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## Demographic Ageing in Japan

### Abstract

The ageing of the population is one of the most important demographic processes taking place in many countries today. This process is connected with the transition from high to low fertility and mortality. However, the beginning and duration of this process varies in different countries, so the proportion of elderly in the total population varies depending on the country being analyzed. In this article, the author has analyzed the process of demographic ageing in Japan in the period from 1950 to 2100 using the data from the World Population Prospects (the medium variant of fertility).<sup>1</sup>

### 1. The replacement of the generations

Japan is one of the 'oldest' countries in the world. It is said that the demographic future of Europe has already happened in Japan. It is one of those countries in which the probability of living longer than 80 years of age has doubled in relation to 1950. Mortality among the elderly is constantly falling, but the extension of the duration of life does not mean that it is free from the diseases and disorders which often lead to partial disability.

Nowadays people can live longer than their parents and grandparents. This situation has certain consequences, economic and social as well as physical. There are several causes of demographic ageing, the most important of which include:

1. a decrease in the number of births;
2. a reduction in mortality;
3. the lengthening of human life;
4. migration processes.<sup>2</sup>

The author will focus on the first and third causes, because "low fertility in combination with increasing life expectancy has led to a remarkable decline of the population in most countries. The main problem is that the population is not only declining, but it is also ageing rapidly and, apparently, inevitably".<sup>3</sup>

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<sup>1</sup> This is the projection made by the Department of Economic and Social Affairs of the United Nations.

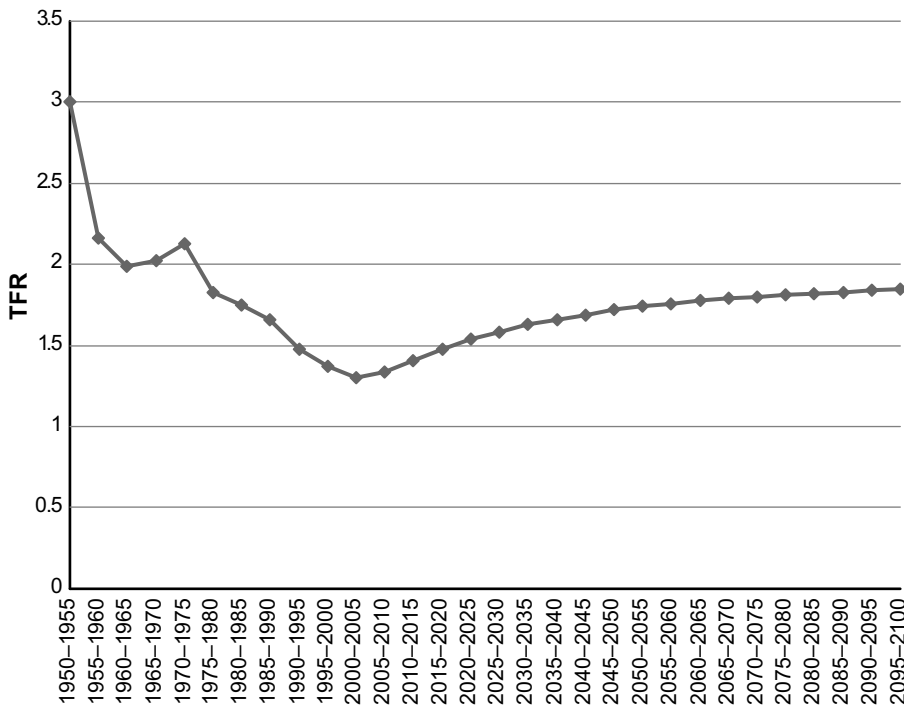
<sup>2</sup> Marta Luty-Michalak, *Intergenerational Bond and Income Redistribution in Ageing Societies. Sociological Study on Example of Chosen European Union Countries*, PhD dissertation, Warsaw: UKSW, 2012, p. 78.

<sup>3</sup> Charlotte Höhn, 'Aim and Structure of the Dialog Project', *Demographic Studies*, Vol. 2, No. 148, June 2005, p. 10.

