	242, 290	252, 170	260, 313	261, 424	260, 526
4	Muroran	146, 234	163, 652	186, 604	213, 816	232, 604	240, 524	242, 170	235, 328	218, 404	204, 482
6	Obihiro	168, 047	188, 826	208, 769	218, 260	229, 258	238, 166	251, 128	266, 320	273, 711	278, 201
58	Tottori	241, 208	247, 289	247, 084	239, 923	233, 789	233, 720	239, 548	246, 385	250, 713	252, 220
5	Kushiro	134, 496	164, 330	196, 291	222, 603	231, 072	238, 534	251, 968	258, 253	255, 760	249, 629
65	Ube	210, 597	229, 955	239, 606	230, 885	215, 656	216, 528	225, 774	233, 483	237, 339	237, 209
84	Miyakonojo	232, 088	239, 948	239, 158	228, 074	214, 313	208, 181	215, 808	225, 486	226, 899	227, 578
41	Ueda	218, 998	214, 655	208, 400	204, 126	202, 678	205, 966	213, 139	220, 324	225, 542	230, 112
14	Ishinomaki	195, 377	201, 179	202, 539	201, 673	201, 356	205, 354	210, 958	214, 537	213, 728	210, 814
72	Imabari	191, 129	196, 458	196, 453	194, 538	194, 486	200, 353	206, 680	209, 111	207, 605	203, 104
81	Yatsushiro	204, 450	213, 459	217, 528	210, 396	198, 843	191, 708	191, 111	191, 557	188, 143	183, 676
73	Niihama	183, 625	192, 459	196, 353	195, 913	193, 893	196, 926	202, 062	204, 834	204, 841	202, 998
36	Komatsu	162, 690	163, 643	163, 222	166, 195	172, 420	182, 231	192, 387	199, 792	203, 236	204, 986
18	Sakata	182, 451	186, 533	185, 977	180, 285	173, 326	169, 614	171, 333	172, 688	170, 402	168, 469
68	Iwakuni	157, 776	166, 270	174, 858	175, 599	172, 235	172, 135	175, 015	174, 636	171, 434	168, 344
85	Nobeoka	139, 555	155, 655	165, 288	165, 681	164, 462	167, 605	171, 779	173, 105	169, 294	163, 376
17	Tsuruoka	180, 823	185, 814	183, 297	173, 472	165, 449	160, 375	160, 263	161, 478	160, 122	158, 398
42	Iida	193, 843	189, 766	179, 365	169, 494	161, 896	158, 619	160, 228	169, 192	176, 410	175, 702
8	Tomakomai	75, 798	88, 953	103, 481	120, 633	140, 755	166, 097	192, 919	206, 068	208, 051	211, 105
7	Kitami	97, 066	106, 289	114, 835	119, 705	121, 528	124, 127	131, 223	137, 530	137, 504	136, 745
	Total	59, 105, 330	64, 433, 947	69, 724, 857	75, 343, 196	81, 943, 263	89, 163, 452	95, 604, 264	100, 237, 621	103, 830, 617	106, 487, 071

Table A-4 Population of FUCs: For Period 1947-1995
(The FURs, instead of FUCs, are sorted by the population level in 1970.)

