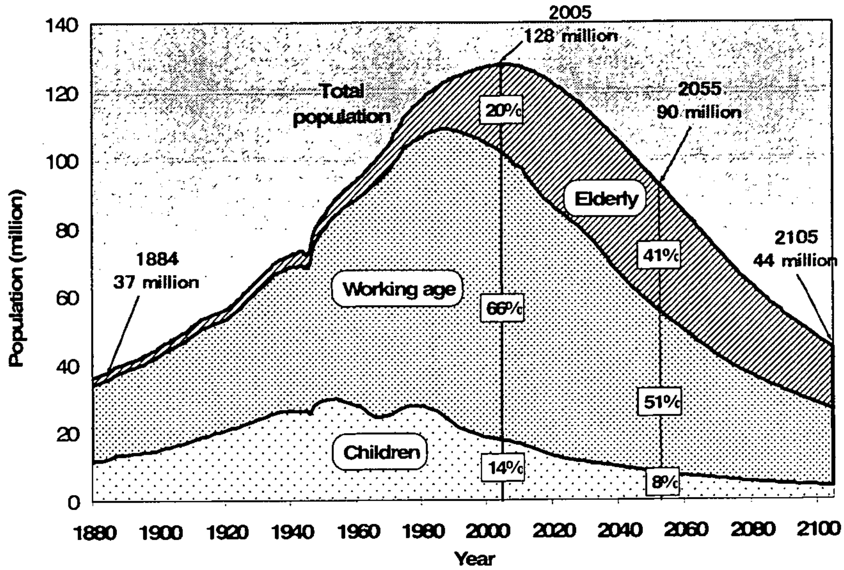
Table 1 Projected Future Population and Proportion by Age Group, 2005-2105: the Variant with Medium-Fertility, Medium-Mortality Assumptions

Year	Population in 1,000				Proportion (%)			Dependency ratio (%)		
	Total	0-14	15-64	65+	0-14	15-64	65+	Total	Child	Old-age
2005	127,768	17,585	84,422	25,761	13.8	66.1	20.2	51.3	20.8	30.5
2010	127,176	16,479	81,285	29,412	13.0	63.9	23.1	56.5	20.3	36.2
2015	125,430	14,841	76,807	33,781	11.8	61.2	26.9	63.3	19.3	44.0
2020	122,735	13,201	73,635	35,899	10.8	60.0	29.2	66.7	17.9	48.8
2025	119,270	11,956	70,960	36,354	10.0	59.5	30.5	68.1	16.8	51.2
2030	115,224	11,150	67,404	36,670	9.7	58.5	31.8	70.9	16.5	54.4
2035	110,679	10,512	62,919	37,249	9.5	56.8	33.7	75.9	16.7	59.2
2040	105,695	9,833	57,335	38,527	9.3	54.2	36.5	84.3	17.2	67.2
2045	100,443	9,036	53,000	38,407	9.0	52.8	38.2	89.5	17.0	72.5
2050	95,152	8,214	49,297	37,641	8.6	51.8	39.6	93.0	16.7	76.4
2055	89,930	7,516	45,951	36,463	8.4	51.1	40.5	95.7	16.4	79.4
2060	84,592	6,987	42,778	34,827	8.3	50.6	41.2	97.7	16.3	81.4
2070	73,488	6,158	36,325	31,005	8.4	49.4	42.2	102.3	17.0	85.4
2080	63,387	5,304	31,505	26,578	8.4	49.7	41.9	101.2	16.8	84.4
2090	54,925	4,600	27,674	22,651	8.4	50.4	41.2	98.5	16.6	81.8
2100	47,712	4,093	24,144	19,475	8.6	50.6	40.8	97.6	17.0	80.7
2105	44,592	3,856	22,631	18,105	8.6	50.8	40.6	97.0	17.0	80.0

Source: NIPSSR(2006), *Population Projection for Japan: 2006-2055*, the medium-fertility and medium-mortality variant. The results for the period 2056-2105 are ancillary calculation with constant vital rates as of 2055.

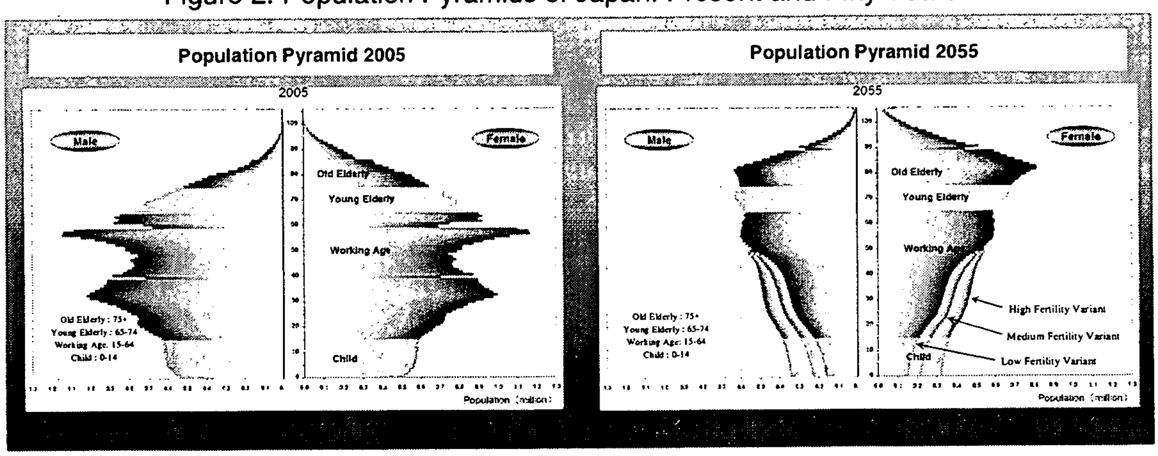
The amount of population loss over the 50 years ranges from 28.2 million in the high fertility with low mortality-variant to 45.4 million in the low fertility with high-mortality -variant. The proportion of elderly ranges from 36.3 per cent in the high fertility with high mortality-variant to 44.4 per cent in the low fertility with low mortality-variant. The ancillary calculation of the population in 2105 with vital rates assumed constant at the 2055 level is 44.6 million or 35 per cent of the initial population in the medium fertility with medium mortality-variant. The assumption of low fertility combined with high mortality results in the smallest total population of 33.6 million or 26 per cent of the starting population, while the result of the high fertility with low mortality-variant is the largest at 62.7 million or 49 per cent of the 2005 population size.

