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The Analysis of Japanese Shrinking Small and Mid-Sized Municipalities

ABSTRACT
Japan's population peaked in 2008; the country has been losing inhabitants since then, with geographical disparities in terms of degree of demographic shrinking and territorial devitalisation. Metropolitan areas like Tokyo are still demographically growing whereas many small and mid-sized cities have been losing their population, but this is under-investigated in literature on shrinking cities and urban dynamics, especially in English. This paper attempts to clarify the types of indicators that correlate with social population change in "non-metropolitan urban Japan": we have tried to identify potential correlations between social migratory population change (measured by net migration) and some social and economic indicators in small and mid-sized cities (population under 50,000). From 2010 to 2019, we picked 30 municipalities that have registered the biggest demographic gains thanks to social migratory increase (in-migration), and 30 others that have suffered the biggest population losses out of social migratory decrease (out-migration), so as to see if there is any statistical difference between these groups with regards to certain economic or social indicators.

KEYWORDS
Shrinking small and mid-sized municipalities, Social migratory population increase, T-Test, Japanese shrinking and aging phenomena

L'analyse des villes petites et moyennes en décroissance au Japon

RÉSUMÉ
La population japonaise a atteint son maximum historique en 2008 et ne cesse de décroître depuis. Cependant, il existe des inégalités géographiques dans l'ampleur de cette décroissance. Les aires métropolitaines telles que Tokyo continuent de croître démographiquement, tandis que de nombreuses villes petites et moyennes ont perdu de la population ; mais cela fait l'objet de très peu de publications, notamment en langue anglaise. Cette communication propose de tester différents facteurs explicatifs grâce à un ensemble d'indicateurs économiques et sociaux. À cette fin, l'auteur a cherché à identifier des corrélations entre le changement démographique et des indicateurs économiques et sociaux dans l'ensemble de ces villes (moins de 50 000 habitants). Il a ensuite sélectionné, sur 2010-2018, les 30 municipalités qui ont gagné le plus d'habitants et les 30 qui en ont perdu le plus, afin de vérifier s'il existe une différence statistique significative entre ces groupes sur la base de plusieurs indicateurs socio-économiques.

MOTS CLÉS
municipalités petites et moyennes en décroissance, croissance démographique par soldes migratoires, T-test, phénomènes de décroissance et de vieillissement au Japon

Japan's population peaked in 2008 and the country has been losing inhabitants since then. However, there exist geographical disparities in terms of degree of shrinking. Metropolitan areas like Tokyo are still demographically growing whereas rural villages in remote regions are shrinking rapidly (Hattori, 2015), and many small and mid-sized Japanese cities as well. In Japan, there are now 588 municipalities whose population is between 20,000 to 80,000 in 2019. Among these, only 23% gained population since 2010, while 24% have registered a demographic loss equivalent to more than 10% of their total population, mostly by natural decrease: Their combined natural decrease of population amounts to 1,019,201, whereas that of social migratory decrease amounts to mere 189,162.
For these analyses, data come from the National Censuses (2010; 2015), Commercial statistics from the Ministry of Economy, Trade and Industry (2014), Office statistics (2016) and Basic Resident Register (2019) from the Ministry of Internal Affairs and Communication.

Table 1 depicts these small and mid-sized cities population data by "natural increase (or decrease)" and "social migratory increase (or decrease)". Only 87 municipalities (15%) experienced natural population increase whereas 202 (34%) experienced a social migratory population increase (that is population gains caused by in-migration from 2010 to 2019). The municipalities that has gained their population from 2010 to 2019 were mostly by the increase of social migratory population. Therefore, one can assume that the social migratory population change plays a more important role than natural population change.