No.	Functional Urban Region	No.	Functional Urban Region	1947	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995
29	東京都市圏	29	Tokyo	4, 421, 807	5, 652, 842	7, 288, 422	8, 676, 843	9, 334, 964	9, 348, 365	9, 246, 737	9, 018, 656	9, 066, 575	8, 921, 821	8, 763, 912
54	大阪都市圏	54	Osaka	1, 900, 449	2, 327, 286	2, 909, 476	3, 466, 087	3, 833, 368	3, 806, 167	3, 625, 358	3, 474, 270	3, 459, 044	3, 441, 789	3, 417, 465
47	名古屋都市圏	47	Nagoya	1, 008, 931	1, 193, 780	1, 457, 936	1, 740, 563	1, 996, 307	2, 115, 659	2, 177, 185	2, 191, 135	2, 229, 665	2, 279, 234	2, 289, 349
27	北関東都市圏	27	Kitakanto	836, 343	862, 973	883, 929	892, 166	950, 864	1, 026, 264	1, 098, 280	1, 150, 893	1, 197, 633	1, 224, 717	1, 228, 848
53	京都市都市圏	53	Kyoto	1, 031, 679	1, 119, 697	1, 219, 226	1, 284, 818	1, 365, 007	1, 419, 165	1, 461, 059	1, 473, 065	1, 479, 218	1, 461, 103	1, 463, 822
64	下関市・北九州市都市圏	64	Shimonoseki-Kitakyushu	810, 576	942, 952	1, 101, 828	1, 233, 719	1, 297, 064	1, 301, 045	1, 325, 035	1, 334, 035	1, 325, 571	1, 289, 090	1, 279, 393
55	神戸市都市圏	55	Kobe	693, 971	820, 956	986, 311	1, 113, 937	1, 216, 614	1, 288, 901	1, 360, 565	1, 367, 390	1, 410, 834	1, 477, 410	1, 423, 792
75	福岡市都市圏	75	Fukuoka	416, 322	487, 885	591, 868	682, 365	769, 178	871, 717	1, 002, 201	1, 088, 588	1, 160, 440	1, 237, 062	1, 284, 795
1	札幌市都市圏	1	Sapporo	342, 133	393, 770	487, 446	615, 684	821, 272	1, 010, 177	1, 240, 613	1, 401, 757	1, 542, 979	1, 671, 742	1, 757, 025
62	広島市・呉市都市圏	62	Hiroshima-Kure	555, 448	616, 082	696, 180	768, 020	882, 379	981, 480	1, 095, 266	1, 133, 948	1, 270, 606	1, 302, 428	1, 318, 373
13	仙台市都市圏	13	Sendai	331, 570	380, 217	414, 775	459, 876	520, 059	598, 950	709, 326	792, 036	857, 335	918, 398	971, 297
61	岡山市・倉敷市都市圏	61	Okayama-Kurashiki	552, 539	581, 652	622, 716	654, 048	707, 412	815, 216	906, 226	949, 550	986, 111	1, 008, 423	1, 038, 593
77	久留米市・佐賀市都市圏	77	Kurume-Saga	261, 149	278, 758	303, 762	311, 532	320, 315	337, 640	356, 740	380, 737	391, 099	398, 310	405, 664
42	岐阜市・大垣市都市圏	42	Gifu-Ogaki	311, 538	337, 377	383, 350	427, 153	484, 470	520, 683	549, 146	553, 508	557, 653	558, 605	556, 893
34	富山市・高岡市都市圏	34	Toyama-Takaoka	332, 418	355, 189	373, 921	392, 674	411, 040	428, 940	459, 764	480, 110	489, 907	496, 720	498, 982
31	新潟市都市圏	31	Niigata	261, 945	281, 676	301, 001	325, 018	356, 302	383, 919	423, 188	457, 785	475, 630	485, 097	493, 769
80	熊本市都市圏	80	Kumamoto	334, 817	358, 548	400, 240	424, 580	455, 249	488, 051	528, 086	568, 820	601, 367	626, 707	650, 341
44	静岡市都市圏	44	Shizuoka	245, 923	275, 284	316, 488	350, 897	382, 799	416, 378	446, 952	458, 341	468, 362	472, 196	474, 092
49	刈谷市・豊田市・安城市都市圏	49	Kariya-Toyota-Anjo	197, 859	205, 193	214, 728	230, 566	282, 897	379, 172	455, 973	511, 094	553, 573	594, 713	615, 848
56	姫路市都市圏	56	Himeji	270, 606	286, 312	309, 335	334, 520	373, 653	408, 353	436, 086	446, 256	452, 917	454, 360	470, 986
26	宇都宮市都市圏	26	Utsunomiya	201, 015	211, 211	227, 094	239, 007	265, 696	301, 231	344, 420	377, 746	405, 375	426, 795	435, 357
45	浜松市都市圏	45	Hamamatsu	259, 421	288, 845	332, 452	365, 652	402, 463	443, 352	480, 376	503, 213	527, 259	547, 875	561, 606
46	沼津市・富士市都市圏	46	Numazu	237, 994	252, 695	274, 001	299, 803	335, 816	359, 677	398, 520	409, 446	426, 180	433, 222	441, 428
86	鹿児島市都市圏	86	Kagoshima	241, 592	269, 560	314, 011	334, 643	371, 129	403, 340	456, 827	505, 360	530, 502	536, 752	546, 282
70	高松市都市圏	70	Takamatsu	189, 274	211, 302	229, 475	243, 538	257, 716	274, 367	298, 999	316, 661	326, 999	329, 684	331, 004
50	津市・伊勢市・松阪市都市圏	50	Tsu-Ise-Matsusaka	282, 988	296, 394	310, 807	313, 988	324, 723	336, 260	353, 388	364, 093	373, 031	380, 066	388, 237
57	和歌山市都市圏	57	Wakayama	225, 081	243, 520	265, 244	285, 155	328, 657	365, 267	389, 717	400, 802	401, 352	396, 553	393, 885
87	那覇市都市圏	87	Naha	—	108, 673	171, 694	223, 050	257, 190	276, 394	295, 006	295, 778	303, 674	304, 836	301, 890
69	徳島市都市圏	69	Tokushima	159, 298	177, 363	192, 642	203, 326	213, 328	223, 451	239, 281	249, 343	257, 884	263, 356	268, 705
78	長崎市都市圏	78	Nagasaki	254, 954	300, 522	349, 121	387, 910	411, 733	427, 083	450, 194	447, 091	449, 382	444, 599	438, 635
37	福井市都市圏	37	Fukui	155, 730	175, 109	183, 275	193, 858	205, 501	215, 137	231, 364	240, 962	250, 261	252, 743	255, 604
63	福山市都市圏	63	Fukuyama	191, 448	199, 114	206, 601	218, 766	238, 083	289, 043	329, 714	346, 030	360, 261	365, 612	374, 517
48	豊橋市都市圏	48	Toyohashi	169, 594	185, 984	202, 985	215, 515	238, 672	258, 547	284, 585	304, 273	322, 142	337, 982	352, 982
82	大分市都市圏	82	Oita	177, 389	186, 136	200, 204	207, 151	226, 417	260, 584	320, 237	360, 478	390, 096	408, 501	426, 979
23	水戸市都市圏	23	Mito	108, 770	117, 403	128, 213	139, 380	154, 973	173, 789	197, 953	215, 566	228, 985	234, 968	246, 347
35	金沢市都市圏	35	Kanazawa	266, 493	283, 863	299, 911	313, 114	335, 830	361, 382	395, 268	417, 684	430, 481	442, 868	453, 975
39	長野市都市圏	39	Nagano	243, 046	248, 653	253, 430	257, 071	269, 160	285, 355	306, 637	324, 360	336, 973	347, 026	358, 516
38	甲府市都市圏	38	Kofu	125, 140	139, 037	154, 501	160, 963	172, 457	182, 669	193, 879	199, 262	202, 405	200, 626	201, 124
74	高知市都市圏	74	Kochi	151, 923	166, 531	184, 728	200, 817	222, 791	248, 121	280, 962	300, 822	312, 241	317, 069	321, 999
16	山形市都市圏	16	Yamagata	174, 595	180, 579	183, 763	188, 560	193, 737	204, 127	219, 773	237, 041	245, 158	249, 487	254, 488
25	土浦市・つくば市都市圏	25	Tuchiura-Tsukuba	154, 661	153, 395	154, 002	147, 463	151, 544	161, 607	185, 229	223, 063	247, 672	270, 867	288, 255
21	郡山市都市圏	21	Koriyama	185, 924	195, 798	206, 049	213, 825	223, 236	241, 726	264, 628	285, 451	301, 673	314, 642	326, 833
