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Demographic Components of Future Population Growth Rates by Prefectures in Japan: Supplementary Materials[1]

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Abstract

This is a supplement to the paper (Kamata et al. 2020), on the decomposition of future population growth rates by prefectures in "The Regional Population Projections for Japan: 2015-2045" (NIPSSR 2018). In this paper, we present additional tables and figures, including assumptions of projections, geographical distribution for demographic components, and the results of decomposition for all prefectures. Kamata et al. (2020) showed that, (1) the negative contributions of the momentum factor were the largest in almost all prefectures (except Okinawa Prefecture). In metropolitan areas, the positive contributions of the migration factor mitigated depopulation, while in non-metropolitan areas, the negative contributions of migration further increased depopulation. By contrast, the contributions of fertility and mortality factors to future population growth were low. (2) Further examination of the four factors by five-year age groups revealed that the momentum factor played a vital role both in metropolitan and non-metropolitan prefectures, but with regional differentials by age group. In non-metropolitan prefectures, where the proportion of people aged 65 and over was already high in 2015 and population decline had begun, the future population of young and old age groups declined mainly due to the momentum factor. In metropolitan prefectures, the future young population aged 64 years and below decreased, but the future elderly population increased due to the age structure effect, anticipating severe population aging in the future.

1. Introduction

The National Institute of Population and Social Security Research (NIPSSR) released "The Regional Population Projections for Japan: 2015–2045" in March 2018. This projection took the results of "The Population Census of Japan 2015" (Statistics Bureau, Ministry of Internal Affairs and Communications) as the base population, and it projected the future population by five-year age groups and sex for each five-year period between 2020 and 2045 (NIPSSR 2018). The geographical units that the projection covered included 1,798 municipalities (23 Tokyo special wards, 128 wards in 12 major cities, 766 cities, 713 towns, and 168

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villages), in accordance with the official boundaries as of March 1, 2018, and one prefecture (Fukushima Prefecture). The sum of the population in geographical units reported here by age and sex is consistent with the medium-variant fertility and medium-variant mortality projection results of the national projections (NIPSSR 2017). In Kamata et al. (2020), we identified four demographic components of future population change following the methodology proposed by Bongaarts and Bulatao (1999), and showed prefectural patterns of the components. This paper supplements with tables and figures that eliminated due to the page restriction.

It has been more than 10 years since the total population of Japan began to decline after peaking in 2008, and the scale of the decline has been increasing every year. The total population on October 1, 2019, had decreased by 276,232 compared to the previous year, with a natural increase of -485,015 and a social increase of 208,783 (Statistics Bureau, Ministry of Internal Affairs and Communications 2019). The percentage of the population aged 65 and over was 26.6% in 2015 (28.4% in 2019) and is projected to rise to 38.4% in 2065 according to NIPSSR (2017). In terms of regional population, many non-metropolitan areas are already experiencing a decline in population, with 39 prefectures experiencing a decline in the total population between 2010 and 2015 (Statistics Bureau, Ministry of Internal Affairs and Communications 2016).

The NIPSSR (2018) shows that Tokyo is the only prefecture with a higher total population in 2045 than in 2015. The percentage of people aged 65 and over will increase in all prefectures, with Akita Prefecture having the highest percentage at 50.1% in 2045. However, the increase in the population aged 65 and over will be greater in metropolitan areas, with Tokyo, Kanagawa, and Okinawa Prefectures having a more than 30% increase in the population aged 65 and over between 2015 and 2045.

2. Method

This study used the method of Bongaarts and Bulatao (1999) to decompose the future population growth rates into four factors: momentum factor (age structure of the base population), fertility factor (fertility rate), mortality factor (survival rate), and migration factor (net-migration rate). This method is a general-purpose factor decomposition method, and widely used for the analysis of the purpose. These include, but not limited to, the United Nations (Andreev et al. 2013; United Nations 2017) and the United Kingdam (Rees et al. 2013).

The following four scenarios were used for factor decomposition of future population growth rates: The double quotation marks in parentheses are the scenario names from Bongaarts and Bulatao (1999).

(1) Standard Scenario ("Standard") P_s: The results under assumptions conformable to NIPSSR (2018). The modifications will be explained below.

(2) Natural Increase Scenario ("Natural") P_n: In addition to (1) above, the net migration rate is set to zero.

(3) Population Replacement Scenario ("Replacement") P_r: In addition to (2), the fertility rate is assumed to be constant in 2015.

(4) Age Structure Scenario ("Momentum") P_m: In addition to (3), the survival rate is assumed to be constant in 2010-2015.

The decomposition is performed using five populations, including (5) the base population P, in addition to the above four projected results. The composition of the scenarios and the assumptions made in this study are listed in Table 1. For instance, all major demographic components in the cohort component method for a population projection are held fixed at specified values in Pm, but projected populations evolve by the vital rates and its age structure will differ from one in the base population. As the population ages, the number of deaths increases, while births and net-migrants likely decrease. Hence, population aging will reinforce future aging under fixed vital rates assumptions solely due to the population age structure and age patterns of the vital rates. In other words, population age structure in the initial population contains information on a current tendency of population increase/decrease, known as the population momentum (Keyfitz 1971). Therefore, comparisons between P_m (2045) and P (2015) will uncover the momentum effects. In another example, future survival rates for P_r change as in NIPSSR (2018), while it is fixed in Pm. Comparisons between P_r and P_m reveal the contributions of mortality change.

Four multipliers quantify and separately summarize the effects of four demographic components on future population change, which in turn will be used to measure contributions of the effects. The multipliers for each factor can be calculated from the results of the four different projections and the ratio of the base population: (1) momentum factor multiplier $M_m=P_m/P$; (2) fetility factor multiplier $M_b=P_n/P_r$; (3) mortality factor multiplier $M_d=P_r/P_m$; and (4) migration factor multiplier $M_{mg}=P_s/P_n$. The projected results for each scenario can be obtained by multiplying the base population by the multipliers.

The contribution of each factor from 2015 to year t was calculated as follows: The contribution is the ratio of the population change caused by each factor to the population in 2015, and the sum of the contribution of each factor is equal to the population growth rate. This analysis shows the results for the 30-year period from 2015 to 2045.

Contribution of the momentum factor (%): $CR_m(t)_i = (P_m(t)_i - P(2015)_i)/P(2015)_i \times 100$

Contribution of the birth factor (%): $CR_b(t)_i = (P_n(t)_i - P_r(t)_i)/P(2015)_i \times 100$

Contribution of the mortality factor (%): $CR_d(t)_i = (P_r(t)_i - P_m(t)_i)/P(2015)_i \times 100$

Contribution of the migration factor (%): $CR_{mg}(t)_i = (P_s(t)_i - P_n(t)_i)/P(2015)_i \times 100$

where *i* is the prefecture, and *t* is the year in five-year intervals from 2020 to 2045.

3. Definition of the Assumptions

It should be noted that the assumptions for future population projections used in this analysis, with the exception of the survival rates, differ from the assumptions published in NIPSSR (2018).

The future fertility rates are the age-specific fertility rates consistent with the population aged 0-4 years, which is obtained by adjusting the child-woman ratio used in NIPSSR (2018) and the national projection (this is referred to as the "adjusted fertility rates" in this study). The results of the prefectural projections are the sum of the projections of the population aged 0-4, using the child-woman ratios for each municipality.

The child-woman ratio (CWR) has been used in the municipal projections of the NIPSSR because it provides a stable assessment of the fertility even in areas with small populations (Yamauchi 2014). Hence, it is widely used in international practices of sub-national projections (Smith et al. 2013; Baker et al. 2017). However, since the child-woman ratio is conceptually incapable of calculating the number of births corresponding with the replacement fertility, we produced an adjusted fertility rate, which is an age-specific fertility rate consistent with the results of NIPSSR (2018).

For migration, we employ the net-migration rates calculated by subtracting the survival rates using the cohort change ratios obtained from the projected results of NIPSSR (2018). The projected results of the standard scenario in these projections are consistent with the results of NIPSSR (2018).

(1) Fertility Assumption: Adjusted Fertility Rates

The adjusted fertility rate, which is an age-specific fertility rate (ASFR), consistent with the population aged 0-4 years in NIPSSR (2018), were prepared as follows.

First, we calculated the relative disparity ratios $R(2015)_{i,x}$ between the actual values of the age-specific fertility rate by five-year age groups by prefecture $ASFR(2015)_{i,x}$ and the national $ASFR(2015)_{I,x}$ in 2015. Here, *i* is the prefecture, *I* is the nation, and *x* is the age at 5-year intervals from to 15-19 to 45-49 years.

$$R(2015)_{i,x} = ASFR(2015)_{i,x}/ASFR(2015)_{I,x}$$

Assuming that the relative disparity ratios of 2015 $R(2015)_{i,x}$ remains constant from 2020 to 2045, and multiplying the future age-specific fertility rate of all Japan (NIPSSR 2017). Here, *t* is a point in time at five-year intervals from 2020 to 2045.

$$ASFR(t)_{i,x} = ASFR(t)_{I,x} \times R(2015)_{i,x}$$

Next, we calculated the adjusting ratios $C(t)_i$ to match the number of births for 5 years obtained from the above age-specific fertility rates with the population aged 0-4 in NIPSSR (2018). We multiplied the future age-specific fertility rates $ASFR(t)_{i,x}$ by the projected population of females aged 15-49 by 5-year age groups from 2020 to 2045, and to calculated the total number of births for five years. The ratio of the total number of births during the 5-year period to the population aged 0-4 $P(t)_{i,0\sim4}$ is taken as the adjusted ratio.

$$C(t)_i = P(t)_{i,0\sim4} / \sum_{15\sim19}^{45\sim49} (P(t)_{i,x} \times ASFR(t)_{i,x})$$

Finally, by multiplying the adjusted ratios $C(t)_i$ and the future age-specific fertility rate by prefecture$ASFR(t)_{i,x}$, the age-specific fertility rate $ASFR(t)_{i,x}^{C}$ was calculated, which is consistent with the results of the population aged 0-4 years in NIPSSR (2018). $ASFR(t)_{i,x}^{C}$ are the adjusted fertility rates.

$$ASFR(t)_{i,x}^{C} = ASFR(t)_{i,x} \times C(t)_i$$

The adjusted fertility rate for the replacement level, $ASFR(t)_{i,x}^{R}$ was calculated by multiplying the ratio of 2.07 to the total age-specific fertility rate$\sum_{15\sim19}^{45\sim49} ASFR(t)_{i}^{C}$, by the age-specific fertility rates of each prefecture$ASFR(t)_{i,x}^{C}$.

$$ASFR(t)_{i,x}^{R} = ASFR(t)_{i,x}^{C} \times \left(\frac{2.07}{\sum_{15\sim19}^{45\sim49} ASFR(t)_{i,x}^{C}}\right)$$

Figure 1 shows the distribution of the total fertility rate (TFR) by prefecture from 2015 to 2045, and Figure 2 shows the distribution of the age-specific fertility rate by prefecture from 2015 to 2045. These figures reveal rather persistent regional patterns that prevail in NIPSSR (2018): median TFR remains almost constant from 1.53 in 2015 to 1.54 in 2045; prefectures of the minimum (Tokyo) and the maximum (Okinawa prefecture) are unchanged over the projection horizon. The distribution of age-specific fertility rates stays at roughly constant from 2015 to 2045.

(2) Mortality Assumptions: Survival rates

For the future survival rates by prefecture, we used the same values as in NIPSSR (2018).

In this paper, we denote the future survival rate by sex as$S(t)_{i,x}$, where *i* is the prefecture, *x* is the age group *x*→*x*+5, from 0-4→5-9 to 85+→90+, and *t* is the point in time at 5-year intervals from 2015→2020 to 2040→2045.

Figure 3 shows the distribution of the survival rate by prefecture from 2015→2020 to 2040→2045. The distribution of age-specific survival rates for males and females proceeded rectangularization because of the assumed increase in life expectancy. Regional differences in age-specific survival rates were not significant.

(3) Migration Assumption: Net-migration rates

In NIPSSR (2018), the assumption of migration rate is estimated by the pool model, which is one of the multi-regional models for setting migration assumptions. The pool model is a method for estimating the numbers of out-migration and in-migration by using the out-migration rate, which is the ratio of the number of out-migrants to the regional population, and the in-migration rate, which is the share of the number of inmigrants by region to the national total of in-migrations (NIPSSR 2018).

In order to set the future migration rates that are consistent with those implemented in NIPSSR (2018), the net-migration rates by sex and age groups were calculated by subtracting the survival rates $S(t)_{i,x}$ from the cohort change ratios$CCR(t)_{i,x}$. *i* is the prefecture, *x* is the age groups *x*→*x*+5 years, from 0-4 years to 5-9 years to 85+ years to 90+ years, and *t* is the time point at 5-year intervals from 2015→2020 to 2040→2045.

$$NM(t)_{i,x} = CCR(t)_{i,x} - S(t)_{i,x}$$

Figure 4 shows the distribution of the net-migration rate by prefecture from 2015→2020 to 2040 →2045. The net migration rates by age group for men and women fluctuate greatly from the late teens to the late 20s, with positive net migration rates in metropolitan areas and negative net migration rates in non-metropolitan areas, while the net migration rates for people aged 85 and over are positive in many areas.

4. Results

Table 2 shows the main decomposition results of Kamata et al. (2020) for the future population growth rates between 2015 and 2045, including the total population in 2015 and 2045 by prefecture, the population growth rates, the contributions and multipliers of each factor, and the products of the multipliers × 100 (equivalent to the index of the total population in 2045 when 2015 is 100). Figure 5 shows the population growth rates and the geographical distribution of each factor, which shows the total population in each scenario, the contributions of each factor to the total population change, and the contributions of each age group for all prefectures.

The population growth rates from 2015 to 2045 of most prefectures are negative, except for Tokyo, which will have a positive rate of 0.7%. Population growth rates tend to be higher in metropolitan areas and lower in regions with higher aging rates. Looking at the contribution of each factor, the momentum factor is negative in all regions, and its negative contribution is higher in regions with higher population growth rates. The contribution of birth and death factors is low, while that of migration factors is high in metropolitan areas, especially in Tokyo, and is generally negative in non-metropolitan areas.

The multiplier for momentum factor was 0.775 on average in this projection, with a minimum of 0.643 in Akita Prefecture and a maximum of 0.986 in Okinawa Prefecture. The momentum factor was less than 1 in all prefectures, and has the effect of lowering the rate of population growth for the period 2015-2045. The multiplier of fertility factor was 1.004 on average, with a minimum of 0.983 in Tokyo and a maximum of 1.026 in Miyazaki Prefecture. The regional distribution of fertility factor tended to be lower than 1 in metropolitan areas and higher than 1 in non-metropolitan areas. The multiplier of the mortality factor was 1.042 on average, 1.031 in Okinawa Prefecture as the lowest, and 1.057 in Akita Prefecture as the highest. The multipliers for the mortality factor were higher in regions where the population is aging than in regions where life expectancy is high or low. The average multiplier for migration factors was 0.966, the minimum was 0.845 in Akita Prefecture, and the maximum was 1.217 in Tokyo. The multipliers for the Tokyo metropolitan area, Aichi Prefecture, Osaka metropolitan area, Okayama Prefecture, Hiroshima Prefecture, and Fukuoka Prefecture exceeded 1, while the multipliers for the other regions were below 1.

As a result, the product of the multipliers of each factor x 100 averaged 78.4 in NIPSSR (2018) (21.6% decrease in population growth rates), with the smallest value being 58.8 in Akita Prefecture (41.2% decrease) and the highest value being 100.7 in Tokyo (0.7% increase). In this analysis, only Tokyo exceeds 100, while the other regions fall below 100, resulting in a decrease in population in 2045 compared to 2015.

In Akita Prefecture, which has the highest rate of population decline, the population growth rate is -41.2% over the period 2015-2045, consisting of -35.7% for the momentum factor, +1.6% for the fertility factor, +3.6% for the mortality factors, and -10.7% for the migration factors. The negative effect of the momentum factor, which reflects the aging of the population in 2015 (33.8%), has the largest negative effect on the future population growth rate, while the positive contributions of fertility and mortality factors have small effect.

However, the population growth rate of Tokyo, which has the highest rate of population growth in NIPSSR (2018), was +0.7%. The results are as follows: a momentum factor of -18.9%, a fertility factor of -1.5%, a mortality factor of +3.1%, and a migration factor of +17.9%, resulting in a total population growth rate of +0.7%. As in other regions, the momentum factor in Tokyo also made a negative contribution, the fertility factor also made a negative contribution, and the positive contribution of the mortality factor was not high, indicating that the large contribution of the migration factor had a decisive effect on the positive population growth rate.

