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A Society with a Lowest-Low Fertility Rate and Super-Aged Population: Risks and Strategy

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1 Introduction

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Korean society is currently undergoing a second wave of demographic transformation. Over the last three decades since 1983, the nation's total fertility rate has consistently hovered below the population replacement level of 2.1. In the meantime, the average life expectancy has continually increased, and by 2007 it was above the Organization for Economic Cooperation and Development (OECD) average, putting Korea among the countries with the highest life expectancies. Since 2001, however, the total fertility rate has remained super low, below 1.3. If this demographic trend continues, the Korean population will further age and eventually decrease.

Korea's population decrease and aging, in turn, will exert far-reaching and severe impact on Korean society. No nation in history has ever seen its elderly population (aged 65 and over) reach 30 to 40 percent of its total population. We therefore have no historical precedents to refer to in preparing for the super-aged society that Korea will face. Although we are able to estimate demographic changes, our inability to estimate and measure their likely social and economic effects severely worsens the uncertainty over the future of the Korean society. To date, we have no means to establish an effective strategy for

preventing or minimizing the impact of a super-aged society. Our failure to anticipate and prepare for its impact consequently limits our ability to ensure the sustainability of our society, the quality of life for individuals, and even the safe future of our nation.

Against the backdrop of these concerns, this study attempts to estimate the ripple effects that the "lowest-low" fertility rate and a super-aged population will exert on Korean society and predict associated future risks. To this end, this study sets up numerous possible demographic scenarios with varying impacts of the demographic changes on the employment rate, the industrial and economic growth rates, the financial market, housing supplies, national defense, old-age income, welfare services for the aged, and rural communities. The objective of this study is to clarify the causes of Korea's lowest-low fertility rate and the risks associated with a super-aged society, thereby providing a basis for informed policy-making in response to low fertility and population aging.

2 Causes of the Persistently Lowest-low Fertility Rate

2 Causes of the Persistently Lowest-low Fertility Rate

Before we analyze the ripple effects of lowest-low fertility, we first need to identify and determine the demographic causes for the phenomenon's persistence.

As part of our demographic decomposition analysis, we measured the ratio of married couples in the Korean population to determine the trend toward late marriages, on the one hand, and the fertility rate of married couples to determine its impact on the total fertility rate, on the other. The entire demographic decomposition analysis proceeds by dividing the period between the first appearance of the lowest-low fertility rate and the present into four main sections. The first section, from 1984 to 1992, is when the total fertility rate fell below the population replacement level before picking up briefly. The second section, from 1992 to 1997 (the year of the Asian Financial Crisis), includes the year when the Korean government officially revoked its population control policy (1996). The third section, from 1997 to 2005, is when the total fertility rate hit the historic low of 1.08. Finally, the fourth section, from 2005 to 2013, spans a period that corresponds to the government's first policy steps in response to declining birth rates and population aging.

Throughout the entire period, from 1992 to 2013, the total fertility rate dropped by 0.57. More specifically, the changing ratio of married couples caused the total fertility rate to drop by 1.10 (with an influence of 60.2 percent), while the changing fertility rate of married couples caused the total fertility rate to rise by 0.73 (with an influence of 39.8 percent). In other words, during this period, the negative impact of the changing ratio of married couples outweighed the positive impact of the changing fertility rate among married couples, ultimately causing the total fertility rate to decline.

Now let us examine the specific changes occurred in the total fertility rate during each of the four sections within the 1992 to 2013 period. From 1992 to 1997, the total fertility rate declined by 0.24 in total, with the ratio of married couples responsible for the loss of 0.20 and their fertility rate accounting for the loss of 0.07. Both factors exerted a negative impact on the total fertility rate, but the ratio of married couples had a relatively greater impact than their fertility rate, which confirms a growing trend toward late marriage.

From 1997 to 2005, the total fertility rate again dropped by 0.44, with the ratio of married couples accounting for the loss of 0.52, while their fertility rate led to an increase of 0.03. Nevertheless, the ratio of married couples exerted an influence of 94.9 percent on the total fertility rate during this period, bringing down the country's fertility rate to a lowest-low level.

Over the years 2005~2013, the total fertility rate rose by 0.11. The ratio of married couples accounted for the loss of 0.31, while their fertility rate accounted for an increase of 0.54. During this period, the fertility rate of married couples exerted a positive impact over the negative impact of the ratio of married couples, causing the total fertility rate to rise.

〈Table 2-1〉 Influences of the Changing Ratios of Married Couples and Fertility Rate of Married Couples on the Total Fertility Rate in Korea

	Absolute (total fertility rate)				Relative influence (%)		
	Change in TFR	Due to changing ratio of married couples	Due to changing fertility rate of married couples	Interaction	Total	Due to changing ratio of married couples	Due to changing fertility rate of married couples
1992~1997	-0.24	-0.20	-0.07	0.03	100.0	75.3	24.7
1997~2005	-0.44	-0.52	0.03	0.05	100.0	94.9	5.1
2005~2013	0.11	-0.31	0.54	-0.13	100.0	36.0	64.0
1992~2013	-0.57	-1.10	0.73	-0.20	100.0	60.2	39.8

Note: The relative influences were estimated by first removing the influence of interaction, then taking the absolute amount of difference made to the total fertility rate by each factor and multiplying it by the distribution ratio.

The relative influence of the changing ratio of married couples may have decreased over recent years in comparison to the changing fertility rate of married couples. Yet the former still exerts a significant impact on the total fertility rate, holding it back from rising beyond 1.3. The fact that even the fertility rate of married couples during the fourth and last section of the analysis period remains below two (2.0) also contributes to the persistence of the lowest-low fertility rate. For Korean so-

ciety to break free from this phenomenon and dramatically raise the fertility rate, both the ratio of married couples and their fertility rate must be increased first.

3 Demographic Changes Resulting from the Lowest-low Fertility Rate

3 Demographic Changes Resulting from the Lowest-low fertility Rate

This study attempts to identify the risks that the lowest-low fertility rate and super-aged population will present to Korean society in the future by projecting population changes in the light of demographic changes. The projection periods spans from 2010 to 2100, and we used the cohort component method for the task. The assumptions underlying our scenarios in the projection are as follows.

First, we posit three possible changes in the fertility rate. The first is that the total fertility rate will reach 1.42 by 2015 and remain at that level until 2100, assuming that the medium-level scenario of Statistics Korea's population projections of 2010—spanning the five decades from 2010 to 2060—still holds. The first scenario borrows the projection results from Statistics Korea's analysis without modification. In the second scenario, we assume that the lowest-low fertility rate will persist throughout our projection period, given that the total fertility rate has remained around 1.2 more or less since 2001. This scenario projects that the total fertility rate, having reached 1.19 in 2013 and slightly increased to 1.20 by 2014, will remain more or less constant afterward. In the third scenario, we assume that the total fertility rate will drop even further to 0.9

and remain at that level throughout our projection period. It is not altogether impossible, considering the recent experiences of Seoul, Busan, Taiwan and Hong Kong.[1] This scenario posits that the total fertility rate, having reached 1.19 in 2013 and further declined to 1.08 by 2015 (the lowest point since 2005), will plummet to 0.9 by 2019 (as already experienced by Seoul, Busan, Hong Kong and Taiwan) and remain constant for decades after.

As for the death rate, we applied the Lee-Carter method to the recent trends in death rates by gender and age until year 2100. However, Statistics Korea's medium-level scenario projections on death rates were also used without modifications until 2060.

As for likely changes in the international migration rate, we again used the medium-level scenario in Statistics Korea's population projections of 2010 without modifications (i.e., assuming that the rate projected for year 2060 remains constant until 2100).

We can summarize the three scenarios used in the projections of this study as shown in Table 1 below.

1) Numerous European countries applying this scenario in projecting population changes have found that lowest-low fertility rates invariably will be experienced in certain regions or countries in the long run. (See Lee et al., 2013.)

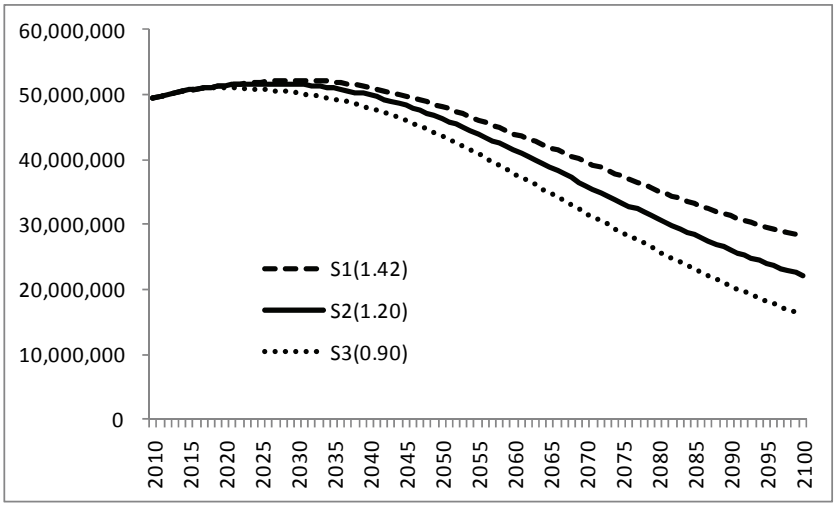
〈Table 3-1〉 Population Projection Scenarios

	Fertility (TFR) assumptions	Death rate (average life expectancy) assumptions	International (net) migration assumptions
Scenario 1 (S1)	Extending Statistics Korea's medium-level scenario: 1.42 by 2045, and constant afterward.	Common: Extending Statistics Korea's medium-level scenario: -Men: 77.2 y.o. in 2010 à 86.6 y.o. in 2060 à 89.3 y.o. in 2100. -Women: 84.1 y.o. in 2010 à 90.3 y.o. in 2060 à 93.2 y.o. in 2100.	Common: Extending Statistics Korea's medium-level scenario: Net increase in population, at 1.67 per thousand in 2010, will drop to 0.53 by 2060 and remain constant afterward.
Scenario 2 (S2)	Based on actual statistics from 2010 to 2013: 1.19 in 2013, 1.20 in 2014, and constant afterward.		
Scenario 3 (S3)	Based on actual statistics from 2010 to 2013: 1.19 in 2013, 1.20 in 2014, 0.9 by 2019, and constant afterward.		

Note: Scenario 3 assumes that the total fertility rate will decline even further from its recent level, until reaching 0.9, and remain constant afterward. This takes into account the actual experiences of Seoul, Busan, Taiwan and Hong Kong.

In Scenario 1, the total population of Korea will peak at 52.38 million in 2030 and the decline to 28.18 million (57 percent of the population in 2010) by 2100. In Scenario 2, with the lowest-low fertility rate expected to persist, the total population will grow to 51.65 million by 2026 and decrease rapidly afterward to 22.22 million (45 percent of its size in 2010) by 2100. In Scenario 3, in which the low fertility rate will decline even further, the total population will grow to 51.01 million by 2019 and begin to decline afterward, to 16.13 million (33 percent of its size in 2010) by 2100.