30	平塚市・厚木市都市圏	30	Hiratsuka-Atsugi	122, 535	130, 176	143, 762	154, 522	196, 319	246, 565	304, 590	359, 685	405, 590	443, 233	462, 449
51	四日市市都市圏	51	Yokkaichi	156, 475	167, 810	179, 454	195, 974	218, 981	229, 234	247, 001	255, 442	263, 001	274, 180	285, 779
71	松山市都市圏	71	Matsuyama	198, 409	215, 083	241, 000	262, 044	290, 662	322, 902	367, 323	401, 703	426, 658	443, 322	460, 968
15	秋田市都市圏	15	Akita	161, 348	173, 029	190, 202	203, 661	216, 607	235, 873	261, 246	284, 863	296, 400	302, 362	311, 948
19	福島市都市圏	19	Fukushima	179, 911	189, 626	201, 375	205, 435	213, 412	227, 455	246, 535	262, 837	270, 762	277, 528	285, 754
40	松本市都市圏	40	Matsumoto	148, 401	150, 091	155, 663	158, 183	164, 927	175, 049	185, 595	192, 085	197, 340	200, 715	205, 523
32	長岡市都市圏	32	Nagaoka	128, 610	135, 366	143, 604	148, 254	154, 752	162, 262	171, 742	180, 259	183, 756	185, 938	190, 470
2	函館市都市圏	2	Hakodate	239, 600	252, 756	267, 945	271, 172	281, 029	292, 286	307, 453	320, 154	319, 194	307, 249	298, 881
83	宮崎市都市圏	83	Miyazaki	129, 700	142, 137	156, 886	166, 360	182, 869	202, 861	234, 346	264, 855	279, 114	287, 352	300, 068
3	旭川市都市圏	3	Asahikawa	164, 230	184, 242	214, 479	239, 636	271, 930	297, 189	320, 526	352, 619	363, 631	359, 071	360, 568
12	盛岡市都市圏	12	Morioka	130, 158	141, 805	157, 254	171, 838	191, 901	212, 690	237, 705	258, 740	272, 776	278, 497	286, 478
11	八戸市都市圏	11	Hachinohe	117, 806	133, 263	149, 938	174, 348	189, 387	208, 801	224, 366	238, 179	241, 430	241, 057	242, 654
79	佐世保市都市圏	79	Saseho	206, 072	227, 736	263, 884	262, 484	247, 069	247, 898	250, 729	251, 187	250, 633	244, 677	244, 909
24	日立市都市圏	24	Hitachi	115, 143	121, 686	135, 368	161, 226	179, 703	193, 210	202, 383	204, 596	205, 074	202, 141	199, 244
22	いわき市都市圏	22	Iwaki	313, 785	340, 260	351, 440	345, 663	333, 681	327, 154	330, 213	342, 074	350, 569	355, 812	360, 598
10	弘前市都市圏	10	Hirosaki	131, 959	139, 784	147, 107	150, 702	151, 624	157, 603	164, 911	175, 330	176, 082	174, 704	177, 972
60	松江市都市圏	60	Matsue	94, 111	97, 307	103, 771	106, 476	110, 534	118, 005	127, 440	135, 568	140, 005	142, 956	147, 416
76	大牟田市都市圏	76	Omuta	166, 438	191, 978	201, 737	205, 766	193, 875	175, 143	165, 969	163, 000	159, 424	150, 453	145, 085
9	青森市都市圏	9	Aomori	153, 138	173, 907	197, 812	210, 883	224, 433	240, 063	264, 222	287, 594	294, 045	287, 808	294, 167
20	会津若松市都市圏	20	Aizuwakamatsu	92, 262	93, 687	97, 885	99, 546	102, 239	104, 065	108, 850	114, 528	118, 140	119, 080	119, 640
33	上越市都市圏	33	Jyoetsu	115, 743	113, 552	117, 069	116, 542	119, 318	120, 410	123, 418	127, 842	130, 659	130, 116	132, 205
28	小山市都市圏	28	Oyama	82, 144	82, 908	83, 785	83, 481	90, 658	105, 374	120, 290	127, 226	134, 217	142, 262	150, 115
66	山口市都市圏	66	Yamaguchi	93, 737	96, 008	99, 660	101, 916	98, 977	101, 041	106, 099	114, 744	124, 213	129, 461	135, 579
52	彦根市都市圏	52	Hikone	76, 627	77, 606	75, 873	72, 931	74, 549	78, 753	85, 066	83, 701	94, 204	99, 519	103, 508
67	徳山市都市圏	67	Tokuyama	73, 269	77, 603	82, 712	87, 382	93, 472	98, 520	106, 967	111, 469	112, 638	110, 900	108, 671
59	米子市都市圏	59	Yonago	87, 537	91, 404	97, 735	99, 737	103, 985	109, 096	118, 332	127, 374	131, 792	131, 453	134, 762
4	室蘭市都市圏	4	Muroran	96, 722	110, 443	123, 533	145, 679	161, 252	162, 059	158, 715	150, 199	136, 208	117, 855	109, 766
6	帯広市都市圏	6	Obihiro	61, 912	67, 552	92, 442	100, 915	117, 253	131, 568	141, 774	153, 861	162, 932	167, 384	171, 715
58	鳥取市都市圏	58	Tottori	95, 168	100, 222	107, 483	107, 350	108, 823	113, 151	122, 312	131, 060	137, 060	142, 467	146, 330
5	釧路市都市圏	5	Kushiro	73, 521	93, 357	119, 536	150, 624	174, 105	191, 948	206, 840	214, 694	214, 541	206, 639	199, 323
65	宇部市都市圏	65	Ube	126, 720	146, 891	160, 020	166, 632	158, 986	152, 935	161, 969	168, 958	174, 729	175, 053	175, 116
84	都城市都市圏	84	Miyakonojo	111, 539	116, 487	122, 708	121, 497	118, 582	114, 799	118, 289	129, 009	132, 098	130, 153	132, 714
41	上田市都市圏	41	Ueda	95, 661	95, 554	94, 384	94, 275	96, 539	99, 499	105, 151	111, 540	116, 178	119, 435	123, 284
14	石巻市都市圏	14	Ishinomaki	84, 441	85, 939	89, 891	93, 698	98, 240	106, 681	115, 085	120, 699	122, 674	121, 976	121, 208
72	今治市都市圏	72	Imabari	84, 467	92, 587	96, 654	100, 082	104, 470	111, 125	119, 726	123, 234	125, 115	123, 114	120, 214
81	八代市都市圏	81	Yatsushiro	85, 796	91, 055	99, 412	103, 488	102, 511	101, 866	103, 691	108, 194	108, 790	108, 135	107, 709
73	新居浜市都市圏	73	Niihama	106, 665	115, 058	120, 863	125, 688	125, 155	126, 033	131, 712	132, 339	132, 184	129, 149	127, 917
36	小松市都市圏	36	Komatsu	87, 302	89, 589	88, 507	89, 085	91, 163	95, 684	100, 273	104, 329	106, 041	106, 075	107, 965
18	酒田市都市圏	18	Sakata	89, 752	93, 724	95, 740	97, 675	95, 986	96, 072	97, 723	102, 600	101, 392	100, 811	101, 230
68	岩国市都市圏	68	Iwakuni	75, 651	79, 439	90, 607	100, 346	105, 931	106, 116	111, 069	112, 525	111, 833	109, 530	107, 386
85	延岡市都市圏	85	Nobeoka	88, 968	103, 986	116, 762	122, 527	124, 000	128, 292	134, 521	136, 598	136, 381	130, 624	126, 629
17	鶴岡市都市圏	17	Tsuruoka	92, 644	95, 968	98, 589	96, 312	95, 615	95, 136	95, 932	99, 751	100, 200	99, 869	100, 538
42	飯田市都市圏	42	Iida	95, 458	95, 653	93, 158	89, 873	88, 021	87, 398	89, 320	91, 848	106, 731	106, 495	106, 772
8	苫小牧市都市圏	8	Tomakomai	30, 760	39, 226	51, 319	62, 384	81, 812	101, 573	132, 477	151, 957	158, 061	160, 118	169, 328
7	北見市都市圏	7	Kitami	47, 277	52, 596	59, 437	66, 932	74, 841	82, 727	91, 519	102, 915	107, 281	107, 247	110, 452
			Total	24, 583, 945	28, 056, 252	32, 466, 586	36, 228, 855	39, 382, 441	41, 442, 925	43, 541, 958	44, 741, 473	46, 039, 281	45, 611, 049	46, 982, 895

