

Declining Fertility Rate: Demographic Factors

By WADA Kohei

Definition of Fertility Rate Decline

Immediately after the first baby boom following the end of World War II, the number of childbirths fell and the fertility rate declined. But the population at the time had reproductive capability – fewer babies were born, but the entire population continued to increase. From a demographical point of view, the present birthrate downtrend entailing a population decline is a critical situation, with the total fertility rate (TFR) staying below the population replacement level for a long time.

The TFR is currently the most commonly used indicator of the birthrate. It is a figure that combines the fertility rate of each age group of women of reproductive age (15 to 49) in a given one-year period. It should be noted here that the TFR is an indicator calculated solely from women, although this fact is unexpectedly little known. Of course in theory, it should not be impossible to calculate the fertility rate of men, but compared with women, it is difficult to identify the connection between men (fathers) and their

children. Adding to the difficulty is the fact that due to the difference in reproductive mechanisms, men are fertile for a far longer period in life than women. That is why it is the fertility rate of women (mothers) that is mainly analyzed when demographic studies deal with data on childbirth, and why attention is given to women's marriages and their childbearing.

The population replacement level is the level of a fertility rate needed to keep the population stationary on a long-term basis. The population as a whole grows when the fertility rate exceeds the replacement level, and shrinks when it drops below this level. In other words, it is the standard that shows whether or not a population has reproductive capability. The replacement level is calculated by taking into account factors such as the survival rate of women of reproductive age and the sex ratio at birth. In industrialized countries, including Japan, the replacement level is around 2.07 in terms of the TFR. If we follow this standard, we can say that Japan has lost its ability to reproduce its population for more than 30

years since 1974 (*Chart 1*). One estimate even shows that Japan's population would dwindle to a mere 14 by the year 3000 if the fertility and death rates stayed the same as in 2005.

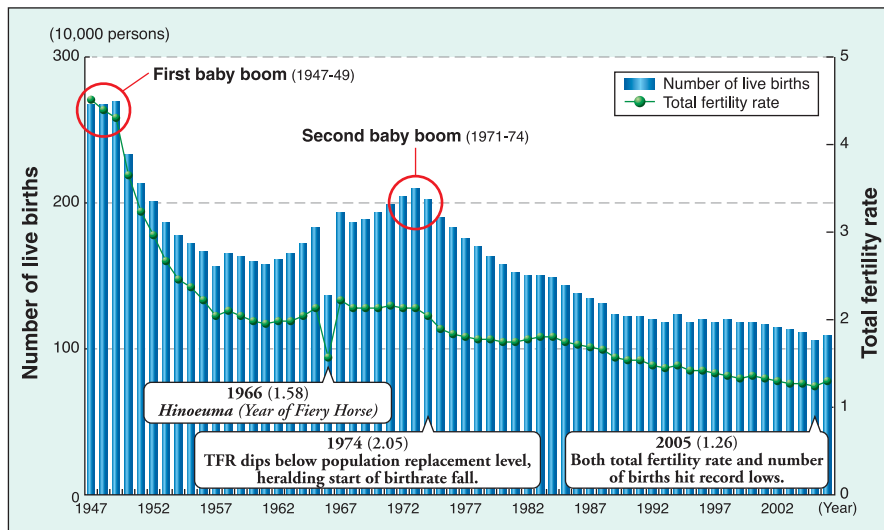
Period TFR & Cohort TFR

If we presume the age groups continuous, the "period TFR," by its definition, approximates an integral of the probability distribution of age-specific fertility rates at a given time. On the premise that a woman would have exactly the same fertility rate during her reproductive life as in the distribution, the period TFR can be interpreted as being the average number of children a woman has in her lifetime. Because it is easy indeed to understand the TFR and calculate the figures under the premise, the period TFR has been commonly used as an indicator of fertility. However, we need to keep in mind that this indicator refers only to the fertility rate at a certain time of the reproductive period.