[Figure 3-1] Total Population Size Projections



The young population, aged 0 to 14, has been shrinking since 1971, and it will likely continue to decrease in the years to come. The size of the young population is thus projected to decline to 2.84 million (36 percent of its size in 2010), to 1.67 million (21 percent of its size in 2010), and to 0.76 million (10 percent of its size in 2010) in Scenarios 1, 2, and 3, respectively, by 2100.

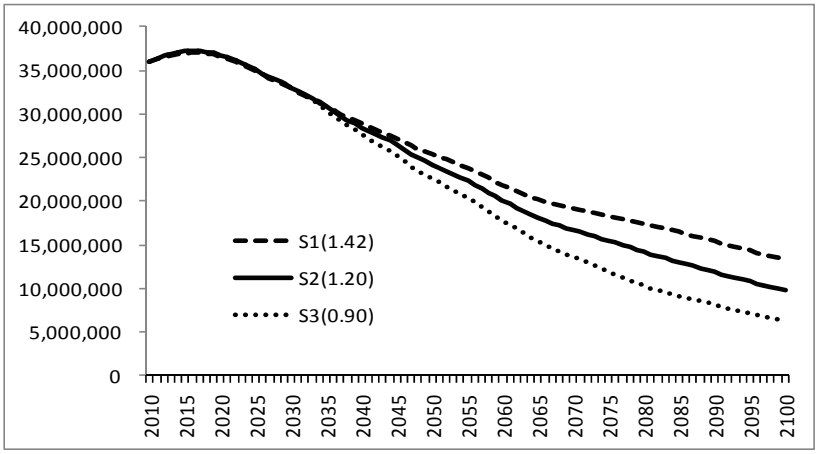
The working-age population, aged 15 to 64, is expected to reach its peak at 37.22 million in 2016 and decrease afterward. In Scenarios 1, 2, and 3, respectively, it is expected to decrease in 2050 and 2100 from 25.39 to 13.47 million (71 to 37 percent of its size in 2010), from 24.21 to 9.84 million (67 to 27 percent of its size in 2010), and from 22.57 to 6.26 million (63 to 17 percent of its size in 2010). The differences in the size of pro-

jected working-age population between the three scenarios may be marginal until 2050 (2.82 million between Scenario 1 and Scenario 3), but will gradually grow toward 2100 (7.21 million between Scenario 1 and Scenario 3), as the lowest-low fertility rate persists. The lower the fertility rate, the more rapid the pace of the decrease in the working age population, and the more dramatic the pace of the decrease in the working age population as a ratio of the total population. The working age population in Scenario 1, for example, occupies 72.8 percent of the total population in 2010, 52.4 percent in 2050, and 47.8 percent in 2100. The ratios decline in 2050 and 2100 more rapidly in the latter two scenarios, from 52.3 to 44.3 percent in Scenario 2 and from 51.7 to 38.8 percent in Scenario 3.

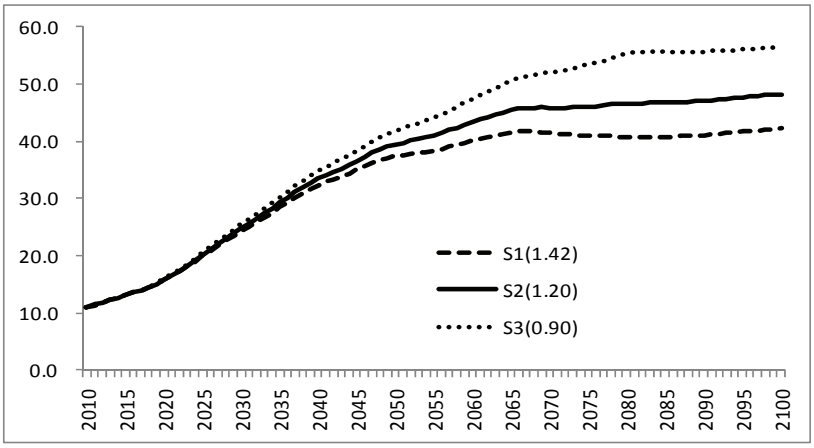
In contrast, the elderly population aged 65 and over will multiply more than threefold from 5.45 million in 2010 to 18 million by 2049. Afterward, the elderly population will decline to 15.31 million by 2075 (2.8 times its size in 2010). By 2100, the elderly population will shrink to 11.87 million, 10.71 million and 9.1 million in Scenarios 1, 2, and 3, respectively. In the meantime, the ratio of the elderly in the total population in Scenario 1 will grow from 11.0 percent in 2010 to 37.7 percent in 2050 and again to 42.1 percent in 2100. The ratios increase more rapidly in the latter two scenarios, to 39.4 and 48.2 percent in Scenario 2 and to 41.8 and 56.4 percent in Scenario 3, by 2050 and 2100, respectively. In other words, the lower and

more persistent the fertility rate, the more abrupt the pace of population aging.

[Figure 3-2] Working-Age Population Projections



[Figure 3-3] Projected Ratio of the Elderly in Total Population



In the remainder of this study, we shall attempt to predict and analyze the socioeconomic risks implicit in these demographic projections. More specifically, we will examine the influences on macroeconomics and labor supply, industrial structures, finance, and the housing market. We will also examine social side effects in terms of the influences on national defense, welfare services for the aged, old-age income, and population changes in rural communities.

4 Socioeconomic Risks of a Lowest-low Fertility Rate and Super-aged Population

4 Socioeconomic Risks of a Lowest-low Fertility Rate and Super-aged Population[2)]

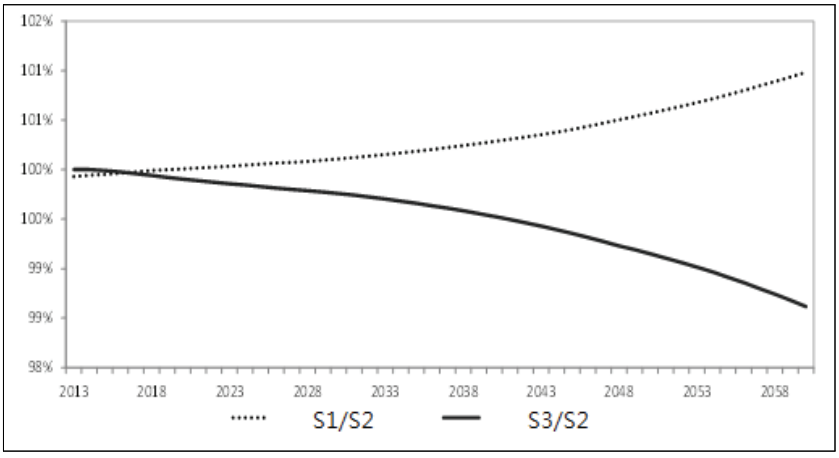
A. Macroeconomics and Labor Supply

The projected demographic changes are expected to slow down the pace of Korea's economic growth, from the annual average of 4 percent in the 2000s to 2 percent in the 2030s and to one percent or even less by the 2050s. Specifically, in Scenario 2, the economic growth rate will decline from 3.59 percent in the 2010s to 2.04 percent in the 2030s and again to 0.99 percent in the 2050s. In Scenario 1, the rates are higher than those in Scenario 2 by 0.02 percentage points in the 2030s and 0.04 percentage points in the 2050s. In contrast, in Scenario 3, the rates are lower than those in Scenario 2 by 0.02 percentage points in the 2030s and 0.05 percentage in the 2050s. The margin of decreases in the economic rate among the scenarios remains less than the margin of difference in the population change rate. However, these economic growth rate projections assume that everything other than the population size will remain constant. The difference of 0.1 percentage point between Scenarios 1 and 3, when the economic growth

2) For the specific models and equations used, see Korea Institute for Health and Social Affairs (KIHASA) (2014), *Lowest-Low Fertility Rate and Super-Aged Society: Risks and Strategy*, Research Report 2014-22-1-7.

rate is expected to fall to 1 percent or even below by the 2050s in all scenarios, can therefore translate into a huge difference (almost 10 percent) in the GDP.

[Figure 4-1] Real GDP Projections by Scenario (with Scenario 2 as Baseline)

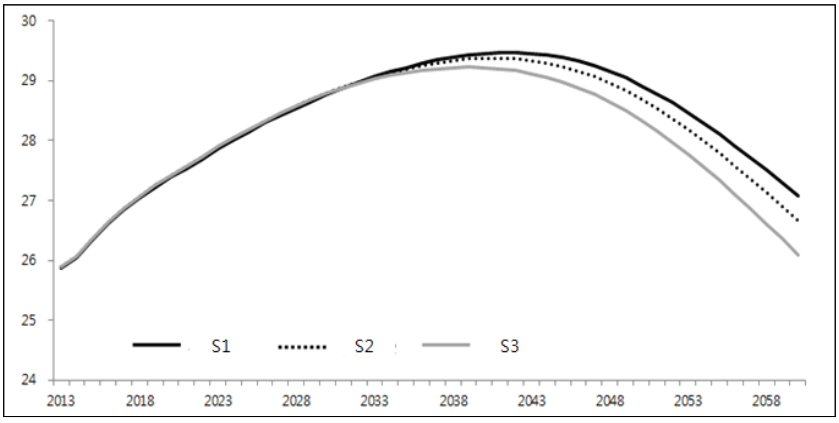


The persistence of a low fertility rate and rapid population aging will influence the size of the working-age population most severely. The size of the economically active population in Korea, an indicator of labor supply, will continue to increase until 2040, but begin to drop rapidly afterward, returning almost to its 2016-level by 2060. There will be a gap of about a decade between the pace of decrease in the economically active population, on the one hand, and the pace of decrease in the population aged 15 and over, on the other. The population decrease may bring down the total demand until 2030 or so, but will also imply a decrease in labor supply overall. Given

that labor supply is an indicator of a nation's economic growth potential, the projections do not bode well for Korea's economic future.

[Figure 4-2] Economically Active Population Projections by Scenario

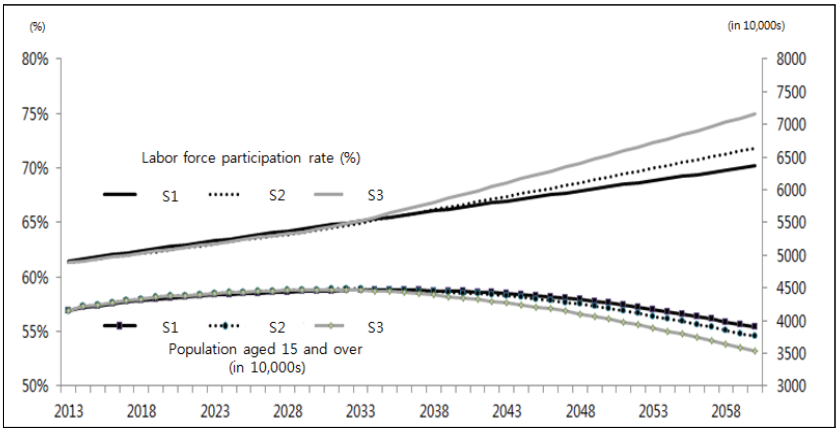
(Unit: in millions)



The labor-force participation rate is projected to rise from 60.8 percent in 2010 to upward of 70 percent by 2060, but at different paces according to different scenarios. The rate will remain in the region of 64 percent until the 2030s in all the scenarios, before the size of the economically active population begins to decrease noticeably. By 2060, however, the rate will rise to 70.4 percent, 72.0 percent, and 75.2 percent, respectively, in Scenarios 1, 2, and 3. The reason why the pace of growth in the labor force participation rate is higher in Scenario 3 than in Scenario 1 is that the size of the population aged 15 and over, serving as the denominator, decreases more

quickly in the former than the latter.