Figure 1. Growth and Reduction of Population of Japan: 1880-2105



Source: Ministry of Internal Affairs and Communications, Statistics Bureau, *Census*, NIPSSR(2006), *Population Projection for Japan: 2006-2055*, the medium-fertility and medium-mortality variant..

Figure 2. Population Pyramids of Japan: Present and Fifty Years Later



Source: Statistics Bureau, *Census* 2005, NIPSSR (2006), *Population Projection for Japan: 2006-2055* (three fertility variants with medium-mortality).

Assumptions

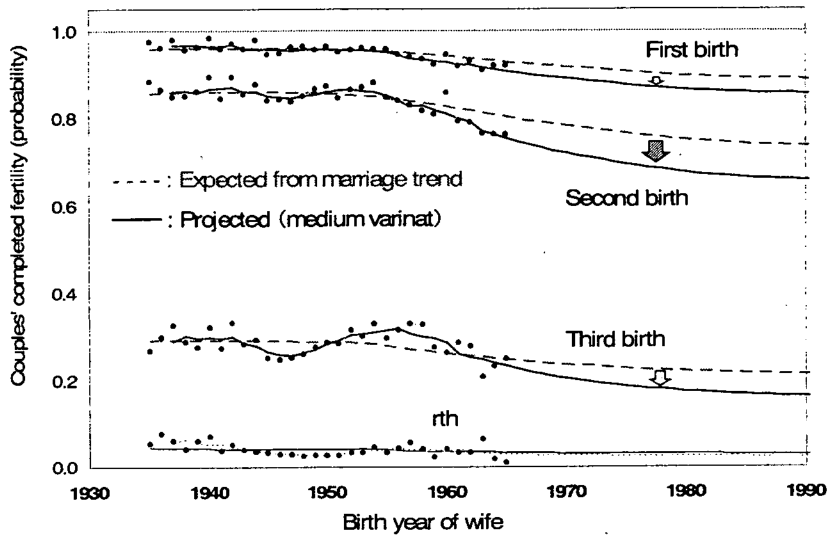
This unprecedented population comes out from assumptions of the world's lowest fertility prospects combined with the longest life expectancy. The eventual total fertility rate is 1.26 (ranging from 1.06 to 1.55), and the female life expectancy 90.3 (ranging from 89.2 to 91.5). How could it be possible for fertility to remain so low for a period of some 50 years? How could the life expectancy be highest?

Fertility Assumptions

Fertility assumptions underlying the projection were made on the basis of the cohort-fertility method, or the life course approach. That is a statistical projection of the level of completed fertility and the birth timing of each female birth cohort including those who have not yet completed their reproductive processes. Future annual age-specific and total fertility rates, which are required for the projection with the cohort component method, can be obtained by converting the cohort rates into the period rates. The age-specific fertility rates of cohorts were estimated or assumed separately by birth order using models with parameters for lifetime birth probability, birth timing and some other traits of the process.

For cohorts that had completed a substantial part of their reproductive processes, the entire processes were constructed by estimating the parameters of an empirically adjusted mathematical model through a statistical method (described later). For younger cohorts for which scant or no data were available, the fertility schedules are generated through reconstruction of reproductive life course formed by such behaviors as marriage and marital childbearing. Assumptions are set up with the following four parameters of reproductive behaviours; (1) the mean age at first marriage, (2) the proportion of never married, (3) the completed number of births from married women, and (4) the coefficient of divorce, bereavement and remarriage. Each of the parameters is projected according to trend derived from recorded data compiled for cohorts so that the completed life courses of future generations are assembled. For example, estimates and prospective trends of couple's birth probabilities by birth order, which sum up to (3) the average completed number of births from the couple, is illustrated in Figure 3. In the figure, the broken lines indicate trends of the expected life time probabilities of having a child of each birth order for first marriage couple resulted only from changes in marriage pattern. They show somewhat downward trend reflecting the trend of marriage delay. The solid lines indicate trends of the probabilities in medium fertility assumption in which the reductions from changes in couple's reproductive behaviors in addition to marriage delay are took into account according to the observed trends through the national fertility surveys. For more information on the construction of fertility assumptions, see elsewhere (Iwasawa and Kaneko 2007).

Figure 3. Expected and Prospective Trends of Couple's Probability of Having Birth of Each Order by Wife's Birth Year



Source: NIPSSR (2006), the Thirteenth National Fertility Survey, 2005.

The assumptions on those four parameters of the female cohorts born in 1990 are shown in Table 2 for three alternative projection variants, i.e. Medium, High and Low[1]. All of the assumed values of the components change to the same direction for fertility reduction even in the high variant, resulting in substantial decreases of the total fertility rate (TFR)[2].

Table 2 Assumptions for Measures of Fertility Components and Total Fertility Rates for the Reference Cohort (born in 1990)

Measures of Fertility Components	Observed: hort born in 1955		Assumptions of Population Projection: ›hort born in 1990		
			Medium	High	Low
(1) Mean age at first marriage	24.9	⇨	**28.2**	27.8	28.7
(2) Proportion never married at age 50	5.8 %		**23.5 %**	17.9 %	27.0 %
(3) Couples' completed fertility	2.16		**1.70**	1.91	1.52
(4) Effect of divorce, widowhood and remarriage	0.952		**0.925**	0.938	0.918
Cohort Total Fertility Rate (Japanese women)	1.94	⇨	**1.26 (1.20)**	1.55 (1.47)	1.06 (1.02)