Table A-5 Annual Growth Ratio of Population by FUC: For Each Between-the-census Period

No.	Functional Urban Region	No.	Functional Urban Region	1947-50	1950-55	1955-60	1960-65	1965-70	1970-75	1975-80	1980-85	1985-90	1990-95
29	東京都市圏	29	Tokyo	1.0853	1.0521	1.0355	1.0147	1.0003	0.9978	0.9950	1.0011	0.9968	0.9964
54	大阪都市圏	54	Osaka	1.0699	1.0457	1.0356	1.0203	0.9986	0.9903	0.9915	0.9991	0.9890	0.9986
47	名古屋都市圏	47	Nagoya	1.0577	1.0408	1.0361	1.0278	1.0117	1.0057	1.0013	1.0035	1.0044	1.0009
27	北関東都市圏	27	Kitakanto	1.0105	1.0048	1.0019	1.0128	1.0154	1.0137	1.0094	1.0080	1.0045	1.0007
53	京都市都市圏	53	Kyoto	1.0277	1.0172	1.0105	1.0122	1.0078	1.0058	1.0016	1.0008	0.9975	1.0004
64	下関市・北九州市都市圏	64	Shimonoseki-Kitakyushu	1.0517	1.0316	1.0229	1.0101	1.0006	1.0037	1.0014	0.9987	0.9944	0.9985
55	神戸市都市圏	55	Kobe	1.0576	1.0374	1.0246	1.0178	1.0116	1.0109	1.0010	1.0063	1.0093	0.9926
75	福岡市都市圏	75	Fukuoka	1.0543	1.0394	1.0289	1.0242	1.0253	1.0283	1.0167	1.0129	1.0129	1.0076
1	札幌市都市圏	1	Sapporo	1.0480	1.0436	1.0478	1.0593	1.0423	1.0420	1.0247	1.0194	1.0162	1.0100
62	広島市・呉市都市圏	62	Hiroshima-Kure	1.0351	1.0247	1.0198	1.0282	1.0215	1.0222	1.0070	1.0230	1.0050	1.0024
13	仙台市都市圏	13	Sendai	1.0467	1.0176	1.0209	1.0249	1.0286	1.0344	1.0223	1.0160	1.0139	1.0113
61	岡山市・倉敷市都市圏	61	Okayama-Kurashiki	1.0173	1.0137	1.0099	1.0158	1.0288	1.0214	1.0094	1.0076	1.0045	1.0059
77	久留米市・佐賀市都市圏	77	Kurume-Saga	1.0220	1.0173	1.0051	1.0056	1.0106	1.0111	1.0131	1.0054	1.0037	1.0037
43	岐阜市・大垣市都市圏	43	Gifu-Ogaki	1.0269	1.0259	1.0219	1.0255	1.0145	1.0107	1.0016	1.0015	1.0003	0.9994
34	富山市・高岡市都市圏	34	Toyama-Takaoka	1.0223	1.0103	1.0098	1.0092	1.0086	1.0140	1.0087	1.0040	1.0028	1.0009
31	新潟市都市圏	31	Niigata	1.0245	1.0134	1.0155	1.0185	1.0150	1.0197	1.0158	1.0077	1.0044	1.0031
80	熊本市都市圏	80	Kumamoto	1.0231	1.0222	1.0119	1.0140	1.0140	1.0159	1.0150	1.0112	1.0083	1.0074
44	静岡市都市圏	44	Shizuoka	1.0383	1.0283	1.0209	1.0176	1.0170	1.0143	1.0050	1.0043	1.0016	1.0008
49	刈谷市・豊田市・安城市都市圏	49	Kariya-Toyota-Anjo	1.0122	1.0091	1.0143	1.0418	1.0603	1.0375	1.0231	1.0161	1.0144	1.0070
56	姫路市都市圏	56	Himeji	1.0190	1.0156	1.0158	1.0224	1.0179	1.0132	1.0046	1.0030	1.0006	1.0072
26	宇都宮市都市圏	26	Utsunomiya	1.0166	1.0146	1.0103	1.0214	1.0254	1.0272	1.0186	1.0142	1.0104	1.0040
45	浜松市都市圏	45	Hamamatsu	1.0365	1.0285	1.0192	1.0194	1.0195	1.0162	1.0093	1.0094	1.0077	1.0050
46	沼津市・富士市都市圏	46	Numazu	1.0202	1.0163	1.0182	1.0229	1.0194	1.0151	1.0054	1.0080	1.0033	1.0038
86	鹿児島市都市圏	86	Kagoshima	1.0372	1.0310	1.0128	1.0209	1.0168	1.0252	1.0204	1.0098	1.0023	1.0035
70	高松市都市圏	70	Takamatsu	1.0374	1.0166	1.0120	1.0114	1.0126	1.0173	1.0115	1.0064	1.0016	1.0008
50	津市・伊勢市・松阪市都市圏	50	Tsu-Ise-Matsusaka	1.0155	1.0095	1.0020	1.0067	1.0070	1.0100	1.0060	1.0049	1.0037	1.0043
57	和歌山市都市圏	57	Wakayama	1.0266	1.0172	1.0146	1.0288	1.0213	1.0130	1.0056	1.0003	0.9976	0.9987
87	那覇市都市圏	87	Naha	—	1.0958	1.0537	1.0289	1.0145	1.0131	1.0085	1.0053	1.0008	0.9981
69	徳島市都市圏	69	Tokushima	1.0365	1.0167	1.0109	1.0097	1.0093	1.0138	1.0083	1.0068	1.0042	1.0040
78	長崎市都市圏	78	Nagasaki	1.0563	1.0304	1.0213	1.0120	1.0073	1.0106	0.9986	1.0010	0.9979	0.9973
37	福井市都市圏	37	Fukui	1.0399	1.0092	1.0113	1.0117	1.0092	1.0146	1.0082	1.0076	1.0020	1.0023
63	福山市都市圏	63	Fukuyama	1.0132	1.0074	1.0115	1.0171	1.0396	1.0267	1.0097	1.0081	1.0030	1.0048
48	豊橋市都市圏	48	Toyohashi	1.0312	1.0176	1.0121	1.0206	1.0161	1.0194	1.0135	1.0115	1.0096	1.0087
82	大分市都市圏	82	Oita	1.0162	1.0147	1.0068	1.0179	1.0285	1.0421	1.0240	1.0159	1.0093	1.0089
23	水戸市都市圏	23	Mito	1.0258	1.0178	1.0168	1.0214	1.0232	1.0264	1.0172	1.0122	1.0052	1.0095
35	金沢市都市圏	35	Kanazawa	1.0213	1.0111	1.0087	1.0141	1.0148	1.0181	1.0111	1.0061	1.0057	1.0050
39	長野市都市圏	39	Nagano	1.0076	1.0038	1.0029	1.0092	1.0118	1.0145	1.0113	1.0077	1.0059	1.0065
38	甲府市都市圏	38	Kofu	1.0357	1.0213	1.0082	1.0139	1.0116	1.0120	1.0055	1.0031	0.9982	1.0005
74	高知市都市圏	74	Kochi	1.0311	1.0210	1.0168	1.0210	1.0218	1.0252	1.0138	1.0075	1.0031	1.0031
16	山形市都市圏	16	Yamagata	1.0113	1.0035	1.0052	1.0054	1.0105	1.0149	1.0152	1.0068	1.0035	1.0040
25	土浦市・つくば市都市圏	25	Tuchiura-Tsukuba	0.9973	1.0008	0.9914	1.0055	1.0129	1.0277	1.0379	1.0212	1.0181	1.0125
21	郡山市都市圏	21	Koriyama	1.0174	1.0103	1.0074	1.0087	1.0160	1.0183	1.0160	1.0104	1.0085	1.0076
30	平塚市・厚木市都市圏	30	Hiratsuka-Atsugi	1.0204	1.0201	1.0145	1.0490	1.0466	1.0432	1.0338	1.0243	1.0179	1.0085
51	四日市市都市圏	51	Yokkaichi	1.0236	1.0135	1.0178	1.0224	1.0092	1.0150	1.0067	1.0058	1.0084	1.0083
71	松山市都市圏	71	Matsuyama	1.0273	1.0230	1.0169	1.0209	1.0213	1.0251	1.0181	1.0121	1.0077	1.0078
15	秋田市都市圏	15	Akita	1.0236	1.0191	1.0138	1.0124	1.0172	1.0206	1.0175	1.0080	1.0040	1.0063
19	福島市都市圏	19	Fukushima	1.0177	1.0121	1.0040	1.0076	1.0128	1.0162	1.0129	1.0060	1.0049	1.0059
40	松本市都市圏	40	Matsumoto	1.0038	1.0073	1.0032	1.0084	1.0120	1.0118	1.0069	1.0054	1.0034	1.0047
32	長岡市都市圏	32	Nagaoka	1.0172	1.0119	1.0064	1.0086	1.0095	1.0114	1.0097	1.0039	1.0024	1.0048
2	函館市都市圏	2	Hakodate	1.0180	1.0117	1.0024	1.0072	1.0079	1.0102	1.0081	0.9994	0.9924	0.9945
83	宮崎市都市圏	83	Miyazaki	1.0310	1.0199	1.0118	1.0191	1.0210	1.0293	1.0248	1.0105	1.0058	1.0087
3	旭川市都市圏	3	Asahikawa	1.0391	1.0309	1.0224	1.0256	1.0179	1.0152	1.0193	1.0062	0.9975	1.0008
12	盛岡市都市圏	12	Morioka	1.0290	1.0209	1.0179	1.0223	1.0208	1.0225	1.0171	1.0106	1.0042	1.0057
11	八戸市都市圏	11	Hachinohe	1.0420	1.0239	1.0306	1.0167	1.0197	1.0145	1.0120	1.0027	0.9997	1.0013
79	佐世保市都市圏	79	Sasebo	1.0339	1.0299	0.9989	0.9880	1.0007	1.0023	1.0004	0.9996	0.9952	1.0002
24	日立市都市圏	24	Hitachi	1.0186	1.0215	1.0356	1.0219	1.0146	1.0093	1.0022	1.0014	0.9962	0.9971
22	いわき市都市圏	22	Iwaki	1.0274	1.0065	0.9957	0.9931	0.9959	1.0019	1.0071	1.0049	1.0030	1.0027
10	弘前市都市圏	10	Hirosaki	1.0194	1.0103	1.0048	1.0012	1.0078	1.0091	1.0123	1.0009	0.9984	1.0037
60	松江市都市圏	60	Matsue	1.0112	1.0129	1.0052	1.0075	1.0132	1.0155	1.0124	1.0065	1.0042	1.0062
76	大牟田市都市圏	76	Omuta	1.0487	1.0100	1.0040	0.9882	0.9799	0.9893	0.9964	0.9956	0.9885	0.9928
9	青森市都市圏	9	Aomori	1.0433	1.0261	1.0129	1.0125	1.0136	1.0194	1.0171	1.0044	0.9957	1.0044
20	会津若松市都市圏	20	Aizuwakamatsu	1.0051	1.0088	1.0034	1.0054	1.0035	1.0087	1.0106	1.0062	1.0016	1.0009
33	上越市都市圏	33	Jyoetsu	0.9936	1.0061	0.9991	1.0047	1.0018	1.0049	1.0071	1.0044	0.9992	1.0032
28	小山市都市圏	28	Oyama	1.0031	1.0021	0.9993	1.0166	1.0305	1.0268	1.0113	1.0108	1.0117	1.0108
66	山口市都市圏	66	Yamaguchi	1.0080	1.0075	1.0045	0.9942	1.0041	1.0098	1.0158	1.0160	1.0083	1.0093
52	彦根市都市圏	52	Hikone	1.0042	0.9955	0.9921	1.0044	1.0110	1.0155	0.9968	1.0239	1.0110	1.0079
67	徳山市都市圏	67	Tokuyama	1.0192	1.0128	1.0110	1.0136	1.0106	1.0166	1.0083	1.0021	0.9969	0.9959
59	米子市都市圏	59	Yonago	1.0145	1.0135	1.0041	1.0084	1.0096	1.0164	1.0148	1.0068	0.9995	1.0050
4	室蘭市都市圏	4	Muroran	1.0452	1.0227	1.0335	1.0205	1.0010	0.9958	0.9890	0.9806	0.9715	0.9859
6	帯広市都市圏	6	Obihiro	1.0295	1.0647	1.0177	1.0305	1.0233	1.0151	1.0165	1.0115	1.0054	1.0051
58	鳥取市都市圏	58	Tottori	1.0174	1.0141	0.9998	1.0027	1.0078	1.0157	1.0139	1.0090	1.0078	1.0054
5	釧路市都市圏	5	Kushiro	1.0829	1.0507	1.0473	1.0294	1.0197	1.0151	1.0075	0.9999	0.9925	0.9928
65	宇部市都市圏	65	Ube	1.0505	1.0173	1.0081	0.9906	0.9923	1.0115	1.0085	1.0067	1.0004	1.0001
84	都城市都市圏	84	Miyakonojo	1.0146	1.0105	0.9980	0.9952	0.9935	1.0060	1.0175	1.0047	0.9970	1.0039
41	上田市都市圏	41	Ueda	0.9996	0.9975	0.9998	1.0048	1.0061	1.0111	1.0119	1.0082	1.0055	1.0064
14	石巻市都市圏	14	Ishinomaki	1.0059	1.0090	1.0083	1.0095	1.0166	1.0153	1.0096	1.0033	0.9989	0.9987
72	今治市都市圏	72	Imabari	1.0311	1.0086	1.0070	1.0086	1.0124	1.0150	1.0058	1.0030	0.9968	0.9952
81	八代市都市圏	81	Yatsushiro	1.0200	1.0177	1.0081	0.9981	0.9987	1.0036	1.0085	1.0011	0.9988	0.9992
73	新居浜市都市圏	73	Niihama	1.0256	1.0099	1.0079	0.9992	1.0014	1.0089	1.0010	0.9998	0.9954	0.9981
36	小松市都市圏	36	Komatsu	1.0087	0.9976	1.0013	1.0046	1.0097	1.0094	1.0080	1.0033	1.0001	1.0035
18	酒田市都市圏	18	Sakata	1.0145	1.0064	1.0019	0.9965	1.0002	1.0034	1.0098	0.9976	0.9989	1.0008
68	岩国市都市圏	68	Iwakuni	1.0154	1.0267	1.0205	1.0109	1.0003	1.0092	1.0026	0.9988	0.9958	0.9961
85	延岡市都市圏	85	Nobeoka	1.0534	1.0234	1.0097	1.0024	1.0068	1.0095	1.0031	0.9997	0.9914	0.9938
17	鶴岡市都市圏	17	Tsuruoka	1.0118	1.0054	0.9953	0.9985	0.9990	1.0017	1.0078	1.0009	0.9994	1.0013
42	飯田市都市圏	42	Iida	1.0007	0.9947	0.9928	0.9958	0.9986	1.0044	1.0056	1.0305	0.9996	1.0005
8	苫小牧市都市圏	8	Tomakomai	1.0844	1.0552	1.0398	1.0557	1.0442	1.0546	1.0278	1.0079	1.0026	1.0112
7	北見市都市圏	7	Kitami	1.0362	1.0248	1.0240	1.0226	1.0202	1.0204	1.0237	1.0083	0.9999	1.0059
			Average	1.0275	1.0191	1.0131	1.0141	1.0136	1.0154	1.0105	1.0067	1.0024	1.0029