The decrease in the birth rate causes ageing of the population at the base of the age pyramid, which means that the participation of the youngest members of the general population is decreasing. Most often, this process is illustrated by the total fertility rate (TFR), or the average number of children that a woman gives birth during her life (between the ages of 15 and 49 years, assuming a certain level of probability of having a baby in the next generations). It is assumed that the value of TFR at a level of 2.1 or higher ensures the simple replacement of the generations.

The first graph shows that the second demographic transition model in Japan has already been established, according to which the fertility has been reduced to a level which means that the generation of children are less numerous than that of their parents. After a radical decrease in the values of this ratio immediately after the Second World War, there was a steady decline over the next few years. A small increase in the value was recorded in the period from 1970 to 1975, and after that its value again began to decrease. From 2005 to 2010 its value has increased, so that in the period from 2095 to 2100 the TFR is projected to reach 1.85.

What could the reasons for such low fertility values be? In the literature we can find the claim that the reduction in TFR to such a low level may be caused by such factors as an increased average age of first marriage and the decrease of their frequency; the frequency



**Graph 1. Total fertility rate in Japan in 1950–2100**

Source: United Nations, *World Population Prospects: The 2012 Revision*, <http://esa.uan.org/unpp> (accessed 25.06.2013).

of divorces; the popularity of consensual relationships, and the older age of women at the birth of their first child.<sup>4</sup>

In the early 1970s, the annual number of marriages in Japan exceeded one million, so the marriage rate (per 1000 population) was about 10%. After this marriage boom the number and rate started declining, so that in 2011 the marriage rate in Japan stood at 5.2%. At the same time, the mean age of first marriage was rising; in 2011 it was 30.2 for men and 29.0 for women, whereas twenty years earlier the same figures were 2.3 years and 3.0 years lower respectively. The reverse situation has occurred with divorces; since the 1960s the number of divorces has been rising, and in 2002 it was 290 000. However since 2003 the number of divorces and the divorce rate have been declining; in 2011, the number of divorces totaled 236 000, and the divorce rate (per 1000 population) was 1.87.<sup>5</sup>

The average age for first birth is also rising. In 1970 it was 25.6, and in 2011 it stands at 30.1.<sup>6</sup> It should be noted that the average age of women giving birth to children has risen significantly over the past 30 years, which confirms the thesis that women are choosing to postpone their reproductive decisions.

**Table 1. Changes in mothers' age at childbirth**

Year	Number of babies	Distribution of mothers' age (%)						Mean age bearing first child
		-19	20-24	25-29	30-34	35-39	40 and over	
1970	1.934	1.0	26.5	49.2	18.5	4.2	0.5	25.6
1980	1.577	0.9	18.8	51.4	24.7	3.7	0.5	26.4
1990	1.222	1.4	15.7	45.1	29.1	7.6	1.0	27.0
2000	1.191	1.7	13.6	39.5	33.3	10.6	1.3	28.0
2010	1.071	1.3	10.4	28.6	35.9	20.5	3.3	29.9
2011	1.051	1.3	9.9	28.6	35.9	21.1	3.6	30.1

Source: Statistical Handbook of Japan 2012, Chapter 2, p. 19: <http://www.stat.go.jp/english/data/handbook/pdf/c02cont.pdf> (accessed 25.06.2013).

Postponing the decision to have children has become possible thanks to the use of contraceptives by women; moreover, it is a logical consequence of the increasing popularity of consensual relationships and relationships referred to as LAT (Living Apart Together). The control of fertility is possible because of the modern methods of effective contraception, which mean that the birth of a child is no longer a matter of coincidence, but is the result of the woman's conscious desire. These methods cut the link between sex, procreation and

<sup>4</sup> Andrzej Ochocki, *The World Population. Duty and Capital*, Warsaw: UKSW, 2010, p. 25.

<sup>5</sup> *Statistical Handbook of Japan 2012*, Chapter 2, p. 20, <http://www.stat.go.jp/english/data/handbook/pdf/c02cont.pdf> (accessed 25.06.2013).

