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JAPAN

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ABSTRACT

Japan has entered a phase of population declining with a rapid pace of aging. Over the period between 2005 and 2050, total population will decline 26 percent and the share of those aged 65 and older will rise to 39.6 percent from 20.2 percent. These demographic pressures will likely reduce growth potential mainly through a reduction in labor force and a decline in the domestic savings rate. The overall impact of these two factors on real GDP growth is expected to lower the underling growth rate to around 0.6 percent over the next 25 years from the 2.4 percent pace over the past 25 years with other things equal. Policy measures to enhance labor force participation and accelerate productivity growth will be required to mitigate expected demographic pressures and ensure modest economic growth.

1. INTRODUCTION

Japan's population has started to decline: it was 127.8 million in 2005, down 19,000 from the previous year for the first time since the end of World War II. With no significant pickup in fertility projected in the foreseeable future, Japan's population will shrink to 95 million in 2050 and the ratio of people aged 65 and older will rise to 39.6 percent from 20.2 percent in 2005. In 2100, total population is projected to fall to around 60 million, only half of the current size. Since World War II, none of the leading world economies has faced a continually declining population caused by lowering fertility and aging population. Japan should be the first advanced country to have a society with a declining population.

These demographic pressures put serious challenges to economic policies in Japan. The declining population should depress growth potential through slowing growth of labor force and a reduction of the household savings rate. Population aging will place a heavier burden on future generations and dampen growth of per capita disposable income. In fact, the Japanese government has started to seriously consider policy measures such as increasing childcare allowances and other public support to childcare so as to enhance fertility. However, it remains unclear how effective these policies would be and it is almost impossible to turn population growth positive. In terms of long-term economic prospects, therefore, key policy agenda are how to raise labor participation, especially of women and the elderly, and improve productivity of the overall economy, both of which can likely mitigate the negative impact of declining fertility and aging population on growth potential.

This article has three purposes, which are expected to help assess demographic pressures and address policy issues in Japan. First, we review the country's long-term demographic trends, including population growth, fertility, age structure and life expectancy, over the period of 1950 to 2050 (Section 2). Second, we overview the relationship between demographic trends and macroeconomic performance, which has been observed over the past decades (Section 3). Third, we roughly explore the impact of demographic pressures on growth potential over the next decades and present policy issues to be discussed. Especially, we survey the current policy discussions about raising labor force participation and improving productivity, and investigate the extent to which these policy measures can affect growth

potential (Section 4). Section 5 provides concluding remarks.

2. DEMOGRAPHIC TRENDS: PAST AND FUTURE

2.1 PAST

This section depicts a rough picture of demographic trends in Japan—such as total population, age structure, fertility, births and deaths, and life expectancy—in the past and future. Total population has been growing 0.8 percent per annum on average over the period of 1950 to 2005, and now stands at 127.8 million (Figure 1). At the same time, Japan has faced a rapid pace of population aging during the past decades: the share of people aged 65 and older has been rising to 20.2 percent in 2005 from 4.9 percent in 1950 (9.1 percent in 1980) and the average age over the total population is 43.1 in 2005, compared to 26.6 in 1950 (33.9 in 1980).

The driving determinants of population growth are fertility and life expectancy. Japan shifted to a phase of few-births-and-few-deaths from that of many-births-and-few-deaths in the 1950s. The total fertility rate (TFR), which is the average number of children a women bears in her life, dropped sharply in the 1950s: from 4.32 in 1949 to 2.00 in 1960 (Figure 2). At the same time, the number of deaths declined substantially over the same period, as the effect of Word War II faded and medical and nutritious conditions improved. At the same time, life expectancy has been rising from 59.6 and 63.0 in 1950 to 78.1 and 85.2 in 2005 for males and females, respectively, reflecting various factors including improved public health, medicine and nutrition.

The demographic fluctuations on a flow basis during the postwar period have been largely determined by the (first) baby-boomers, who were born during 1947 and 1949. Their initial size was about 8 million and they have been sharing 5-6 percent of total population. They entered the labor market in the 1960s and early 1970s, establishing the core group of labor force during the period of rapid economic growth. Moreover, as pointed out by Yoshikawa (1995), their residential movement to urban areas from rural areas stimulated demand for consumer durables, which led to rapid economic growth. Their children, most of whom were born in the early and mid-1970s and called the second baby-boomers, made the second population hump in the postwar period.

Under these demographic trends, Japan enjoyed a so-called "demographic dividend" during the 1960s and 1970s. As Japan shifted quickly to smaller families shortly after World War II, the number of young dependents—those who need nurturing and educating—declined sharply relative to the number of working adults. Also, the share of the elderly remained at a low level, making the cots of social security to the elderly relatively small. In this situation, household savings climbed, investment rose, worker productivity increased, and economic growth accelerated. Indeed, the share of working population (aged 15 to 64) smoothly climbed from 59.7 percent in 1950 to 69.0 percent in 1970, making it easy for working generations to absorb increasing costs of public services. Actually, generous social security programs, which are now challenged by demographic pressures, were smoothly introduced and widespread during the 1960s and 1970s. Most of all, medical care costs became free for the elderly and the price indexation of pension benefits were introduced in the 1970s, when Japan faced high inflation in the wake of the first oil

shock.

However, it has been widely recognized that declining and aging population will put serious pressures to the Japanese economy. Most of all, TFR has been declining steadily to 1.25 in 2005. There seem to be various factors that have reduced fertility, including higher opportunity costs of childbearing due to women's higher educational background and more labor market participation. It has been often criticized that public support—both in-cash and in-kind types—to married couples for childcare are not sufficient in Japan. It is true, but we should also remember that the average number of children born from the married couples who have lived together for 15-19 years has stayed virtually unchanged slightly above 2.2 since the 1970s. As is often the case of other Asian countries, the trend away from marriage among the young seems to be a primary reason that accounted for declining fertility. This makes it difficult for policymakers to turn the downtrend of fertility around. To be sure, the number of new born babies appears to have been stabilizing in 2005. It is, however, premature to conclude that trend in fertility is starting to turn around, because fundamentals surrounding marriage and childcare have not significantly improved so far.

Along with declining fertility, labor force growth decelerated and it turned negative in the mid-1990s, when most of the second baby-boomers finished entering labor force. It means that the Japanese economy has lost one of major contributors to economic growth. Accordingly, the country can no longer enjoy any benefit from the demographic bonus, as the share of working population started declining at around 1990, when the country experienced the burst of the "bubble" economy.

At the same time, the rise in the share of people aged 65 and older has accelerated during the past two decades. Combined with the long-term recession, it has raised concerns about not only growth potential but also sustainability of social security systems, which depend much on income transfer from the currently working and future generations. Indeed, the government has launched a series of major social security reforms in recent years, including an increase in eligibility ages for public pension benefits, more health care costs, and an introduction of the long-term nursing care insurance.