Table A-6 Estimated Population of FUCs: For Mid-point Year between Two Adjacent Censuses

No.	Functional Urban Region	No.	Functional Urban Region	1947-50	1950-55	1955-60	1960-65	1965-70	1970-75	1975-80	1980-85	1985-90	1990-95
29	東京都市圏	29	Tokyo	4, 999, 578	6, 418, 746	7, 952, 389	8, 999, 890	9, 341, 662	9, 297, 412	9, 131, 984	9, 042, 584	8, 993, 907	8, 842, 514
54	大阪都市圏	54	Osaka	2, 103, 066	2, 602, 150	3, 175, 610	3, 645, 105	3, 819, 743	3, 714, 663	3, 549, 010	3, 466, 649	3, 450, 405	3, 429, 605
47	名古屋都市圏	47	Nagoya	1, 097, 471	1, 319, 263	1, 592, 994	1, 864, 054	2, 055, 117	2, 146, 202	2, 184, 149	2, 210, 316	2, 254, 313	2, 284, 286
27	北関東都市圏	27	Kitakanto	849, 554	873, 388	888, 038	921, 048	987, 845	1, 061, 662	1, 124, 279	1, 174, 030	1, 211, 099	1, 226, 781
53	京都市都市圏	53	Kyoto	1, 074, 787	1, 168, 402	1, 251, 592	1, 324, 306	1, 391, 823	1, 439, 960	1, 467, 050	1, 476, 138	1, 470, 133	1, 462, 462
64	下関市・北九州市都市圏	64	Shimonoseki-Kitakyushu	874, 262	1, 019, 299	1, 165, 910	1, 264, 995	1, 299, 053	1, 312, 985	1, 329, 527	1, 329, 796	1, 307, 203	1, 284, 232
55	神戸市都市圏	55	Kobe	754, 798	899, 843	1, 048, 183	1, 164, 144	1, 252, 236	1, 324, 248	1, 363, 973	1, 388, 942	1, 443, 738	1, 450, 353
75	福岡市都市圏	75	Fukuoka	450, 685	537, 367	635, 508	724, 471	818, 843	934, 685	1, 044, 502	1, 123, 940	1, 198, 139	1, 260, 703
1	札幌市都市圏	1	Sapporo	367, 045	438, 111	547, 825	711, 087	910, 840	1, 119, 481	1, 318, 726	1, 470, 674	1, 606, 071	1, 713, 853
62	広島市・呉市都市圏	62	Hiroshima-Kure	584, 980	654, 908	731, 218	823, 216	930, 611	1, 036, 813	1, 114, 439	1, 200, 334	1, 286, 419	1, 310, 376
13	仙台市都市圏	13	Sendai	355, 061	397, 120	436, 744	489, 043	558, 112	651, 806	749, 541	824, 039	887, 341	944, 477
61	岡山市・倉敷市都市圏	61	Okayama-Kurashiki	566, 909	601, 834	638, 190	680, 207	759, 403	859, 517	927, 635	967, 658	997, 205	1, 023, 397
77	久留米市・佐賀市都市圏	77	Kurume-Saga	269, 810	290, 992	307, 622	315, 893	328, 863	347, 059	368, 543	385, 883	394, 688	401, 970
43	岐阜市・大垣市都市圏	43	Gifu-Ogaki	324, 200	359, 630	404, 659	454, 910	502, 250	534, 725	551, 323	555, 577	558, 129	557, 748
34	富山市・高岡市都市圏	34	Toyama-Takaoka	343, 615	364, 435	383, 183	401, 752	419, 895	444, 085	469, 827	484, 984	493, 302	497, 850
31	新潟市都市圏	31	Niigata	271, 631	291, 178	312, 779	340, 301	369, 853	403, 076	440, 147	466, 622	480, 835	489, 918
80	熊本市都市圏	80	Kumamoto	346, 479	378, 821	412, 230	439, 647	471, 365	507, 674	548, 075	584, 867	613, 906	638, 415
44	静岡市都市圏	44	Shizuoka	260, 190	295, 168	333, 249	366, 501	399, 236	431, 394	452, 611	463, 324	470, 275	473, 143
49	刈谷市・豊田市・安城市都市圏	49	Kariya-Toyota-Anjo	201, 493	209, 906	222, 506	255, 395	327, 516	415, 803	482, 747	531, 910	573, 774	605, 188
56	姫路市都市圏	56	Himeji	278, 348	297, 601	321, 681	353, 545	390, 618	421, 992	441, 142	449, 574	453, 638	462, 598
26	宇都宮市都市圏	26	Utsunomiya	206, 050	219, 009	232, 974	251, 998	282, 906	322, 102	360, 698	391, 317	415, 947	431, 055
45	浜松市都市圏	45	Hamamatsu	273, 738	309, 882	348, 657	383, 616	422, 413	461, 493	491, 662	515, 096	537, 468	554, 698
46	沼津市・富士市都市圏	46	Numazu	245, 234	263, 132	286, 612	317, 299	352, 340	383, 828	403, 946	417, 729	429, 687	437, 306
86	鹿児島市都市圏	86	Kagoshima	255, 193	290, 938	324, 163	352, 414	386, 899	429, 251	480, 481	517, 778	533, 618	541, 496
70	高松市都市圏	70	Takamatsu	199, 985	220, 201	236, 402	250, 527	265, 911	286, 418	307, 703	321, 788	328, 339	330, 343
50	津市・伊勢市・松阪市都市圏	50	Tsu-Ise-Matsusaka	289, 613	303, 515	312, 393	319, 310	330, 441	344, 718	358, 701	368, 535	376, 532	384, 130
57	和歌山市都市圏	57	Wakayama	234, 119	254, 150	275, 019	306, 134	346, 479	377, 294	395, 221	401, 077	398, 945	395, 217
87	那覇市都市圏	87	Naha	—	136, 596	195, 699	239, 518	266, 619	285, 548	295, 392	299, 700	304, 254	303, 359
69	徳島市都市圏	69	Tokushima	168, 088	184, 845	197, 912	208, 267	218, 331	231, 231	244, 260	253, 578	260, 606	266, 018
78	長崎市都市圏	78	Nagasaki	276, 802	323, 911	368, 005	399, 644	419, 338	438, 486	448, 640	448, 235	446, 984	441, 607
37	福井市都市圏	37	Fukui	165, 135	179, 145	188, 492	199, 595	210, 264	223, 103	236, 114	245, 567	251, 499	254, 169
63	福山市都市圏	63	Fukuyama	195, 243	202, 823	212, 597	228, 220	262, 328	308, 709	337, 773	353, 074	362, 927	370, 038
48	豊橋市都市圏	48	Toyohashi	177, 600	194, 299	209, 156	226, 798	248, 411	271, 254	294, 264	313, 080	329, 967	345, 401
82	大分市都市圏	82	Oita	181, 710	193, 042	203, 648	216, 570	242, 900	288, 875	339, 762	374, 995	399, 192	417, 638
23	水戸市都市圏	23	Mito	113, 004	122, 689	133, 680	146, 970	162, 112	185, 478	206, 572	222, 174	231, 957	240, 590
35	金沢市都市圏	35	Kanazawa	275, 041	291, 777	306, 441	324, 273	348, 372	377, 945	406, 321	424, 034	436, 631	448, 387
39	長野市都市圏	39	Nagano	245, 834	251, 030	255, 244	263, 046	277, 139	295, 805	315, 374	330, 606	341, 963	352, 724
38	甲府市都市圏	38	Kofu	131, 906	146, 565	157, 699	166, 611	177, 490	188, 191	196, 552	200, 827	201, 514	200, 875
74	高知市都市圏	74	Kochi	159, 059	175, 394	192, 605	211, 519	235, 115	264, 031	290, 722	306, 478	314, 646	319, 524
16	山形市都市圏	16	Yamagata	177, 562	182, 164	186, 146	191, 131	198, 864	211, 806	228, 244	241, 065	247, 313	251, 975
25	土浦市・つくば市都市圏	25	Tuchiura-Tsukuba	154, 027	153, 698	150, 697	149, 490	156, 495	173, 015	203, 268	235, 046	259, 010	279, 426
