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AGING, SAVING, AND PUBLIC PENSIONS IN JAPAN

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Abstract: We analyze the impact of population aging on Japan's household saving rate and on its public pension system and the impact of that system on Japan's household saving rate and obtain the following results: first, the age structure of Japan's population can explain the level of, and past and future trends in, its household saving rate; second, the rapid aging of Japan's population is causing Japan's household saving rate to decline and this decline can be expected to continue; third, the pay-as-you-go nature of the public pension system, combined with rapid population aging, created considerable intergenerational inequities and increased the saving rates of cohorts born after 1965, which in turn slowed the decline in Japan's household saving rate; and fourth, the 2004 public pension reform alleviated the intergenerational inequities of Japan's public pension system somewhat but will in the long run exacerbate the downward trend in Japan's household saving rate.

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1. Introduction

Japan's population is aging at the fastest rate in human history (as measured by the speed with which the share of the elderly (those aged 65 or older) in the total population has increased over time) and is now virtually the most aged in the world. In 2006, the share of the elderly (those aged 65 or older) in the total population was 20.6%, which implies that more than one-fifth of Japan's population was elderly, and this ratio is projected to increase further to 28.7% by 2025 and to 35.7% by 2050, according to official Japanese government projections. In this paper, we discuss the impact of population aging on Japan's household saving rate and on its public pension system and the impact of that system on Japan's household saving rate.

In section 2, we present data on trends over time in Japan's household saving rate and on Japan's household saving rate in relation to the other OECD countries; in section 3, we discuss the impact of the age structure of the population on the level and past and future trends in Japan's household saving rate; in section 4, we discuss the impact of population aging on Japan's public pension system and the impact of that system on Japan's household saving rate; and section 5 is a brief concluding section.

2. The Level of, and Trends over Time in, Japan's Household Saving Rate

In this section, we present data on trends over time in Japan's household saving rate and on Japan's household saving rate in relation to the other OECD countries in order to shed light on whether Japan's household saving rate is high in absolute and/or relative terms. We present data on net saving (saving net of depreciation on fixed capital) because it is net saving that leads to an increase in wealth or assets and that is thus the more meaningful concept.

2.1. Trends over Time in Japan's Household Saving Rate

We look first at trends over the past century in Japan's household saving rate. As shown in Horioka (1993a), Japan's household saving rate was volatile during the prewar, wartime, and early postwar periods. It was low, sometimes even negative, during about half of the years in this period but was high and generally in the double digits during the other years. In fact, it exceeded 30 or even 40 percent at the height of World War II (1941-44), but during the war years, goods were scarce or rationed and the state encouraged and often forced people to save. If we exclude the war years (1937-45), Japan's household saving rate was low, on average, during both the prewar and early postwar

periods, averaging only 4.3 percent during the prewar period (1906-1936) according to the Long-Term Economic Statistics and only 5.6 percent during the early postwar period (1945-54) according to the former System of National Accounts (hereafter SNA).[1]

Turning to the post-1955 period, a continuous time series is unfortunately not available for the entire post-1955 period. The Japanese government switched from the 1968 United Nations SNA to the 1993 United Nations SNA in 2000, and thus data based on the 1968 SNA are available only for the 1955-1998 period whereas data based on the 1993 SNA are available only since 1980.[2] Two further complications are that the 1995 benchmark revision was implemented at the same time as the conversion to the 1993 SNA and that the 2000 benchmark revision was implemented in 2005. As a result, there are three different data series for the 1955-2004 period, with data based on the 1968 SNA (1990 benchmark revision) being available only for the 1955-1998 period, data based on the 1993 SNA (1995 benchmark revision) being available only for the 1980-2003 period, and data based on the 1993 SNA (2000 benchmark revision) being available only for the 1996-2005 period.

In the case of the 1993 SNA, we present data on the adjusted household saving rate because it includes social transfers in kind (i.e., social benefits in kind and transfers of

individual non-market goods and services from the government and from private non-profit institutions serving households) in both the numerator and the denominator and hence is the correct theoretical concept and because it is consistent with the household saving rate based on the 1968 SNA.

