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Toshihiko Hara

A Shrinking Society
Post-Demographic Transition in Japan

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Population Studies of Japan

The world population is expected to expand by 39.4 % to 9.6 billion in 2060 (UN World Population Prospects, revised 2010). Meanwhile, Japan is expected to see its population contract by nearly one-third to 86.7 million, and its proportion of the elderly (65 years of age and over) will account for no less than 39.9 % (National Institute of Population and Social Security Research in Japan, Population Projections for Japan 2012). Japan has entered the post-demographic transitional phase and will be the fastest shrinking country in the world, followed by former Eastern bloc nations, leading other Asian countries that are experiencing drastic changes.

A declining population that is rapidly aging impacts a country's economic growth, labor market, pensions, taxation, health care, and housing. The social structure and geographical distribution in the country will drastically change, and short-term as well as long-term solutions for economic and social consequences of this trend will be required.

This series aims to draw attention to Japan's entering the post-demographic transition phase and to present cutting-edge research in Japanese population studies. It will include compact monographs under the editorial supervision of the Population Association of Japan (PAJ).

The PAJ was established in 1948 and organizes researchers with a wide range of interests in population studies of Japan. The major fields are (1) population structure and aging; (2) migration, urbanization, and distribution; (3) fertility; (4) mortality and morbidity; (5) nuptiality, family, and households; (6) labor force and unemployment; (7) population projection and population policy (including family planning); and (8) historical demography. Since 1978, the PAJ has been publishing the academic journal *Jinkogaku Kenkyu* (The Journal of Population Studies), in which most of the articles are written in Japanese.

Thus, the scope of this series spans the entire field of population issues in Japan, impacts on socioeconomic change, and implications for policy measures. It includes population aging, fertility and family formation, household structures, population health, mortality, human geography and regional population, and comparative studies with other countries.

This series will be of great interest to a wide range of researchers in other countries confronting a post-demographic transition stage, demographers, population geographers, sociologists, economists, political scientists, health researchers, and practitioners across a broad spectrum of social sciences.

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Contents

Chapter 1
Introduction: The Demographic Impacts from the Great East Japan Earthquake

Abstract The long-term impacts from the Great East Japan Earthquake, tsunami and nuclear meltdown on 11 March 2011, should be deep, broad and link with various aspects in Japanese society. However, the regional population projections for Japan show different views on the future after the flood of news on aftermath of the great disaster. The comparison of the new and former projection indicates rather limited demographic impacts. Besides, both show similar prediction to the future. The East Japan is known as the advanced depopulation area long before the disaster. In fact, Tōhoku is not unique. Most of the regional communities in Japan confront the same steady tends of depopulation and rapid aging. The Great East Japan Earthquake reveals the demographic problem of the current Japan, a shrinking society in post-demographic transition. This book focuses on a new phenomenon, 'a shrinking society', emerging in the twenty-first century: the rapid aging and decreasing population of a well-developed country, Japan. Japan has entered a post-demographic transitional stage and led the world in both population aging and decline, followed by former Eastern bloc nations and other Asian countries.

Keywords Great East Japan Earthquake • Tsunami • Nuclear meltdown • 11 March 2011 • Regional population projection • Depopulation • Shrinking society • Post-demographic transition • Population aging • Fukushima

1.1 The Tōhoku Earthquake and Tsunami

On 11 March 2011, a great earthquake and tsunami hit East Japan. Followed by a serious nuclear accident happened in Fukushima Nuclear Power Plants. The aftermath of this disaster was huge and it was difficult to estimate until now. According to the National Police Agency of Japan, by 15 February 2014 (NPA 2014), 15,884 people (Miyagi 9537, Iwate 4673, Fukushima 1607, Ibaraki 24, Chiba 21, Tokyo 7, Tochigi 4, Kanagawa 4, Aomori 3, Yamagata 2, Gunma 1, and Hokkaido 1) were dead after a series of aftershocks. It also included 6147 people who were injured and 3155 people who were still missing. Reconstruction Agency of Japan reported that the disaster produced over 470,000 victims at its peak (3 days after) and this num-

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ber was later reduced to 274,088 people. As of 19 November 2013, the victims of Fukushima were 142,000 people, of which 102,000 people were from the planned evacuation areas (Reconstruction Agency of Japan 2014).

The Great East Japan Earthquake, tsunami and nuclear meltdown, these interlocking disasters have a long-term impacts to Japanese society. This draw keen attention from the fields of disaster science to social science.

1.2 The Demographic Impacts

Usually in demography, the impacts of the Great East Japan Earthquake to the population development are the main focuses. Since 2008, the total population of Japan has begun to decline. The decreasing population is accompanied by rapid aging, below replacement fertility, and a constant outmigration of working age population on sub national level. And the East Japan is known as the advanced depopulation area long before this disaster. In this context, the East Japan is one of the most typical area as well as Hokkaido, to be concerned with the long-term influence of this earthquake to its future developments.

The Tsunami followed by the earthquake caused a serious damage on the coastal communities, which mainly depended on fishery and marine products. This area has been suffered by a constant outflow of young generation on behalf of insufficient job opportunities. The small local communities where Fukushima Nuclear Power Plants are located face depopulation as there are no other industries other than nuclear power plant. These communities lost many inhabitants due to the evacuation activities.

The flood of the news on the aftermath of the great disaster have brought a pessimistic impression on the population development of Japan and these areas. However, the Regional Population Projections for Japan: 2010–2040 (NIPSSR: National Institute of Population and Social Security Research, March 2007a, 2013)[1] presented a different view.

[1] Based on the latest publication from the Population Census of Japan and the Vital Statistics of Japan, the National Institute of Population and Social Security Research in Japan had conducted national population projection periodically. On a national level, the latest projection was released in January 2012. It assumed that there were impacts from the Great East Japan Earthquake to fertility, life tables and international migration. See NIPSSR (2012: 8–11). The latest version on sub national level was released in March 2013. It was a compound of both projections done by prefecture and municipality. Usually, they release separately. However, in this time the projection done by prefecture was on an aggregate basis together with municipality. For Fukushima prefecture, the projection done by municipality was not performed and only the work done by prefecture had released. It was because the uncertain situation after nuclear accidents. In any case, these projections had different assumptions on net migration rates, including the impacts from the Earthquake. See NIPSSR (2013: 6–17), and see also http://www.ipss.go.jp/pp-shicyoson/e/shicyoson13/t-page.asp.

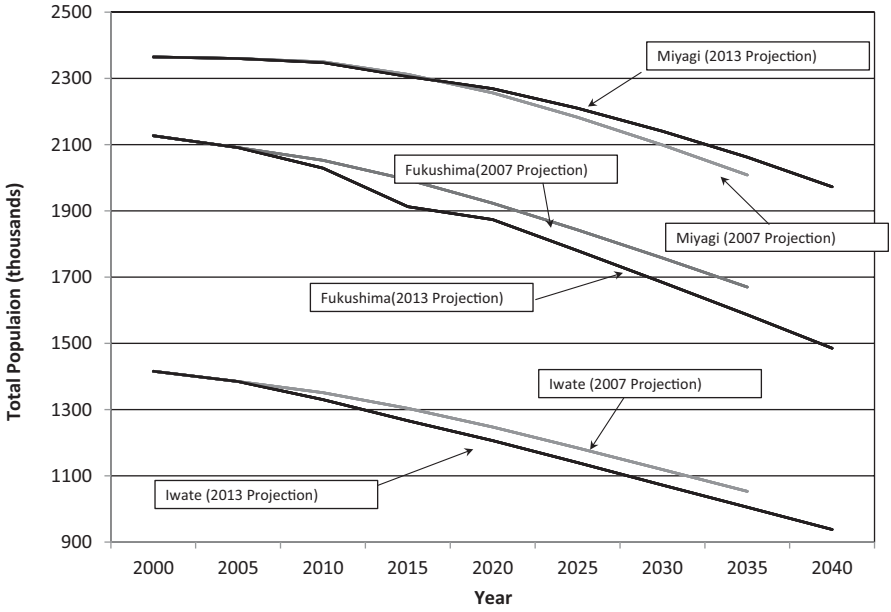

Fig. 1.1 Regional population projections for three prefectures: total population. (NIPSSR 2013)

1.3 Comparing the Population Projections: Prefectures Level

1.3.1 Total Population

The long term impacts from the earthquake to the total population developments in three prefectures: Miyagi, Fukushima, Iwate could be observed by a comparison between the regional population projections of Japan: 2010–2040 and the former projection by prefecture: 2005–2035 (NIPSSR 2007a; Fig. 1.1),[2] see also Nishioka et al. 2011.

In the case of Miyagi prefecture, the new projection shows less population decrease than the former projection. It reflects the regional structure of Miyagi prefecture. Miyagi prefecture includes her capital city, Sendai. Sendai is the largest city in Tōhoku region and is one of the Japan's 20 designated cities. Sendai has one million populations. Hyōgo Prefecture, which includes Kobe, was

[2] Regional population projections were adjusted uniformly so that the sum of prefectural figures would comply with the results of the national projection (medium variant). Therefore, in comparison, the results of the former regional projection by prefecture (NIPSSR 2007a) are corrected with the difference between two population projections on a national level. For the total population, the new estimations were slightly higher than the former. The different was from 0.7 % in 2010 to 2.2 % in 2035. It reflects chiefly upturn fertility trends since 2005.

devastated by a magnitude 7.2 Great Hanshin Earthquake in 1995. The population was almost recovered after 10 years. Therefore, the new projection presumed the migration pattern of Sendai would be the same as Hyōgo prefecture. A slightly excessive trend of the new projection was caused by the enforced migration from the surrounding municipalities in 5 years and the upturn of fertility in Japan since 2005. However, the total population of Miyagi prefecture was expected to decrease to 1,973,000 by 2040. It would be a reduction of 375,000, 16.0% of the population in 2010.

In the case of Fukushima prefecture, the new projection indicated a lower population development than the former projection. Fukushima prefecture lost many inhabitants by the evacuations, including some regional communities that contained "designation evacuation zone". In this context, the new projection presumed much more time for recovery based on the usual migration pattern. The difference of both projections at total population in 2035 was 83,000, 5.0% lower than the former projection. The total population of Fukushima was expected to reduce to 1,485,000 by 2040. It would be 544,000, 26.8% of the population in 2010.

Iwate prefecture also showed a lower population development than the former projection. The total population of Iwate prefecture was 1,449,000 in 1960 at its peak and had decreased to 1,330,000 in 2010. In this context, the new projection suggested the earthquake would accelerate depopulation for about 5 years. The difference of both projections in total population in 2035 was 48,000, 4.5% lower than the former projection results. The total population of Iwate prefecture was expected to decrease to 938,000 by 2040. It would be a reduction of 392,000, 29.5% of the population in 2010.

1.3.2 Population Aging

Long before the Great Earthquake, East Japan faces population aging. Among the three prefectures, Iwate prefecture showed the highest proportion of the elderly population (65 year and over) in total population in the new projection (Fig. 1.2). According to the new projection, the elderly population would be 39.4% in 2040. It was only 0.5% different to the former projection for 2035. In contrast, Fukushima prefecture had a larger difference. In 2035 the elderly population was 1.9% higher than the former projection and its population-aging rate would be 37.4% in 2040, which was similar to Iwate prefecture. This suggests evacuation caused the loss of young population. In the case of Miyagi prefecture, the aging population rate will stay at the lowest level among the three, 33.7%. However, the divergence of both projections was not observed.

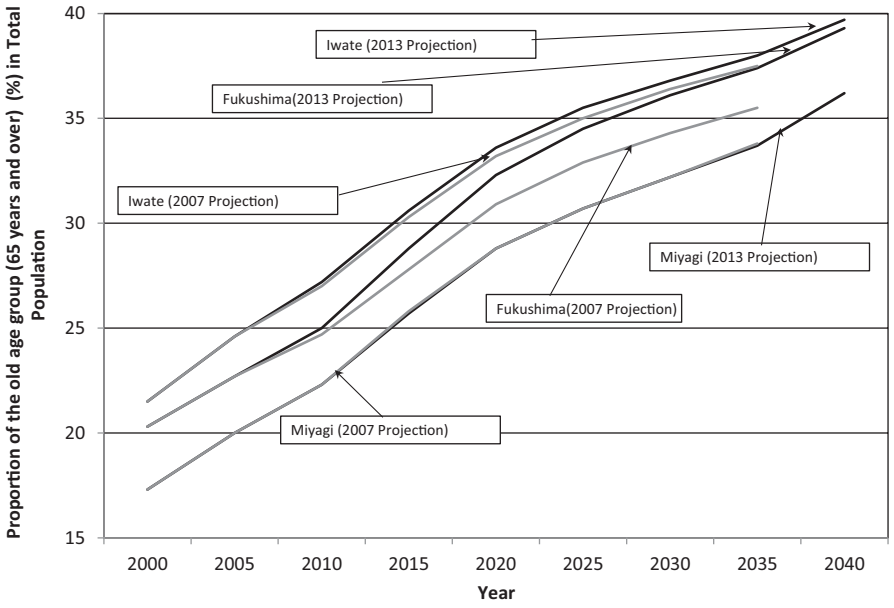

Fig. 1.2 Regional population projections for three prefectures: proportion of the old age group (65 years and over) (%) in total population. (NIPSSR 2007a, b, 2013)

1.4 Comparing the Population Projections: Cities Level

1.4.1 Total Population

The long term impacts on the total population developments of three cities in Miyagi prefecture could be observed by comparing the regional population projections of Japan: 2010–2040 (NIPSSR 2013) and the former projection: 2005–2035 (NIPSSR 2007a, b; Fig. 1.3): see also Nishioka et al. 2009.

In 2011, tsunami attacked the coastal zone of the prefecture capital city, Sendai and caused huge damage. Even though, the new projection showed a slightly excessive trend against the former projection, it was presumed that the usual migration pattern should be recovered soon. In the case of Kesennuma City, the new projection expected a higher level of total population development. This reflects the municipal amalgamation in 2006 had raised the total level of inhabitant number. Like other cases of amalgamation, the basic trend of population development stays unchanged and the results of both projections seem almost parallel. However, Minamisanriku Town had a slightly lower development in the new projection than the former version. This town had recorded the unprecedented damage by Tsunami, a total of 566 dead and 310 missing, 5.03% of the total residents in 2010. Furthermore, the new projection referred the recovery case of the Okushiri Island in 1993 from the southwest-off Hokkaido

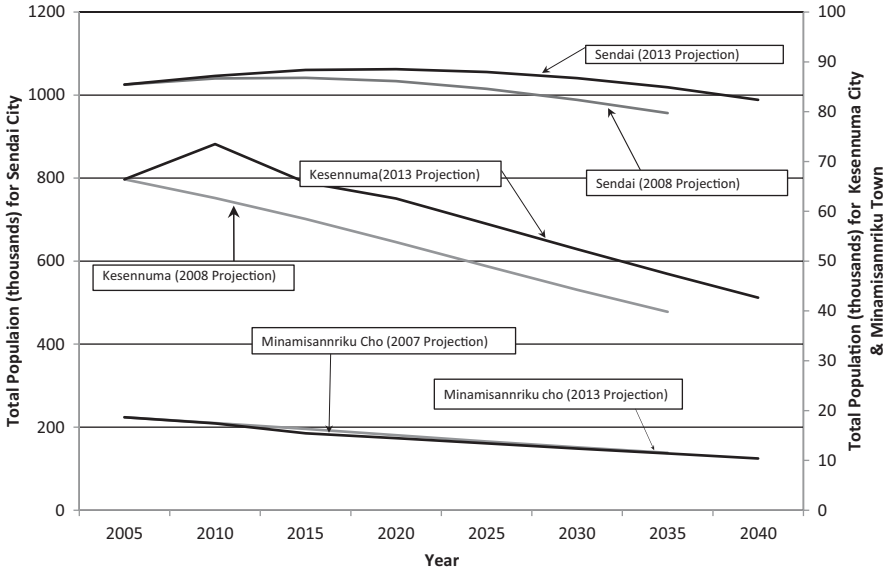

Fig. 1.3 Regional population projections for three cities and town in Miyagi Prefecture: total population (thousands). (NIPSSR 2007a, b, 2013)

earthquake. Even though the impacts of the disaster on the total population were expected to be limited, the population declining rate from 2010 were expected to be −5.8% in Sendai, −72.3% in Kesennuma City and −67.8% in Minamisanriku Town.

1.4.2 Population Aging

According to the new projection, the highest proportion of the aged in total population would be 47.5% in Kesennuma City in 2040. Followed by Minamisanriku Town, 45.4%. Even Sendai is the largest city of the Tōhoku region, its aged proportion was expected to be 35.2% (Fig. 1.4).

In contrast to the case of Sendai City, the results of the new projection of Kesennuma City and Minamisanriku Town, were slightly lower than the former projection. It points out the different impact of the disaster to the age structure and migration pattern. In any cases, the divergence of both projections is slightly diminishing.

1.5 Impacts of the Great East Japan Earthquake

According to the comparison between the new and former regional projection, the demographic impacts from the Great East Japan Earthquake seems to be limited. It is subject to the assumptions in the new projection towards the usual migration

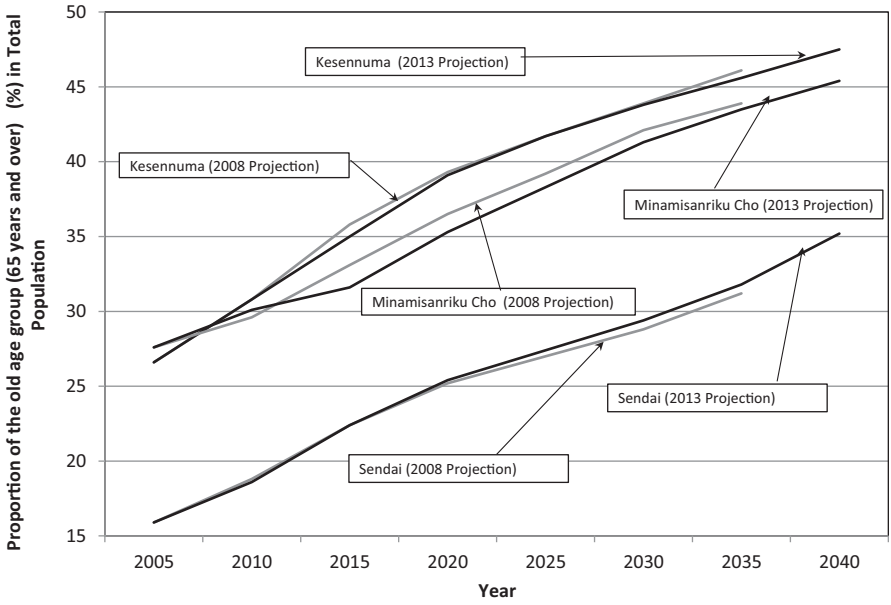

Fig. 1.4 Regional population projections for three cities and town in Miyagi Prefecture: proportion of the old age group (65 years and over) (%) in total population. (NIPSSR 2007a, b, 2013)

pattern could be returned like the cases of Great Hanshin earthquake, in 1995 and the southwest-off Hokkaido earthquake in 1993. Generally, successful restoration of damaged area could be achieved by the efforts of people. In other words, the new projection indicates the possible status of the demography in the future.