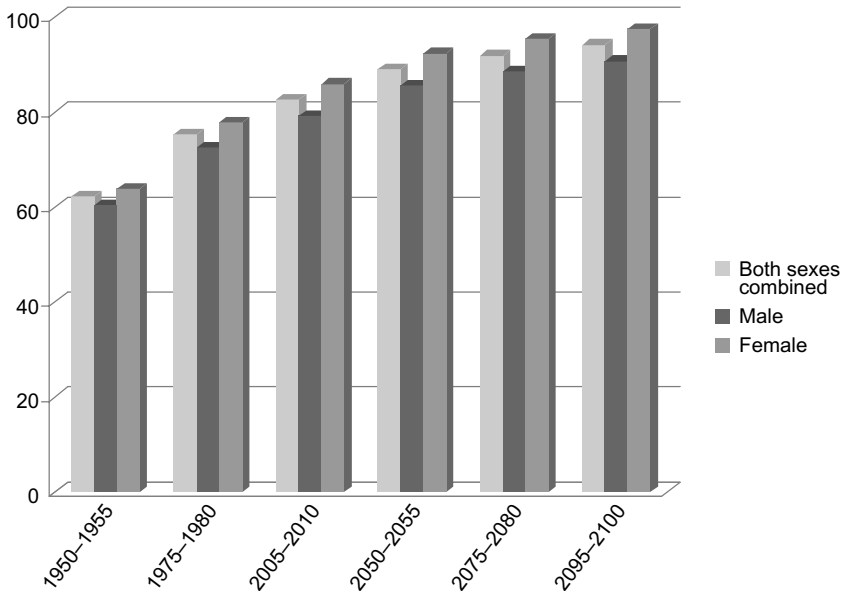
<sup>6</sup> *Ibid.*, p. 18, <http://www.stat.go.jp/english/data/handbook/pdf/c02cont.pdf> (accessed 25.06.2013).

marriage. The greater empowerment of women and the introduction of contraceptives have resulted in changes in the pattern of fertility, the increasing number of illegitimate births and the increasing popularity of consensual relationships.<sup>7</sup>

In conclusion, it should be noted that despite the small changes in the level of the total fertility rate over the period analyzed, its values remain similar, a low level which does not guarantee the replacement of the generations. However, the noticeably slower growth in the value of this ratio may be a factor that slows the ageing process of Japanese society in the future.

## 2. Life expectancy at birth

In the light of life expectancy tables disaggregated by gender, it is clear that ageing causes an increasing feminization of the population, because due to high male mortality, there are far more women living to old age. Women give birth to more boys than girls, and men generally remain in the majority at younger ages, but in middle age the proportion between the genders becomes even, and in old age women predominate. These features are characteristic of today's ageing population in Japan and throughout the wider world. The average life expectancy for a newborn for both sexes combined was 62.2 years at the beginning of the period analyzed, while for men it was 60.4 and for women 63.9. In the entire period analyzed, the life expectancy at birth should rise to 94.2 years for both sexes combined in 2095–2100 (90.8 years for men and 97.6 years for women).<sup>8</sup> It is clear that the difference in average life expectancy between the sexes will increase.



**Graph 2. Life expectancy at birth in Japan in 1950–2100**

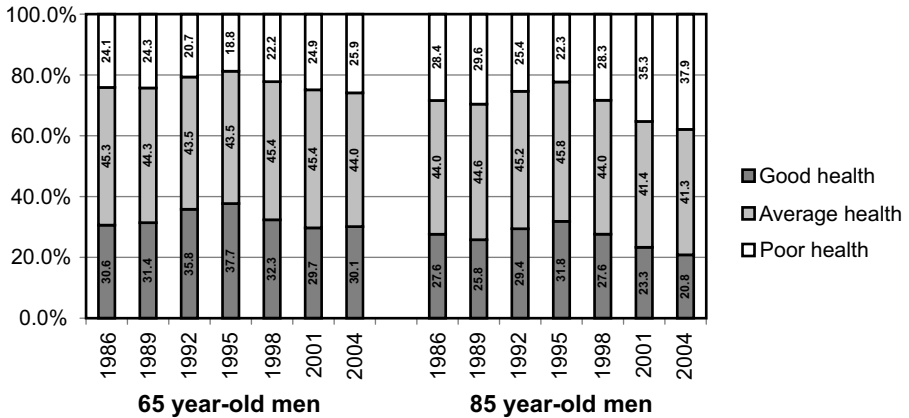
Source: United Nations, *World Population Prospects: The 2012 Revision*, <http://esa.uan.org/unpp> (accessed 25.06.2013).