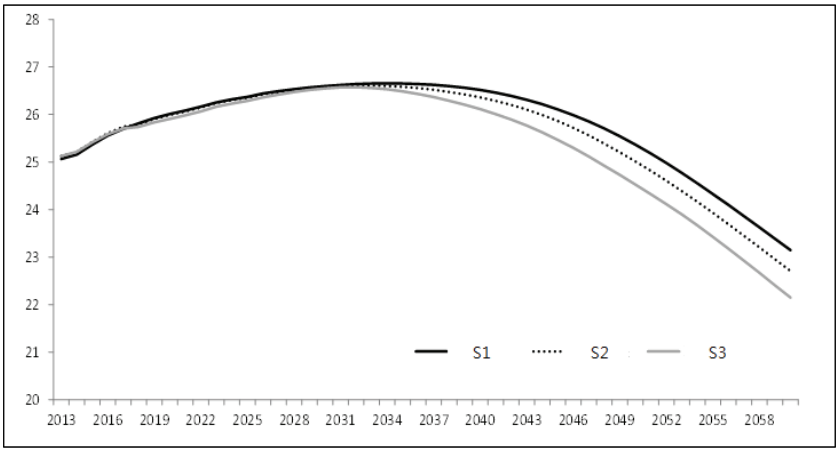
[Figure 4-3] Labor Force Participation Rate Projections by Scenario



The size of the employed population, representing labor demand that changes with real economic growth, will continue to increase until the early 2030s, and begin to plummet radically afterward, returning to its early post-millennium level by 2060. More specifically, the employed population will grow from 23.83 million in 2010 to 26.6 million in 2030, but soon begin to decrease until reaching 22.15 million, 22.71 million, and 23.15 million by 2060 in Scenarios 1, 2, and 3, respectively.

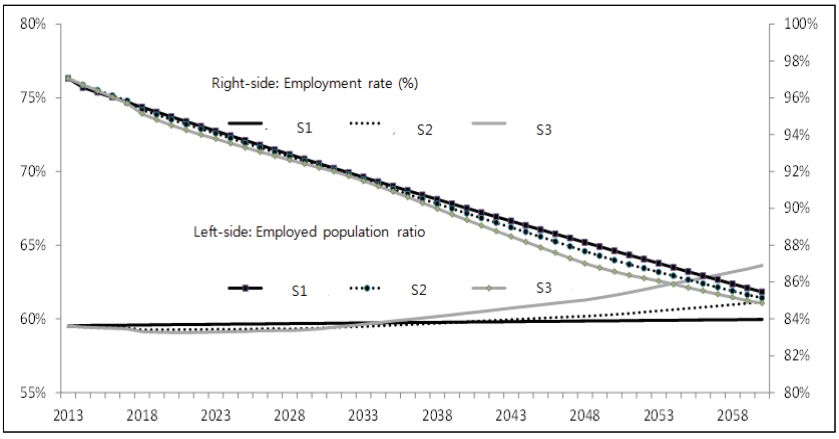
[Figure 4-4] Employed Population Size Projections by Scenario

(Unit: millions)



As the size of the employed population is likely to shrink at a faster rate than the size of the economically active population (i.e., labor supply), the employment rate will also likely plummet rapidly, from 96.6 percent in 2010 to 92 percent in 2030 and further to 85 percent in 2060. The ratio of the employed in the population aged 15 and over will remain stable until the mid-2030s, but may increase abruptly in the case of Scenario 3. This is because, as is the case with the labor-force participation rate, the size of the population aged 15 and over is presumed to shrink much more rapidly in Scenario 3 than in Scenario 1.

[Figure 4-5] Employed Population Ratio and Employment Rate Projections by Scenario

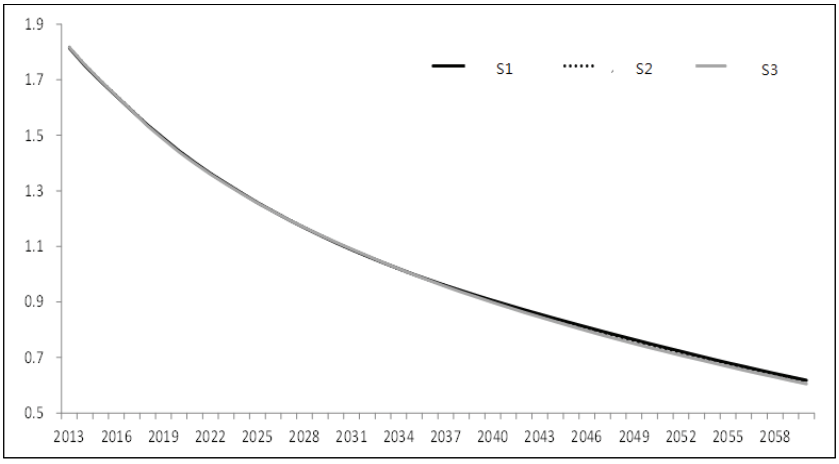


Labor demand is expected to decline consistently over the decades, not only due to the slowdown of economic growth, but also due to the gradual decline in the employment-to-GDP ratio, which indicates the labor-absorptive capacity of a given nation's productive activities. The employment-to-GDP ratio is inversely related to labor productivity. The higher labor productivity, the lower the employment-to-GDP ratio. Our scenarios of the exogenous variables assume that the indicators of the quality of labor in Korea, such as educational attainments, efficiency, gender-and-age composition of the population, and total factor productivity will grow at an increasingly slower pace over time, but nonetheless rise over the decades in absolute terms. These assumptions, in turn, imply that labor productivity itself will continue to grow, albeit at a slower pace. This ac-

counts for the likely gradual decline in the employment-to-GDP ratio, causing the entire national economy to suffer a decline in its capacity to create employment over the long term.

That labor demand may decline faster than labor supply means that the problem of unemployment may worsen over time, due more to a decline in employment than a decline in the labor force. The rise of the unemployment rate, in turn, will incur greater social costs, not the least of which will be an increasing burden on younger generations to support the elderly and the increasing constraints on economic growth.

[Figure 4-6] Employment-to-GDP Ratio Projections by Scenario

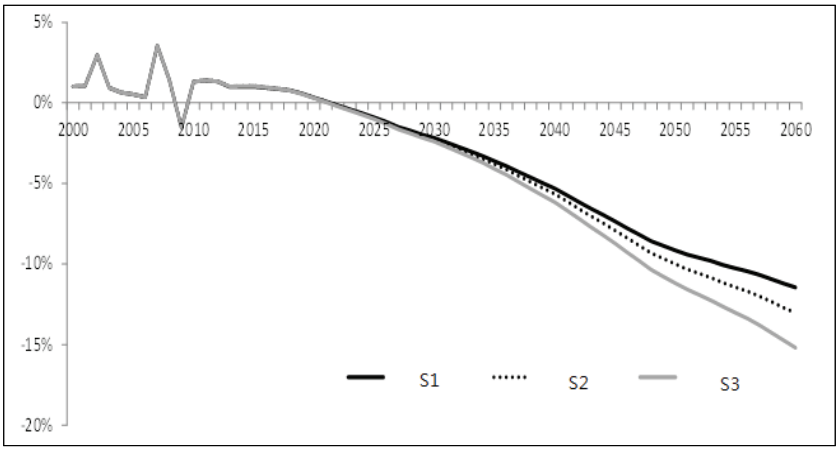


Korea's fiscal balance, based upon the consolidated central government balance, has consistently made up about one per-

cent of the nominal GDP, rising from KRW 6.5 trillion in 2000 to KRW 16.7 trillion in 2010, and dropping to KRW 14.2 trillion in 2013. The fiscal surplus, however, will gradually become a deficit that will increase over time because of the loss of fiscal revenue from an economic slowdown and population aging. Because of the population aging and increases in social spending on pension payouts and welfare services, the fiscal deficit is projected to grow for decades. Compounding the deficit will be a long-term decline in social security contributions stemming from a decrease in the size of the employed population.

Specifically, beginning in the early 2010s, when the size of the working-age population is likely to begin its long-term decrease, the fiscal balance will decline to the total deficits of KRW 79 trillion, KRW 82 trillion and KRW 87 trillion in Scenarios 1, 2, and 3, respectively. By 2060, the total deficits are likely to multiply to KRW 989 trillion, KRW 1,114 trillion, and KRW 1,281 trillion in Scenarios 1, 2, and 3, respectively. As a share of the nominal GDP, the fiscal balance will drop from 1.3 percent in 2010 to -2.0 percent by 2030, and to -12.0 percent, -13.0 percent and -15.0 percent by 2060 in Scenarios 1, 2, and 3, respectively.

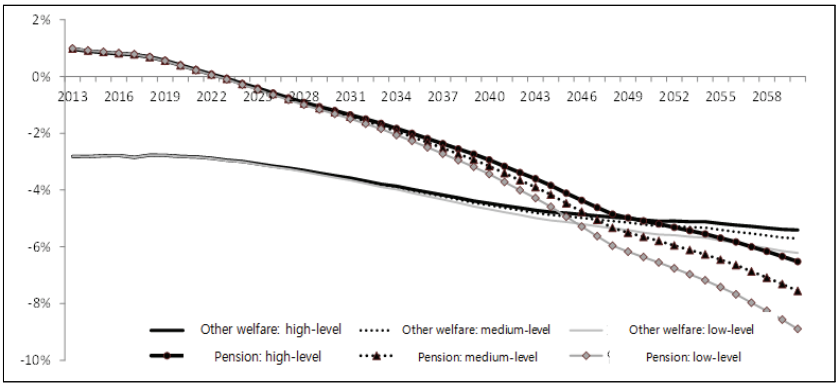
[Figure 4-7] Fiscal Balance Projections by Scenario (as a Percentage of the Nominal GDP)



The growth of fiscal deficits, in turn, will contract consumption and investment and cause losses to capital accumulation, thus fundamentally weakening Korea's potential for economic growth. The declining economic growth rate, in turn, will perpetrate a vicious cycle by reducing fiscal revenue. To prevent such a vicious cycle of fiscal deficits and economic decline from occurring, we need to find effective policy solutions for improving Korea's demographic structure and enhancing the nation's employment potential.