On the other hand, apart from the disaster, the two projections show almost same demographic development in the future. Since long before the Earthquake, the depopulation process of Tōhoku has begun. It is a serious problem to build reconstruction plans for these regions. With a tendency for the outmigration pattern of working age population is fixed and the elderly population is left behind. What would be the target if the reconstruction plans are expected to change the demographic development?

Although the situation of Tōhoku is not unique, most of the regional communities in Japan confront depopulation and rapid aging. The Great East Japan Earthquake happened on 11 March 2011 exposes the demographic problems of present Japan, a shrinking society in post-demographic transition.

1.6 About This Book

This book focuses on a new phenomenon emerging in the twenty-first century: the rapid aging and decreasing population of Japan.

Japan has entered a post-demographic transitional stage in which it has led the world in both population aging and decline, followed by former Eastern bloc nations

and other Asian countries. Kaufmann (2005) refers to this emerging phenomenon as 'a shrinking society'. 'Shrinking society' is characterized by a fertility rate below replacement level, and a decreasing and rapid aging population. This could be comprehended merely as a possible historical consequence of a decrease in birth and death rates. Nevertheless, population change could influence a country's economic growth, labour market, pensions, taxation, health care and housing.

Population aging and population decline are threatening the sustainability of Japanese society. This book concludes that the clearest long-term solution to solve these problems is to raise the fertility rate back to replacement level. Thus, the purpose of this study is to clarify the conditions for fertility recovery and discuss corresponding policy challenges and innovations.

This book is constructed along 7 main chapters. Chapter 2 first describes the shift from population growth to population decline of Japan based on the Historical Statistics of Japan (Statistics Bureau and the Director General for Policy Planning of Japan 2006) and Population Projections for Japan (NIPSSR 2012). Then, the chapter observes the changing age structure between 1891 and 2060 by using dependency ratios as indicators of Child/Elder care cost. In last section of this chapter, the depopulation process at sub-national level is demonstrated by using the regional population projections of Japan: 2010–2040 (NIPSSR 2013).

Chapter 3, observes the effects of increasing life expectancy and declining fertility on the dependency ratio separately by utilizing the population life table and net reproduction rate.First, this chapter explains the basic relation of optimal care cost to net reproduction rate. Then, this chapter compares the historical change of this optimal care cost curves. And the last section analyses the effects of the rising longevity on the child/elder care cost.

Chapter 4, analyses the historical relationship between women's survival rates at reproductive age, the theoretical replacement-level fertility rate (NRR = 1.00) and the recorded total fertility rate (TFR). These illustrate the causal model of demographic transition in Japan. Historical observation shows TFR adapts the theoretical level of fertility with a certain time lag and corresponding to women's survival rates at reproductive age. An increasing lifespan and survival rates of women at reproductive age could have influenced on reproductive decision making in the context of minimizing the risk of childbearing. Even though the theoretical fertility rate meets the reproductive level, women's views on minimizing the risk may remain unchanged. It is because the cost–benefit imbalance in childbearing is still too high for women in Japan. In last section, this chapter proposes the condition for recovering the replacement fertility level.

Chapter 5 discusses the sustainability of Japanese society in relation to national finances and social security reform, based on the previous findings. Chapter 6 first argues about the effectiveness of family policies in recovering replacement fertility. Then, the chapter discusses the impact of immigration policies for the globalization of Japanese society. After that this chapter examines the effect of regional policies in 'Selection and Concentration'.

The last chapter acts as an epilogue. It will re-examine the principle of the "sustainable" population and concluded as a revised version of T. R. Malthus.

This book is written as one part of the book series: "Population Studies of Japan." The purposes of the series are to draw attention to Japan's entering the post-demographic transition phase and to present cutting-edge research in Japanese population studies. As a compact monograph, this book is not going to examine the preceding studies and explain the terminology or basic concepts like demographic transition, post-demographic transition, etc. The author would like to apologize in advance for these shortcomings.

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Chapter 2
Population Prospects in Japanese Society

Abstract Although there were some interruptions at wartimes, the growth of Japanese population reached its peak in 2008, and then began to decrease. There are two basic factors: first, rising longevity up to 90 years; second, a below replacement fertility. Both factors affect the age structure. The share of young population (aged under 15 years) has fallen from 35.4% (1950) to 13.1% (2010) and it continues to shrink to 9.1% by 2060. In contrast, the share of aged population (aged 65 years or older) has risen from 4.9% (1950) to 23.0% (2010) and will increase further to 39.9% (2060). The demographic care cost (dependency ratio) begins to rise continuously since 1990 and is predicted to increase from 0.57, 2010 to 0.96 by 2060. The effect of rising longevity indicates only a gradual trend. It begins to rise smoothly from 0.58 in 1975 to 0.71 in 2010 and is expected to reach 0.79 by 2060. Comparatively, the additional effect of below replacement fertility starts to go beyond the former from 1980s and is expected to increase from 0.83 in 2010 to 0.94 by 2060. The situations in local communities are more critical because of outmigration among young population.

Keywords Population prospects • Age structure • Rising longevity • Below replacement fertility • Intergenerational contract • Demographic care cost • Actual value • Minimum value • Optimal value • Dependency ratio • Outmigration

2.1 From Population Growth to Decline

Since the end of nineteenth century, Japan's total population has grown steadily (with the exception of a slight interruption during the Second World War); however, after its peak in 2008, the population has begun to decline steadily (Fig. 2.1).[1]

According to the 2010 Population Census, Japan's total population (including non-Japanese residents) was 128.06 million. Based on a medium-fertility and mor-

[1] *Source*: from 1872 to 2005, Statistics Bureau (2006, pp. 88–90), from 2010 to 2110 (NIPSSR 2012a). According to the Population Estimates of Japan, Inter-census Adjustment of Current Population Estimates (as of October 1 of each year) by Statistics Bureau of Japan, the peak population was 128.084 million in 2008 (NIPSSR 2012b).

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tality projection (NIPSSR 2012a, pp. 1–2), Japan was expected to enter a long period of population decline to 86.7 million by 2060. This projection represents a 32.2% decrease (41.26 million) compare to 2010. Auxiliary projections up to 2110 showed an expected decrease to 42.86 million, a 66.5% reduction (85.20 million) of the present stage.

This projected drastic population decline could be attributed to increasing life expectancy and below-replacement fertility. Japan's life expectancy increased from Meiji period (1891/1898) 44.3 years for men and 42.8 years for women to post-war Shōwa period (1950) 57.7 years for men and 61.0 years for women. The life expectancy continues to increase steadily until now. According to the Medium-Mortality Assumption (NIPSSR 2012a, p. 12), life expectancy was expected to grow from 79.64 years for men and 86.39 years for women in 2010 to 84.19 years for men and 90.93 years for women in 2060 (Fig. 2.2).

Meanwhile, Japan's total fertility rate (TFR) has decreased from 5.10 in 1925 to 3.65 in 1950, and starts falling below replacement level in 1975 (1.90). The TFR was 1.39 in 2010, and according to Medium-fertility Assumption it was expected to decrease gradually to 1.33 by 2024, and then increase slightly to 1.35 in 2060 (Fig. 2.3),[2] (NIPSSR 2012a, p. 7).

Population aging and fertility decline have drastically changed the age structure of Japanese society (Fig. 2.4).[3]

Influenced by fertility decline, the proportion of the young population (aged under 15 years) in the total population fell from 35.4% in 1950 to 13.1% in 2010. According to the medium-fertility projection (NIPSSR 2012a), this share would continue to shrink to 9.1% by 2060. In contrast, together with increasing life expectancy, the share of the aged population (aged 65 years or older) in the total population rose from 4.9% in 1950 to 23.0% in 2010. The same projection predicted this share would continue to increase to 39.9% by 2060. Meanwhile, the share of the working age group (aged 15 to 64 years) remained relatively stable, from 69.0% in 1970 to 69.5% in 1995. Yet, it had decreased to 63.8% in 2010 and was expected to shrink to 50.9% by 2060.

[2] In auxiliary projection for 2110, the value of fertility and the life expectancy were fixed at TFR = 1.35 and average span of life was 84.19 years for men and 90.93 years for women in 2060. The period TFR of Japan showed a recovery from 1.26 in 2005 and to 1.39 in 2010 (NIPSSR 2013; see also and see also http://www.ipss.go.jp/pp-shicyoson/e/shicyoson13/t-page.asp). However, there is no substantial increase in the cohort TFR to the replacement level at present.

[3] *Source*: (NIPSSR 2012b) from 1888 to 2005, (NIPSSR 2012a) from 2010 to 2110. The proportions are obtained by calculations.

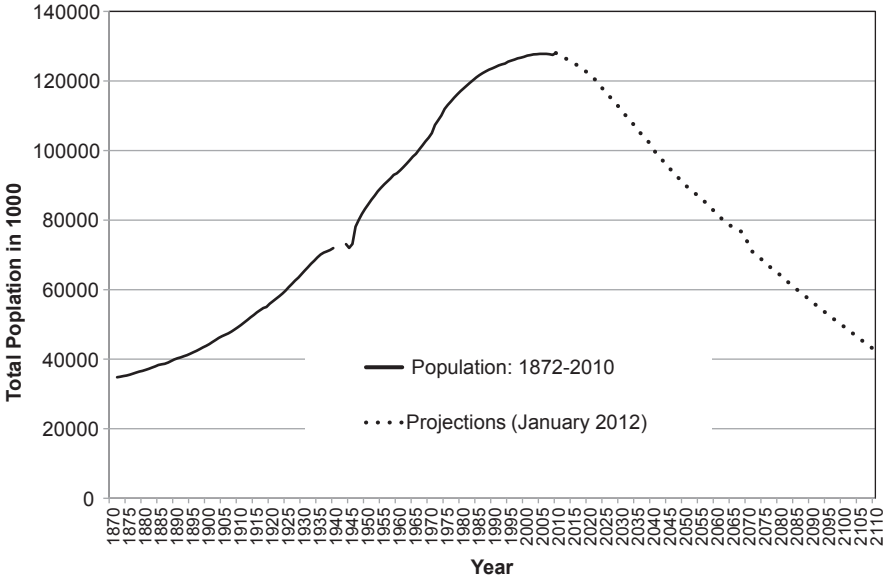

Fig. 2.1 Total population trends: 1872–2110. (Statistics Bureau 2006; NIPSSR 2012a)

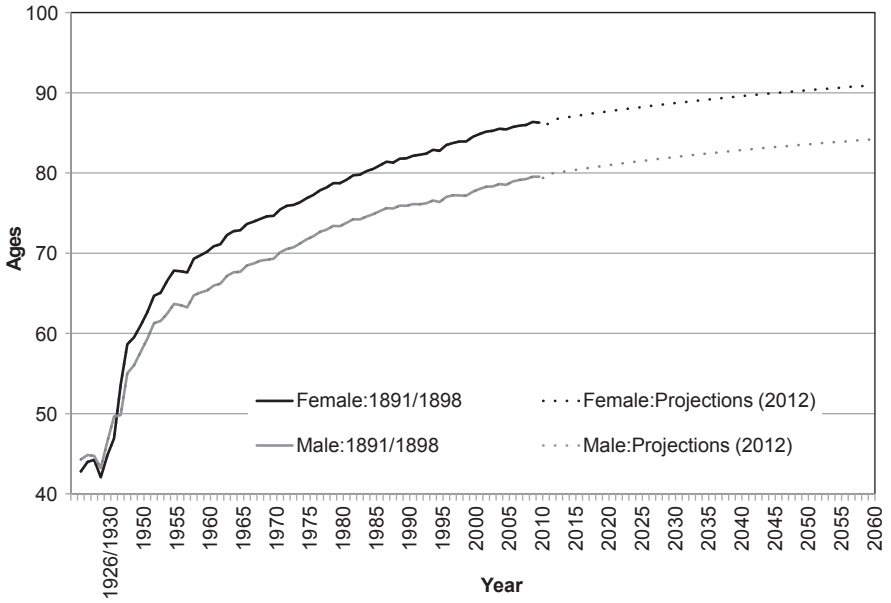

Fig. 2.2 Life expectancy at birth: 1891/1898–2060. (Statistics Bureau 2006; NIPSSR 2012a)

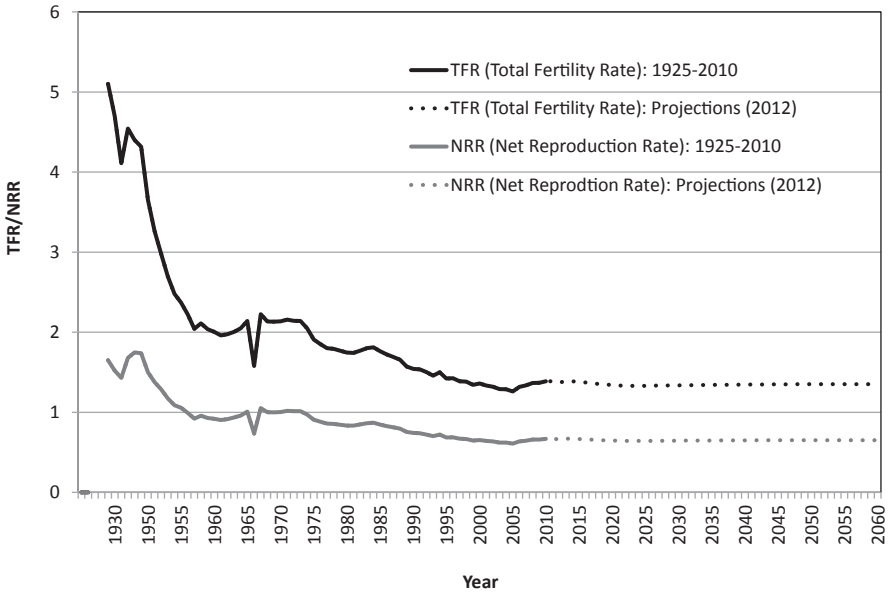

Fig. 2.3 Fertility trends: 1925–2060. (NIPSSR 2012a)

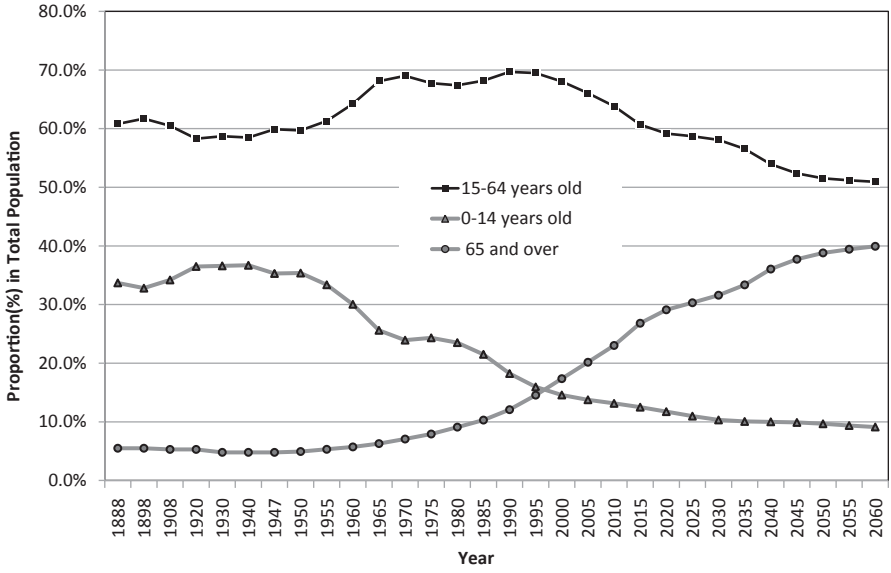

Fig. 2.4 Indicators on age structure by major three age groups: 1888–2060. (NIPSSR 2012a, b)

2.2 Changing Dependency Ratios as Indicators of Child/Elder Care Costs

Since the basic trend from population growth to decline seems to be the historical consequence of a demographic transition from high to low fertility and mortality. This not only affects the total population number, but also the society's age structure and intergenerational care cost.

The concept of intergenerational care cost is borrowed from Kaufmann's (2005, pp. 204–209) idea of an intergenerational contract (*Generationenvertrag*). This notion assumes the existence of a social contract that obliges the working age generation to rise the following generation and care for the preceding generation. From a demographic perspective, the accountability for this intergenerational care could be regarded as the ratio of the working age population to the pre- and post- working age populations. In this way, dependency ratios could be used as indicators of child/elder care costs incurred by the working age generation.

2.2.1 Actual Value of Demographic Care Cost (Dependency Ratio)[4]

The total demographic care cost could be expressed in the same number with the total dependency ratio (not a percentage). This directly reflects the age structure in a given year and illustrates the care burden incurred by the working age generation.

$$\text{Total Care Cost}_{\text{actual}} = \text{Child Care Cost}_{\text{actual}} + \text{Elder Care Cost}_{\text{actual}}$$

$$\text{Child Care Cost}_{\text{actual}} = \frac{\text{Number of People aged under 0-14}}{\text{Number of People aged under 15-64}}$$

$$\text{Elder Care Cost}_{\text{actual}} = \frac{\text{Number of people aged 65 and over}}{\text{Number of people aged 15-64}}$$

[4] Kaufmann (2005, p. 209) used the different age categories, namely, the population aged 0–19 as pre-working generation, the population aged 20–60 as working generation, the population aged 60 and over as post working generation. He considered the life stages of modern German society to get into job and to be retired. For the convenience to use the historical data and the population projection, this chapter used the same age categories as Kaufmann did with those of the usual dependency ratio. Certainly, the exact value of care cost depends on age categories (especially on practical earning period) and relative living cost to the one of working generation. Furthermore, the basic care relation between the generations is proportional to the demographic age structure.