<sup>7</sup> Luty-Michalak, *Intergenerational...*, p. 80.

<sup>8</sup> The average life expectancy in Japan rose sharply after the Second World War, and is today the highest in the world.

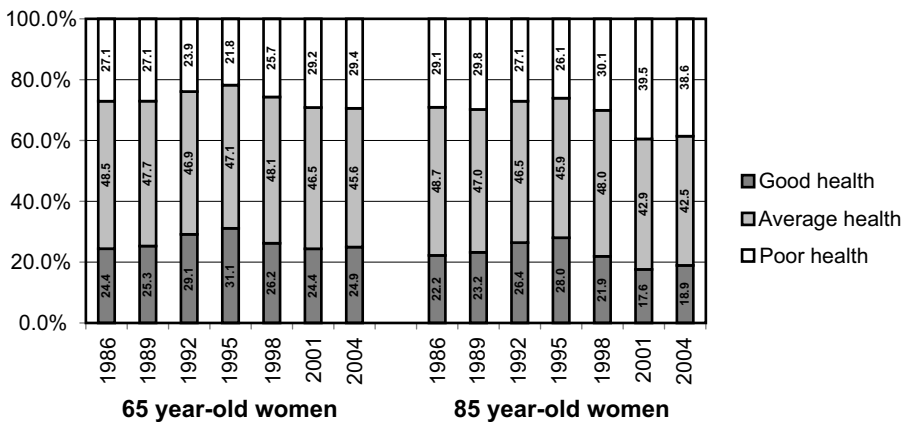
The rise in life expectancy does not mean that the elderly enjoy good health. In a situation when the development of medicine does not compensate sufficiently for a decrease in mortality among the oldest part of the population, in a society that is ageing the result of longer life expectancy may be an increase in morbidity and disability among the elderly. The data shown in graphs 3 and 4 suggest that after 1995, we can observe an expansion of morbidity for both men and women. However before 1995 the situation was reversed because of the compression of morbidity.

These trends may be explained in several ways. In 1989, the Japanese government implemented the so-called ‘Golden Plan’, which introduced or expanded many support



**Graph 3. Proportion of life expectancy in various health states for 65- and 85-year old Japanese men, 1986–2004**

Source: Vanessa Yong, Yasuhiko Saito, ‘Trends in healthy life expectancy in Japan: 1986–2004’, *Demographic Research*, Vol. 20, No. 19, April 2009, p. 477.



**Graph 4. Proportion of life expectancy in various health states for 65- and 85-year old Japanese women, 1986–2004**

Source: Vanessa Yong, Yasuhiko Saito, ‘Trends in healthy life expectancy in Japan: 1986–2004’, *Demographic Research*, Vol. 20, No. 19, April 2009, p. 479.

services and infrastructure for the elderly. The change in these trends may also be a consequence of the Asian financial crisis in 1997, because it caused changes in stress levels, risk-taking, lifestyle and health behaviors, human capital investments, unemployment levels, relative income, and the relative costs of medical care.<sup>9</sup>

We can explain these changes using the General Theory on Population Ageing. This theory assumes the periodicity of successive steps, which include the expansion of morbidity theory, the theory of dynamic equilibrium and the theory of compression of morbidity. The first researcher, Jean-Marie Robine, asked whether it was possible to create a General Theory of Ageing as an attempt to reconcile and combine the above three theories and which would be a subsequent stages of the epidemiological and demographic transition models. Robine and Jean-Pierre Michel, as authors of the General Theory of Ageing, have hypothesized about the cyclical nature of the above-mentioned steps. This means that at the beginning the sick and disabled people live to old age; then we observe a balance between mortality, morbidity and disability and finally the number of years lived without disability and disease increases. Then there will probably once again be an increase in the number of years lived with disability and illness as a result of lower mortality and increased life duration, which will generate an increasing number of elderly (even reaching 100 years and more). Those people will be characterized by physical and mental weakness in the last period of life.<sup>10</sup>

Taking into account the lengthening of the life expectancy in Japan, we may have to deal with a situation when, in the light of the General Theory on Population Ageing, we will once again witness an expansion of morbidity and disability.