2.2 FUTURE

Population declining and aging will most likely continue to put pressure on the economy over the next few decades. In 2006, the National Institute of Population and Social Security (NIPSSR) updated its population projections. The Institute now assumes that the TFR will keep falling to 1.21 in 2013 from 1.26 in 2005 and recover to mere 1.26 by 2050 in their baseline (medium variant) projection. Based on this projection, the total population is expected to decline to 115 million in 2030 and 95 million in 2050 from 127.8 million in 2005. And the pace of population declining will gradually accelerate to an annualized one percent pace or more after 2040. The projected total population size in 2050 is almost the same as that in the early 1960s, but the age structure is quite different due to population aging. The share of those aged 65 and older will substantially rise to 39.6 percent in 2050 from 20.2 percent in 2005, and the average age will rise to 53.8 from 43.1 over the same period. This pace of aging is higher than any other country all over the world.

However, some observers suspect that even the baseline population projections are too optimistic. Actually, the NIPSSR released two variants of population projections in addition to the baseline one. The low variant projection, which might be more plausible and assumes that the TFR will stay as low as 1.06 in 2050, expects the total population to decline to 89 trillion in 2050. The pace of population aging will be much faster than in the medium variant projection, with the share of those aged 65 and older expected to climb to 41.8 percent in 2050. Even the high variant projection assumes the TFR to recover to only 1.55 by 2050 and expects the total population to decline to 102 trillion and the share of the elderly to 36.9 percent. The demographic structure has changed from its past pyramid shape to its current bell shape, and will change again in the future to a mortar shape that is close to an inverted pyramid.

3. DEMOGRAPHIC TRENDS AND ECONOMIC PERFORMANCE

3.1 BASIC IDEA

This section overviews the relationship between demographic changes and macroeconomic performance over the past fifty years and roughly explores the impact of population aging on growth prospects. Neo-classical growth theory provides us with a useful framework for addressing these issues. According to this theory, economic growth is determined by three key factors; increases of labor force and capital stock and productivity advancement. In the simplest framework that assumes constant returns to scale, economic growth can be decomposed as

$$\frac{\Delta Y}{Y} = \alpha \frac{\Delta L}{L} + (1-\alpha)\frac{\Delta K}{K} + \eta, \qquad (1)$$

where Y, L, K are real GDP, labor, and capital stock, α is the share of labor, and η is growth of total factor productivity (TFP). TFP reflects labor productivity, technology, and broadly-defined efficiency of the overall economy. This "growth accounting" is a conventional and useful tool to review economic growth in the past and project it in the future.

This theory suggests that population aging will affect economic growth through two major routes. First, population aging, combined with a reduction in total population size, will lower growth of labor force. Second, population aging is expected to reduce the pace of capital accumulation, mainly because an increasing share of the elderly, who tends to dissave or save less than the young, will likely lower the household savings rate at a macroeconomic level. In what follows, we first decompose economic growth over the past few decades into three factors, labor, capital, and productivity in order to assess the relative importance of each input. Second, we discuss the past and future trend of each input and assess its potential impact on growth potential.

3.2 GROWTH ACCOUNTING

Labor force population peaked at 67.9 million in 1993 after growing at a pace slightly more than 1 percent on average since the 1950s, and since then it has been declining to date. The economy now faces a negative contribution from labor force growth. However, it is important to quantitatively gauge its impact on growth potential, because population growth has not been widely viewed as a major source

that determined the growth trend in postwar Japan. In fact, there is no clear correlation observed between labor force growth and real GDP growth, as far as year-on-year fluctuations are concerned.

There have been various preceding empirical studies about Japan's economic growth based on the growth accounting framework, including white papers and official reports published by government ministries. The most recent example is the analysis in the *White Paper on Trade and Industry* released by the Ministry of Economy, Trade, and Industry (METI) in 2005. Figure 3 is an updated version of the *White Paper*'s analysis based on the latest data.

This figure confirms that the importance of labor force input has been relatively small, compared to other two inputs. It is true that labor force increased rapidly during the 1960s, when the first baby-boomers were entering labor force. Labor force growth, however, contributed only 1.4-1.6 percent points to above-10 percent economic growth over the period, while capital accumulation and TFP growth played much more important roles. Since the 1990s, labor input has made a negative contribution—which was amplified by a reduction in hours worked under the new labor law—to economic growth. Even in this period, however, contributions from capital stock and TFP played much more important roles in driving overall economic growth.

These facts suggest that even if the labor force decreases, economic growth can be possible in the future through capital accumulation and productivity advancement, which can likely more than offset any negative contribution from shrinking labor force. While we cannot completely avoid demographic pressures on capital accumulation as discussed above, we can sustain economic growth by increasing TFP through efficiency improvement of the economy and intellectual asset utilization.

Finally, it should be noted that per capita GDP might be a better proxy of each individual's economic welfare than overall GDP, as declining population adds to per capita GDP due to wealth accumulation or wealth deepening. Higher levels of wealth support higher living standards later on when the proportion of middle-aged workers begins to fall. The result is higher living standards in the long run than would have been possible without consumption smoothing. Mason and Lee (2004) describe this as the "second demographic dividend."

Per-capita GDP growth is derived by subtracting growth of labor force from both the left and right hand sides of equation (1):

$$\frac{\Delta y}{y} = -(1-\alpha)\frac{\Delta L}{L} + (1-\alpha)\frac{\Delta K}{K} + \eta, \qquad (2)$$

where y is per capita GDP. Hence, the impact of declining labor force on economic welfare could be smaller than widely imagined. Indeed, recent official documents published by government ministries which discuss the long-term economic and fiscal strategies tend to project growth of per capita GDP as well as that of overall GDP.

3.3 SAVINGS

It is a well-established view that high savings rate and its uptrend has been a driving force of rapid economic growth in Japan. A high savings rate can lead to a capital-intensive economy where people can enjoy high income per capita, and a rise in the savings rate will accelerate economic growth because capital accumulates at a faster pace than the overall economy. There are many empirical studies, including Horioka (1990) and Hayashi (1997), that investigate why the savings rates were so high in Japan. An open question is whether Japan can sustain the high savings rate in the future.

The relationship between savings and long-term economic growth should be discussed in many aspects. Most broadly, it is of interest to examine whether overall domestic investment (corporate, housing, and public investment) has been financed by overall domestic savings (household, corporate, and government savings). If the economy can make easy assess to global financial market, a reduction in domestic saving would not be severe constraint to domestic investment.

Figure 4 compares domestic savings and investment on a gross basis (including depreciation) during the postwar period. It highlights the fact that domestic investment has been determined largely by domestic savings, about in line with what is implied by so-called the "Feldstein-Horioka" puzzle. Domestic savings will most likely continue to be a key determinant of domestic investment in coming decades. Indeed, notwithstanding the complexities of interpreting t he Feldstein-Horioka puzzle, there is abundant independent evidence that national capital markets are still far from being fully integrated. This phenomenon is often called "home basis" in the patterns of asset holding and liability issuance. Limited dependence of government bonds on foreign investors and a quite low level of FDI inflow are good examples that explain this bias in the case of Japan.

More relevant to growth potential is the relationship between private savings (household and corporate savings) and corporate investment, which tends to determine long-term economic growth more directly than overall domestic investment (which includes residential and public investment as well as corporate investment). As shown in Figure 5, there has been *no* downtrend in private savings and a fall in private investment since 1990 looks cyclical rather than secular, compared to a clear downtrend in both overall domestic savings and investment depicted in Figure 7. Behind this development, there has been a substantial drop in government savings (due to a reduction in tax revenues during a stagnant economy) and a reduction in public spending (due to the government's fiscal consolidation policy). We also notice that private savings and corporate investment rates have been moving in a roughly parallel way, although the former has been always higher than the latter (indicating no need to rely on foreign capital) and the gap between the two has tended to be cyclically narrowed during economic expansions.