[Figure 4-8] Fiscal Balance Projections Concerning Pension and Welfare Spending by Scenario

(as a Percentage of the Nominal GDP)



B. Industrial Structure

(1) Industrial structure prospects

Over the next decades, agriculture, forestry, fisheries, mining, and manufacturing will suffer increasingly accelerated declines in their respective roles and statuses within Korea's industrial structure, while services will emerge as increasingly important. Agriculture, forestry, fisheries and mining will continue to fall significantly behind other sectors in terms of growth rates, turning into deficit generators in the 2030s, with their market presence shrinking further year by year. Manufacturing may lag a bit behind certain sectors in terms of

growth, but will continue to grow thanks to improved productivity and continuing research and development. The fall in the relative price of manufacturing due to technological advancement, however, will gradually decrease manufacturing's share in value-adding industries. Social-overhead-capital (SOC) related industries will also see declines in demand as Korea's economic growth rate begins to slow and the nation's population noticeably shrinks in size. The service sector, on the other hand, will maintain a growth rate well above the national economic growth rate. In sum, post-manufacturing will grow stronger in the Korean economy over time, with the service sector playing an increasingly important role, as we are seeing in other advanced economies worldwide.

〈Table 4-1〉 Industry-by-Industry Makeup of Ordinary Values-Added

(Unit: %)

	Respective ratios in ordinary values-added						
	2010	2030			2060		
		S1	S2	S3	S1	S2	S3
Agriculture/forestry/fishery	2.47	1.55	1.55	1.55	0.91	0.91	0.90
Mining	0.19	0.15	0.15	0.15	0.10	0.10	0.10
Manufacturing	30.72	26.25	26.27	26.32	16.94	16.99	17.07
Consumption goods	4.08	2.55	2.56	2.56	1.23	1.23	1.24
Basic materials	10.59	8.21	8.21	8.22	4.64	4.65	4.67
Assembly/processing	16.05	15.49	15.51	15.54	11.07	11.10	11.17
SOC	6.81	6.08	6.07	6.06	6.16	6.15	6.12
Service	59.81	65.97	65.96	65.92	75.89	75.86	75.80
Consumers	25.55	25.69	25.69	25.69	26.49	26.49	26.49
Producers	17.01	21.16	21.18	21.21	27.06	27.12	27.24
Society	17.25	19.11	19.09	19.02	22.34	22.25	22.07
All industries	100.0	100.0	100.0	100.0	100.0	100.0	100.0

	Respective increase rates in real values-added					
	2011-30			2031-60		
	S1	S2	S3	S1	S2	S3
Agriculture/forestry/fishery	0.23	0.20	0.13	-1.23	-1.27	-1.34
Mining	0.72	0.70	0.64	-0.82	-0.86	-0.92
Manufacturing	3.21	3.18	3.13	1.39	1.36	1.30
Consumption goods	2.16	2.14	2.09	1.08	1.05	1.00
Basic materials	2.32	2.30	2.24	1.29	1.25	1.19
Assembly/processing	3.94	3.92	3.86	1.49	1.46	1.40
SOC	1.98	1.95	1.88	0.62	0.58	0.51
Service	3.46	3.43	3.37	1.68	1.64	1.57
Consumers	3.21	3.18	3.12	1.28	1.24	1.18
Producers	4.11	4.09	4.03	2.11	2.09	2.03
Society	3.14	3.11	3.03	1.69	1.64	1.56
All industries	3.23	3.20	3.14	1.51	1.48	1.41

(2) Trade structure

In Korea's export structure, manufacturing will occupy an increasingly important role, while the respective roles of agriculture, forestry, fisheries, SOC related industries and service industries will shrink over time. In other words, Korea's dependency on manufacturing for exports will continue to expand. The spread of free trade and neo-liberalism will force Korea to open up its agriculture/forestry/fishery market to the rest of the world, while growing competition on the global market will further decrease Korean exports from these industries. The service sector and SOC-related industries, far more dependent on the domestic demand than is manufacturing, will also see their roles in exports shrink in comparison with manufacturing. Despite manufacturing's central role in

Korea's trade structure and in boosting assembly and processing industries, the total volume of its exports will likely decrease over time because of growing uncertainty over the global economy and increasing competition from late industrializers. A decline in exports of consumption goods and basic materials will then worsen Korea's trade imbalance and weaken the bases of certain individual industries. Nevertheless, given its importance for exports, manufacturing will continue to foster investment in ongoing research and development, thus maintaining at least a certain level of competitiveness and viability on the world market.

〈Table 4-2〉 Export Projections by Industry

(Unit: %)

	2010	2030			2060		
		S1	S2	S3	S1	S2	S3
Agriculture/forestry/fishery	0.12	0.08	0.08	0.08	0.06	0.06	0.06
Mining	0.02	0.01	0.01	0.01	0.00	0.00	0.00
Manufacturing	86.50	90.22	90.18	90.11	93.88	93.81	93.67
Consumption goods	5.56	4.11	4.12	4.14	2.77	2.79	2.83
Basic materials	22.87	21.74	21.74	21.73	19.74	19.76	19.78
Assembly/processing	58.07	64.37	64.33	64.25	71.37	71.27	71.06
SOC	0.07	0.05	0.05	0.05	0.04	0.04	0.04
Service	13.28	9.64	9.68	9.75	6.01	6.08	6.22
Consumers	10.46	7.04	7.07	7.12	4.09	4.14	4.24
Producers	2.76	2.56	2.57	2.59	1.90	1.92	1.97
Society	0.06	0.03	0.03	0.04	0.02	0.02	0.02
All industries	100.0	100.0	100.0	100.0	100.0	100.0	100.0

As for Korea's import structure, mining's role and presence will continue to increase, while those of manufacturing, serv-

ices, and other industries will likely shrink over time. The reason why Korea's imports of minerals are expected to increase can be found in the projected growth of Korea's industrial production and manufacturing, which require constant inputs of coals, crude oil, natural gas, metals, and other industrial materials. Meanwhile, agriculture, forestry, and fisheries will see their imports decline over time. While the manufacturing sector may import fewer goods from abroad over time, the pace of decline in basic materials imports will vary from industry to industry. The majority of basic materials imported into Korea will go toward the production of such intermediate goods as coals, petrochemicals, synthetic resins, medical and pharmaceutical products, and steel. With the output of all industries in Korea expected to maintain its overall growth trajectory, the respective industry-by-industry makeup in total exports will remain more or less constant, while imports by the service sector will gradually decrease. However, the trade balance of the service sector eventually fall into deficit as the pace of decrease in imports is likely to hover below the pace of decrease in exports. The export-import gap in producer services will grow wider over the decades, requiring effective measures to improve the global competitiveness of such industries as finance and insurance, equipment and gear rental, information services, research and development, and business support services.

〈Table 4-3〉 Import Projections by Industry

	2010	2030			2060		
		S1	S2	S3	S1	S2	S3
Agriculture/forestry/fishery	1.79	1.61	1.61	1.62	1.66	1.68	1.72
Mining	22.97	29.72	29.45	28.89	41.52	40.62	38.88
Manufacturing	61.46	56.49	56.71	57.20	48.91	49.69	51.20
Consumption goods	7.81	6.72	6.75	6.83	5.25	5.35	5.54
Basic materials	27.50	26.67	26.79	27.06	23.65	24.09	24.94
Assembly/processing	26.15	23.10	23.16	23.31	20.01	20.26	20.72
SOC	0.03	0.03	0.03	0.03	0.02	0.02	0.02
Service	13.75	12.16	12.19	12.26	7.90	8.00	8.17
Consumers	6.61	5.08	5.09	5.12	2.98	3.01	3.07
Producers	6.38	6.59	6.61	6.66	4.67	4.73	4.85
Society	0.76	0.49	0.49	0.49	0.25	0.25	0.25
All industries	100.0	100.0	100.0	100.0	100.0	100.0	100.0

(3) Employment structure

With the gradual slowdown in Korea's economic growth, numerous industries will continue to invest in research and development for technological progress and enhanced productivity. Nevertheless, the capacity of the Korean economy to create employment will decrease radically over the decades. The decreasing employment-creation capacity—especially in agriculture, forestry, fisheries, and manufacturing—in conjunction with growing labor market unpredictability will worsen employment prospects throughout the economy. The employment creation capacity will worsen in almost all industries and sectors except services, and the accelerated population aging will

further frustrate labor supply.

〈Table 4-4〉 Employment Projections by Industry

(Unit: %)

	2010	2030			2060		
		S1	S2	S3	S1	S2	S3
Agriculture/forestry/fishery	7.07	3.50	3.52	3.54	1.48	1.49	1.52
Mining	0.09	0.02	0.02	0.02	0.01	0.01	0.01
Manufacturing	16.27	14.36	14.38	14.42	13.21	13.30	13.45
Consumption goods	5.86	4.39	4.41	4.45	4.10	4.15	4.25
Basic materials	4.01	3.86	3.87	3.87	3.95	3.97	4.00
Assembly/processing	6.41	6.10	6.10	6.10	5.16	5.18	5.20
SOC	7.16	7.01	7.02	7.04	6.77	6.81	6.89
Service	69.42	75.11	75.07	74.98	78.53	78.39	78.13
Consumers	34.33	34.13	34.19	34.31	33.05	33.28	33.69
Producers	16.82	20.73	20.60	20.35	22.52	22.06	21.22
Society	18.27	20.25	20.27	20.32	22.96	23.05	23.22
All industries	100.0	100.0	100.0	100.0	100.0	100.0	100.0

C. Financial market

Our projections of how a super-aged society and population will affect demand for financial services and products until 2050 show that the financial debt-to-asset ratio, the net savings rate, and the ratio of risky assets in financial assets will gradually decline with population aging. The margin of decrease grows larger as we progress from Scenario 1 to 3. Household debt, currently a major source of concern in Korea, is likely to decline as the Korean population ages over the decades, with the financial debt-to-asset ratio decreasing from

0.456 in 2010 to 0.443 by 2017 and again to 0.373 by 2026, as projected in Scenario 1. This suggests that the financial assets accumulated by the elderly will grow at an accelerated pace. The pace of financial asset accumulation from Scenarios 1 to 3 quickens in proportion to the pace of population aging.

〈Table 4-5〉 Household Financial Debt-to-Asset Ratio Projections by Scenario

Year	Scenario		
	S1	S2	S3
2005	0.458	0.458	0.458
2010	0.456	0.456	0.456
2015	0.446	0.439	0.440
2020	0.417	0.415	0.417
2025	0.379	0.375	0.377
2030	0.358	0.354	0.356
2035	0.321	0.317	0.312
2040	0.294	0.284	0.273
2045	0.266	0.249	0.230
2050	0.251	0.224	0.192

The net savings rate, which has been plummeting since 1990, will continue to drop past 2010, but at a slower pace, from somewhere in the four-percent range in 2015 to the one-percent range by 2025. The slowdown in economic growth and the accelerated aging of the population will cause the net savings rate to turn negative after 2030, ushering Korea into an age of dissaving. The pace of the drop in the net savings rate in Scenarios 1 to 3 quickens in proportion to the pace of population aging.

