

# **Megacities dynamics in a country of population decline**

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## **ABSTRACT**

Tokyo is the largest urban agglomeration of Japan (and the world) which keeps on growing even with the total population decline in Japan. However, the second largest urban agglomeration, Kinki, centered by Osaka, Kyoto and Kobe, the growth is not guaranteed. By both prefectural and municipal definition of agglomeration, the population of Kinki has decreased in 2015. Although the 2015 figure of Densely Inhabited Area (DID) of Kinki is not available for the moment and the real urban change is yet to be determined, due to the fact that the third and fourth urban agglomerations (Nagoya and Fukuoka) keep on growing along with Tokyo, it can be said that Kinki's relative weakening is a real phenomenon, backed by demographic and socio-economic indicators. Population decline is not a vicious thing by itself, but if it is caused by the unfavorable conditions of people's life, then there should be reform and changes are needed to make things better.

**Keywords:** Kinki, Japan, population decline, Major Metropolitan Areas, Densely Inhabited District

## **1. INTRODUCTION**

The preliminary results of Population Census of Japan conducted in October 2015 revealed that the population of Japan decreased by 947,305, for the first time of the Census history since 1920. Several other statistics already showed the population decline since around 2008 and the Census results confirmed the steady trend of Japanese population decline. However, what was received as a surprise is that the population of Osaka prefecture decreased for the first time since 1950, following the trend of neighbouring prefectures of Kyoto, Hyogo and Nara, which recorded the population decline earlier, regardless of the fact that those prefectures are covering Kinki (Kansai) agglomeration, the world's 8<sup>th</sup> largest urban agglomeration (UN 2014). On the contrary, the population of Tokyo prefecture, as well as surrounding three prefectures (Saitama, Chiba, Kanagawa) recorded an increase. Is this Kinki(Kansai) shrinkage a sign of the limit of the everlasting trend of urbanization or caused by the mighty superiority of monopolizing Tokyo? To answer this question, it is necessary to verify firstly if the urban population of Kinki (Kansai) is really decreasing. In this paper, the definition of urban population and agglomeration is explained using the latest data available to verify the recent trend.

## **2. THE DEFINITION AND TREND**

### **2.1 Urban definition**

The oldest and basic urban definition of Japan is by using the category of municipality, namely that of City (Shi). Japanese administrative structure is double layered, the level of prefecture which counts 47 and the level of municipality, which counts 1,718 (Table. 1). At the outset, when the municipality system was introduced in 1888, the municipalities, which counted as many as 70,472,

were classified either as city, town or village. The urban areas were designated as city and the population of cities were defined as urban population. However, along with time, the municipalities went through waves of mergers, decreasing in number and increasing the population per municipality. After the Showa merger started from 1953, the rapid integration of towns and villages to cities occurred and it was felt that the population of cities no more represented the true urban population. Thus in 1960 Census, the definition of DID (Densely Inhabited District) was introduced and urban population was defined as the population living in DID. DID is defined using population density; the census basic unit block which retains more than 4,000 persons per km<sup>2</sup> is gathered together and when the total population of combined blocks exceeds 5,000 persons, it becomes a DID.

Table. 1. The number of municipality according to type.

	Prefecture	Municipality			
		Total	Cities	Towns	Villages
1871 July	310				
1871 Dec.	76				
1879	40				
1888	47	70,472	37	12,002	58,433
1889	47	13,386	39	715	12,632
1893	47	15,144	43	1,328	13,773
1903	47	13,532	60	1,121	12,351
1913	47	12,348	69	1,246	11,033
1920	47	12,244	83	1,365	10,796
1930	47	11,864	109	1,704	10,051
1940	47	11,190	168	1,762	9,260
1950	46	10,500	254	1,889	8,357
1960	46	3,574	561	1,933	1,080
1970	46	3,331	588	2,020	723
1980	47	3,256	647	1,993	616
1990	47	3,246	656	2,003	587
2000	47	3,230	672	1,991	567
2010	47	1,727	786	757	184
2014	47	1,718	790	745	183

Source : Up to 2000 by *Historical statistics of Japan* (2006), from 2000 by <http://www.soumu.go.jp/gapei/gapei2.html>

Comparing these two urban definition, one by the city population and the other by DID population, both are showing increasing trend, in terms of rate per total population (Fig. 1). The increase of urban rate by city population from 2000 to 2010 is stronger than that of by DID population, mainly due to the Heisei merger which incorporated many rural areas to the cities. From 2010 to 2015, there were less mergers and the speed of increase was reduced, but slightly increased from 90.7% in 2010 to 91.4% in 2015. The urban rate by DID population is much lower than that by city population. In 2010, 67.3% of total population was living in DID. We have to wait some more months until the results of 2015 Census on DID population will be released but so far, we can say that urbanization is proceeding by both definitions using city population or DID, even though the growth is slow.