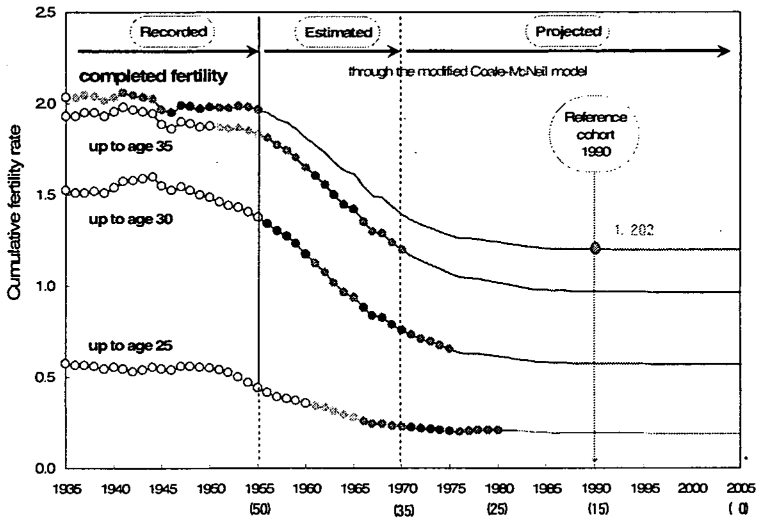
The parameters are translated into fertility schedules separately by birth order through a demographic model called the Generalized Log-gamma model (an extension of the Coale-McNeil model) with empirical adjustments specific to unique Japanese patterns (Kaneko, 2003). The resulting cohort trends of the cumulative fertility rate are shown in Figure 4 in the solid lines along

1 The cohorts born in 1990 served as a reference whose values of parameters were most carefully examined.

2 This construction is applied only for Japanese women. The fertility rates of women with foreign nationalities are produced in relation to those of Japanese, using the observed relationships to be fixed for the future.

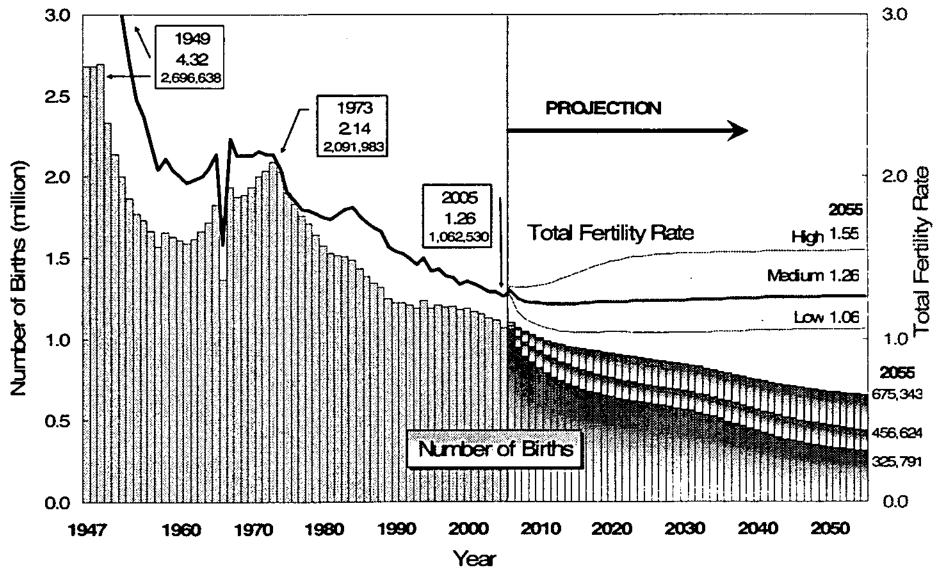
with the recorded values represented by dots. As stated above, these cohort fertility rates were converted into the period fertility rates as assumptions of the cohort component procedure. The transitions of assumed TFR are shown in Figure 5 along with projected number of births which exhibit extensive reductions.

Figure 4. Recorded and Projected Cohort Trends of the Cumulative Fertility Rate at Selected Age: 25, 30, 35, and Completed (Age 50)



Source: NIPSSR (2006), Population Projection for Japan: 2006-2055 [the medium-fertility assumption].

Figure 5. Number of Births, and Total Fertility Rate in Japan Trends and Prospects: 1947-2055



Source: Ministry of Health, Labor and Welfare, *Vital Statistics*. NIPSSR (2006), *Population Projection for Japan: 2006-2055* (the three fertility variants with medium-mortality assumption).

The assumption building through estimation and projection of cohort measures of life course components of fertility in the projections enables us to construct the projected life course in relation to the relevant life events. I constructed the multistate life tables for the projected life by family status. Those are examined in the next section. The results indicate that less-reproductive and non-familial lives prevail among today's young and future generations, reflecting rapid transformation of partnerships and family formation patterns observed in the current cohorts.

Mortality Assumptions

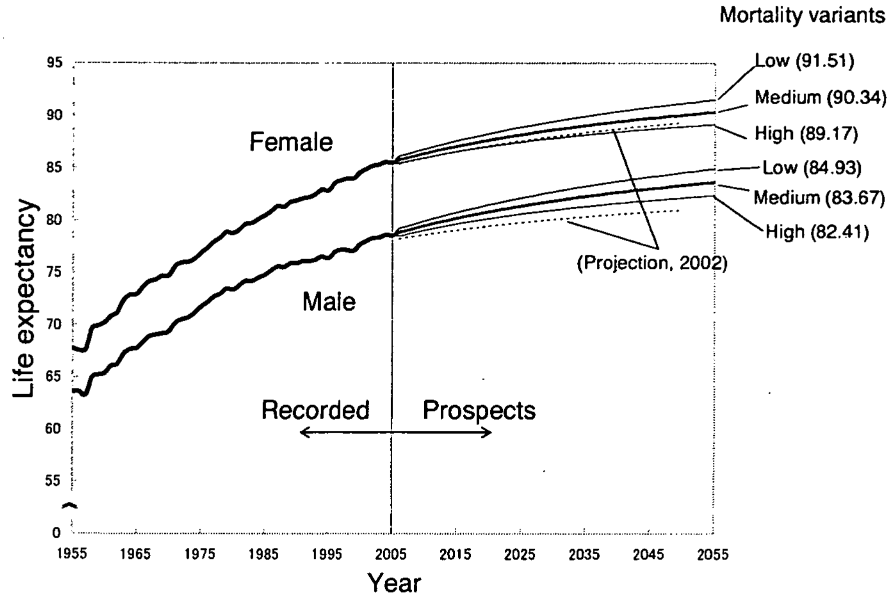
The Lee-Carter model was adopted as a basis to construct future annual life tables. The procedure is, however, modified by introducing a new technique called the shifting logistic model method (Bongaarts 2005), which identifies improvements in the mortality rates as shifts of the aging process toward older ages. This modification is a reflection of the actual mortality trend observed in Japan as a continuing gain of life expectancy especially in old ages. Combining the Lee-Carter model with the shifting logistic model is considered to be a better way of accounting for this trend, and in fact exhibits more sensible age patterns of future mortality than those from the Lee-Carter model alone.