Figure 1 shows data on all three series for the 1955-2005 period, and as can be seen from this figure, Japan's household saving rate showed a steady upward trend from the mid-1950s until the mid-1970s, increasing from 11.9 percent in 1955 to a phenomenal level of 23.2 percent in 1974 and 1976, but has shown a downward trend since then, falling to the 2 to 3 percent level in recent years.[3]

(Figure 1 about here)

If we give precedence to data based on the 1993 SNA whenever possible, Japan's household saving rate exceeded 20 percent only during the six-year period from 1973 until 1978, exceeded 15 percent only during the 21-year period from 1961 until 1981, and exceeded 10 percent only during the 41-year period from 1955 until 1995.

To sum up, Japan's household saving rate was not always high. It was high during much of the postwar period (especially during the 1960s and 1970s), but it was not necessarily high during the prewar and early postwar periods and has by no means been

high in recent years.

2.2. An OECD Comparison of Household Saving Rates

We turn now to an international comparison of household saving rates. Horioka (1989, Table 1) shows data on household saving rates for the 1975-84 period for the sixteen Organization for Economic Cooperation and Development (OECD) member countries for which data are available, while Horioka (2007, Table 1) shows data on household saving rates for the 1985-2005 period for the 23 OECD member countries for which data are available. Data are available only on gross household saving rates for five of these countries, but since net household saving rates are, on average, about 70 percent of gross household saving rates, the figures on the gross household saving rate were converted to a net basis using this conversion factor in the case of the five countries for which only gross data are available.

As can be seen from Horioka (1989, Table 1) and Horioka (2007, Table 1), Japan's household saving rate was one of the highest among the OECD member countries during the 1975-85 period. It ranked first in 1975, was second only to Italy in 1980 and 1985, and was 1.6 to 1.8 times the OECD average in these years. However, Japan's rank among

the OECD member countries as well as the ratio of her household saving rate to the OECD average both fell steadily during the subsequent twenty years, falling to 17th place (43 percent of the OECD average) by 2005.

Thus, Japan's household saving rate was high not only in absolute terms but also relative to the other developed countries during the 1955-95 period (especially during the 1960s and 1970s) and was at one point the highest in the developed world, but it has since fallen not only in absolute terms but also relative to the other developed countries and is no longer high by any standard.

3. The Impact of the Age Structure of the Population on the Household Saving Rate

In this section, we discuss the impact of the age structure of the population on trends over time in Japan's household saving rate and on the level thereof.

3.1. Theoretical Considerations

In this subsection, we discuss the impact of the age structure of the population on the household saving rate from a theoretical point of view.

According to the life cycle hypothesis, the household saving rate will be higher in

a country with a younger population (a country in which the elderly dependency ratio, defined as the ratio of the elderly population to the working-age population, is low) because the young typically work and save, whereas the elderly typically retire from work and dissave their previously accumulated saving (see, for example, Modigliani and Brumberg, 1955). Conversely, one would expect a country's household saving rate to decline as the population of that country ages and its elderly dependency ratio increases.

However, one would also expect a country's young dependency ratio, defined as the ratio of children to the working-age population, to exert downward pressure on its household saving rate because children, like the elderly, contribute to consumption without contributing to income. Moreover, the young dependency ratio typically declines as the population ages, and this will at least partially offset the downward pressure on the household saving rate caused by the increase in the elderly dependency ratio.

3.2. The Impact of the Age Structure of the Population on the Past Level of, and Trends over Time in, Japan's Household Saving Rate

In this subsection, we discuss the impact of the age structure of the population on the past level of, and trends over time in, Japan's household saving rate.

Japan's population is now virtually the most aged in the world, but until recently, Japan's population was the youngest among the industrialized countries. As Horioka (2007, Table 2) shows, in 1975, the share of the elderly (those aged 65 or older) in Japan's total population was only 7.9 percent, which was the lowest among the OECD member countries at the time (this ratio was 3.6 percent in South Korea in 1975, but South Korea was not yet an OECD member country at the time). Thus, if the life-cycle hypothesis is applicable, the young age structure of Japan's population can explain why Japan's household saving rate was so high in the past. Indeed, Horioka (1989) finds that the low ratio of the aged population to the working-age population was by far the most important cause of Japan's high private saving rate during the 1975-84 period, and the same undoubtedly holds for her household saving rate.