21	郡山市都市圏	21	Koriyama	190, 797	200, 858	209, 901	218, 480	232, 297	252, 918	275, 323	293, 963	308, 089	320, 680
30	平塚市・厚木市都市圏	30	Hiratsuka-Atsugi	126, 298	136, 800	149, 045	174, 171	220, 012	274, 046	330, 993	381, 948	423, 994	452, 739
51	四日市市都市圏	51	Yokkaichi	162, 043	173, 534	187, 532	207, 158	224, 049	237, 952	251, 186	259, 194	268, 532	279, 919
71	松山市都市圏	71	Matsuyama	206, 578	227, 673	251, 302	275, 982	306, 358	344, 397	384, 129	413, 993	434, 910	452, 059
15	秋田市都市圏	15	Akita	167, 086	181, 412	196, 816	210, 034	226, 035	248, 236	272, 799	290, 574	299, 366	307, 118
19	福島市都市圏	19	Fukushima	184, 705	195, 412	203, 395	209, 386	220, 322	236, 803	254, 556	266, 770	274, 124	281, 611
40	松本市都市圏	40	Matsumoto	149, 244	152, 852	156, 918	161, 520	169, 913	180, 245	188, 812	194, 695	199, 020	203, 105
32	長岡市都市圏	32	Nagaoka	131, 945	139, 424	145, 910	151, 468	158, 463	166, 935	175, 949	181, 999	184, 844	188, 190
2	函館市都市圏	2	Hakodate	246, 090	260, 240	269, 554	276, 057	286, 602	299, 774	313, 739	319, 674	313, 165	303, 036
83	宮崎市都市圏	83	Miyazaki	135, 776	149, 330	161, 554	174, 419	192, 606	218, 036	249, 134	271, 891	283, 203	293, 641
3	旭川市都市圏	3	Asahikawa	173, 948	198, 786	226, 709	255, 273	284, 279	308, 637	336, 190	358, 083	361, 344	359, 819
12	盛岡市都市圏	12	Morioka	135, 857	149, 330	164, 384	181, 593	202, 028	224, 850	248, 000	265, 665	275, 622	282, 459
11	八戸市都市圏	11	Hachinohe	125, 296	141, 355	161, 683	181, 712	198, 857	216, 444	231, 169	239, 799	241, 243	241, 854
79	佐世保市都市圏	79	Sasebo	216, 633	245, 145	263, 183	254, 660	247, 483	249, 309	250, 958	250, 910	247, 637	244, 793
24	日立市都市圏	24	Hitachi	118, 369	128, 345	147, 732	170, 214	186, 334	197, 743	203, 486	205, 334	204, 098	200, 687
22	いわき市都市圏	22	Iwaki	326, 754	345, 805	348, 540	339, 721	330, 505	328, 685	336, 091	346, 295	353, 181	358, 197
10	弘前市都市圏	10	Hirosaki	135, 815	143, 399	148, 894	151, 162	154, 585	161, 216	170, 041	175, 706	175, 392	176, 330
60	松江市都市圏	60	Matsue	95, 696	100, 487	105, 115	108, 486	114, 208	122, 632	131, 441	137, 769	141, 473	145, 169
76	大牟田市都市圏	76	Omuta	178, 752	196, 797	203, 742	199, 732	184, 271	170, 494	164, 478	161, 202	154, 874	147, 745
9	青森市都市圏	9	Aomori	163, 192	185, 475	204, 243	217, 553	232, 116	251, 853	275, 660	290, 802	290, 910	290, 970
20	会津若松市都市圏	20	Aizuwakamatsu	92, 972	95, 763	98, 712	100, 884	103, 148	106, 333	111, 550	116, 320	118, 609	119, 360
33	上越市都市圏	33	Jyoetsu	114, 642	115, 297	116, 805	117, 922	119, 863	121, 905	125, 611	129, 243	130, 387	131, 156
28	小山市都市圏	28	Oyama	82, 525	83, 345	83, 633	86, 996	97, 739	112, 585	123, 709	130, 675	136, 181	146, 136
66	山口市都市圏	66	Yamaguchi	94, 866	97, 817	100, 782	100, 436	100, 004	103, 539	110, 337	119, 385	126, 810	132, 485
52	彦根市都市圏	52	Hikone	77, 115	76, 735	74, 387	73, 736	76, 622	81, 849	84, 381	88, 797	96, 825	101, 494
67	徳山市都市圏	67	Tokuyama	75, 415	80, 117	85, 015	90, 376	95, 963	102, 657	109, 195	112, 052	111, 766	109, 780
59	米子市都市圏	59	Yonago	89, 450	94, 517	98, 731	101, 839	106, 510	113, 620	122, 770	129, 564	131, 622	133, 097
4	室蘭市都市圏	4	Muroran	103, 355	116, 805	134, 150	153, 268	161, 655	160, 378	154, 398	143, 033	126, 700	113, 739
6	帯広市都市圏	6	Obihiro	64, 671	79, 023	96, 586	108, 778	124, 204	136, 576	147, 694	158, 332	165, 143	169, 536
58	鳥取市都市圏	58	Tottori	97, 662	103, 789	107, 416	108, 084	110, 966	117, 642	126, 610	134, 026	139, 737	144, 386
5	釧路市都市圏	5	Kushiro	82, 847	105, 639	134, 183	161, 939	182, 809	199, 255	210, 730	214, 617	210, 553	202, 948
65	宇部市都市圏	65	Ube	136, 433	153, 315	163, 293	162, 764	155, 931	157, 387	165, 427	171, 819	174, 891	175, 084
84	都城市都市圏	84	Miyakonojo	113, 986	119, 557	122, 101	120, 031	116, 675	116, 531	123, 533	130, 544	131, 122	131, 427
41	上田市都市圏	41	Ueda	95, 607	94, 967	94, 329	95, 400	98, 008	102, 286	108, 298	113, 835	117, 795	121, 344
14	石巻市都市圏	14	Ishinomaki	85, 187	87, 893	91, 775	95, 942	102, 374	110, 803	117, 859	121, 682	122, 325	121, 591
72	今治市都市圏	72	Imabari	88, 434	94, 599	98, 353	102, 252	107, 746	115, 345	121, 467	124, 171	124, 110	121, 655
81	八代市都市圏	81	Yatsushiro	88, 386	95, 142	101, 430	102, 998	102, 188	102, 774	105, 919	108, 492	108, 462	107, 922
73	新居浜市都市圏	73	Niihama	110, 782	117, 925	123, 252	125, 421	125, 593	128, 841	132, 025	132, 261	130, 658	128, 532
36	小松市都市圏	36	Komatsu	88, 438	89, 046	88, 786	90, 118	93, 396	97, 952	102, 281	105, 182	106, 058	107, 016
18	酒田市都市圏	18	Sakata	91, 717	95, 220	97, 206	96, 827	96, 029	96, 894	100, 132	101, 994	101, 101	101, 020
68	岩国市都市圏	68	Iwakuni	77, 522	84, 839	95, 352	103, 101	106, 023	108, 564	111, 795	112, 178	110, 676	108, 453
85	延岡市都市圏	85	Nobeoka	96, 184	110, 189	119, 610	123, 261	126, 128	131, 370	135, 556	136, 489	133, 471	128, 611
17	鶴岡市都市圏	17	Tsuruoka	94, 291	97, 270	97, 444	95, 963	95, 375	95, 533	97, 823	99, 975	100, 044	100, 213
42	飯田市都市圏	42	Iida	95, 555	94, 397	91, 501	88, 942	87, 709	88, 354	90, 575	99, 010	106, 613	106, 633
8	苫小牧市都市圏	8	Tomakomai	34, 736	44, 867	56, 582	71, 441	91, 159	116, 000	141, 888	154, 984	159, 086	164, 659
7	北見市都市圏	7	Kitami	49, 866	55, 912	63, 073	70, 776	78, 685	87, 012	97, 050	105, 075	107, 264	108, 838
			Total	26, 192, 426	30, 153, 409	34, 276, 999	37, 769, 732	40, 381, 878	42, 457, 011	44, 123, 647	45, 379, 624	46, 318, 548	46, 793, 081