The geographic distribution of population growth tended to be high in metropolitan areas and low in non-metropolitan areas, with particularly low population growth rates in the Tohoku region, including Aomori, Akita, Iwate, Yamagata, and Fukushima prefectures. The momentum factors exhibited a similar distribution. Fertility factors were high in the Tohoku and Kyushu regions, including Miyazaki, Kagoshima, Kumamoto, Oita, and Nagasaki Prefectures, and low in metropolitan areas. The mortality factor showed little regional variation, but tended to be higher in Eastern Japan. The migration factor was significantly higher in the Tokyo metropolitan area, higher in Aichi, Osaka, Kyoto, Hyogo, Okayama, Hiroshima, and Fukuoka Prefectures, and lower in other areas.

5. Conclusion

This is a supplement to the paper (Kamata et al. 2020) on the decomposition of the future population growth rates by prefectures in NIPSSR (2018). In this paper, we present additional tables and figures, such as the assumptions of projections, the geographical distribution for the demographic components, and the results of decomposition for all prefectures.

As a result of decomposing the future population growth rate from 2015 to 2045 into the four factors of momentum, fertility, mortality, and migration factors using the method of Bongaarts and Bulatao (1999), we show that the negative contribution of the momentum factor was the largest in all prefectures except Okinawa Prefecture. In metropolitan areas, the positive contribution of the migration factor mitigated the decline in population growth rates, while in non-metropolitan areas, the negative contribution of the migration factor led to further population decline. However, the impact of fertility and mortality factors on future population growth rates were low.

The results of the analysis of the contribution of each factor by age group showed that in non-metropolitan areas, where the percentage of the population aged 65 and over was high as of 2015 and population decline had already begun, population decline was structurally caused by the momentum factor for almost all age groups. In particular, the rate of population decline tended to be higher in areas where there are more people in their 60s, the first baby boom generation “DANKAI” (born in 1947-1949). However, metropolitan areas will experience a decline in the young and working-age population and an increase in the elderly population due to the momentum factor, and the population will continue to age. In particular, because the second baby boom generation “DANKAI Junior” (born in 1971-1974) will enter the population aged 65 and over in the 30 years from 2015 to 2045, the rate of increase in the population aged 65 and over will be higher in regions with more of that generation as of 2015. As for the migration factor, we observed positive contributions from metropolitan areas for the young population and from non-metropolitan areas for the middle-aged and older population.

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Table 1. Projection scenarios, composition of assumptions, results of projected population and multipliers

Projection Scenarios	Composition of Assumptions	Results	Multipliers[3]
1. Standard	Momentum, Mortality, Fertility[1], Migration[2]	$\mathbf{P_s}$	$\mathbf{P \cdot M_m \cdot M_d \cdot M_b \cdot M_{mg}}$
2. Natural	Momentum, Mortality, Fertility	$\mathbf{P_n}$	$\mathbf{P \cdot M_m \cdot M_d \cdot M_b}$
3. Replacement	Momentum, Mortality	$\mathbf{P_r}$	$\mathbf{P \cdot M_m \cdot M_d}$
4. Momentum	Momentum	$\mathbf{P_m}$	$\mathbf{P \cdot M_m}$

Note: 1. Adjusted fertility rates: The fertility rates are the age-specific fertility rates to obtain the number of births consistent with the projected results of the population aged 0-4 years in the regional projections (2018).

2. The net migration rate is calculated by subtracting the future survival rate from the cohort change rate, which is obtained from the results of the regional projections (2018).

3. Each multiplier is based on (1) the age structure factor $M_m=P_m/P$, (2) the birth factor $Mb=P_n/P_r$, (3) the death factor $Md=P_r/P_m$, and (4) the migration factor $M_{mg}=P_s/P_n$, where P is the base population.

Figure 1 The trend of the total fertility rate by prefecture from 2015 to 2045

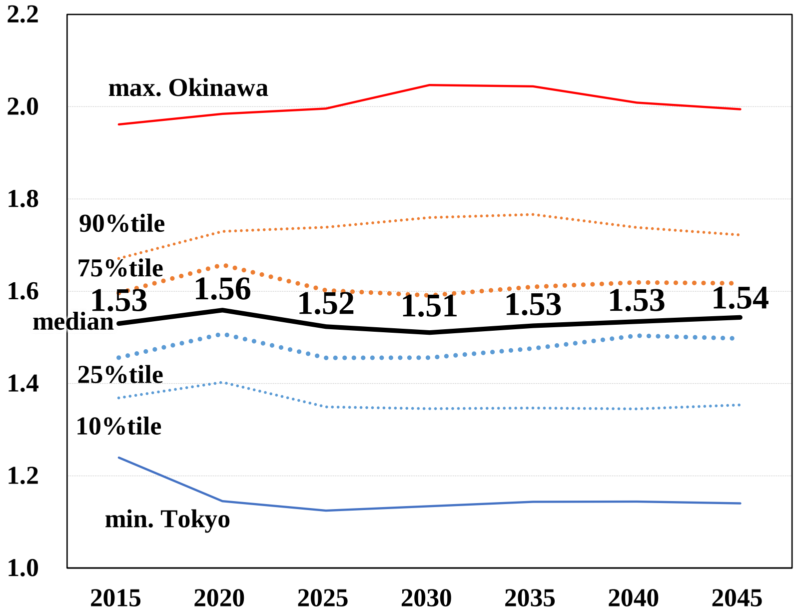


Figure 2 The distribution of the age-specific fertility rate by prefecture from 2015 to 2045

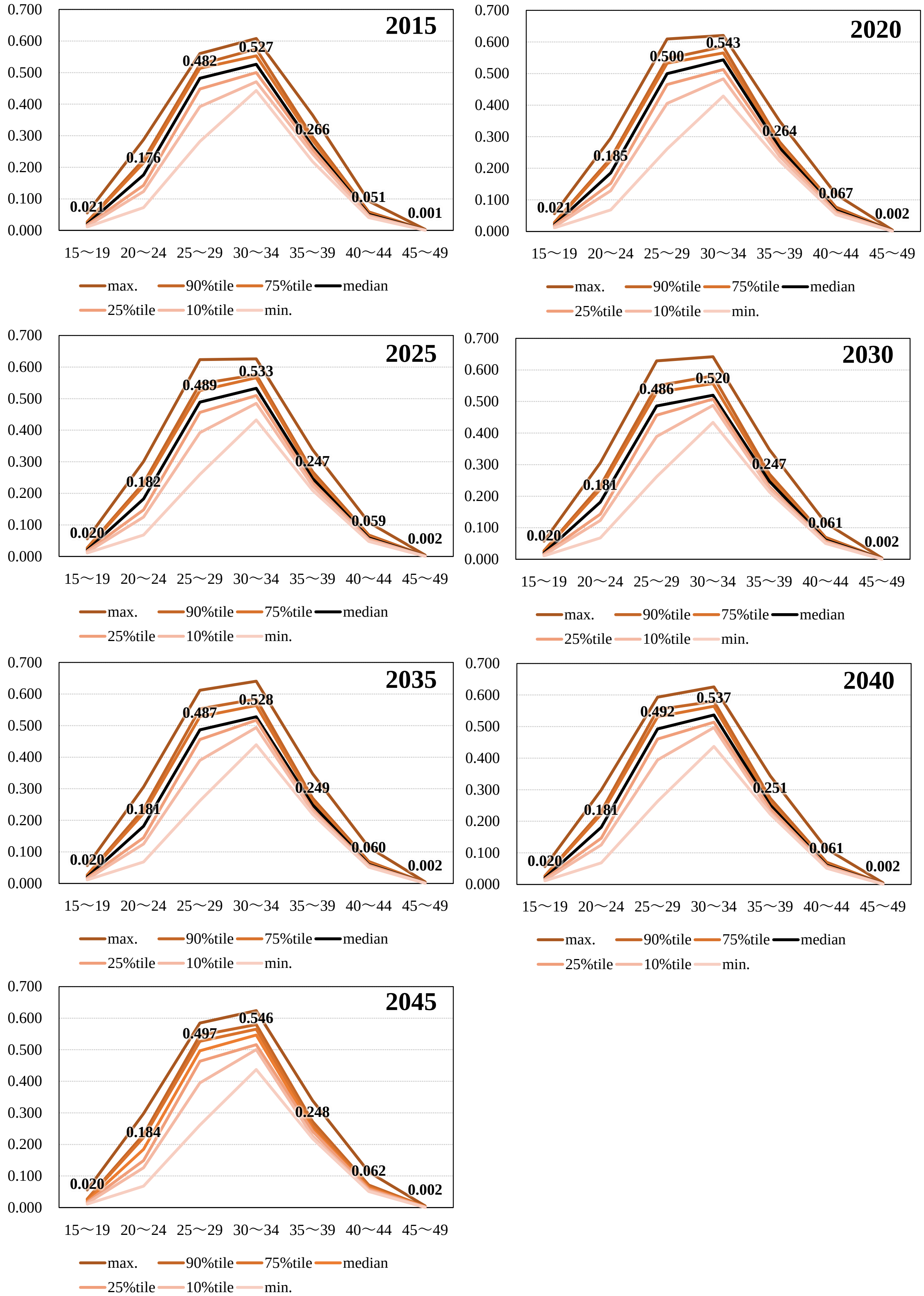


Figure 3 The distribution of the age-specific survival rate by prefecture from 2015→2020 to 2040→2045

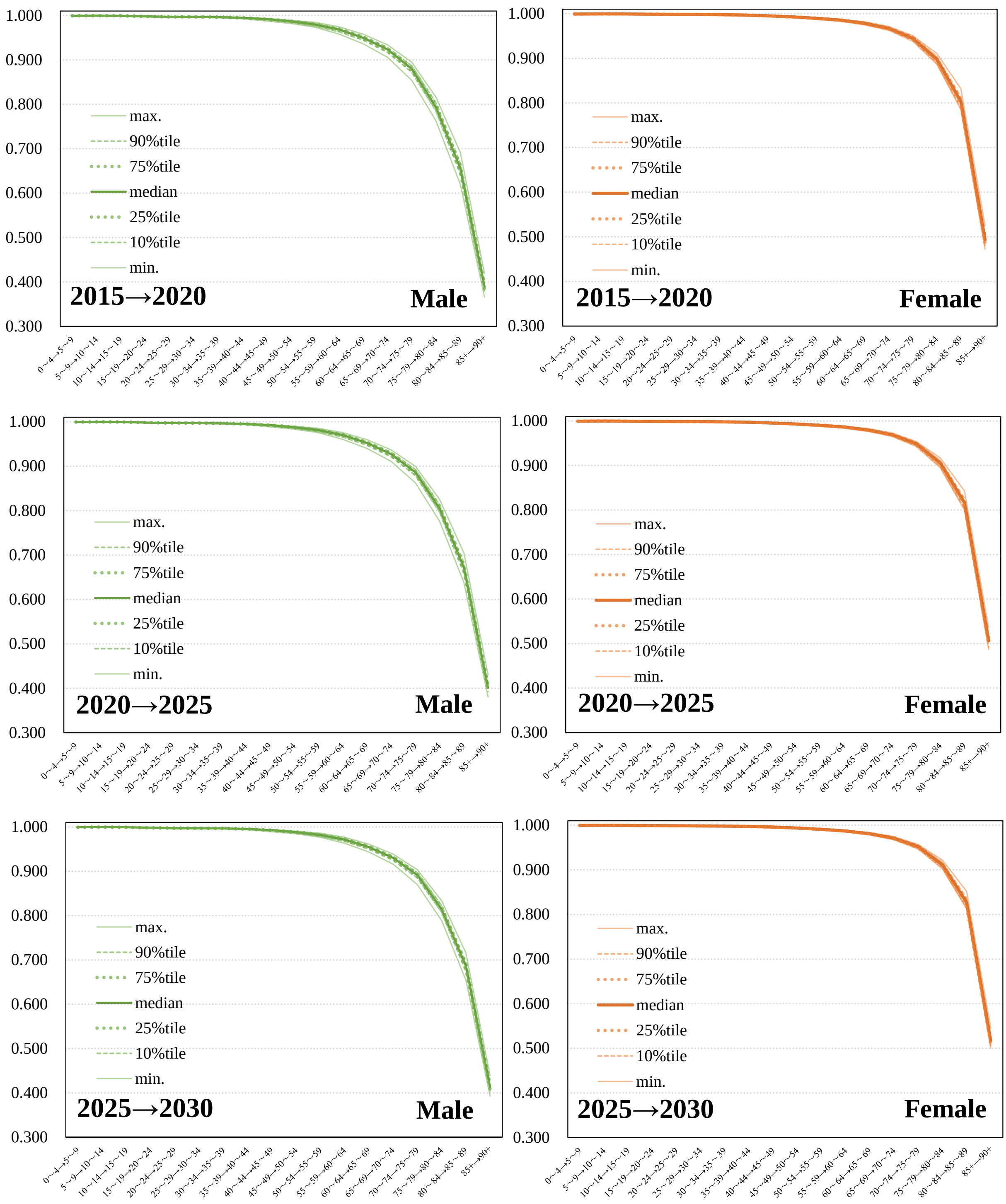


Figure 3 (cont.)

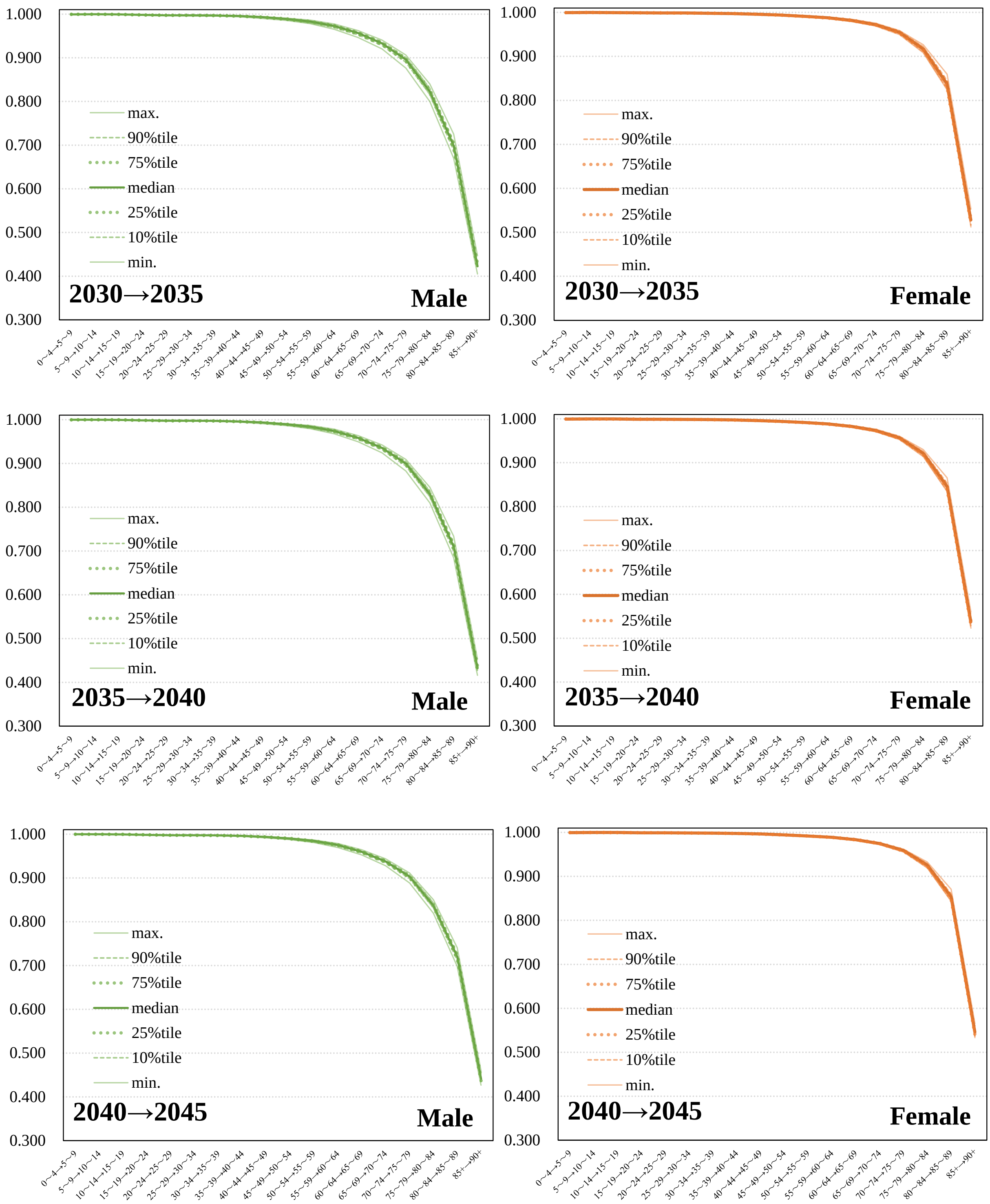


Figure 4 The distribution of the age-specific net migration rate by prefecture from 2015→2020 to 2040→ 2045

Figure 4 (cont.)