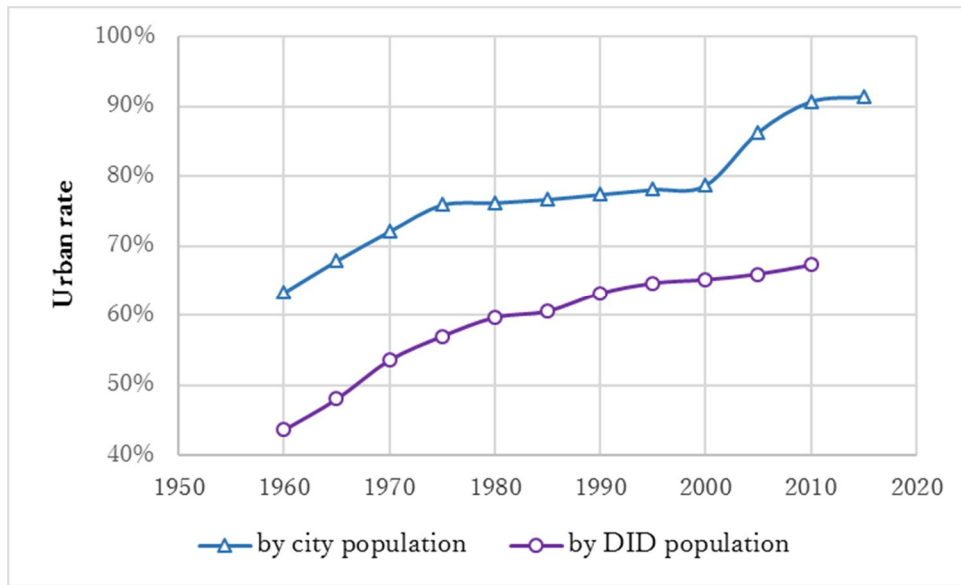


Fig. 1. Urban population defined as DID and City

Source : Population Census

Area wise, the cities are all over Japan. In 2015, the total area of cities is 57.4% of total area of Japan. On the contrary, the area of DID is small, only 3.4% of total area of Japan in 2010 (Statistics Bureau 2014, Fig. 2, Fig. 3).

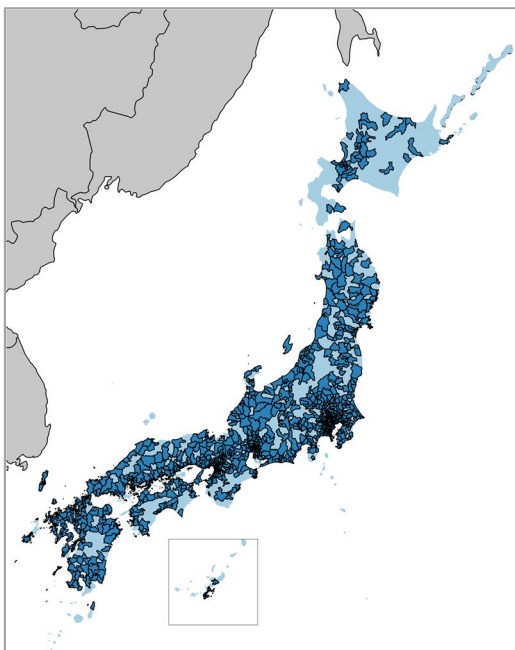


Fig. 2. Cities, 2010

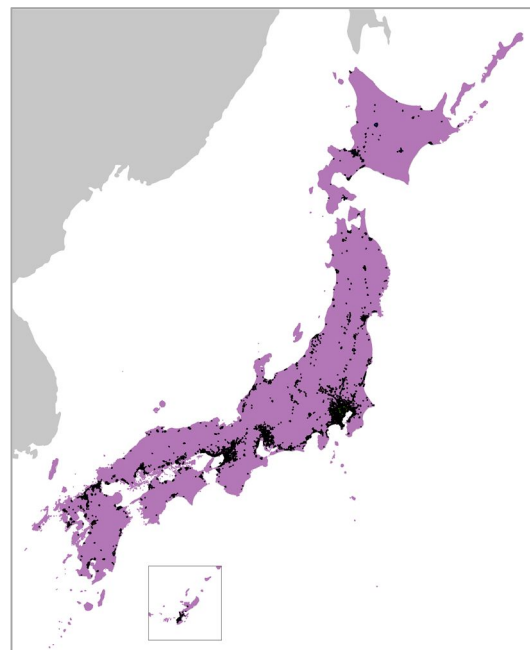


Fig. 3. Densely Inhabited District (DID), 2010

## 2.2 Definition of urban agglomeration

As cities grow, the urban area extends beyond the border of city municipality. Neighboring cities become connected by transport network such as train, subway and road, people start to live along these lines until they fill up the void. The urban agglomeration composed of several city centers,