Moreover, as Horioka (1991, 1997) shows, the age structure of Japan's population can also explain trends over time in its household saving rate. In Japan, the young dependency ratio has shown a downward trend over time, and the elderly dependency ratio has shown an upward trend over time, but the relative speeds of these trends has varied over time. For example, until the early 1970s, the decline in the young dependency ratio was more pronounced than the increase in the elderly dependency ratio in Japan, and this

can explain the steady upward trend in Japan's household saving rate until the early 1970s.

By contrast, the increase in the elderly dependency ratio has been more pronounced than the decline in the young dependency ratio in Japan since the early 1970s, and this can explain why Japan's household saving rate has been declining sharply since the early 1970s.

Thus, the age structure of Japan's population can explain the level of its household saving rate as well as trends over time therein, and thus it appears to be a major determinant of the level of, and trends over time in, Japan's household saving rate.[4]

3.3. The Impact of the Age Structure of the Population on Future Trends in Japan's Household Saving Rate

In this subsection, we discuss the impact of the age structure of the population on future trends in Japan's household saving rate. As Horioka (2007, Table 2) shows, the share of the population aged 65 or older to the total population in Japan is projected to increase from 17.2 percent in 2000 to 28.7 percent in 2025, rising from third to first place among the OECD member countries). This will cause its household saving rate to continue its rapid decline if the life-cycle hypothesis is valid, and Horioka (1993b, 2002,

and 2006b) argues that it is. Indeed, a number of authors have projected that the rapid aging of Japan's population will cause Japan's household saving rate to decline to zero or even negative levels by 2010-24 if all other determinants of the household saving rate remain constant (see Horioka (1989), Horioka (1991), Farrell and Greenberg (2005), and for a useful survey, Horioka (1992)).[5]

3.4. Summary

Our conclusion in this section is that the age structure of Japan's population can explain the level of its household saving rate as well as trends over time therein and that it is a major determinant of future trends in Japan's household saving rate as well.

Of course, many other factors, such as **(**1) the growth rate of income, (2) the level of household wealth holdings, (3) the availability of consumer credit, (4) the bonus system of compensation, (5) tax breaks for saving, (6) the government's saving promotion activities, and (7) culture and tradition, may also influence the level of, and trends over time, in Japan's household saving rate, and one especially important factor is the public pension system (see Hayashi (1986, 1997) and Horioka (1990, 1993b, 2006a, 2007) for useful surveys of the literature on household saving behavior in Japan and Horioka and Okui

(1999 and 2007) and Wakabayashi (2001) for analyses of the impact of public pensions on household saving). Thus, in the next section, we discuss Japan's public pension system, with emphasis on the impact of population aging on this system and its likely impact on Japan's household saving rate.

4. Japan's Public Pension System and the Household Saving Rate

4.1. Japan's Public Pension System and Reforms of the System through 2004

As discussed in section 3, from a macro perspective, Japan's household saving rate can be expected to decline sharply as its population ages. However, aging will also raise the saving rate of individuals due to the existence of a pay-as-you-go public pension system. How did population aging affect Japan's public pension system and how was the household saving rate affected by this system? Furthermore, how will the 2004 reform of the public pension system affect future trends in the household saving rate? We examine these issues in this section.

Japan's public pension system can be divided broadly into the Employees' Pension System to which private salaried workers and their spouses belong, the Mutual Aid Association Pension System to which government workers and their spouses belong, and

the National Pension System to which the self-employed and all others belong. The first tier pension (the “basic pension”) is common to all three systems.

These public pension systems are essentially operated on a pay-as-you-go system. Thus, in a society in which fertility is declining and the population is aging, it becomes necessary to raise the contribution rate in order to maintain benefits at their original levels, and this, in turn, requires younger cohorts, whose net transfer from the public pension system is negative, to increase their own saving for retirement. These effects are common to all three public pension systems, but in what follows, we focus on the Employees’ Pension System, which is the largest system.

