UN/POP/PD/2005/4

August 2005

UNITED NATIONS EXPERT GROUP MEETING ON SOCIAL AND ECONOMIC IMPLICATIONS OF CHANGING POPULATION AGE STRUCTURES
Population Division
Department of Economic and Social Affairs
Mexico City, Mexico
31 August – 2 September 2005

DEMOGRAPHIC DIVIDEND AND LABOUR FORCE TRANSFORMATIONS IN ASIA: THE CASE OF KOREA

Hanam S. Phang, Korea Labor Institute

A. Overview of Population Changes in Korea

Much like her economic development, demographic transition in Korea followed a very steep and condensed path in the past and, the same pattern of rapid change is expected to turn 'one of the youngest populations out of the more-or-less developed economies' into one of 'the oldest' by the middle of the 21st century (OECD, 2002) if timely policy intervention and demographic behavioural change do not take place (see Appendix 1).

Demographic transition in Korea can be characterized by a rapid decline in fertility and a consistent and gradual decrease in mortality. It started with a very high fertility rate at around 5.0-6.0 in the early 1950s right after the Korean war. By that time improvement in public health and hygiene had already lowered down crude death rate from about 35.0 in 1910 to about 17.0 in 1950-1955 and, as a result, had extended life expectancy at birth from about 23 years in 1905-1910 to about 50 years in the same time period (Kim, T.H., 2004).

At the start of the half-century-long (1950-2000) demographic transition, the baby-boom generation was born during the 1950s. According to the Korean national statistical record, the size of the baby-boom cohort was around 8 million or so. Long-term view of the Korean population changes, either observed or expected for the period between the mid-20th century and the mid-21st century, clearly show that the baby-boom cohort had been and will continue to be a major factor and a variable that had shaped and will shape the demography of the Korean population. In other words, the baby-boom cohort and its offspring 'echo generation' constitute the 'population momentum' that is working its way through the demographic history of the Korean population for almost a century. The phenomenon of a rapidly declining fertility and then a rapidly ageing population in an amazingly short time period revolves around the baby-boom cohort – their demographics, culture and attitude, behaviour, and ultimately, retirement from the labour market.

In less than a half-century, the fertility and mortality regime have changed from a typical 'the least developed' one to that of 'the more developed' countries in the global context. The traditional 'high' fertility above 5.0-6.0 in the 1950s-1960s, when the government was aggressively campaigning for family planning, was decreased to a under-replacement level (1.70) in the mid-1980s, recording a decrease of more than 3.0 in about 2 decades, which is a unprecedented speed rarely observed in the known world demographic history (Kwon, 1997). The lowered fertility rate was continued into the 1990s and, recently, hit a record low 1.17 in 2002, 1.19 in 2003.

The critical question is on what the major driving force is and what will be the future development: will it stay at the current way-below replacement level or bounce up as many policy concerns and 'optimistic' demographers expect. Critically depending on the course of the change in the future fertility regime are the future of Korean population and its ageing, labour force and economic growth, and social welfare system. In this paper, we will describe and discuss the major patterns of past demographic transition and future population prospects drawing on a series of the population projections made by the Korean government agency and by the UN. A more detailed look into the assumptions on future fertility rates adopted for those population projections will be taken and the assumptions or expectations will be evaluated.

The baby-boom generation has been a so-called 'population dividend' to Korean economy and society. Born at the onset of the first demographic transition they grew up to become a young and growing labour force, which, in turn, contributed to a 'miracle' economic growth during the latter part of the 20th century. This paper will describe and discuss how and to what extent the Korean economy benefited from the 'population dividend' generated by the demographic transition led by the baby-boom generation.

As the large baby-boom generation is getting old along with their life-expectancy ever-increasing, the age structure of the Korean population is expected to be changed radically in coming decades. Korea has entered the stage of ageing society as of 2000 with its population aged 65 and above sharing 7.0 per cent. Further it is expected to become an aged society before 2020. As it was with the fertility transition in the latter part of the 20th century, in less than 2 decades, Korean society will be facing a completely 'developed countries' issue of rapidly ageing population and decreasing labour force. As such the population dividend that benefited the Korean economy in the past generation is expected to turn into a 'population lend' claiming its credit back on the same population but of a different generation. Out of this process of switching from population dividend to population lend emerges a serious issue of intergenerational equity in terms of economic growth and welfare distribution. According to the population projections and public finance accounting, the large number of old retirees from the baby-boom generation, through pension and health costs, will be exerting an unbearable pressure on the economy and social security system which will be run by the relatively small labour force of the next generation in the first part of the 21st century.

As many concerned demographers and policy analysts are rightly pointing out, the transition period of a decade or so between the two centuries will be the most critical period in which appropriate and timely policy intervention and preparation could be effectively adopted and applied to keep her economic growth and social welfare in a healthy and sustainable path. A Brief discussion will be made of the necessary policy initiatives that are needed to ameliorate the adverse repercussions possible from the 'population dividend' enjoyed by the past generations of Korea during her rapid development stage.

B. Demographic Transition in Korea: 1950-2000

Figure i shows a long-term trend in crude birth and death rates and total fertility rates over the period: 1950-2000. Crude birth rate (CBR) was peaked at about 45 in the 1955-1960 period, when demographic transition took off, and decreased down to 13.5 in the 1995-2000 period, while crude death rate (CDR) was at around less than 15 in 1955-1960 and was gradually decreased down to 5.5 in 1995-2000. During the early stage of demographic transition, there was a dramatic decline in fertility, which can be well apprehended through the observed total fertility rates(TFR) as high as 5.4-6.4 in the 1950s and 1.70 in the mid-1980s.[1] The below-replacement level of fertility was continued into the 1990s and hit a record-low level of 1.17 in 2002 and 1.19 in 2003.[2]

Figure ii show a long-term trend in total population and its growth rate for the same period. During the half century, Korean population grew up from about 19 million in 1950 to about 47 million in year 2000 – an increase of more than 2.5 times. Population growth rate peaked at 3.1 per cent in 1960 and then started to decline rapidly until it finally reached 1.0 per cent in the mid-1980s.

Figure iii shows a historical trend of the total fertility rate of Korea in an internally comparative perspective. Until the mid-1970s Korea was closer to the 'less developed' group of countries in fertility pattern. But, after then, TFR was swiftly converged to the level observed in the 'more developed' group of countries. In a relatively short period of time (less than half-century) the fertility and mortality regime have changed from a typical under-developed to a more like the pattern observe in the 'developed' region of the world.

Table 1 presents the completed fertility rates of selected cohorts born in 1950 through 1985 by 5-year term, which could provide an insight into the future development of the fertility regime for Korea. The consistent decline of total fertility rate as shown in figure 1 was the result of the overlapping effects of cohort completed fertility rates which had declined from 2.87 by the 1950 cohort to 1.32 by the 1985 cohort. It was by the 1970 cohort that the rate first got below replacement level at 1.70. The completed

fertility rates of the 1970 through 1985 cohorts are based on both observed and projected data. Of particular importance are their completed fertility rates as those rates will determine the total fertility rate of the early 21st century in Korea. According to the data presented the completed fertility rates of the 1975, 1980, 1985 cohorts will be about 1.5, 1.4, and 1.3 respectively. This indicates a well-below-replacement fertility rate will prevail during their prime childbirth period; 2000-2025.

Demographic transition in Korea took place in the midst of rapid economic development and transformation of the socio-economic system from a rural agrarian to an urban industrialized society (Kim Doo-Sub, 2004). In that aspect, the steep and consistent decline in fertility during the early period of demographic transition (1950-1985) could be seen as an outcome of the socio-economic change at the macro-level. But the convergence of the TFR to that of more developed countries after the mid-1980s (the second transition period) might be more dictated by parent's rational choice based on the cost-benefit calculation of bearing and rearing children and their aspiration for upgrading the standard of living at the micro-level(Kim Doo-Sub, 2004). Parents began investing in the quality rather than the quantity of their children, which was made possible by a shift from 'natural' to 'controlled fertility'(Coale, 1974). Investment in children's human capital was viewed as a rational choice given high returns to education, which was made possible by growing economy and modernizing society(Becker, Murphy and Tamura, 1990).

The changing fertility regime has been realized mainly through an increasing proportion of young men and women in their 20s remaining unmarried and, when married, their decreasing marital fertility. As shown in table 2, the prime age for first marriage was 20-24 for women and 25-29 for men until the mid-1980s. But, since then, that convention became rapidly out-of-dated as the changes in the average age at first marriage had been consistently increased. As table 2 shows, in 1972, the average age at first marriage was 26.7 for men and 22.6 for women. But since then it increased steadily up to 30.6 for men and 27.5 for women as of 2004. Delayed marriage means a shortened time period for women to bear children. And then, if age-specific fertility rate remains the same, total fertility rate will go down further.

Social survey results indicate, however, that the young generation may not be giving up their marriage for good but just delaying it for their work careers (Byun, 2004). The traditional male-dominated corporate culture in Korea that used to be discriminating against married women working has been one of the major barriers to extended female labour force participation so far. And the current trend of much delayed marriage among young women should be their behavioural adaptation to the hard reality in the job market.

To illustrate this more clearly, figure iv shows a long-term trend in age-specific marriage rates. Particularly conspicuous is the decline in the marriage rate among males and females aged 24 and under and males aged 25-29 ever since 1970. In contrast but in a much less extent, marriage rates of males and females aged 30 and over have been gradually increasing over the period observed. And that will be the trend for a while.

This trend in marriage rate might have a negative effect on the future of the already-low fertility by restraining its bounce up to the replacement level. But, at the same time, it could be a positive sign for the future of Korean labour force and economic growth as it could mean an increasing proportion of the high-educated females productively participating in the labour force and remaining attached longer to their work careers.

Getting married late does not necessarily mean a reduced number of children. They, the young generation, might catch up by shortening their childbirth spaces, which is rare, or extending their effective childbearing period. Table 3 presents a trend in crude birth rates by mother's childbearing age for 1970-2004. Age 25-29 has been consistently the modal age for childbearing. Crude birth rate for that age

period, however, has been decreased from about 321 in 1970 to about 112 in 2003. On the other hand the crude birth rate for the 30-34 age group, betraying normal expectations, does not show an increase of any significance so far. In fact it has been decreased from about 206 in 1970 to about 80 in 2003. In less than 3 decades, a totally different marital fertility regime has emerged in Korea.

C. Demographic Dividend and Economic Growth.

'Demographic (population) dividend' refers to the opportunity for economic growth that demographic transition offers to developing countries through changing age structure of the population in consideration, especially through the proportion of the workforce rising. According to Bloom, Canning and Sevilla (2002), while population growth has a negative effect on per capita income growth, this effect is counteracted by the positive effect from growth in the share of the population that is economically active. The demographic dividend was essential, they argue, to East Asia's 'economic miracle' explaining one third of its growth. A counter argument can obviously posited proposing a reverse causal mechanism as Mason (2001) does: rapid economic development and accompanied social change (modernization, urbanization, and changes in demographic behaviour) might have induced or facilitated demographic transition. But, when the two processes (economic development and demographic change) take place almost simultaneously in a relatively short period of time, it could be a sterile effort to draw a neat causal flow from the procedural simultaneity.