Because of the unpredicted life expectancy gains in recent years of low mortality countries including Japan (Oeppen and Vaupel 2002, Tuljapurkar et al. 2000), a higher degree of uncertainty was anticipated for the future of mortality. This was coped with by making multiple assumptions just like those in fertility. The high and low variants of mortality, however, are derived from the boundaries of the 99 per cent confidence interval of the mortality level parameter of the Lee-Carter model (denoted by k_t in the original formulation).

According to the principal future life tables or the medium variant assumption of mortality, the life expectancy, which in 2005 was 78.53 years for males and 85.49 years for females, is expected to extend to 79.51 years for males and 86.41 years for females by 2010, 81.88 years for males and 88.66 years for females by 2030, and to 83.67 years for males and 90.34 years for females in 2055.

The assumed mortality rate for the high mortality variant will be higher, and consequently the life expectancy will be shorter than for the medium variant. According to this assumption, the life expectancy in 2055 will be 82.41 years for males and 89.17 years for females. Similarly, in the low mortality assumption, the mortality rate will be lower, and therefore the life expectancy will be longer than in the medium variant. The life expectancy by 2055 according to this assumption will be 84.93 years for males and 91.51 years for females. The assumed course of life expectancies is shown in Figure 6.

Figure 6. Trends and Prospects of the Life Expectancy: 1955-2055



Source: Ministry of Health, Labor and Welfare, *the Abridged Life Table.* NIPSSR (2006), *Population Projection for Japan: 2006-2055.*

Life Course Construction

The life-course construction is a characterized approach employed in the projection for Japan since the 1990's. It requires a good deal of quality data and a somewhat complicated model system. Series of the census, vital statistics, and micro data from national representative fertility surveys were brought together into play in the construction of fertility assumptions. It is often the case with population projection that excessive complications do not contribute to accuracy. However, our experience indicates that complexity to some extent would serve, since it provides detailed information on the way life of the future could be. It offers many distinct traces to improve the models through monitoring and contrasting the actual drift of the measures with those projected. In addition, it contributes to fulfilling accountability on preposition of the projections to the public. I briefly discuss the roles, uses, prospects and some limitations of the approach as well.

I attempted to construct the multistate life table for the projected life of Japanese women to obtain their life course measures mainly by ultimate family status. The measures include life time probability of never marrying, childless, having no grandchildren and so on. The probabilities incorporate incidences from women's immature deaths before the events. Average life time spent in each family status such as never married state, childless state, and only-child state, are also examined.

In Table 3, the woman's life time probabilities and distributions by family status are indicated for female birth cohorts born in every five years since 1950 through 1990. The cohorts born in 1950 and 1955 had completed their reproductive life processes by the time of projection, thus their figures are regarded as actually recorded. On the other hand, the cohorts born in 1960 and after have not yet completed the processes, and their figures are all for projected life by the assumption based on the trends of relevant parameters, though length of the projected period varies by cohort to cohort in relation to their age at projection.

Life time probability of a woman who is eventually marrying, assessed at her birth, is 86.4% for anyone among cohorts born in 1950. The figure gradually decreases from one cohort to the next until 75.7% for a woman born in 1990. These figures are somewhat lower than those calculated from the nuptiality rate among the fertility assumption, since the former includes effects from premature death before marriage.

The probability of never marrying, childlessness and having no grandchildren are 24.3%, 38.1% and 50.2% respectively in cohorts born in 1990 (see also Figure 7). If compared with those in preceding cohorts, these figures indicate rapid prevalence of less-reproductive and non-familial life styles toward an unprecedented level in this society.

Average life times spent in certain family status for female cohorts born in 1950-90 are presented in Table 4, with their proportion in the life expectancies. For instance, the average life time spent in never married status increases to 42.5 years (or 47% of the life expectancy) in cohorts born in 1990 from 25.3 years (31%) in those born in 1950. Figure 8 illustrates that the amount of life spent in never married state will drastically increase for Japanese women of young generations.

The changes in woman's life course cause tectonic movements in population composition as well. In Table 5 and Figure 9, I indicated the composition of female population by family status at three chronological times, year 2005, 2030, and 2055. They give us a manifest view that these life course changes observed above initiate the drastic increase of elderly who do not have any offspring in this society of the near future. 30.9% of women age 65 and higher do not have children in 2055, and 8.0% in 2005. Although only the situations for women are indicated here, the view should be expanded over the whole nation.

Table 3 Woman's Life Time Probabilities and Distributions by Family Status: Perspectives from the Medium Variant for Cohorts Born in 1950-90

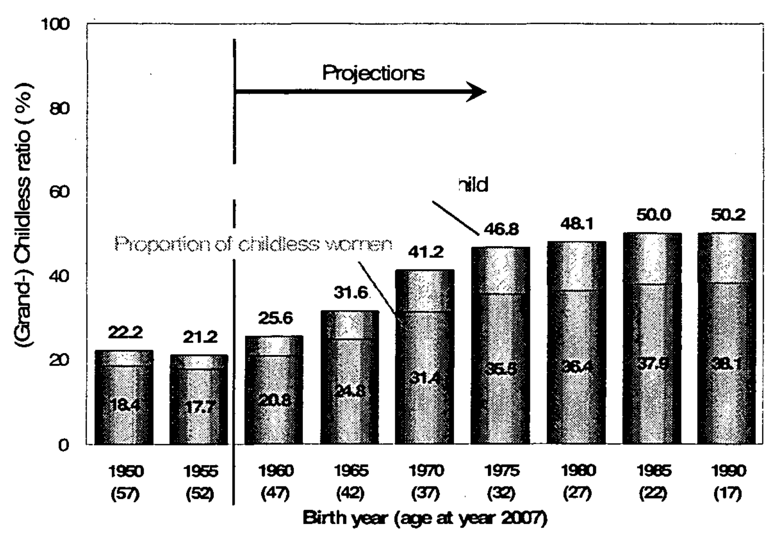
(%)