Japan’s Employees’ Pension System was operated as a fully funded system when it was first established in 1937. However, from the end of World War II until the rapid growth period, a number of reforms were enacted that gradually raised the benefit levels of pensioners irrespective of the amount of their contributions, and these reforms gradually transformed the system into a pay-as-you-go system. The 1973 reform of the public pension system introduced wage indexation and inflation indexation, and this reform resulted in a pure pay-as-you-go system that lasted until the 2004 reform.

Let us now provide an overview of this system that continued until 2004.

First, benefits were determined through two types of indexation.

(1) The benefits of pensioners reaching the pensionable age (at present 65) in a given year were set so that the earnings replacement rate (the ratio of pension benefits to the average wages of current workers) would be kept constant at roughly 60%. Such a system, whereby the benefit amount of pensioners reaching the pensionable age each year is adjusted so as to keep the replacement rate constant, is called “wage indexation.”

(2) The benefits that pensioners received in their second and later years were automatically increased each year by the rate of inflation. This system of raising the nominal benefit amount of pensioners in their second or later years so as to keep the real purchasing power of benefits constant throughout the remainder of the pensioner’s life is called “inflation indexation.”

Note that if pensioners are compared at a given point in time in an economy in which the average (real) wage rate is continuing to increase, the average benefit amount will be higher the younger is the pensioner due to the wage indexation.

Second, the future schedule of contribution rates of current workers was decided so as to generate enough revenue to finance the level of benefits determined by the two indexation systems. Thus, the contribution rate was decided by conducting a projection of

the future finances of the public pension system once every five years and making adjustments if the finances of the public pension system had deviated from equilibrium since the previous projection.

After entering the 1980s, the decline in the fertility rate and the aging of the population proceeded more rapidly than projected by the Ministry of Health and Welfare (now called the Ministry of Health, Labour and Welfare, hereafter MHLW). Consequently, during the past 25 years, the contribution rate had to be increased each time the government's population projections were revised, and this has led to massive intergenerational inequities, as we will show in the next subsection.

4.2. The Impact of the Pre-2004 Public Pension System on Saving: Simulation Analysis

In order to analyze the impact of Japan's public pension system on the household saving rate by cohort, the authors conducted a simulation analysis using the OSU II Model, a simplified public pension finance simulation model they themselves developed (http://www.geocities.jp/kqsmr859).[6] This model accurately reflects the details of Japan's complex public pension system including survivors' pensions, disability pensions, and

transitional measures contained in past reforms.

It should be noted, however, that the OSU II Model projects the fiscal balance and reserves of the public pension system by treating demographic and macroeconomic variables (e.g., the growth rate of wages, the interest rate, and the inflation rate) as exogenous.[7] Thus, it does not have a feedback mechanism whereby the fiscal projections of the public pension system affect the macroeconomy, causing macroeconomic variables to vary endogenously.

The predictions of the OSU II Model are very close to those of the MLHW, which are apparently based on the undisclosed MLHW model.[8] This implies that the MLHW model does not have a feedback mechanism, either. Incidentally, the MLHW model is neither published nor available on the web, while the OSU II Model is available on the web. Thus the OSU II Model is the only publicly available pension model that reflects the details of the post-2004 reform pension system.[9]

Figure 2 shows the results of the OSU II Model concerning the intergenerational inequity of public pension benefits and contributions. This figure is based on the provisions (contribution rate, indexation scheme, and financing scheme of the basic pension) of the pre-2004 public pension system but uses the same economic assumptions

and demographic projections as the 2004 fiscal projections of the public pension system.[10]

(Figure 2 about here)

The horizontal axis of Figure 2 is the year of birth. The thin dotted line shows lifetime contributions by birth year based on the pre-2004 public pension system for married male pensioners of the Employees' Pension System with the average contribution period. The lifetime contribution rate is the ratio of the present discounted value of lifetime contributions to the present discounted value of lifetime wages (including bonus income). The pre-2004 lifetime contribution rate was calculated using not the contribution rate schedule decided in 1999 but the contribution rate schedule used in the document "On the Impact of the New Population Estimates on the Finances of the Employees' Pension System and the National Pension System," released by the MHLW in May 2002. In this document, the MHLW itself calculates by how much the increase in the contribution rate schedule decided in 1999 would have to be accelerated pursuant to the 2002 revision of the population projections of the National Institute of Population and Social Security Research and expresses the view that the ultimate contribution rate of 21.6% calculated in 1999 would have to be increased to 24.8%. According to the OSU II Model, if the ultimate contribution rate were to be raised to 24.8%, the reserves of the

public pension system would not be exhausted until 2100.

