

FORUM 005 SPECIAL REPORT

# The Impacts of Population Decline in Japan: Demographic Prospects and Policy Implications

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## Introduction

The objective of this study is to examine the demographic underpinnings for possible social-institutional and policy changes associated with rapid population aging and continuous population decline in Japan during the first half of the 21st century. Specifically, I first examine changes in the size and age composition of Japan's population from 1960–2010 and their direct contributors, namely mortality and fertility. Second, I examine the prospects for population aging and decline in Japan from 2010–2060, based on the most recent official population projections. Third, providing that the major characteristics of Japan's population aging are rapidity and magnitude, I look at the prospects for aging within the elderly population itself. Fourth, I seek to assess the possible impacts of these future demographic changes on the labor market, examining the prospects for changes in the size and age composition of the working-age population. Fifth, I then analyze the possible effects of population aging and decline on Japan's public pension and long-term care insurance schemes. Finally, I consider implications of these future demographic changes from the perspective of international migration.

With the proportion of the elderly (those aged 65 and above) in the total population being 23 percent in 2010 (National Institute of Population and Social Security Research 2014: 30–38), Japan is currently the most aged society in the world. Furthermore, Japan's population has begun to decline notably since 2010. There has never been a peace-time period (time without crises and upheavals such as wars, famines, and epidemics) in the country's recorded history in which the population declined continuously for a long duration of time. Once the population begins to decline, however, it is projected to continue during the lifetime of, if not all, a large majority of Japanese men and women alive today (National Institute of Population and Social Security Research 2012). On the other hand, there are few, if any, social institutions and systems in the country that have been constructed, taking a long-term population decline into consideration. It is therefore urgent and important that we now assess the socioeconomic consequences of Japan's aging and declining population so that we can find ways to accommodate them.

## Changes in Population Size and Age Composition in 1960–2010

Though slowing down, Japan's population has increased in the postwar years from around 93.4 million in 1960 to a little over 128 million in 2010: 37-percent increase in these 50 years (see the upper panel of Table 1). However, dividing the total population into three major age groups—children (under age 15), working age (15–64), and elderly (65 and above)—we can see that the number of persons under age 15 began to decline in 1980 and continued to decrease rapidly thereafter, reaching



**Table 1.** Actual & Projected Changes in Absolute Population Size (in 1,000), Relative Population Size (with Year 1960 as 100), and Proportion (%) by Age Group: Japan 1960–2010 & 2015–2060

	Population (in 1,000)				Relative size by age group				Proportion (%) by age group		
	Total	Age 0–14	Age 15–64	Age 65+	Total	0–14	15–64	65+	0–14	15–64	65+
1960	93,419	28,067	60,002	5,350	100	100	100	100	30.0	64.2	5.7
1965	98,275	25,166	66,928	6,181	105	90	112	116	25.6	68.1	6.3
1970	103,720	24,823	71,566	7,331	110	88	119	137	23.9	69.0	7.1
1975	111,940	27,221	75,807	8,865	120	97	126	166	24.3	67.7	7.9
1980	117,060	27,507	78,835	10,647	125	98	131	199	23.5	67.4	9.1
1985	121,049	26,033	82,506	12,468	130	93	138	233	21.5	68.2	10.3
1990	123,611	22,486	85,904	14,895	132	80	143	278	18.2	69.7	12.1
1995	125,570	20,014	87,165	18,261	134	71	145	341	16.0	69.5	14.6
2000	126,926	18,472	86,220	22,005	136	66	144	411	14.6	68.1	17.4
2005	127,768	17,521	84,092	25,672	137	62	140	480	13.8	66.1	20.2
2010	128,057	16,803	81,032	29,246	137	60	135	547	13.1	63.8	23.0
2015	126,597	15,827	76,818	33,952	136	56	128	635	12.5	60.7	26.8
2020	124,100	14,568	73,408	36,124	133	52	122	675	11.7	59.2	29.1
2025	120,659	13,240	70,845	36,573	129	47	118	684	11.0	58.7	30.3
2030	116,618	12,039	67,730	36,849	125	43	113	689	10.3	58.1	31.6
2035	112,124	11,287	63,430	37,407	120	40	106	699	10.1	56.6	33.4
2040	107,276	10,732	57,866	38,678	115	38	96	723	10.0	53.9	36.1
2045	102,210	10,116	53,531	38,564	109	36	89	721	9.9	52.4	37.7
2050	97,076	9,387	50,013	37,676	104	33	83	704	9.7	51.5	38.8
2055	91,933	8,614	47,063	36,257	98	31	78	678	9.4	51.2	39.4
2060	86,737	7,912	44,183	34,642	93	28	74	648	9.1	50.9	39.9