If we could set aside the validity of the 'demographic dividend' proposition and its causal mechanism assumed, the demographic transition and economic growth of Korea during the past half-century epitomize what the authors (Bloom, Canning and Sevilla, 2002) try to sell by the concept. That is, during demographic transition, consistent mortality decline precedes a high fertility period; the lag or difference between the two generates a 'bulge' population growth, so-called, baby-boom generation; in the mean time the baby-boomers grow up to form a large labour force of young age; that increasing labour force contributes to unprecedented economic growth by quantity; rapid socio-economic modernization and development bring in speedy changes in the generation's fertility behaviour, which leads to rapid decrease in fertility, which, in turn, reinforces the economic growth effect through low dependency and welfare burden, and through increased investment in human capital.

However, according to the authors, the demographic dividend is not inevitable but has to be earned and also time-limited. If timely policy initiatives are not adopted and rightly applied, then, the opportunity would be missed and foregone. And then, adverse effect could set in instead. If right environment-channel is set up, then, the population dividend is delivered through increased and/or better (a)labour supply, (b)savings, and (c)human capital. Below we present the past half-century history of population changes and economic growth by demographic dividend through increased or better labour supply, national savings, and human capital.

1. Population Growth and Labour Force

Table 3 presents a long-term trend in the size and age composition of Korean population. Korean Population grew up in size from about 19 million in 1950 to about 47 million in 2000. The average growth rate for the half-century was about 1.8 per cent per year on average. The population growth rate during the early phase of demographic transition (for 1950-1975) was much higher at about 2.5 per cent and much lower at about 1.1 per cent during the late phase (for 1975-2000). It is expected to be growing up to almost 50 million in around 2020 if current demographic indicators remain about the same.

On the other hand, as shown in figure v, the share of the productive population (aged 15-64) was above 50 per cent during the early stage of economic development and began increasing since the early 1970s to reach above 70 per cent level in 2000. As the population size grew, so did the size of the

population in productive age group. This was possible by the birth of a large baby-boom cohort out of the high fertility regime on the onset of the demographic transition (1950-1960) and their successive 'off-spring cohort' being also large in size even though total fertility rate had already started decreasing by the time when they reached their own reproductive age range.

Although youth dependency ratio was high due to high fertility rate during the early stage of economic development, old-age dependency ratio was extremely low as the proportion aged 65 and above stayed less than 4 per cent until the mid-1980s. The result was high total dependency ratio rapidly decreasing since the early 1970s down to the level below that of the more developed countries after the mid-1980s, when Korean economy was entering a more mature stage of economic development.

These changes in population and its age structure must have been beneficial to economic growth by supplying a growing but young labour force to the economy. Figure vi shows trend in the size of the population (a) economically active, (b) employed and working, and (c) labour force participation rates for males and females. As a consequence of a growing population, those aged 15-64 in particular, the size of the work force had been ever growing in its size. The labour force participation rate for males stayed above 70 per cent, while that for females remained under-50 per cent even though it had been gradually increasing through the entire period.

Demographic transition should have contributed to economic growth by providing women an increased opportunity of participating in the labour market. Women are more likely to enter the workforce as family size declines and as they are getting more educated. Increasing labour force participation of women will add to labour supply to reinforce the effect of demographic dividend. In that aspect, the relatively low female labour force participation rate might have been detrimental to economic growth in itself, but they contributed to economic growth indirectly by providing their male bread-earners a committed and quality home making and childrearing throughout the economic development stage when single income family was a norm.

On the other hand, the female population aged 15 and above remains as a promising source of future labour force as the younger generation becomes more educated, more participatory, and more attached to their own work career, thanks to their delayed marriage, very low fertility, and small number of children to be taken care of. In fact, the labour force participation rates of the females in their prime childbearing and childrearing age period has been consistently increasing according to national statistics. Especially impressive is the increase in the labour force participation rate of the 20-29 age group, fresh out of schooling and entering their first work career, which was below 45 per cent in 1980 but increased to almost 65 per cent as of 2004.

2. Population Growth and Savings Rate

According to Bloom, Canning and Sevilla (2002), demographic transition also contributes to economic growth by increasing savings, which improves a country's prospects for investment and growth. The young and old consume more than they produce, whereas working-age population tend to have a higher level of economic output and also a higher level of savings (Higgins, 1998).Improved health and longevity make saving easier and more attractive: a healthy population must plan far in advance if it is to maintain its standard of living through decades of retirement (Lee, Mason, and Miller, 2000). Thus, Bloom, Canning and Sevilla (2002) predict that, when large numbers of baby boomers grow into their mid-age (40s-50s), national savings will tend to rise, which will contribute to capital accumulation to be invested hopefully into productive activity.

The long-term trend in national savings rate in Korea appears to be supporting the argument of Bloom, Canning, and Sevilla (2002) as is shown in figure vii. If the two deep recess periods (the early

1980s and the late 1990s) are taken out, then, the overall trend shows that national savings rate and economic growth rate moved in the same direction. In particular, national savings was highest in around 1990, when the baby-boom cohort started hitting their 40s. But after the peak national savings rate was decreased slightly while economic growth rate started decreasing to a larger extent.

3. Demographic Transition and Investment in Human Capital

Finally, demographic transition may have a significant effect on investment in human capital. Long life expectancy granted by decreasing mortality and improved health makes parents to invest more in their children's human capital as the premium of higher education increases and lasts longer. With fewer children, it becomes easier to devote more time and money to each child. And as a result, the labour force becomes more productive, promoting higher wages and a better standard of living.

Figure viii shows trends in population and GDP growth rates along with the average educational level of the population.[3] By reading the long-term trend lines for these rates we can see that GDP growth rate moves more in parallel with the growth rate of the productive population than of the total population. The two trend lines (i.e., growth rate of the productive population and of GDP) have about a 10-year time lag: the former was peaked in 1977 (at 3.3 per cent) and then decreased, while the latter was peaked in 1987 (at about 11.0 per cent) and then decreased thereafter. Particularly interesting and noteworthy is the parallel trend in the decreasing growth rates of the productive population and the GDP since the late-1980s.

During the same time period, the educational level of the population had linearly increased from less than 6.0 years to almost 12 years. Along with the educational upgrade of population economic growth rate also increased at least until the late 1980s. As J. W. Lee (1997) reports, the miracle economic growth of Korea could be attributed to the rapid growth of human capital stock at least for the first 3 decades (1960s-1980s) of her economic development.

But, since then, economic growth rate was consistently decreased while the population level of education increased continuously. The start point of the reversed trend coincides with the induced expansion of college education in the mid-1980s. According to D.I. Kim (2004), while the supply of the college-educated labour force had been consistently increasing over the past decades, their quality had been deteriorated ever since the rapid, unregulated expansion of college education had started. This signifies a falling rate of return to investment in education due to either oversupply of highly educated labour force or receding quality of college education as it is well documented in recent analyses of Korean labour market (Lee, B.H. et al, 2005). As such part of the falling rate of economic growth since the late 1980s could be explained by deteriorating quality of the human capital among the newly entering labour force as well as by decreasing population growth rate.

In sum, population growth and changing age structure as a result of the demographic transition seem to have successfully worked as a population dividend to spur economic growth in Korea during the 2nd half of the 20th century.[4] But here emerges an important question for the future development. What will happen to the population and labour force in the coming decades of the 21st century? According to the long-term projections, Korean population will continue growing until at least 2020 (exact point depending on the future fertility rates) and then turn into a negative growth period. Even though total fertility rates have already been reduced to the far-below-replacement level, the population will continue growing until 2020, when the baby-boom and its 'echo generation' will have passed through their reproductive age period. As Bloom, Canning and Sevilla (2002) have rightly informed us, the population momentum created by the baby-boom cohort at the beginning of the demographic transition worked its way through the population for the latter part of the 20th century and will continue its pass until 2020, an about 70 years

in length. But after 2020 Korean population is projected to be getting old in a full speed to reach a hyper-aged one by 2027.

The entire demographic transition process in Korea, including ageing stage, can be divided into 4 major periods: (1) early transition period (1955-1985), (2) late transition period (1985-2000); (3) early ageing period (2000-2020), and (4) mature ageing period (2020-2050) as summarized in table 4. Through the whole process of the demographic transition, the baby-boom generation has been a major 'momentum' or deriving power for demographic transition, economic growth, and social change. Table 5 summarizes the major profile of the baby-boom generation through demographic transition and economic development periods.

D. Korean Population in the Future: KNSO and UN Projections

The U.N. Population Division (UNPD) issued its 19th Revised World Population Projections in 2004. Korea National Statistics Office (KNSO) issued its Revised Population Projections in 2005, which is a revised version of the original 2001 Population Projections based on the 2000 Census. The motive of the 2005 revision by KNSO was to reflect the radical drop in fertility rate since 2000 in the new population projection. In this section we compare and contrast the population projections and demographic assumptions adopted by the KNSO (1996, 2001, 2005) and UNPD (United Nations, 2004). In table 5 major demographic indicators and assumptions adopted in each population projection are summarized.

The critical variable for the different versions of the population projections, as well expected, is the future fertility rates. As being notoriously hard to predict (Bongaarts, 1998), there is a significant variation in the future fertility rates assumed across projections by the same agency and between projecting agencies. In its original projection issued in 2001, KNSO pictured a very smooth and stable development of the future fertility and assumed TFR for 2005 at 1.37, which was expected to be gradually increasing to 1.40 by 2030, which was expected to stay at the same level by 2050. The observed TFR for the 3 preceding years (1998-2000) was 1.47, 1.42, and 1.47 respectively, an average of 1.45. But the TFR abruptly dropped in the 3 succeeding years, to 1.30 in 2001, 1.17 in 2002, 1.19 in 2003. The sudden drop in the TFR in recent 3 years motivated the KNSO to revise its 2001 decennial projection.

The revised projection in KNSO 2005 assumes TFR at 1.19 for 2005, 1.28 for 2030 and 1.30 for 2050. The target TFR for 2050 is adjusted down by 0.10 from the 2001 projection. On the other hand, in the UN projection a more optimistic picture is drawn by assuming a gradually increasing TFR from 1.21 in 2005 to 1.56 in 2030 and finally 1.77 in 2050.

Both KNSO and UN projection predict Korean population will enter the stage of an 'aged society' (14 per cent of its population being aged 65 and over) as of 2017 or 2018, and then a 'hyper-aged society' (21 per cent) as of 2026 within a short time interval (8-9 years).

Figure ix shows the result of the population projections by the KNSO (medium variant) and the UN (low, medium, high fertility variant). According to the KNSO projection, Korean population will be growing up to about 50 million by 2020 and then decreasing down to less than 43 million by 2050. The medium variant of the UN projection is very close to that of the KNSO even though it predicts a slightly large population for the end point of projection, about 45 million in 2050.