	Birth year of woman's cohort								
	Recorded		Projected						
	1950	1955	1960	1965	1970	1975	1980	1985	1990
Life time probability of woman ... (at birth)									
Marrying	86.4	88.8	87.1	85.6	82.1	78.3	76.4	75.7	75.7
Having 1st birth	81.6	82.3	79.2	75.2	68.6	64.5	63.6	62.1	61.9
Having 2nd birth	70.4	71.1	65.8	58.6	49.8	45.7	44.8	43.9	43.9
Having 3rd birth	23.6	26.7	24.1	19.1	14.7	12.8	11.7	11.3	11.2
Having 4th and higher birth	4.2	4.7	4.5	3.8	3.2	2.7	2.3	2.0	1.9
Never marrying	13.6	11.2	12.9	14.4	17.9	21.7	23.6	24.3	24.3
Childless	18.4	17.7	20.8	24.8	31.4	35.5	36.4	37.9	38.1
Never having 2nd child	29.6	28.9	34.2	41.4	50.2	54.3	55.2	56.1	56.1
Never having 3rd child	76.4	73.3	75.9	80.9	85.3	87.2	88.3	88.7	88.8
Never having 4th child	95.8	95.3	95.5	96.2	96.8	97.3	97.7	98.0	98.1
Life time distribution of woman by number of child (at birth)									
Childless	18.4	17.7	20.8	24.8	31.4	35.5	36.4	37.9	38.1
Never married	13.6	11.2	12.9	14.4	17.9	21.7	23.6	24.3	24.3
Ever married	4.8	6.5	7.9	10.5	13.5	13.8	12.8	13.6	13.8
Only child	11.2	11.2	13.3	16.5	18.7	18.8	18.8	18.1	18.0
Two children	46.8	44.4	41.8	39.5	35.2	32.9	33.0	32.6	32.8
Three children	19.4	22.0	19.6	15.3	11.5	10.1	9.4	9.3	9.3
Four and more children	4.2	4.7	4.5	3.8	3.2	2.7	2.3	2.0	1.9
Net Reproduction Rate	87.5	90.0	84.5	76.3	66.3	61.2	59.6	58.1	57.9
No grandchild	22.2	21.2	25.6	31.6	41.2	46.8	48.1	50.0	50.2

Life time proportion of woman (without mortality effect = directly derived from fertility assumption)									
Never married	5.0	5.8	9.3	12.0	16.2	20.4	22.6	23.5	23.5
Childless	10.3	12.7	17.5	22.7	30.0	32.8	35.7	37.1	37.4
No grandchild	12.1	15.0	21.3	28.8	39.3	42.9	46.8	48.9	49.4

Source: From the projection 2006, medium-fertility and medium-mortality variant. The life time proportions of woman never married and childless (without mortality effect) are officially provided numbers. Other numbers are calculated by the author from the assumption. The sex ratio at birth for the net reproduction ratio is an officially provided assumption and is 105.4 (fixed value from average over year 2001-05).

Figure 7. Childless and Non-grandchild Ratio among Women by Cohort: The Medium Assumption for Female Cohort born in 1935-1990



Source: From the projection 2006, medium-fertility and medium-mortality variant. Proportions are calculated by the author from the assumption of the projection 2006, medium-fertility and medium-mortality variant.

Table 4 Woman's Average Life Time Length of Period Spent in Each Family Status: Perspectives from the Medium Variant for Cohorts Born in 1950-90

(year)

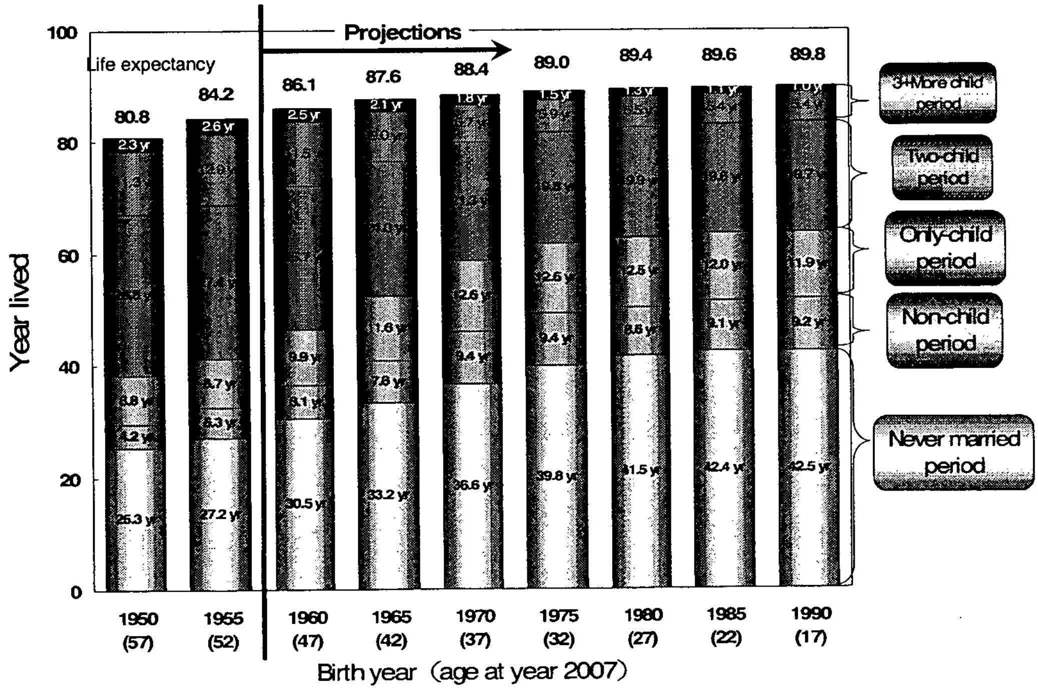
	Birth year of woman's cohort								
	Observed		Projected						
	1950	1955	1960	1965	1970	1975	1980	1985	1990
Average life time length of period spent in each family status									
Life expectancy	80.8	84.2	86.1	87.6	88.4	89.0	89.4	89.6	89.8
Never married	25.3	27.2	30.5	33.2	36.6	39.8	41.5	42.4	42.5
Childless	29.5	32.5	36.5	40.9	46.0	49.2	50.2	51.4	51.7
Never had 2nd child	38.3	41.2	46.4	52.5	58.7	61.8	62.7	63.5	63.7
Never had 3rd child	67.1	68.7	72.1	76.5	79.9	81.6	82.6	83.1	83.4
Never had 4th child	78.5	81.5	83.6	85.5	86.7	87.5	88.1	88.5	88.8
Ever married	55.4	57.0	55.6	54.3	51.8	49.2	47.8	47.3	47.3
Having Child(ren)	51.2	51.7	49.6	46.7	42.4	39.8	39.2	38.2	38.1