Table 1. Number of municipalities by ratio of population change (2010-2019)
Source: Basic Resident Register (2010-2019), Japanese Ministry of Internal Affairs and Communications

	Total Population	Natural Increase	Social Migratory Increase
More than 20% Growth	3	0	1
10% to 20% Growth	27	0	16
0 to 10% Growth	107	87	185
0 to 10% Decrease	291	483	384
10 to 20% Decrease	160	18	2
More than 20% Decrease	0	0	0

Since the control of natural decrease of population is barely possible, it is essential to look at social migratory population change for making public policy. This cannot be overemphasized for small to mid-sized cities that are affected by population decline. Some researches regarding shrinking of small and mid-sized cities population focus on their land use changes (Asano *et al.,* 2014; 2015; Inohae *et al.,* 2013). Others look at the characteristics of these cities' total population change (Esaki, 2016; Koike *et al.,* 2015). However, no research specifically look into the social migratory population change of these Japanese small and mid-sized cities.

It is all the more relevant to analyse in-migrations at this level that small to mid-size cities find themselves at the losing end of a metropolisation process that has contributed to strengthen the economic and symbolic power of Japan's biggest urban areas. Despite growing discussions on social and spatial disparities generated by austerity-oriented policies favouring larger urban regions in Japan (Chiavacci *et al.,* 2016; Buhnik, 2017), cities populated from 20,000 to 100,000 inhabitants are not subject to many investigations, especially in the literature accessible to English audiences, and when compared to a renewed attention for mid-size cities in Europe (Berroir *et al.,* 2019). From a statistical point of view, the enforced municipal mergers of the Heisei era (1990-2018) have led to the incorporation of many mid-size localities (Koike *et al.,* 2015). Their political and cultural importance within larger cities remains strong, but mapping their evolution has become increasingly difficult.

Therefore, this research focuses on small and mid-sized cities social migratory population change and its correlative relation to social economic indicators. Its objective is to understand the factors that contribute or harm their social migratory population change. Several correlation analyses were thus conducted to find out what were the main contributors to gain a social migratory population.

As shown in table 2, no industry displays a strong correlation. However, information, transportation, and real estate are relatively higher than others. It is worthwhile to note that municipalities with higher percentage of construction workers seem to have a tendency to decrease social migratory population. In Japan, construction works are mostly provided by public sector. High dependency in government subsidised construction industry may contribute to net decrease of social migratory population for small and mid-sized cities.

Table 2. Correlation coefficient between social migratory population change and percentage of workers in several industries (2010-2019)

	Correlation Coefficient with Social Migratory Population Change
Agriculture, Forestry	-0.280
Fishery	-0.259
Mining	-0.193
Construction	-0.350
Manufacturing	0.145

Electricity, Gas	-0.156
Information	0.202
Transportation	0.252
Retail	0.101
Sales	0.001
Finance	-0.246
Real Estate	0.253
Research	0.030
Tourism, Food Service	0.053
Daily Service, Entertainment	0.003
Education	0.066
Health, Medical	-0.156
Miscellany Services	-0.398
Other Services	0.012
Government Service	-0.269

Besides, the more shops per capita a city have, the more likely the city will lose its social migratory population. It also suggests that large retailers such as supermarkets may help to increase the social population. However, this needs further investigation (tabl. 3).

Table 3. Correlation coefficient between social migratory population change and indicators for commercial services (number of stores, eateries, large-scale retail surface per capita) (2010-2019)

	Correlation Coefficient with Social Migratory Population Change
stores	-0.53
eateries	-0.30
large retails	0.15

We also underline that there is a positive relation between social migratory population increase and municipalities with a sound fiscal condition (tabl. 4).

Table 4. Correlation coefficient between social migratory population change and indicators for fiscal condition of municipalities (2010-2019)

	Correlation Coefficient with Social Migratory Population Increase
Financial Capability Index	0.66
Future Burden Ratio	-0.18

According to table 5, either people tend to move out of a municipality that has low share of young generations or municipalities that have attracted people from outside have higher share of young generations.

Table 5. Correlation coefficient between social migratory population change and age structure (2010-2019)

	Correlation Coefficient with Social Migratory Population Increase
Percentage of population under 15 years old	0.62
Percentage of population from 15 to 64 years old	0.54
Percentage of population over 65 years old	-0.63

As for medical facilities, there seem to be no or negative relation between people's migrations and the ampleness of medical facilities (tabl. 6). This fact implies that people would move out from small and mid-sized cities despite the ampleness of medical facilities or people would move to these cities although medical facilities are scarce.