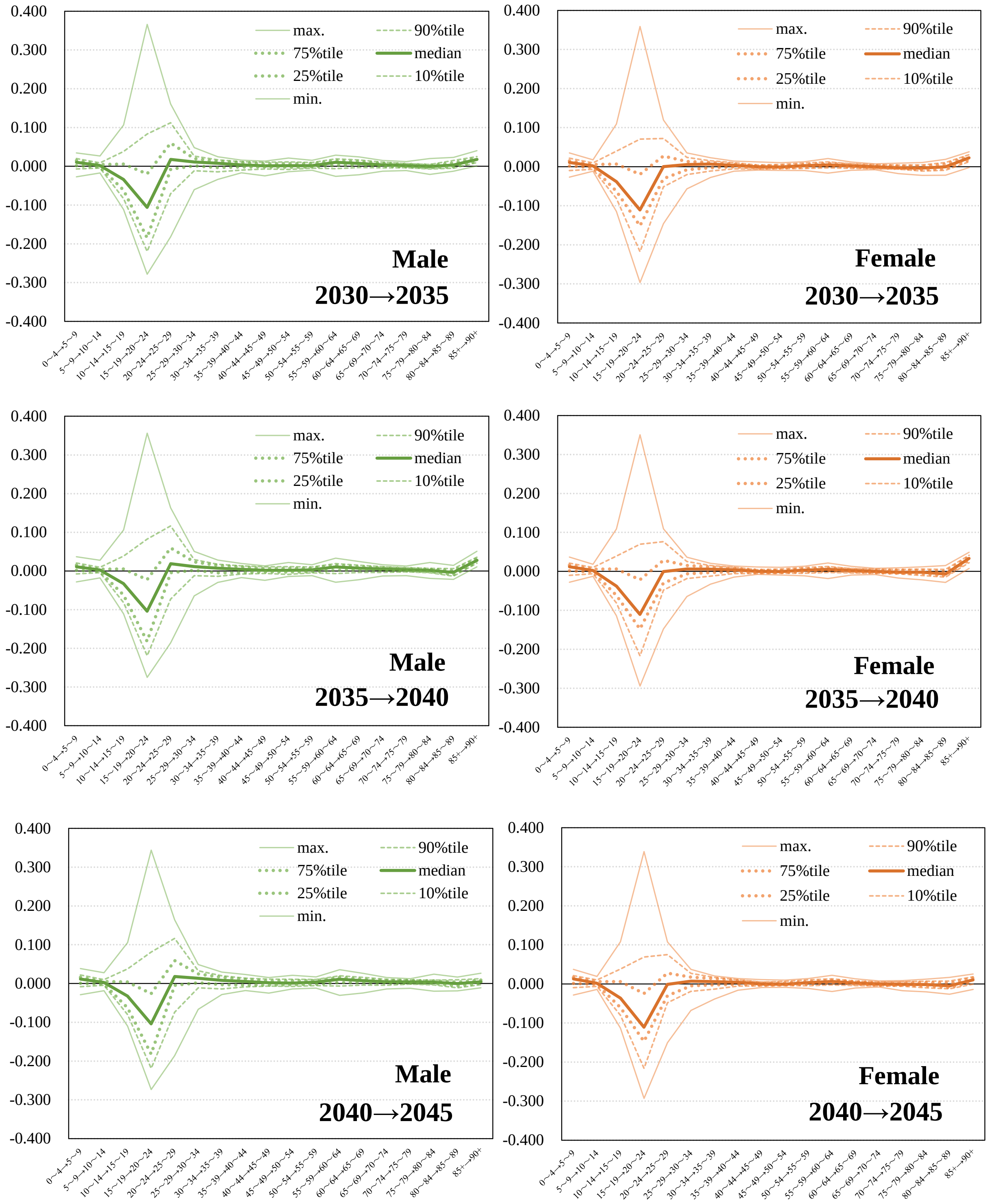
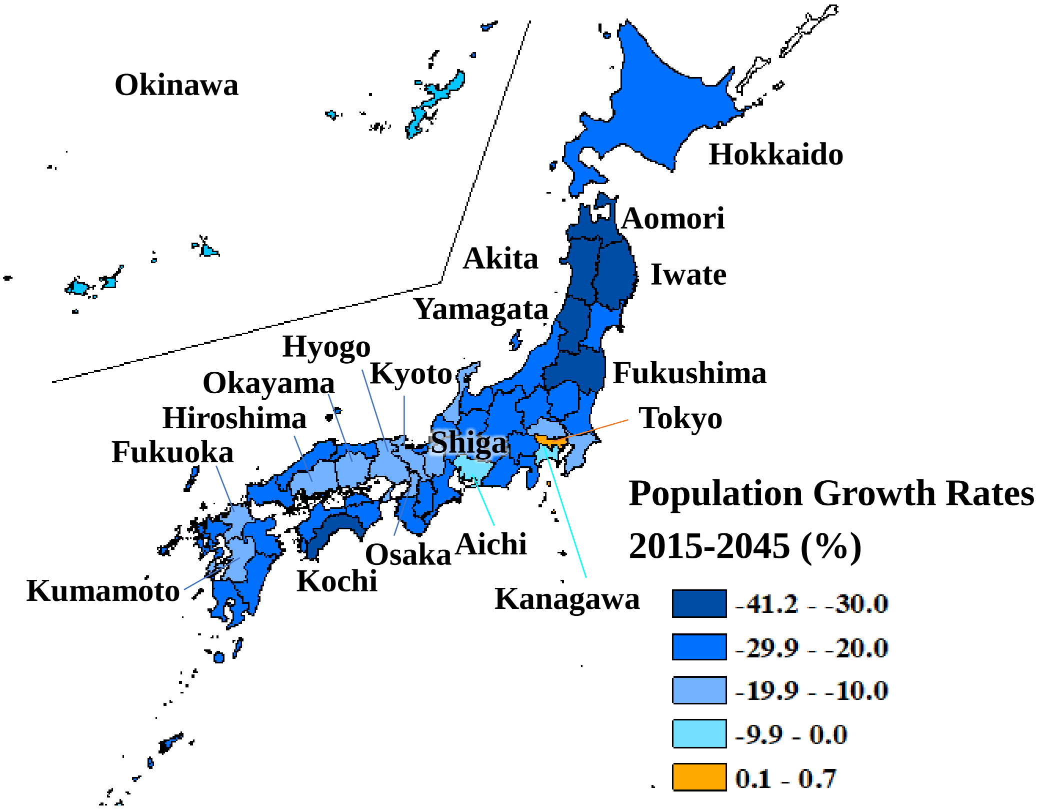


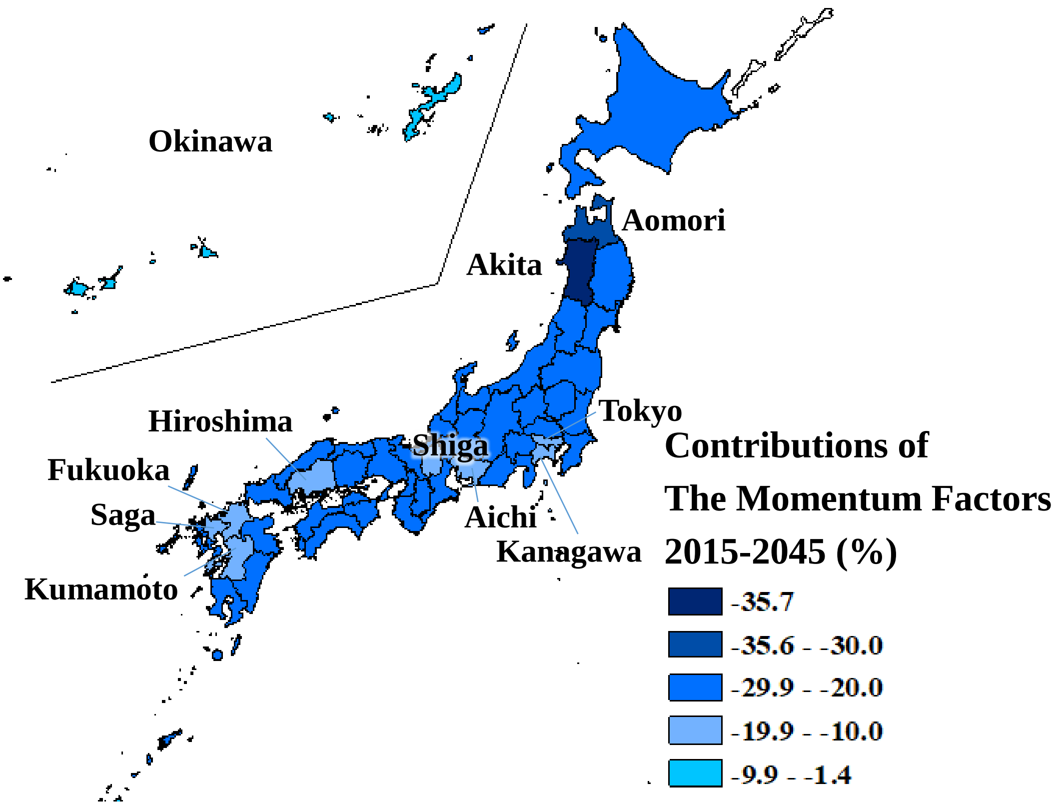
Table 2. Summary of results: Total Population, Population Growth Rate, Contributions and Multipliers of Demographic Components

Prefecture	Total Population (thousand) 2015	2045	Population Growth Rates 2015-2045	Contributions (%) Momentum CR_m	Fertility CR_b	Mortality CR_d	Migration CR_{mg}	Multipliers Momentum M_m	Fertility M_b	Mortality M_d	Migration M_{mg}	product of multipliers ×100
Hokkaido	5,382	4,005	-25.6	-27.9	0.5	3.4	-1.6	0.721	1.007	1.047	0.978	74.4
Aomori	1,308	824	-37.0	-30.3	0.8	3.8	-11.4	0.697	1.011	1.055	0.847	63.0
Iwate	1,280	885	-30.9	-28.1	1.2	3.5	-7.5	0.719	1.016	1.049	0.903	69.1
Miyagi	2,334	1,809	-22.5	-21.8	1.3	3.2	-5.1	0.782	1.016	1.041	0.938	77.5
Akita	1,023	602	-41.2	-35.7	1.6	3.6	-10.7	0.643	1.024	1.057	0.845	58.8
Yamagata	1,124	768	-31.6	-27.5	1.9	3.2	-9.3	0.725	1.025	1.045	0.881	68.4
Fukushima	1,914	1,315	-31.3	-25.4	0.0	3.5	-9.4	0.746	1.001	1.047	0.879	68.7
Ibaraki	2,917	2,236	-23.4	-22.9	0.6	3.4	-4.4	0.771	1.007	1.044	0.946	76.6
Tochigi	1,974	1,561	-21.0	-22.2	0.6	3.5	-2.8	0.778	1.007	1.045	0.966	79.0
Gunma	1,973	1,553	-21.3	-22.9	0.3	3.3	-2.0	0.771	1.003	1.043	0.975	78.7
Saitama	7,267	6,525	-10.2	-20.3	0.0	3.3	6.8	0.797	1.000	1.041	1.082	89.8
Chiba	6,223	5,463	-12.2	-21.7	-0.2	3.2	6.5	0.783	0.997	1.041	1.081	87.8
Tokyo	13,515	13,607	0.7	-18.9	-1.5	3.1	17.9	0.811	0.983	1.038	1.217	100.7
Kanagawa	9,126	8,313	-8.9	-18.3	-0.6	3.1	6.9	0.817	0.993	1.037	1.082	91.1
Niigata	2,304	1,699	-26.3	-26.2	1.0	3.2	-4.3	0.738	1.013	1.043	0.945	73.7
Toyama	1,066	817	-23.3	-25.5	-0.3	3.1	-0.6	0.745	0.996	1.042	0.992	76.7
Ishikawa	1,154	948	-17.9	-20.5	-0.2	3.1	-0.3	0.795	0.998	1.039	0.997	82.1
Fukui	787	614	-21.9	-20.6	0.0	3.0	-4.3	0.794	1.000	1.038	0.947	78.1
Yamanashi	835	599	-28.3	-23.2	-0.2	3.2	-8.1	0.768	0.998	1.042	0.899	71.7
Nagano	2,099	1,615	-23.1	-22.8	0.1	2.9	-3.3	0.772	1.002	1.037	0.959	76.9
Gifu	2,032	1,557	-23.4	-20.8	0.0	3.1	-5.7	0.792	1.000	1.040	0.930	76.6
Shizuoka	3,700	2,943	-20.5	-22.1	0.5	3.2	-2.1	0.779	1.006	1.041	0.974	79.5
Aichi	7,483	6,899	-7.8	-14.9	-0.8	3.1	4.8	0.851	0.991	1.036	1.055	92.2
Mie	1,816	1,431	-21.2	-21.4	-0.1	3.2	-2.9	0.786	0.999	1.041	0.965	78.8
Shiga	1,413	1,263	-10.6	-13.6	0.8	2.9	-0.7	0.864	1.009	1.033	0.993	89.4
Kyoto	2,610	2,137	-18.1	-21.3	-0.5	3.0	0.7	0.787	0.994	1.038	1.009	81.9
Osaka	8,839	7,335	-17.0	-21.1	-1.3	3.3	2.1	0.789	0.984	1.042	1.026	83.0
Hyogo	5,535	4,532	-18.1	-21.0	-0.5	3.2	0.2	0.790	0.994	1.040	1.002	81.9
Nara	1,364	998	-26.8	-23.3	0.6	3.1	-7.2	0.767	1.008	1.040	0.910	73.2
Wakayama	964	688	-28.6	-26.5	-0.3	3.4	-5.2	0.735	0.996	1.047	0.932	71.4
Tottori	573	449	-21.8	-23.1	0.6	3.2	-2.5	0.769	1.008	1.042	0.969	78.2
Shimane	694	529	-23.8	-24.2	-0.1	3.1	-2.6	0.758	0.998	1.041	0.967	76.2
Okayama	1,922	1,620	-15.7	-20.4	-0.2	3.0	1.9	0.796	0.997	1.037	1.024	84.3
Hiroshima	2,844	2,429	-14.6	-19.0	-0.1	3.0	1.5	0.810	0.999	1.037	1.018	85.4
Yamaguchi	1,405	1,036	-26.3	-26.5	0.2	3.3	-3.3	0.735	1.003	1.045	0.957	73.7
Tokushima	756	535	-29.2	-27.0	-0.4	3.3	-5.0	0.730	0.994	1.046	0.934	70.8
Kagawa	976	776	-20.5	-23.1	-0.4	3.2	-0.1	0.769	0.995	1.041	0.999	79.5
Ehime	1,385	1,013	-26.9	-26.2	0.8	3.3	-4.8	0.738	1.010	1.045	0.938	73.1
Kochi	728	498	-31.6	-29.3	0.4	3.3	-5.9	0.707	1.005	1.047	0.920	68.4
Fukuoka	5,102	4,554	-10.7	-18.3	0.1	3.2	4.4	0.817	1.001	1.039	1.051	89.3
Saga	833	664	-20.3	-19.2	1.5	3.2	-5.8	0.808	1.018	1.040	0.932	79.7
Nagasaki	1,377	982	-28.7	-23.0	0.8	3.3	-9.8	0.770	1.010	1.043	0.879	71.3
Kumamoto	1,786	1,442	-19.2	-19.5	0.9	3.0	-3.7	0.805	1.011	1.037	0.956	80.8
Oita	1,166	897	-23.1	-23.6	0.9	3.1	-3.5	0.764	1.011	1.040	0.957	76.9
Miyazaki	1,104	825	-25.3	-21.5	2.1	3.2	-9.2	0.785	1.026	1.041	0.890	74.7
Kagoshima	1,648	1,204	-26.9	-22.1	1.9	3.3	-10.1	0.779	1.023	1.043	0.879	73.1
Okinawa	1,434	1,428	-0.4	-1.4	0.9	3.0	-2.9	0.986	1.009	1.031	0.972	99.6

Note: This Table is modified from Kamata et al. (2020). The product of the multipliers multiplied by 100 is the index of the total population in 2045, with 2015 as 100.The sum of each contribution is equal to the population growth rate.