stretching over several municipalities is measured in several ways. The easiest is to group the several prefectural population as the approximate size of agglomeration. Traditionally, the Kanto agglomeration, centered by Tokyo is represented by 4 prefectures, namely Tokyo, Kanagawa, Saitama and Chiba. Kansai agglomeration, centered by cities of Osaka, Kyoto and Kobe is represented by 3 prefectures namely Osaka, Kyoto and Hyogo. The agglomeration of Chukyo, centered by Nagoya is represented by Aichi prefecture and the agglomeration of Fukuoka is represented by Fukuoka prefecture. When we see the trend of the population of these urban agglomerations since 1920, Kanto, Chukyo and Fukuoka continue the slow but steady increase but only Kansai decreased in 2015.

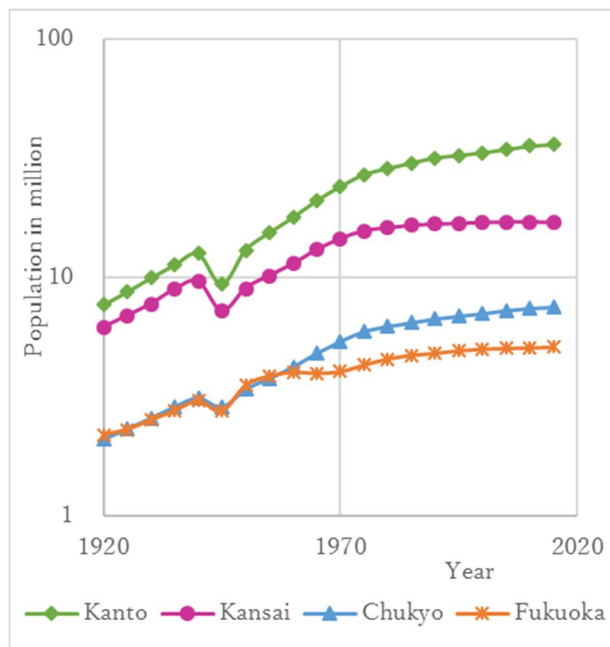


Fig. 4. Population of 4 major agglomerations

Source : Population Census

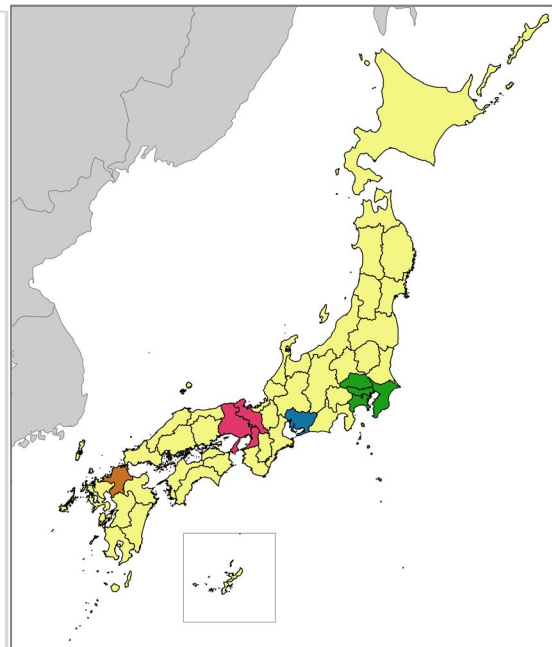


Fig. 5. Prefectures and 4 major agglomerations

Another definition of urban agglomeration is using the municipality population. It defines Major Metropolitan Area (MMA) and Metropolitan Area (MA) by allocating central cities, Designated Cities for MMA and large cities of more than 500,000 population for MA. If at least 1.5% of population of a municipality commute to a central city, then this municipality is included in the MMA or MA. For example in 2010, Kanto MMA is composed of Tokyo 23 special wards, Saitama city, Chiba city, Yokohama city, Kawasaki city and Sagami-hara city as central cities, and 192 surrounding municipalities; in these 192 municipalities, 1.5% or more population is commuting to the above mentioned 6 central cities. Likewise, 9 other MMAs and 4 MAs are defined as shown in Table. 2 and Fig. 6. MMAs and MAs are scattered over Japan, and the largest three MMAs are Kanto, Kinki and Chukyo, by both population and surface area.