Table 6. Correlation coefficient between social population change and medical facilities (2010-2019)

	Correlation Coefficient with Social Migratory Population Increase
Hospitals per capita	-0.34
Clinics per capita	-0.22

There is a positive correlation between number of traffic accidents per capita and social migratory population change (tabl. 7). There is also a somewhat positive correlation between number of crimes occurred per capita as well. This result is difficult to comprehend. However, it does imply that people moving to small and mid-sized municipalities may not consider safety issues as seriously as other factors.

Table 7. Correlation coefficient between social population change and indicators for safety condition (2010-2019)

	Correlation Coefficient with Social Migratory Population Increase
Traffic accident per capita	0.21
Crimes occurred per capita	0.35

There is no correlation with unemployment rate, however there is a negative correlation between ratio of people who live and work in the same municipality (tabl. 8). This indicates that either people tend to avert from moving to a municipality with a self-sufficient economy or people tend to move out when there are few work opportunities beyond the boundaries of the municipality that they live in.

Table 8. Correlation coefficient between social migratory population change and indicators for workforce (2010-2019)

	Correlation Coefficient with Social Population Increase
Percentage of unemployment	-0.03
Percentage of employees who live and work in same municipalities	-0.57

There is a relatively strong positive correlation between population density and social migratory population change (tabl. 9). Density in Density Inhabited District (DID) also has a relatively strong positive correlation. This result indicates that either people tend to move to a municipality that have higher density or a municipality with lower population density tends to lose population to outside. Especially, in order to have a net gain of social migration, density in urban area seem to play an important role.

Table 9. Correlation coefficient between social migratory population change in 2019 and indicators of spatial characteristics (2019)

	Correlation Coefficient with Social Population Increase
Density in Habitable Area	0.40
Density in Density Habited Area	0.43

From the above results, the survey found out that, for small to mid-sized cities in Japan, the following indicators may contribute to social migratory population increase: higher density, job opportunity in surrounding region, financial stability of a local government, high percentage of younger generation in total population (lower percentage of older generation in total population).

It also found that shops, restaurants, clinics do not play a significant role to attract people from outside. A smaller number of traffic accidents or crime committed does not influence the migratory population either.

In order to further understand the components that have strong or negative effects, the research has picked 30 municipalities that displayed high social migratory population gain and 30 municipalities that had high social migratory population loss (according to the data between 2010 and 2019). They are presented in tables 10 and 11.

Table 10. 30 municipalities that had high social population gain (2010 to 2019)