Appendix B

The following are the publications and presentations discussing the Roxy Index by T. Kawashima (including those with coauthors):

01. "Recent Urban Evolution Processes in Japan: Analysis of Functional Urban Regions," presented at the Twenty-fifth North American Meetings of the Regional Science Association, Chicago, Illinois, USA, 1978.

02. "Urbanization and Metropolitan Analysis," *Shin-toshi*, Toshi Kyohkai, Tokyo, August 1981, pp.1-12 (in Japanese).

03. "Recent Urban Trends in Japan: Analysis of Functional Urban Regions," *Human Settelement System: Spatial Patterns and Trends*, T. Kawashima and P. Korcelli (eds.), International Institute for Applied Systems Analysis, Laxenburg, Austria, 1982, pp.21-40.

04. *Human Settlement Systems; Spatial Patterns and Trends*, International Institute for Applied Systems Analysis, Laxenburg, Austria, 1982 (with P. Korcelli, eds.)

05. "Recent Urbanization in Japan: Implication of the 1980 Population Census Figures," *Housing Policy in Urban Areas: Principles, Planning and Policy*, A. Andersson and B. Harsman (eds.), Swedish Council for Building Reserch, Stockholm, 1985, pp.241-255.

06. "Roxy Index: An Indicative Instrument to Measure the Speed of Spatial Concentration and Deconcentration of Population," *Gakushuin Economic Papers (Gakushuin Daigaku Keizai Ronshuh)*, Vol.22, No.2, Gakushuin University, Tokyo, September 1985, pp.183-213.