### 3. The population structure by age

In Japan, there have been significant changes in the population structure by age. The age pyramids are the basic method for presenting such changes; it is a graph drawn on the rectangular coordinate, the X-axis to the right of the zero point is determined by the number of women, and that of men to the left, expressed in absolute figures (often in thousands of persons); or in relative terms, the Y-axis is determined by age (usually five-year age groups).<sup>11</sup>

Gustaw Sundbärg distinguished three types of population structures: progressive, stagnant and regressive. In each of these three types he distinguished a class of children (the population aged 0–14 years), of parents (15–49 years), and a class of grandparents (50 years and above). In each of these three types the class of parents is about 50% of the total population. In the progressive type, the class of children numbers 40%, and the class of grandparents 10% of the total population. In the stagnant type these proportions are 27% and 23%, and in the regressive type 20% and 30%.<sup>12</sup>

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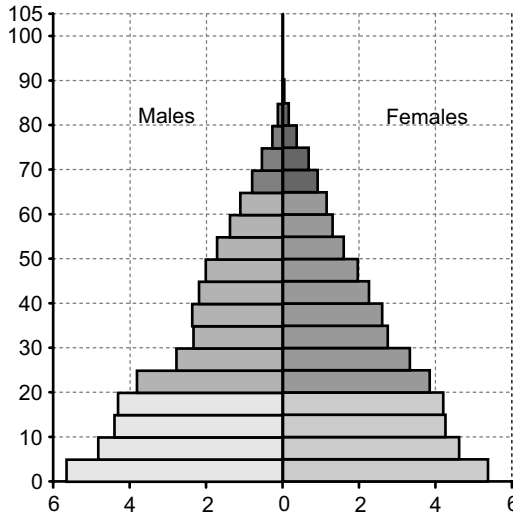
<sup>9</sup> Vanessa Yong, Yasuhiko Saito, 'Trends in Healthy Life Expectancy in Japan: 1986–2004', *Demographic Research*, Vol. 20, No. 19, April 2009, p. 480.

<sup>10</sup> Jean-Marie Robine, Jean-Pierre Michel, 'Looking Forward to a General Theory on Population Aging', *The Journals of Gerontology*, Vol. 59A, No. 6, June 2004; Jean-Pierre Michel, Jean-Marie Robine, 'A «New» General Theory on Population Ageing', *The Geneva Papers on Risk and Insurance*, Vol. 29, No. 4, October 2004.

<sup>11</sup> Jerzy Zdzisław Holzer, *Demography*, Warsaw: Polskie Wydawnictwo Ekonomiczne, 2003, p. 135.

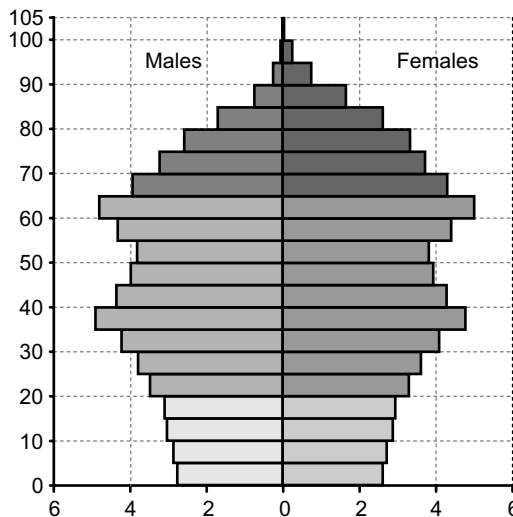
<sup>12</sup> Edward Rosset, *The Old People. Demographic Study*, Warsaw: Polskie Wydawnictwo Ekonomiczne, 1967, p. 173.