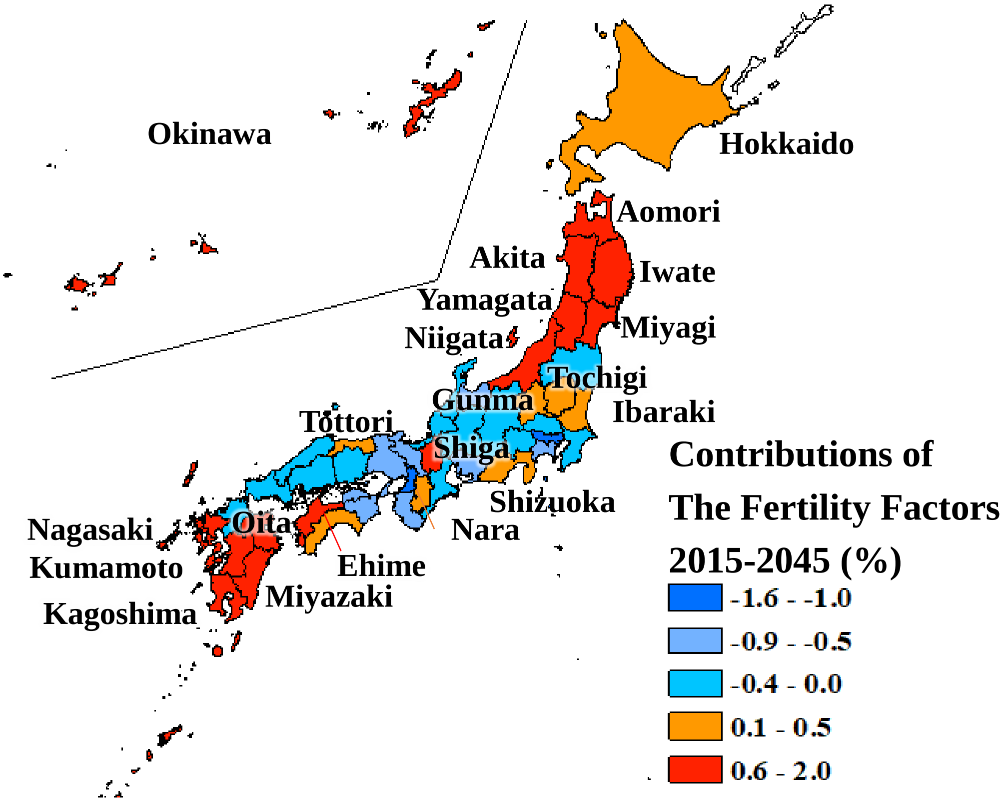
Figure 5 The geographical distributions of the population growth rates, and the four factors.

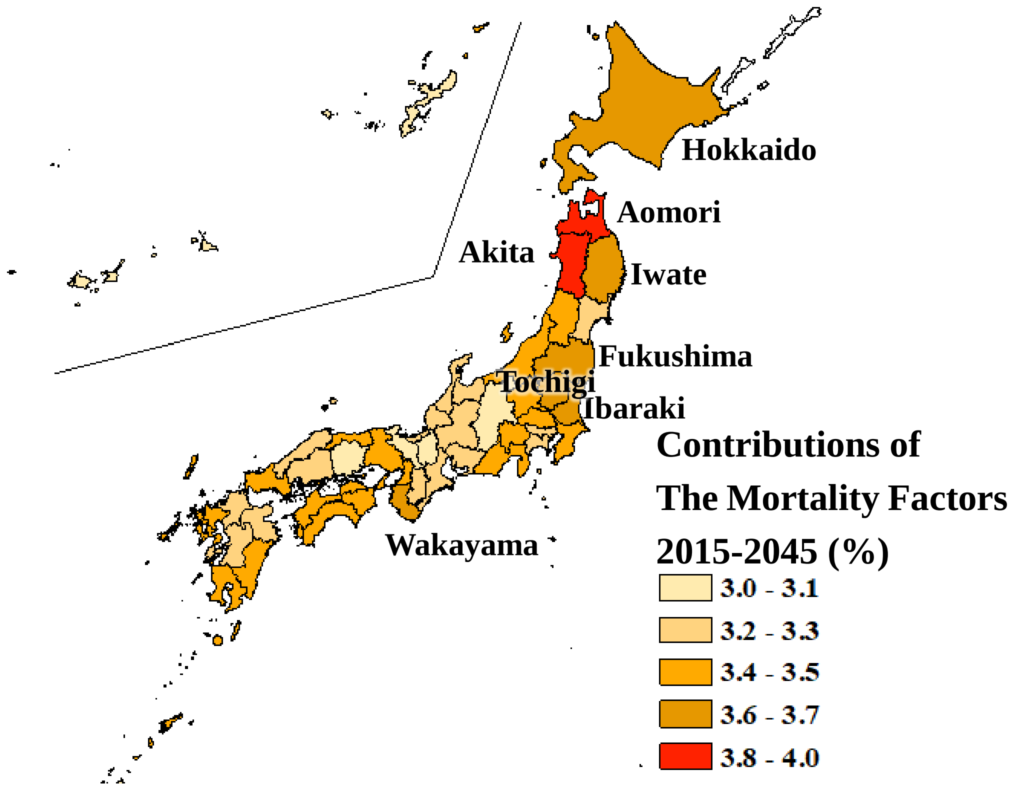




* Okinawa areas has been enlarged to twice the scale.

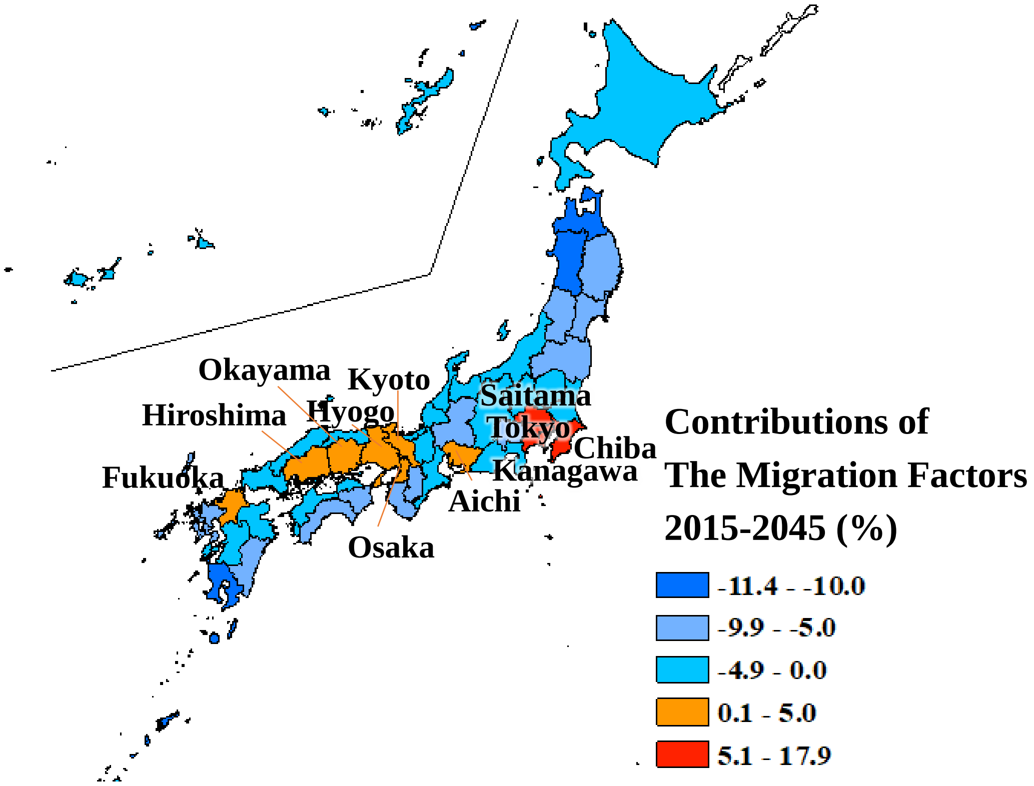
Figure 5 (cont.)





* Okinawa areas has been enlarged to twice the scale.

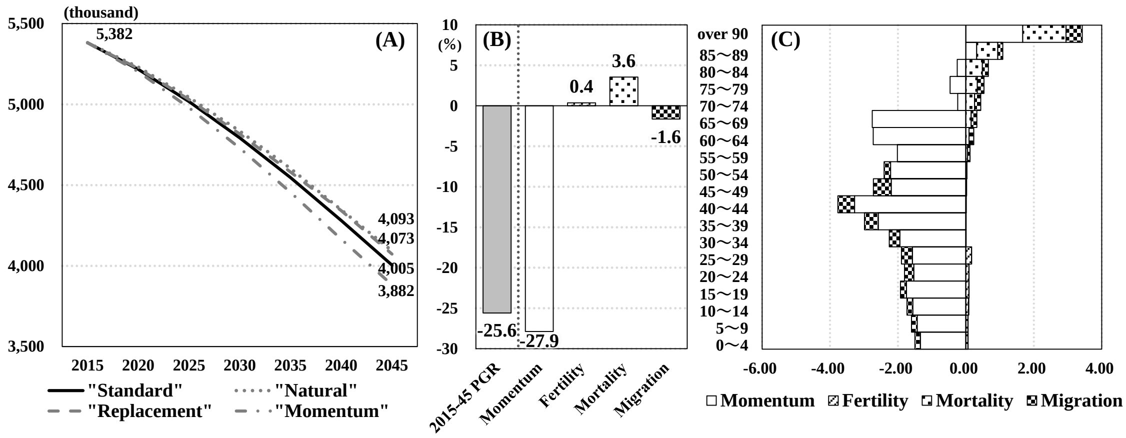
Figure 5 (cont.)



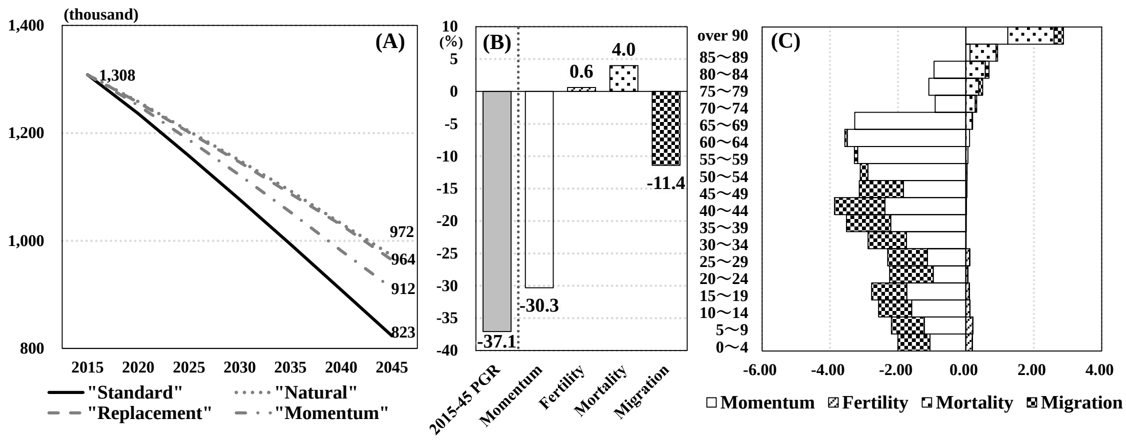
* Okinawa areas has been enlarged to twice the scale.

Appendix: Summary of the decomposition results by Prefecture

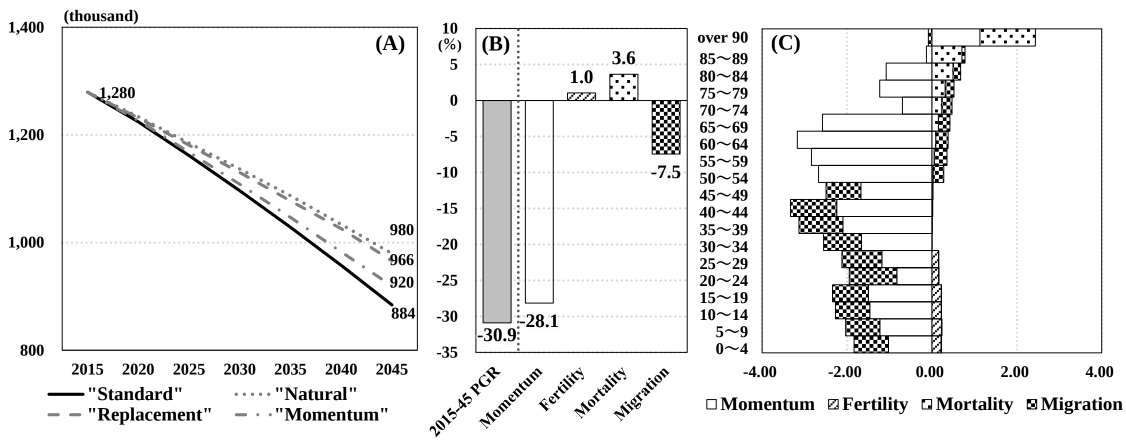
1. Hokkaido



2. Aomori Prefecture



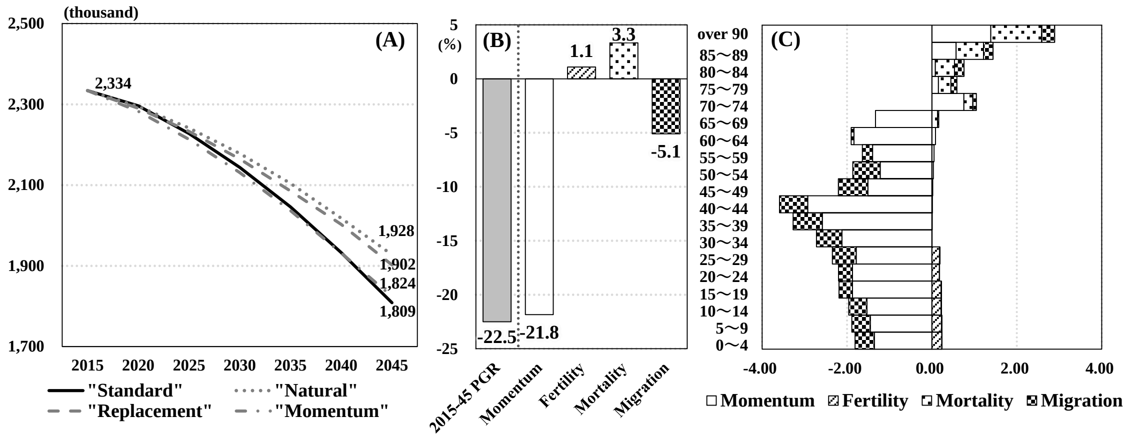
3. Iwate Prefecture



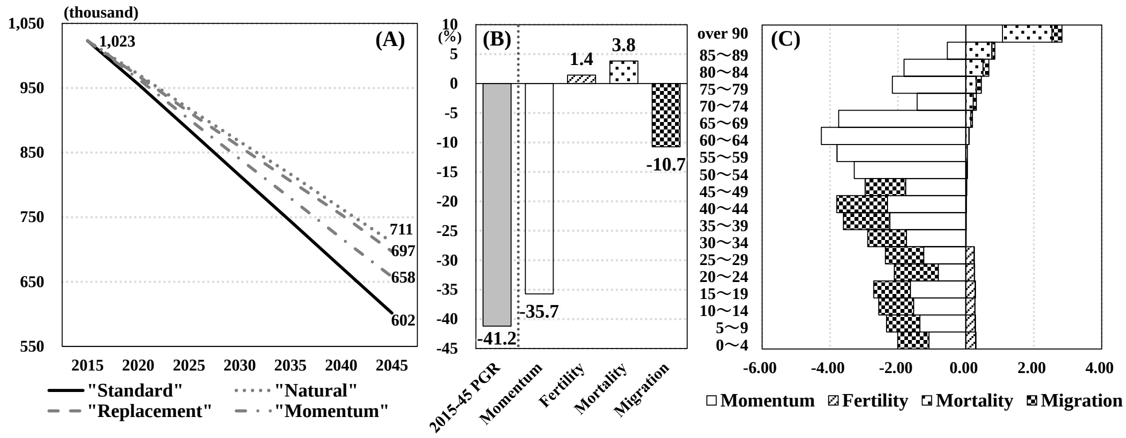
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