07. "Speed of Suburbanization: ROXY Index Analysis for Intra-metropolitan Spatial Redistribution of Population in Japan," *Gakushuin Economic Papers (Gakushuin Daigaku Keizai Ronshuh)*, Vol.22, No.3, Gakushuin University, Tokyo, March 1986, pp.243-304.

08. "People Follow Jobs in Japan ?: Suburbanization of Labour and Job Markets," *Gakushuin Economic Papers (Gakushuin Daigaku Keizai Ronshuh)*, Vol.23, No.1&2, Gakushuin University, Tokyo, October 1986, pp.157-183.

09. "Spatial Cycle Race 1985: ROXY Index Analysis of the 1985 Population Census for Three Railway-line Regions in the Tokyo Metropolitan Area," *Gakushuin Economic Papers (Gakushuin Daigaku Keizai Ronshuh)*, Vol.23, No.3, Gakushuin University, Tokyo, December 1986, pp.53-70.

10. "Is Disurbanization Foreseeable in Japan ?: A Comparison between US and Japanese Urbanization Processes," *Spatial Cycles* (Chapter 7), Leo van den Berg, Leland S. Burns and Leo H. Klaassen (eds.), Gower, Aldershot, England, 1987, pp.100-126.

11. "ROXY Index Analysis of Population Changes in Japan for 1960-85: Spatial (De) centralization and (De)concentration," *Gakushuin Economic Papers (Gakushuin Daigaku Keizai Ronshuh)*, Vol.24, No.3, Gakushuin University, Tokyo, December 1987, pp.11-39.

12. "Basic Concepts of the Nature of ROXY Index," *GEM Annual Report (Gakushuin Daigaku Keizai Keiei Kenkyuhsho Nenpoh)*, Vol.3, Gakushuin University, Research Institute of Economics and Management, Tokyo, October 1989, pp.81-94 (in Japanese).

13. "Metropolitan Analysis: Boundary Delineations and Future Population Changes of Functional Urban

Regions," *Gakusyuin Economic Papers* (*Gakusyuin Daigaku Keizai Ronshuh*), Vol.29, No.3 & 4, Gakusyuin University, Tokyo Jan. 1993, pp.205-248 (with N.Hiraoka, A.Okabe, and N.Ohtera).

14. "Centralization and Suburbanization: ROXY Index Analysis for Five Railway-line Regions in Tokyo Metropolitan Area," *Gakusyuin Economic Papers* (*Gakusyuin Daigaku Keizai Ronshuh*), Vol.30, No.1, Gakusyuin University, Tokyo March 1993 pp.203-230 (with N.Hiraoka).
15. "Mathematical Characteristics of ROXY Index (Ⅰ): Distance and Reversed Distance Used as Weighing Factors," *Gakusyuin Economic Papers* (*Gakusyuin Daigaku Keizai Ronshuh*), Vol.30, No.2, Gakusyuin University, Tokyo, June 1993, pp.257-297 (with N.Hiraoka).
16. "Mathematical Characteristics of ROXY Index (Ⅱ): Periods of Inter-ametropolitan Spatial-cycle Paths and Theoretically-ideal Formulations of ROXY Index," *Gakusyuin Economic Papers* (*Gakusyuin Daigaku Keizai Ronshuh*), Vol.30, No.3, Gakusyuin University, Tokyo, October 1993, pp.317-422 (with N.Hiraoka).
17. "Mathematical Characteristics of ROXY Index (Ⅲ): Functional Relationship between 'Theoretically-ideal ROXY Index with CBD Distance Used as Weighing Factor' and 'That with Reversed CBD Distance'," *Gakusyuin Economic Papers (Gakusyuin Daigaku Keizai Ronshuh),* Vol.30, No.4, Gakusyuin University, Tokyo, Feburary 1994, pp.451-478 (with N.Hiraoka).
18. "Aged Population in Spatial Cycles: ROXY Index Analysis for Chuo-line Region in Tokyo Metropolitan Area," *Gakusyuin Economic Papers* (*Gakusyuin Daigaku Keizai Ronshuh*), Vol.31, No.1, Gakusyuin University, Tokyo, March 1994, pp.13-35 (with N.Hiraoka).
19. "Chronological Time-lags over Spatial-cycle Path: Comparative Analysis on Inter-city Agglomeration and Deglomeration of Population in Indonesia, Japan, Sweden and USA," *GEM Annual Report* (*Gakushuin Daigaku Keizai Keiei Kenkyuhsho Nenpoh*), Vol.7, Bulletin, No.7, Gakushuin University Research Insititute of Economics and Management, Tokyo, March 1994, pp.31-44 (with I.J.Azis and M.Tene).
20. "Mathematical Characteristics of ROXY Index (Ⅳ): ROXY Index as Compared with Correlation Cofficient," *Gakusyuin Economic Papers* (*Gakusyuin Daigaku Keizai Ronshuh*), Vol.31, No.3, Gakusyuin University, Tokyo, October 1994, pp.155-171 (with Y.Asami, S.Funamoto, N.Hiraoka and J.H.Paelinck).
21. "Mathematical Characteristics of the ROXY Index (Ⅴ): Comparison of the ROXY Index with Other Major Yardsticks Measuring Convergence and Divergence," *Gakushuin Economic Papers* (*Gakushuin Daigaku Keizai Ronshuh*), Vol.32, No.2, Gakushuin University, Tokyo, July 1995, pp.81-101 (with N.Hiraoka).
22. "Relative Positions along the Spatial-cycle Path: Inter-city Concentration and Deconcentration of Population in Australia, Indonesia, Japan, Sweden and USA," *Cities and the New Global Economy, Joint OEDCD/Australian Government Conference Proceedings,* Volume 2, Commonwealth of Australia, Melbourne, 1995, pp.386- 406 (with I.J.Azis, M.Tene and N.Hiraoka).
23. "Roxy-index Analysis on the Spatial-cycle Path for Six Spatial Systems in Japan," *Gakushuin Economic Papers* (*Gakushuin Daigaku Keizai Ronshuh*), Vol.32, No.4, Gakushuin University, Tokyo, December 1995, pp.201-255 (with N.Hiraoka).

24. "Robustness of Roxy Index in Analysis of Three Systems of Largest Thirty Cities in Japan: Constantly Fixed, Backwardly Variable and Forwardly Variable Member Cities," *GEM Annual Report* (*Gakushuin Daigaku Keizai Keiei Kenkyuhsho Nenpoh*), Vol.12, Gakushuin University, Research Institute of Economics and Management, Tokyo, December 1998, pp.55-70 (with N.Hiraoka).

25. "Long-term Urban Development of the Finnish Population: Application of the ROXY-index Analytical Methods," *Gakushuin Economic Papers* (*Gakushuin Daigaku Keizai Ronshu*), Vol.36, No.2, Gakushuin University, Tokyo, August 1999, pp.243-263 (with M.Hirvonn and N.Hiraoka).

26. "Urbanizaiton, Suburbanization and Revived-urbanization: ROXY-index Analysis for the Chuo-line Region of Tokyo," *Gakushuin Economic Papers* (*Gakushuin Daigaku Keizai Ronshu*), Vol.36, No.3, Gakushuin University, Tokyo, October 1999, pp.389-414 (with A.Fukatsu).

27. "Spatial-Cycle Race for Urbanization and Suburbanization: The Tokyo, Osaka and Nagoya Metropolitan Areas," *Regional Science Perspectives in Economic Analysis*: *A Festschrift in Memory of Benjamin H. Stevens*, M.L.Lahr and R.E.Miller (eds.), Elsevier Science B.V., Amsterdam, The Netherlands, 2000, pp.131-146 (with N.Hiraoka).