Trying to interpret the data in the age pyramids for Japan, I have noticed that in 1950 the age structure of the population was progressive; the number of children significantly exceeded the number of grandparents. In 2010, we can see a decrease in the birth rate, together with an increase in the life expectancy. The age pyramid has a narrow base, and looks like a spindle. We can see that in this case the ageing of the population takes place



**Graph 5. Age pyramid for Japan in 1950**

Source: United Nations, *World Population Prospects: The 2010 Revision*, <http://esa.uan.org/unpp> (accessed 1.04.2013).

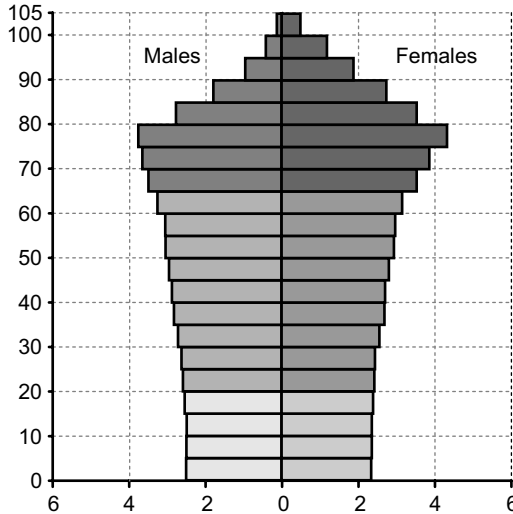


**Graph 6. Age pyramid for Japan in 2010**

Source: United Nations, *World Population Prospects: The 2010 Revision*, <http://esa.uan.org/unpp> (accessed 1.04.2013).

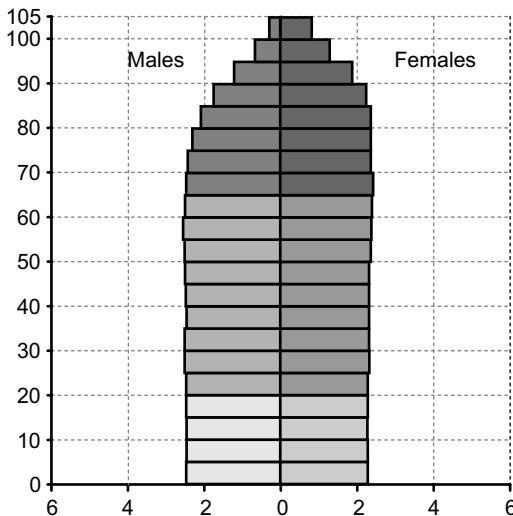
at the bottom of the age pyramid, which is caused by a decrease in the number of births, as well as at the top of the age pyramid, which is affected by the lengthening life expectancy of the population.

The years 2050 and 2100 shows that the age pyramids will change significantly, and will look more like a bell than a spindle. This means that we will deal with a stagnant structure



**Graph 7. Age pyramid for Japan in 2050**

Source: United Nations, *World Population Prospects: The 2010 Revision*, <http://esa.uan.org/unpp> (accessed 1.04.2013).



**Graph 8. Age pyramid for Japan in 2100**

Source: United Nations, *World Population Prospects: The 2010 Revision*, <http://esa.uan.org/unpp> (accessed 1.04.2013).



of population, which means that the annual number of births will be similar to the annual number of deaths. Moreover, the annual number of births in each year will be similar. We can also observe lengthening life expectancy, and consequently, we will observe the ageing of the population from the top of the age pyramid.

#### 4. Analysis of the demographic ageing process in Japan using various ratios

We should begin the analysis of the ageing process in Japan by defining what the demographic threshold of old age is. Most researchers maintain that the threshold of old age is retirement age. It seems that today we are witnessing a shift in the top border of old age from 60 to 65 years. The reason for this is a noticeable difference in the length of human life. If we observe the lengthening of the life expectancy at birth, the threshold of old age must be rising. Demographers have also taken into account the fact that old age is not a single period, and that different sub-periods must be distinguished. In the literature we can find a bipartite division of the elderly: the first phase of elderly is 60 to 79 years for women and 65 to 79 years for men; the second phase occurs after crossing the age of 80 for both sexes, which corresponds to the terms used in gerontology of 'the third age' and 'the fourth age'. The World Health Organization (WHO) define the threshold of old age as 65 years or over for both sexes; I have also chosen to define it in this way.