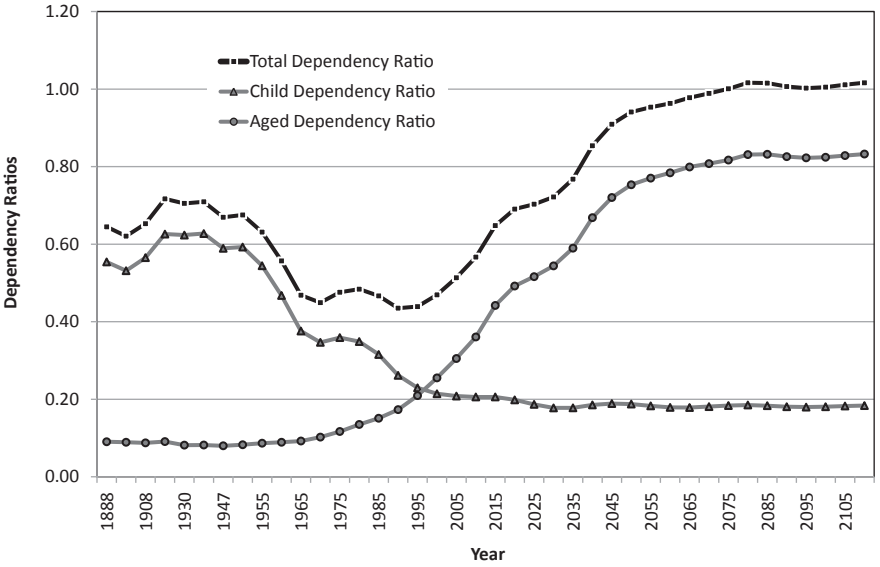

Fig. 2.5 Dependency ratios: 1888–2060. (NIPSSR 2012a, b)

Figure 2.5[5] illustrates historical changes in the demographic care cost (total dependency ratio) on the working age population. The value rose from 0.64 in 1888 to 0.72 in 1920, and then began to decrease to 0.44 in 1990 (with the exception of a slight increase around 1980). After 1990, the demographic care cost began to increase steadily. According to the medium-fertility projection (NIPSSR 2012a), this figure was expected to increase from 0.57 in 2010 to 0.96 by 2060. By 2110, it would reach 1.02 (in auxiliary projection).

By observing the shift of child care cost (child dependency ratio) and the elder care cost (aged dependency ratio) separately, it suggests that the former was very high from 1888 in the Meiji Period to 1930 in the early Shōwa period, while the latter was relatively stable and low until around 1975. It is because of the large proportion of children to the total population. However, around 2000, elder care cost have increased disproportionately to the decreasing childcare cost. It leads to an unprecedented care burden on the working population.

2.2.2 Minimum Value of Demographic Care Cost (NRR = 1.00, The Effect of Life Expectancy)

The long-term minimum demographic care cost could also be evaluated by assuming a stable population in terms of fertility at replacement level (NRR: net reproduc-

[5] *Source*: (NIPSSR 2012b) from 1888 to 2005, (NIPSSR 2012a) from 2010 to 2110. The ratios are obtained in calculations.

tion rate = 1.00)[6] and mortality rates of the life table[7] for a given year. While this model depends directly on life expectancy, it shows the influence of rising longevity on the working population's demographic care burden over time (assuming a ca. 30-year generational interval).[8]

$$\text{Total Care Cost}_{\text{minimum}} = \text{Child Care Cost}_{\text{minimum}} + \text{Elder Care Cost}_{\text{minimum}}$$

$$\text{Child Care Cost}_{\text{minimum}} = \frac{\text{Stable population aged 0-14}}{\text{Stable population aged 15-64}}$$

$$\text{Elder Care Cost}_{\text{minimum}} = \frac{\text{Stable population aged 65 and over}}{\text{Stable population aged 15-64}}$$

Unlike the actual value of demographic care cost (dependency ratio), this minimum value is based on the stable population structure of the life tables at replacement fertility. It shows an upward demographic care cost trend increases proportionally to life expectancy (Fig. 2.6).[9] This value was almost constant at 0.54 between 1891/1898 and 1965. It began to rise smoothly from 0.58 in 1975 to 0.71 in 2010, and then it was expected to increases consistently to 0.79 by 2060 (NIPSSR 2012a).[10] As a result, the effect of rising longevity on the actual value of demographic care cost would stay at or near 0.80.

The actual value of total care cost reached its lowest level (recently referred as 'demographic bonus') in 1990, at 0.44. However, the minimum value of total care cost in the same year was much higher than the actual value, at 0.65 due to below-replacement fertility. In Germany, Kaufmann (2005, p. 213) had referred this gap

[6] Population with a constant birth rate (fertility) and death rate (life table), along with no migration would reach stable population in long term. In this state the percentage of people in every age group remains constant and the population pyramid would remain unchanged. Therefore, the dependency ratio would also be stable. However, a stable population could expand or shrink. In the case of this chapter, fertility is assumed to be at replacement level. Therefore, the age structure of stable population of the life table in a given year would be unchanged in size. In other word, it is called "stationary population."

[7] To calculate the demographic care cost, the sum total of stable population is being added to both male's and female's life tables to keep the consistency with the usual dependency ratio. On the other hand, the net reproduction rate (NRR) indicates the average number of daughters that would be born to a female. Thus, there is some inconsistency in the calculation of the optimal value (by using the NRR < 1or NRR > 1).

[8] According to the original model (Kaufmann 2005), the average interval of the generations is assumed as 30 years for reproduction. That means this minimum cost should be taken by the next generation within 30 years.

[9] *Source*: Complete Life Tables of Statistics Bureau (2006, pp. 202–203) from 1891/1898 to 2000, Future Life Tables at the Medium-Mortality Assumption (NIPSSR 2012a) from 2010 to 2110. As for 2005, Life Table 2005 (NIPSSR 2007).The values of indicators are obtained by calculations.

[10] The value remain unchanged until 2110 because the auxiliary projection made an assumption that there is a constant life expectancy (84.13 years for males and 90.87 years for females in 2060).

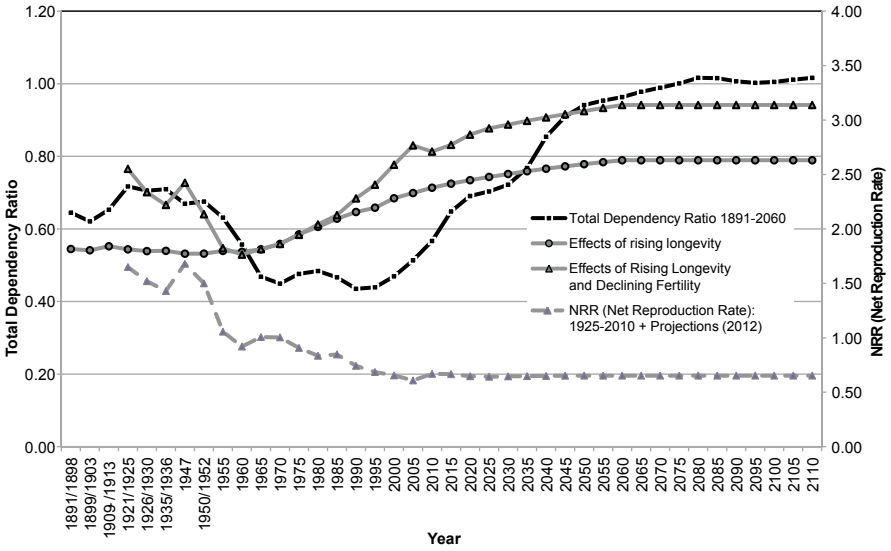

Fig. 2.6 Effect of rising longevity and declining fertility on dependency ratio 1891/1898–2060. (Statistics Bureau 2006; NIPSSR 2012a)

as the preceding generation's "saving (*Ersparnis*)" on child care costs as a result of fertility decline. Besides, it is found that the current high actual care cost (0.57 in 2010) is below the current minimum cost (0.71), and is far below the record high actual care cost (0.72 as of 1921/1925 during Taishō period). This suggests that the demographic impacts of such figures on the Japanese economy are relatively limited until now.

2.2.3 Optimal Value of Demographic Care Cost (NRR < 1 or NRR > 1, The Effect of Fertility)

In addition to this minimum value, it is possible to evaluate the optimal value of the demographic care cost in the long term by assuming a stable population at any given fertility level (NRR < 1 or NRR > 1). This calculation depends on both life expectancy and the net reproduction rate (NRR). It reflects the age structure of a life table and fertility in a given year. And it also shows the effects of decreasing fertility on the demographic care cost at any given life expectancy.

$$\text{Total Care Cost}_{\text{optimal}} = \text{Child Care Cost}_{\text{optimal}} + \text{Elder Care Cost}_{\text{optimal}}$$

$$\text{Child Care Cost}_{\text{optimal}} = \frac{\text{Stable population aged 0-14}}{\text{Stable population aged 15-64}} \times NRR$$

$$\text{Elder Care Cost}_{\text{optimal}} = \left[\frac{\text{Stable population aged 65 and over}}{\text{Stable population aged 15-64}}\right] \div NRR$$

Kaufmann argued that, under the hypothetical condition of a closed national economy (neither imports nor exports) this indicator showed the optimal total care cost would be incurred by the working age generation. The segmentation of the pre-/post- working age generations and the productivity of the working population could vary over time. However, under the same conditions, Kaufmann's definition is true.

From Fig. 2.6, the optimal value of total care cost remained almost equal to the minimum value from 1955 (0.54) to 1980 (0.63). However, it began to exceed the minimum in 1985. According to the author's calculation based on the medium-fertility projection (NIPSSR 2012a), this figure was expected to increase from 0.83 in 2010 to 0.94 by 2060.

The optimal value is essentially the leading practical indicator of the level of total care cost, which would be sustained by the next working age generation. At the same time, it depends on the former generation's life expectancy and fertility level. In this context, the actual value is expected to reach the optimal value by 2045. After that, the actual value would exceed the optimal value. Yet, historical population momentum[11] might have certain influence on it.

Ultimately, it is clear that with the current fertility rate, which is far below replacement level (NRR = 0.668 in 2010), will shift the burden of total care cost to the future generation.

2.3 Depopulation at Sub-national Level: Shrinking Regions

2.3.1 Population Decline at Sub-national Level

As mentioned in Chap. 1, most of the regional communities in Japan confront depopulation and rapid aging. Comparing 2005 and 2010 Census, the depopulation areas had covered 75.2% of the municipalities (766 cities, 23 wards in Tokyo

[11] Momentum can be caused by the differences in absolute size among the age cohorts through historical events.

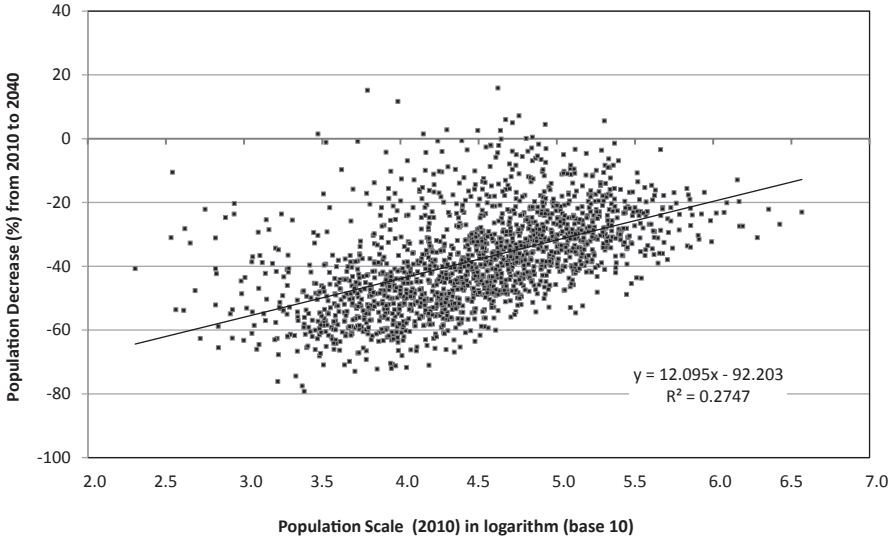

Fig. 2.7 Population decrease at sub-national level. (NIPSSR (2013))

prefecture, 715 towns, 169 villages, as of March 2013). And according to the newest regional population projections (NIPSSR 2013), the proportion of depopulation area would expanded to 95.2% by 2040.

Figure 2.7 shows 46.6% of the municipalities would lose 20–40% of the residents in 2010. By 2040, 22.9% of the municipalities (385 municipalities) would lose more than 20–40%, and 6.3% of the municipalities (106 municipalities) would lose more than half.

At the national level, the total population would decrease 19.4% by 2040, 32.2% by 2060 and 66.5% by 2110 from the present (NIPSSR 2012a). As a result, the depopulation at sub-national level serves as an early warning to the future development of this country.

The horizontal axis of the scatter diagram (Fig. 2.7) is the population scale logarithm (base 10) and the vertical axis is the population decrease in percentage (%) by 2040. This diagram shows there is a positive correlation ($r = 0.524$) between the population scale and the population decrease clearly. This suggests that the smaller the community was in 2010, the more population it would lose by 2040.

2.3.2 Dependency Ratios at Sub-national Level

As for population aging, the local communities also represent the future stages of this country.

At the national level, the proportion of the aged population (65 years or older) in the total population was expected to rise from 23.0% in 2010 to 36.1% by 2040 and to 39.9% by 2060 (NIPSSR 2012a). At the community level, 5.2% of 1,683

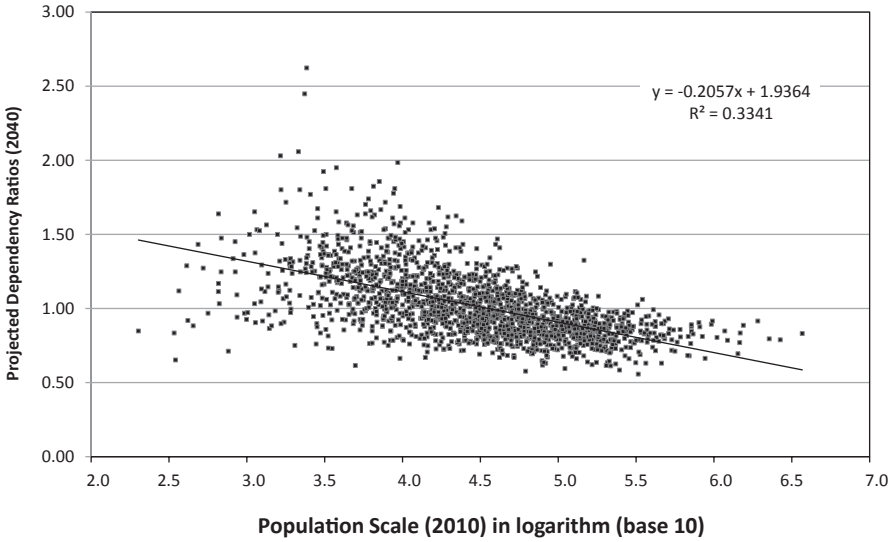

Fig. 2.8 Dependency ratios at sub-national level. (NIPSSR 2013)

municipalities as of March 2013, the elder proportion had already exceeded 40%. According the regional projection (NIPSSR 2013), those area would be 49.7% of the total municipalities by 2040. And 9.9% of the municipalities, more than half of their residents would be composed by aged population (65 years or older).

This rapid aging together with the structurally fixed outmigration pattern of young age population increase the dependency ratios as well as the actual value of demographic care cost. This process runs much faster at regional level than at the national level.

This figure at national revel is expected to increase from 0.57 in 2010 to 0.85 by 2040, and to 0.96 by 2060. By 2110, it would reach 1.02 (in auxiliary projection) (NIPSSR 2012a). At community level (Fig. 2.8), this ratio would exceed 0.90 by 2040, more than 67.8% of 1,683 municipalities as of March 2013. And 21.4% of the municipalities, the ratio would even exceed 1.20.

The scatter diagram (Fig. 2.8) presents the population scale logarithm (base 10) at x axis and the dependency ratios by 2040 at y axis. This shows there is a negative correlation ($r=-0.578$) between the population scale and the dependency ratios clearly. This suggests that the smaller the community was in 2010, the higher the dependency ratios would be by 2040.

2.3.3 Problems of the Shrinking Regions

Since 1999, Japanese government has established municipal merger plan and dissolution policy, known as 'Heisei No Dai Gappei' (Great Merger of Heisei era). The goal of this policy was to reduce the total number of Japanese municipalities

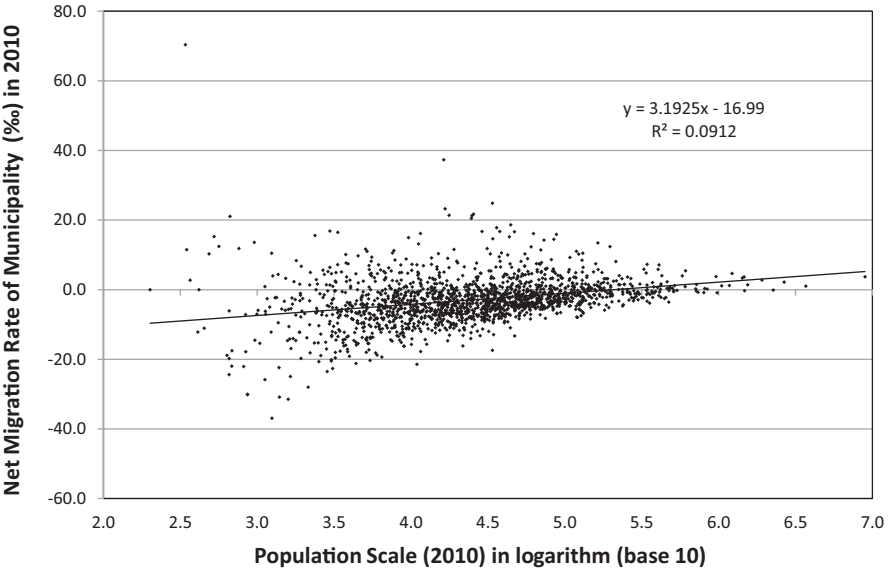

Fig. 2.9 Net migration rate of municipality (‰) in 2010. (Statistics Bureau 2012)

to 1000. Thus, at the beginning of 2014, Japan had about 1742 municipalities (MIC 2014). It is a decrease of 46.1% from 3232 municipalities since March 31, 1999. However, many communities still face the threat of extinction through merger and dissolution.