In contrast to the period TFR, there is another TFR called the "cohort TFR." A cohort refers to a group of people born in the same year. The cohort TFR is calculated by totaling the age-specific fertility rate of each cohort of women in their reproductive years. The term is also called the "completed fertility." The cohort TFR is probably a better term to convey the meaning of the average number of children that women in a cohort will have in their entire lifetime. The difficulty with the cohort TFR is that it is necessary to wait at least 50 years for a cohort to reach the end of its reproductive years in order to make accurate calculations.

Nonetheless, we do have quite recent data prepared by the National Institute of Population and Social Security Research of the Ministry of Health, Labor and Welfare. According to the 2005 Japanese National Fertility Survey conducted by the institute, the average number of children born to couples married for 15-19

Chart 1 Trends in live births and total fertility rate in Japan (1947-2006)



Source: "Vital Statistics of Japan," Ministry of Health, Labor & Welfare

years (known as the completed number of births from marriage) was 2.09. Meanwhile, the mean number of children that married couples expected to have stood at 2.11. While continuing to slip, the fertility rate in this sense is still above 2. At present, the period TFR is very low, but the cohort TFR decline is moderate. Having looked at the two different TFRs, let us now consider how the TFR trend will be in the future.

Catch-up Effect

The relationship between the period TFR and the cohort TFR is illustrated in each of the three graphs of *Chart 2*. Each graph shows the three factors of time, age and age-specific fertility rates, respectively, in the horizontal axis, the longitudinal axis and the vertical axis. Each cohort is represented by the line that lies at 45 degrees between the horizontal line (time) and the longitudinal line (age). The continuous distribution of age-specific fertility rates for each cohort is shown by the curved lines. For the sake of simplicity, only three cohorts are used here, and all the cohorts have the same distribution of age-specific fertility rates. In other words, the cohort TFR is the same for all cohorts.

Now, please look at the dashed line that represents the passage of a certain period of time. When straight lines are drawn upwards from the dashed time line, they touch the curved lines representing the fertility rates. These thick straight lines equal the age-specific fertility rates of each cohort on the time line marked 1. Namely, their total sum represents the

period TFR. In the top graph, the period TFR is well balanced, with women in their prime childbearing years in cohort No. 2 having the most childbirths, many more than those of cohort No.1 comprising older women and cohort No.3 comprising younger women.

The middle graph is based on the premise that women have children later in their lives. The distribution of age-specific fertility rates remains unchanged, namely each cohort TFR is the same, but the distribution of fertility rates has been shifted toward the upper right, and is concentrated among older women. As a result, the period TFR on the dashed time line marked 1 becomes temporarily low since it only totals the limited numbers of births by the No.1 cohort and the No. 2 cohort. However, after some period of time, the period TFR picks up. On the time line marked 2, the period TFR climbs to a high figure as it includes a peak rate of women in the No. 2 cohort in their prime childbearing phase. This is the so-called “catch-up effect” of women giving birth later in their lives.

The middle graph shows that on the premise that the cohort TFR stays the same, the period TFR may drop (as on the time line 1), but this can be understood as a development prior to a rise in the future (as on the time line 2). If attention is focused on the period TFR alone, such an apparent drop could occur. It is important to understand that changes in the period TFR can be temporary, as shown here, and a low period TFR at a certain point in time does not necessarily mean the fertility rate itself is weakening.

In fact, the National Institute of Population and Social Security Research expects the catch-up effect to occur – though to a limited extent – in an assumed median variant of the fertility rate contained in its future population projection, and there is some hope that it may rise somewhat in the future.