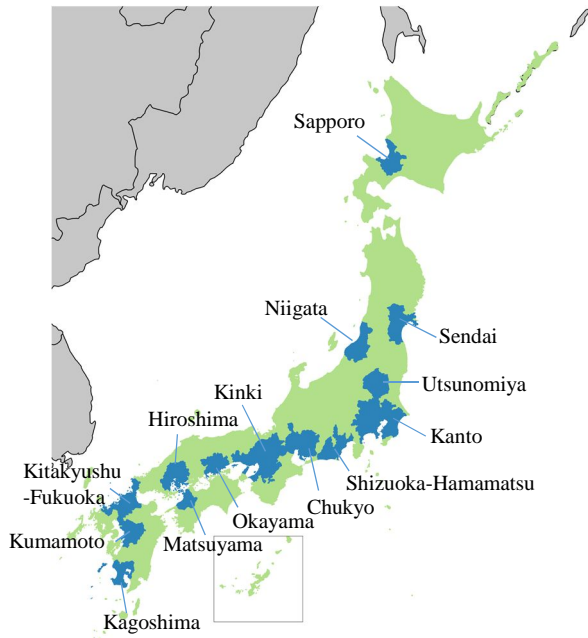


Fig. 6. Major Metropolitan Areas (MMAs) and Metropolitan Areas (MAs), 2010

Population-wise, the share of MMA and MA is large; 69.2% of Japanese population are living within MMAs and MAs. Area-wise, the share is nearly a quarter (22.4%) of total area of Japan. Logically that makes higher population density of MMA and MA (1,045 persons/km<sup>2</sup>), compared to Japan as a whole (343 persons/km<sup>2</sup>). Among MMAs and MAs, Kanto's density (2,631 persons/km<sup>2</sup>) is the highest, double than that of Kinki (1,484 persons/km<sup>2</sup>) or Chukyo (1,288 persons/km<sup>2</sup>). Comparing Kanto and Kinki, almost twice as many Kanto's population is living in almost the same area. Kanto is a "compact" city, if we consider the population density. This can be further confirmed by the geographical distribution of DID in each MMA. Within the boundary of Kanto, Kinki and Chukyo MMA, the surface area of DID is more important in Kanto, compared to Kinki or Chukyo (Fig. 7).

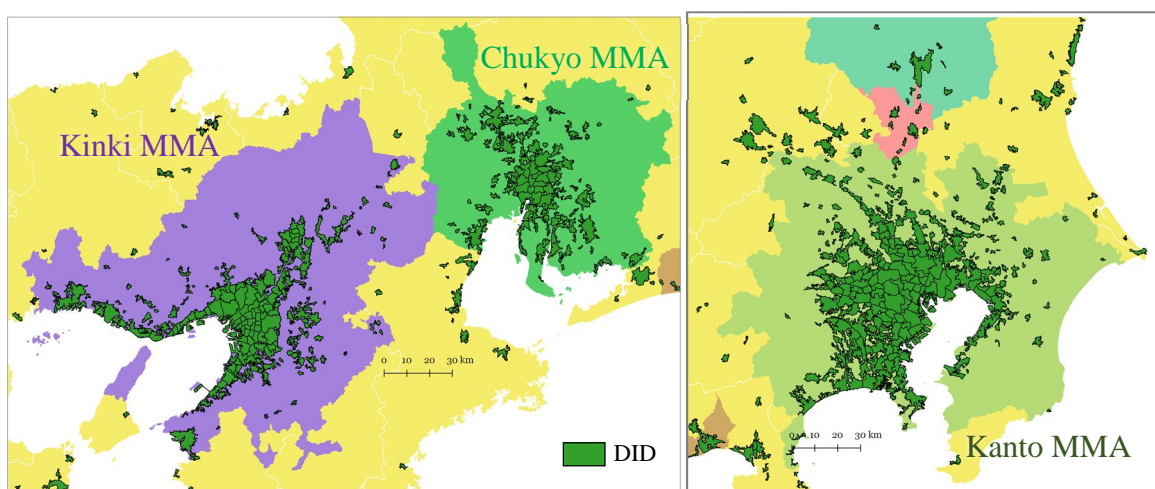


Fig. 7. The area of Kanto, Kinki and Chukyo MMA and DID

Table. 2. Major Metropolitan Areas and Metropolitan Areas in 2010.