Notes: Projected numbers are estimated, based on the medium variants of fertility and mortality estimates.

Source: National Institute of Population and Social Security Research (2012) *Population Projections for Japan: 2011–2060 (With Long-Range Population Projections: 2061–2110)*. Tokyo: National Institute of Population and Social Security Research.

16.8 million in 2010. That is, the population size of this youngest age segment shrank by 40 percent in 50 years from 1960 to 2010. Reflecting these changes in the absolute numbers, the proportion of children in Japan's total population dropped from 30 percent in 1960 to 13 percent in 2010. On the other hand, the size of the working-age population (age 15–64) first increased from 60 million in 1960 to more than 87 million in 1995, followed by a slow decline, reaching 81 million in 2010. The proportion of the working-age population in the total population accordingly increased from around 64 percent in 1960 to 70 percent in 1990, and then decreased back to 64 percent by 2010.

In contrast, the size and the proportion of the elderly have both risen continuously and rapidly throughout the 50 years from 1960 to 2010 (see Table 1). The number of persons aged 65 and above grew from around 5.4 million in 1960 to more than 29 million in 2010: a 5.5 times increase over these 5 decades. Concomitantly, the proportion of the elderly quadrupled from less than 6 percent to 23 percent during the same period.

This rapid pace is one of the main characteristics of population aging (defined as increases in the proportion of the elderly in the total population) in postwar Japan, as its Western counterparts have taken a great deal longer for their populations to age. For example, Japan took only 24 years (from 1970 to 1994) for the proportion of population age 65+ to double from 7 percent to 14 percent (National Institute of Population and Social Security Research 2014: 39). By contrast, it took France 126 years (from 1864 to 1990), Sweden 85 years (from 1887 to 1972), and Germany 40 years (from 1932 to 1972) for the proportion elderly to increase two-fold from 7 percent to 14 percent (United Nations 1956, 2010).

## Direct Factors of Population Aging and Population Decline

The rapid population aging that we saw above has been caused directly by two demographic factors: a declining fertility rate and a reduction in mortality (i.e. increasing life expectancy). As shown in Figure 1, Japan experienced a sharp downturn in its fertility rate from shortly after World War II until the late 1950s. In a span of a little over one decade, the birth rate was cut by more than one-half from the Total Fertility Rate (TFR) of 4.5 children per woman in 1947 to 2.0 in 1957.<sup>1</sup> After

<sup>1</sup> The total fertility rate (TFR) indicates the average family size (completed fertility) of a fictitious group (cohort) of women, assuming that they bear children at each age during their reproductive years (age 15–49) at the rate prevailing in a given country in a given year and that none of the women die before reaching age 50, the end of the reproductive years.