It is somewhat surprising to see that overall private savings rate has been almost flat since the mid 1970s. It is true that the household savings rate has been on a gradual but steady downtrend since the 1970s, at least partly reflecting demographic changes as discussed later. The corporate savings rate, by contrast, has been steadily rising at the same time and mostly offsetting a fall in the household savings rate. These offsetting movements of household and corporate savings are

more or less observed among many OECD countries. The "piercing of the corporate veil" hypothesis argues that households own corporates and adjust their savings plan to offset the savings by corporates on their behalf.[1] Japanese households appear to have been almost completely piercing the corporate veil, making the total private savings rate almost flat since the 1970s.

Although the one-way causality from corporate savings to household savings is not plausible, it is of interest to know why corporate savings have been increasing so remarkably. IMF (2006) points out that one factor behind the increase in corporate savings in industrialized countries since 2000 has been the strong rise in profitability, rather than a reaction to the excess debt and physical capital that was accumulated in the late 1980s. In Japan, corporate savings started to rise as early as in the 1970s, suggesting that more structural and longer-term factors—along with deregulation in financial markets and rapid development of direct finance via stock market—have been driving corporate savings.

Then, how should we expect future trends of private savings and corporate investment? It is most likely that population aging will reduce the household savings rate as implied by a life-cycle hypothesis. Population increases a share of households that dissave or save less than the young ones, presumably causing a reduction in overall household savings. To be sure, there has been a debate about the extent to which the life-cycle hypothesis holds for Japanese households. Some researchers emphasize strong bequest motives—whether altruistic, strategic, or consumption— in the household savings, implying limited applicability of the life-cycle hypothesis. However, there now seems to be a consensus among researchers that the life-cycle hypothesis holds quite well in Japan, based on detailed analysis of various household data.

Figure 6 shows the savings rate by age of the household head in the Family Income and Expenditure Survey. In recent years (1990 and 2005 in this figure), those in their 30s have the highest savings rate and that as people grow older the savings rate gradually declines and then rapidly declines when people aged 60 or above. Two things should be noted here.

First, the savings rate has risen in younger ages and fallen in older ages over the past twenty-five years, implying that there is a cohort effect in the savings rate. Hence, we cannot rule out the possibility that younger and future cohorts will save more in the future than the previous cohorts, making a reduction in the savings rate more limited than observed in the past. Indeed, several household surveys show an increase in precautionary savings among the young especially since the mid 1980s, when the government started major pension reforms that aimed to reduce pension benefits as well as gradually raise the eligibility age for pension benefits. Second, Figure 9 does not cover the non-working elderly, most of whom are pensioners and *dis*save 15 percent and 20 percent of income in recent years. An increase in the share of these households will likely reduce overall household savings.

Those two things make it difficult to precisely forecast future GDP-base savings rate based on information available from the Family Income and Expenditure Survey. To make matters worse, both the trends and levels of the household savings rate have been inconsistent between national accounts and the Survey, as stressed

[1] For the United States, Poterba (1987) finds that a $1 increase in corporate savings is likely to increase total private savings by only about $0.25-0.50, as households reduce their savings by $0.50-0.75.

by many researchers.[2]

Instead of sticking to household data from the Survey, we tentatively focus on a rough relationship between the GDP-base household savings rate and the ratio of those aged 65 and over in total population observed over the past three decades: as a rule of thumb, a 1 percent point increase in the latter roughly corresponds to a 1 percent point decrease in the former (with the adjusted determinant coefficient being 88.6 percent in a simple regression model). We suppose that this stable correlation will be sustained over the next decades in assessing future growth potential in the next section. Based on this tentative extrapolation, the household savings rate is projected to fall to around -5 percent in 2030.[3]

It is more difficult to forecast the future trend of corporate savings. As shown in Figure 6, corporate savings have been largely offsetting a downtrend of household savings, making the overall savings rate virtually flat over the past three decades. IMF (2006) argues that high corporate *excess* savings is unlikely to continue going forward, because with the degree of excess capacity in the G7 countries narrowing, companies are likely to begin investing more in plant and equipment, while some of the factors that have driven recent strong corporate profits are likely to wane. However, we have little information to precisely predict the future trend of (gross) corporate savings, which makes prospects of the pace of capital accumulation quite uncertain. Still, it seems reasonable to expect corporate savings to continue at least partly offsetting a reduction in household savings.

4. PROSPECTS AND CHALLENGES

4.1 THE IMPACT OF POPULATION DECLINING AND AGING IN THE FUTURE

This section explores the impact of demographic pressures on growth potential over the next twenty-five years. We roughly assess the potential impact of population aging, considering the past relationship between demographic factors and macroeconomic performance. Based on the framework of growth accounting, we consider the three key factors—labor, capital, and productivity—respectively and then add them up.

We first examine the negative impact of declining labor force on economic growth. The medium population projections expect total population to decline 0.3 percent per annum over the period until 2030. The simplest projection of labor force is to extrapolate it assuming that the current pattern of labor participation rates remain unchanged. Figure 7 illustrates the age patterns of labor participation in 2005 for males and females. For males, labor participation drops sharply after age 60, which is the normal retirement age for employed workers, although about 70 percent of those aged 60-64 remain in the labor market. For females, labor participation rates are generally lower than for males and, more importantly, there is an M-shaped curve, which indicates that women tend to leave labor force due to marriage and childcare (before returning to workforce as part-time rather than full-time workers in most cases).

[2] Iwamoto, Ozaki, and Maekawa (1995a) (1995b) present a comprehensive analysis on the discrepancy of the household savings rates between national accounts and the Family Income and Expenditure Survey. They find that about 40 percent of the discrepancy is account for by conceptual differences in some items between the two statistics and that at most 20 percent-plus is due to the fact that the household savings in the Survey rate are only for employed workers' households. They also emphasize a narrower coverage of household consumption in the Survey and show that its downtrend is as one of key factors for a widening gap in the trends of the household savings rates since the 1980s.

[3] The reduction in the household savings rate might be overestimated in this extrapolation, because the recent sharp in the household savings rate appears to have reflected a fall in household disposable income during the long-term recession after the "bubble" economy.

Assuming that these age and gender patterns of labor participation rates remained the same as the current ones, and combining them with projected population by each age group, we can get a rough picture of future trends of labor force. By this simple calculation, total labor force is projected to decline to 54.1 million in 2030 from 66.5 million 2005, which means a 0.8 percent reduction per annum. Also, assuming that labor income shares about 70 percent in total national income, this projection means that a reduction ion labor force by itself will subtract about 0.6 percent point from real GDP growth over the next few decades.

The same kind of projection could be applied to the savings rate, but we rely on the other method which is mentioned above and looks more plausible than that based on the household survey. We assume that a 1 percent point increase in the share of those aged 65 and above will continue to reduce the GDP-base household savings rate by 1 percent point. Still, it is uncertain how the corporate savings will react to a change in household savings. As mentioned above, corporate savings have been largely offsetting a downtrend of household savings, making the overall savings rate virtually flat over the past three decades. Hence, assuming no response from the corporate sector sounds unreasonable, whereas assuming a fully offsetting increase in corporate savings also sounds unreasonable. Therefore, we tentatively assume that half of a projected reduction in the household savings rate will be offset by corporate savings in a benchmark case.