Area name	Central city	Number of surrounding municipalities	Population in 1,000		Change (2010-2005)		Area(km <sup>2</sup> )	Density (persons /km <sup>2</sup> )
			2010	2005*	in 1,000	%		
<b>Japan</b>			<b>128,057</b>	<b>127,768</b>	<b>289</b>	<b>0.2</b>	<b>377,950</b>	<b>343</b>
<b>Major Metropolitan Area</b>			<b>83,553</b>	<b>82,139</b>	<b>1,414</b>	<b>1.7</b>	<b>69,365</b>	<b>1,205</b>
Sapporo	Sapporo	11	2,585	2,568	17	0.7	4,514	573
Sendai	Sendai	30	2,170	2,170	0	0.0	5,970	363
Kanto	Tokyo 23 wards, Saitama, Chiba, Yokohama, Kawasaki, Sagami-hara	192	36,923	35,748	1,175	3.3	14,034	2,631
Niigata	Niigata	14	1,422	1,445	-24	-1.6	5,345	266
Shizuoka-Hamamatsu	Shizuoka, Hamamatsu	13	2,741	2,758	-17	-0.6	4,982	550
Chukyo	Nagoya	86	9,107	8,946	161	1.8	7,072	1,288
Kinki	Osaka, Kyoto, Kobe, Sakai	128	19,342	19,257	85	0.4	13,033	1,484
Okayama	Okayama	16	1,648	1,647	1	0.1	3,637	453
Hiroshima	Hiroshima	14	2,100	2,101	-2	-0.1	5,048	416
Kitakyushu-Fukuoka	Fukuoka, Kitakyushu	62	5,515	5,499	17	0.3	5,731	962
<b>Major Metropolitan Area</b>			<b>5,034</b>				<b>15,436</b>	<b>326</b>
Utsunomiya	Utsunomiya	22	1,687				5,455	309
Matsuyama	Matsuyama	7	718				2,272	316
Kumamoto	Kumamoto	25	1,476				4,251	347
Kagoshima	Kagoshima	10	1,153				3,458	333

\*Adjusted to the 2010 sets of municipalities

Source : Population Census 2010

The definition of MMA/MA was elaborated to assess the extent of an urban agglomeration but due to the changing nature of each MMA/MA, the municipalities covered change over time and it is difficult to compare chronologically.

Nevertheless, comparing from 2005 to 2010, most MMAs increased their population. The largest increase is found in Kanto MMA, which increased 1.2 million or 3.3% from 2005 to 2010. This Kanto's rate is outstandingly high, compared to that of Kinki (0.4%)<sup>1</sup>, Chukyo (1.8%), Kitakyushu-Fukuoka (0.3%) and Sapporo (0.7%). Considering the total population growth during this period (2005 to 2010) was 0.2%, much lower than that of MMAs, one can say that the larger MMAs were absorbing population from the rest of the country.

As for the change from 2010 to 2015, there might be a chance that the population of Kinki MMA decreases, as the total of 3 prefectures (Osaka, Kyoto and Hyogo) decreased. Although the selection

<sup>1</sup> Kinki MMA roughly corresponds to Keihanshin MMA in 2005. However, due to the inclusion of Sakai city as a central city in 2010, which became Designated City in 2006, Keihanshin was reclassified as to Kinki MMA. The Kinki MMA population of 2005 listed in Table. 2 is the total of 2005 population of municipalities which are included Kinki MMA defined in 2010.

of municipalities for Kinki MMA of 2015 is not yet published, if we add up the 2015 population of the same municipalities included in Kinki MMA in 2010, it declined indeed; 19,341,976 in 2010 to 19,253,418 in 2015, a -0.5% decrease, which is slightly milder than the rate of total population change (-0.7%). For the period of 2005 to 2010, the decrease of population of MMA was recorded such as Niigata (-1.6%), Shizuoka-Hamamatsu (-0.6%) and Hiroshima (-0.1%), Kinki's depopulation can happen.