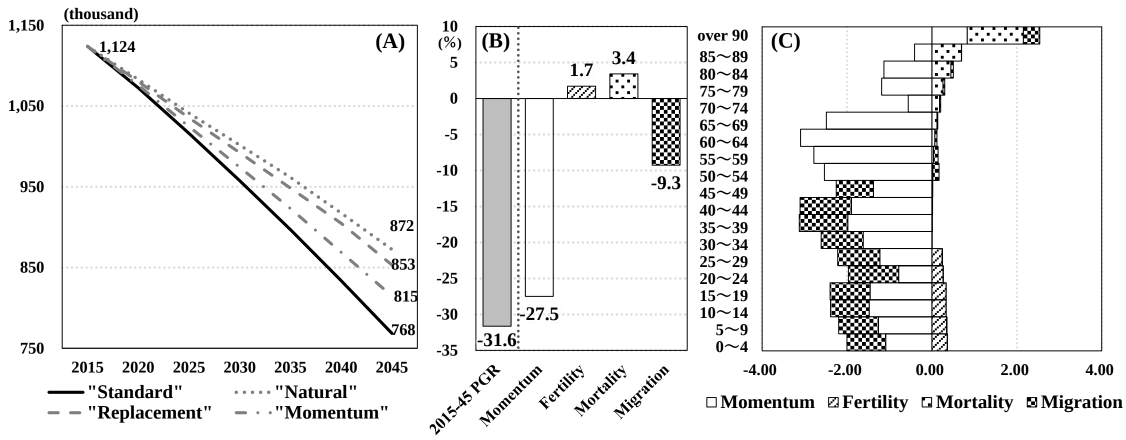
4. Miyagi Prefecture



5. Akita Prefecture



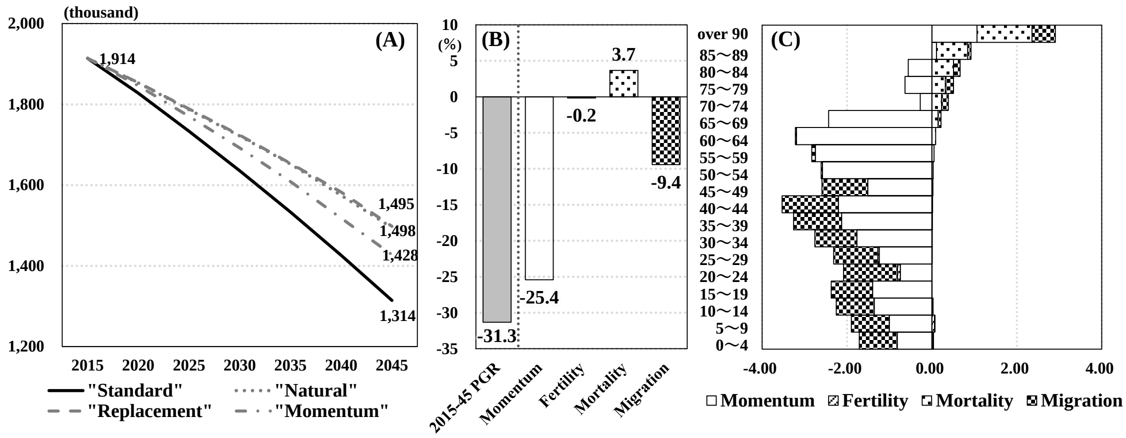
6. Yamagata Prefecture



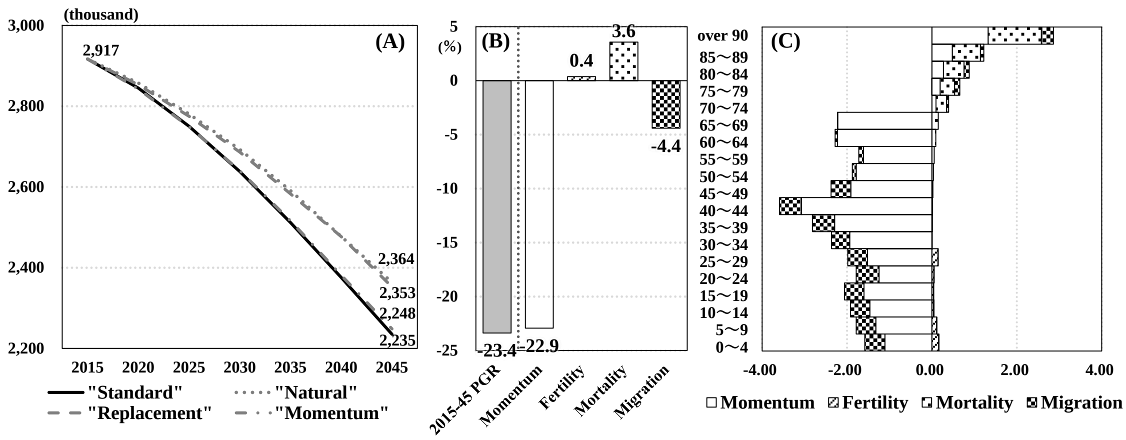
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

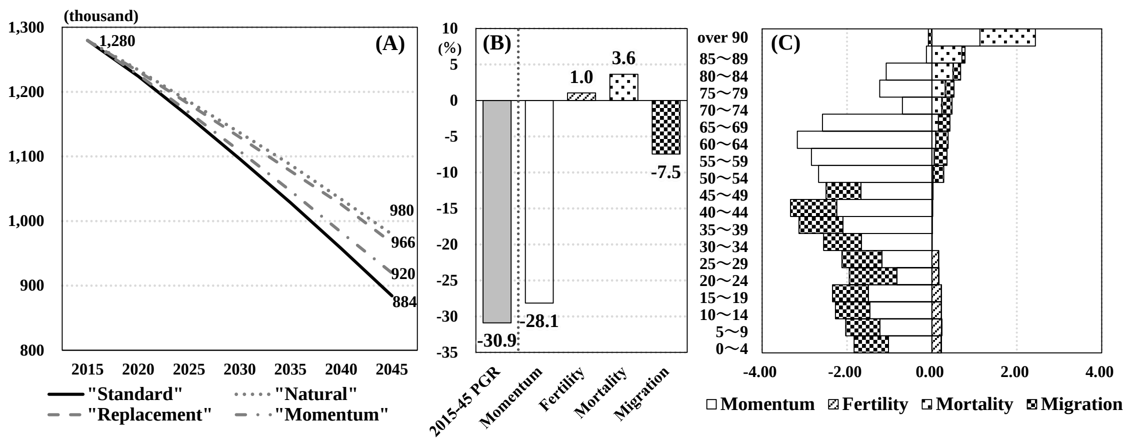
7. Fukushima Prefecture



8. Ibaraki Prefecture



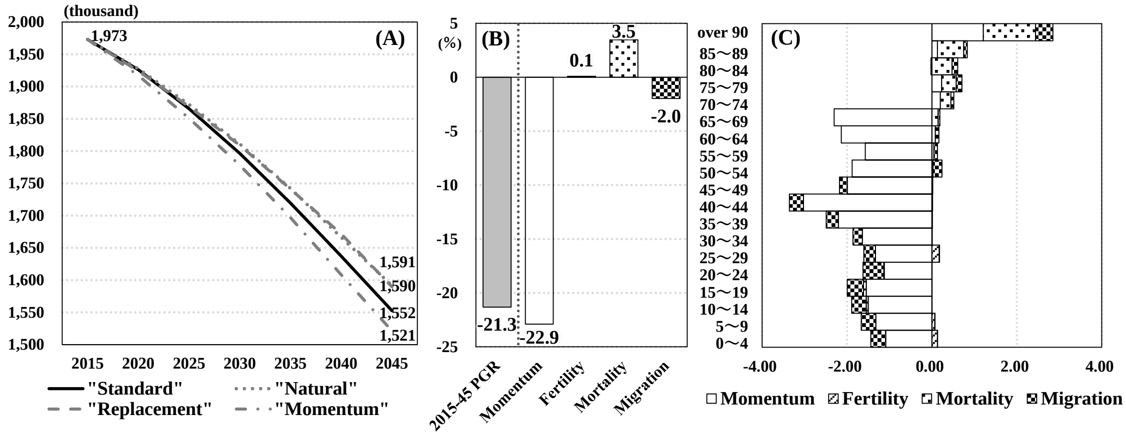
9. Tochigi Prefecture



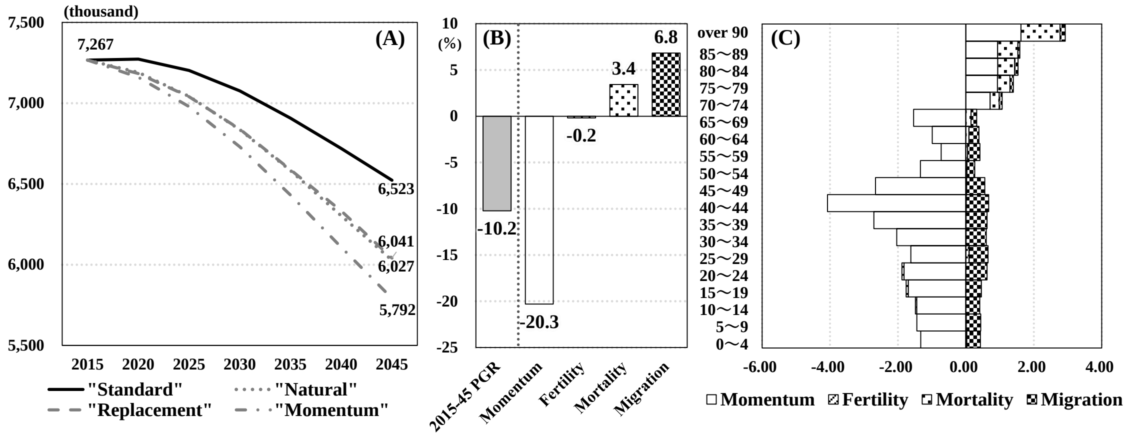
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

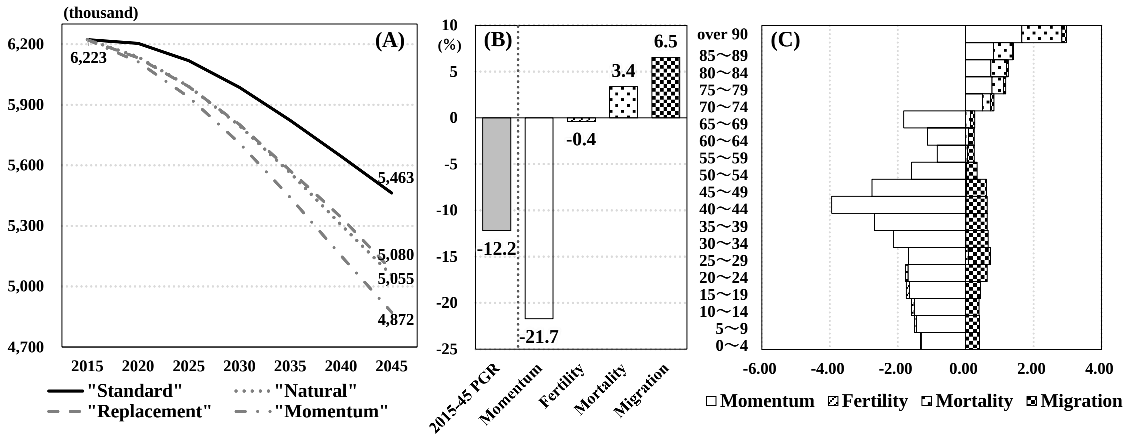
10. Gunma Prefecture



11. Saitama Prefecture



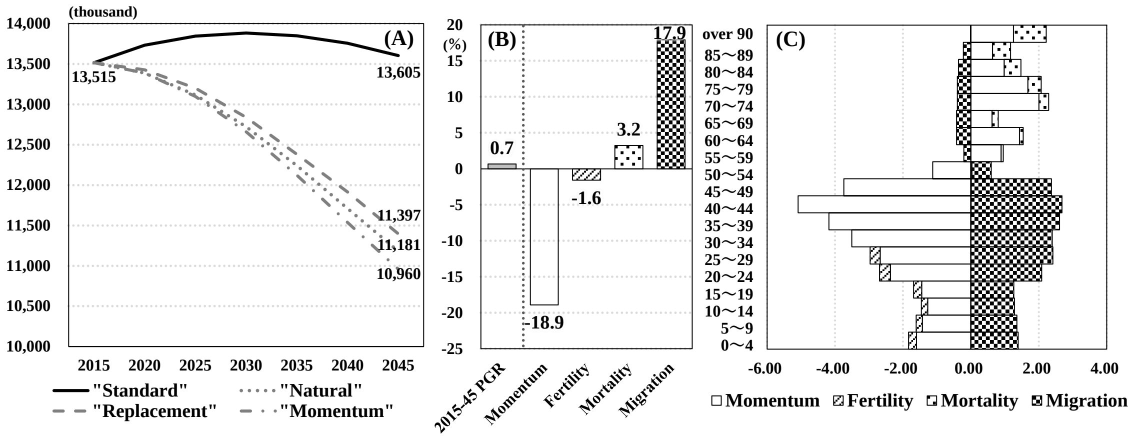
12. Chiba Prefecture



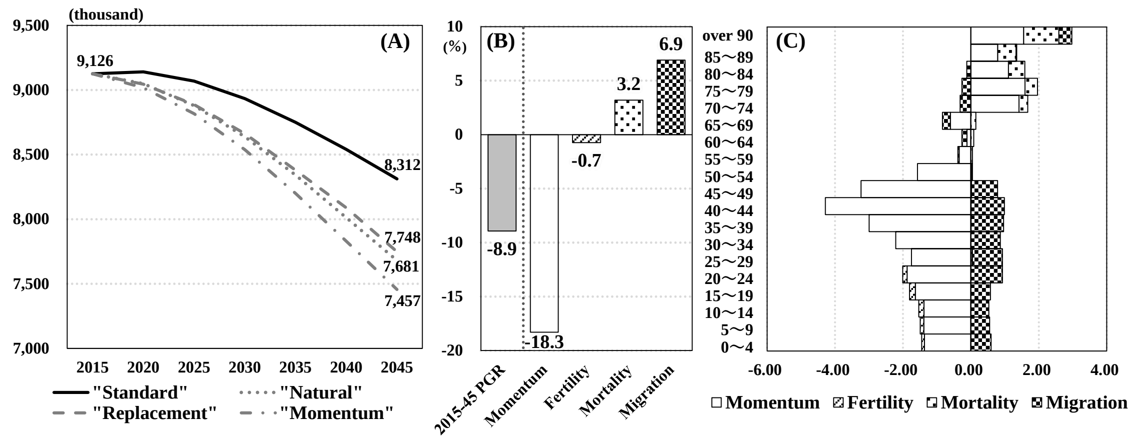
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

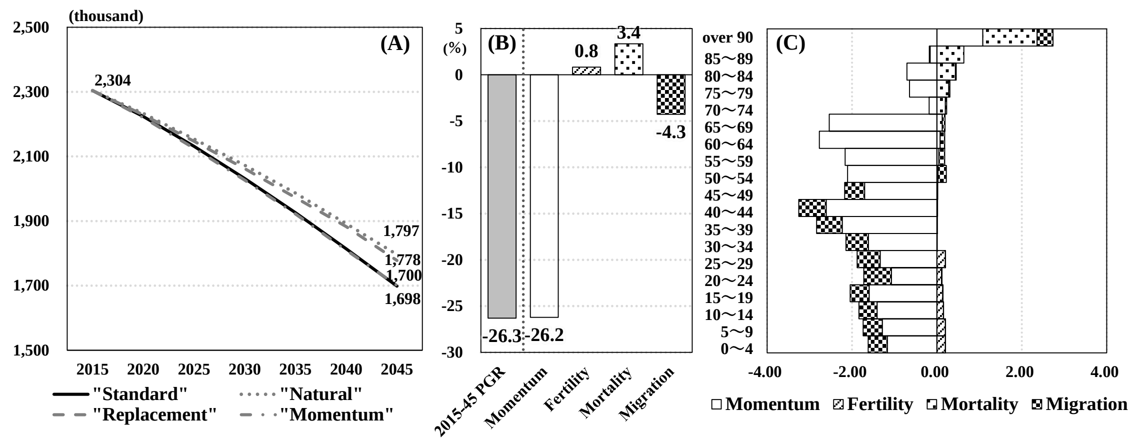
13. Tokyo



14. Kanagawa Prefecture



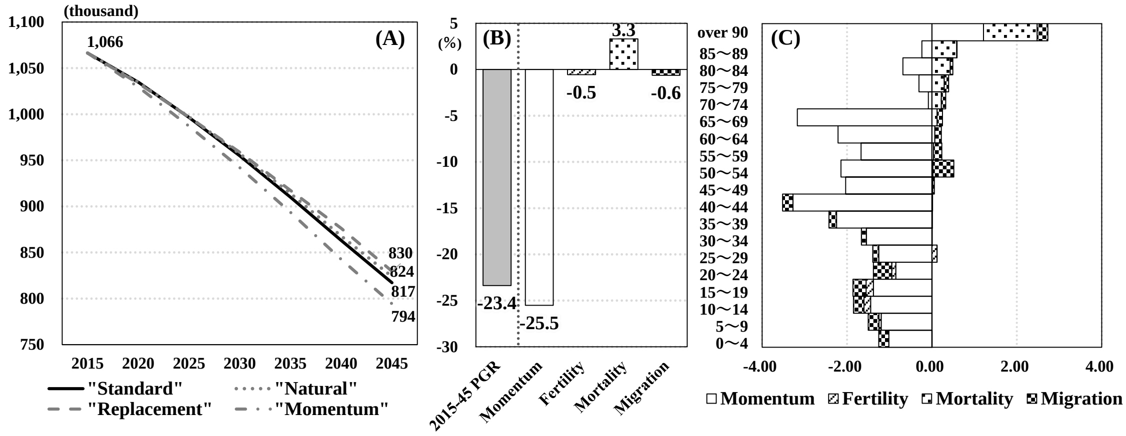
15. Niigata Prefecture



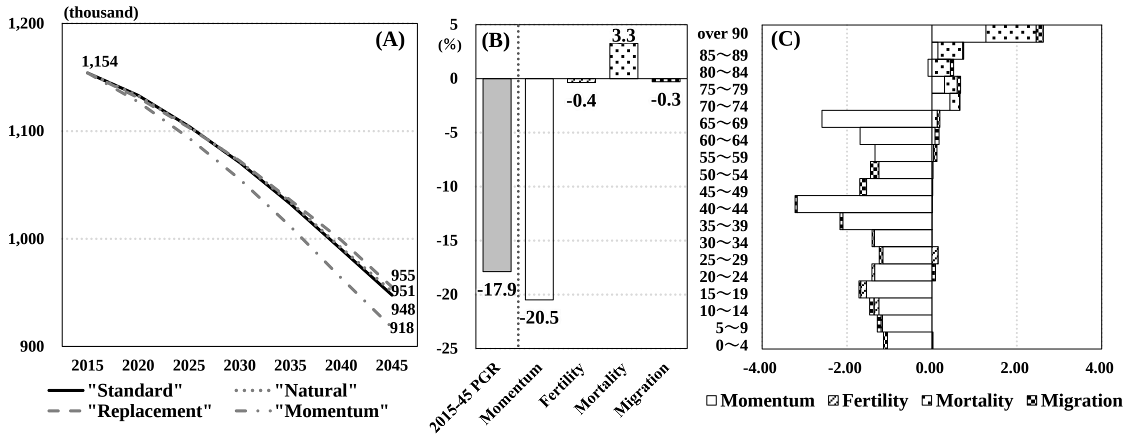
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