The third factor that determines growth potential is TFP growth, which it is almost impossible to project. We instead tentatively assume that it will be 0.9 percent per annum, the average pace over the past twenty-five years. Some researchers point to the possibility that lower labor force growth can enhance labor productivity by promoting labor-saving productivity based on cross-country evidence, but the past experience in Japan does not tell anything clear.

Then, based on the above-mentioned assumptions about the three production factors, GDP growth is calculated by the dynamic equation system:

$$\frac{\Delta Y}{Y} = \alpha \frac{\Delta L}{L} + (1-\alpha)\frac{\Delta K}{K} + \eta, \qquad \frac{\Delta K}{K} = s\frac{Y}{K} - \delta \tag{3}$$

where s is the corporate investment rate and δ is the depreciation rate. The depreciation rate is set to be equal to 4.1 percent, the average over the period between 1980 and 2005. The results of the benchmark simulation are summarized and compared to the performance over the past twenty-five years in Table 1.

This table confirms the negative impact of population aging and shrinking on growth potential. Labor force will reduce economic growth by 0.6 percent point per annum and a contribution from capital accumulation will decline to 0.2 percent point from the previous 1.4 percent pace. As a result, overall economic growth will decline to as low as 0.6 percent per annum over the next twenty-five years, much lower than a 2.4 percent pace observed over the past twenty-five years. We also estimate economic growth assuming no change in the savings rate and labor supply from the current levels, to obtain 1.5 percent average growth. It implies that the overall impact of population aging and shrinking on growth potential will be just

below 1 percent per annum. In terms of per capita GDP, our benchmark projection shows 0.9 percent growth over the estimation period, less than half of the previous 2.0 percent pace.

This type of projection has been conducted by the Bank of Japan and the government as well, based on somewhat different assumptions. For example, Kozu *et al.* (2003) at the Bank of Japan projects real GDP growth to decelerate to a slightly negative pace by 2025, as a contribution from capital accumulation will decline gradually from the current pace of around 0.5 percent point to virtually zero in 2025 in addition to a constantly negative contribution from labor force. Although they assume 0.5 percent TFP growth, which is lower than our 0.9 percent, their projections are about in line with ours.

The latest growth projections by government officials are *Japan's 21st Century Vision*, which was released by the Cabinet Office in 2005. This Vision projects real GDP to grow 1 1/2 percent during 2006 and 2012, around 2 percent during 2013 and 2020, and then 1 1/2 percent during 2021 and 2030. In these projections, TFP is assumed to contribute slightly less than 1 percent point to real GDP growth over the whole projection period. Their relatively optimistic projections seem to rely on policy measures which aim to raise labor force participation and corporate activity.

4.2 ENHANCING LABOR FORCE

It is natural for policymakers to consider policy measures to enhance labor participation to offset its reduction. For example, the MHLW is striving to raise the mandatory retirement age or introduce a continued employment system so as to support outplacement for the elderly. A gradual increase in the entitlement age for public pension benefits, which has been incorporated in recent pension reforms, is also likely to raise incentives to work among the elderly. In addition, the Cabinet Office as well as MHLW is now trying to support labor participation of married women by enhancing childcare support including childbirth/care leaves and public child-nursing services.

It is, however, difficult to estimate to what extent these policy measure to enhance labor productivity can mitigate demographic pressures. In what follows, we estimate the potential impact of these measures. For the elderly males, we tentatively assume that thanks to policy efforts the labor participation rates for those aged 60 and over will rise in such a way that the rate for each age group will rise to that for the five-year younger age group over the period to 2030. More specifically, we suppose that the rate for those aged 60 to 64 will rise to 96.6 percent (which is now the rate for those aged 55-59) from the current 70.3 percent. In the same way, we assume that the rates for those aged 65 to 69 and those aged 70 and 74 will rise to 70.3 percent and 46.7 percent, respectively, which are now those for five-year younger age groups.

For females, we assume the same change in the participation rates for the elderly thanks to policy efforts to enhance job opportunity among the elderly. The rates are assumed to rise to 60.0 percent, 40.1 percent, and 24.0 percent for those aged 60 to 64, 65 to 69, and 70 to 74, respectively. In addition, we expect the M-shaped curve to completely flatten by year 2030, reflecting the improvement in family-friendly policies and more gender-equal opportunities to work. In 2005, the rate

peaks at 74.9 percent for those aged 25 and 29, then declines to 62.7 percent for those aged 30 and 34, and moves up to 73.9 percent for those aged 45 and 49. We suppose that a downward bending between the two peaks will disappear by 2030.

Under these assumptions, total labor force is projected to be 59.4 million in 2030, which is about 10 percent higher than 54.1 million in the baseline case that does not expect any measures to enhance labor force (Figure 8). Accordingly, a pace of labor force reduction over the period to 2030 is estimated to be 0.45 percent, compared to 0.82 percent in the baseline case. And a negative contribution to real GDP growth will be halved to about 0.3 percent point from 0.6 percent point. This magnitude of the projected impact is not negligible especially under lowered potential growth in prospect.

Another important, but often neglected issue is immigration. The United Nations (2000) shows that if Japan wishes to keep the size of population in 2005, the country would need 17 million net immigrants up to 2050, or an average of 381,000 immigrants per annum between 2005 and 2050. By 2050, the immigrants and their descendants would total 22.5 million and comprise 17.7 percent of the total population of the country. As pointed out by OECD (2005), however, foreign workers share only 0.3 percent of total labor force shares, much lower than in other member countries. There has been no consensus yet as to whether Japan should absorb more immigrants to offset a reduction in labor force, probably because of commonly-held concerns about social and cultural problems which the country has little experience in solving in the past. However, expected shortage in labor force especially in the nursing and other service sectors is likely to stimulate discussions about immigration policy in the future.

4.3 IMPROVING PRODUCTIVITY

Enhancing labor force is unlikely to perfectly offset demographic pressures as discussed in the previous section, and a reduction in savings rate due to population aging is difficult to be prevented by policy measures. Therefore, improving productivity of the overall economy—in other words, raising growth of TFP—should play a key role in sustaining growth potential. However, it is difficult to project TFP growth and quantitatively assess the impact of policy measures to improve productivity. In fact, most researchers tend to *assume* rather than project TFR growth in their long-term forecasts.

In principle, there are three major ways to improve productivity. The first way is to shift production factors from less productive sectors to more productive sectors and make more effective use of them. As pointed out by Miyagawa *et al.* (2004), distortions in resource allocation due to an inability to smoothly shift labor and capital to more productive sectors led to the economic downturn in the 1990s. A series of economic structural reforms, which have been promoted by the Japanese government in recent years, are intended to correct this kind of distortion in resource allocation through deregulations (Cabinet Office, 2005a). Indeed, an OECD study shows that government regulations that restrict competition tend to suppress TFP of the economy as a whole (Nicoletti and Scarpetta, 2003). This study also confirms that deregulation and privatization can enhance productivity.