Yet, the change of boundary does not help to stop population decline. In depopulated area, low population density makes it difficult to maintain the infrastructures of the communities. In such area, the rising dependency ratio becomes a visible landscape. Somewhere no children or working age people could be met on the street, even an elder taking a walk alone is rare.

In fact, most of the regional communities are straggling to seek effective countermeasures to stop depopulation. Though, it is not easy because of their population dynamics.

The net migration rate in 2010 was negative in 73.8% of the municipalities (Fig. 2.9; Statistics Bureau 2012). It shows the basic pattern in outmigration of young population for education and job seeking is fixed. While the proportion of the elder population with low mobility is increasing, because of below replacement fertility, the proportion of young population with high mobility is reducing. Thus, the effect of the migration rate is becoming smaller but still negative and population is slowly diminishing through outmigration.

On the other hand, the natural increasing rate in 2010 was also negative in 73.8% of the municipalities (Fig. 2.10; Statistics Bureau 2012). In contrast to net migration rate, those negative values are growing rapidly. While the number of birth is reduced through the below replacement fertility and the decreasing population of

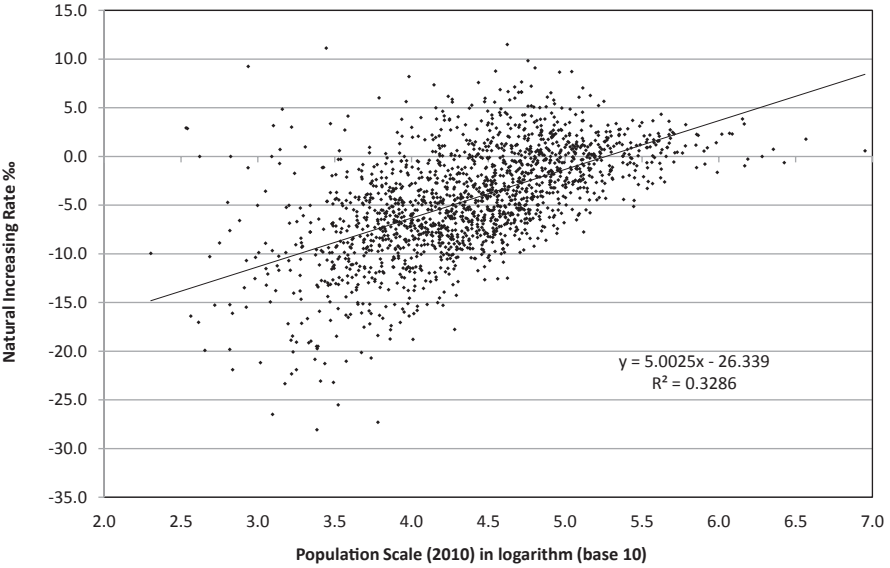

Fig. 2.10 Natural increasing rate of municipality (‰) in 2010. (Statistics Bureau 2012)

women at reproductive ages, the number of death is increasing due to aging of inhabitants.

To conclude, the diminishing ability for socio-demographic change and increasing weight of natural decrease are limiting the possibilities of effective countermeasures for depopulation on community levels.

2.3.4 What means Depopulation at Sub-national Level?

The depopulation at sub-national level shows Japan is already a shrinking society. It indicates the possible future development on national level, even though it is difficult to imagine the same situation would happen everywhere in the nation.

In fact, the population decrease and aging depend on the population scale of the communities. The smaller the population of municipal is, the faster it will lose the inhabitants, the higher the elder proportion and the dependency ratios. In contrast, the greater metropolitan areas, such as Tokyo, these changes are slower. As a result, even though social mobility has decreased, the concentration of population distribution will be preceded more than ever. In addition, not only in countryside, depopulation on districts level has already happened in the greater metropolitan areas. In such district, it is not difficult to find vacant dwellings. On the other hand, it is difficult to meet inhabitants.

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Chapter 3
Demographic Transition and Child/Elderly Care Cost

Abstract If life expectancy remains unchanged, how would fertility levels affect optimal care cost? To answer this question, Japan's life table for 2010 was analysed. The curve of the optimal care cost between low fertility and high fertility is non-linear and asymmetric. This revealed care costs increase more sharply when fertility decreases than it increases. This curve was historically varied by life expectancy. From Meiji period to Shōwa period and after the World War II, the curve leaned to left and the care cost increased linearly according to the value of fertility. From 1975, the bottom of the curve shifted up higher and its position moved to the right side, at higher fertility with the expanding life expectancy. As for the rising longevity, this analysis indicate from the female life expectancy of 40 years to that of 70 years, the total care cost were stable through the offset between decreasing child care cost and increasing elderly care cost. However, it began to rise after the female life expectancy exceeded 70 years. The rapid increase reflects the stagnation of child care cost and the accelerated increase of elderly care cost.

Keywords Life expectancy • Life table • Fertility level • Total care cost • Child care cost • Elderly care cost • Net reproduction rate • Optimal care cost curve

3.1 Optimal Care Cost and Net Reproduction Rate

If life expectancy remains unchanged, how will fertility levels affect optimal care cost? Before answering the question, the basic conditions of Japan are present as below: The life expectancy is 84.13 years for men and 90.87 years for women. The age structure of the stable population[1] is: 0–14 years, 17.5 %; 15–64 years, 57.2 %; and 65 years and over: 25.3 %.[2]

The curve of the optimal care cost (Fig. 3.1) between low fertility (NRR < 0) and high fertility (NRR > 0)[3] is non-linear and asymmetric.

[1] *Source*: Table 5.7 Life Table: 2010. Population statistics of Japan 2012 (NIPSSR 2012). The values are obtained in calculations.

[2] About the calculations, see 2.2.3.

[3] As indicator, instead of Total Fertility Rate (TFR), Net Reproduction Rate (NRR) is being used. For the NRR, it takes both mortality rates and sex ratios at birth into account.

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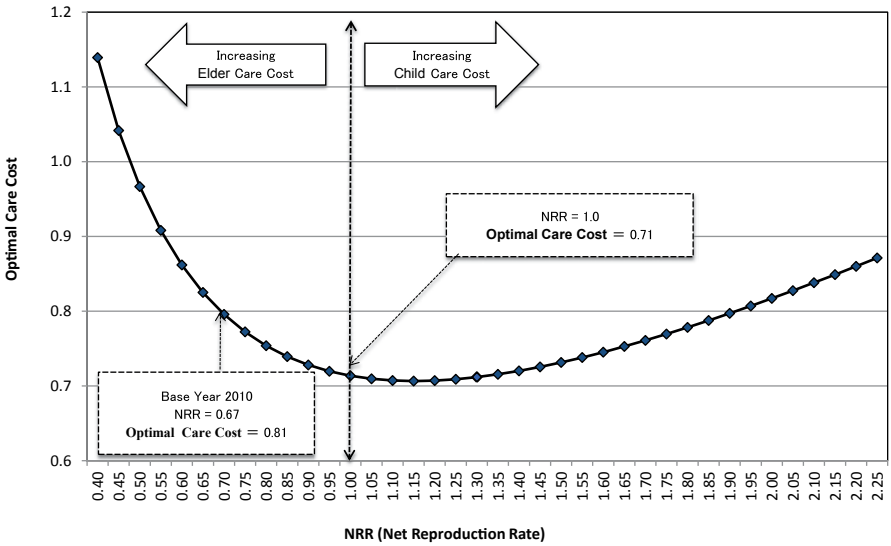

Fig. 3.1 Optimal care cost. (Base year 2010)

1. Fertility close to replacement level (NRR ≒ 1)
   When the fertility rate gets near replacement level, the optimal care cost stays around the minimum value of 0.71.
2. Fertility above replacement level (NRR > 1)
   When the fertility rate exceeds replacement level (right of NRR = 1.0), increasing childcare costs cause the optimal care cost to reach up to 0.87 at NRR = 2.25.
3. Fertility below replacement level (NRR < 1)
   When the fertility rate is below replacement level (left of NRR = 1.0), increasing elder care costs cause the optimal care cost to rise to 1.14 at NRR = 0.40.

This analysis explains optimal care costs increase more sharply when fertility decreases than when it increases (Fig. 3.1). This balance also affects the growth of the working age population. In a low fertility scenario, the working age population is not fully replenished. Thus, a shrinking generation bears a greater elder care burden. In a high-fertility scenario, despite the added childcare costs, the children grow up to replenish or even increase the working age population in long-term. And this helps to balance the elder care burden. In current statistical context, Japan's present TFR is 1.39 (NRR 0.67 in 2010) which indicates an optimal care cost of 0.81. To satisfy the minimum care cost of 0.706, TFR should reach 2.36 (NRR 1.15).

The relation of both indicators are follows;
NRR = TFR × Reproduction survival rate × (Sex ratio at birth ÷ (100 + Sex ratio at birth))
TFR = (NRR ÷ Reproduction survival rate) ÷ (Sex ratio at birth ÷ (100 + Sex ratio at birth))
where,
Reproduction survival rate: proportion of the females will survive until completing their childbearing years
Sex ratios at birth: the number of boys (Standard value:105) to 100 girls at birth.

3.2 Historical Change of Optimal Care Cost Curves

Historically, optimal care cost curves should vary by life expectancy. Using the complete life tables from the 1891/1898 to 2010 (Statistics Bureau 2006; NIPSSR 2012), selected curves can be compared (Fig. 3.2; Statistics Bureau 2006).

1. From 1891/1898 to 1950
   When the NRR was below 1.00, the optimal care cost remained low. The curve skewed left, and care cost increased proportionally to NRR.
2. From 1975 to 2010
   In 1975, increased life expectancy shifted the bottom of the care cost curve to a higher value and skewed the curve to the right (i.e. a higher NRR).This indicates that a higher fertility level is needed to keep the optimal care cost stable to counteract the inevitable effects of population aging. Maintaining a stable optimal care cost would have required TFR to reach at least 2.17 (NRR 1.05) in 1995 and 2.46 (NRR 1.25) in 2010. In other words, the amplifying effect of below-replacement fertility rate on optimal care cost has become stronger than ever.

3.3 The Effects of Rising Longevity on Child/Elder Care Costs

3.3.1 Female Life Expectancy and Child/Elder Care Costs

While increased longevity has changed the minimum value of care cost at the replacement fertility level (NRR = 1.00), longevity has affected child and elder care costs in different ways (Fig. 3.3; Statistics Bureau 2006).

As female life expectancy increased from around 40 years to around 70 years, the total care cost remained stable at around 0.53–0.54. It was because a decreasing childcare costs offset increasing elder care costs. However, when female life expectancy exceeded 70 years, the total care cost began to rise and reaching 0.70 at a female life expectancy of 86 years. This rapid increase reflects the stagnation of child care cost at around 0.30 and the accelerated increase of elder care cost at around 0.40.

This inversely disproportionate relationship between child and elder care costs could be explained by historical increases in longevity.

3.3.2 Age-specific Mortalities (‰) (3 age groups)

From 1891/1898 to 1921/1925, the female age-specific mortalities (‰) (3 age groups) ware relatively stable or even slightly faced upward (Fig. 3.4; Statistics Bureau 2006).

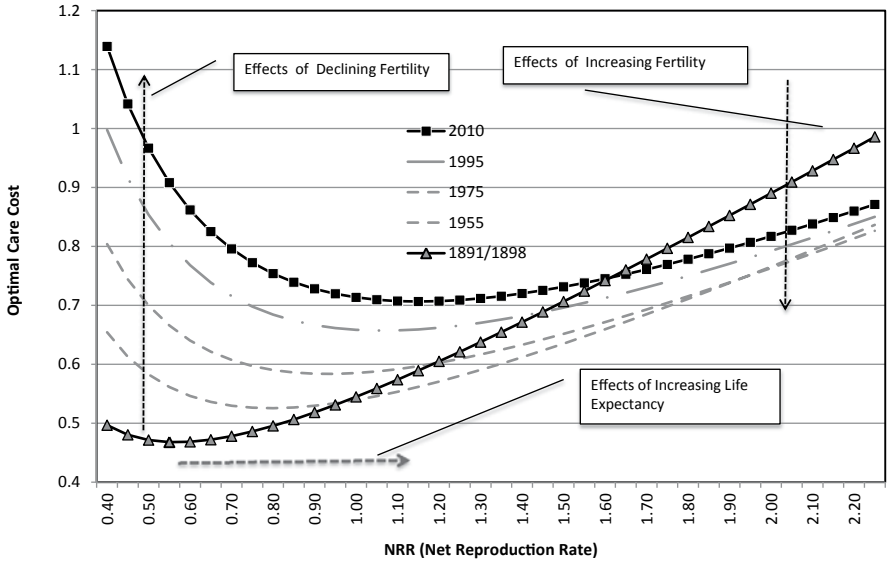

Fig. 3.2 Historical change in selected optimal care cost curves. (Statistics Bureau 2006; NIPSSR (2012)

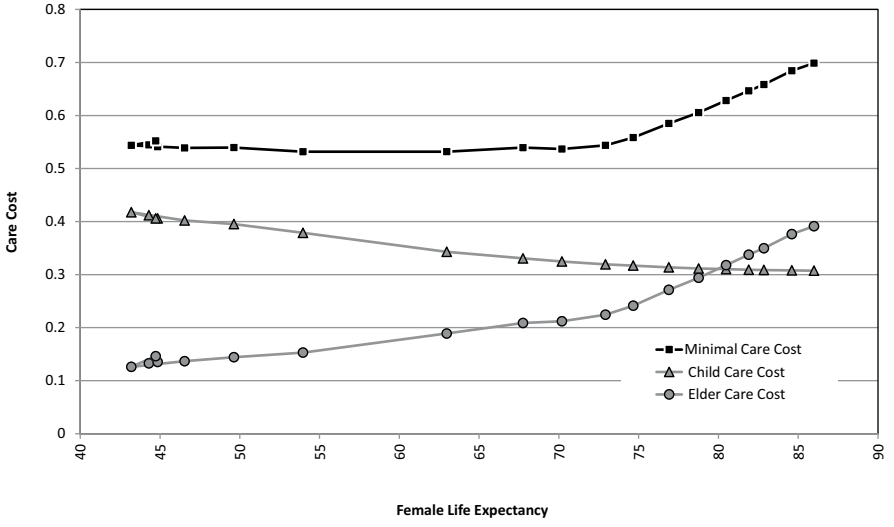

Fig. 3.3 Female life expectancy and child/elder care cost. (Statistics Bureau 2006; NIPSSR 2012)

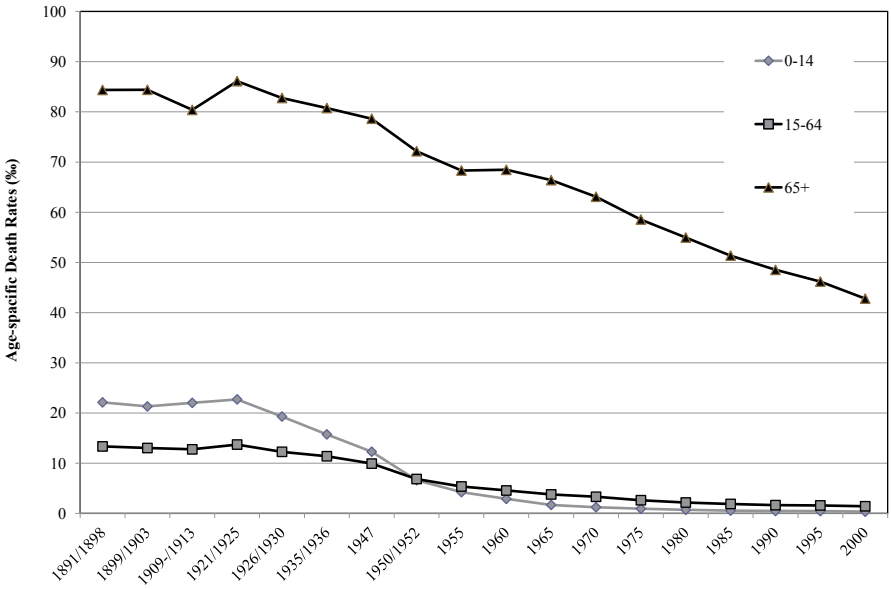

Fig. 3.4 Female age-specific death rates (‰) (3 age groups). (Statistics Bureau 2006; NIPSSR 2012)

Then, the female age-specific mortalities began to decrease from 1926/1930 in different ways. The child mortality under aged 14 went down faster than the working age mortality at aged 15–64. It reached the bottom and became almost 0 by 1975. Although the working age mortality has reduced, the change was slower than the infantry mortality. After 1950, it became relatively higher than the child mortality even the child mortality rate reached nearly to the bottom and became almost 0 by 1975. At the same time, the late mortality for aged 65 years or older began to decrease, it continued to fall until today. The level of death rate in aged 65 years or older was halved from the peak of 86.12 in 1921/1925 to 42.78 in 2000. Nonetheless, only the aged mortality has enough possibility to reach the bottom.

3.3.3 Women's survival rate at selected age

These different development of age-specific mortalities resulted in the development of women's survival rate at a certain age (Fig. 3.5; Statistics Bureau 2006).

The survival rate at aged 15 increased from 73.4% in 1921/1925 to 98.7% in 1975. It means 98.7% of the new born grew up and enter to reproductive age in 1975, compared to 73.4% in 1921/1925. Besides, the survival rate at aged 50 reached from 49.4% in 1921/1925 to 94.9% in 1975. By Taishō era, more than half of the women could not survive and complete their reproductive period. However, by 1975, the risk became less than 6%. It was because the survival rate at aged 65

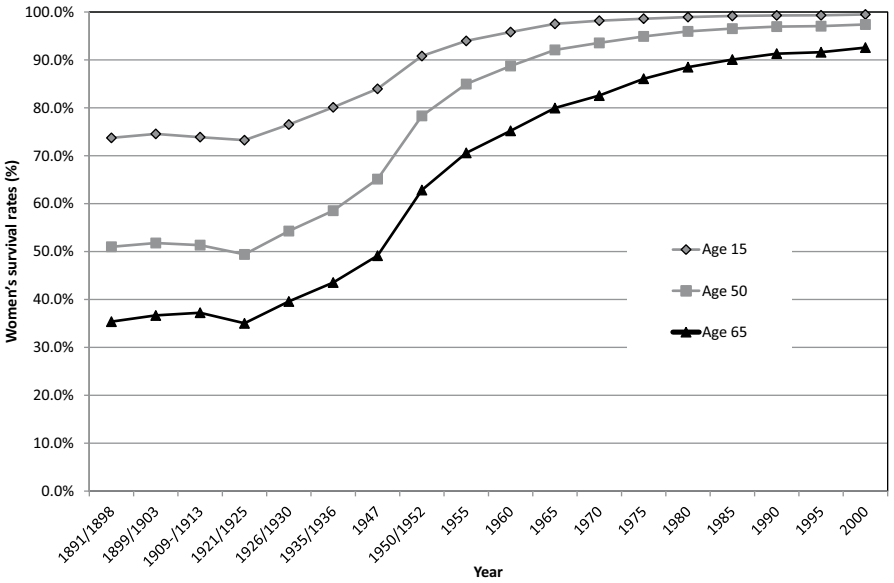

Fig. 3.5 Women's survival rates (%) at selected age. (Statistics Bureau 2006; NIPSSR (2012)

has increased from 35.0 % in 1921/1925 to 86.1 % in 1975. The chance of survival is more than a doubled and it continues to have an upward trend.