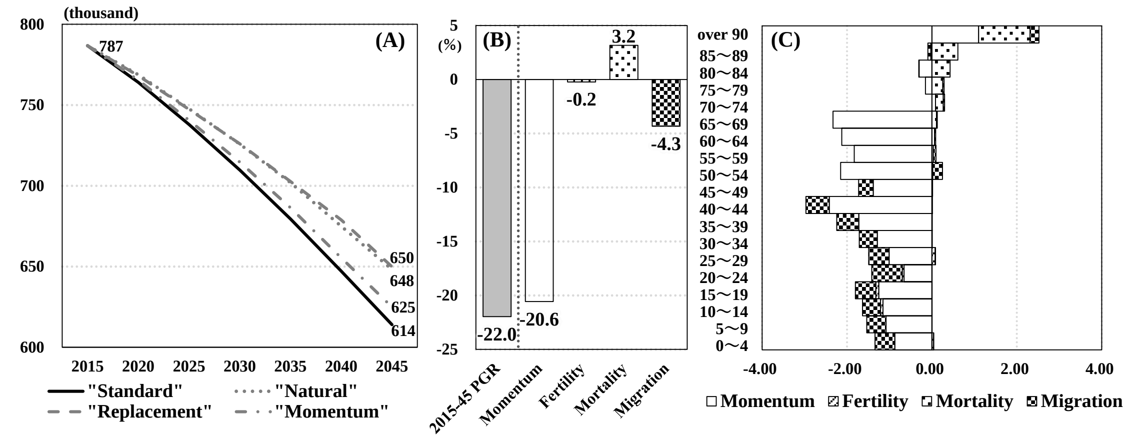
16. Toyama Prefecture



17. Ishikawa Prefecture



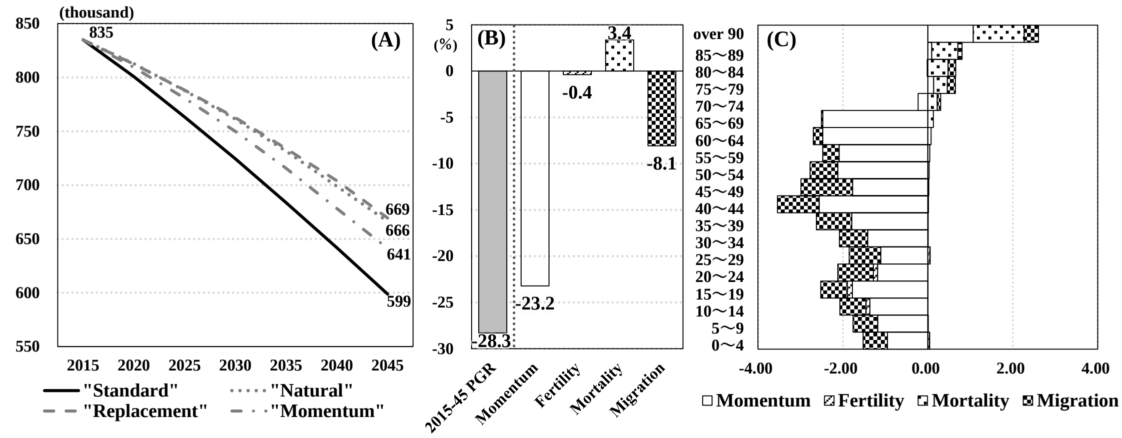
18. Fukui Prefecture



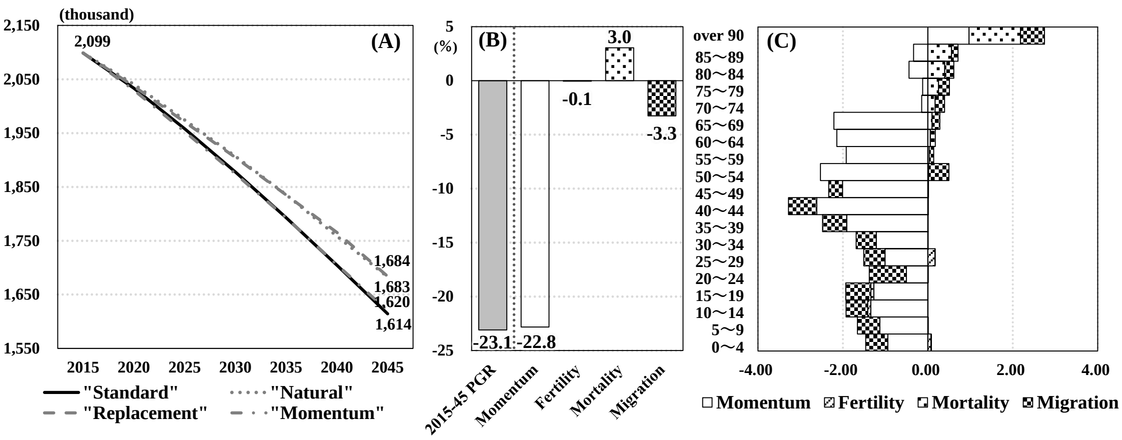
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

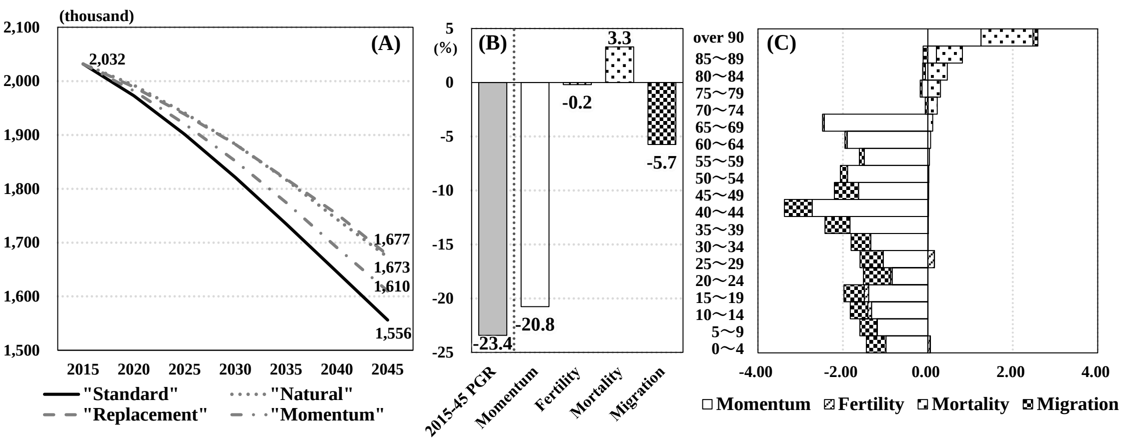
19. Yamanashi Prefecture



20. Nagano Prefecture



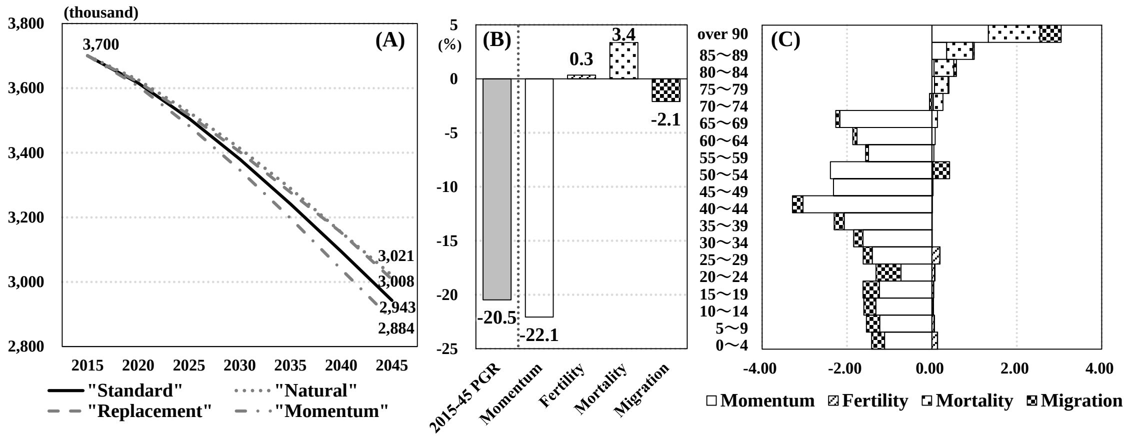
21. Gifu Prefecture



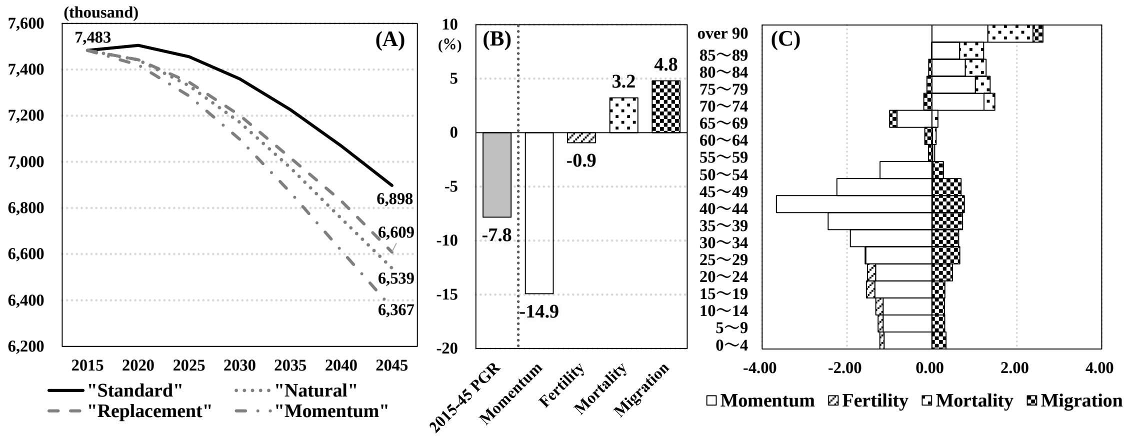
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

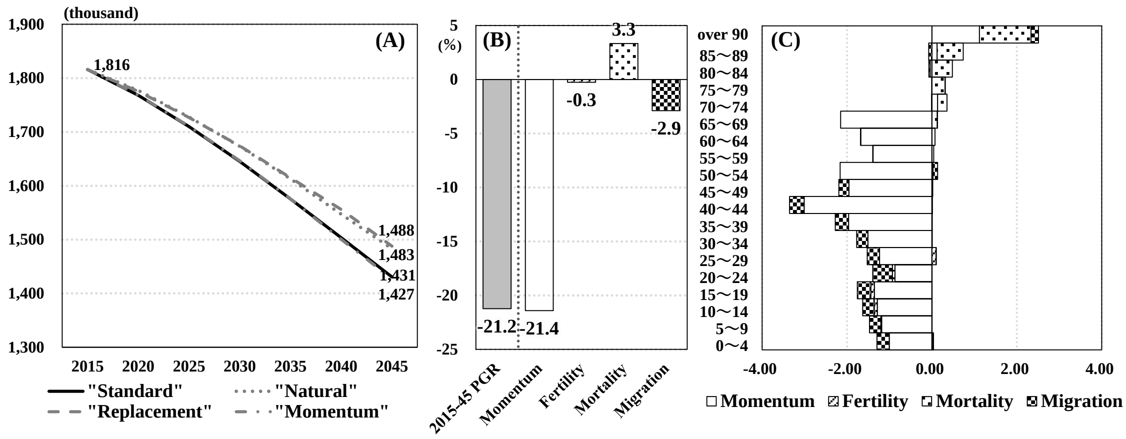
22. Shizuoka Prefecture



23. Aichi Prefecture



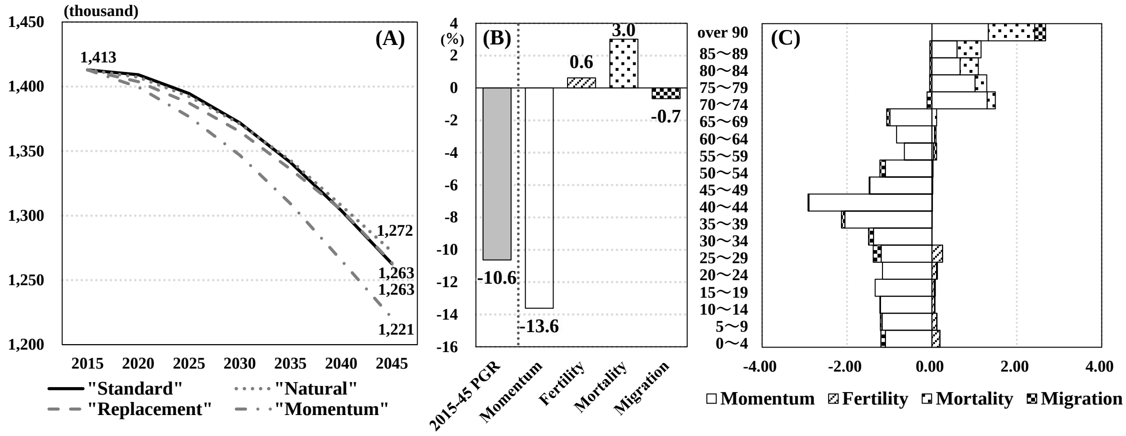
24. Mie Prefecture



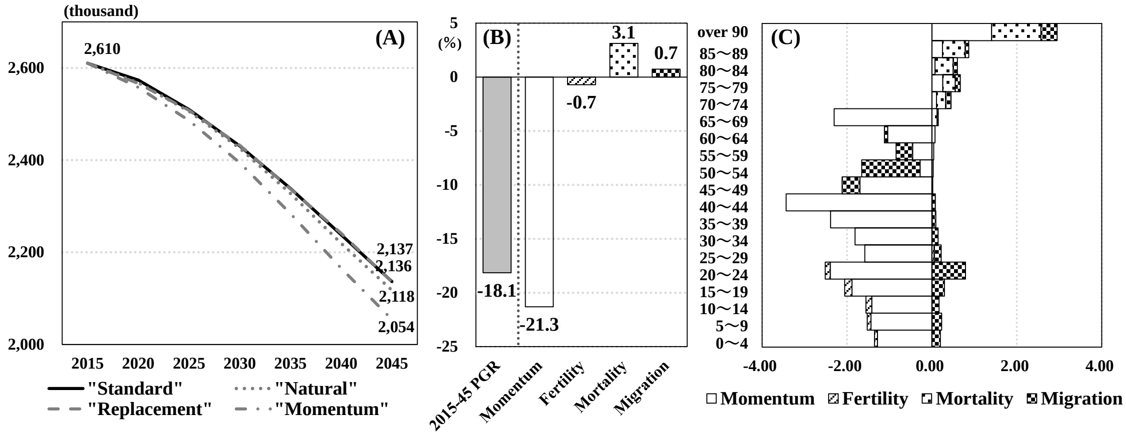
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