Municipality	Prefecture	Japanese	Population (2019)	Population (2010)	Growth rate			Contribution rate of migration in growth
					Total	Natural	Social migration	
Shingu Town	Fukuoka	新宮町	32,930	24,649	35.2%	7.2%	28.1%	79.7%
Nakagusukuson	Okinawa	中城村	21,284	17,144	24.4%	5.1%	19.2%	78.9%
Ohizumi-machi	Gunma	大泉町	41,785	34,925	19.5%	0.6%	18.9%	96.7%
Fukutsu	Fukuoka	福津市	64,729	55,979	16.1%	-0.8%	16.9%	105.1%
Nagakute	Aichi	長久手市	58,452	48,069	22.2%	7.5%	14.7%	66.3%
Daiwa-Cho	Miyagi	大和町	28,564	24,825	15.3%	0.9%	14.4%	94.0%
Showa–Cho	Yamanashi	昭和町	20,227	17,016	18.4%	4.3%	14.1%	76.6%
Tsukuba Mirai	Ibaragi	つくば みらい市	51,630	44,889	15.3%	1.2%	14.1%	92.3%
Agui-Cho	Aichi	阿久比町	28,767	25,229	14.6%	2.3%	12.3%	84.2%
Minokamo	Gifu	美濃加茂市	56,987	50,114	13.0%	1.2%	11.7%	90.4%
Takahama	Aichi	高浜市	48,579	42,784	13.8%	2.2%	11.6%	84.4%
Warabi-Shi	Saitama	蕨市	75,261	68,455	10.1%	-1.1%	11.2%	110.7%
Yaese-Cho	Okinawa	八重瀬町	31,338	27,318	15.2%	4.4%	10.8%	70.9%
Karuizawa	Nagano	軽井沢町	20,389	18,993	7.5%	-3.1%	10.6%	140.6%
Koushi	Kumamoto	合志市	62,215	54,944	13.4%	2.9%	10.4%	78.1%
Kyoutanabe	Kyoto	京田辺市	69,804	62,730	11.2%	0.8%	10.4%	92.7%
Kikkawa	Saitama	吉川市	72,891	65,147	12.1%	1.9%	10.2%	84.4%
Kouta-Cho	Aichi	幸田町	41,947	36,477	13.7%	3.8%	9.9%	72.5%
Kizugawa	Kyoto	木津川市	77,188	69,310	11.5%	1.7%	9.8%	85.3%
Yosioka-Machi	Gunma	吉岡町	21,447	19,284	11.4%	1.8%	9.7%	84.5%
Kikuyo-Machi	Kumamoto	菊陽町	41,976	36,389	16.0%	6.5%	9.5%	59.5%
Tokoname	Aichi	常滑市	59,037	54,679	8.3%	-1.1%	9.4%	112.7%
Natori	Miyagi	名取市	78,544	72,150	9.1%	0.0%	9.1%	100.5%
Suemachi	Fukuoka	須恵町	28,554	26,014	9.9%	1.0%	8.9%	89.9%
Tomiya	Miyagi	富谷市	52,569	47,211	11.7%	3.2%	8.5%	72.6%
Ohzu-Machi	Kumamoto	大津町	34,788	31,158	12.0%	3.9%	8.2%	67.8%
Oharucho	Aichi	大治町	32,636	29,380	11.4%	3.7%	7.8%	68.0%
Shiki	Saitama	志木市	76,303	69,711	9.2%	1.4%	7.7%	84.4%
Nonoichi	Ishikawa	野々市市	52,610	46,293	14.1%	6.4%	7.7%	54.5%
Nanjo	Okinawa	南城市	43,945	40,728	8.0%	0.3%	7.7%	95.9%

Table 11. 30 municipalities that had high social migration population loss (2010 to 2019)