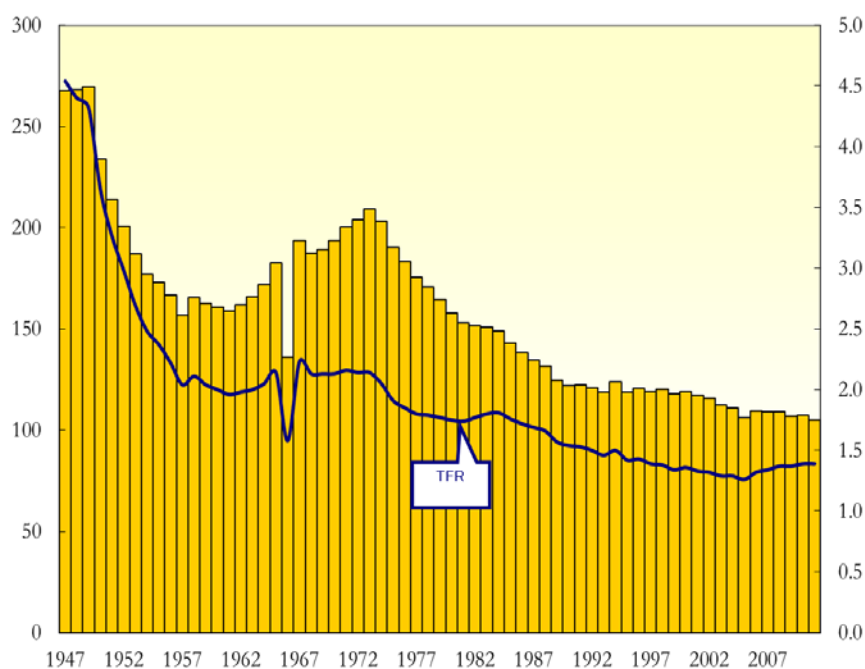
this dramatic decline, Japan's fertility rate stabilized at a level of 2.0 to 2.2 children per woman—at around the replacement level—until 1974, when it began to decline again.<sup>2</sup>

Since the mid-1970s, Japan's fertility level has been declining to well below replacement, reaching the TFR of approximately 1.5 children per woman in the early 1990s. Since then, the TFR has never recovered the 1.50 level, decreasing further to 1.3 to 1.4 children per woman—the 'lowest-low' level according to Kohler, Billari and Ortega (2002)—in the 2000s. The TFR stood at 1.41 children per woman in 2012. Although the fertility rate decline to below-replacement levels since the mid-1970s was less dramatic and slower than that of the earlier postwar decline, its demographic and socioeconomic consequences are much more important and serious, because it has resulted in the rapid and extreme aging and decline of Japan's population discussed in the previous section.

The second demographic factor of the country's population aging and decline is declining mortality—especially decreasing mortality in old age. Put differently, prolonged life expectancy in old age is one of the chief causes for Japan's rapid and extreme aging. As shown in Figure 2, for both sexes, life expectancy at birth has been improving rapidly and steadily throughout the postwar years, with the gender difference widening over time. Likewise, life expectancy at age 65 has been improving for both sexes, with the tempo of improvement accelerating in recent years. As of 2010, life expectancy at age 65 for males was around 19 years and that for females stood at 24 years. This means that, if a fictitious birth cohort of persons was to live and die according to the age schedule of male mortality in Japan in 2010, they are expected to live on the average 14 years if they managed to survive to age 65. The corresponding duration is 24 years if we base the estimate on the age profile of mortality to that of Japanese women in 2010. Altogether, these estimates show the clear prolonging of the life expectancy of Japanese men and women in old age, affecting the social security systems.

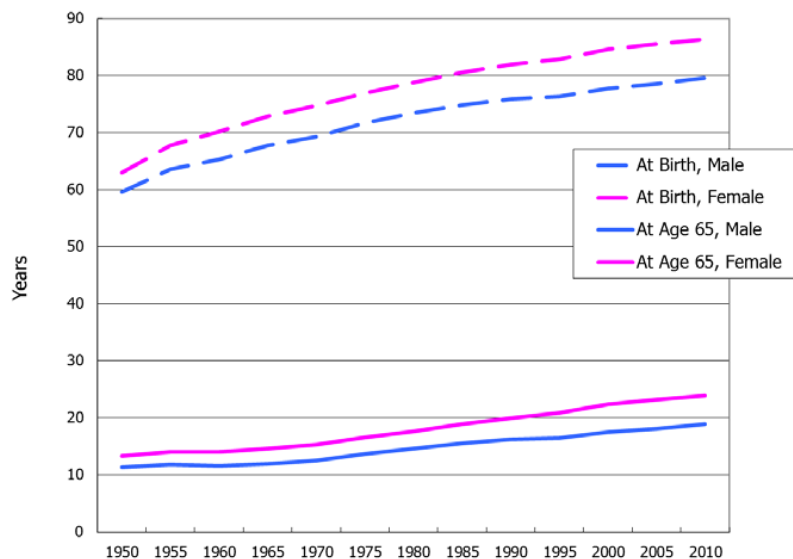
<sup>2</sup> Replacement-level fertility is the level of fertility at which a group (cohort) of women, on the average, have just enough daughters to replace themselves in the population at current mortality levels. In terms of the TFR, the replacement level is a little less than 2.1 per woman.