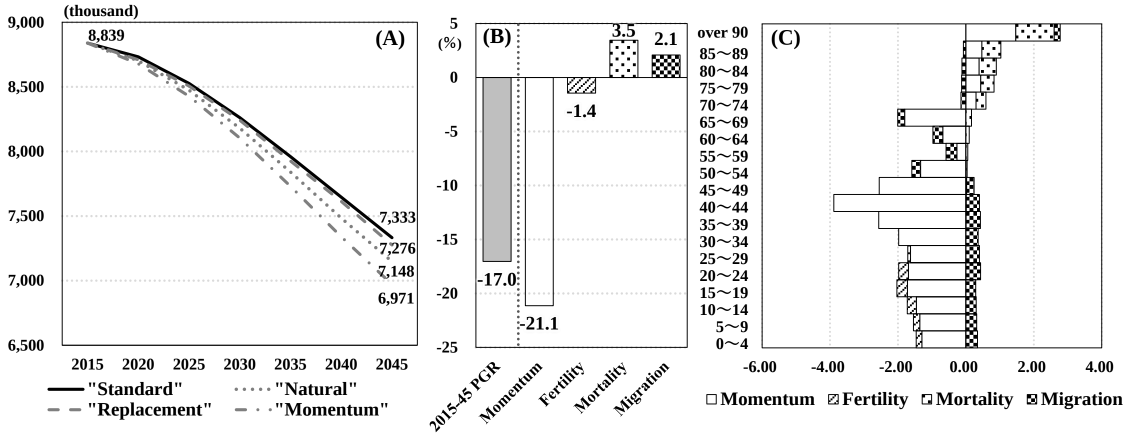
25. Shiga Prefecture



26. Kyoto Prefecture



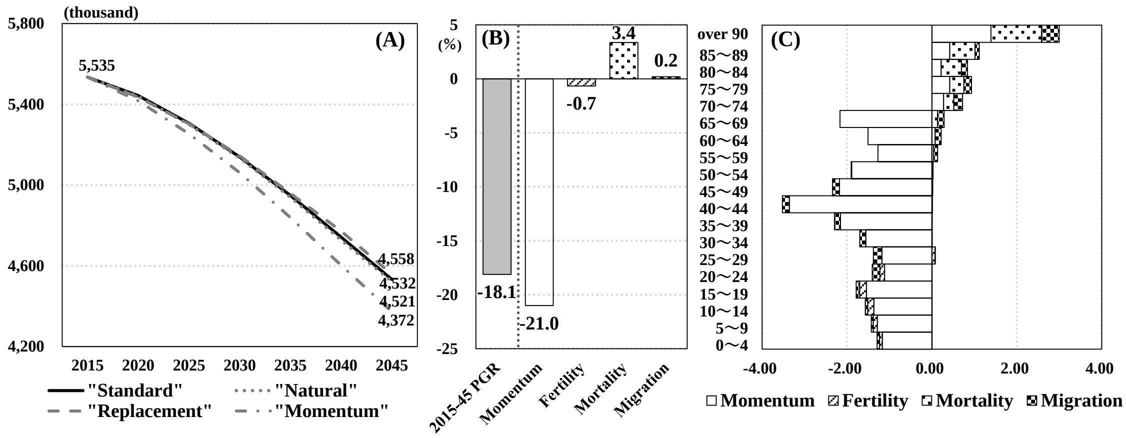
27. Osaka Prefecture



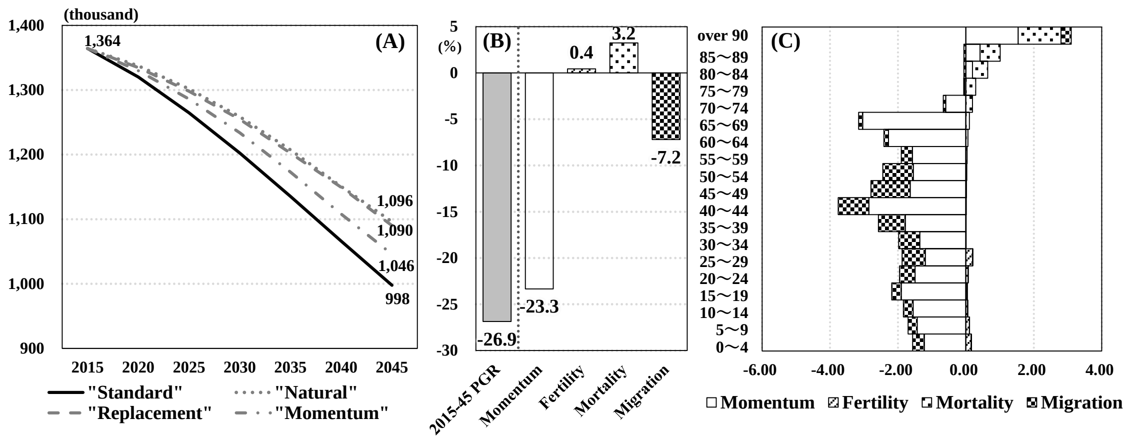
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

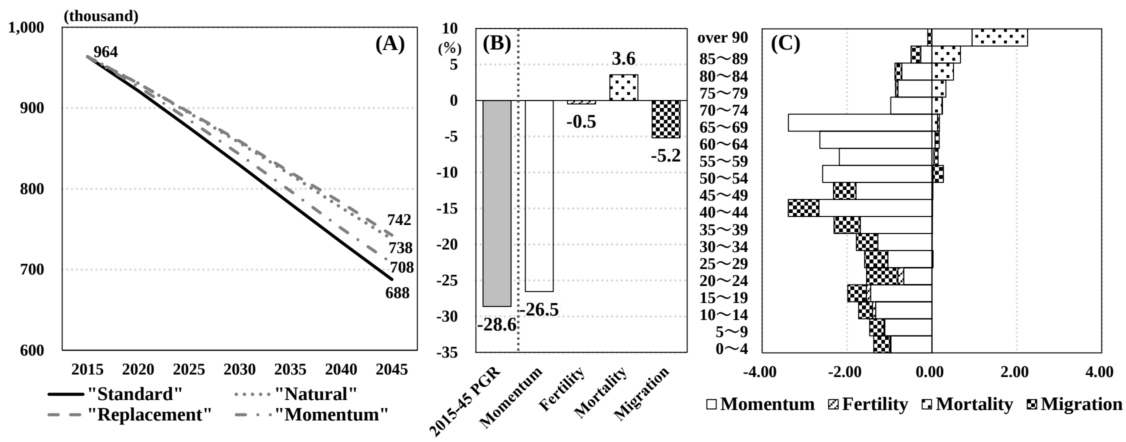
28. Hyogo Prefecture



29. Nara Prefecture



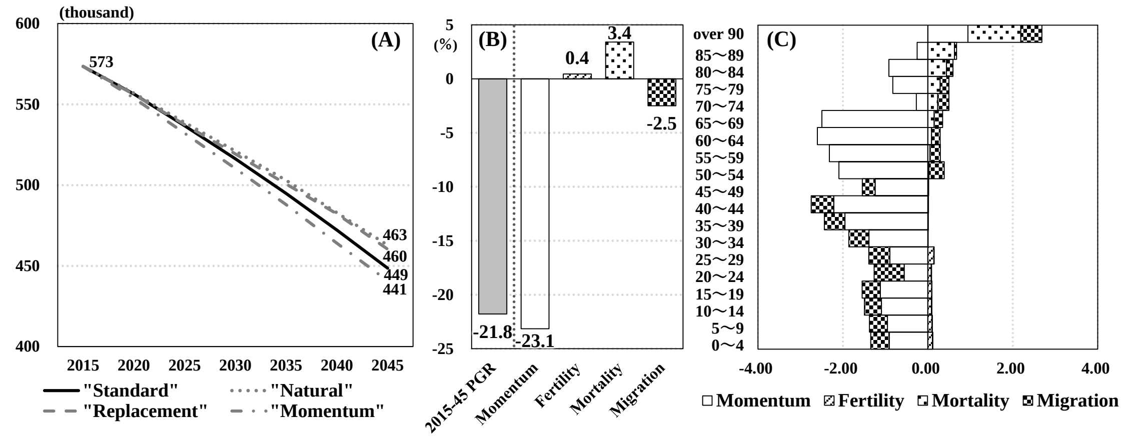
30. Wakayama Prefecture



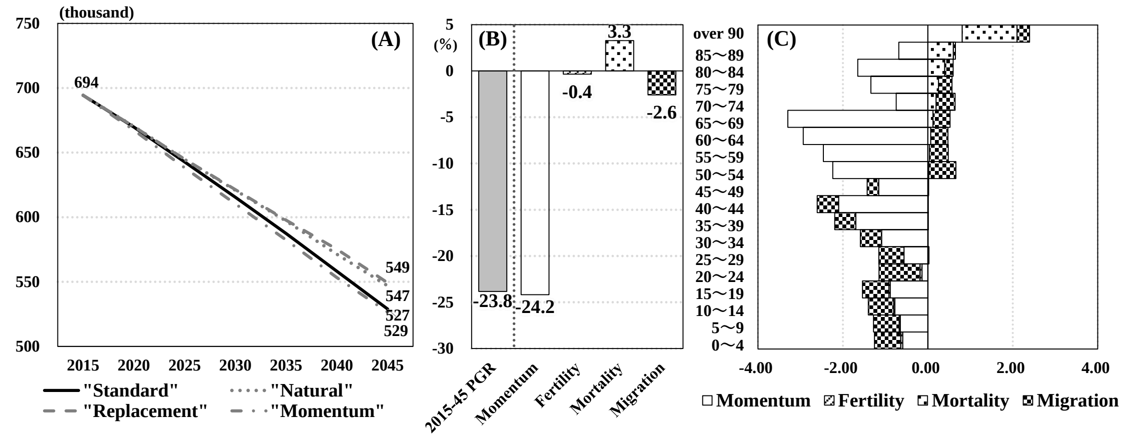
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

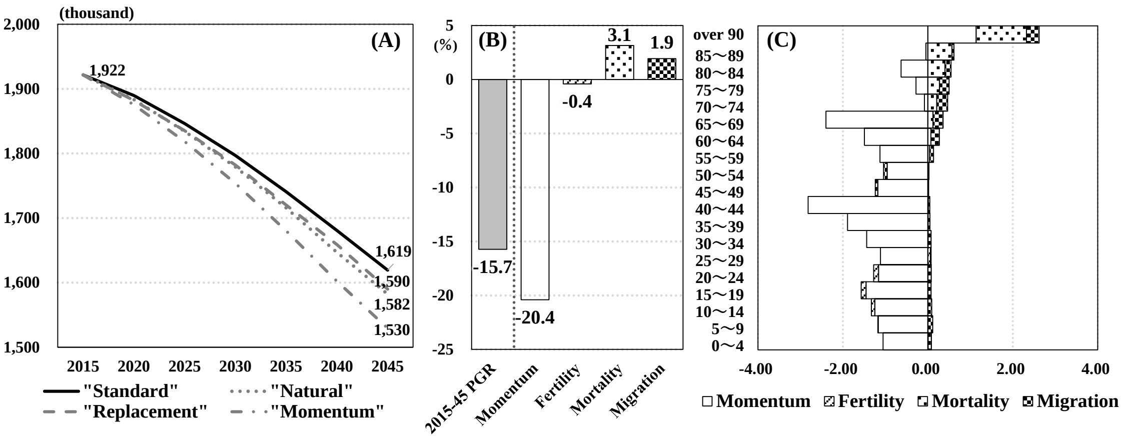
31. Tottori Prefecture



32. Shimane Prefecture



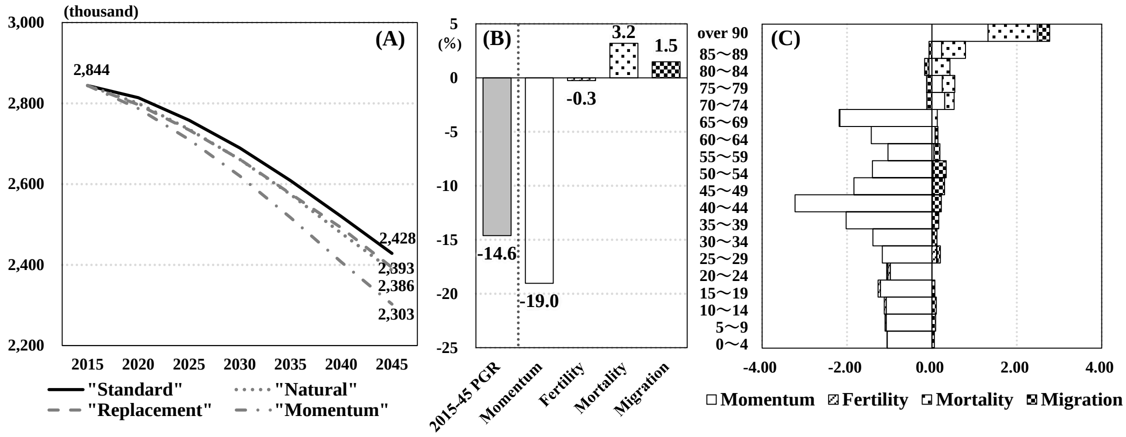
33. Okayama Prefecture



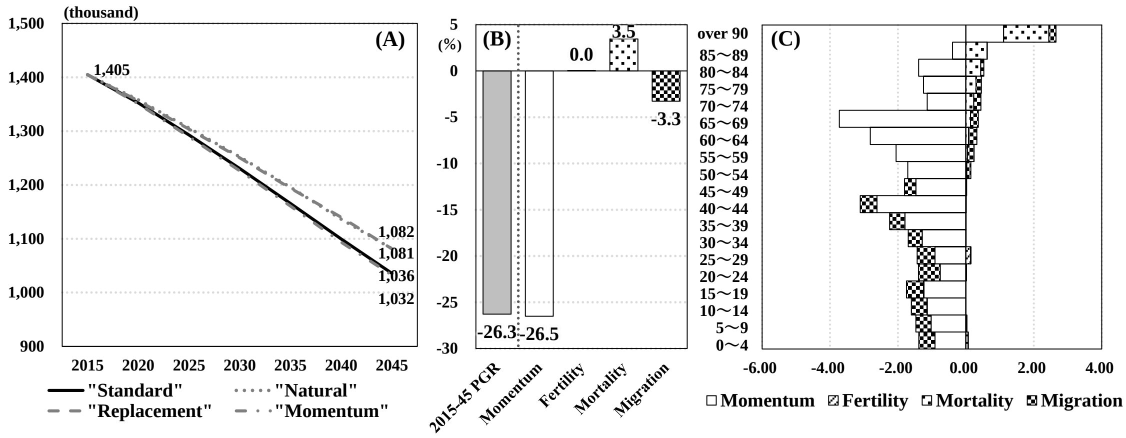
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

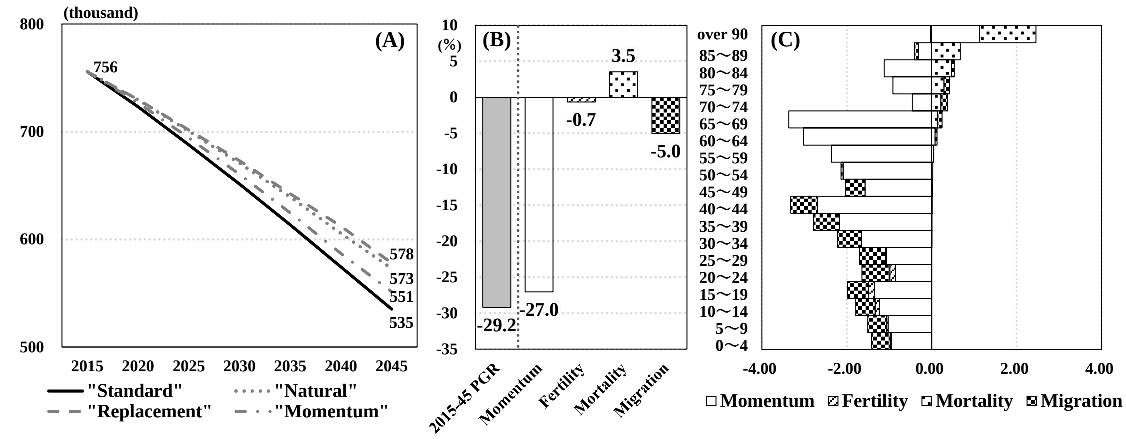
34. Hiroshima Prefecture



35. Yamaguchi Prefecture



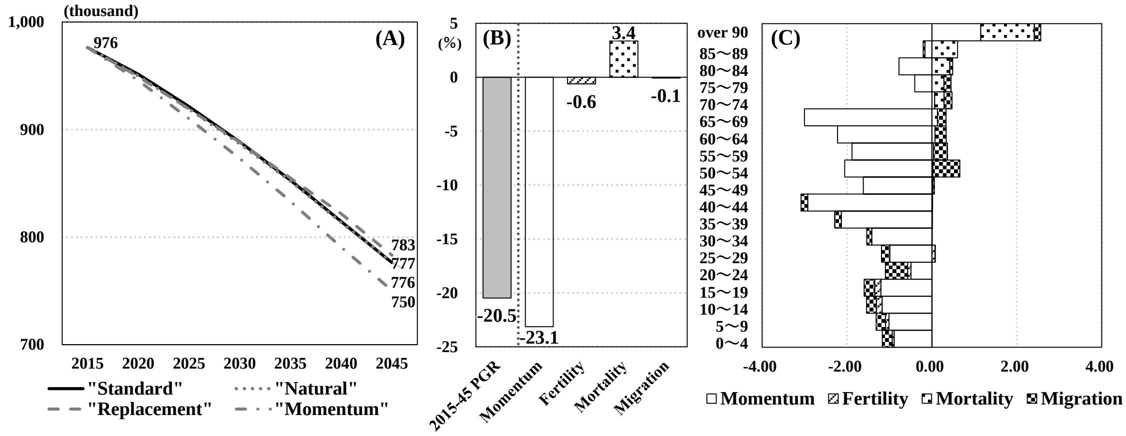
36. Tokushima Prefecture



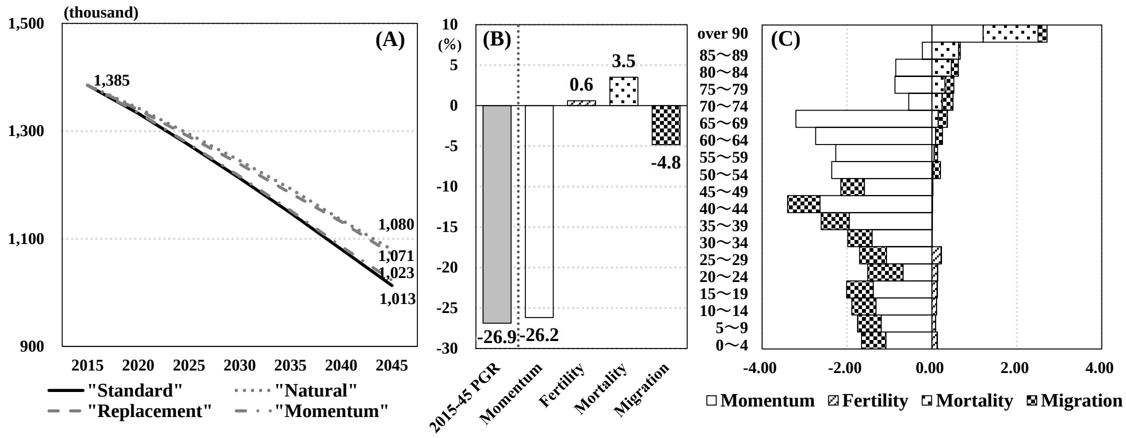
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