〈Table 4-6〉 Household Net Savings Rate Projections by Scenario

Year	Scenario		
	S1	S2	S3
2005	7.2	7.2	7.2
2010	4.3	4.3	4.3
2015	4.1	4.2	4.2
2020	3.3	3.3	3.3
2025	1.5	1.5	1.5
2030	-1.0	-1.0	-1.0
2035	-3.3	-3.4	-3.5
2040	-5.8	-6.1	-6.5
2045	-7.6	-8.2	-9.0
2050	-9.4	-10.4	-11.8

In the meantime, the ratio of risky assets in the financial wealth of households will gradually decline from 20 percent in 2010 to 18.2 percent in 2015 and again to 15.3 percent by 2025, when Korea society will have entered a super-aged state. The ratio will further decline to less than 10 percent by 2040 or so, with over 90 percent of the financial assets of the majority of households being stable and safe by 2050.

〈Table 4-7〉 Ratio of Risky Assets in Household Financial Assets Projections by Scenario

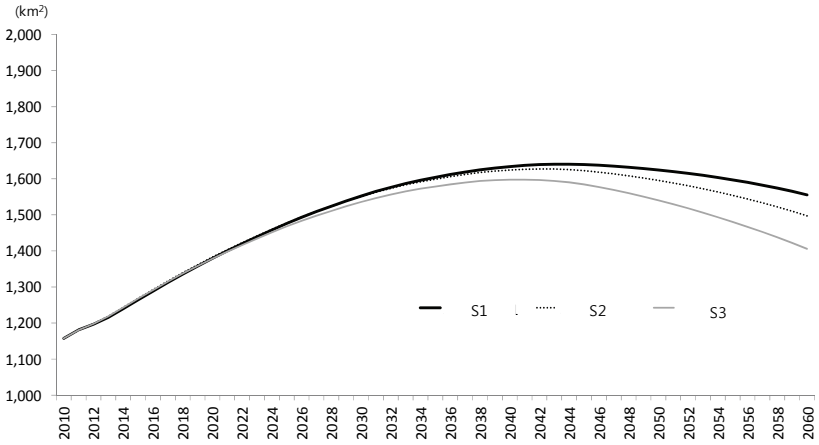
Year	S1	S2	S3
2005	0.198	0.198	0.198
2010	0.199	0.199	0.199
2015	0.182	0.180	0.180
2020	0.170	0.169	0.169
2025	0.153	0.152	0.152
2030	0.140	0.138	0.138
2035	0.122	0.121	0.118

Year	S1	S2	S3
2040	0.107	0.103	0.098
2045	0.093	0.087	0.079
2050	0.083	0.073	0.060

D. Housing market

We need to measure the changes in housing supply not simply by the number of available housing units, but more accurately by the residential service amount available to the given number of households. Using this method, we project that the residential service amount in Scenario 1 will fall to 41.8 percent of the current level (as of 2010) by 2044, when the demand for housing will reach its peak, and continue to drop to 34.4 percent by 2060. In Scenario 2, the residential service amount will drop to 40.6 percent and 29.4 percent of the current level by 2042 and 2060, respectively. In Scenario 3, the figure will drop to 38.0 percent and 21.5 percent by 2041 and 2060, respectively. These projections imply that—notwithstanding the general decrease in the total population size—the likely increase in single- or two-person households, the growing demand for housing among the elderly, and the rising level of income will maintain housing demand above a certain level.

[Figure 4-9] Housing Demand Area Projections by Scenario



E. National defense

The persistence of the lowest-low fertility rate will severely limit the pool of human resources available for military enlistment. Assuming that the current 21-month mandatory military service system remains constant and the total number of troops decreases according to the Fourth National Defense Reform Plan, no absolute shortage of troops will occur until around 2025. For the size of the male population aged 19 and over will only begin to decrease noticeably after 2030, and the Basic Defense Reform Plan will only run until 2030. However, if the Korean military wished to maintain 300,000 troops until 2050, it would have to search hard for soldiers by 2050 due to the radical decrease in the young male population, and the se-

verity of the shortage will grow only worse afterward. For the Korean military to avoid a troop shortage problem, it would need to start scaling back troop reduction plans after 2030.

If the period of mandatory military service were shortened to 18 months and the current reform plan implemented, the troop shortage problem will become prominent by 2022. The pace of decrease in the size of the male population aged 19 and over remains more or less constant in Scenario 1 to 3 until 2025, with the troop shortage problem going from 1,000 to 4,000 from 2022 to 2025 in all scenarios. However, as the pace of decrease accelerates from 2030 onwards, the troop shortage problem will become much more severe, with shortage gaps widening from depending on the scenario. By 2050, the Korean military will be short 20,000 troops in Scenario 1 or 90,000 troops in Scenario 3. Therefore, if the mandatory military service period were shortened to 18 months, the number of troops should be reduced at a greater rate in 2030 and afterward for the military to avoid the troop shortage problem.

If we were to reflect the actual enlistment rate (83 percent on average over the last 10 years) in our projections, the troop shortage problem will occur even earlier. With the 21-month mandatory service system intact, the Korean military will be short of at least 5,000 troops by 2022, and the shortage gaps among the scenarios will begin to grow noticeably larger from 2050 onward. Under the 21-month system, the Korean military

will be short of 20,000 troops, 52,000 troops, or 92,000 troops by 2050 in Scenarios 1, 2, and 3, respectively. If the mandatory service period were shortened to 18 months, the troop shortage problem will be even more severe. In order to avoid this problem, the Korean government should start diminishing the target number of troops from 300,000 to fewer until 2050. How feasible this would be is a question very difficult to answer, as the state of affairs remains uncertain on the Korean Peninsula today.

〈Table 4-8〉 Troop Shortage Projections by Scenario

(Unit: 1,000 troops)

Remarks			2020	2021	2022	2023	2024	2025	2050	2075	2100
Population projections	S1		302	260	242	242	224	220	201	146	103
	S2		302	260	242	241	223	219	168	107	67
	S3		302	260	242	241	223	219	128	64	35
Demand	21 months		233	222	211	204	196	189	189	189	189
	18 months		272	259	246	238	229	220	220	220	220
Short of	S1	21	69	38	31	38	28	31	12	-42	-85
		18	30	1.1	-4.3	4.4	-5.0	-0.5	-19	-74	-117
	S2	21	69	38	31	38	27	30	-20	-82	-122
		18	30	1.1	-4.6	3.8	-5.6	-1.1	-52	-82	-153
	S3	21	69	38	31	38	27	30	-60	-125	-154
		18	30	1.1	-4.6	3.8	-5.6	-1.1	-92	-125	-185
Demand (actual enlistment rate)	21 months		273	260	247	238	229	221	221	221	221
	18 months		318	303	288	278	268	257	257	257	257
Short of	S1	21	29	0.3	-5.1	3.7	-5.7	-1.1	-20	-74	-118
		18	-16	-43	-46	-36	-44	-38	-57	-111	-154
	S2	21	29	0.3	-5.3	3.1	-6.3	-1.7	-52	-114	-154
		18	-16	-43	-47	-37	-45	-39	-89	-151	-191
	S3	21	29	0.3	-5.3	3.1	-6.3	-1.7	-92	-157	-186
		18	-16	-43	-47	-37	-45	-39	-129	-194	-223

F. Welfare for the aged

With the Korean population aging at a rapid pace, the employment rate among the elderly will continue to rise, from 34.8 percent in 2020 to 36.8 percent by 2030, 38.8 percent by 2040, and 40.8 percent by 2050. The number of people aged 65 and over remaining economically active will similarly increase, from 2.82 million in 2020 to 4.67 million by 2030, 6.4 million by 2040, and 7.34 million by 2050.[3)]

Considering that 37.5 percent of the elderly population in Korea already wants to remain in the workforce (Elderly Survey, 2011), it is astonishing that the elderly employment rate will only reach 40 percent by 2050. By then, more than 40 percent of a larger elderly population will wish to remain in the workforce, given the general rise in educational attainment levels and improvements in public health. What's more, an elderly employment rate at 40 percent by 2050 is only possible with the creation of 7.3 million additional jobs. Whether this will be possible will be determined by the future evolution of Korea's economic and labor market conditions. It will need to offer diverse new jobs that reflect the needs and characteristics of working seniors.

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3) The number of economically active seniors has been projected according to the medium-level scenario used in Statistics Korea (2011), Long-Term Population Projections. The scenario corresponds to Scenario 1 in this study and shows the same projection results until 2060.

〈Table 4-9〉 Elderly Employment Rate Projections (2000-2050)[1)]

Year	Elderly employment rate (%)	Number of seniors
2000	30.9	1,104,492
2005	31.6	1,452,330
2010	33.1	1,806,683
2015	33.8	2,241,835
2020	34.8	2,816,273
2025	35.8	3,701,716
2030	36.8	4,673,572
2035	37.8	5,578,493
2040	38.8	6,404,488
2045	39.8	6,953,207
2050	40.8	7,340,232

Note: 1) The currently available data on the elderly employment rate in Korea are government statistics spanning the years 1999 through 2014. However, basing employment rate projections for the next 26 years on statistics from the past 16 years may be less reliable depending on future circumstances.

Sources: The data for 2000, 2005, and 2010 are from Statistics Korea's annual surveys of the economically active population, conducted each June (http://kosis.kr).

The accelerated growth of the elderly population aged 65 and over will also stimulate an explosive growth in the demand for elderly care services. We employed two scenarios for projections concerning this demand, based on surveys on the need for care services for years 2006 through 2012.[4)] In the first scenario, the demand will rise from 1.69 million in 2015 to 4.59 million by 2050 in Scenario1.[5)] In the second scenario, the

4) The first scenario assumes that the current ratio of seniors of all ages in need of care services (2006-2012, i.e., 25.5 percent) will remain constant into the future, while the second scenario assumes that the current average ratios of seniors of different age groups (2006-2012, i.e., 14.7 percent for those aged 65 to 74, 35.3 percent for those aged 75 to 84, and 67.1 percent for those aged 85 and over) will remain constant into the future.

5) The size of the elderly population remains more or less the same among all the three scenarios until 2075. Thus, only the projections based on Scenario

number will rise to 1.72 million (26.0 percent of all seniors) in 2015 and multiply to 6.01 million (33.4 percent of all seniors) by 2050. The fact that the projections increase more rapidly with respect to Care scenario 2 indicates that the segment of the elderly population in need of care services will grow more rapidly than the over all elderly population. Given these different paces of grow th indifferent segments of the elderly population, policymakers need to develop measures to meet this rapidly growing demand for elderly care services.

〈Table 4-10〉 Elderly Care Service Demand and Seniors in Care Projections (2010-2050)[6)]

Year	Elderly care service demand			
	Ratio (%)		Number of seniors in care	
	Care scenario 1	Care scenario 2	Care scenario 1	Care scenario 2
2010	25.5	24.6	1,390,385	1,341,187
2015	25.5	26.0	1,689,151	1,722,138
2020	25.5	26.6	2,061,444	2,152,741
2025	25.5	26.3	2,634,424	2,711,841
2030	25.5	26.3	3,236,319	3,329,640
2035	25.5	27.6	3,761,451	4,065,935
2040	25.5	29.2	4,207,838	4,824,894
2045	25.5	31.5	4,454,311	5,510,794
2050	25.5	33.4	4,587,718	6,014,255

1 have been presented here.