(%)

	1950	1955	1960	1965	1970	1975	1980	1985	1990
Proportion of life time spent in each family status									
Life expectancy	100	100	100	100	100	100	100	100	100
Never married	31	32	35	38	41	45	46	47	47
Childless	37	39	42	47	52	55	56	57	58
Never had 2nd child	47	49	54	60	66	69	70	71	71
Never had 3rd child	83	82	84	87	90	92	92	93	93
Never had 4th child	97	97	97	98	98	98	99	99	99
Ever married	69	68	65	62	59	55	54	53	53
Having Child(ren)	63	61	58	53	48	45	44	43	42

Source: From the assumption of the projection 2006, medium-fertility and medium-mortality variant. The life expectancies are officially provided numbers. Other numbers are calculated by the author.

Figure 8. Woman's Average Life Span and Its Composition by Family Status for Birth Cohorts born in 1950-1990



Source: From the projection 2006, medium-fertility and medium-mortality variant. The life expectancies are officially provided numbers. Other numbers are calculated by the author from the assumption.

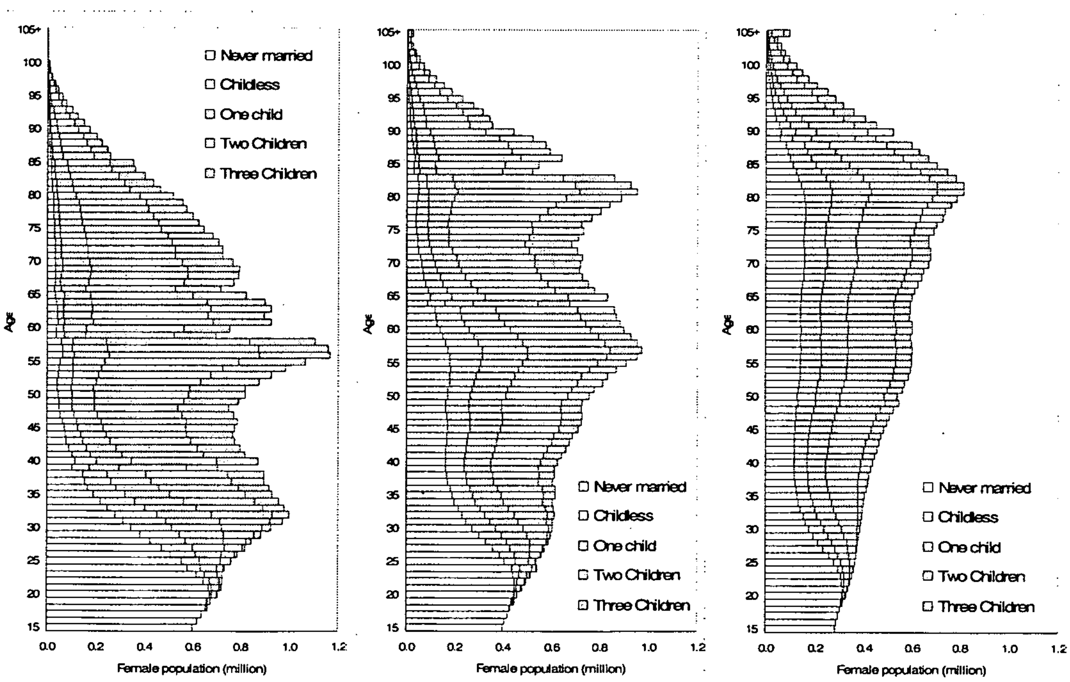
Table 5 Composition of Woman in Each Age Group by Family Status: Perspectives from the Medium Variant in Year 2005, 2030, and 2055

Age Group	2005			2030			2055		
	Proportion of woman ...								(%)
	Never married	Childless	Less than two children	Never married	Childless	Less than two children	Never married	Childless	Less than two children
15-19	99.2	99.3	99.9	99.2	99.4	99.9	99.2	99.4	99.9
20-24	88.4	91.9	97.9	89.2	92.6	98.1	89.3	92.6	98.1
25-29	57.5	72.4	88.6	62.6	75.2	89.3	62.8	75.3	89.4
30-34	29.3	46.1	68.1	38.5	54.0	73.4	38.5	53.9	73.4
35-39	17.6	30.0	48.5	28.6	41.9	60.3	28.7	41.9	60.3
40-44	11.4	20.7	36.1	25.1	37.9	55.9	25.1	37.9	56.1
45-49	7.3	14.6	27.4	23.3	36.5	55.1	23.9	37.5	55.7
50-54	5.0	11.5	23.3	21.9	35.0	54.1	23.6	37.5	55.7
55-59	5.2	9.6	22.2	17.9	32.2	51.7	23.6	37.5	55.7
60-64	4.6	7.5	20.7	14.3	26.8	44.8	23.5	37.4	55.6
65-69	4.1	7.7	22.4	10.7	20.4	35.8	23.5	37.4	55.6
70-74	4.4	8.1	23.1	7.2	14.6	27.4	22.9	36.5	55.1
75-79	4.4	8.1	23.1	5.0	11.5	23.3	21.9	35.0	54.1
80-84	4.4	8.1	23.1	5.2	9.6	22.2	17.9	32.2	51.7
85-89	4.4	8.1	23.1	4.6	7.5	20.7	14.3	26.9	45.0
90-94	4.4	8.1	23.1	4.1	7.7	22.3	10.8	20.6	36.1
95-99	4.4	8.1	23.1	4.4	8.1	23.1	7.4	14.9	27.9
100+	4.4	8.1	23.1	4.4	8.1	23.1	5.1	11.3	23.2
15+	22.8	29.8	43.6	24.8	34.3	49.4	28.9	41.2	58.1
15-49	41.6	51.4	65.3	48.0	58.9	73.4	48.2	59.0	73.4
65+	4.3	8.0	22.9	6.3	12.2	25.6	18.2	30.9	48.8