What is most striking is the large difference in the total population projected by the two contrasting assumptions on future fertility development, that is, the high vs. low fertility variant in the UNDP projection 2004. While the high variant predicts a population linearly increasing (up to 2030) in size and then stabilizing at around 53 million, the low variant predicts a completely different population ever decreasing in the long-term from about 48 million currently to about 37 million in 2050. The difference in

the final population projected by the two variants is almost 15 million. As such, depending on the future course of fertility change, Korean population is projected to follow a completely different course of change during the first half of the 21st century. If we could assume the plausibility of the projection will be highest with the medium variant, then, we could see that the future population will be more like that projected by the low variant than that by the high variant. Also need to be considered is the fact that past projections had over-projected future fertility rates, which was the case with Japan also (Atoh, 2000).

There are not much data and information available for researchers to make a sensible judgment on the future of the TFR in Korea, but we can get informed from the observed history of TFR in other countries that have passed through demographic transition stages in advance. In that sense, the past history of the demographic transition – fertility and population growth - in Japan could be one of the best references for the future demographic changes for Korea. The two countries belong to the same Asian culture of family formation and child values. And also Japan has been a forerunner of modern demographic transition among the East Asian countries. In fact, by comparing demographic transitions in Japan and Korea during 1950-2000, we can find that the Japan and Korea are remarkably similar in their pattern and pace of demographic transition with about a quarter century time lag.

Table 6 presents a long-term trend in total fertility and population growth rate for Japan from 1950 to 2000 and those for Korea from 1975-2025 time period with a time lag of 25 years. So the rates are all observed ones for Japan. But for Korea, only part of the trend (until 2000) is observed and the rest is a projected one.

As well illustrated in figure x, the TFR of Japan was decreased into a below-replacement level in around 1960(=2.02), while the TFR of Korea was lowered down below replacement in 1984(=1.76), about a quarter century later. Interestingly the population growth rate of Japan for 1960-1965 and that of Korea for 1985-1990 were both 0.99. Since the, the Japanese TFR had been gradually but consistently decreased to reach at 1.39 in 1995-2000 period. In the same period, Korean TFR was at 1.51. The difference between the two clearly discernable is in the swiftness of Korean fertility decline through the 1970s and 1980s (from 2.92 to 1.60). After the mid-1980s, Korean TFR and population growth rate were staying far below those of Japan until now. Other than that, the long-term trend in both total fertility and population growth rates goes in parallel.

One important hint that we can draw from the two countries' demographic trend lines is about the course of future fertility rate of Korea. According to the lagged-time period reference framework, the TFR of Korea should not be slowly increasing as the UN projection dictates, but further declining toward 1.0 level for the 2000-2025 along the downward slope of the Japanese TFR from 1970 to 2000. These observations lead us to suspect the plausibility of a gradually increasing fertility rate up to 1.5 after 2000-2005. The question is whether the steep downward trend of Korean fertility would continue into the first decade of the 21st century or bounce up to converge to the level of Japanese TFR observed for the reference time point.

E. Population Ageing and Future Labour Force

Korea has its population youngest among the OECD countries up to now but is expected to undergo as rapid aging process as its economic development over the next few decades. It is likely to experience one of the most rapid demographic transitions from an aging to an aged society. As a result its work force would also be under intense transition process.

1. Ageing of the Labour Force

Korea has entered a stage of aging society as of 1999 with more than 7 per cent of its population aged 65 and over. Within less then 20 years (in 2019), Korea is expected to become an aged society with its projected old-aged population over 14 per cent in 2019, 20 per cent in 2026(KNSO, 2001). This pace of transition is extra-ordinary compared to the past experience of Western societies as summarized in table 7. France took 115 years, for example, to move from an aging to an aged society, while for U.S. it took 75 years. Among the most industrialized countries, Japan had experienced so far the fastest transition process to an aged society. But Korean case is expected to be faster than that of Japan .

As a result of her population rapidly ageing, Korea will experience a rapid increase in old-age dependency ratio as reported in table 8. The long-term trend of the total dependency ratio in Korea is U-curved: that is, it was relatively high (about 84) by the 1970s due to high youth dependency and then was steeply decreased down below 40 in 2000 and will rapidly increase up to the level (about 82) due to old-age dependency ratio. The type of dependency shifted from children to older persons as it was observed in many countries that have passed through during the demographic transition (Mirkin and Weinberger, 2000). During the same time period the median age of the population will rise from 18.5 in 1970 to 37.5 in 2010 to 53.8 in 2050 and to that extent the labour force will also be getting older. For instance, the proportion of the old aged (50 and over) among the total labour force is projected to be increasing from about 25 per cent in 2000 to above 50 per cent by 2050 (Phang 2004a). As well-observed in the past experiences of advanced countries, increasing old-age dependency ratio and ageing of the labour force usually proceed hand in hand and as such have a double negative effect on economy and society.

2. Labour Force Participation of the Old-aged

The future size of the labour force will depend not only on the demographic changes but also on age-specific participation rates. Particularly significant would be the effect of old-age participation rates as that age group will be growing significantly in both relative and absolute size (OECD, 2002)

How do Korean old-aged participation rates compare with other advanced industrial countries? Table 9 shows labour force participation rates by age group (25-49 v.s.50-64) and by sex for Korea and other international groups. The prime age labour force participation rate of Korean males is slightly lower and that of females is much lower than the average rate of OECD or EU countries. On the other hand, the old-age participation rates for both Korean males and females are slightly or considerably higher than the average rate of OECD or EU countries (with an exception of U.S. females), even though much lower than those of Japan.

The data in table 9 indicates that Korean old-aged tend to remain in the labour market in higher proportion than those of Western industrialized countries, which makes Korean pattern look more like Japan than EU or OECD countries. This in turn implies a possibility that the future pattern of labour force participation and withdrawal for Korean old-aged could be different from that of advanced Western countries – the secular trend of early voluntary withdrawal from the labour force (Jacobs, Kohli and Rein, 1991).

The high participation rate of the old-aged may be attributable, in part, to the particularity of Korean labour market: that is, the largest self-employed sector (including agriculture = 40 per cent) among OECD countries. Among the old-aged workers aged 55-64, about 60 per cent of men and of women are classified as self-employed. And these figure goes even higher for workers aged 65 and above (77 per cent, 76 per cent). Given that the self-employed workers tend to work until quite old than wage workers, this would in part explain the relatively high rate of labour force participation by old-aged Koreans. This relatively high participation rate of the old-aged will help alleviate the negative effect of decreasing labour force on economic growth in coming decades. Then one of the most important and challenging policy initiatives is making quality employment opportunities available to the old-aged workers so that they could remain

active in the labour market until normal retirement age. In that sense, the quality of employment and working conditions for the old-aged workers need to be improved.

3. Future Labour Force Projections

In one of the many researches on population ageing and labour force changes, Kim(D. I. Kim, 2004) simulated the growth rate of the future labour force according to the 6 different target fertility scenarios.[5] The 6 target fertility for 2050 runs from 'very low' 1.00 to 'very high' (by current standard) 2.10 with 1.40 and 1.60 in the medium. His simulation results presented in table 11 show how the future labour force will increase or decrease in size depending on the target fertility level applied. The result of the projection is presented in table 10. Because those born in 2004 will grow to be working age by 2019, the effect of the target fertility rate assumed will take place from 2020. According to the simulation based on the medium variant, the total labour force working will grow up to 23.7 million by 2020, and to 24.8 million by 2019. But after 2019, the labour force will be consistently decreasing down to 17~19 million depending on the target fertility level assumed.

The size of the future labour force working is dependent not only on population growth rate but also on the labour force participation rate of the productive population (15-64). Many of the projections of the future labour force by Korean scholars are limited in that future changes in participation rates are not aptly taken into account. As population ageing goes on, it is expected that people's labour market behaviour would also change in response to changing living standards, social security programs (especially retirement pension) being further developed, increasing educational level and decreasing number of children in family – which may surely affect labour force participation behaviour of the old-aged and of women. Thus, it is of critical importance in policy perspective to consider the possible effect of their future labour force participation rates.

Is this aspect, the OECD's study of Korean labour force growth in the future is noteworthy. OECD reports their simulation results of the future labour force growth according to age-specific participation rates. Considering the dependency of the size of the future labour force on future variations in age-specific participation rates, several scenarios have been developed which make different assumptions about how participation rates will change over the next half century by OECD study group and its predictions are as follows (OECD, 2002).

Using the same assumptions about participation rates remaining constant at their 2000 levels, these changes in labour force growth can be compared across OECD countries as shown in figure xiii. Over the next two decades, labour force growth will still be faster in Korea than in most other OECD countries. However, the slowdown in growth when compared with the earlier two decades will be more marked (OECD, 2002). Japan and the EU may already be experiencing a decline in the absolute size of their labour forces. Over the period 2020-2050, labour force growth will switch sharply into reverse in Korea and, along with Japan, it is projected to experience one of the steepest falls in the size of the labour force.

Even though the OECD's simulation result is informative, it is also limited in that no fertility variation is taken into account. Depending on the magnitude of the future fertility level the simulation result based on future participation rates could be easily overturned. In general the OECD study is a bit less pessimistic about the future labour force growth in that the size of the labour force according to the 'maximum participation' scenario is projected to reach 24 million in 2050, whereas it does not go over 20 million according to any scenarios in other studies in Korea.

Nevertheless, more important is the point that both the OECD and other studies by Korean researchers arrive at similar projections for the future labour force in Korea: it will grow in slower rates until 2020 and then turn into negative growth streak thereafter.

F. The Impact of Ageing Population on Economic Growth

Korean economy had enjoyed a very high growth rate of about 7 per cent during the last two decades. Such a high growth was mainly from growth in the quantity and quality of labour and capital accumulation, not much from total productivity growth (Hahn et al., 2002). It was also noted that there was a considerable drop in the growth rate between the 1980s and 1990s (from 8.29 per cent to 5.97 per cent) and that most of the drop was due to decreasing rate of (working) population growth. These observations point to the possible negative effect of the rapidly ageing population and labour force on economic growth during the coming decades.

On the effect of population ageing on economic growth, there are still more debate than consensus between researchers. While the majority of scholars uphold a pessimistic view, quite a few scholars advance an optimistic view pointing out over-simplified pessimism ingrained in the pessimistic views so far advanced (see Gee, 2000). According to the pessimistic view (Bloom, Canning and Sevilla, 2002; Borsch-Supan, 2000; OECD, 1998; World Bank, 1994), population ageing driven by low fertility and longer life expectancy has negative effects on economic growth through a set of inter-related mechanisms: (1) decreasing labour input due to low population growth and ageing; (2) decreasing savings rate and capital accumulation due to increasing dependency ratio and social cost of a prolonged-care of the old-aged; (3) decreasing investment into the human capital of the young generation due to increasing social welfare cost; (4) increasing foreign debt due to falling interest rates.