By contrast, the thin solid line in Figure 2 shows the lifetime benefit rate by birth year. The lifetime benefit rate is the ratio of the present discounted value of lifetime benefits to the present discounted value of lifetime wages where lifetime benefits include the wife's basic pension, survivors' benefits, and other supplementary benefits.

The two lines cross in around 1965, which means that lifetime benefits and lifetime contributions are roughly equal in that birth year. For cohorts born before around 1965, benefits exceed contributions, whereas for cohorts born after around 1965, benefits fall short of contributions. In other words, massive intergenerational inequities are caused by the public pension system. The gap between the lifetime contributions and lifetime benefits of cohorts born after around 1965 represents the excess payments of these cohorts, and if they wish to spend all of their lifetime contributions to finance living expenses during retirement, they would have to save the aforementioned gap on their own. Thus, for those born after around 1965, the public pension system has the effect of raising their saving, and this effect is larger, the later the birth year of the cohort. Since the proportion of the population that was born after around 1965 will increase over time, the upward pressure the pre-2004 public pension system exerted on the household saving rate has

increased over time, thereby holding down the decline therein caused by population aging and other factors.

4.3. The Main Features of the 2004 Reform of the Public Pension System

The solid line in Figure 3 shows projected public pension reserves in the case of the pre-2004 public pension system. The economic assumptions and demographic projections are the same as in the case of Figure 2. Pension finances were supposed to be in balance as a result of the 1999 reform, but this figure shows that because of changes in economic conditions and demographic projections, public pension reserves were projected to be exhausted by 2050 at the time of the 2004 reform. Thus, it was necessary to reconstruct the finances of the public pension system and to convert it into a self-sustaining system.

(Figure 3 about here)

The 2004 reform reconstructed the finances of the public pension system, but at the same time, it represented a fundamental change of course. Until 2004, benefit levels had been determined first, and contribution rates had then been set at levels that could finance that level of benefits. However, in the 2004 reform, the contribution rate was

determined first, and the level of benefits was then set in such a way that the level of contributions could finance it. More specifically, the following system was introduced:

(1) Lowering the contribution rate cap. The 1999 reform specified that the contribution rate (expressed as a percent of total compensation including bonus income) would be raised to 21.4% by 2025, but the 2004 reform specified that the contribution rate would be raised by 0.354 percentage points per year until it reached 18.3% in 2017 and that it would not be raised any further thereafter.

(2) The introduction of “macroeconomic indexation.” It was decided to lower the earnings replacement rate in such a way that fiscal balance is maintained over the next 100 years given the contribution rate fixed as specified in (1). Reducing the earnings replacement rate means not indexing benefits fully for a period long enough to allow the system to recover fiscal balance. More specifically, it was decided to deduct an adjustment coefficient of about 0.9 percentage points from the growth rate of wages used to index the wages of new pensioners as well as from the inflation rate used to index the benefits of existing pensioners. This way of reducing the indexation rate in response to the macroeconomic balance of the system is called “macroeconomic indexation,” and the period during which “macroeconomic indexation” is applied is called the “macroeconomic

indexation period."

(3) The finite equilibrium system. Before 2004, the public pension system was designed so that it would achieve fiscal balance over an infinite horizon, but beginning with the 2004 reform, it was decided that the public pension system would be designed so as to achieve fiscal balance over a roughly 100-year period, a system called the "finite equilibrium system." Thus, the policy goal was to leave behind at least one year's worth of benefits as reserves as of 2100.

(4) Establishment of a lower bound on benefit levels. During the macroeconomic indexation period, the earnings replacement rate will continue to decline, but when the earnings replacement rate reaches 50%, macroeconomic indexation will be halted even if the system is not in balance. However, what countermeasures will be taken after macroeconomics indexation is halted is not clear at this time.