Municipality	Prefecture	Japanese	Population (2019)	Population (2010)	Growth rate			Contribution rate of migration in decline
					Total	Natural	Migration	
Rumoi	Hokkaido	留萌市	21,310	25,021	-15.9%	-4.8%	-11.2%	70.2%
Minami Souma	Fukushima	南相馬市	60,585	71,732	-16.2%	-6.2%	-10.0%	61.6%
Bibai	Hokkaido	美唄市	21,602	26,449	-19.1%	-9.8%	-9.4%	48.9%
Wakkanai	Hokkaido	稚内市	34,249	39,005	-13.4%	-4.2%	-9.2%	68.9%
Nemuro	Hokkaido	根室市	25,953	29,868	-13.8%	-5.0%	-8.8%	63.9%
Otsuki	Yamanashi	大月市	24,289	28,911	-16.9%	-8.2%	-8.7%	51.5%
Tsushima	Nagasaki	対馬市	31,005	35,724	-14.6%	-5.9%	-8.7%	59.6%
Shin Hidaka	Hokkaido	新ひだか町	22,677	25,791	-12.8%	-4.5%	-8.4%	65.3%
Nayoro	Hokkaido	名寄市	27,582	30,608	-11.1%	-3.3%	-7.8%	70.1%
Kamiamakusa	Kumamoto	上天草市	27,311	32,193	-16.0%	-8.5%	-7.6%	47.3%
Abashiri	Hokkaido	網走市	35,704	39,384	-10.6%	-3.2%	-7.4%	69.7%
Gojo	Nara	五條市	30,729	35,832	-14.8%	-7.6%	-7.2%	48.6%
Uenohara	Yamanashi	上野原市	23,370	26,947	-13.9%	-6.7%	-7.2%	51.7%
Uda	Nara	宇陀市	30,439	35,815	-15.5%	-8.4%	-7.1%	45.9%
Iiyama	Nagano	飯山市	21,114	24,401	-14.3%	-7.2%	-7.0%	49.3%
Oga	Akita	男鹿市	27,626	33,164	-17.5%	-10.6%	-6.9%	39.6%
Yawatahama	Ehime	八幡浜市	33,850	39,499	-15.3%	-8.4%	-6.9%	45.2%
Kesennuma	Miyagi	気仙沼市	63,867	74,926	-15.4%	-8.6%	-6.8%	44.3%
Gose	Nara	御所市	25,997	30,526	-15.4%	-8.6%	-6.8%	44.1%
Ainancho	Ehime	愛南町	21,485	25,585	-16.8%	-10.1%	-6.8%	40.3%
Kama	Fukuoka	嘉麻市	38,371	44,544	-14.4%	-7.7%	-6.7%	46.6%
Shisou	Hyogo	宍粟市	38,013	43,313	-12.8%	-6.2%	-6.6%	51.9%
Hirado	Nagasaki	平戸市	31,530	36,584	-14.7%	-8.2%	-6.5%	44.4%
Furano	Hokkaido	富良野市	21,921	24,270	-10.4%	-3.9%	-6.5%	62.8%
Uonuma	Niigata	魚沼市	36,368	41,634	-13.4%	-7.3%	-6.1%	45.4%
Ibigawacho	Gifu	揖斐川町	21,274	24,685	-14.4%	-8.3%	-6.1%	42.1%
Inocho	Kouchi	いの町	23,024	26,595	-14.0%	-8.0%	-6.0%	42.9%
Sakaemachi	Chiba	栄町	20,773	23,150	-10.7%	-4.7%	-6.0%	56.1%
Yabu	Hyogo	養父市	23,723	27,524	-14.5%	-8.6%	-6.0%	41.2%
Miyoshi	Tokushima	三好市	26,230	31,758	-18.3%	-12.3%	-5.9%	32.5%

To see if there is any difference among municipalities that has gained social migratory population and that has lost it, the author had conducted T-test over these two groups with several indicators (tabl. 12). The population seems to play a big role in terms of social population change: people tend to move in or not to leave from municipalities that have bigger population, even in the realm of small and mid-sized municipalities.
Shops, restaurants and clinics per capita also do seem to influence the social population change, however the affluence of the number seem to help people avert to come in or encourage to move out of from a municipality. Unemployment per capita does not influence the social population change, however percentage of employment who reside and work in the same municipality seem to have some. The higher the percentage of employment who reside and work in the same municipality, the higher the chance of municipality to lose its population to other municipalities.
The population density in habitable area seem to be crucial for gaining and not losing social population. Foreigners per capita also seem to play a key role for gaining social migratory population as well as percentage of population under 15, and from 15 to 64. Accordingly, the percentage of population over 65 does help to lose population by social migration.

The ratio of workers in secondary and tertiary industry seems to have no or less influence, however ratio of primary industry may have some negative effect in terms of gaining or not losing the social migratory population.

In terms of financial capability index, municipalities with better figures happen to attract or not lose their population.

Table 12. Results of P-value by the T-test

Indicators	P-value
Population	0.000
Shops per capita	0.000
Restaurants per capita	0.000
Clinics per capita	0.000
Unemployment per employment	0.338
Percentage of employment who reside and work in the same municipality	0.000
Population density in habitable area	0.000
Foreigners per capita	0.026
Percentage of population under 15 years old	0.000
Percentage of population from 15 to 64 years old	0.000
Percentage of population over 65 years old	0.000
Ratio of workers in primary industry	0.000
Ratio of workers in secondary industry	0.178
Ratio of workers in tertiary industry	0.456
Financial capability index	0.000

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