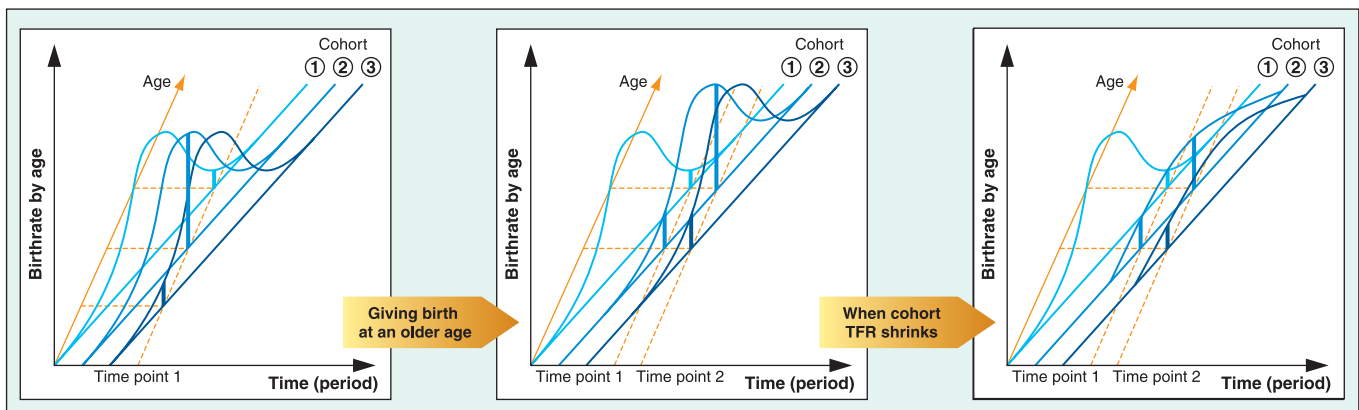
That said, however, the fertility rate is far from reaching the replacement level. This is probably because the cohort TFR itself is falling as seen in the bottom graph. A decline in the cohort TFR offsets much of the catch-up effect, and makes a rise in the period TFR difficult. The latest period TFR (for 2006) unusually rose to 1.32, but this should be seen only as a fleeting phenomenon, and does not allow us to be optimistic. In any case, we need to be aware that the period TFR is unstable since it totals the age-specific fertility rates of different ages of many cohorts at a certain time point. It would not be wise to focus our attention only on the short-term movements of the period TFR in making various policy decisions.

Demographic Factors

Next I would like to discuss demographic factors of the period TFR. There is often the mistaken notion that the period TFR is limited only to married women, but the fact is that, both married and unmarried women (excluding those divorced or bereaved) are included in calculating the period TFR.

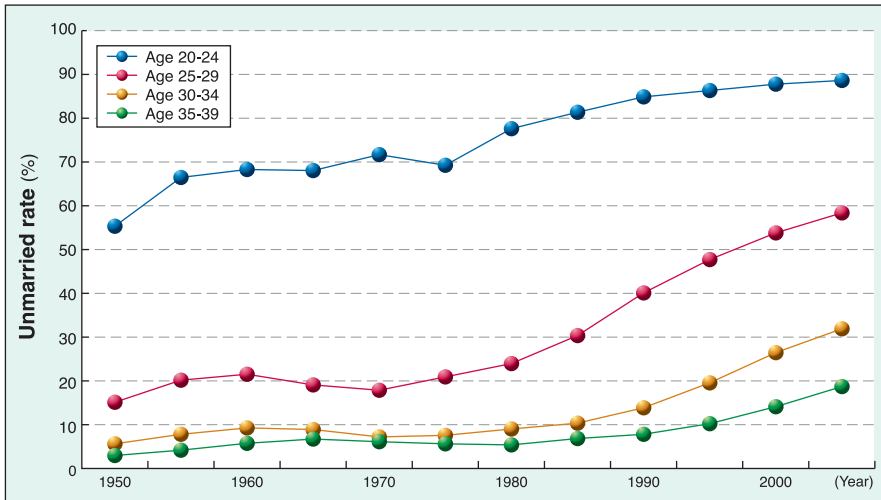
The period TFR is decomposed into the proportion of married women and the marital fertility rates since the proportion