On the positive side, in contrast, scholars point out the positive effects of population ageing and low growth on economic growth such as development of labour-saving technology and increased investment into human capital, which is posited to compensate for the lost growth rate due to quantitative decrease in labour input. Scarth(2002), for example, asserts that population ageing could lead to productivity growth by motivating increased investment into human capital as labour becomes a relatively scare production factor. Cutler and others' (1990) cross-national comparative study using panel data came up with a conclusion that decreasing labour force growth results in increasing labour productivity.

One of the fundamental measures against the adverse effects of ageing population and shrinking labour force will be improving the productivity of the labour force. Increasing labour productivity is in fact recommended as an effective policy alternative to solve for the problem of labour shortage and stagnant economic growth. If consistent growth in labour productivity and increasing labour force participation among women could be achieved in coming decades, then, the negative effect of population ageing could be much mitigated (Phang et al., 2004; Cho, 2000).

The question is: would it be possible to raise up the labour productivity to the extent that is large enough to compensate for the decreasing labour force and output growth, say, after 2020? The answer is rather negative. According to the long-term projections by Korean scholars (Choi et al.,, 2003; Kim Dae-Il, 2004) the labour productivity growth in Korea is predicted to be at around 0.2-0.4 per cent, a much lower level relative to the average 2.0-4.0 per cent during the last 30 years. Underlying the decreasing labour productivity in the future, according to Kim Dae-Il(2004), are changing age structure of the population (i.e., ageing) and decreasing quality of high education.

In projecting economic growth rates, obviously multiple factors should be taken into account in a more complicated way that is the case in many past studies. Depending on how future fertility changes are assumed, how labour quality changes are predicted, and how total factor productivity is estimated, the projection result could be wildly different.

Taking into account future fertility changes and total factor productivity assumptions, Kim Dong-Suk(2004) simulated future economic growth measured by real GDP growth rate. His projection of potential economic growth is based on the Cobb-Douglas production function, in which long-term changes in savings and capital stock, human capital index, and the number of work force according to population projections are taken into account. The result presented in table 11 is based, in particular, on the assumption that total fertility rate will bounce up to 1.4 level and total factor productivity will grow by 2 per cent annually and shows predicted contributions from each growth factor for succeeding 10-year periods. Overall, it is predicted that the potential economic growth rate of Korea will stay around 5.0 per cent for the next two decades (i.e., 5.1 per cent on average until 2010, 4.8 per cent for 2010-2020). But after 2020, economic growth rate is projected to be decreasing to a much lower level, 3.5 per cent during the 2020s, 2.2 per cent during the 2030s, 1.5 per cent during the 2040s.

In a similar vein, H. H. Lee (2001) also predicts population ageing in Korea will result in a substantial decrease in future economic growth rate due to decreased savings rate and slower-to-negative labour force growth. It is predicted the potential economic growth rate will be down from 8.8 per cent (in 2000) to 4.1 per cent in 2010, 3.1 per cent in 2020, 2.2 per cent in 2030, 1.3 per cent in 2040, and finally 1.0 per cent in 2050.

G. Population Ageing and Increasing Cost of Old-age Income Security

A country's pension system serves as a basic component of its old-age income security. Figure xi describes Korean pension system and related retirement benefits. The importance of the pension system is more pronounced in Korea than in many other countries due to not only its fast ageing population and increasing costs to support the elderly but also underdevelopment of complimentary programs for old-age income security. Korea has National Basic Living Protection program as social assistance to minimum income. But its coverage is so limited that it should be rather regarded as poverty program. For employed workers there exists retirement allowance (1 month salary for each year of service) that is paid as they leave the firm. But its coverage is also limited (under 40%) and the lump-sum payments tends to be dispensed over the working life and not preserved until their retirement age for most of Korean workers whose work careers are characterized by multiple disrupted period of relatively short employment.

The projected demographic transition to an aged society will have serious economic and social impacts. It will create, among other things, a severe strain on public finances. According to the OECD(2002) estimation, total public expenditures associated with ageing in Korea are expected to rise by 8½% of GDP over the next five decades, one of the largest increases in OECD countries.

The main component of this increase is and will be the well-expected rise in expenditure on old-age pensions. But health care and other social assistance expenses will also rise along with the increasing number of the old-aged. Korean national pension system in particular is projected to be accumulating huge amount of hidden liability as it matures, which shall be transferred to the next generation of work force, which shall again negatively affect national economy in next few decades by putting too much burden on the future work force. Figure xii shows public expenditure on old-age pension in 2000 and projected changes between 2000 and 2050 for Korean along with other OECD countries. At only 2% as of 2000 Korea is at the lowest level in

public expenditure on old-age pension but will be in the highest group (with Norway and Spain) at 8% in its future increases in public pension expenditures.

The projected increase in public expenditures as the population ages, and the associated hikes in taxes and social security contributions that will be required to finance them, could give rise to a number of intergenerational inequities and tensions. Much of this extra burden of taxation will fall on the working-age population while at the same time their political power in terms of voting numbers may be in decline relative to the growing number of older people. This could make the necessary adjustments to cope with an ageing society more difficult in the future (OECD, 2002).

H. Conclusion: Policy Initiatives Advised

Before I conclude, I briefly describe and evaluate the items of the new population policy that have been put out or suggested so far to prepare for her ageing and slow growth population.

1. 'More Children' Policy:

As is well recognized, the most critical demographic variable for population and economic growth in the future will be fertility rate. Depending on the future fertility trend, the size and composition of the future population and labour force could be quite different and, as a consequence, the status of the economy and social well-being would be also different. In that context, as the below-replacement low fertility is deemed to be the main demographic force behind the rapid population ageing projected, it is understandable that Korean government began campaigning pro-natalist 'More Children' policy by providing direct financial incentives (tax break or cash allowance) to married couples for additional child and by introducing new or reinforced 'work-family' friendly measures for working women (see MOHW, 2004).

Underlying the policy initiatives is a recognition that the cost of rearing, and educating children is already high enough to encourage couples not to have more than one child these days and that it is too hard for married women with children to successfully combine work and family while pursuing their own work careers – the reason being not only institutional but also cultural barriers. It seems that young women of current generation have already decided to go rather for their own work even if that means a delayed marriage and own-family formation.

If the first stage of fertility transition was started by demographic forces of declining mortality and increasing life-expectancy, the last stage of fertility transition seems to be driven by a conscious choice of young generation and married couples based on their cost and benefit calculation of having another child (Coale, 1974). Having effective techniques and procedures readily available couples would find it easy to put the number of children to be born under their own control. On the other hand, in the Asian culture of family and kinship, No-Child is still not a popular option for couples and one or two children would be ideal. But at the same time, as the notorious culture of son-preference is still ingrained in their mind-set, Korean couples have successfully pursued a parity-specific sex control for their additional children. The sex-ratio for the 3rd child was almost 180 in 1995 and 144 in 2000 whereas that for the 1st and 2nd child was 105 and 107 respectively (KNSO, 2003).

In this context, few believe the government's pronatalist campaign based on direct incentive system would have any sizable impact on the demographic behaviour of the young generation. Rather it is recommended that more fundamental reforms should be pursued on the long-term basis to keep lower the cost of rearing and educating children, to make more work opportunities available to married women with

children, and to build-up a social-institutional system free of sex-discrimination. Sleebos(2003), on examining the effect of the pronatalist policies of many European countries, concludes that those pro-natalist policies, while very costly, fall short of affecting people's fertility behaviour in any significant magnitude.

On a more macro-level, there have not been much discussions or consensus on the optimal size and ideal age-composition of population in demographic research community. And so it is advised that Korean government should rather invest more into the quality of her children and future labour force instead of pursuing a blind-minded, quantity-based policy of 'more children'.

2. Immigration Policy

Another important policy for dealing with ageing population and labour force shortage is to increase working population through immigration (Visco, 2001). In that aspect, replacement migration as discussed in United Nations (2000) could be an 'easy solution' to low population growth and labour shortage. Immigration policy could be a direct and strong measure against labour shortages in a country because most of the immigrants workers are relatively young and ready to participate in the country's labour force (Denton and Spencer, 2003). At the same time, the fertility of the immigrant population is normally higher than that of the residents and immigration could contribute to the country's fertility recovery.

Nevertheless, it is advised that immigration cannot solve the problem of ageing population and low population growth for good, even if it could be a short-term treatment (Tapinos, 2000). According to Choi et al.(2003), immigration cannot be a problem solver because (1) the size of immigrants needed to compensate for decreasing labour force must be huge; (2) immigrant workers are hard to be registered and controlled; (3) immigrant workers get old too.

3. Labour Market and Employment Policy

The OECD and other Korean scholars' simulation studies imply that over the next few decades the size of Korean labour force could vary in considerable magnitude depending not only on future fertility rate but also on the age-specific participation rates, which would be greatly influenced, in turn, by institutional settings and policy initiatives. This also suggests that the future size of the active labour force would depend in great extent on the participation and/or activation rates of the old-aged and women given that the participation rate of the core labour force (aged 20-64) may stay at much the same level in any given point of time.

In other words, there is a considerable scope for changes in policy and institutional arrangements that affect participation rates to influence the rate at which labour force growth slows down over the next few decades. Even though in all of the OECD scenarios, labour force growth turns negative after 2020, but again the magnitude of this drop will be larger if participation rates for the older population fall and it will be smaller if there is a general rise in participation rates. For instance, under the baseline scenario, labour force growth over the next two decades is projected to be only 0.8 per cent per annum following growth of 2.1 per cent per annum in the previous two decades. If older participation rates for the older population decline in response to, say, public pensions becoming more extensively available, then, all else constant, annual labour force growth over the next two decades will be even lower at only 0.5 per cent. Under the maximum scenario this rises to 1.35 per cent (OECD, 2002).

Since the economic impact of ageing population is mainly through fewer working population relative to the total population, it follows that such problem could be much eased if more non-active population,

such as older workers and females, could be mobilized to participate in the labour force. In a policy perspective, therefore, maintaining a proper level of participation and employment for the old-aged work force should be stressed (OECD, 2002).

Korea is lucky with regard to this issue because the participation rates of the old-aged population (esp. males) have been high. However, with only limited opportunity in the regular sector of employment and involuntary early retirement practice at Korean firms, increasing number of older workers could encounter employment difficulties in the future. Rapid technological changes and skill upgrade that will characterize future labour market also could exacerbate the employment problem of older workers who are slow to adapt to new skills and technological change. Therefore, on the demand side, employment contracts (including mandatory early retirement policies) should be changed gradually to adjust to the ageing of population and of the labour force. On the supply side, worker's initiative and choice should be directed toward lowering the cost of long-duration employment contracts (such as seniority wage and retirement allowance) so that long tenure (normal retirement) with productivity-based wage system could make a soft landing in place of short tenure (early retirement) with high wage system(Phang, 2004a).

Currently the labour force participation of Korean women is considerably low relative to other advanced countries as shown in table 12. Particularly low is the participation rate of the young women with higher education. So women could be the most valuable source of the future labour force for Korea. Korean government is advised to strengthen its sex-fair policy to keep the threshold to labour market lower so that first entry (after schooling) and re-entry (after childbearing) to the labour market could be achieved without much transition costs incurred. Also Korean labour market institutions and practices need to be reformed in the direction that enables working women to successfully harmonize work and family and to develop their work career more consistently.