The second way is to promote the corporate sector to raise their expenditures on

research and development (R&D). Figure 9 compares growth of real corporate R&D and a contribution from TFP to real GDP growth. In general it takes a long time for R&D to actually raise productivity, and effectiveness, time lag, spillover effects differ substantially across types of R&D, sectors and industries. However, this figure suggests that corporate R&D is one of key determinants of the trend of TFP growth at least in the long run, and also raises the concern that the recent low pace of R&D growth cannot buffer the demographic impact in the next decades. Tax and other incentive measures for R&D expenditures will be needed.

The third way is to enhance and utilize human capital. As the source of economic growth shifts to "knowledge," the value of intellectual assets such as ideas and planning ability become more important. A declining population might lead to a fall in the total amount of knowledge in the entire nation, meaning that it becomes increasingly important to enhance the quality of each and every human resource and efficiently link this human resource development to value creation. The government should increase public support to science education at both university and lower levels by allocating more financial resources and improving education quality. There is much room for the government to increase education expenditures, judging by the fact that the ratio of expenditures—especially public ones—on education to GDP is relatively low in Japan among OECD member countries.

Another concern is a slowdown in human capital accumulation in workplace. Investment in human capital in the corporate sector, including both on- and off-the-job training, has played a key role in improving overall productivity. It has compensated for relatively low expenditures on official educational institutions, meaning that Japanese corporations been informal but effective education institutions. In recent years, however, the share of educational training costs to labor costs fell from 0.38 percent in 1988 to 0.28 percent in 2002 (METI, 2005). This seems to be largely due to ongoing corporate restructuring to improve short-term profits in the wake of the economic stagnation of the 1990s, with human resource investment also decreasing. As a result, Japan's share of educational training costs to labor costs falls well below those of European countries.

Since human resources are sources of competitiveness, it is important to improve company productivity by restoring and increasing declining company investments in human capital in order to enhance the competitiveness of the Japanese economy. Increasing mobility in the labor market, however, will likely reduce incentives of the firms to provide the employees with training under the long-term employment contract. From this perspective, the tax system for promoting human resource investment is required. In fact, recent tax forms have put more emphasis on promoting human resource investment.

4.4 GROWTH PROJECTIONS BASED ON DIFFERENT ASSUMPTIONS

We finally present alternative growth projections to help assess the potential impact of policy measures to tackle demographic pressures. We consider the following three alternative cases which reflect these policy responses:

– **Case 1** assumes that the government will smoothly enhance labor force participation especially among females and elderly persons, as discussed in section 4.2. A negative contribution from labor force to real GDP growth will be halved to

about 0.3 percent point from 0.6 percent point per annum over the 2005-2030 period.

– **Case 2** assumes 1.5 percent TFP growth, compared to 0.9 percent in the benchmark case. This accelerated pace of TFP growth assumes that the government will further shift production factors from less productive sectors, conduct policy measures to promote corporate R&D activity, and enhance human capital accumulation.

– **Case 3** assumes a combination of these two policy measures.

Table 2 summarizes the projection results, which highlight that the impact of policy measures will be limited but not negligible. Case 1 indicates that enhancing labor force will add to 0.3 percent point to potential growth, while Case 2 shows that policy measures to raise TFP growth to a 1.5 percent pace is expected to raise potential growth by 0.6 percent point. Judging by the results in Case 3, a combination of these policy measures raises the possibility that GDP growth will remain at around 1.5 percent and that per capita GDP growth will sustain almost the same pace observed over the past twenty-five years. Table 2 illustrates the projected growth paths of per capita GDP in each case, showing that enhancing labor force enforcement and productivity will be required to sustain steady improvement of economic welfare under demographic pressures.

4.5 IMPACTS ON FINANCIAL MARKETS

Our projections, which are based on the conventional methodology of generational accounting and some alternative scenarios about labor force, neglect the impact of population aging on financial markets. To be sure, population aging is likely to reduce the household savings rate even if corporate savings at least partly mitigate the downtrend in the overall private savings rate, and to decelerate capital stock accumulation. However, financial assets will continue accumulating and potentially affect economic activities and living standards. In addition, standard models imply that equilibrium returns on financial assets will vary in response to population age structure. Demand for different classes of financial assets is also likely to change, because young, middle-aged, and elderly savors may seek to hold their assets in different forms.

Bosworth *et al*. (2004) and Poterba (2004) provide a comprehensively survey of the empirical literature on the impact of population aging on financial markets, as well as their own empirical analysis. Behind their study, there is a popular argument that the US baby boomers contributed to the rise in asset values during the 1990s and that asset prices will decline when they retire and begin to draw down their financial assets. Among others, their key conclusions, which are related to our analysis, are summarized as:

– Asset holding in the United States rises sharply when households are in their 30s and 40s, but asset decumulation in retirement is slower than simple life-cycle models would suggest;

– US households raise the share of their wealth invested in the risky asset through age 60 but do not significantly reduce their exposure to this risk there-

after; and

– Population age structure affects stock market prices and the real returns of different classes of financial assets, but the consistency of this evidence is not overwhelming.

They also find that cross-country analyses sometimes find that the estimated demographic effects have the opposite sign in different countries. In all, the impact of the demographic factors on financial markets have been modest at most, and there remains an open question how strongly population aging will affect demand, real returns and price levels of financial assets overt the next decades.

In Japan, financial asset holdings tend to steadily continue rising as households age, in contrast with the household savings rate and inconsistent with simple life-cycle models. In 2005, average financial assets held by households with the household head aged 70 and above were 25.9 million yen, compared to 11.8 million yen held by households with the household head aged 40-49, according to the Family Income and Expenditure Survey (Figure 10). We should be cautious about measurement errors due to highly skewed distribution of wealth across households, because a small percentage of households accounts for an out-size fraction of private wealth accumulation. However, this pattern of asset holding by age calls into question any argument that retirement babyboomers may affect negatively financial markets.

In addition, the elderly households tend to hold more risky assets than the young households. The Survey found that in 2005, the share of risky assets (bonds and equities) was 18.5 percent of total assets held by households with the household head aged 70, much higher than 8.0 percent for the households with the household head aged 40-49. Although asset holding in the household sector is in general much skewed to safer and lower-yield assets in Japan, the elderly tend to be less risk averse than the young probably because they hold more financial assets and thus can absorb more financial risks.

It is reasonable to expect that the age pattern of financial asset holding will remain almost intact, given no sign of its change observed from statistics so far. For the next decade, however, much will depend on the babyboomers, who will be starting to retire and receive lump-sum retirement allowance in coming years. They are most likely to diversify their portfolios and increase their investment in riskier assets, which are now more available and easier to access than in the past. It is thus likely that population aging will increase rather than decrease demand for financial assets and affect positively their prices.

5. CONCLUDING REMARKS

We have briefly overviewed the expected impact of population aging on long-term growth potential in Japan and discussed policy measures to react to aging issues and macroeconomic impacts. The key points are summarized as follows.

(1) Japan has entered a phase of population declining with a rapid pace of aging. Total population will decline to 101 million in 2050 from 127.8 million in 2005, and the share of those aged 65 and older will substantially rise to 35.7 percent

in 2050 from 19.9 percent in 2005. This pace of aging is higher than any other country all over the world. Moreover, there is no sign of pickup in the total fertility rate, which is officially projected to recover to 1.39 from the current 1.29 level.