We have confirmed so far that Kansai or Kinki area is shrinking by both prefectural level aggregation and by the MMA definition, still there is the doubt that the depopulation is caused by the municipality boundary. There is the possibility that people are living more densely within a municipality in the Densely Inhabited Districts, and DID population is increasing in spite of total population decline. As DID population is not yet available for 2015, the change from 2005 to 2010 can be examined. We have already seen that the DID population keeps on increasing until 2010 at the national level (Fig. 1). By prefecture, almost all prefectures except Yamanashi are having larger DID population change rate than that of total population change (they are above the diagonal line

). Even in the prefectures which experienced sharp total population decline, DID population does not decrease as much, suggesting a concentration of population in DID. However, in terms of absolute number, many prefectures' DID population is also experiencing the population decline. There are already 18 prefectures (C in Fig. 8) of which DID population is declining and among them there are Hiroshima and Kagoshima, which are harbouring MMA and MA, respectively. As the total population change and DID population change is highly correlated ( $r = 0.883$ ), with further total population decline, there would be more prefectures which will experience DID population decline, leading to the national level urban population decline. But also one can notice that the slope of the approximate curve ( ) is smaller than the diagonal line, suggesting that the population decline of DID is not as strong as total population decline.

In Hyogo and Kyoto, two of the three main prefectures composing Kinki MMA, DID population increased from 2005 to 2010, in spite of the total population decline during the same period. However, this compactization of population might not apply to Osaka prefecture since the proportion of DID population of Osaka is 96%, almost all of the total population. As the total population of Osaka in 2015 decreased in 2015 from 2010, so would DID population. The decrease of Osaka prefecture population implies decline of urban population of Kinki from 2010 to 2015.

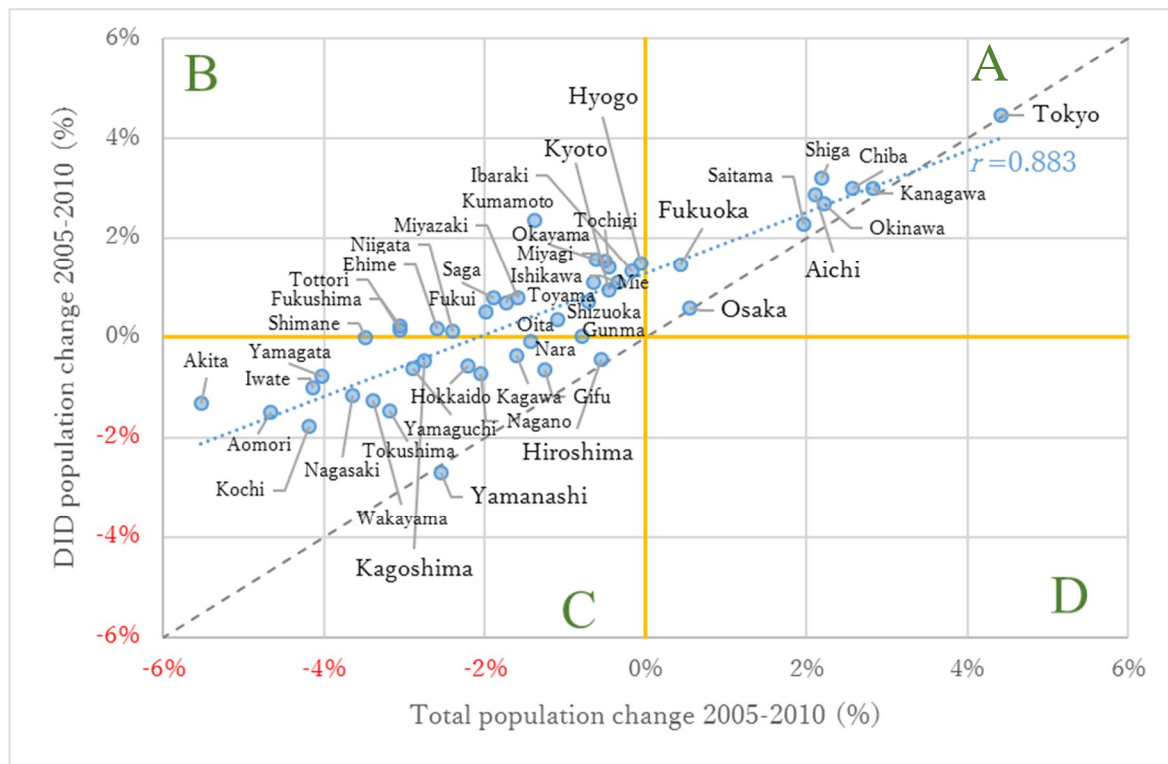


Fig. 8 The change of total population and DID population by prefecture, 2005-2010

### 3. WHY IS KINKI SHRINKING?

The Kinki's depopulation is well probable in the context that Japan as a whole is going through population shrinkage. However, the question arises; why Kinki population is declining when Aichi and Fukuoka, the third and fourth MMAs, not to mention Kanto, the largest agglomeration of Japan and of the world, are gaining the population? The Tokyo monopolization has been widely criticised in recent years but it might not be the problem of Tokyo, but rather the problem of Kinki.