Korean economy and society has apparently benefited from the demographic transition that had enabled her to have a relatively young population and growing labour force during the second half of the 20^{th} century. The result was a rapid and consistent economic growth and social development. The baby-boom generation born in the early stage of demographic transition has brought in a so-called 'demographic dividend' on which the miracle economic development could have been achieved.

Social structural changes at the macro-level that accompany a rapid economic development often tend to induce radical changes in individuals' demographic behaviour at the micro-level, which was more than the case in Korea. Rapid changes in family formation behaviour, especially marriage and childbearing, had been observed among the generations succeeding the first baby-boom cohort. They get married much later and bear much less children. And at the same time, the baby-boom generation that had been the backbone of Korean economic development during the past half-century is getting old. These demographic changes that are still under process are expected to be materialized in a rapidly ageing population. Here comes the socio-economic challenge that Korea had never been confronted: old-aged population and labour force, low economic growth, growing burden of social cost for supporting older people (Phang, 2004b).

Nevertheless, according to the population projections whether optimistic or pessimistic, Korea seems to be granted a grace period of about 20 years (2000-2020) during which the old demographic regime characteristic of developing economy and society will be faded into a new demographic regime typical of developed one. During that grace period her population and labour force are expected to be still growing though in a much slower rate than before. And then symbolically the year 2020 will be the time point at which the large baby-boom cohort will be completely retired from the labour force and its small off-spring cohort born during the 1980s will make the core labour force – a time for generational transition.

As such it is strongly advised that Korean government pursue a wide-rage of reform policy in a consistent and efficient way, especially reforms in labour market institutions and social welfare system that could face a rapidly ageing population and labour force and that could enable Korean economy and society to be in a sustainable growth (OECD, 2002). It is disappointing however to report that Korean government does not seem to be quite ready with a long-term, comprehensive blue-print for an ageing population and labour force. In addition the demand side of the economy and labour market is still in a stagnant state under the seemingly long shadow of the economic crisis that hit hard Korea and other Asian countries in the end of the 1990s. As a consequence, employment opportunities for the old-aged as well as for the youth have been cut off to a considerable extent so far due to the structural adjustment and lean management policies widely practiced in many big organizations and firms in Korea. As such Korean government should double its effort to prepare for the old-aged society while recovering from the current economic recess.

The "problems" of an aging population, or "challenges" if one prefers, are not going to go away in a few years, to be replaced by others. They will be with us for a long time. Short-term "solutions" should be suspect. Think long. (Denton and Spencer, 2003)

Endnotes:

[1] Total fertility rates for the pre-1950 period was above 6.0: 6.44 in 1925-1930, 6.13 in 1930-1935, 6.22 in 1935-1940, 6.08 in 1940-1945, 5.96 in 1945-1950 (Jun, 2004: Table 3.1).

[2] Viewed in the demographic transition theory(1997), the period up to 1960 is equivalent to stage 2, which is characterized by declining mortality, substantially high fertility and moderate population growth, whereas the period 1960-1985 is equivalent to stage 3, which involves further declines in mortality, usually to low levels, and initial sustained declines in fertility, with quite high population growth. The period 1985-2020 is equivalent to stage 4, which is characterized by the achievement of low mortality and the rapid emergence of low fertility levels, usually near those of mortality with population growth rate very low or negligible.

[3] The observed GDP growth rate has two big dips in the early 19980s and the late 1990s, the former due to the oil price shock and the latter due to the international currency crisis. Thus for a better illustration of the long-term trend, the rates are smoothed and the two dips are replaced with 3-year moving average at the time point.

[4] But all these mechanisms are heavily dependent on the policy environment (Bloom, Canning, and Sevilla, 2002:42): (a) flexibility in the labour market to allow the expansion of the labour force; (b) adequate saving mechanisms and established domestic financial market; (c) government providing a high-quality health and education.

[5] Kim, Dong-Suk (2004) applied sex- and age-specific employment rates to the same sex- and age-specific population projected for 2000-2050.

REFERENCES

Atoh, M. (2000). The Coming of a Hyper-Aged and Depopulating Society and Population Policies: The Case of Japan. Paper presented at the Expert Group Meeting on Population Ageing and Population Decline, organized by the Population Division, United Nations. New York, 16-18 October.

Becker, G. S., K. M. Murphy, and R. Tamura. 1990. Human Capital, Fertility, and Economic Growth. *The Journal of Political Economy* (New York), vol. 98, No. 5, pp. s12-s37.

Bloom, D. e., D. Canning, and J. Sevilla (2002). *The Demographic Dividend: A New Perspective on the Economic Consequences of Population Change*. RAND.

Bongaarts, J. 1998. Fertility and Reproductive Preferences in Post-Transitional Societies. Working Paper No. 114. Population Council.

Borsch-Supan, A. (2001). Labor Market Effects of Population Ageing. Working Paper #8640, National Bureau of Economic Research.

Byun, W. S (2004). Marital Status. In *The Population of Korea*, D.S. Kim and C. S. Kim, eds. KNSO, Korea, pp. 143-160.

Choi, K. S. et al. (2003). The Economic Impact of Population Ageing and Needed Policy Initiatives(I). Korea Development Institute.

Cho, Nam-Hoon. (2000). Policy Responses to Population Ageing and Population Decline in Korea. Paper presented at the Expert Group Meeting on Population Ageing and Population Decline, organized by the Population Division, United Nations. New York, 16-18 October.

Coale, A. J. (1974). The Demographic Transition Reconsidered. Paper presented at the International Population Conference 1973. vol. 1, pp. 53-72. Liege, Belgium: IUSSP.

Cutler, D. M., J. M. Poterba, L. M. Sheiner, L. H. Summers (1990). An Ageing Society: Opportunity or Challenge? *Brookings Papers on Economic Activity*. ABI/INFORM Global.

Denton, F. T. and B. G. Spencer (2003). Population Change and Economic Growth: The Long-term Outlook. QSEP Research Report, No. 383. Hamilton: McMaster University.

Gee, E. M. (2000). *Population and Politics: Voodoo Demography, Population Ageing and Social Policy. In The Overselling of Population Ageing: Apocalyptic Demography, Intergenerational Challenges, and Social Policy*, E. M. Gee and G. M. Gutman, eds. Oxford: Oxford University Press, pp. 5-25.

Hahn, J. H., K. S. Choi, D. S. Kim, and K.M. Lim. (2002). Prospects for the Potential Growth Rate of Korean Economy: 2003-2012. Korea Development Institute. Seoul, Korea.

Higgins, M. (1998). Demography, National Savings and International Capital Flows. International Economic Review, Vol. 39, pp. 343-369.

Jacobs, K., M. Kohli and M. Rein (1991). The Evolution of Early Exit: A Comparative Analysis of Labor Force Participation Patterns. In Time for Retirement: Comparative Studies of Early Exit from the Labor Force, Martin Kohli and others, eds. Cambridge University Press.

Kim, Dae-Il. (2004). Population Ageing and Changes in Labour Productivity. In *Population Ageing and Macro-Economy in Korea*, Moon, H. P., D. S. Kim, and C. G. Park, eds. (in Korean) Korea Development Institute.

Kim, Dong-Suk. (2004). Population Ageing and Potential Growth Rate. In *Population Ageing and Macro-Economy in Korea*, Moon, H. P., D. S. Kim, and C. G. Park, eds. (in Korean) Korea Development Institute.

Kim, Doo-Sub. (2004). Population Growth and Transition. In *The Population of Korea*, D.S. Kim and C. S. Kim, eds. KNSO, Korea, pp. 1-32.

Jun, K. H. (2004). Fertility. In *The Population of Korea*, D.S. Kim and C. S. Kim, eds. KNSO, Korea, pp. 65-89.

Kim, T. H. (2004). Mortality. In *The Population of Korea*, D.S. Kim and C. S. Kim, eds. KNSO, Korea, pp. 90-120.

Kim, I. K. (2000). Policy Responses to Low Fertility and Population Aging in Korea. Paper presented at the Expert Group Meeting on Population Ageing and Population Decline, organized by the Population Division, United Nations. New York, 16-18 October.

KNSO (2005). Report on Population Projections Revised, 2000-2050. Korean National Statistics Office.

-------. (2003). Special Report on Trends in Marriage and Divorce since 1970. Korean National Statistics Office.

-------. (2001). Report on the Survey of Economically Active Population. Korean National Statistics Office.

-------. (2000). Report on the Survey of Economically Active Population. Korean National Statistics Office.

Kwon, T. H. (1997). The Fertility Transition in Korea: Its Processes and Implications. In *Toward An Interpretation of the Korean Fertility Transition*, T. H. Kwon and others, eds. (in Korean) Seoul: Il Shin Sa.

Lee, B. H. et al. (2005). Education and Labour Market in Korea. Korea Labour Institute.

Lee, H. H. (2002). An Essay on the Economic Impact of Population Ageing. In *Labour Policy Review*. Vol. 2 (No. 2). Korea Labor Institute.

Lee, J. W. (1997). Economic Growth and Human Development in the Republic of Korea, 1945-1992. Human Development Report, Occasional Paper 24, UNPD, UN.

Lee, R., A. Mason and T. Miller. (2000). Life-Cycle Savings and Demographic Transition: The Case of Taiwan. Population and Development Review, vol. 26(suppl), pp. 194-222.

Mason, A. (2001). *Population Change and Economic Development in East Asia: Challenges Met and Opportunities Seized*. (ed). Stanford, California: Stanford University Press.

Meltzer, D. (1992). Mortality Decline, the Demographic Transition, and Economic Growth. Ph. D. Dissertation, University of Chicago, Department of Economics.

Mirkin, B and M. B. Weinberger (2000). The Demography of Population Ageing. Paper presented at the Technical Meeting on Population Ageing and Living Arrangements of Older Persons: Critical Issues and Policy Responses, organized by the Population Division, United Nations. New York, 8-10 February.

MOHW(Ministry of Health and Welfare) (2004). White Paper on National Health and Welfare. Seoul, Korea. (in Korean) Government Publishing Office.

Moon, H. P. (2002). The Korean Pension System: Current State and Tasks Ahead. Paper presented at the OECD/INPRS/Korea Conference on Private Pensions in Asia. Oct. 24-25, in Seoul, Korea.

OECD (2002). *Older But Wiser: Achieving Better Labor Market Prospects For Older Workers in Korea*. Paris, OECD.

------- (2001). Economic Outlook: Ch. IV, Fiscal Implications of Ageing: Projections of Age-Related Spending. Paris, OECD.

------- (1998). *Maintaining Prosperity in an Ageing Society.* Paris, OECD.

Phang, H. N. (2004a). Rapid Ageing and Labor Force Changes in Korea. Paper presented at the International Seminar on Low Fertility and Rapid Ageing, organized by Korean National Statistics Office and Korean Association of Population

-------. (2004b). The Past and Future of Korean Pension System: A Proposal for Coordinated Development of the Public and Private Pensions. PIE Working Paper No. 196. Tokyo: IER, Hitotsubashi University.