6) The number of seniors in need of care was projected according to the medium-level scenario of Statistics Korea (2011).

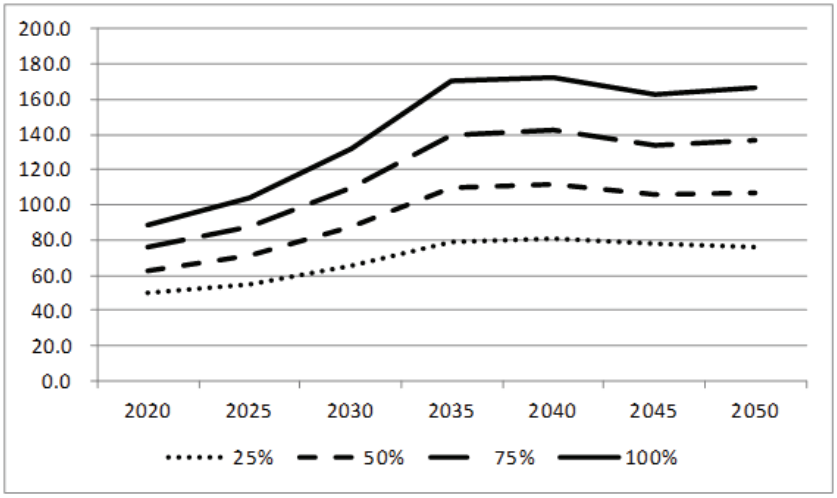
G. Old-age income

We apply the permanent income hypothesis (PIH) to project and analyze whether the public pension benefits and assets that Koreans accumulate until age 65 will be enough to help them maintain the level of income necessary for minimal or optimal consumption after retirement. If we were to project the sufficiency of old-age income based on public pension benefits and the income-converted value of assets, the total old-age income, based on an income conversion ratio of 25 percent, can provide 49.8 percent of the income retirees need to maintain life-cycle utility. At income conversion ratios of 50, 75 and 100 percent, the proportion grows to 62.8 percent, 75.8 percent and 88.7 percent, respectively. The sufficiency of old-age income will grow continually until 2040, providing 81.1 percent, 111.7 percent, 142.2 percent, and 172.7 percent of the income needed at the income conversion ratios of 25, 50, 75 and 100 percent, respectively. By 2050, the figures will decline slightly, to 76.3 percent, 106.4 percent, 136.6 percent and 166.7 percent. In other words, with the income conversion ratio at 50 percent or higher, retirees will be able to earn enough old-age income to maintain their life-cycle utility from 2035 onwards.

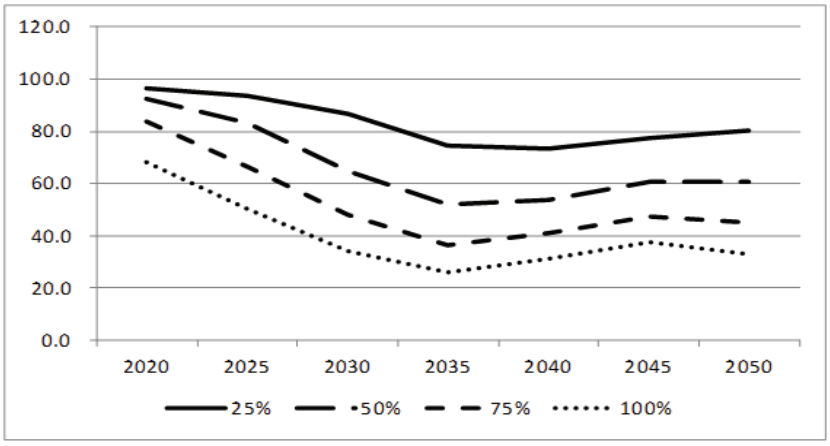
At the income conversion ratios of 25, 50, 75 and 100 percent, however, the ratios of households that fail to earn enough old-age income to maintain lifecycle utility will reach 96.4 per-

cent, 92.4 percent, 84.0 percent, and 68.0 percent, respectively, by 2020. These ratios, nevertheless, will gradually decline to 74.7 percent, 52.2 percent, 36.7 percent and 26.3 percent by 2035. From then on until 2050, however, the ratios will begin to rise slightly again to 80.2 percent, 60.6 percent, 44.9 percent and 33.1 percent. In other words, even with the income conversion rate of 100 percent, at least 40 percent of households will fail to earn enough old-age income to maintain lifecycle utility.

[Figure 4-10] Sufficiency of Old-Age Income (Lifecycle Utility)



[Figure 4-11] Ratio of Households Not Earning Sufficient Old-Age Income (Lifecycle Utility, %)

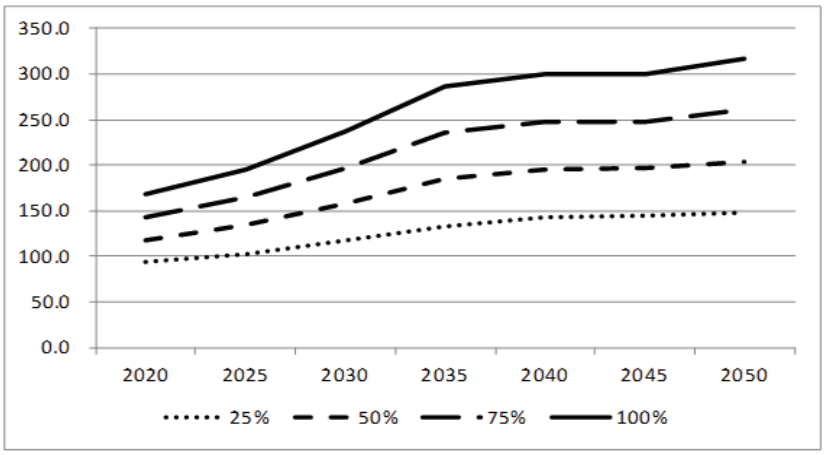


If we were to measure the sufficiency of old-age income in the light of the minimum cost of living, using the income conversion rates of 25, 50, 75, and 100 percent, it will reach 93.5 percent, 118.5 percent, 143.5 percent and 168.5 percent, respectively. These percentages will continue to rise until 2050, reaching 147.6 percent, 204.1 percent, 260.7 percent and 317.3 percent, respectively.

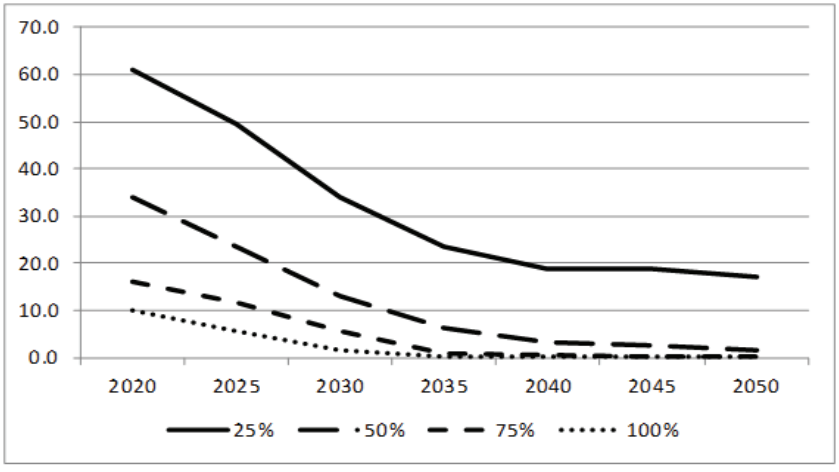
However, a significant number of households will fail to earn a sufficient old-age income to meet even the minimum cost of living, making up 60.8 percent, 34.0 percent, 16.0 percent and 10.0 percent of all retiree households by 2020 at the income conversion rates of 25, 50, 75 and 100 percent, respectively. Fortunately, these percentages will steadily decline from then until 2050, reaching to 17.1 percent, 1.6 percent, 0.2 percent,

and 0.2 percent by 2050.

[Figure 4-12] Sufficiency of Old-Age Income (Minimum Cost of Living)



[Figure 4-13] Ratio of Households Not Earning Sufficient Old-Age Income (Minimum Cost of Living, %)



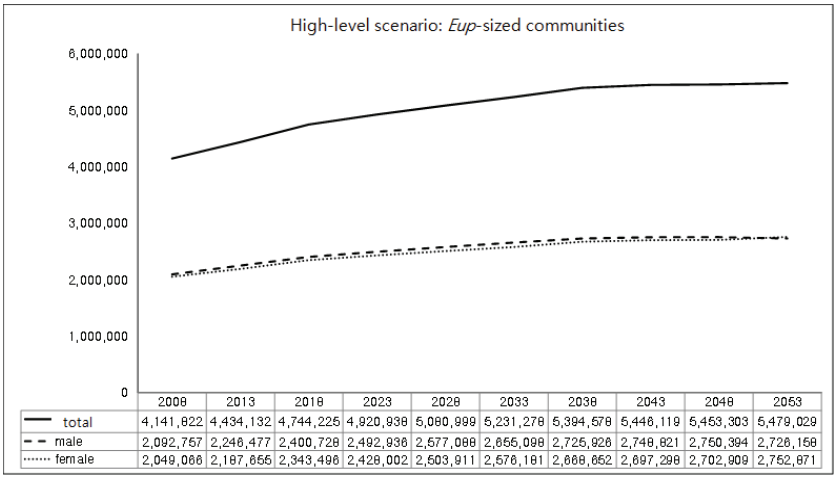
H. Rural communities

The low fertility rate and population aging will also affect rural communities. Our projections of the changes in the rural population are based on the cohort component method. However, given that rural populations are much more prone to change through migration than the death and birth rates, we posited three different scenario levels on the future migration rate. The high-level scenario assumes that the highest five-year migration rate over the past 10 years (2003 to 2013) will apply constantly to each cohort. The medium-level scenario, adjusting for fluctuations in the migration rates by averaging them out, first involves estimating the migration rates in and out of rural areas for the past 10 years (2003-2013). It then estimates the rural population increase or decrease for each year of the projection period and averages out all the annual estimates to readjust the migration rate. The low-level scenario assumes that the lowest five-year migration rate of the past 10 years (2003-2013) will remain constant for each cohort.

The high-level scenario indicates that the rural population in Korea will increase somewhat until 2023 and begin to decrease afterward, but very gradually. More specifically, the rural population will drop from 9.3 million in 2008 to 9.0 million by 2043 and to upwards of 8 million by around 2048. If we divide rural communities into eup- and myeon-sized districts, the net migration rate

for the eup-sized communities will grow across all cohorts. However, the net migration rate for the myeon-sized communities will plummet radically, even with the relative increase in the influx of people in their 40s through 60s into these communities over the past 10 years. This is primarily because even more people in their 20s and 30s have left these communities.