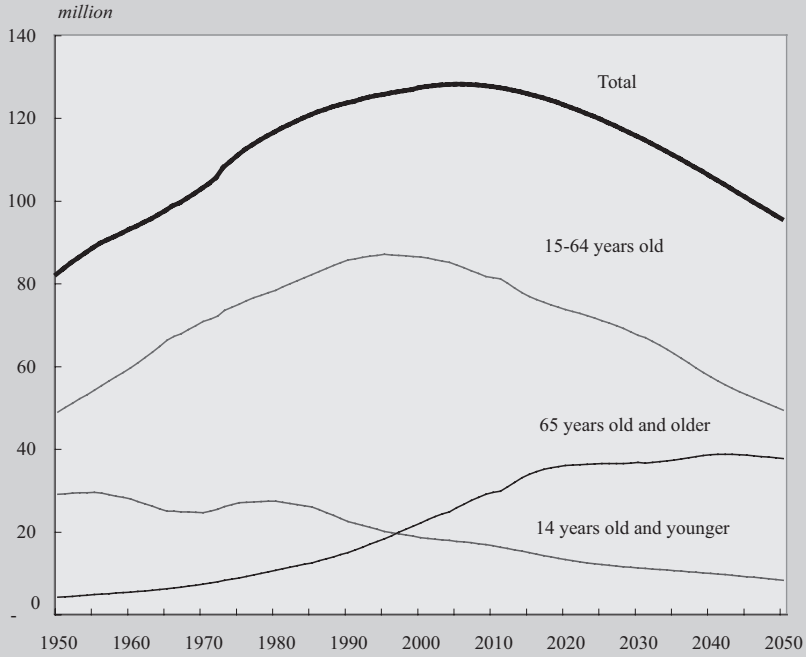
(2) Population declining and aging will reduce growth potential mainly via two routes. First, total labor force will decline 0.8 percent per annum and subtract about 0.6 percent point from real GDP growth over the next few decades. Second, population aging will lead to a reduction in the household savings rate, which will decelerate capital accumulation unless the corporate savings do not fully offset its reduction. The overall impact of these two factors on potential growth is expected to be nearly 1 percent point per annum. Assuming that TFP will grow at 0.9 percent, which has been observed over the past twenty-five years, the underling real GDP growth rate over the next twenty-five years is projected to be around 0.6 percent, much lower than a 2.4 percent pace over the past thirty years.

(3) The government should implement policy measures to mitigate demographic pressures and ensure modest economic growth. First, it has to enhance labor participation of the elderly and females—such as an increase in the mandatory retirement age, pension reforms to raise the elderly's incentives to work, and more childcare support and family-friendly policies to make it easier for females to keep working. Second, the government should accelerate productivity growth, by promoting corporate R&D activity, and enhance human capital accumulation. The recent low pace of corporate R&D spending as well as the government's limited commitment to education raises concern about prospects of future productivity growth.

(4) A combination of enhancing labor force participation and promoting productivity advancement raises the possibility that GDP growth will remain at around 1.5 percent and that per capita GDP growth will sustain almost the same pace observed over the past twenty-five years.

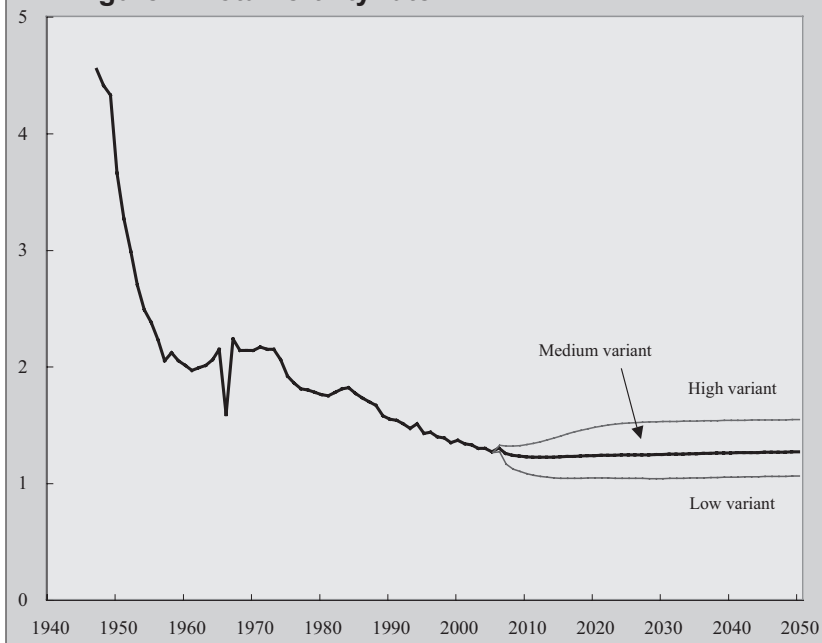
(5) It is difficult to forecast the impact of population aging on financial markets. However, the age pattern of asset holdings suggests that population aging will likely raise demand for riskier assets and have some positive impact on asset prices.

Figure 1. Total population



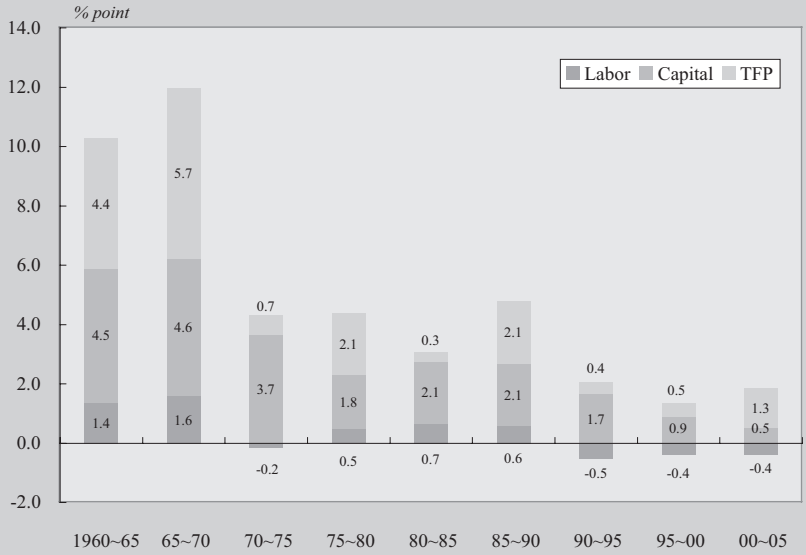
Source: NIPSSR (2002), *Population Projections for Japan: 2001-2050.*

Figure 2. Total fertility rate



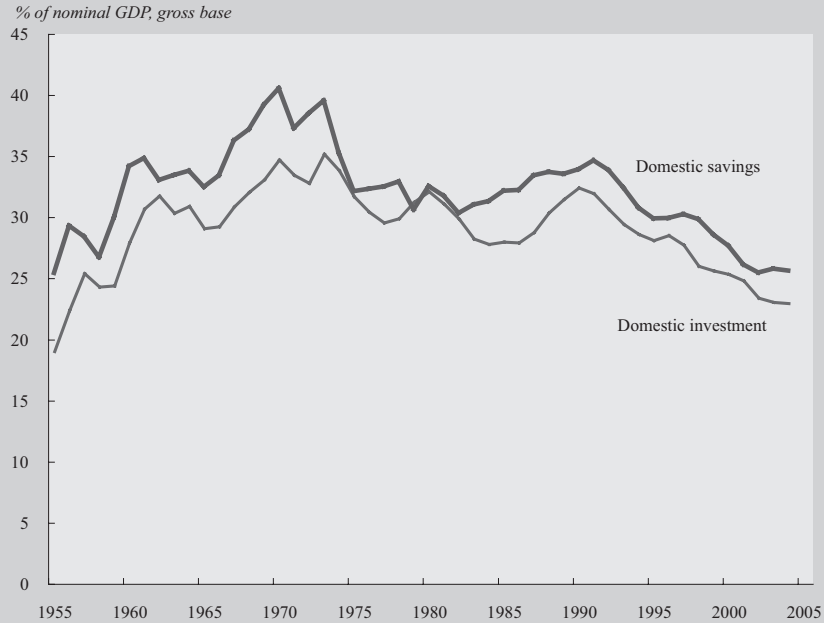
Source: NIPSSR (2002), *Population Projections for Japan: 2001-2050* .