In any case, the women's survival rate increased to an upper limit of 100 % from young to old. This process is cumulative and sequential. Thus, at the early stage of the development, the proportion of women aged 15–64 in a stable population grows relatively faster than the population aged under 15, and slower than the population aged 65 or older. At the same time, the cost of childcare decreases as the cost of elder care increases.

In contrast, at this late stage of development, the survival rate of women aged under 65 reached the upper limit. And the survival rate of the aged 65 or older could have space to grow. Thus, the cost of childcare stagnates and the cost of elder care increases faster than ever.

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Chapter 4
Historical Process and Background of Fertility Decline in Japan

Abstract The extending longevity means rising survival rate at reproductive age. And it reduces the replacement level of fertility. The development of historical TFR seemed to follow the theoretical replacement level with certain time lag until at the female life expectancy reached 70 years. Over aged 75 years, the historical TFR continued to decrease and stays below replacement level. In fact, this process shows the deduction of mean number of childbirth. And, the major group women by the number of children shift from more than 4 to 2. Based on historical analyses, a causal model of the demographic transition and total care cost in Japan could be postulated. The modernization of Japanese society was adaptive and successful in the first phase. The demographic bonus brought the economic growth in 1960–1970's. At the same time individualization towards reproduction had spread throughout Japanese society. The responsibility for child/elderly care had shifted from family as a whole to woman as an individual. The reduction of average number of births changed women's life course. Education and employment opportunities for women were expanded. These made the timing for marriage and childbearing became more adjustable for decision-making and increased the age of marriage and childbearing.

Keywords Female life expectancy • Survival rate at reproductive age • Causal model • Demographic transition • Demographic bonus • Timing for marriage and childbearing • Decision-making

4.1 Female Life Expectancy and Survival Rate of Women

The historical development of survival rate of women at selected age (Fig. 3.5) could also be identified in correlation with the female life expectancy (Fig. 4.1).[1] The women's survival rate increases to an upper limit from younger age at 15 to elder age at 65 with extending life expectancy. This change is almost proportional to life expectancies from aged 45 to 70. However, beyond aged 70, the survival rate at

[1] *Source*: reproduction survival rate (Statistics Bureau 2006), Historical TFR (NIPSSR 2012) and reproduction survival rate (obtained in calculation).

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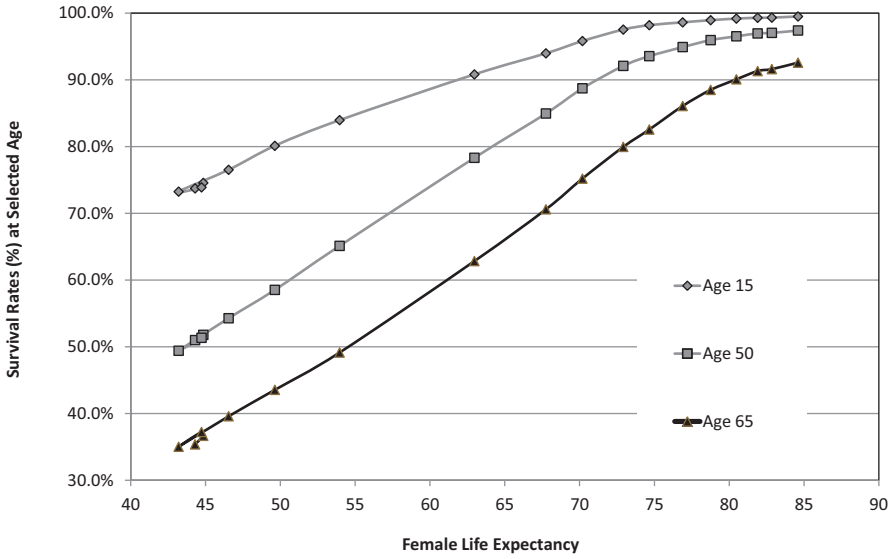

Fig. 4.1 Female life expectancy and survival rates (%) at selected age. (Statistics Bureau 2006; NIPSSR 2012)

aged 15 and aged 50 swiftly lost its upward trend and only the survival rate at aged 65 remained to grow. As mentioned in former chapter, these differences caused the effects of rising longevity on child/elder care costs.

At the same time, the rising life expectancy from aged 45 to 70 caused the proportional development of the survival possibility of women between aged 15 and 50. It means the reproductive period of woman[2] could be used more effectively. Other aspects, such as the risk of maternal mortality (the number of maternal deaths per 1000 women at reproductive age in the population) had decreased near zero.

4.2 Fertility Effects of the Rising Survival Rate of Women at Reproductive Age

Increasing life expectancy could be seen as a rising survival rate for women at reproductive age. This could raise the total fertility rate (TFR) and net reproduction rate (NRR), if women do not take any additional birth control. In other words, the risk to have too many children would be higher.

[2] It also called "reproductive ages" or "childbearing period." This period is between aged 15 and 49 (Jinkougaku Kenkyukai 2010, p. 79). Certainly, it is possible to have children out of this period but it is statistically negligible.

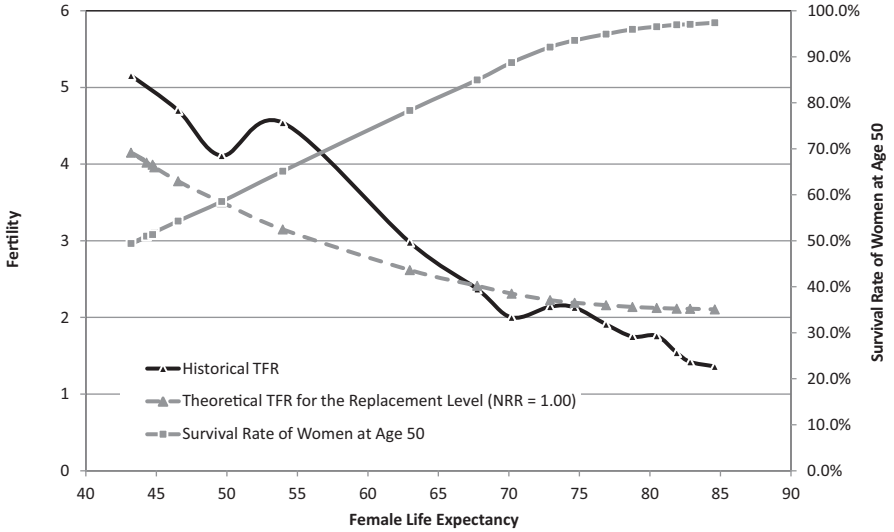

Fig. 4.2 Female life expectancy and fertility change. (Statistics Bureau 2006; Kaneko et al. 2008)

On the other hand, it could also reduce the replacement-level TFR (NRR = 1.00), because the number of births for reproduction would be fewer.

The value of this TFR is calculated as follows:

$$\mathrm{TFR}_{\text{at replacement level}} = \left(\frac{1.00}{\text{Reproduction Survival Rate}}\right) \div \left(\frac{\text{Sex Ratioat Birth}}{100 + \text{Sex Ratio at Birth}}\right)$$

Where:

Reproduction survival rate: proportion of the females will survive until completing their childbearing years;

Sex ratios at birth: the number of boys (standard value: 105) to 100 girls at birth.

Figure 4.2 shows the historical fertility development in Japan in relation to the female life expectancy. This analysis points out the change of historical TFR seem to align with theoretical replacement-level TFR (NRR = 1.00) (with a certain time lag) until female life expectancy reached 70 years. It suggests the rising life expectancy and survival rate at reproductive age increased the risk for higher fertility and the pressure for the birth control. This tells a changing condition of life expectancy development would reduce fertility.

However, once female life expectancy reached 75 years, historical TFR continued to decrease and remained below replacement level (Fig. 4.2; Statistics Bureau 2006). This would be explained later in this chapter.

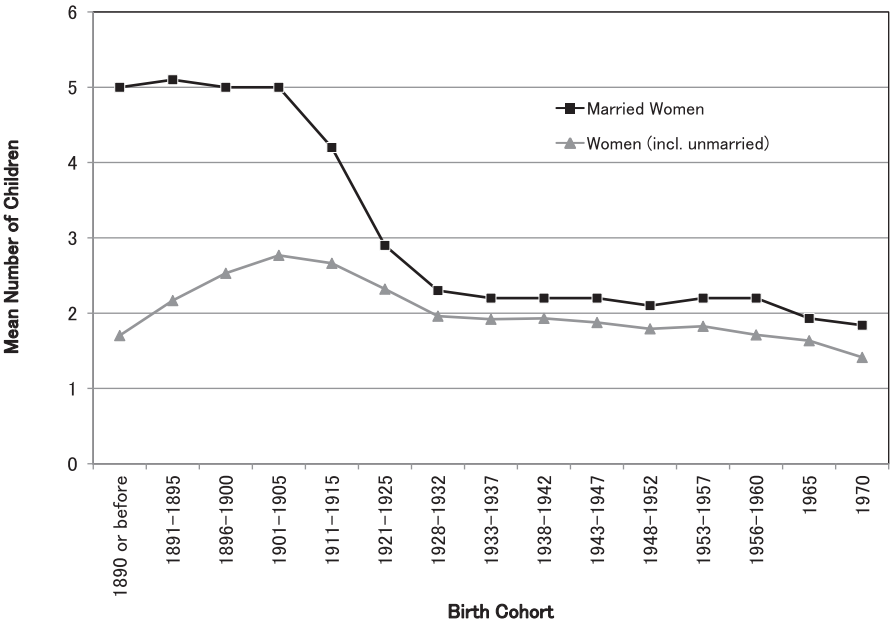

Fig. 4.3 Mean number of children ever born to women by birth cohort. (Statistics Bureau 2006; Kaneko et al. 2008)

4.3 Mean Number of Children Ever Born to Women

In fact, this historical process of decreasing fertility could be observed by the mean number of children ever born to women by birth cohort (Fig. 4.3). An average of almost 5 children was born to each married woman in the birth cohort of 1890 or before, and birth cohort of 1901–1905. In contrast, an average of 2.3 children was born to married women in 1928–1932 cohorts. This figure remained slightly over 2.0 in 1956–1960 cohorts, and started falling to 1.93 by 1965 cohort, then to 1.84[3] in 1970 cohort.

Taking into account births to unmarried women in each cohort,[4] the average number of children ever born to each woman increased from 1.70 in the 1890 cohorts or before to 2.77 in the 1901–1905 cohorts. By 1928–1932, this figure slipped to 1.96, and continued to decrease steadily to 1.71 (1956–1960), 1.63 (1965) and 1.41 (1970).

These changes suggest women were trying to have fewer children, despite natural reproductive pressure exerted by increased lifespan and survival rates at reproductive age. Additionally, the difference between married and unmarried illustrates

[3] As for the birth cohort between 1965 and 1970, the mean numbers of children among married women were estimated values from population projection of Japan (Kaneko et al. 2008).

[4] In Japan, even though the illegitimate birth rate had an increasing trend, it was still at a low level, 2.15% in 2010. Therefore, this number could be regarded as an approximate value.

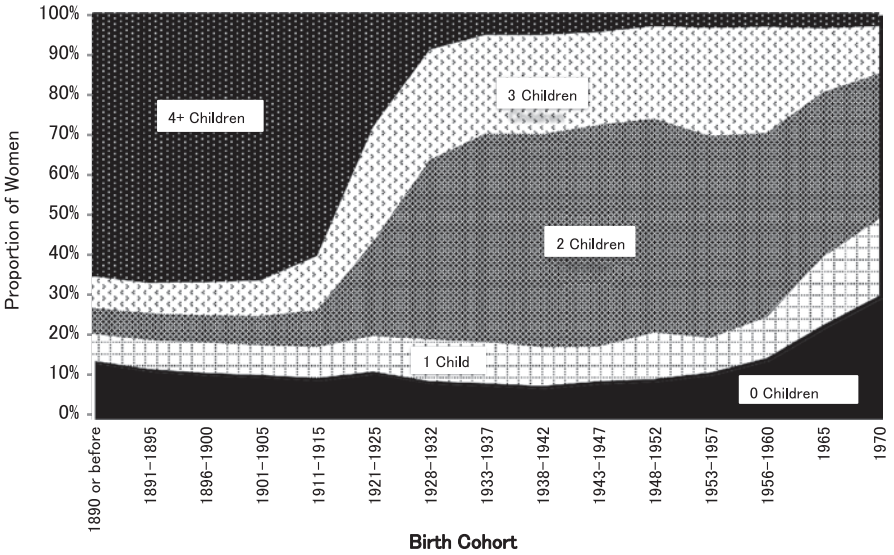

Fig. 4.4 Proportion of women by number of children ever born. (Statistics Bureau 2006; NIPSSR 2012)

the role of marriage status in regulating women's fertility. At around 1905, a relatively high proportion of never-married, widowed, and divorced women had fewer children than married counterparts (or even no children at all). The alignment of these rates from 1921−1925 onward reflects an increasing marriage rate of women in reproductive age.[5]

4.4 Decreasing Number of Children

The fertility decline could be further observed through the changing distribution of women (married and unmarried)[6] by the number of children ever born (0–4+) (Fig. 4.4).

As Fig. 4.4 illustrated, most women in the birth cohorts of 1890 or before and 1901–1905, had more than four children. However, this category began to decrease from 1911–1915 cohorts, and in 1928–1932 cohorts this category had reduced to less than 10%. As the number of women having four children in their lifetime had

[5] The proportion of never married women at age 50 was 1.80% in 1920 (1870 birth cohort). This rate was reduced to the bottom at 1.35% in 1950 (1900 birth cohort). Then, it began to increase continuously. The current level was 10.61% in 2010 (1960 birth cohort) (NIPSSR 2012).

[6] By adjusting the proportion of childlessness in married women, the proportion was based on the total population of women while adding the proportion of never-married women. In sum, one can approximately estimate childlessness of the women (Hara 2008).

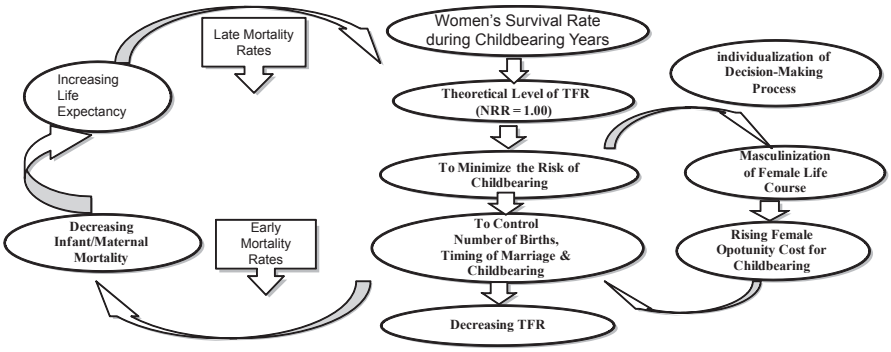

Fig. 4.5 Causal diagram of demographic transition in Japan

decreased, the proportion of women with one to three children increased comparatively. Later, women with two children dominated the 1933–1937 cohorts. Further, the share of women with only one or no children had increased since 1956–1960 birth cohorts and was estimated to fill 49 % of women in the 1970 birth cohort.[7]

This steady downward trend suggests an adaptation to the rising survival rates of women in reproductive age, as well as their children. Without this adaptive behaviour, mothers would have more children to raise, and having more children than societal average would lead both mother and children at greater risk. This type of risk-reducing reproductive decision has contributed to increase the share of women who with only one or no children. This accordingly decreased the fertility rate to below replacement level.

4.5 Causal Model of Demographic Transition in Japan

Based on the historical analyses, a causal model of the demographic transition and total care cost in Japan could be postulated (Fig. 4.5). The model describes two phases[8] of women's life expectancy: from aged 40 to 70 years and aged over 70 years.

[7] The women born in 1970 are 43 years old as of 2013 and have not completed their childbearing years. The proportion of never married women in this birth cohort was 18.9 % at the age of 40 in 2010 (Statistics Bureau 2013). The proportion of married women with only one child and childlessness was 21.3 % (13.8 % + 7.5 %) in the birth cohort of '1960–1965' in 2010 (NIPSSR 2012). According to these data, this expectation was sufficiently reliable.

[8] Instead of the expression "phase," it is possible to use "demographic transition." Then, both phases are correspond to the first and the second demographic transition as well as the demographic transition and the post demographic transition. However, the universality in case of Japan is not proved at this moment.

4.5.1 First Phase (Increase in Life Expectancy from Aged 40 to 70 Years)

Under the modernization in Meiji period (1868–1912), infant mortality rate and maternal mortality rate began to decrease. This increased the survival rate of women in reproductive age, as well as extending the average female life expectancy. These new conditions decreased the theoretical replacement-level TFR (NRR = 1.00) lower than ever, in turn it creates pressure to have fewer children. If modernization did not improve these conditions, the birth rate would have remained high or even increased. Thereby limiting women's average life expectancy and infant mortality rates, and in turn leading to a higher fertility rates.[9]

However, despite the conflict between traditional social pressures to maximize the number of births and the personal interest of women (and their children) to minimize the risk of childbearing/childcare, fertility rates decreased from Taishō period (1912–1926).

Ultimately, the increase in female life expectancy from aged 40 to 70 years, decreased the average number of children per married woman from five to two. In this phase, increasing life expectancy and decreasing fertility reduced the proportion of children to the working age population. In turn it also reduced Japan's childcare costs. Moreover, during this phase, the aged population remained small and lead to a relatively low elder care costs. These advantages contributed Japan into her "post-war economic miracle."