It seems probable that the Kinki shrinkage is not by the superficial effect of urban definition but caused by a real decline of urban population. Demographically speaking, both natural (birth - death) and social (net migration) population changes are negative in Kinki recently. As for the socio-economic aspects, we can also get some quick insights comparing different indicators.

Income per capita of prefecture of Osaka is lower than that of Tokyo and Aichi but higher than Fukuoka. All prefectures were affected by Lehman shock in 2008 then recovered. Apart from Aichi, which shows a strong increase since 2010, Osaka's trend is as good as in Tokyo or Fukuoka (Fig. 9.a). As for the unemployment rate, Osaka's rate was highest even before the Lehman shock and now it is again the highest among the four prefectures (Fig. 9.b). Even among the 47 prefectures of Japan, Osaka's unemployment rate ranks the third after Okinawa and Aomori in 2015. Employment availability affects a lot the in-migration and the high level of unemployment rate in Osaka would surely be the cause of population decline.

Even though the income is low, or the job is not available, if people can live healthy, then there would be less problem. However, the life expectancy of Osaka is the lowest among the four MMR



central prefectures throughout the period since 1985 (Fig. 9.c, d) and healthy life expectancy of Osaka is among the lowest of the 47 prefectures (Fig. 10).

At times when population grows, the little difference of attracting power might be easily neglected but when the phase of population decline starts, when every urban centers compete with each other, the result is obvious, either population increases or decreases. By itself, population decline is not a vicious thing, but if it is caused by the unfavourable conditions of people's life, then there should be reform and changes are needed to make things better. At present, it seems that is the case for Kinki.