Source: From the projection 2006, medium-fertility and medium-mortality variant. Numbers are calculated by the author.

Figure 9. Composition of Female Population by Family Status: Perspectives from the Medium Variant in Year 2005, 2030, and 2055

2005 2030 2055



Source: From the projection 2006, medium-fertility and medium-mortality variant. Numbers are calculated by the author.

Discussion

In this paper, first I described results and methods of the latest Japanese official Population Projections. Besides their unprecedented demographic perspectives on population decline and aging through the world's lowest fertility assumptions with the highest life expectancy, the projections provide some pictures of people's life course changes making use of their life course approaches employed mainly in constructing fertility assumptions. Hence, I attempted to build multistate life tables for the projected life of Japanese women in relation to family status. As a consequence, it is revealed that historically unparalleled increases both in proportion of never married and childless women and in average life time spent in those statuses would be witnessed within the scope of the next few decades. It also sets up an expansion of elderly people who have no offspring or family. These insights in individual aspects of the population projection should rouse public awareness as to the necessity for fundamental alteration in life course related institutions, in addition to reforms of macro socioeconomic organizations such as the labor market or social security system. For example, the society would not be able to rely any more on individual families caring for elderly in the manner used up to today.

The life course approach to making assumptions of vital rates requires significant amount of quality data and sophisticated models. There are arguments that the complexity of models does not necessarily contribute to precision in prediction, especially for systems consisting of many factors. Population projection, in particular, can be carried out with a jump-off population and three assumed vital rates (fertility, mortality, and migration). Incorporation of other components such as marriage makes the model complex, and requires additional assumptions on the future course of the component whose future is often more uncertain than those of the basic three factors. Seeking too much reality in projection models often leads to a morass of technical difficulties with little gain in accuracy. However, to the extent that each rate consists of several behavioral factors which change disjointedly, preparing different assumptions for their future courses is essential for sensible prediction[3]. Therefore, better policy about the degree of reality to seek in a population projection depends on what kinds of data are available and how confidently we see the future of each component involved, providing the present knowledge and technology. Then, what is the direction we should take to expand "the present knowledge and technology?"

We live in an era of difficulty in forecasting the demographic future of the society due to unpredictable developments in all vital rates. In many countries of the developed world, the traditional cohort component method with naive vital assumptions has continually shown its limitations along with the development of institutional changes called the Second Demographic Transition (Lesthaeghe 1994, Van de Kaa 1987) in the last quarter of the former century[4,5]. Demographers have increasingly become aware of projection's uncertainty, and some new

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3 For example in fertility, coupling and having babies among couples are separate behaviors and their propensities have their own trends.

4 The precursors in demographic projection experienced similar difficulties during the first Demographic Transition accompanied with the post-war baby boom.

5 The author thinks it reasonable that the shifts in mortality improvement recognized as the fourth stage of the Epidemiologic Transition (the age of delayed degenerative diseases, Olshansky and Ault 1986) being experienced by the most developed countries since the late 1960's should be included in the same stream of the Second Demographic Transition to the extent that they were concurrent phenomena unexpected in the context of the first Demographic Transition.

"paradigms" have emerged as solutions. Among them, the probabilistic population projection is a most pronounced exemplar that enhances projection's practical applicability explicitly indicating its inherent uncertainty. It bestowed the scientific outline on population projection. Beside techniques that specify uncertainty, however, we should seek frameworks to reduce uncertainty on the other side. The life course approach or statistical life course construction of relevant cohorts should be the basis of the novel framework for that function, since it offers distinct traces by each lifetime behavior to improve the models through monitoring and contrasting the actual drift of the measures for them. The measures are free from annoying disturbances, so called tempo effects, and rarely violently fluctuate.

The present study combined with the above discussion suggests that the life course approach in population projection may deserve all efforts to overcome the difficulties that have been preventing it from working such as unavailability of the data it requires and the model complexities it induces. It provides essential information on people's life in the upcoming society, and is an effective basis for more reliable demographic prediction tools. The instruments are ample. The event history models, micro-simulation techniques possibly with agent-based design, and decision making theories, for instance, should play central roles in developing such a framework. However, what is most required for the approach to work is cohort data of many aspects. In most cases, an enhancement of the statistical systems and starting a new series of survey may be required. Public consent should be necessary. For that purpose, international cooperation is indispensable, and developing a communal outline for data collection may be effective.

Conclusion

According to the multistate life table constructed from the principal assumptions of the latest official population projections of Japan, the life time probability of childlessness and having no grandchildren among women born in 1990 are respectively 38.1% and 50.2%, while the corresponding proportions are 18.4% and 22.2% in those born in 1950. Similarly, the average life time spent in never married status increases to 42.5 years (or 47% of the life expectancy) in cohorts born in 1990 from 25.3 years (31%) in those born in 1950. These changes set off a drastic increase of elderly who do not have offspring to live with or rely on in this society of the near future.