4.5.2 Second Phase (Extension of Life Expectancy Beyond Aged 70 Years)

In contrast, in the second phase of demographic transition, as women's life expectancy surpassed 70 years, mortality rates of children/youth and the working age generation in general have decreased to virtually zero. However, late mortality rates remain possible to decrease. As a result, this rising longevity has directly increased the total care cost. As previously highlighted, while the child care cost had stagnated at the minimum level of 0.3, the cost of elder care would grow continuously to 0.40, leading to a total care cost exceeded 0.70.

On the other hand, even if the actual fertility rate met the theoretical replacement-level TFR (NRR = 1.00) (Fig. 4.2), women's views to minimize the risk of childbearing/child care remained unchanged. Thus, from 1975 onward, fertility in the second phase began to decline, as women began to marry and have children later (age of 30 and over), and to minimize the risk of childbearing/childcare. Such risk reduction strategies including never married, having a single child and childless. Subsequently, the fertility rate dropped below the replacement level. In addition to

[9] This case would corresponded with "Malthusian catastrophe" or known as "Malthusian check."

the effect of rising longevity, the optimal total care cost increased from 0.8 to 0.9, and the population began to decrease.

In this context, even longevity continues to increase, it is possible to maintain total care costs at stable population levels if the fertility rate could reach replacement level. Such strategy would require policy measures to minimize women's childbearing/childcare risks as well as influencing the cost-benefit balance positively.

4.6 Conditions for Recovering the Replacement Fertility Level

In the first phase of demographic transition, the modernization of Japanese society was very adaptive and successful. Increasing female life expectancy from aged 40 to 70 years and reducing the average number of children per married woman from five to two; in turn, had increased the working age population and reduced child and elder care costs. This "demographic bonus" had contributed an unprecedented, steady economic growth throughout the 1960s and 1970s. This period significantly awarded Japan to her present prosperity.

One of the adaptations that Japanese society had made to this economic growth was the individualization of reproduction. The responsibility for child/elder care shifted from the family as a whole to woman as an individual, as well as the childbearing decision-making process. As women's longevity increased, there was greater incentive to reduce the number of births in order to improve the health and wellbeing of both mother and children.

On the other hand, the reduction of average number of births changed the life course of women. As the timing of marriage and childbearing became more flexible, education and employment opportunities for women had increased. As a result, more women began to prioritize education and professional attainments over marriage and childbearing. Even women who want to get married and have children, they are encouraged to prioritize education and career in order to encounter the most suitable partner. Esping-Anderson (2009) referred this phenomenon as the "masculinization" of women's life course. However, until now, a corresponding "feminization" of men's life course has not yet occurred in Japan.

Meanwhile, major social security systems for the elderly, such as medical insurance, nursing-care insurance and pensions are well established in Japan. Although the cost of elder care is not sufficiently covered, it is almost entirely socialized. On the contrary, the costs of childbearing/care are insufficiently socialized. This becomes a burden which almost entirely on the woman. Hence, the childbearing cost/benefit equation is extremely inconvenient to most women. As long as the balance remains in the negative, the recovery of replacement-level fertility is unthinkable.

Consequently, in this post-demographic transition, where women's life expectancy exceeds 70 years, Japanese society is failing to adapt the change in societal demands. After the effect of "demographic bonus" began to show weakness, elder care costs would increase gradually as an inevitably effect of rising longevity.

Simultaneously, fertility goes under replacement level has in turn transferred the total care cost to the next generations and magnify their burden.

In this process of the "demographic onus," consumption is stagnating or even decreasing due to the reduction in income-earning population. Contrary to expectations on labor shortage, supply-demand imbalance towards labor in the new global economy have raised unemployment rates and promoted irregular employment. This employment pattern has widened the income gap and stratifies Japanese society. It is because the base of national income is getting narrower.

In this changing economy, the growing imbalance between social security contributions and payment would make the entire system unsustainable. Increasing elder care costs would hinder the further development of the social security systems for childbearing/care under the never-ending financial crisis. Consequently, the burden of childbearing/care is concentrated on the individuals who want to have children and take the risk of childbearing in life course. And this would become too great to bear, especially for women.

Japan as a shrinking society, is falling into a vicious and unsustainable cycle. Within a few generations, it must confront the limits of its sustainability.

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Chapter 5
Sustainability of Japan as a Shrinking Society

Abstract The post demographic transition had generated various social conflicts. The opposing groups are children and elder, males and females, working and retired population. The basic questions are how to readjust the existing distribution schemes to this changing demographic condition and how to recover the intergenerational reproduction. Towards the future development of Japan, the most discussed topic in money market is the apprehension about the collapse of nation's finance. The growing debts of the government are reducing the fiscal flexibility and narrowing the path to the economic growth. Concerning the rapid aging and the rising dependency ratio as main factors, it is too early to worry. The answer is redistribution policy enforce the effective demand of working population, who are going to raise the child population. The relation between increasing social security cost and rapid aging population is clear and obvious. The most important point is to minimize the total amount of social security benefits and the burden of the current workers. This would help to create effective demand. At the same time, it is expected that the relative wealthy and healthy elder would expend more money from their savings and means.

Keywords Post demographic transition • Social conflict • Nation's finance • Effective demand • Redistribution • Social security cost • Social security benefit • Wealthy and healthy elder

5.1 Increasing Conflicts on the Redistribution Between Different Social Groups

As prospected in Chap. 2, the population of Japan has already entered the post demographic phase, a long period of population decline under the conditions of rising longevity and below replacement fertility. Population is expected to decrease to around 86.74 million by 2060, a 32.2% less (41.26 million) from 2010 levels (NIPSSR 2012a).

The reduction of population itself could lead to a decrease in demands and productions, if the income per capita and the labor productivity are assumed to be constant. In fact, even this assumption is too optimistic when recognizing the rapid

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aging accompanied with the population decline, the share of the elder population (65 years or older) rose from 23.0% in 2010 to 39.9% by 2060 (NIPSSR 2012a). As a consequence, the demographic care cost (total dependency ratio) on the working age population was expected to increase from 0.57 in 2010 to 0.96 by 2060 (NIPSSR 2012a), almost a double. It means the working age population, the one who are the foundation of innovation,[1] to keep or raise the income per capita and responds for labor productivity, is diminishing.

Same problem happens to child population. While the expenditure for elder care is growing rapidly, the amount of expenditure for childcare stays almost constant. It is curious phenomenon that even the prosperous society like Japan invests fewer in younger people than in elder people.

As an investment to the future, it seems ridiculous but inevitable. It is because the elder people need more care than the young. The health and wealth conditions of elder people are individually divergent due to their course of life. The rising longevity is making possible to live a longer life, 84.19 years for men and 90.93 years for women by 2060 (NIPSSR 2012a). The risk to be physically inactive and living alone at the end of life would be higher than ever, even people who had built one's family. This risk also related to having fewer children, involuntary or voluntary childlessness, divorces, unstable partnerships, and to remain single. Not only the care receivers, the carers also need health and economic support.

On the other hand, the role of women in Japanese society has begun to change. They were the main force for both childcare and elder care for a long time. Japanese housewife, 'Sengyo Shufu' (literally translated to "professional housewife"), has a respectful social status even in present stage. Japanese housewives seem to be a part of celebrities, as they could liberate from the caregiving burden by using their rich economic resources. Most women have a career even bear a caregiving burden. However, the chance for women to have decent work is basically lower than men. It is because the habit of men as breadwinner remains as the major approach.

For women, it is possible but still difficult to live alone. However, it is also difficult for them to find a partner, who could guarantee the living standard equivalent to the one she had and have certain economic power for childcare and elder care. Therefore, many of them choose to remain single.

For the young men at working population, it is not easy to find a good job to undertake the role as a breadwinner of the family. Globalization of the economic ambience has reduced wages and working opportunity for newcomers. Nevertheless, taxes and social expenditures are increasing because of the rise of demographic care cost. The young generation have to undertake the demographic care cost but they could not expect to have equivalent treat in their old age.

After the World War II, Japan is known as a safety and peace society. Traditional attitude in avoiding recognition of current social conflicts covers the reality of the crisis.

[1] That is the problem on population decline as it mainly related to social production. Although additional by educations could cover up the problem, extended time for schooling would affect the effective volume of the working age population.

The post demographic transition phase caused various social conflicts between different social groups, in consequences of population decline and rapid aging. As mentioned above, the social groups with opposing interests are children and elder, males and females, working and retired population. These conflicts were disputed over the redistribution of the social resources among different social groups due to the change of demographic conditions. The basic solution is to understand how to readjust the existent distribution schemes to the future conditions. In other words, it is to recover the intergenerational function of reproduction in the society.

If there is no change in the present distribution schemes, the social conflicts would be more visible and the society would lose the basis of solidarity.

In Chap. 2, the demographic situation at sub-national level showed the future of this country. In depopulated areas, empty dwellings are outstanding and the decrease in population density made it more difficult to maintain the infrastructures. The rising dependency ratio became a visible landscape, where child or working aged people were not easy to found and even it was rare to have an elder walking on the street. A shrinking society as such would not be sustainable at national level.

5.2 Collapse of National Finances

5.2.1 Increasing National Debt

For the future development of Japan, the most discussed topic in money market is the apprehensions about the collapse of nation's finance. In recent debates on the budget for the next fiscal year in Japanese Diet, the phrase of "financial stringency" is often used as a reason to cut social expenditure, thereby, often mentioning the rapid aging and rising dependency ratio.

In fact, according to the government financial statement (6 March 2013), the outstanding debt of Japanese government bonds was expected to excess over ¥ 1000 trillion in 2022 (Nikkei 2013). The cumulative debt (Expenditure -Revenue) of general account reached this level on July in 2012 (Fig. 5.1; MOF 2013a, b, 2014; NIPSSR 2013b). The deficit in national budget is basically covered by the issuance of government bonds. Since 2009, this deficit is larger than tax revenue, in other words, more than half of the expenditure depends on the additional national debt.

At present, Japanese government bonds (JGBs) are composed by three types: the construction bond, deficit-financing bond and reconstruction bond.

Based on the bad experience with hyper-inflation caused by wartime bonds, the issuance of government bond was basically prohibited by the Public Finance Law in 1947. However, in 1966, the construction bond was issued based on Article 4[2]

[2] Article 4 (1): "National expenditures shall be compensated by the revenue excluding those from public bonds or borrowings. However, for the source of public works expenditures, disbursements and loans, it shall be permissible to issue public bonds or make loans not exceeding the amount approved by the Diet resolution" (Enatsu 2013, p. 3).

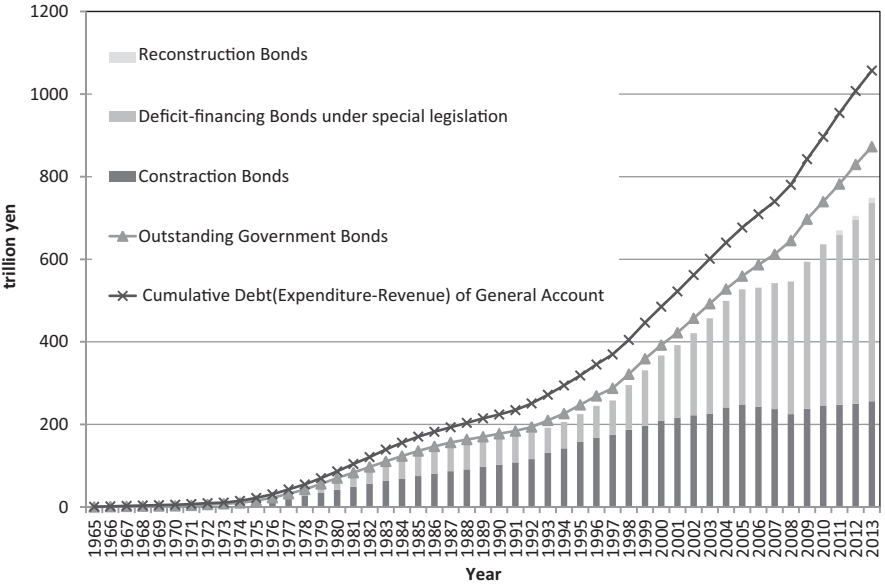

Fig. 5.1 Outstanding Japanese government bonds: 1965−2013. (MOF 2013a, b, 2014; NIPSSR 2013b)

by the resolution of the diet. The purpose of this bond was to recover the economy from "Showa 40 (1965) recession." However, since then this bond is being issued every year. The deficit-financing bond was first issued in 1975 for the purpose of economic recovery from "Oil Shock." This bond is to finance the budget deficit "in addition to the 'ordinary' construction bonds for capital investment" (See Wright 2002, p. 15). After that, this bond became larger and excessed the number of construction bond. The reconstruction bond was introduced in 2011 to support the recovery from East Japan Earthquake.

It is true that the growing government debts are reducing the fiscal flexibility and narrowing the economic growth. On the other hand, it is understandable that these enormous debts were not caused by the present economic stagnation but from the past economic policies. These policies were intended to stimulate the economy for settling economic recessions. The basic idea of issuing the bonds was the public investments by government bonds would lead to economic recovery and growth. And the growth of economy could increase tax revenue for the redemption of the public debt.

In fact, shortly after the bubble economy (1986−1991), Japanese government ceased to issue the deficit-financing bond for fiscal-year 1991–1993 (Enatsu 2013, p. 8). Therefore, the dependency ratio of the bond (the new public bonds issues divided by general account expenditure) (Fig. 5.1) stayed at a low level. Hashimoto Cabinet enacted the Fiscal Structure Reform Law (1997) to end the dependency on special deficit-financing bonds. However, the effort was suspended by the following Obuchi Cabinet.

Especially, after the financial crisis of 2007–2008, the bond dependency ratio was raised to 50 % for the first time in the budget for fiscal-year 2009 (Enatsu 2013,

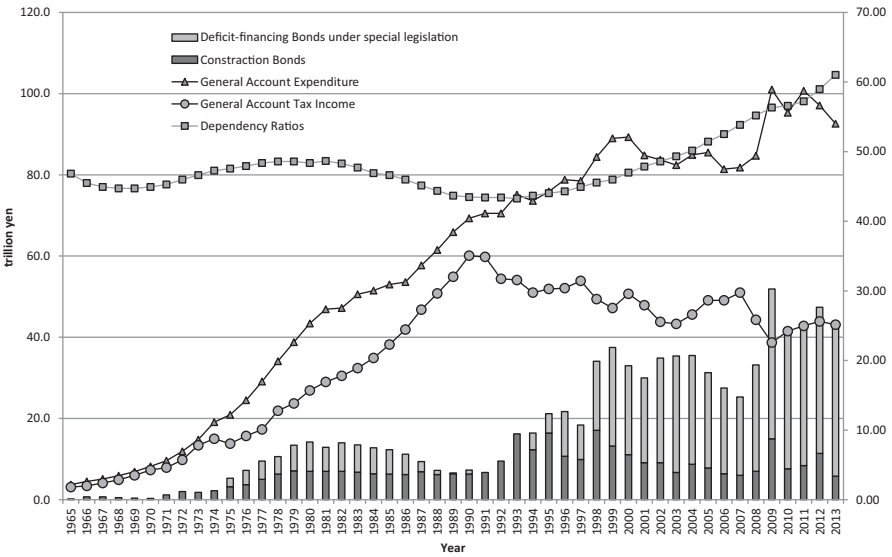

Fig. 5.2 Historical relationship between aggravation of the financial condition and dependency ratios. (MOF 2013a, b, 2014; NIPSSR 2013b)

pp. 8−9). The bond dependency ratio remains at a high level until now. This high level of dependency ratio is partly due to the increasing amount of national debt service in total expenditure. The national debt service is the budget for the redemption of the public debt (including interest). This amount exceeded ¥ 20.6 trillion and more than 22.4% of the general account expenditure in fiscal year 2010 (MOF 2013b). This amount and proportion in total expenditure are expected to increase continuously with the growing national debt.

5.2.2 Demographic Impact on National Finances

Consequently, the collapse of the national finance is predicable. It is because of this deficit-financing structure and the general idea towards bond issuance in the national budget planning for economic recovery. However, concerning with the rapid aging and the rising dependency ratio as main reasons, until nowadays, it is too early to apprehend.

Figure 5.2 shows the historical relationship between the aggravation of the financial condition and demographic dependency ratios. As mentioned in Chap. 2, the demographic dependency ratios of Japan between 1965 and 1995 were almost reached the lowest level which allowed the Japanese economy enjoyed "demographic bonus." The actual value of total care cost reached its lowest level in 1990, at 0.44. After then, it began to increase but still at 0.61 in 2013. This value is expected to increase to 0.96 by 2060. By 2110, it would reach 1.02 (in auxiliary projection) according to the medium-fertility projection (NIPSSR 2012).

In contrast to the development of demographic dependency ratios, the aggravation of the financial condition shows an incremental development, especially in the case of general account expenditure. This trend existed long before the ending of the "demographic bonus."

As mentioned before, the divergence between expenditure from general account and tax income is compensated by the issuance of government bonds. The divergence has increased rapidly since 1992 according to a decrease in revenues by taxes. This suggests that it is not easy to recover the tax revenue under the condition of increasing demographic dependency ratio.

That means the basic idea of the bond issuance should be changed. This idea is outdated because the working age population, which is the taxpayers and the child population as additional newcomers in consumption market are shrinking. As they are the basic effective demand for economic growth.

In fact, the huge outstanding of JBGs is undertook mostly by Japanese banks and institutional investors. Their resources are deposits and savings of enterprises and individuals (above all, retired and aged persons). Under the condition of decreasing effective demand and unstable money market, JBGs are the most secure investment with relatively high return and face no risk in foreign currency movement. As a result, the deficit of income tax revenue compensated by JBGs do not stimulates the real economy and stagnate the money market. The excess liquidity from JBGs has turn into speculative money games and destabilized the money market.

Redistributing policies to enforce the effective demand of working population, who raise the child population is an important issue. Without any strong redistribution policies to increase income tax revenue, the outstanding of JGBs would continue to increase. It would expand the volume and the proportion of the national debt service in expenditure under the condition of increasing demographic dependency ratios. In this context, the present National Finance system of Japan is not sustainable in long term.