**Figure 1.** The Number of Live Births and the Total Fertility Rate (TFR) per Woman: Japan 1947–2012



Source: National Institute of Population and Social Security Research (2014: 49–51).

**Figure 2.** Life Expectancy (in Years) at Birth and at Age 65 by Sex: Japan 1950–2010



Source: National Institute of Population and Social Security Research (2014: 79).

## Projected Changes in Population Size and Age Composition from 2010–2060

According to the 2012 official population projections, Japan's total population is expected to decline from approximately 128 million in 2010 to 87 million in 2060 (see Table 1).<sup>3</sup> Put differently, Japan's population is projected to decline by 32 percent during the next 50 years. This rapid population decline is due mainly to very rapid declines in the childhood and working-age populations. As shown in the lower panel of Table 1, the size of the population under age 15 is projected to plummet from 16.8 million in 2010 to 7.9 million in 2060. The size of the working-age population (age 15–64) is also estimated to decrease dramatically from around 81 million in 2010 to 44 million in 2060.

Consequently, the proportion of the population aged 65 and above in the total population, which is the most commonly used indicator of population aging, is anticipated to jump from around 23 percent in 2010 to 40 percent in 2060. As discussed above, Japan is one of the most rapidly aging populations in the world (National Institute of Population and Social Security Research 2014: 39), and this rapid aging, especially that of the elderly population, is expected to continue for the years to come.

### Prospects of Aging of the Elderly Population

Let us next look at the prospects for aging within the elderly population in Japan. As shown in Table 2, the size of the population aged 65 and above is projected to increase from approximately 29 million in 2010 to over 38 million in 2040, followed by a modest decline to around 35 million in 2060. The population aged 75 and above (the 'old-old') is projected to rise more rapidly from 14 million in 2010 to around 24 million in 2055, and the population aged 85 and above (the 'oldest-old') is expected to grow even more dramatically from mere 3.8 million in 2010 to over 11.5 million in 2060 (see Table 2).

**Table 2.** Indicators of Projected Aging of the Elderly Population (Age 65 and Above), According to Medium Variants of Fertility and Mortality: Japan 2010–2060

Year	Population (in 1,000) by age group			% in pop. age 65+		Ratio per 100 pop. 15–64		
	65+	75+	85+	75+	85+	65+	75+	85+
2010	29,484	14,194	3,825	48.1	13.0	36	17	5
2015	33,952	16,458	5,111	48.5	15.1	44	21	7
2020	36,124	18,790	6,368	52.0	17.6	49	26	9
2025	36,573	21,786	7,362	59.6	20.1	52	31	10
2030	36,849	22,784	8,462	61.8	23.0	54	34	12
2035	37,407	22,454	10,149	60.0	27.1	59	35	16
2040	38,678	22,230	10,366	57.5	26.8	67	38	18
2045	38,564	22,567	9,848	58.5	25.5	72	42	18
2050	37,676	23,846	9,774	63.3	25.9	75	48	20
2055	36,257	24,010	10,346	66.2	28.5	77	51	22
2060	34,642	23,362	11,490	67.4	33.2	78	53	26

Source: National Institute of Population and Social Security Research (2012) *Population Projections for Japan: 2011–2060 (With Long-Range Population Projections: 2061–2110)*. Tokyo: National Institute of Population and Social Security Research.