To begin an analysis of the process of ageing in Japan, we must initially consider the changes in the proportion of the population in old age (65 years and older) in the total population. The data presented in Table 2 shows a significant increase in the proportion of people over 65 years of age in the general population over the period analyzed. We should therefore consider the demographic changes leading to the establishment of a new demographic order of population in Japan.

The proportion of the population aged 65 years and more in the general population is expected to rise up to 2050, and in 2075 there will be a slight drop in the old age ratio value. The value of this ratio at the beginning of the period analyzed was only 4.95% in 1950, but in 2100 it will be 35.66%. The largest value will be noted in 2050 (36.55%).

In the opinion of the United Nations statisticians, if the value of these ratio is less than 4% then the population is considered young. In 1950 in Japan, its value was 4.95%, which means that according to the UN typology Japanese society already belonged to the old societies at the beginning of the period analyzed. The speed at which Japan's population has aged is much faster than in advanced Western European countries.<sup>13</sup> "Although the aged population in Japan accounted for only 7.1 percent of the total population in 1970, 24 years later in 1994, it had almost doubled in scale to 14.1 percent. In other countries with an aged population, it took 61 years in Italy, 85 years in Sweden, and 115 years in France for the percentage of the elderly to increase from 7 percent to 14 percent of the population. These comparisons clearly highlight the rapid progress of demographic aging in Japan".<sup>14</sup>

The old age index shows the relationship between the number of people aged over 65 and the number of people aged between 0 and 14 years, thus showing the effects of the

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<sup>13</sup> In comparison in Germany, which is one of the oldest European countries the value of this ratio will be in 2050 – 32.7%, and in 2100 – 34.2%.

<sup>14</sup> *Statistical Handbook...*, pp. 14–15: <http://www.stat.go.jp/english/data/handbook/pdf/c02cont.pdf> (accessed June 25.06.2013).

changes in the proportion of the population. The lowest value of this index was also reached in 1950 (13.99%). Since 1975 we can observe a very rapid rise in its value. This situation will last until 2050, when the index will reach 291.74%, and in 2075 and 2100 we will notice a decrease in the value of the index, so that by 2100 it will reach 262.49%.

We should be concerned by such a huge change in the proportion of the population. This index reflects the increase in the population of grandparents and the decrease in the population of grandchildren. In the future this will lead to an excessive burden on the Japanese budget.

The old-age dependency ratio<sup>15</sup> illustrates the burden placed on the working population (15–64 years) by the population at retirement age (65 years or more). In the period analyzed there was a significant rise in its value. In 1950, it was 8.29%, and will reach the highest value in 2050 (71.78%), and after that its value will fall, until it reaches 70.25% in 2100. The reduction of the old-age dependency ratio has important implications for social security schemes, especially for the pension system.

We should also look at the changes that will happen in the structure of the sub-population of the elderly. We can use the very old age ratio, which is used to count how many people aged 80 years or over there are per 100 persons aged over 65 years. In 1950 this indicator reached the value of 8.92%, thereafter its value began to rise very quickly. The same situation will arise in the future, when in 2100 its value reaches 53.61%. In this case there will be no decrease in its value in 2075, as we can observe with other ratios. This means that despite the projected slowdown in Japan's ageing process after 2075, Japanese society will confront the problem of increasing proportion of people over 80 years.