5.2.3 Redistribution Policies

To enforce the effective demand, redistribution policies should be strengthen. The winner of the Nobel Prize in economics, Josef E. Stieglitz, wrote in his book, *The Price of Inequality* (2013, p. 89); the irony is that just unequal outcomes, tax policy asked less of the top. The top marginal tax rate decreased from 70% under Jimmy Carter to 28% under Ronald Regan. It went up to 39.6% under Bill Clinton and dropped to 35% under George W. Bush.

The upper limit of income tax in Japan was also reduced from 70% (1984−1986) to 50% (1989−1998), 37% (1999−2006), and then increased slightly to 40% (2007−). Simultaneously, the progressive tax was also reduced from 15 (1984−1986) to 6 steps (MOF 2013c). As generally known, a reduction in upper limit and weakening the progression in taxation would promote inequality in after-tax incomes and transfers. Stieglitz did not mention the demographic aspect of the inequality problems. However, in the case of Japan, the expanding life expectancy could also enlarge the variance of income distribution, as cumulative impacts of individual life course.

Thus, income tax allocation policy is needed to shift the tax weight from low-middle income class (relative young population) to middle-high income class (relatively aged population). Obviously, even they are not easy to be carried out under the present circumstances of globalization, the tax rate on capital gains and inheritance tax should be raised in the same context[3].

At present, Japanese government follows the tax policy to raise the consumption tax rate from 5 to 10 % as the financial resources for rising social security cost (above all for Basic Pension Scheme). Basically, the consumption tax functions as regressive income tax, especially to the low-middle income class (relative young population). Thus, this tax policy is inadequate as a countermeasure for a shrinking society. It is because it reduces the effective demands for the economic growth and enlarges the inequality in income distribution.

5.3 Social Security Reform

5.3.1 Increasing Social Security Cost

The relation between increasing social security cost and the rapid aging of population is clear and definitely. The curve of the social security benefit as a part of national income shows almost the same developing trend with the proportion of aged 65 or older among the total population (Fig. 5.3). However, the development of social security benefit began to accelerate since 1974. In particular, the amount of pension and medical care started to increase faster than the speed of aging. It is related to "Fukushi Gannen (the first year for welfare society)" in 1973 (JICL 1973). In this year, Tanaka Cabinet declared the start of constructing a welfare society. This cabinet made the people who are aged 70 or older enjoyed free medical care and this shifted up the scale of pension benefit significantly. As a result, the social security expenditure went up to 15 % of national finance for the first time. However, after the 'Oil Shock' in 1974, the economic circumstances and Japanese economic growth were totally changed. But the legacy of this welfare policy remains behind.

The Japanese pension system is not based on the defined contribution (DC) plan but on the defined benefit (DB) plan. In a DC plan, contributions are paid into an individual account, which is used to provide retirement benefits. In short, the contributor would be the recipient of pension from his own contributions. This system is clear and easy to understand but it depends on one's performance and the fund also faces security risk.

By contrast, in a defined benefit DB plan, the pension is determined by a set of formula linked with wages, years of employment, age at retirement, etc. The benefits are paid by current workers' contributions and taxes. Thus, the recipients of pension depend on the current contributions, in other words, they are paid by the "next generation." This system is complicated and difficult to understand but could be stable and sustainable under the condition that elder dependency ratio is relatively

[3] Namely, the risk for the capital and wealthy people exodus is not excluded.

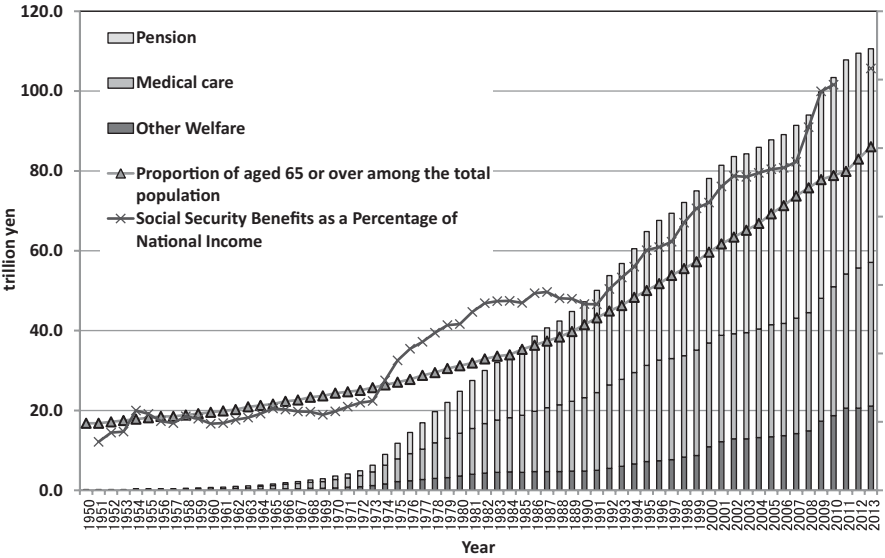

Fig. 5.3 Social security benefits and population aging rates. (NIPSSR 2013a)

low and economic growth is high. However, under the present conditions in which elder dependency ratio is increasing and the economy is stagnating, the imbalance between benefits and contributions is automatically increasing in the near future.

Thus, the Japanese pension system has been reviewed and reformed. In the 2004 revision, also called 'Hyakunen Anshin Nenkinn (Safety Pension Plan for 100 years)', the benefits and burdens are readjusted. Accordingly, the benefit level should be over 50% (currently 59.3–50.2% from FY2023 onward) of the average income of a household with an active salaried worker. As for the premium burden, Employees' pension (currently 13.58%) and National pension (currently ¥ 13,300) would be increased to 18.30%, ¥ 16,900 from 2017 and so on. It also decided that the state subsidy would cover 1/2 of the basic pension fund by 2009 (MHLW 2013a). Even though there is such a reform in pension system, the reliance on system is not high in public opinions.

According to a questionnaire about reliance on pension system, 77% of 20s, 83% of 30w, 53% of 60s, and 45% of 70s answered "no." It is clear that many Japanese do not trust the pension system (Asahi Shinbun 4th October 2013).

The medical care cost is also expanding in proportion to an increase in elder population. Towards this, the health care insurance system has been reviewed and reformed too. Especially, in 2008, "late-stage medical care system" for the elderly was introduced. This system is designed for the people who are aged 75 or older. This system also independents to other medical care accounts. The financial resources are derived from public funding (50%), support coverage of other medical care funds (40%), co-payment (10%, and 30% for people who with more than a certain level of income) (MHLW 2013b). By separating from others, this reform opened a possibility to control the high expenditures on late-stage medical

care. However, according to the population projection in medium variant (NIPSSR 2012a), the share of this late-stage age group (75 years or older) in the total population would continue to increase from 11.1 to 26.9% by 2060. It would be larger than the share of the "early-stage elder age group" (65−74 years), which was expected to be 11.9% in 2010 and raised to 13.0% by 2060.

The cost for other welfare is also rising due to different reason. After the bubble economy (1986−1991), the cost for the employment insurance and the public livelihood aid were expanding. It reflects the increasing inequality among jobless young generations under the economic recovery. In addition, the elder people who could afford neither health care insurance nor pension system were joining this trend too.

As a whole, the present social security system is not sustainable in long term. It is because most of the expenditures are applied to the elder population who are rapidly increasing. At the same time, the contributions of the working aged population are shrinking. Thereby the problematic point is the proportion of pension and medical care in social security expenditure is expanding. They are depriving the resources of other welfare services, those that support the working aged population who are responsible to reproduce next generations.

5.3.2 Necessary Changes to Sustainable Social Security System

The total amount of social security benefit was growing from ¥ 0.157 trillion in 1951 to ¥ 103.4 trillion in 2010. As a percentage of national income, this covered 29.6% (Fig. 5.3).

Curiously, this huge volume of expenditures did not show any visible impact on real economy. This suggests that most of the elder people keep their savings and means untouched by using their social security benefit only. Many of them did earn well and had saved enough during the growing economy in the past. Many of them could own their own houses and cars before retirement. Even, the relation between benefit and burden of pension system, they enjoyed much better conditions before the revisions.

Most of elderly are retired and might have not enough income for living and medical care. However, many of them are prudent to expend their savings and means. This could be because they are afraid that the social security system would collapse. In a general way, they are preparing for a reduced pension and increasing co-payment at late-stage medical care. In addition, they could not find any good investment methods for their savings, which could stimulate the real economy.

As mentioned before, both pension and medical care benefits in Japan are originally conceptualized as an insurance system based on an intergenerational contract (see Chap. 2). That means the working age generation are obliges to support the following generation and the preceding generation. As a matter of fact, both pension and medical care benefits are paid by current workers' contributions and taxes. And the preceding generation is insured for the late stage of their life as their contributions are recorded during their working age. However, this never means the working age generation should care all of the preceding generation, including those who have enough competent to live by themselves.

In this context, the 'Fukushi Gannen (the first year for welfare society)' created by Tanaka Cabinet had leaded a wrong image about the welfare society. In which a retired person could afford the expenses of his/her life only with his pension benefits, and without any co-payment for his/her medical care. The real purpose of the social security system is to ensure everyone; even incompetent people could afford to live. In this context, the scheme of social security service should be transformed from 'benefits based on contribution' to 'benefits based on the needs and the contribution according to competence'. In such case, the benefits from pension and medical care should be defined and guaranteed as national minimum, which including the part from recipients' own payment. The total amount of social security benefits would be essentially constricted to the minimum.

As a result, the relatively wealthy and healthy people would receive almost nothing from the benefits even they have relatively high contribution in the past. It is because they have enough money and mean to afford their living after retirement. They would have to pay the late stage medical care fee without public subsidy. Hence, everybody should be insured for a national minimum even elderly or incompetent.

The most important point of this change is to minimize the total amount of social security benefits and to reduce the burden of current workers' contributions and taxes. By doing so, effective demand would be created. It is also expected to see the relatively wealthy and healthy elder people would expend more money from their savings and means.

To well function this social security scheme, it is necessary to rationalize the information processing of social security accounts. Both contribution and benefit as well as pension, medical care and other social welfare. At present, most of the social security services in Japan based on the self-declaration. This makes the control of social security account complicated and difficult to measure recipient's income and means. Thus, the system should be changed from self-declaration to automatic assessment which is linked with taxation system.[4] It could reduce the huge overhead costs and improve the efficiency of the system operations. Furthermore, it would be possible to expand the range of recipients to all age groups by achieving national minimum. Theoretically, it could be seamless service for entire life course, which is independent to age categories.

5.3.3 Expanding Life Time and the Role of Social Security Service

In Chap. 2, it told the life expectancy of Japan was expected to grow from 79.64 years for men and 86.39 years for women in 2010 to 84.19 years for men and 90.93 years for women in 2060. The demographic care cost (total dependency ratio) on the working age population would increase from 0.57 in 2010 to 0.96 by 2060. Even under the replacement level of fertility, the long-term minimum cares cost would increase from 0.71 in 2010 to 0.79 by 2060.

[4] It does not exclude the right of self-declaration but the linkage with taxation system would simplify the means test.

This fact shows there is no other choice for the present system to maintain, except minimizing both total amount of social security benefits and the burden of the current workers' contributions and taxes. It could not be sure that the national minimum would be enough to sustain the living of late stage of elder people. If not the case, the life expectancy could be reduced.

On the other hand, we could expect that there would be an increasing number of elderly who are competent to live for a longer life without social support. Those would be more wealthy and healthy than the elder people in the past.

The basic scheme of the present elder care system was created at the early stage of the industrialization. At that period, the working conditions were harder and more unstable than present; the average life span of the earners and the retired people were basically shorter than now. Therefore, it was almost needless or did not expected the need to prepare for the risk for long life by own saving. Especially, the DB plan was designed by the demographic condition, where relatively large working population as contributors to support the relatively small elder population as recipients. In this context, the elder care was a sort of the rewards for a long life by fortune.

In contrast, the basic scheme of the future elder care system should be based on the post-industrial information society, which the working conditions are not hard and stable (theoretically, at full employment economy). Besides, the average life span of the earners and the retired people would be longer than ever. For most of the working population, it is necessary and also possible to prepare for the risk for long life by own earning and saving. The important point is to create effective demands for the working population and to develop a safety net of elder care system for misfortunes in a long life. For this case, national minimum should be enough.

Furthermore, the definition of "working age" should be extended. In fact, the mandatory retirement age in Japan has shifted from 60 to 65 and age of receiving pension benefits is going to be raised gradually from 60 to 65 (males by 2025, females by 2030) (MHLW 2013c). Considering job opportunities for younger generation are not affected, it should not be harmful to increase the volume of working population and effective demands by increasing the mandatory retirement age.

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Chapter 6
Policy Measures for a Shrinking Society

Abstract Without recovering to the replacement fertility level, the "Clear and Present Danger" of a shrinking society could not be avoid fundamentally. For this purpose, it is necessary to take up various policy challenges in different fields. For family policy, the idea that childbearing and childcare exclusively belong to the individual responsibility of parents should be changed. Society should also bear responsibility for childbearing and childcare in terms of reproduction to keep it sustainable. It is important for the Government to have a clear message in recovering fertility to replacement level as policy target. If the main target is to refine the social reproduction, the budget scale for family policy would be ten times more than of present. Even the massive immigration could not stop the rapid aging and population decline of Japan. It should be far more effective as a counter measure for the globalization, to prevent the overseas transfers of domestic corporations and capitals than to promote immigration. The local administration systems should be adjusted for population shrinking. They should be selected, concentrated and reorganized, under the changing conditions of traffic, information, communication technologies and networks.

Keywords Family policy • Social responsibility • Reproductive right • National Eugenic Law • Umeyo Fuyaseyo • Gender equality • Childcare allowance • Career design for next generation • Immigration policy • Local administration

6.1 Family Policies for Recovering Replacement Fertility

6.1.1 Social Responsibility for Reproduction

As well as elder care, in terms of childcare the family policies should fulfill the most important part of an intergenerational contract, in which the working age generation could oblige to bring up the next generation. Without a recovery to the replacement fertility level, it would be difficult to avoid the 'Clear and Present Danger' of a shrinking society. For this target, it is necessary to have various policy challenges in various fields.

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First of all, it is important to change the idea that childbearing and childcare are individual responsibilities of parents. According to the classical economics as well as Neoclassical economics, children are private goods that are the objects for private investment and consumption. Therefore, family affairs usually regarded as private matter, not to be intervened by others. However, in the era of post demographic transition, a society should also take responsibility for childbearing and childcare in terms of reproduction to keep its sustainability.

This never means a denial of the reproductive right and health for individuals. By contrary, it means the affirmative of social duty to grantee individual right and freedom in making decision on having children (including the option of having no child). The most important point is the individual decision is accepted, blessed and supported by the society. Risk should not be left alone for individual. Such idea is never new but was standard in the past.

Japan has experienced the nightmare of pro-natalistic policy around the World War II. Therefore, it should careful to keep out of the way to the National Eugenic Law (1940), which intended to promote 'Umeyo Fuyaseyo (more births, more increase)' for militarism. Family policies need not to be nationalistic or pro-natalistic but have to support the individual right and freedom at decision making on having children (including the option of having no child).

Nevertheless, it is important for the Japanese government to send a clear message as a political campaign which the society is ready for the mission to recover the fertility to replacement level as policy target. The 'Kodomo Teate (child allowance)' Law introduced by the Democratic Party of Japan (DPJ) in April 2010 (grants ¥ 13,000 per month to parents who have children under or at the age of 15 (Wikipedia 2014) was expected to be a political campaign. However it was revised shortly after the regime has change to Liberal Democratic Party (LDP). Therefore, it was too weak to be a message and to show a clear policy target. Generally, it is important to remove the attitude of skepticism among the young generations.

6.1.2 Promotion of Gender Equality in Japan

There is certain space for Japan to improve gender equality. The gender roles on childbearing and childcare should be adjusted to equal partnership based on the principle of common duty and responsibility. This never denies division of labor by gender. According to the principle, each role in a family should be dealt with consensus of both sexes. There would not be any prescribed role to remain except being pregnant.

In this context, Japanese society is well known as difficult to change. According to the international comparison (2011) (JILPT 2013b), in Japan the daily average time used (hours and minutes per day) for "Domestic work and care" was 1.08 for men and 4.02 for women. In contrast, those for "Job and activities related to employment" was 4.57 for men and 2.27 for women. In Sweden, it was 2.33 for men and 3.44 for women in "Domestic work and care," and 3.57 for men and 2.40

for women in "Job and activities related to employment." This tells Japanese men used up too much time for job activities and too little time for domestic work. Furthermore, there are many fathers living alone for years, who have taken a job post and have to leave their families behind.

These circumstances are not uncommon in Japanese family. However it does not have roots in either Japanese tradition or culture. They are generated by the contemporary working style of Japanese bureaucracy and corporate culture. That is a negative legacy of Japan from "post-war economic miracle" in 1960s–1970s. Conversely, if there are some affirmative action or the gender diversity campaign in central government agencies and major business enterprises. It could say gender equality in Japanese family would come soon.

6.1.3 Family Policy Measures for the Social Reproduction

Family policy measures, such as childcare allowance, childcare leave and nursery schools, are gradually being strengthened in the Japanese society. However, the concept of these measures is based on the idea to support children who are suffering from lack of care or low income single mother. The policies do not have any meaning and intention to support individual in common, that takes care of children. If the main purpose and the target of the family policy are to refine social reproduction, the budget scale for the policies should be ten times [1]more than the present. That would not stay at the level of the family support, rather the income redistribution policy for next generation.

6.1.4 Career Design for Next Generation

Same sort of policy changes is needed in the fields of career design for next generation. The critical condition to realize the recovery of fertility to replacement level is to change the cost/benefit balance of childbearing and childcare, especially towards the women. For this purpose, it is necessary to support the career design which is child-rearing friendly. It is difficult to harmonize the extending years of education and the timing of family formation in Japan. Therefore, it is necessary to support a flexible design of career course among people of higher education and their job hunting.

As mentioned, it is possible to assume a sort of social contract in human society that the working age generation is responsible for raising the following generation in pre working age and to take care the preceding generation in post working age. In this case, the massive shift of social capital to the former part of this social con-

[1] Only 4.3% of the public social expenditure was used in the family policy area. In contrast to 46.4% for the elder age, 31.9% for the Health. This accounted for only 1% of GDP of Japan. JILPT (2013a).

tract should be realized. Obviously, the latter part of the contract with the preceding generation must be performed as far as possible. Nevertheless, the former has a higher priority to the latter. It is because the society would be unsustainable without alternation of generations in reproduction.