Figure 3. Decomposing GDP growth



Source: The Author's calculation based on data from Cabinet Office, *National Accounts* , Statistics Bureau, *Labor Force Surveys* , and MHLW, *Monthly Labor Surveys* .

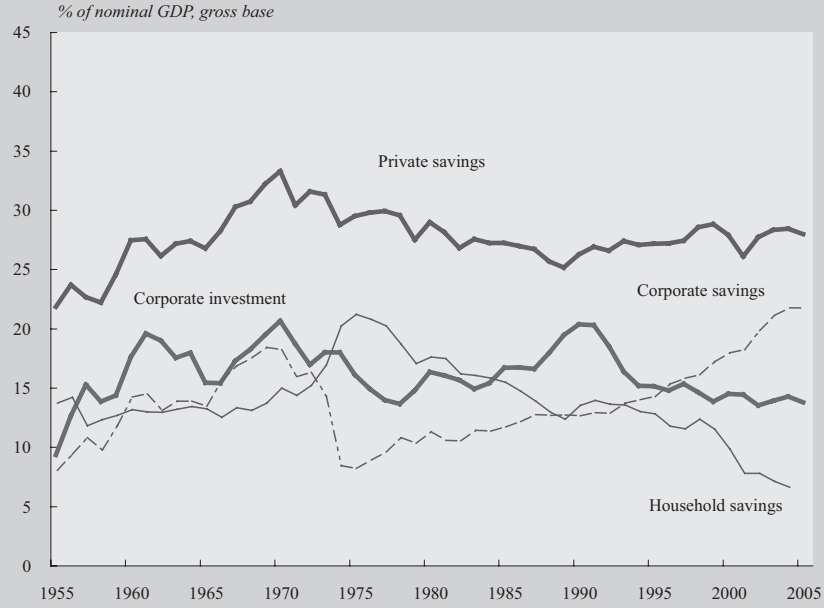
Figure 4. Domestic savings and investment



Source: Cabinet Office, Annual *Report on National Accounts*.

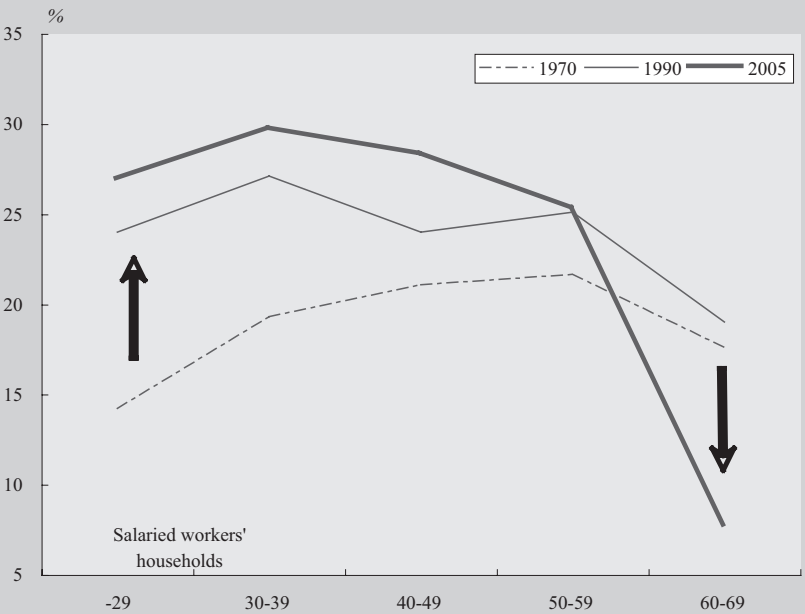
Figure 5. Private savings and investment

% of nominal GDP, gross base



Source: Cabinet Office, Annual *Report on National Accounts*.

Figure 6. Household savings rate by age group



Source: Statistics Bureau, *Annual Report on the Family Income and Expenditure*.

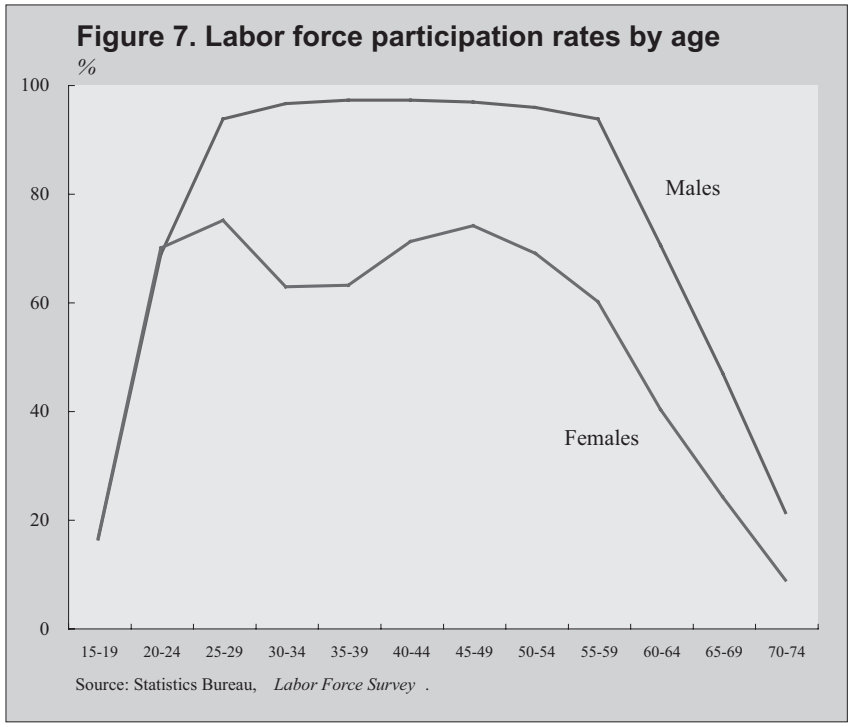


Figure 7. Labor force participation rates by age
%
100
80
60
40
20
0
Males
Females
15-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
Source: Statistics Bureau, Labor Force Survey .