**Table 2. The value of selected population ratios in Japan in 1950–2100 (in %)**

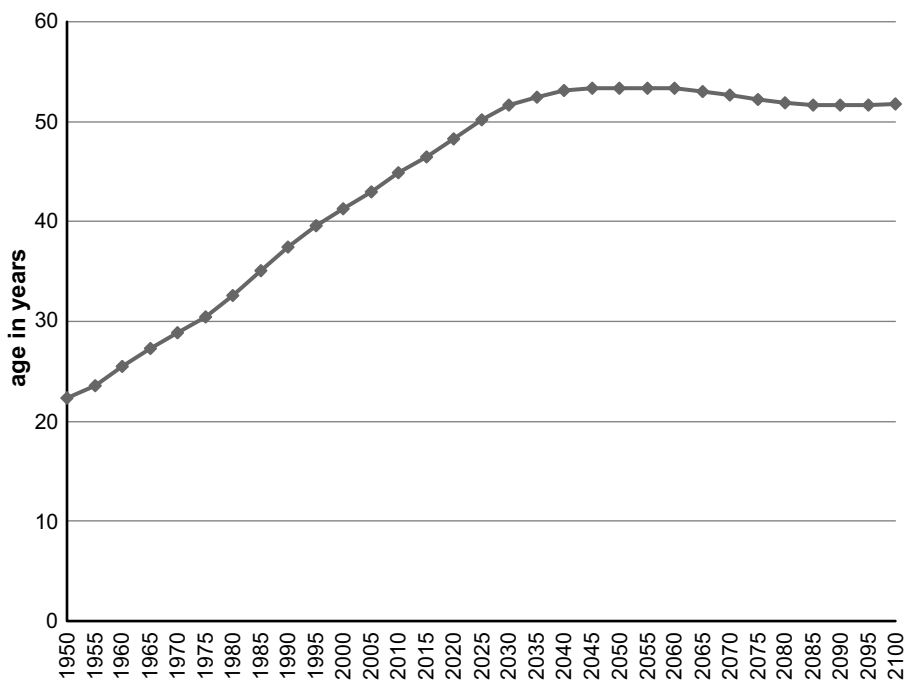
Ratio	Year						
	1950	1975	2000	2025	2050	2075	2100
<b>Old age ratio</b>	4.95	7.88	17.18	29.63	36.55	35.81	35.66
<b>Old age index</b>	13.99	32.39	117.49	238.38	291.74	270.08	262.49
<b>Old age dependency ratio</b>	8.29	11.63	25.19	51.15	71.78	70.29	70.25
<b>Very old age ratio</b>	8.92	13.46	21.61	36.67	40.96	51.99	53.61

Source: United Nations, *World Population Prospects: The 2012 Revision*, <http://esa.un.org/unpp> (accessed 25.06.2013).

According to the latest United Nations forecast, by 2045 the median age<sup>16</sup> in Japan will be 53.4 years, and from the year 2060 it will also slowly decrease to 51.8 in 2100.

<sup>15</sup> The old-age dependency ratio is also known as the old-age support ratio.

<sup>16</sup> This is the age that divides the population into two equal parts, where there are as many persons with ages above the median as there are with ages below the median. <http://esa.un.org/unpd/wpp/Documentation/glossary.htm> (accessed 25.06.2013).



**Graph 9. Median age in Japan in 1950–2100**

Source: United Nations, *World Population Prospects: The 2012 Revision*, <http://esa.un.org/unpp> (accessed 25.06.2013).

Taking all the information into account, it is clear that in the year 2100 there will be a significant increase in the share of people over 65 years in the general population in Japan in comparison to 1950, but after 2050 we will see a gradual decrease in the value of the old-age ratio. The same will happen with the old age index. We should worry about such a significant increase in the old-age dependency ratio, which illustrates the burden being placed on the population of working age by the population of retirement age. Moreover, increases in the very old-age ratio and the median age of the population will be recorded.

Such changes in population structure in Japan are very disturbing. “Population ageing is profound, having major consequences and implications for all facets of human life. In the economic area, population ageing will have an impact on economic growth, savings, investment, consumption, labor markets, pensions, taxation and intergenerational transfers. In the social sphere, population ageing influences family composition and living arrangements, housing demand, migration trends, epidemiology and the need for healthcare services. In the political arena, population ageing may shape voting patterns and political representation”.<sup>17</sup>

<sup>17</sup> *World Population Ageing 2009*, New York: United Nations, 2010, ST/ESA/SER.A/295, p. XXV.