6.2 Immigration Policies and Globalization of Japanese Society

6.2.1 Immigration Policies

According to the Economist's future prospect, Japan would lose her presence among the growing share of Asian economy. That would be almost half of the world GDP (48.1%). In contrast, Japanese share is shrinking from 5.8% in 2010 to 1.9% by 2050 (Franklin and Andrews 2012, p. 178). Even though demographic impacts on GDP development are hardly to estimate, it is not easy for Japan to keep the present status in global economy under rapid population decline and a shrinking working population. Besides, under the globalization it becomes more difficult, as the conditions for national competitiveness would be homogenized in terms of political, economic and technological power.

Even though, as counter measure for globalization, it could be a wrong choice to promote massive immigration for the purpose to stop rapid aging and population decline. The Japanese labor population began to shrink from 67.93 million in 1998 and had continued to fall. The Japan Cabinet Office estimates It would be 37.95 million in 2060 (Nikkei 2014). However, the main problem for Japanese economy is not labor shortage but lack of job opportunities, especially for young labor population. It is caused by corporate and capital movements which shifting production overseas for less expensive manpower and this hollowing-out the domestic industries. Massive immigration could reduce job opportunities and wages for local young labor population as imported manpower would generate intensified competition in the job market. Such effect of bring down the cost of labor power should be basically limited in global economy. It also could not raise the national competitiveness of Japan. When the (average) wage is lower than the global market, Japan would not be attractive for immigrants. In addition, most Asian couturiers face below replacement fertility and rapid aging, they could not be the supplier of young labor power to Japan eternally.

Furthermore, a successful acceptance of immigrants would generate additional social cost. Even young immigrants could be well adapted to Japanese society, get marriage and build their own family; they usually need more social support than local Japanese. Therefore, rather than spending extra resources to support immigrants, it would be more effective to recover the fertility to replacement level by using the resources to support Japanese young generation.

As a good example, a demographic study of impacts on social security to the future (Ishii et al. 2013) showed a simulations in population change under the condition of accepting foreign immigrant in Japan. According to the results of this study, the foreign immigrants could only shift the increase of social security cost in the future. And the effect of immigrants in reducing social security cost could only be realized under the assumption that immigrants reproduce themselves as much as Japanese.

6.2.2 Globalization of Japanese Society

In this context, it should be far more effective as a counter measure for the globalization to prevent overseas transfers of domestic corporations and capitals than promoting immigration. For this purpose, Japanese government could enforce taxations on Japanese enterprise managers, investors and pensioners who live abroad and could execute controls for the movement and the out flow of domestic income, capital and saving to overseas in cooperation with other OECD countries.

Counter measure against globalization is often criticized by neo-liberalism in terms of promoting free trade. However, the rapid capital transitions from country to country in seeking less expensive manpower have hollowing-out the domestic industries in many countries. This situation is not only unsustainable because of diminishing new targets but also harmful to the development of world's economy. Especially, in terms of realizing the global optimal location and establishing international divisions of labor. Because, under the circumstances of rapid capital transitions,any domestic industry could not survive and up grow. In addition, the nationals in a country have proper rights to prevent the out flow of domestic income, capital and saving to overseas. The reason is no industry could grow up without social investments by the nationals, which provide infrastructures and public services for education, healthcare, social securities, etc.

It is clear that for a successful globalization, Japanese society should be more open for foreign corporations, capitals, and investment. Not only economy, but also in the field of culture and education, Japan has to accelerate interplay between foreign countries and enhance an atmosphere to accept other cultures. This would help to attract more immigrants to Japan and stimulate the future of the country.

6.3 Selections and Re-concentration of Communities

6.3.1 Sustainability of Regional Communities

As mentioned in 2.3, the depopulations at sub-national level represent the future development of Japan as an early warning. In fact, most of the regional communities in Japan have already confronted depopulation and rapid aging. Between 2005

and 2010 Census, the depopulation area reached 75.2% of municipalities. 46.6% of them would lose 20–40% of residents in 2010, 22.9% would lose more. 6.3% would lose even more than half by 2040. Among 5.2%, the elder proportion have exceeded 40% and those area would be increased to 49.7% by 2040.

This rapid aging does not only caused by expanding longevity but also due to a structurally fixed outmigration of young age population. While young population go to large cities for education and job carrier and the elder population is left behind. As a result, the dependency ratios would exceed 0.90 by 2040, in 67.8% of the present regional communities.

The question is if a regional community has a dependency ratios over 0.90 will be sustainable or not. In fact, there are some communities or rural hamlet district, where a dependency ratio has exceed 1.00 at present. In other word, the elder (aged 65 or older) proportion among inhabitants is over 50%. According to Akira Ohno (2008) these communities are called "Marginal Settlements" or "Marginal Municipalities". Recently, they could be observed not only in depopulation area, they could be also found at the old housing complex area where located in the periphery of metropolis. There is controversy as to whether these areas were confronting crises of diminishing or still surviving. Even though, it is hard to imagine after 30 years these areas would be supported from the surrounding neighbourhood communities, municipalities, local government or even national government. It is because the dependency ratios would exceed 1.00 for more than half of regional communities in Japan.

Assumed that these areas could survive, the population density of the communities would decrease continuously as far as the outmigration trend of young age remains constant. With such low population density, it would be difficult to keep and renewal the infrastructures like roads, water supply and sewage system, electricity and communication systems, etc. Therefore, most of these areas would be isolated and could not function as a regional society. At the end, these areas would diminish, as a self-governing body.

Sustainability crises would appear in regional communities faster than national level. However, in long term, nation as a whole would face the same problem.

6.3.2 Reform of Local Administration System

In Japan, the Comprehensive Decentralization Law which clarifying the roles between central and local governments was enforced in April 2000. Under this law, a nationwide campaign was conducted to promote annexation of municipalities. As the results of this 'Heisei No Dai Gappei' (the Great Merger in Heisei Era), the number of municipalities was drastically reduced from 3232 municipalities as of 31 March 1999 to 1730 by 31 March 2010.

The Ministry of Internal Affairs and Communications reported that the positive effects of this annexation were: (a) enforcement of public service system for inhabitants through the allocation of professional staffs, (b) coping with an aging society

with fewer children, (c) community development over a wider area, (d) optimization of administration and public finance through reallocation of the personnel and scrap-and-build of public facilities.

At the same time, negative effects were also being indicated: (a) lowering the vitality in communal activities at the areas where have become adjacent areas by annexation, (b) losing power to influence community affairs, (c) weakening the public service through expansion of community areas, (d) loss of geographical name of former municipality etc. (MIC 2010).

In addition to the annexation of municipalities, Japanese Government is executing 'Three-part Reform Package' (i.e. reforms on state subsidies, local allocation tax and allocation [including transference] of tax revenue sources). In spite of these, strengthening the fiscal foundations of municipalities by annexation was not enough to achieve such purpose. The number of communities confronting financial problems is still increasing, where local government bond was exceptionally issued during annexation.

Certainly, the positive effect of annexation of municipalities could be expected to enforce the regional sovereignty by stepping up the administrative and financial foundations through the expansion and reorganization of community area. However, it could not change the location of dwellings and inhabitants. Thus this effect is basically limited. Therefore, appropriate option except for annexation should be selected case by case, including wide-ranging collaboration with nearby municipalities and the reception of assistance from their prefectures. On the other hand, the decision making for the annexation depends primarily on the initiatives of concerned municipalities at present, which based on the idea of regional sovereignty. In future, conditions, such under certain restrictive such as finance crisis, the national government or the prefectures government would be urged to give advice or recommend for the annexation of concerned municipalities. In addition, the present local government system, including not only municipalities (i.e. the city ('shi'), ward ('ku'), county ('gun'), town ('machi'), village ('mura')), also a city designated by government ordinance ('Seireishitei toshi') and a prefecture ('Ken') should be boldly refined in accordance with the emerging situations of "Shrinking Society". For the historical backgrounds of the present system are the 'Fuken' (prefectures) system, 'Haihan-chiken' (the feudal domain system was replaced by the prefectural system) which was introduced in 1871 and the City-town-village system was introduced in 1889 during Meiji Era. They were designed to promote the centralization of power for the modernization of Japan and had been partly adjusted according to the historical changes. Therefore, they were not necessarily to consist with local history and traditional culture before the Meiji Era. Also, they are not well coordinated with the industrial, economic and demographic conditions of today's Japan.

Consequently, the local administration system in Japan should be reformed to adjust for promptly "shrinking" local societies. System have to be carefully selected, concentrated and reorganized under the changing possibilities of traffic, information, communication technologies and networks. They could be the wider-ranging autonomous bodies like 'Doshu Sei' (district-state system). In current topics, highly independent autonomous cities are more developed form of present 'Seireishitei

toshi' and the autonomous bodies for functional collaboration with municipalities, such as energy, traffic, culture, education, various administrative procedures, and advances made by information and communication technology (ICT). Therefore, it is important to develop functionally, more advanced and diverse local administration systems.

6.3.3 Regional Community and Inhabitants

How advanced local administration systems would be reformed, the relation between regional community and inhabitants should be drastically changed in the rapid "shrinking society."

At present, most of the inhabitants in Japanese regional communities recognize themselves merely as "a recipient of public community services." Nevertheless, the function of regional administration system as "a provider of public community services" would be inevitably weakening in accordance with the shrinking number of inhabitants. This also means a reduction in tax resource. Thus, the inhabitants should take a role of "an active administrator and a main member of the regional community." Similarly, the enterprises, the educational institutions and the other local groups should undertake tasks for community services as "an active stakeholder in regional interests" from the position of "a marginal interested party." Furthermore, people living apart from the regional community and various kinds of organization could join the communal activities as supporters. These types of community members are supporting the voluntary activities such as recovery/reconstruction support for the Great East Japan Earthquake, workshops for cooperation in "making planning for a city" and the local tax exemption which is introduced in 2008 and named as 'Furusato Nozei Seido' (Hometown Tax System[2]).

Hence, the responsibility for community management in terms of revenue (including tax income) and expenditure would be literally owned by inhabitants. The role of administration staff should be service management, in which few selected professional personnel have to in contact with inhabitants. This could be done by outsourcing. And the autonomous bodies for the functional collaboration with municipalities would perform most of routine of public services.

In changing relation between the regional community and the inhabitants, the present representative institutions should be in various fields, from local neighborhood association to a local assembly and local (and national) election systems.

Furthermore, the inhabitants in a community as "a shrinking regional society" would be confronted with a serious of decision making on their community destiny for the future. If they would choose the positive option, they should reconsider and redefine their community identity, the main functions to be sustained, such as work-

[2] In principle, donation which is over ¥ 2000 to any prefecture or municipal (including ex-home town) would be exempted from individual income tax and local income tax. For example, a salaried employee (married and without child) with an annual income ¥ 7000,000, a donation of ¥ 30,000 could help to exempte ¥ 28,000 (excepted ¥ 2000) (MIC 2009).

ing place, resident, culture and education etc. They have to realize the future of their community by their own initiatives.

6.3.4 *From Merely 'Shrinking' to 'Selection and Concentration' for Newly Designed National Land Use*

Based on the 'Kokudo Keisei Keikaku' ('National Spatial Strategy 2008' National Plan (July 2008)), the National Land Council has published a brief report called "Aratana Kokudo No Gurando Dezain" (the New Grand Design of the National Land) (Mlit: Ministry of Land, Infrastructure, Transport and Tourism 2014) in March 2014.

This report emphasized the necessity of common recognition on national crises, such as the sustainability of regional societies, the possibility of gigantic disasters and so on. It mentioned at the beginning that rapid population decrease, aging society and fewer children are the most important issues by 2050. More in detail, this report expected as the preconditions for the new grand design of the national territory, the number of total population would be around 97 million by 2050. Approximately 60% of the whole regions would lose more than half of their inhabitants and one third of them would be uninhabited. The population-aging rate in regions would be beyond 40%, which was never experienced in world's history.

The basic structure of the present land use in Japan was determined by the National Spatial Strategies, which were designed under the precondition of increasing population. In contrast, under the precondition of decreasing population, there is a need to establish a new spatial strategy in long term, which is based on the future layout of industries, traffic, energy supply, natural resources and so on (Hara 2007, 2011). In this meaning, the outcomes of the New Grand Design of the National Land are expected with great hope.

Above all, the regional population estimation based on 1 km mesh-data was published at the same time with this report. The map showed the future development of communities along with spatial concerns. This is the first step to classify regions by time and space, which would be used more, less or never in future.

In fact, the shrinking regional societies have been confronting serious problems, such as destroyed scenery with deserted and ruined houses, increasing criminalities in areas that elderly living alone, the damages and dangers of natural disasters, etc. However, under the present legal framework, swift administrative responses to those problems are quite difficult. It is because the problems are linked with the protection of property and inheritance rights of individuals. In this context, a new public law is needed to limit those rights to promote prompt action and development of land use in local communities, as well as in metropolitan area and the use rights of air and underground.

With such a new legislation, together with maintenance and renewal of infrastructures, protection of natural environments, new layout plan for the whole Japan, including redeveloping the regional communities is needed. In particular, it is

important to have industrial and economic policies to create working opportunities in regional communities for the young generations, who are going to have their families.

It is important to recognize the prerequisites of such new layout plan, such as active commitment, selection and consensus on the future development of the region among the inhabitants. At the same time, participating communal decision-making and activities by own initiatives should be conditioned as a duty for the new comers including foreign investors and immigrants.

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Chapter 7
Epilogue: The Principle of the Sustainable Population

Abstract For the convergence of the shrinking society, it is important to recover the fertility back to the replacement level. Even this issue is being realized at this moment, population decline and rapid aging would continue for certain period of time. The population projection done by UNPD (2013) and the policy targets of Japanese Government (2014) showed good examples of possible scenarios. Thereby, the total population slightly above a 100 million in 2060 does not have any means to be realized. The level of total population result from the recovery of replacement fertility would generate a posteriori optimal level. Without political interventions those scenarios would not appear in reality. The 'demographic bonus' has stimulated unprecedented economic growth in the 1960s and 1970s. However, the recent 'demographic onus' has magnified the burden of care and has transferred it to the future generations. To address these crises and remain sustainable, Japan has to face corresponding policy challenges and have new systems to take responsibility for her reproduction and replenishment.

Keywords Principle of population • Sustainable population • T.R. Malthus • UNPD • Policy target • Demographic bonus • Demographic onus • Feedback loop • Overshoot

7.1 The Principle of the Sustainable Population

In the first edition of *Principle of Population*, T.R. Malthus wrote, 'I said that population, when unchecked, increased in a geometrical ratio, and subsistence for man in an arithmetical ratio' (Malthus 1798). In the context of Japan as a shrinking society, 'population, when unchecked', is instead *decreasing* in a geometrical ratio. Such ratio would be untenable in either positive or negative proportions. For example, even the population is increased to a rate far exceeding the fertility replacement level, the increasing demographic care cost would still be unsustainable. Survival of the fittest is not achieved by high reproductive rate, but by the most long-term sustainable growth in relation to the replacement level. In such case, only society that could recover or maintain a replacement fertility level could sustain successfully.

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From this perspective, teleological conditions such as instinct, passion or even natural reproductive tendencies are irrelevant and unnecessary. When the population deviates too far from the replacement level, either population shrinking or exploding would overshoot the limits of its existence. In this respect, there is no exception for Japan's demographic transition.

For the convergence of the shrinking society, it is important to recover the fertility to the replacement level. However, even it is being realized at this moment (in 2012[1]), total population would still decrease for a certain of time (beyond 2200) and it would be almost stable at the level that population is slightly above a 100 million in 2060. As for the age structure, the proportion of the young age group (15 years and under) to the total population would be 17.73% (cf. 13.0% in 2012), the share of the working age group (aged 15–64 years) would decrease to 53.51% (cf. 62.9% in 2012) and the aged group (65 years and over) would increase to 24.7% (cf. 24.1% in 2012). As a result, the total dependency ratios (Actual Value of Demographic Care Cost) would be 0.868 (cf. 0.590 in 2012). Thus, the population decline and rapid aging would be continued for the time being.

In this context, the population projection done by UNPD[2] and the policy target of Japanese Government to keep the total populations at a level of a 100 million after 50 years (Nikkei 2014)[3] would be good examples of the possible scenario in the future. However, the total population which is slightly above a 100 million in 2060 does not have any practical meaning as an optimal population of Japan. Merely, those numbers are the results of population projection which based on an assumption that the present lowest low fertility is being recovered to nearly the replacement level of 2.07. Indeed, the most important point is our society would restore the capacity and socio-economic conditions to regenerate before it would be too late. If it is possible, the restoration would confirm an optimal population level.

Certainty, it is difficult to justify those scenarios are true or not. At least, it is clear that they would not come true without political intervention to change the society. To stop population shrinking, a new society must be the one, where the equality and co-operation among gender, generation and communities are fulfilled. It also has good relations to the global society. Furthermore, it must be a society based on the balanced use of natural and artificial environments. Every last but not least, it must be a mature symbiotic society than a competitive society in the past age of rapidly population growing.

[1] NIPSSR (2012, p. 30, 48). The assumptions of this projection are the population by age and sex in 2012 as a basic population, the replacement level fertility is 2.07, the sex ratio at birth is 105.2 and the life expectancy for male is 79.94 years and for female is 86.41 years. They all remain constant after 2012.

[2] Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat. 2013. According to this projection, the total population of Japan in 2060 is expected to be 103.241 million. It assumes the slowly recovering of fertility rate to 1.87.

[3] Nikkei (2014). This policy target is conditioned with the fertility recovery in long term to 2.07 by 2060.

7.2 Conclusion

This book has examined the emerging phenomenon of Japan's shrinking society. It is the historical consequence of a demographic transition caused by a feedback loop between increasing longevity and decreasing fertility. The force driving this process is the desire to reduce average number of children per woman as well as to reduce the risk of childbearing/care to minimum. As this reproduction strategy has helped to prolong women's life span to exceed 70 years, the cost of elder care has begun to increase proportionally to rising longevity. Meanwhile, fertility levels remain below replacement level, as the childbearing/care cost/benefit ratio remains disadvantageous to women in Japan. This reduces the number of people for bearing the cost of elder care in future generations.

'Demographic bonus' has stimulated unprecedented economic growth in the 1960s and 1970s, but today's 'demographic onus' has magnified the burden of care and transfers it to the future generations. To address these crises and maintain sustainable, Japan has to face corresponding policy challenges and have new systems to take responsibility for her reproduction and replenishment.

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