Phang, H. N, D. G. Shin, D. H. Kim, and H. K. Shin (2004). *Population Ageing and Labor Market in Korea*. (in Korean) Korea Labor Institute.

Scarth, W. (2002). Population Ageing, Productivity and Living Standards. In *The Review of Economic Performance and Social Progress: Towards a Social Understanding of Productivity*, A. Sharpe, F. St-Hilaire, and K. Banting, eds. Montreal: IRPP, pp. 145-156.

Sleebos, J. (2003). Low Fertility Rates in OECD Countries: Facts and Policy Responses. OECD Social, Employment and Migration Working Papers, No. 15. Paris: OECD.

Tapinos, G (2000). The Role of Migration in Moderating the Effects of Population Ageing. OECD Document for the Working Party on Migration.

United Nations (2000). Replacement Migration: Is It a Solution to Declining and Ageing Populations? ESA/WP 160/Rev. 1. New York: United Nations.

-------. (2004*). World Population Prospects: The 2004 Revision*. Population Division, DESA. New York: United Nations.

Visco, I. (2001). Ageing Populations: Economic Issues and Policy Challenges. Paper presented at Economic Policy for Ageing Societies. Kiel Week Conference. OECD.

World Bank (1994). *Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth*. Oxford, Oxford University Press.

<Table 1> Cohort Completed Fertility Rates

Born in	1950	1955	1960	1965	1970	1975	1980	1985
Prime Childbirth Period (Age 25-40)	1975-1990	1980-1995	1985-2000	1990-2005	1995-2010	2000-2015	2005-2020	2010-2025
Completed TFR	2.87	2.27	2.08	1.98	1.70	1.49	1.39	1.32

Source: Korea National Statistics Office(KNSO)(2005). Special Report on Trends in Marriage and Divorce since 1970.

<Table 2> Trend in the Average Age at First Marriage for Korean Men and Women

	1972	1975	1981	1985	1990	1995	2000	2003	2004
Men	26.7	26.8	26.4	27.0	27.8	28.4	29.3	30.1	30.6
Women	22.6	22.8	23.2	24.1	24.8	25.4	26.5	27.3	27.5

Source: Korea National Statistics Office(KNSO)(2005). Special Report on Trends in Marriage and Divorce since 1970.

<Table 3> Changes in Population Size and Age Structure: Korea, 1950-2000

	Population	Population aged 15-64	Percentage 15-64	Population growth (*) (per cent)	Median age (*)	Dependency ratio
1950	18859	10429	55.0	2.55	19.1	81
1955	21422	12204	57.0	3.09	19.8	76
1960	25003	13698	54.8	2.64	19.2	83
1965	28530	15246	53.1	2.25	18.7	87
1970	31922	17540	54.4	2.00	19.0	83
1975	35281	20449	58.0	1.55	19.9	71
1980	38124	23717	62.2	1.36	21.8	61
1985	40806	26759	65.6	0.99	24.5	52
1990	42869	29701	69.3	0.97	26.9	45
1995	45007	31900	70.7	0.77	29.4	41
2000	46779	33702	71.7	0.44	32.0	39

Source: Korea National Statistics Office(KNSO), Statistical Database(KOSIS) at http://kosis.nso.go.kr and United Nations Population Division, World Population Database (Korea): The 2004 Revision at http://esa.un.org/unpp

<Table 4> Major Profile of the Baby-Boom Cohort through Demographic Transition and Economic Growth

Born in (Age 0)	Prime Childbearing (Age 20-40)	Prime Labour Force (Age 40)	Retiring and Old-aged (Age 65-)
1951-1960 (1955)	1971-2000 (1985)	1991-2000 (1995)	2016-2025 (2020)

- Baby Boom - Early Demographic Transition Started - High TFR	- Late Stage of Demographic Transition - TFR Stabilized Below Replacement - High Economic Growth	- Savings Rate Peaked - Job Insecurity for the Mid-to-Old Aged - Entering Ageing Society	- Mass Retirement - Entering the Aged Society - Crisis in Social Security

<Table 5> Major Indicators and Assumptions Adopted for Population Projections by KNSO and UNPD

		KNSO 2005	KNSO 2001	UN 2004	KNSO 1996
Total Population	2005	48,294	48,461	47,817	47,275
	2030	49,329	50,296	49,161	52,744
	2050	42,348	44,337	44,629	-
Aged Society (14 per cent)	Reaching in	-2018	-2019	-2017	-2022
Aged Society (20 per cent)	Reaching in	-2026	-2026	-2026	-2032
Total Fertility Rate (medium variant)	2005	1.19	1.37	1.21	1.71
	2030	1.28	1.4	1.56	1.8
	2050	1.3	1.4	1.77	
Life Expectancy	2005 (M, F)	(74.8, 81.5)	(74.4, 81.2)	(74.0, 81.0)	(72.3, 79.7)
	2030 (M. F)	(79.2, 85.2)	(78.4, 84.8)	(78.4, 86.4)	(75.4, 82.5)
	2050 (M. F)	(80.7, 86.6)	(80.0, 86.2)	(80.8, 88.5)	
Migration (in 1000)		Average 2000-2003 (-19 -> -6)	Average 1995-2000 (-21 -> -8)	Average 2000-2003 (-16 -> -6)	Average 1990-1995 -30

Source: Korea National Statistics Office(KNSO), Statistical Database(KOSIS) at http://kosis.nso.go.kr and United Nations Population Division, World Population Database (Korea): The 2004 Revision at http://esa.un.org/unpp

<Table 6> Japan and Korea: Past and Future of Total Fertility Rate and annual rate of Population Growth

	Population Growth (Japan)	TFR (Japan)	Population Growth (Korea)	TFR (Korea)
1950-55(J), 1975-80(K)	1.43	2.75	1.55	2.92
1955-60(J), 1980-85(K)	0.93	2.08	1.36	2.23
1960-65(J), 1985-90(K)	0.99	2.02	0.99	1.60
1965-70(J), 1990-95(K)	1.07	2.00	0.97	1.70
1970-75(J), 1995-00(K)	1.33	2.07	0.77	1.51
1975-80(J), 2000-05(K)	0.93	1.81	0.44	1.23

1980-85(J), 2005-10(K)	0.68	1.76	0.31	1.21
1985-90(J), 2010-15(K)	0.44	1.66	0.22	1.28
1990-95(J), 2015-20(K)	0.31	1.49	0.12	1.35
1995-00(J), 2020-25(K)	0.25	1.39	0.03	1.42

Source: United Natiions Population Division, World Population Database (Korea, Japan): The 2004 Revision at http://esa.un.org/unpp

<Table 7> Transitions from Aging to Aged Society: Experiences of Advanced Countries and Korean Projections

Country	Reached			Took	
	7 per cent	14 per cent	20 per cent	7 per cent →14 per cent	14 per cent →20 per cent
Korea	2000	2019	2026	19	7
Japan	1970	1994	2006	24	12
France	1864	1979	2020	115	41
Germany	1932	1972	2012	40	40
U.K.	1929	1976	2021	47	45
Italy	1927	1988	2007	61	19
Spain	1942	2013	2028	71	15

Source: Korea National Statistics Office(KNSO) (2001). News Release on Population Projections, 2001.

<Table 8> Trend in Dependency Ratio and Population Median Age in Korea: 1970-2050

Dependency Ratio	1970	1980	1990	2000	2010	2020	2030	2040	2050
Total (per cent)	83.8	60.7	44.3	39.5	38.8	40.9	54.9	71.2	81.6
Youth	78.2	54.6	36.9	29.4	23.9	19.6	19.1	19.6	19.0
Old-Age	5.7	6.1	7.4	10.1	14.8	21.3	35.7	51.6	62.5
Median Age	18.5	21.8	27.0	31.8	37.5	42.8	47.7	50.9	53.8

Source: Korea National Statistics Office(KNSO) (2001). News Release on Population Projections, 2001.
Note: Youth Dependency Ratio = Population Aged (0-14) / Aged (15-64); Old-Age Dependency Ratio = Population Aged (65+)/Aged (15-64).

<Table 9> Labour Force Participation Rates by Age and Gender, 2000: International Comparison

	Male		Female		Total	
	25-49	50-64	25-49	50-64	25-49	50-64
Korea	92.4	78.0	58.2	50.7	75.5	64.3
Japan	97.2	89.1	66.1	56.8	81.8	72.6
EU	94.0	66.1	73.9	42.3	84.0	54.0
US	92.4	75.6	77.3	61.0	84.7	68.0
OECD [b]	93.7	72.8	69.0	48.4	81.3	60.3

Source : OECD, Statistics Portal, Labour Statistics (Each Country) at http://www.oecd.org/statsportal

<Table 10> Growth Rate of the Labour Force Projected: Korea, 2000-2050

	TFR=1.00	TFR=1.19	TFR=1.40	TFR=1.60	TFR=1.80	TFR=2.10
2000 ~ 2010						
2010 ~ 2020	0.97	0.97	0.97	0.97	0.97	0.97
2020 ~ 2030	0.45	0.45	0.45	0.45	0.45	0.45
2030 ~ 2040	-0.62	-0.60	-0.59	-0.59	-0.58	-0.56
2040 ~ 2050	-1.38	-1.30	-1.23	-1.19	-1.13	-1.03
	-1.81	-1.64	-1.45	-1.33	-1.19	-0.95

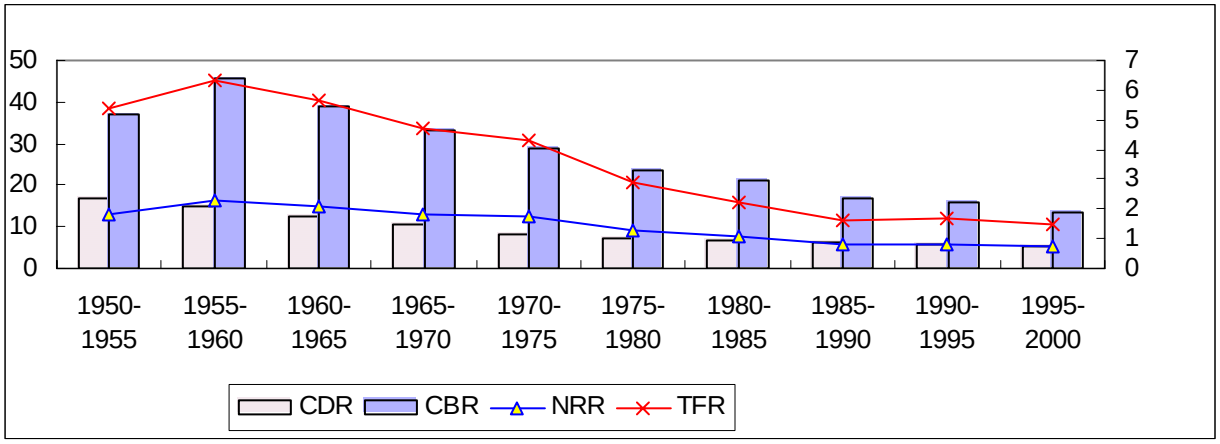
Source: Kim, Dong-Suk (2004), Table 2-7

<Table 11> Economic Growth Rate Projected for 2000-2050, Korea

Period	Growth Rate	Contribution by Growth Factor			
		Work Force	Human Capital	Capital Stock	TFP
2000-2010	5.10	0.66	0.79	1.66	2.0
2010-2020	4.81	0.31	0.62	1.90	2.0
2020-2030	3.52	-0.41	0.51	1.43	2.0
2030-2040	2.24	-0.85	0.32	0.79	2.0
2040-2050	1.48	-1.00	0.10	0.40	2.0