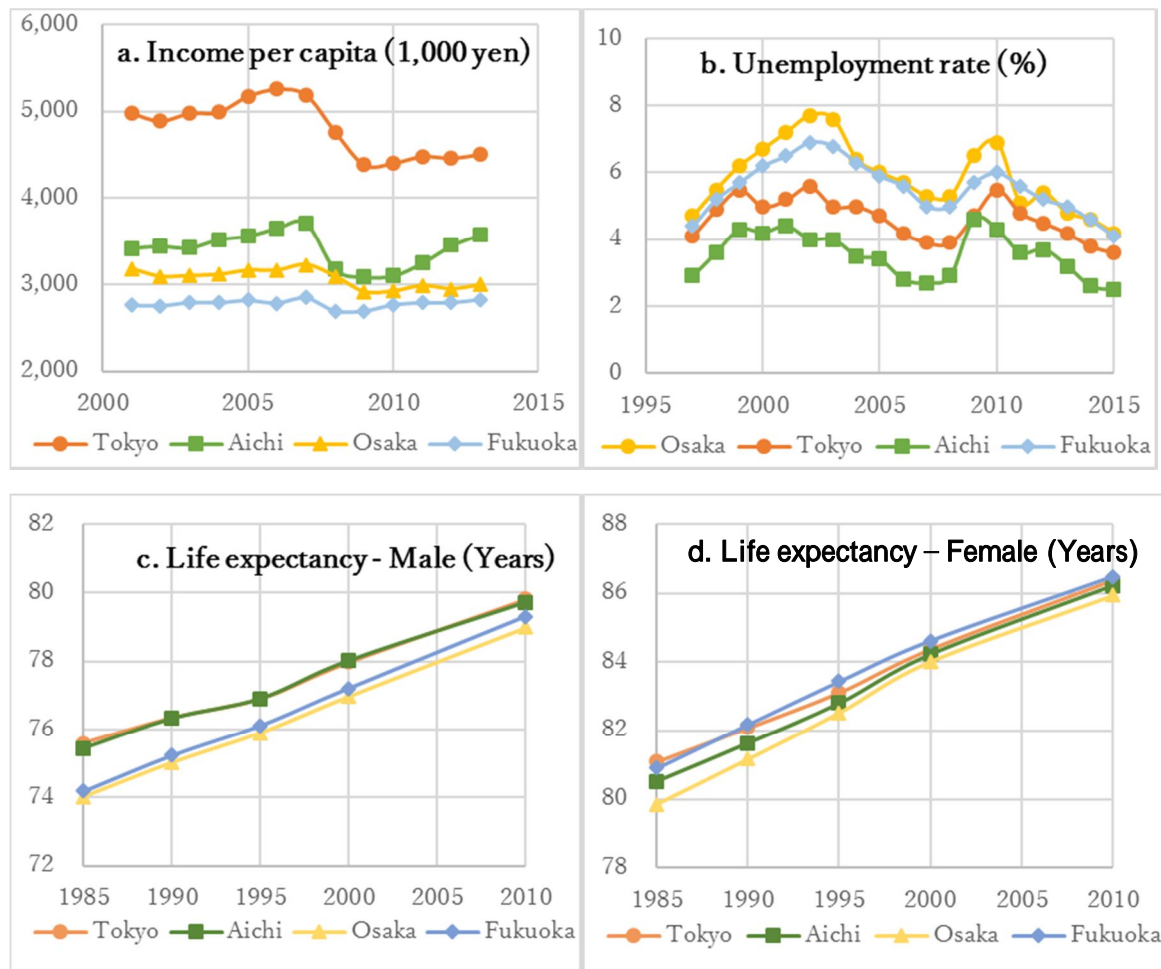


Fig. 9 Trend of socio-economic indicators of core prefectures of MMA.

Source : Income per capita by National Accounts, Economic and Social Research Institute, Cabinet Office; Unemployment rate by Labour Force Survey, Statistics Bureau; Life expectancy by Vital statistics, Ministry of Health, Labour and Welfare

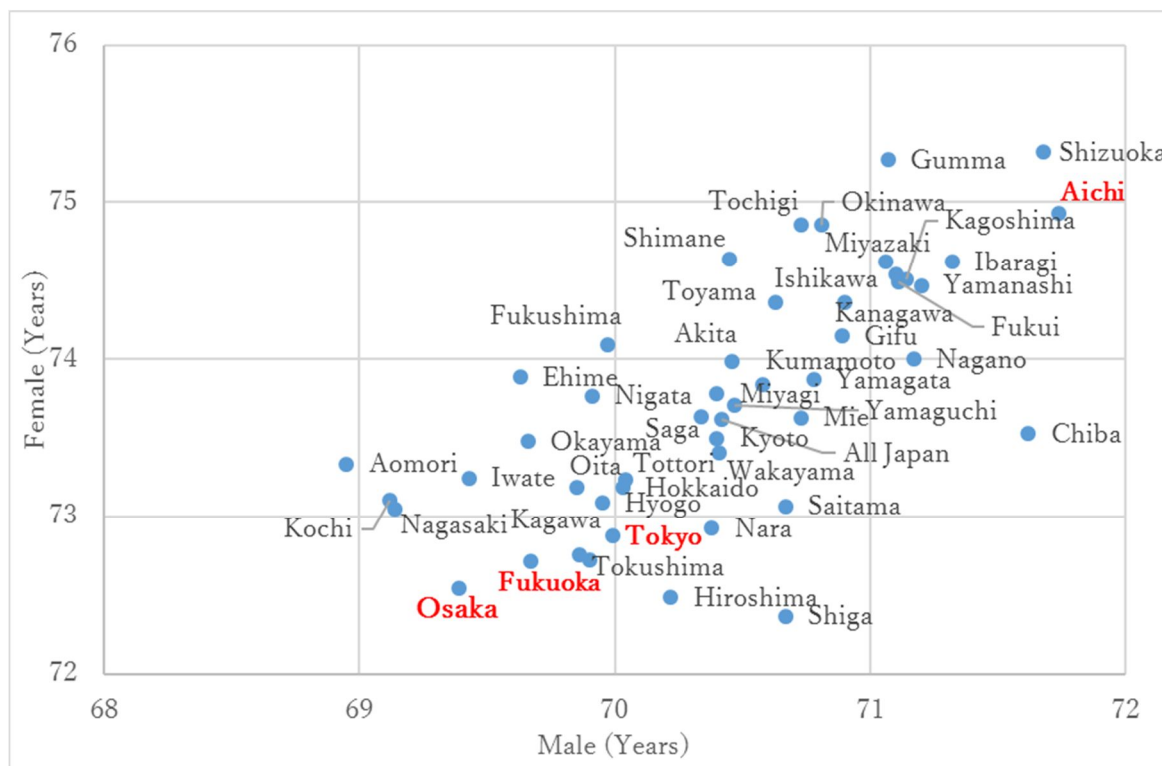


Fig. 10 Healthy life expectancy by prefecture, 2010

Source: Ministry of Health, Labour and Welfare, data available at <http://life.umin.jp/hle/appendix.xlsx>

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