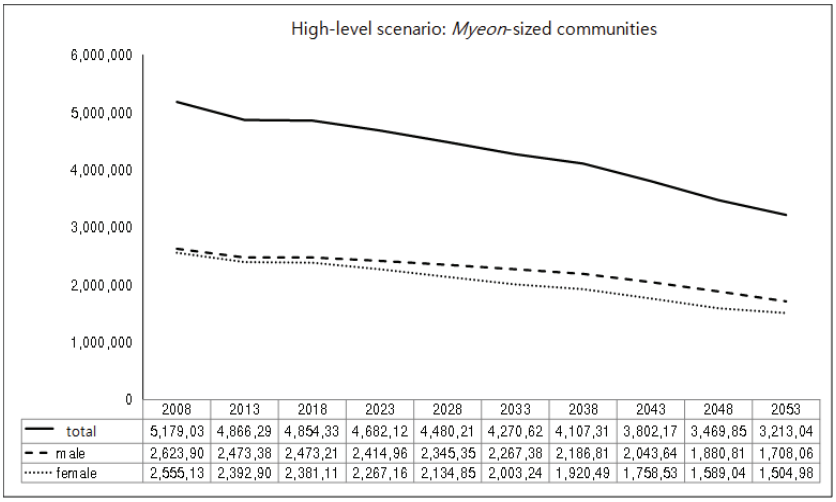
[Figure 4-14] Eup-Sized Community Population Projections(High-Level Scenario)



	2008	2013	2018	2023	2028	2033	2038	2043	2048	2053
total	4,141,822	4,434,132	4,744,225	4,920,938	5,080,999	5,231,278	5,394,578	5,446,119	5,453,303	5,479,029
male	2,092,757	2,246,477	2,400,728	2,492,936	2,577,088	2,655,098	2,725,926	2,748,621	2,750,394	2,726,158
female	2,049,066	2,187,655	2,343,496	2,428,002	2,503,911	2,576,181	2,668,652	2,697,298	2,702,909	2,752,871

Note: Data for 2008 and 2013 are based on actual measures, and data for 2018 and beyond are projections.
Source: Statistics Korea (KOSIS).

[Figure 4-15] Myeon-Sized Community Population Projections(High-Level Scenario)

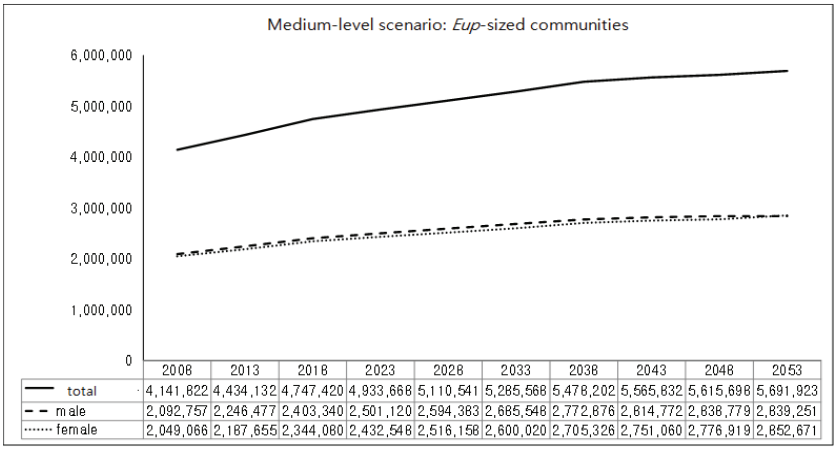


	2008	2013	2018	2023	2028	2033	2038	2043	2048	2053
total	5,179,03	4,866,29	4,854,33	4,682,12	4,480,21	4,270,62	4,107,31	3,802,17	3,469,85	3,213,04
male	2,623,90	2,473,38	2,473,21	2,414,96	2,345,35	2,267,38	2,186,81	2,043,64	1,880,81	1,708,06
female	2,555,13	2,392,90	2,381,11	2,267,16	2,134,85	2,003,24	1,920,49	1,758,53	1,589,04	1,504,98

Note: Data for 2008 and 2013 are based on actual measures, and data for 2018 and beyond are projections.
Source: Statistics Korea (KOSIS).

In the medium-level scenario, the rural population in Korea will remain constant, at 9.3 million, from 2008 until 2023 and begin to decrease in 2043, reaching 8.5 million by 2053. As in the high-level scenario, the eup-level population will continue to grow, while the myeon-level population will radically shrink from 5.1 million in 2008 to 2.8 million by 2053 because of the continued exodus of younger generations and the declining birth rate.

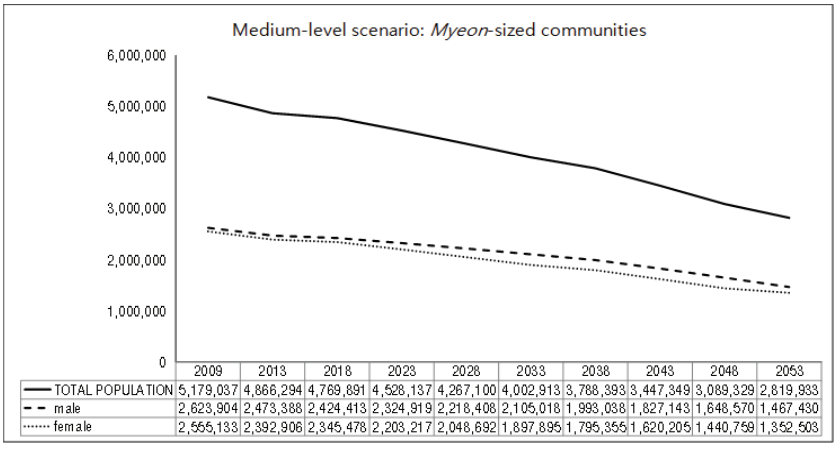
[Figure 4-16] Eup-Sized Community Population Projections (Medium-Level Scenario)



	2008	2013	2018	2023	2028	2033	2038	2043	2048	2053
total	4,141,822	4,434,132	4,747,420	4,933,668	5,110,541	5,285,568	5,478,202	5,565,832	5,615,698	5,691,923
male	2,092,757	2,246,477	2,403,340	2,501,120	2,594,383	2,685,548	2,772,876	2,814,772	2,838,779	2,839,251
female	2,049,066	2,187,655	2,344,080	2,432,548	2,516,158	2,600,020	2,705,326	2,751,060	2,776,919	2,852,671

Note: Data for 2008 and 2013 are based on actual measures, and data for 2018 and beyond are projections.
Source: Statistics Korea (KOSIS).

[Figure 4-17] Myeon-Sized Community Population Projections (Medium-Level Scenario)

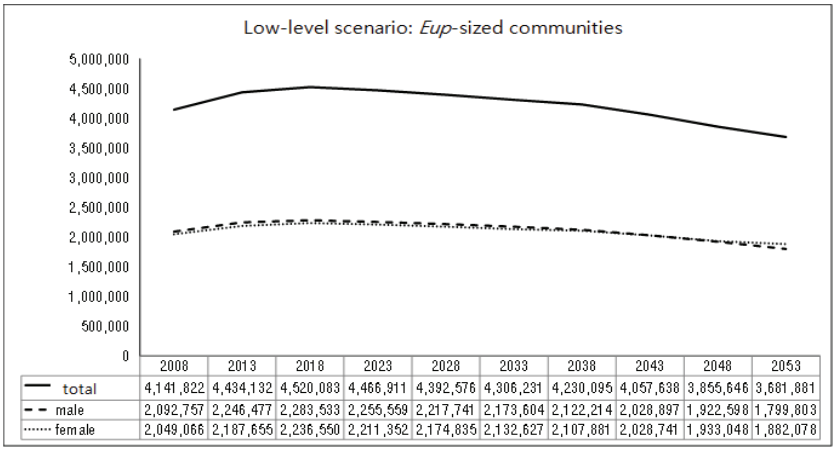


	2009	2013	2018	2023	2028	2033	2038	2043	2048	2053
TOTAL POPULATION	5,179,037	4,866,294	4,769,891	4,528,137	4,267,100	4,002,913	3,788,393	3,447,349	3,089,329	2,819,933
male	2,623,904	2,473,388	2,424,413	2,324,919	2,218,408	2,105,018	1,993,038	1,827,143	1,648,570	1,467,430
female	2,555,133	2,392,906	2,345,478	2,203,217	2,048,692	1,897,895	1,795,355	1,620,205	1,440,759	1,352,503

Note: Data for 2008 and 2013 are based on actual measures, and data for 2018 and beyond are projections.
Source: Statistics Korea (KOSIS).

Unlike in the first two scenarios, the low-level scenario shows that the rural population is likely to decrease significantly, from 9.3 million in 2008 to 8.5 million by 2028 and to 6.2 million by 2053. The scenario shows that the eup-level population will reach its peak in 2018 and begin to decrease rapidly, reaching 3.7 million by 2053. The myeon-level population is also expected to plummet, even more rapidly than in the first two scenarios, halving from 5.2 million in 2008 to 2.5 million by 2053.

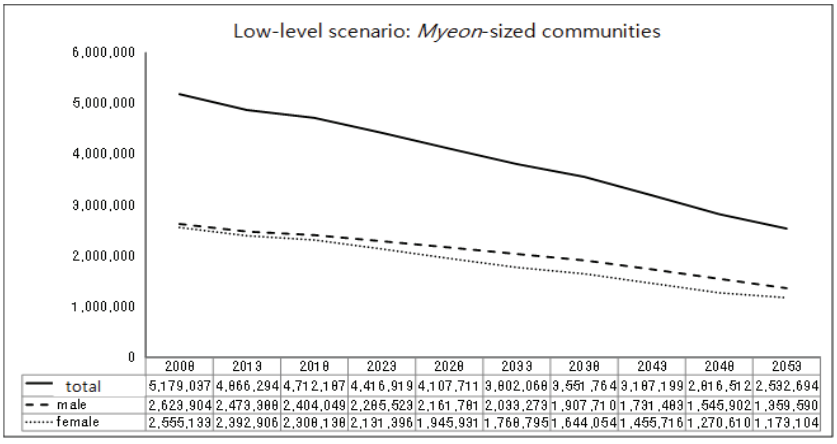
[Figure 4-18] Eup-Sized Community Population Projections (Low-Level Scenario)



	2008	2013	2018	2023	2028	2033	2038	2043	2048	2053
total	4,141,822	4,434,132	4,520,083	4,466,911	4,392,576	4,306,231	4,230,095	4,057,638	3,855,646	3,681,881
male	2,092,757	2,246,477	2,283,533	2,255,559	2,217,741	2,173,604	2,122,214	2,028,897	1,922,598	1,799,803
female	2,049,066	2,187,655	2,236,550	2,211,352	2,174,835	2,132,627	2,107,881	2,028,741	1,933,048	1,882,078

Note: Data for 2008 and 2013 are based on actual measures, and data for 2018 and beyond are projections.
Source: Statistics Korea (KOSIS).