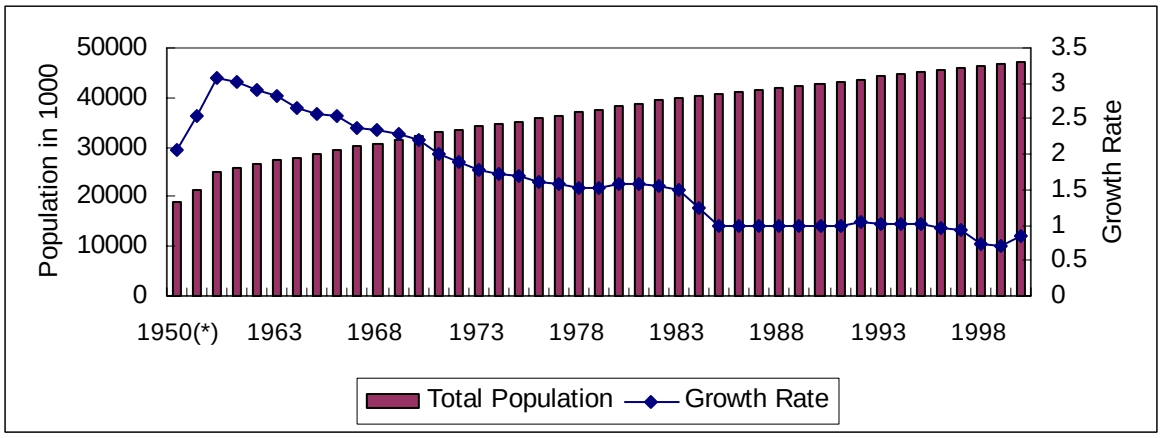
Source: Kim, Dong-Suk(2004), Table 2-12
Note: Economic Growth is measured by real GDP growth

<Figure I> Crude Death, Crude Birth, Net Reproduction , and Total Fertility Rates: Korea, 1950-2000



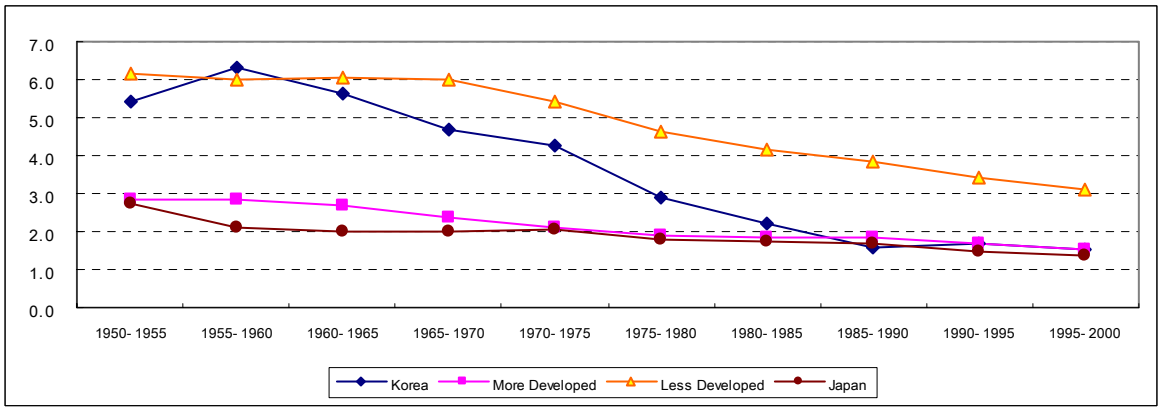
United Nations Population Division, World Population Database (Korea): The 2004 Revision at http://esa.un.org/unpp

<Figure II> Trend in Total Population and Population Growth Rate



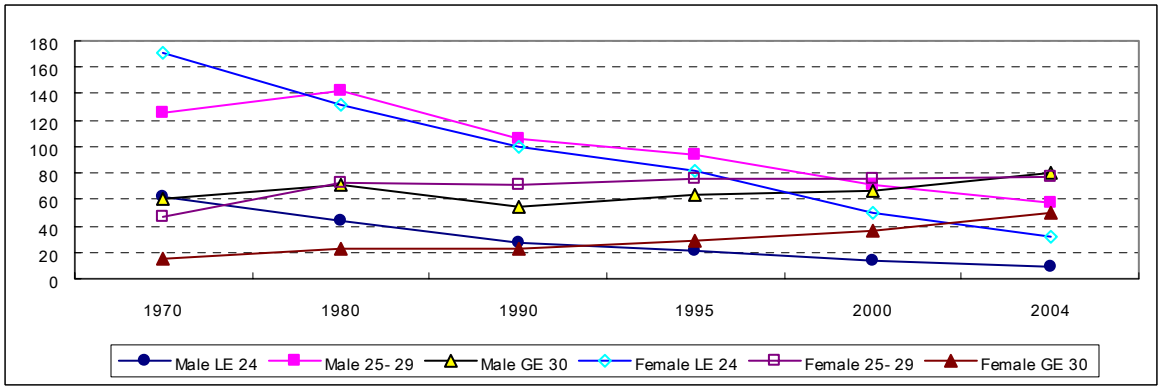
Source: Korea National Statistics Office(KNSO), Statistical Database(KOSIS) at http://kosis.nso.go.kr and United Nations Population Division, World Population Database (Korea): The 2004 Revision at http://esa.un.org/unpp for 1950(*) and 1960(*). *Note*: 1950(*) = 1950-1955; 1955(*) = 1955-1960.

<Figure III> Trend in Total Fertility Rate: Korea in International Comparison



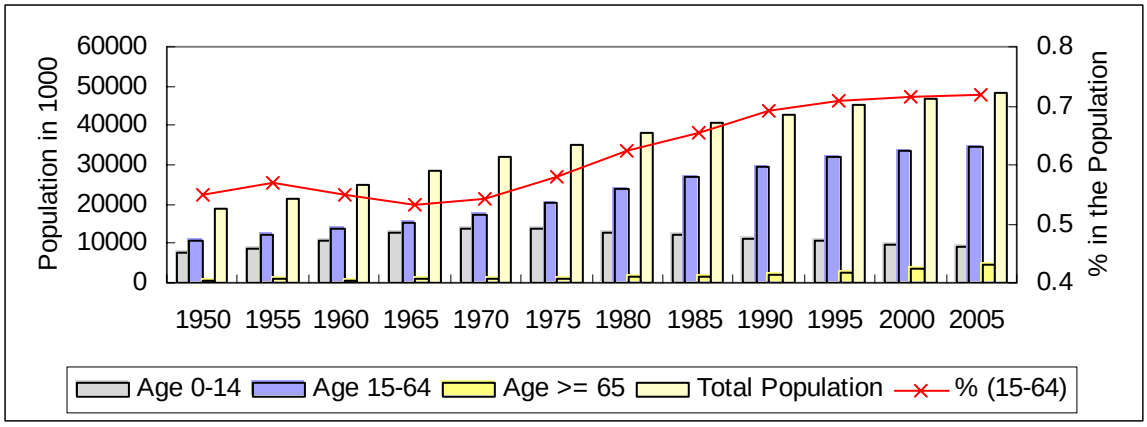
Source: United Nations Population Division, World Population Database (Korea): The 2004 Revision at http://esa.un.org/unpp

<Figure IV> Trend in Age-specific Marriage Rates: Korea, 1970-2004



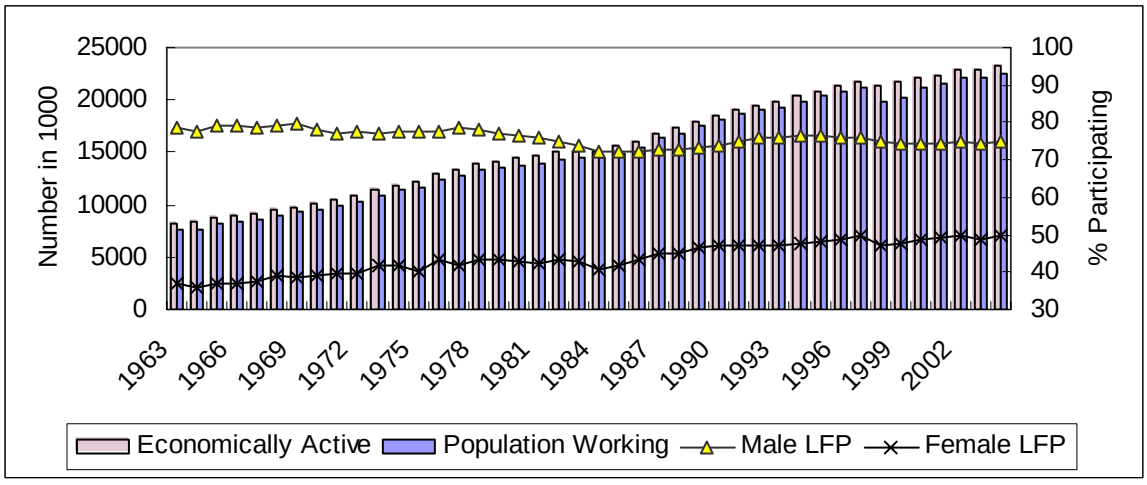
Source: Korea National Statistics Office(KNSO)(2005). Special Report on Trends in Marriage and Divorce since 1970.