(5) The increase in the government subsidy for the basic pension. The government subsidy for the basic pension was one-third before the 2004 reform, but the 2004 reform stipulates that it will be gradually raised until it reaches one-half by 2009 at the latest.

According to the public pension system's fiscal projections (benchmark projection[11]) of the MHLW, pursuant to the 2004 reform, the system will reach fiscal balance after a period of macroeconomic indexation at the earnings replacement rate of 50.2% and leave behind one year's worth of reserves in 2100. The dotted line in Figure 3 shows the projected reserves of the Employees' Pension System after the 2004 reform according to the OSU II Model. As can be seen from this figure, positive reserves will be maintained even in 2100.

We can favorably evaluate the 2004 reform (1) because it achieved the transition from a pure pay-as-you-go system in which the contribution rate is increased without limit in order to maintain benefit levels to a system in which the contribution rate is capped and benefits are reduced if necessary and (2) because it automatically stabilized pension benefits in the face of demographic fluctuations by introducing a macroeconomic indexation system.[12] [13]

4.4. The Impact of the 2004 Public Pension System: Simulation Analysis

What impact did the post-2004 public pension system have on the household saving rate? If we look again at Figure 2, the bold dotted line shows the post-reform

lifetime contribution rate while the bold solid line shows the post-reform lifetime benefit rate. Because the reform lowered the contribution rate cap, the lifetime contribution rate curve shifts downward, as shown by the bold dotted line, but because a macroeconomic indexation was introduced, the lifetime benefit rate curve shifts downward also, as shown by the bold solid line. In order to make it easier to see the change caused by the 2004 reform, Figure 4 shows the net lifetime benefit rate, defined as the lifetime benefit rate minus the lifetime contribution rate. As this figure shows, the reform increased the net benefits of cohorts born in 1970 or later. Thus, if we confine ourselves to the public pension system itself, the 2004 reform alleviated somewhat the intergenerational inequities of the public pension system and presumably also alleviated somewhat the upward pressure the existence of a public pension system imposed on the saving rates of cohorts born after 1970.

However, the increase in the government subsidy to the basic pension is likely to be financed by an increase in the consumption tax, and in order to see the total impact of the reform on intergenerational equity, it is necessary to take account of this increase in the tax burden. We did so by estimating the increase in the consumption tax rate needed to finance the future increase in the government subsidy to the basic pension[14] and by

deducting this tax increase from the net benefit ratio. As can be seen from comparing the bold and thin solid lines in Figure 4, the improvement in the net benefits of younger cohorts is not as great when account is taken of the increase in the consumption tax, but even so, the 2004 reform alleviated somewhat the intergenerational inequities of the public pension system, with net benefits increasing for all cohorts born after 1980.

(Figure 4 about here)

It is probably more appropriate to examine the impact of pension reform on the household saving rate by looking at the change in net benefits caused by the reform in relation to expected post-reform income (wages plus net benefits to be received after the reform) rather than to lifetime wages. This is because, in the case of current pensioners, wages are something they have already received and how the pension reform changes their future consumption schedule will be determined by the expected value of their subsequent pension benefits. Similarly, in the case of current workers as well, how the pension reform changes their future consumption and labor supply schedules will be determined not by how much wages they have already received but by the wages and net pension benefits they receive after the reform. Therefore, in order to see the impact of the reform on the household saving rate, we use a direct measure called the “rate of change in post-reform net

income," which we define as follows:

$$\text{Rate of change in post-reform net income} = \frac{\text{The total present discounted value of the change in net benefits caused by the reform}}{\text{The total present discounted value of post-reform wage receipts and net benefits}}$$

Figure 5 shows the rate of change of post-reform net income for each cohort, and as can be seen from this figure, the impact of the reform on the household saving rate differs by cohort. The bold dotted line shows the case that takes account of the increase in the consumption tax rate necessitated by the increase in the government subsidy to the basic pension whereas the bold solid line does not. As can be seen from the bold dotted line, in the case of cohorts born after around 1975, for whom the rate of change of post-reform net income is positive, the reform causes downward pressure on their saving rates. By contrast, in the case of cohorts born before around 1975, for whom the rate of change of post-reform net income is very minus, the reform causes upward pressure on their saving rates. Since cohorts born before around 1975 are far more numerous than cohorts born after around 1975, the net effect of the 2004 reform is likely to be to hold up the aggregate household saving rate, but the proportion of the population that was born after around 1975 will increase over time, and thus the post-2004 public pension system

will eventually exert downward pressure on the household saving rate, causing it to decline even faster than projected earlier.