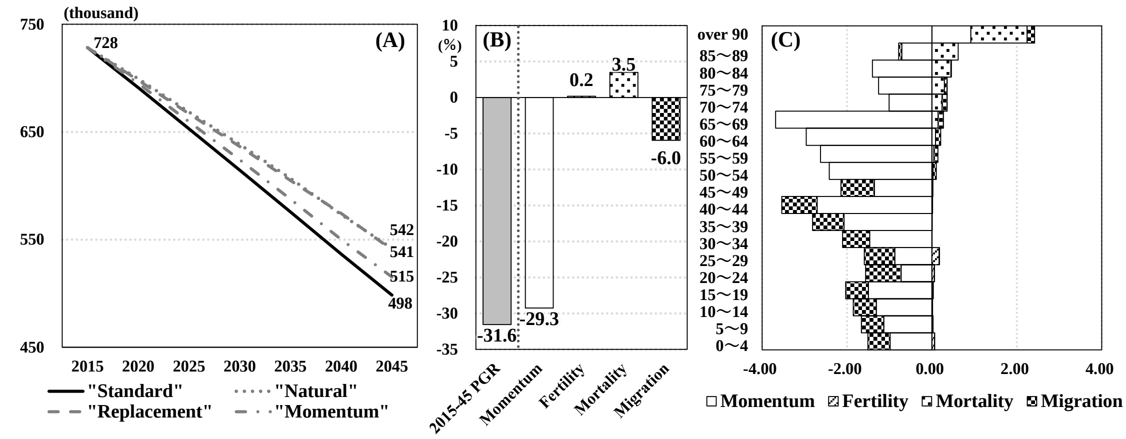
37. Kagawa Prefecture



38. Ehime Prefecture



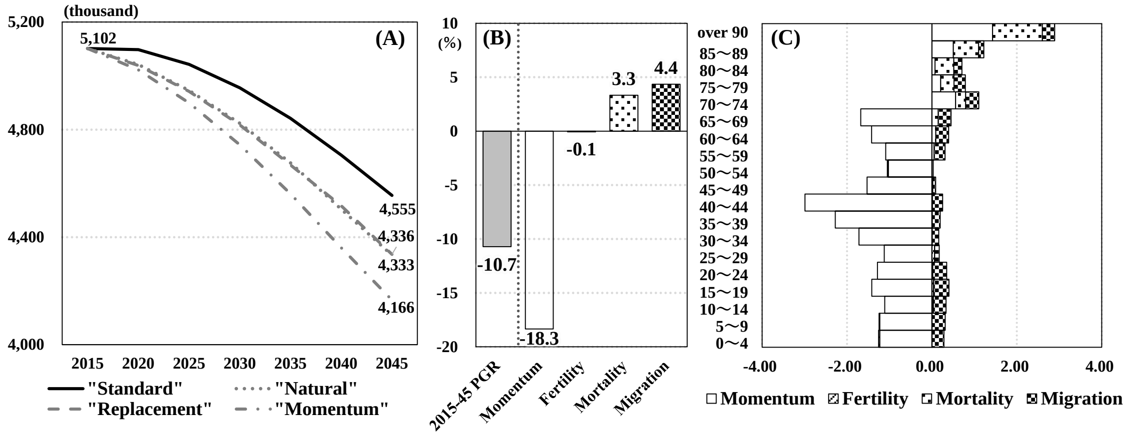
39. Kochi Prefecture



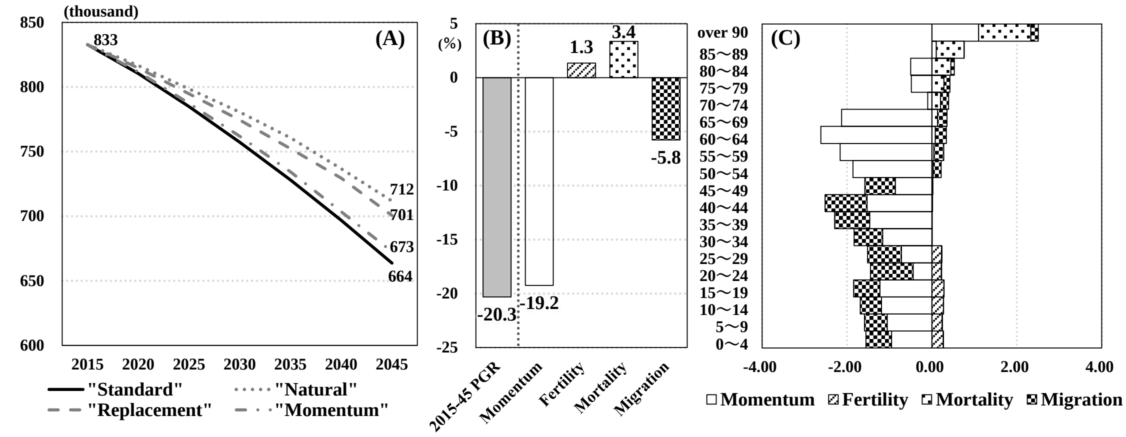
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

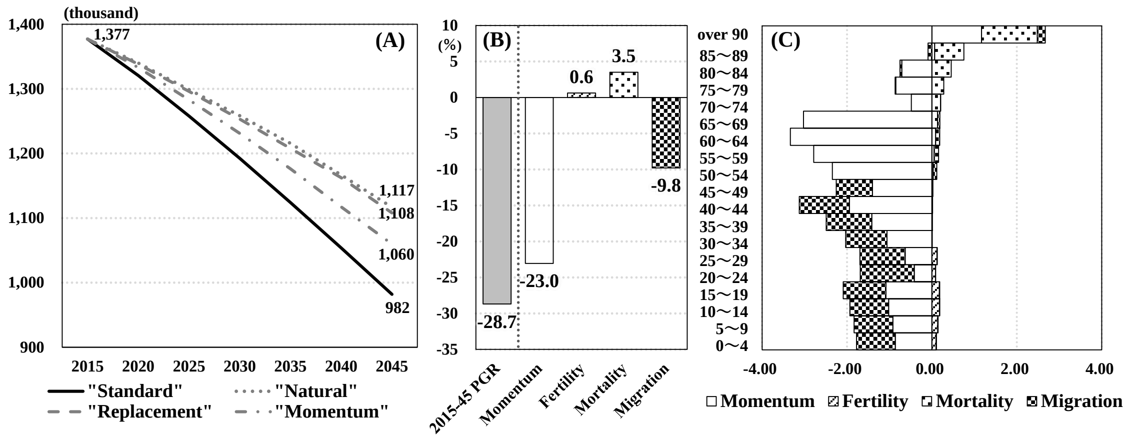
40. Fukuoka Prefecture



41. Saga Prefecture



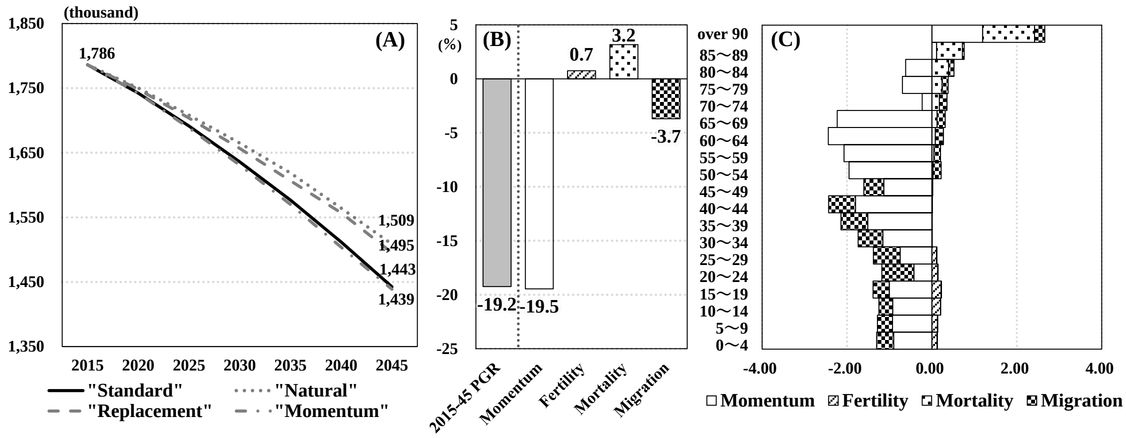
42. Nagasaki Prefecture



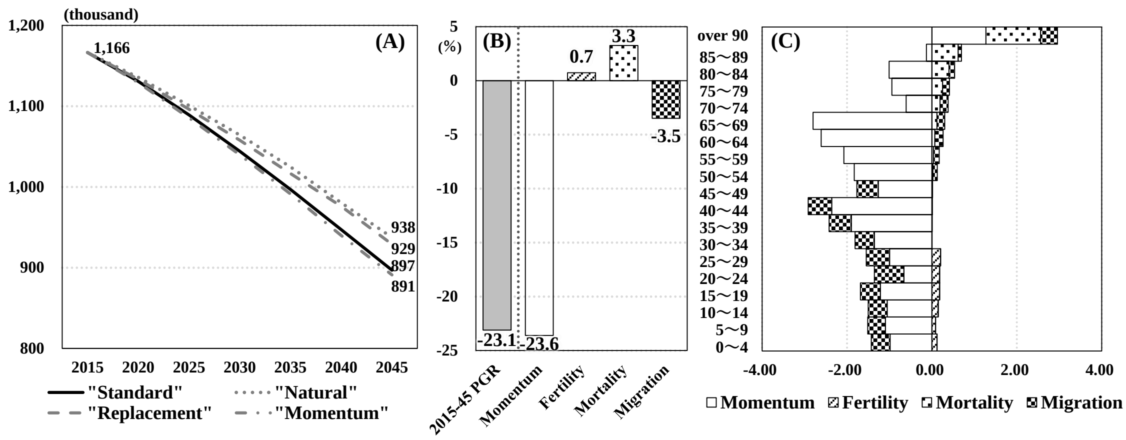
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

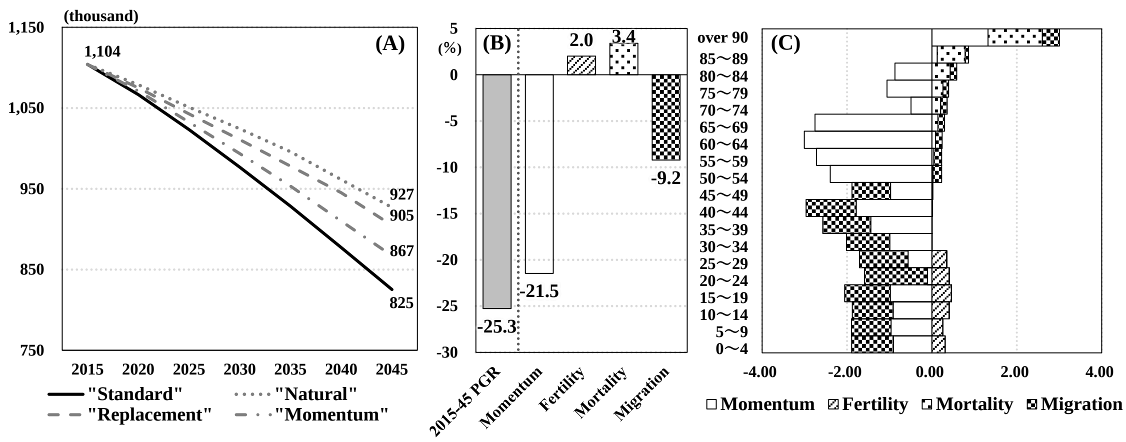
43. Kumamoto Prefecture



44. Oita Prefecture



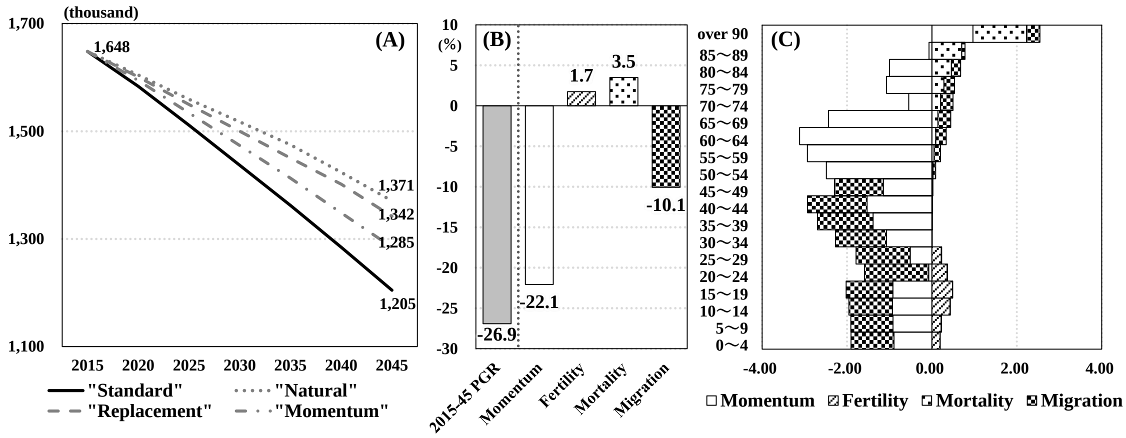
45. Miyazaki Prefecture



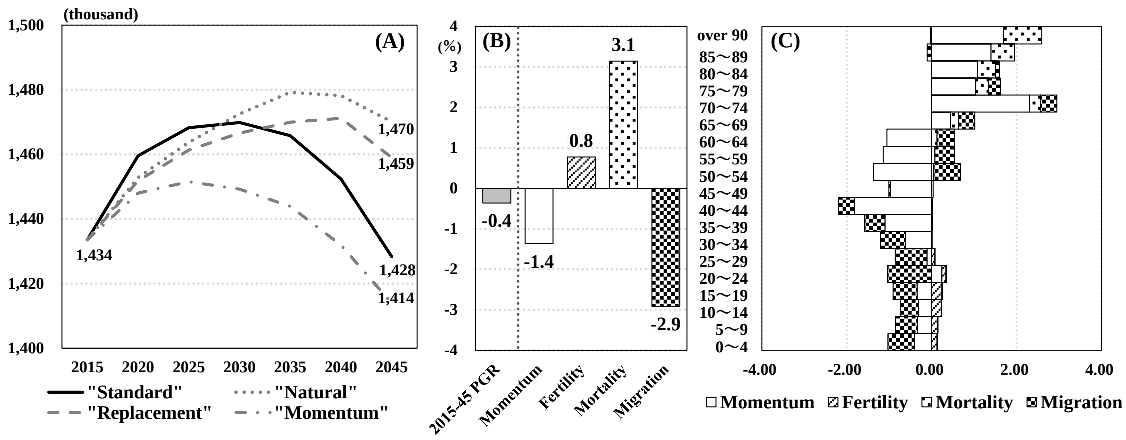
Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate

Appendix: Summary of the decomposition results by Prefecture (cont.)

46. Kagoshima Prefecture



47. Okinawa Prefecture



Notice: (A) Trends of Total Population for four scenarios, (B) 2015-45 Population Growth Rates and the rates of the contributions for decomposed demographic components, (C) Age specific rates of contributions for decomposed demographic components. PGR: Population Growth Rate