<Figure V> Trend in Population Size by 3 Major Age-groups: Korea, 1950-2005



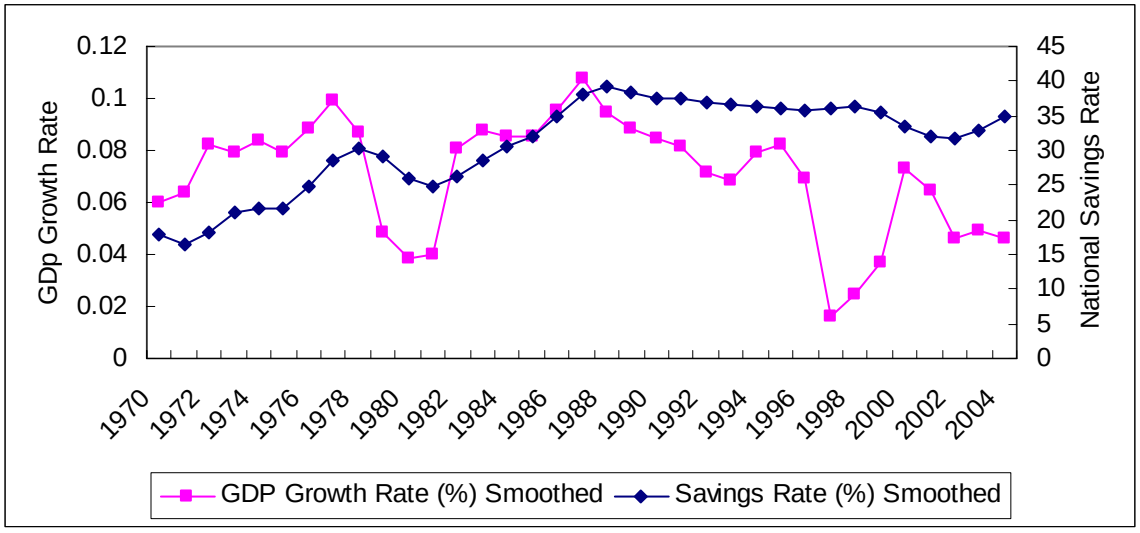
Source: Korea National Statistics Office(KNSO), Statistical Database(KOSIS) at http://kosis.nso.go.kr and United Nations Population Division, World Population Database (Korea): The 2004 Revision at http://esa.un.org/unpp for 1950 and 1955

<Figure VI> Trend in Population Economically Active, Working, and Male-Female Participation Rates



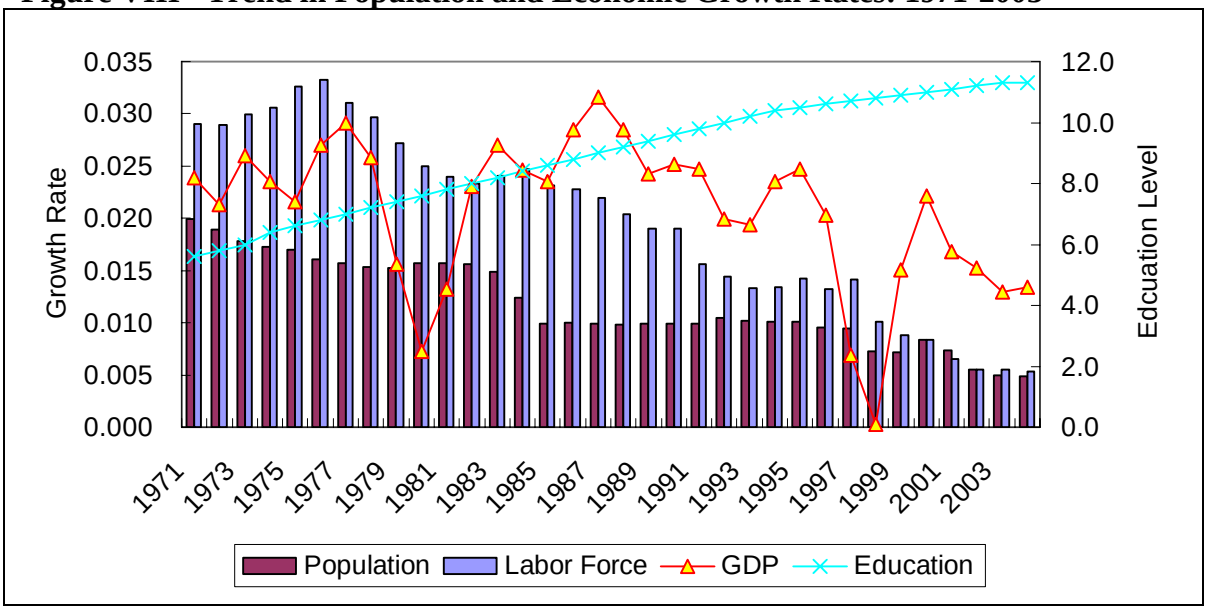
Source: Korea National Statistics Office(KNSO), Statistical Database(KOSIS) at http://kosis.nso.go.kr

<Figure VII> Trends in National Savings Rate and GDP Growth Rate



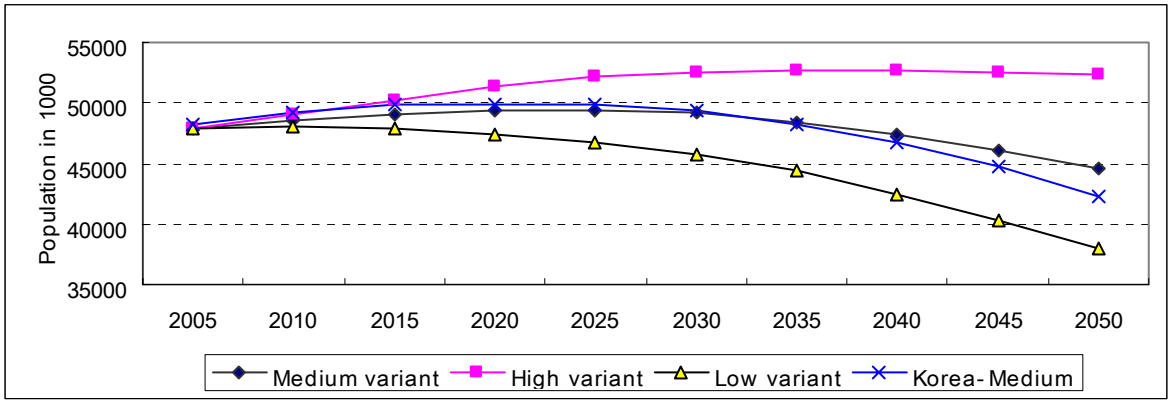
Source: Korea National Statistics Office(KNSO), Statistical Database(KOSIS) at http://kosis.nso.go.kr

<Figure VIII> Trend in Population and Economic Growth Rates: 1971-2003



Source: Korea National Statistics Office(KNSO), Statistical Database(KOSIS) at http://kosis.nso.go.kr

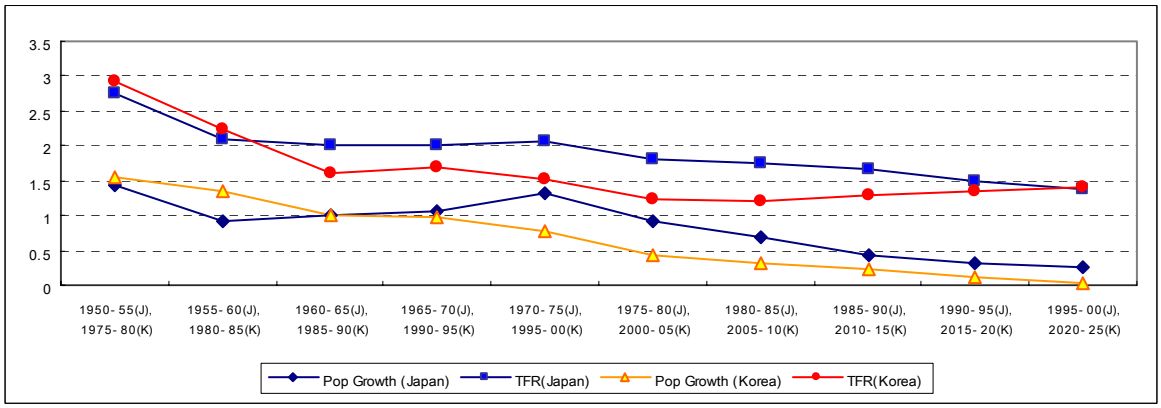
<Figure IX> Korean Population Projected by United Nations (All Variants) and by KNSO: 2000-2050



Source: Korea National Statistics Office(KNSO), Statistical Database(KOSIS) at http://kosis.nso.go.kr and United Nations Population Division, World Population Database (Korea): The 2004 Revision at http://esa.un.org/unpp

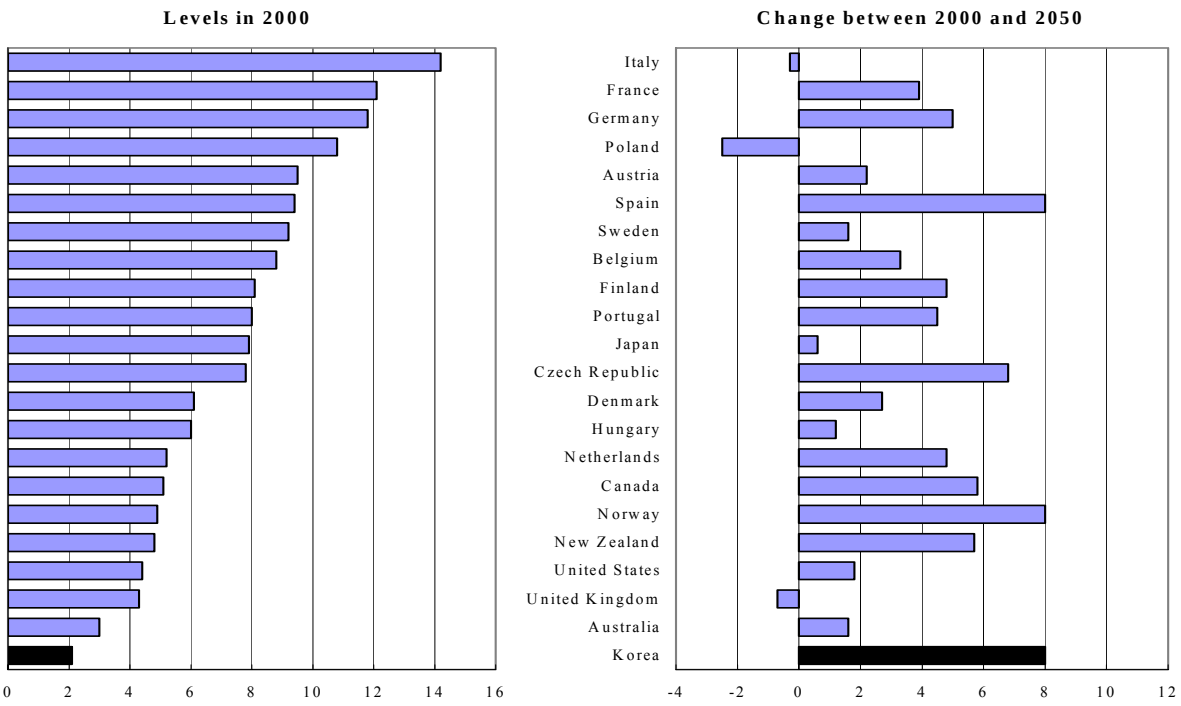
Note: UNPD rates are for preceding 5 years: 2005 = 2000-2005, 2010=2005-2010,

<Figure X> Korea and Japan in a Time-Lag Framework: Trend in TFR and Population Growth Rates



Source: United Nations Population Division, World Population Database (Korea, Japan): The 2004 Revision at http://esa.un.org/unpp

<Figure XII> Public Old-Age Pension Expenditures in OECD Countries, 2000-2050



Source: OECD (2001)
Note: Levels as a percentage of GDP, changes in percentage points.

Appendix I: Population Pyramid of Korea: Dramatic Changes through Decades