Chart 2 Relations between period TFR & cohort TFR



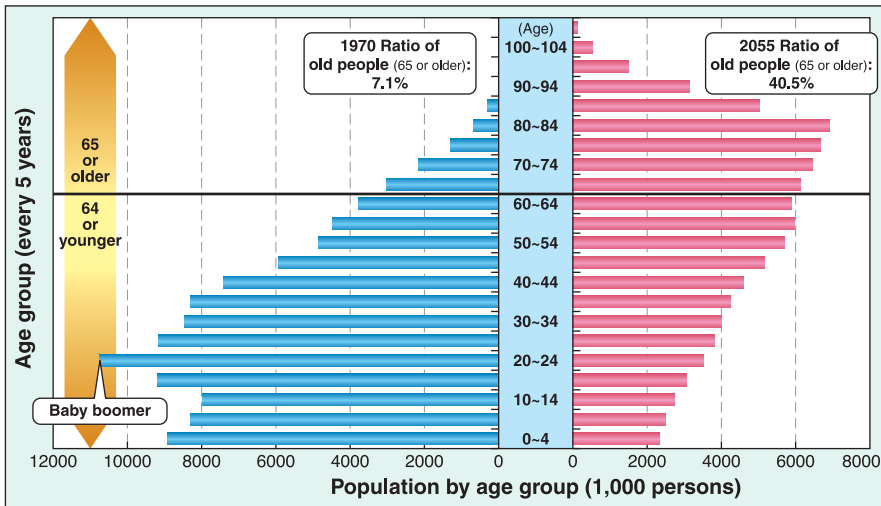
Source : “Demography Learned by Excel,” authored by Wada Kohei

Chart 3 Women's unmarried rate by age (1950-2005)



Source: "Population Census," Ministry of Internal Affairs & Communications

Chart 4 Change in age pyramid



Note: Population aged 85 or older in 1970 is all included in the 85-89 age group for convenience's sake.
Sources: "Population Census" & "Population Estimates," Statistics Bureau, Ministry of Internal Affairs & Communications; "Population Projections for Japan (2006)," National Institute of Population & Social Security Research

of illegitimate births is extremely small at 2% in Japan. The married proportion shows how a fertility rate decline has been affected by people not marrying or marrying at a later age while the marital fertility rate shows the effect brought about by lower fertility rates of married couples. When we standardize the distribution of marrying ages of women in each cohort and study these effects, we obtain the following conclusion. From the late 1970s to the 1980s when the TFR began to decline below the replacement level, the main reason for the decline was the larger number of women staying unmarried. In

the 1990s, however, fewer childbirths by married couples had a relatively larger effect on the fertility rate decline. A key factor behind this is, as shown in *Chart 3*, a rise in the proportion of unmarried women in their late 20s and early 30s since the mid-1970s. In demographic terms, people who remain unmarried at the age of 50 are regarded as lifetime singles. The lifetime unmarried proportion has been rising since the 1970s until the present although its level is low. From the demographic viewpoint, the fertility rate decline has been brought about by women marrying at an older age (and giv-

ing birth at an older age) or staying unmarried, and by the weakened reproductive tendencies of married couples.

Consequences of Low TFR

A low fertility rate staying below the population replacement level means that the aging of the population is speeded up and that the population will shrink in the future. It is estimated that in about 50 years from now, in 2055, people aged 65 and over will comprise more than 40% of Japan's population (*Chart 4*). And the population itself, in a turnaround from the past consistent rise, showed a decrease of around 20,000 people in 2005 from the preceding year, marking the start of a new era of population shrinkage. There is no doubt that the declining trend will continue over the long term and that the working population will also decrease. There is little room for the labor capacity of men to be raised any further. It will be necessary now to enhance the labor participation rate among women in their 20s and 30s who have so far stopped working due to marriage and childbirth.

Japan's population has taken a turn toward a decline in about 30 years since the TFR began to decline below the replacement level. This time lag is a phenomenon referred to as "momentum." The current average age that women give birth is 30, which corresponds to the time lag from the time when a generation of women was born at the start of the fertility rate downtrend to the time when they start having children. That is, the population entering a long-term declining course had been foreseen more than 30 years ago. Conversely, we must be aware that even if efforts were made now to have the fertility rate recover to the replacement level, the same length of time would be needed for the population to stop declining and begin to grow again. We should not think it is too late. In fact, we should begin making every effort right now to raise the marriage rate and the marital fertility rate and help bring about a recovery in the TFR. It is surely our responsibility for later generations. **JS**

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