[Figure 4-19] Myeon-Sized Community Population Projections (Low-Level Scenario)



	2008	2013	2018	2023	2028	2033	2038	2043	2048	2053
total	5,179,037	4,866,294	4,712,187	4,416,919	4,107,711	3,802,068	3,551,764	3,187,199	2,816,512	2,532,694
male	2,623,904	2,473,388	2,404,049	2,285,523	2,161,781	2,033,273	1,907,710	1,731,483	1,545,902	1,359,590
female	2,555,133	2,392,906	2,308,138	2,131,396	1,945,931	1,768,795	1,644,054	1,455,716	1,270,610	1,173,104

Note: Data for 2008 and 2013 are based on actual measures, and data for 2018 and beyond are projections.
Source: Statistics Korea (KOSIS).

In the meantime, the rural population will be aging even more rapidly than the nationwide population. The ratio of the rural elderly (aged 65 and over) in the total nationwide population is expected to rise from 12 percent in 2013 to 23 percent by 2028 and again to 38 percent by 2053. In the high-level scenario, the elderly ratio in eup-level areas will multiply from 14 percent in 2014 to 23 percent by 2028 and to 40 percent by 2053, while the elderly ratio in myeon-level areas will soar from 26 percent in 2013 to 38 percent by 2028 and to 59 percent by 2053.

In the medium-level scenario, the elderly ratio in eup-level areas will similarly grow from 14 percent in 2013 to 23 percent

in 2028 and to 40 percent in 2053, while the myeon-level counterpart will rise from 26 percent in 2013 to 40 percent in 2028 and to 61 percent in 2053.

In the low-level scenario, the elderly ratio in the eup-level areas will grow even more rapidly, from 14 percent in 2013 to 24 percent in 2028 and to 44 percent in 2053. The myeon-level counterpart will also rise, from 26 percent in 2013 to 39 percent in 2028 and again to 63 percent in 2053.

〈Table 4-11〉 Rural Elderly Population Projections by Scenario

(Unit: %)

Region		2008	2013	2018	2023	2028	2033	2038	2043	2048	2053
Nationwide (medium-level)		10	12	15	18	23	27	31	33	36	37
Rural (high)	Total	18	20	22	25	30	33	39	42	45	47
	Eup	12	14	16	19	23	27	32	36	39	40
	Myeon	23	26	29	33	38	43	48	52	56	59
Rural (medium)	Total	18	20	22	25	30	34	39	42	45	46
	Eup	12	14	16	19	23	27	32	35	38	40
	Myeon	23	26	29	33	40	44	51	54	58	61
Rural (low)	Total	18	20	22	26	31	35	42	45	49	51
	Eup	12	14	16	19	24	29	35	39	42	44
	Myeon	23	26	29	33	39	44	51	55	59	63

Note: The nationwide rural elderly population ratio projections are based on the long-term population projections in KOSIS.

The accelerated aging of the rural population will exert a far-reaching impact on Korean society, particularly with respect to the cost of elderly welfare and social services. Seniors living in rural communities are already older than their urban

counterparts. They are also more likely to live in single-person households, earn low income, and have low levels of education (Bae, 2007). The increase in older seniors living by themselves in rural communities will significantly raise welfare and health-care service costs. As the majority of healthcare facilities and services are concentrated in urban and suburban areas, rural senior residents not capable of making the required trips will be denied healthcare when they need it. The overall lack of the social support infrastructure in rural communities is likely to compromise the quality of life for rural seniors, increasing their vulnerability to various mental and psychological issues (Song and Kim, 2000).

5 Conclusion

5 Conclusion

The persistence of the lowest-low fertility rate in the future will transform Korea's demographic structure, downsizing the country's working-age population and accelerating population aging, and thereby exerting critical shocks upon its society and economy. The risks implicit in these demographic changes may feel distant from us now, and we may even be able to manage them in the near future. However, if these risks are left unmanaged and unmitigated, Korea may enter an irreparable state. The biggest cause of concern is that all of these diverse risks will unfold simultaneously rather than one by one, exerting cumulative shocks through their interactions. We therefore need to develop solutions that take into account and manage all risks accordingly.

This study examined the impact of the lowest-low fertility rate on macroeconomics, the labor market, industries, finance, housing, national defense, old-age income, welfare for the aged, and rural communities in Korea. From our projections and analyses, we can draw the following policy implications.

First, the lowest-low fertility rate persists in Korea because the trend toward late marriage has been exerting a much greater influence than the rise in the fertility rate of married women. We should therefore seek to overcome the current problem of

low birth rate by prioritizing employment opportunities, a work-family balance, and housing support for young people, so that they will not have to wait so long to get married. The later women marry, the more they might feel tempted to give up on having children due to the age-related risks associated with late childbearing. More active policy solutions therefore need to be developed to encourage married women to consider having children.

Second, the lowest-low fertility and accelerated population aging will adversely affect Korea's labor market and the industrial structure in diverse and far-reaching ways. They will reduce labor supplies and thereby compromise Korea's growth potential; aggravate the imbalance between exporting industries and industries that cater to the domestic market; widen the labor supply-demand gap; and worsen fiscal deficits. Once the Korean population begins to decline, it will exert long-term, irrevocable, and cumulative adverse effects throughout the Korean economy. We therefore need to find effective measures to maintain the current virtuous cycle of population growth and economic growth while we can before it is too late. While raising the birth rate and encouraging consumption and investment in the country, policymakers also need to tackle the growing structural imbalance in Korean industries.

Third, the anticipated demographic changes will slow down

the growth of manufacturing and SOC-related industries, while increasing the role of the service sector in Korea, thus prompting the structure of production in Korea to shift toward post-manufacturing. In the meantime, manufacturing will continue to lead exports, but service and SOC-related exports will shrink, thus increasing Korea's dependency on manufacturing exports. This, in turn, will widen the export imbalance not only between manufacturing and other sectors, but also among manufacturing industries. On the employment front, as industries continue to invest in research and development, which results in technological progress and greater productivity, Korean industries' employment creation capacity will contract over the years. A steady labor supply will still be needed, but it will diminish due to population aging. Korean policymakers therefore need to find solutions to ensure Korea's growth potential by creating quality jobs for the increasingly elderly population in the future. It will be crucial to enhance the productivity of industries and develop new and better technologies to this end. The emergence of new industries and the growth of existing small ones will naturally create more jobs. However, the government and the business community need to think about directing investment into senior-oriented industries.

Fourth, the continued aging of the population will slow the pace of decrease in the net savings rate, thus ultimately increasing the financial assets in possession of households.

Thanks to the increase in financial assets, the demand for real assets (less liquid) will naturally decrease, as households will come to prefer safe assets. However, the low interest rate will bring down the level of income for the elderly, and may possibly aggravate the problem of poverty among them. Policies on enhancing access to finance, including those for risk sharing and better intermediation, should thus focus on minimizing aging-related risks. Active responses to population aging should therefore include the innovation of corporate finance and consumer finance. The financial market should diversify its pension products and develop more effective and distinct services to ensure that workers will have secure sources of post-retirement income. It should also evolve and mature so that the types of assets on offer are flexible in response to changes in demand. The government, for its part, should issue more long-term treasury bonds in light of credit risks, thereby fostering the growth of markets for inflation-indexed bonds, asset securitization, and reverse mortgage schemes.

Fifth, the eventual decrease in the size of the Korean population will not readily translate into shrinking housing demand, as the number of single-person elderly households will increase. There will therefore be a gap of a decade or so between when the population begins to decrease (circa 2030) and when housing demand (in terms of the residential service amount) begins to decrease (circa 2040). In other words, the

multiplication of single-person households, the growing desire of the elderly to maintain independent living arrangements, and the rise in the income level will put a brake on the decline in the housing demand. Policymakers therefore need to be cautious before deciding whether to contract housing supply today. A decreased housing supply may lead to serious repercussions in the future. Also, the increasing number of single- or two-person households does not mean that only the demand for smaller housing units will increase, as people's preferences for home sizes vary according to income levels and age. The housing market therefore needs to provide housing arrangements of diverse sizes.

Sixth, if we assume that the current rate of young male military enlistment candidates passing the physical examination and the actual enlistment delay rate remain constant, the Korean military will begin to experience troop shortages in 2022. Shortening the period of mandatory military service from 21 months to 18 months will only aggravate the problem. Reform measures, such as increasing in the number of (volunteering) officers and introducing cutting-edge weapons systems will raise defense cost significantly, placing even greater strains on the fiscal structure already burdened with the lowest-low fertility rate and super-aged population. As it will be necessary for the Korean military to maintain its current troop level, given the state of growing uncertainty over the Korean

Peninsula and in the rest of Northeast Asia, it will be imperative for policymakers to find measures to ensure adequate troops and budgets for the Korean military.

Seventh, in terms of the minimum living cost, the public pension benefits will nearly suffice as a source of old-age, post-retirement income for the elderly by 2020. By 2040 and afterward, the National Pension alone could provide over 90 percent of the minimum cost of living. It is therefore crucial to minimize gaps in the National Pension and enhance other public assistance systems for retiree households. This, in turn, will require a financial system that minimizes the cost of asset transaction and facilitates the liquidation of assets into cash income. The Korean government may also need to encourage retirees-to-be to subscribe to housing pension, agricultural pension or other such public pension schemes for supplementary sources of old-age income. In addition, it will be important to minimize the number of people forced to leave work due to old age and to foster the labor market catering to people in their 50s through 70s. For full-time wage earners, in particular, either the retirement age should be raised or a peak wage system should be instituted so that they can remain employed and continue to participate in the public pension scheme as long as possible. For part-time wage earners, the self-employed, employers, and unpaid family business workers, new jobs will need to be created to encourage their return to the la-

bor market and continued earning potential.

Eighth, the demographic changes will aggravate and diversify the problem of elderly poverty, multiplying the types and severity of risks to seniors and supporting family members. The super-aged society will feature explosive growth in the elderly's demand for both jobs and care services. In order to satisfy this growing demand, it is important to expand the infrastructure for welfare and social services for the aged and to improve the quality of existing services. Moreover, work environments need to be diversified, work conditions improved, and age-based discrimination removed so that seniors can remain in the labor force. In addition, family members supporting the elderly should be given greater support for maintaining a healthy work-family balance, as well as resources, programs and subsidies for caregiving; working conditions and training support for professional caregivers should also be improved (including greater support for work-family balance, old-age design programs, facilities, equipment, etc.). Elderly counseling centers, counselors, and local elderly support networks should be given greater support too, so that the elderly receive better psychological and emotional care.

Finally, in both the high- and low-level scenarios, the rural population will decrease in size abruptly and age at an accelerated pace. In order to prevent and minimize the hollowing out of rural communities, it is crucial to enable rural residents

the ability to use and develop local community resources, enhance the efficiency of fiscal investments in rural communities, and launch decentralized rural policies for more effective rural development. These will require the systematic and organized maintenance of rural spaces, the development of incentives for continued influxes of people into rural areas, the growth of new local communities to replace hollowed-out ones, and the revitalization of local communities based on their own development models.

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