Consequently, the proportion of the old-old in the elderly population is expected to surpass the 50-percent mark during 2015–2020, and the corresponding proportion of the oldest-old is projected to increase dramatically from 13 percent in 2010 to 33 percent in 2060. That is, the proportion of the old-old in the elderly population is estimated to surpass that of the young-old in the next 5 years. Further, while around one out of eight elderly was the oldest-old in 2010, the ratio will be one-third in 50 years later. In summary, not only is Japan's population aging expected to continue, but the elderly population will be aging at a much more rapid pace than the total population during the first half of this century, with the oldest-old increasing most rapidly.

Let us further look at future changes in the relative sizes (ratios) of different age segments of the elderly population to the working-age population (aged 15–64), as population aging is not a matter pertaining only to the elderly but also to the rela-

<sup>3</sup> Projected numbers are based on the medium variants of fertility and mortality. Medium variants refer to the projections based on the assumptions of medium-level cohort fertility and mortality. For more details, see National Institute of Population and Social Security Research (2012: 9–38).

**Table 3.** Projected Absolute Changes in Size of Likely Workforce (Population Age 20–64), Relative Changes in Size of Likely Workforce (with Year 2010 as 100), and Proportion (%) of Likely Workforce by Age Group, According to Medium Variants of Fertility and Mortality: Japan 2010–2060

Year	Population (in 1,000) by age group:				Relative size by age group:				% in population age 20–64			
	Total (20–64)	20–39	40–49	50–64	Total (20–64)	20–39	40–49	50–64	20–39	40–49	50–64	
2010	75,642	32,201	16,902	26,540	100	100	100	100	42.6	22.3	35.1	
2015	70,885	28,385	18,504	23,997	94	88	109	90	40.0	26.1	33.9	
2020	67,830	26,080	17,989	23,762	90	81	106	90	38.4	26.5	35.0	
2025	65,593	24,478	15,493	25,624	87	76	92	97	37.3	23.6	39.1	
2030	62,784	23,374	13,670	25,740	83	73	81	97	37.2	21.8	41.0	
2035	59,096	22,294	12,548	24,255	78	69	74	91	37.7	21.2	41.0	
2040	53,933	20,693	12,124	21,117	71	64	72	80	38.4	22.5	39.2	
2045	49,785	19,020	11,683	19,082	66	59	69	72	38.2	23.5	38.3	
2050	46,430	17,572	11,030	17,930	61	55	65	68	37.8	23.8	38.6	
2055	43,682	16,069	10,407	17,208	58	50	62	65	36.8	23.8	39.4	
2060	41,050	15,089	9,474	16,487	54	47	56	62	36.8	23.1	40.2	

Source: National Institute of Population and Social Security Research (2012) *Population Projections for Japan: 2011–2060 (With Long-Range Population Projections: 2061–2110)*. Tokyo: National Institute of Population and Social Security Research.

tions between the elderly and the rest of the population. From the right-side panel of Table 2, we can see that the ratio of those aged 65 and above per 100 persons aged 15–64 (the ‘old-age dependency ratio’) is estimated to increase 2.2 times from 36 to 78 during 2010–2060. That is, while there are around 2.8 working-age adults per elderly aged 65 and above in 2010, the ratio will decline to merely 1.3 by 2060.

Furthermore, the ratio of the old-old (aged 75 and above) per 100 working-age adults (those aged 15–64) is expected to triple from 17 in 2010 to 53 in 2060, and the ratio of the oldest-old (aged 85 and above) is projected to increase more than 5 times from 5 to 26 during the 50 years. Hence, the old-age dependency in Japan is expected to increase at an unprecedented pace. This will pose a formidable challenge to our social systems and policies.