The life course approach in population projection provides rich information on people's life in the upcoming society on the one hand, and on the other, it should be a promising basis of a new "paradigm" of the projection in the era of the Second Demographic Transition. The development of the new framework should be accompanied by enhancement of the data collection via upgrading national statistical systems toward demographic formulation of individual life courses.

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Ⅲ. 資 料 編

国連統計委員会－欧州経済委員会（UNECE）
欧州連合統計局（EUROSTAT）

ヨーロッパ統計専門家会議

1　将来人口推計に関するEUROSTATならびにUNECEによるジョイント・ワークセッション

（ブカレスト、2007年10月10-12日）

(1) 議事録とタイムテーブル

会議は2007年10月10日（水）午前10時よりルーマニアの国立統計研究所（16 Libertatii Avenue, sector 5, Bucharest, Romania）の会議室にて開始 会議主催はルーマニア国立統計局

会議の議題項目の要旨

1. 開会の辞
2. 議題の採択と役職の任命
3. 基調講演
4. 出生
5. 死亡
6. 人口推計
7. 世帯推計
8. 特定の推計に関する諸問題
9. 円卓会議
10. 将来の研究
11. 報告書の採択

時間割表

2007年10月10日（水）

9：30-10：00　参加者の登録

10：00-10：50　1.　開会

開会の辞：

Vergil Voineagu（国立統計研究所、ルーマニア）

Eugen Nicolaescu（厚生大臣、ルーマニア）

Michel Glaude（Eurostat）

Paolo Valente（UNECE）

10：50-11：00　2.　議題の採択と役職の任命

11：00-12：30　3.　基調講演

11：00-11：45

「長期的な人口減少に向けて：世界人口史の臨界点についての見解」

David Reher（マドリッド大学）

11：45-12：30

「ヨーロッパにおける長期人口推計：なぜ人口推計は政策に影響を与え改革を加速させるのか？」

Henri Bogaert（連邦計画局、ベルギー）

12：30-14：00　昼食

14：00-15：30　4.　セッション1：出生（座長：Wolfgang Lutz）

14：00-14：20

「社会的相互作用に関する Agent-based モデルを通じた年齢別出生率の推計」

Belinda Aparicio Diaz, Thomas Fent, Alexia Prskawetz（ウィーン人口研究所 (Austrian Academy of Science)）

Laura Bernardi（マックスプランク人口研究所）

14：20-14：40

「コーホートの観点から見た日本におけるパートナーシップの変化」

Miho Iwasawa, Ryuichi Kaneko（国立社会保障・人口問題研究所、日本）

14：40-15：00

「社会的地位ごとの出生力変化に関する meta-analysis」

Vegard Skirbekk（国際応用システム研究所（IIASA））

15：00-15：20

「家族および出生力イベント：調査データからの年齢プロファイル推計」

Roberto Impicciatore and Francesco C. Billari（ボッコーニ大学）

15：20-15：50　質疑応答

15：50-16：05　コーヒーブレイク

16：05-16：45　5.　セッション2：死亡（座長：Nico Keilman）

16：05-16：25

「リー＝カーター・モデルによる死亡推計に関する不調和を改善するためのアプローチ」

Dalkhat Ediev（ウィーン人口研究所(Austria Academy of Science)）

16：25-16：45　質疑応答

17：00から

ORGANISED SOCIAL EVENT

2007年10月11日（木）

9：15-10：45　5.　セッション2：死亡（座長：Nico Keilman）

9：15-9：35

「ポルトガルにおける超高齢者の死亡と寿命の推計」

Edviges Coelho, Maria Graca Magalhaes（国立統計研究所、ポルトガル）
Jorge Miguel Bravo（University of Evora）

9：35-9：55
「人口推計における死亡率：推論への確率的アプローチ」
Therese Karlsson, Gustaf Strandell（Statistics Sweden）

9：55-10：15
「ノルウェイの年金改革における平均余命の調整」
Helge Brunborg（Statistics Norway）

10：15-10：55　質疑応答

10：55-11：10　コーヒーブレイク

11：10-12：30　6.　セッション3：人口推計（座長：Graziella Caselli）

11：10-11：30
「確率的人口推計のための新たな手法」
Salvatore Bertino, Eugenio Sonnino（ローマ大学“La Sapienza”）

11：30-11：50
「最長寿・超低出生からの人口の見通し：日本における新たな将来推計人口とそのライフコース・アプローチ」
Ryuichi Kaneko（国立社会保障・人口問題研究所、日本）

「時系列アプローチを用いたスウェーデンにおける公的な人口推計の検証」
Supporting paper（not presented）
Gustaf Strandell（Statistics Sweden）

11：50-12：30　質疑応答

12：30-14：00　昼食

14：00-15：30　6.　セッション3：人口推計（座長：Graziella Caselli）

14：00-14：20

「人口予測と長期的な潜在成長力に対するその影響」Ion Ghizdeanu（National Commission for Economic Forecasting、ルーマニア）

14：20-14：40

「標準年齢スケジュールに基づく年齢別率の推計のための手法と線形スプラインを用いた相対的リスクに関する仮定：TOPALS」

Joop de Beer, Nicole van der Gaag, Frans Willekens（オランダ人口研究所）

14：40-15：00　ミクロシミュレーションを通じた人口予測：MicMac プロジェクトのソフトウェアデザイン」

Jutta Gampe, Sabine Zinn（マックスプランク人口研究所）

Frans Willekens, Nicole van den Gaag（オランダ人口研究所）

15：00-15：30　質疑応答

15：30-15：45　コーヒーブレイク

15：45-17：15　7.　セッション4：世帯推計（座長：Vasile Ghetau）

15：45-16：05

「将来の世帯構造について」

Nico Keilman（オスロ大学、経済学部）

Juha Alho（University of Joensuu）

16：05-16：25

「オランダの世帯推計のための動学的モデルに向けて」

Coen van Duin（オランダ統計局）

16：25-16：45

「世帯主率法の拡張に基づく確率的世帯推計のロシアのケースへの応用」

Sergei Scherbov（ウィーン人口研究所(Austrian Academy of Science)）

Dalkhat Ediev（国際応用システム研究所（IIASA））

16：45-17：15　質疑応答