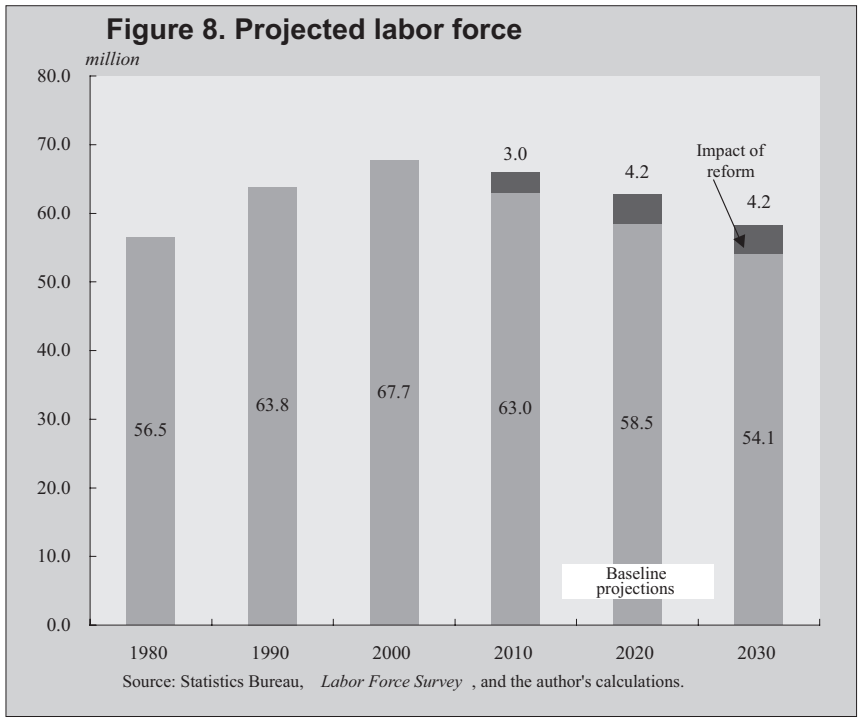


Figure 8. Projected labor force
million
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
56.5
63.8
67.7
63.0
3.0
58.5
4.2
54.1
4.2
Impact of reform
Baseline projections
1980
1990
2000
2010
2020
2030
Source: Statistics Bureau, Labor Force Survey , and the author's calculations.

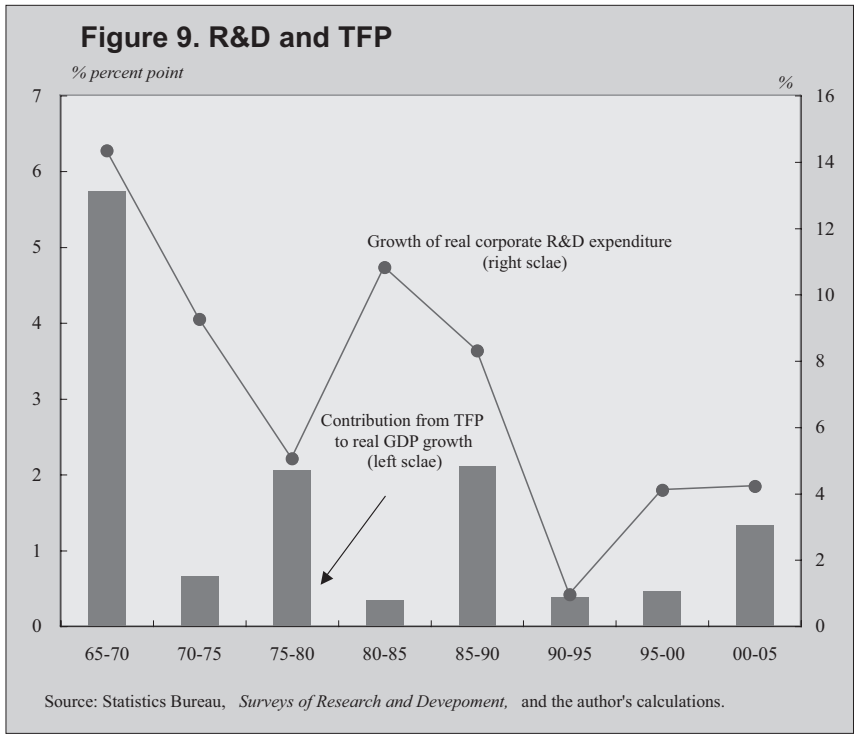
Table 1. GDP growth: past and future 25 years

(%, %point, annual rate)

	GDP	Contributions from:			Per capita
		Labor	Capital	TFP	GDP
1980-2005	2.4	0.0	1.4	0.9	2.0
2005-2030	0.6	-0.6	0.2	0.9	0.9
05-10	0.8	-0.7	0.6	0.9	0.8
10-15	0.7	-0.5	0.3	0.9	1.0
15-20	0.5	-0.5	0.1	0.9	0.9
20-25	0.4	-0.5	0.0	0.9	1.0
25-30	0.4	-0.6	0.0	0.9	1.0
cf. Future 25 years assuming no population shrinking and aging					
2005-2030	1.5	0.0	0.5	0.9	1.8

Source: The author's calculations.

Figure 9. R&D and TFP



Source: Statistics Bureau, *Surveys of Research and Devepoment,* and the author's calculations.

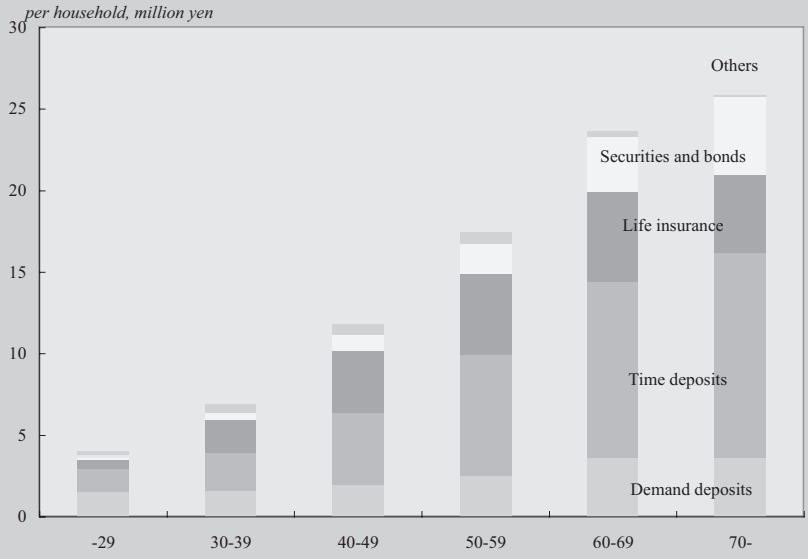
Table 2. Alternative growth projections

(%, %point, annual rate)

2005-2030	GDP	Contributions from:			Per capita
		Labor	Capital	TFP	GDP
Benchmark	0.6	-0.6	0.2	0.9	0.9
Case 1. Labor force enhancement	0.9	-0.3	0.2	0.9	1.2
Case 2. 1.5% point TFP growth	1.2	-0.6	0.3	1.5	1.6
Case 3. 1+2	1.5	-0.3	0.3	1.5	1.9
cf. 1980-2005	2.4	0.0	1.4	0.9	2.0

Source: The author's calculations.

Figure 10. Financial assets outstanding by age group



Source: Statistics Bureau, *Annual Report on the Family Income and Expenditure* .

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