### Prospects of Aging and Decline of the Likely Workforce

Let us next consider the possible impacts of these future demographic changes on the labor market, focusing on changes in the size and age composition of the population aged 20–64, the age group most likely to be in the labor force. As shown in Table 3, the size of population aged 20–64 is projected to drop from around 77 million in 2010 to 41 million in 2060—a decline of 46 percent in the 50 years. This decline is due primarily to decreases in the size of the two youngest segments (aged 20–39 and 40–49), which are projected to shrink during 2010–2060 by 53 percent and 44 percent, respectively.

Consequently, the population at the peak working ages (20–64) will continue to decrease and become considerably older during the first half of this century, although the pace and degree of the projected decline and aging of the working-age population will not be as dramatic as that of the total population. This suggests that Japan’s labor-market and employment policies need to be altered drastically because the domestic pool for the workforce will continue to age and shrink as time passes.

### Implications to the Public Pension and the Long-term Care Insurance Schemes

I next discuss possible implications of the projected population decline and aging to Japan’s public pension system and long-term care insurance schemes. We can see from the left-side panel of Table 4 that the ratio of persons aged 20–64 per 100 elderly persons aged 65 and above is projected to fall steeply from 257 in 2010 to 118 in 2060. Put differently, while there are roughly 2.6 persons of the contributing age (20–64) per person of the receiving age (65 and above) in 2010, the ratio will plummet to mere 1.2 in 2060. Because Japan’s public pension is funded by a pay-as-you-go system with the coverage of the scheme being almost universal (Westley et al. 2000), this dramatic decline in the ratio of possible payers to payees has serious policy and socioeconomic consequences. While the public pension scheme has been facing financial difficulties and has been revised repeatedly in recent years, these estimates suggest that the system may soon become unsustainable unless some drastic measures are taken.

Table 4. Projected Ratios per 100 of Populations Age 20–64 & Age 40–64 to Elderly (Population Age 65+), and Ratios per 100 of Women Age 40–59 to Elderly by Age Group (65+, 75+, and 85+), According to Medium Variants of Fertility and Mortality: Japan 2010–2060

Year	Ratio to 100 elderly (age 65+) of: <sup>a</sup>			Ratio of women age 40–59 to 100 elderly by age group: <sup>b</sup>	
	Age 20–64	Age 40–64	Age 65+	Age 75+	Age 85+
2010	257	147	56	117	435
2015	209	125	50	103	331
2020	188	116	47	91	269
2025	179	112	45	76	226
2030	170	107	42	68	182
2035	158	98	36	61	134
2040	139	86	32	56	121
2045	129	80	30	52	119
2050	123	77	30	47	115
2055	120	76	30	45	104
2060	118	75	29	43	87

Source: National Institute of Population and Social Security Research (2012) *Population Projections for Japan: 2011–2060 (With Long-Range Population Projections: 2061–2110)*. Tokyo: National Institute of Population and Social Security Research.

Notes: (a) Ratios of persons age 20–64 and 40–64, per 100 persons age 65+  
(b) Ratios of women age 40–59 per 100 persons age 65+, 75+, and 85+.

Japan has also adopted policies to encourage family care for the elderly, starting with the Golden Plan and the New Golden Plan in 1990–1999 that subsidized adult day care and other support services aimed at helping children care for their elderly parents at home (Japan Aging Research Center 1998: 67–68). These policy efforts have culminated in the establishment of the long-term care insurance scheme for the elderly, which designated persons aged 40–64 responsible to pay for the insurance and those aged 65 and above possible recipients of its services although the recipient elderly is also liable to bear part of the costs and the degree of their needs for care is assessed by municipality (Japan Aging Research Center 2002: 102–104). As shown in Table 4, the ratio of persons age 40–64 per 100 persons aged 65 and above is projected to plummet from 147 in 2010 to 98 in 2035, and further to 75 in 2060. Put differently, whereas there are around 1.5 payers per possible recipient of the long-term care insurance in 2010, the population eligible to receive the services will surpass that of the contributor population during 2030–2035. This suggests that the prospects for Japan’s long-term care insurance scheme are murky at best unless some drastic measures are taken to modify the system.