(Figure 5 about here)

As for the impact of the public pension reform on government saving, since a decumulation of the reserves of the public pension system represents negative government saving and causes national saving to be lower than it would be otherwise, the reduction in the need to decumulate the reserves of the public pension system caused by the 2004 reform of the public pension system will prevent national saving from falling as much as it would have otherwise.

5. Conclusions

In this paper, we analyzed the impact of population aging on Japan's household saving rate and on its public pension system and the impact of that system on Japan's household saving rate and obtained the following results: first, that Japan's high household saving rate was a temporary phenomenon and that it was high in both absolute and relative terms during the 1955-95 period (especially during the 1960s and 1970s) but that it was not unusually high during the prewar and early postwar periods or after 1995; second, that the

age structure of Japan's population can explain the level of its household saving rate as well as trends over time therein and that it is a major determinant of future trends in Japan's household saving rate as well; third, that the rapid aging of Japan's population is likely to cause Japan's household saving rate to continue declining and to cause it to become zero or even negative in the near future; fourth, that existence of a pay-as-you-go public pension system increased the savings rate of cohorts born after 1960, slowing the decline in Japan's household saving rate as the proportion of these cohorts in the total population increased; and fifth, that the 2004 public pension reform alleviated the intergenerational inequities of Japan's public pension system somewhat but will in the long run exacerbate the downward trend in Japan's household saving rate.

Looking finally at the policy implications of our findings, one might be tempted to conclude that measures are needed to prevent Japan's household saving rate from continuing its sharp decline, but we do not feel that such measures are necessary for the following reasons: First, corporate saving has been increasing in recent years and government saving has been increasing since 2005 as the government reconstructs its finances after accumulating massive debts during the prolonged recession. Thus, increases in corporate and government saving have, and will continue to, offset declines in

household saving to a large extent, as a result of which the national saving rate will not decline as sharply as household saving rate declines. Second, Japan's population is declining in absolute terms, which means that there will be less need to expand the productive capacity of the economy and hence less need for investment. Thus, even if the national saving rate declines, it will be accompanied by declines in investment, meaning that a saving-investment imbalance will not necessarily emerge.[15] Third, even if a saving-investment imbalance did emerge, Japan always has the option of borrowing from abroad, and with many East Asian and Southeast Asian countries showing high saving rates, there is no shortage of potential lenders.

Turning to the policy implications of our findings for public pension policy, the 2004 public pension reform can be favorably evaluated because it held down future increases in contribution rates and reduced intergenerational inequities somewhat, but substantial intergenerational inequities remain, and moreover, this reform may have adverse implications for household saving. Further reforms of the public pension system that further reduce intergenerational inequities of the system and move the system toward a funded system so that its adverse impact on household saving are offset by increases in government saving, may be warranted.