Since the prospects for the long-term care insurance scheme are shaky, what will be the capacity of the family to care for the elderly in the future? The right-side panel of Table 4 shows three sets of the ‘family care ratios’ in Japan from 2010–2060. The family care ratios are estimated based on the assumption that middle-aged women aged 40–59 are likely to be primary providers of the care for the elderly at home. Three sets of these ratios are prepared because the proportion and number of the elderly who need care tends to increase as they age, with those of bed-ridden and demented elderly being notably higher among the oldest-old (Japan Aging Research Center 2002: 93–94). We can see that the ratio of women aged 40–59 per 100 elders aged 65 and above was already 56 in 2010 (i.e., the number of women in their forties and fifties is close to one half of the number of the elderly aged 65+), and the ratio is projected to decline to 30 by 2045. This means that by mid-century there will be 3.3 times more elderly than the number of middle-aged women who are most likely to be providers of care at home.

We next look at the family care ratios, based on the old-old and the oldest-old. As shown in Table 4, the ratio of women age 40–59 to 100 elders age 75 and above is projected to plummet from 117 in 2010 to 43 in 2060. If we are to base our estimate on the oldest-old, the family care ratio is projected to decrease even more dramatically: 435 in 2010 to 87 in 2060. That is, while there were more than 4 women aged 40–59 per elderly aged 85+ in 2010, the ratio will be only 0.9 in 2060, indicating that there will be more elderly aged 85+ than women aged 40–59 in 50 years. Furthermore, the labor force participation rates of women in their forties and fifties have been increasing since the mid-1970s (National Institute of Population and Social Security Research 2014: 137). Hence, the family care capacity is clearly insufficient to accommodate the rapidly growing needs for care for the elderly, and it is therefore imperative to seek ways to effectively and efficiently combine family care with services provided by the government and other organizations.

## Future Demographic Changes and International Migration

International migration (bringing persons from overseas) is often discussed as a possible policy response to rapid population aging and continuous population decline. International migration to counter such demographic changes is called ‘replacement migration,’ and the United Nations (2001: 124–127) estimated the magnitudes of replacement migration needed to maintain total population, working-age population, and the ratio of the working-age population to the elderly population.

According to this UN estimation, in order to have the same total population in 2050 as in the year 2000, Japan would need to have 343,000 net in-migrants per year on average from 2000–2050. To have the same working-age population in 2050 as in the year 2000, we would need to net around 650,000 migrants annually on average during these 50 years. In order to maintain the ratio between the population aged 15–64 and those aged 65 and above in the year 2000 through to 2050, we would have to have over 10 million in-migrants per year on average during these five decades. Altogether, these estimates clearly indicate that it is unrealistic to counter the future population aging and decline in Japan solely through international migration.

## Concluding Remarks

As we saw in the previous section, the feasibility (or lack thereof) of international migration as a possible policy response to counter Japan’s population aging and decline suggests that other types of policy efforts are needed to counter these demographic changes. As we saw earlier in the paper, fertility decline to below-replacement levels since the mid-1970s has been one of the primary factors responsible for Japan’s rapid and extreme population aging as well as projected continuous population decline. As fertility continues to slide, the government has openly begun to voice its ‘concern’ toward extremely low fertility (Tsuya 2005).

Looking at developed countries as a whole, however, we can see that countries in which fertility has recovered and/or stabilized at relatively high levels have also experienced improvements in women’s labor force participation (Brewster and Rindfuss 2000; Chesnais 1996; Tsuya 2007). That is, as far as the developed world today is concerned, fertility tends to be higher in countries where women’s employment rate is higher. This implies that Japan’s family and other public policies would need to focus on the well-being and welfare of couples and families, putting aside its macro concern about low fertility. Only when the society stops pressuring women to choose between work and family life will Japan’s fertility rate begin to recover, which will in turn lead to the slowing of population aging and the halting of population decline.

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