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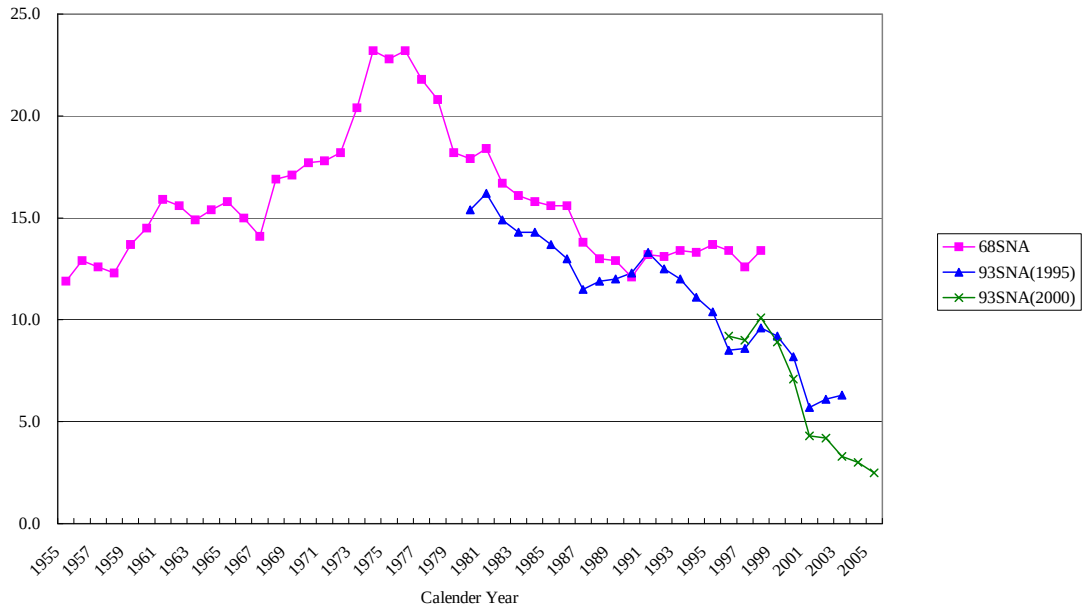
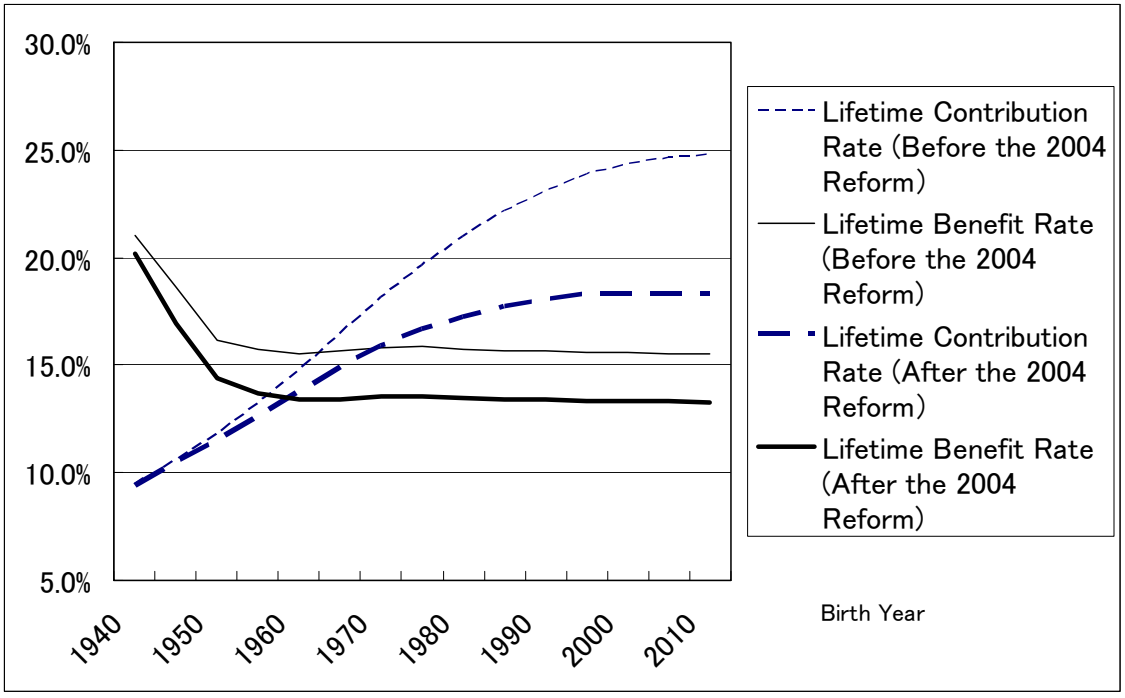
Figure 1: Trends in Japan's Net Household Saving Rate, 1955-2005



Notes: The line marked "68SNA" shows data based on the 1968 United Nations System of National Accounts, whereas the line marked "93SNA" shows data based on the 1993 United Nations System of National Accounts. The 68SNA figures show the net household saving rate, while the 93SNA figures show the adjusted net household saving rate.

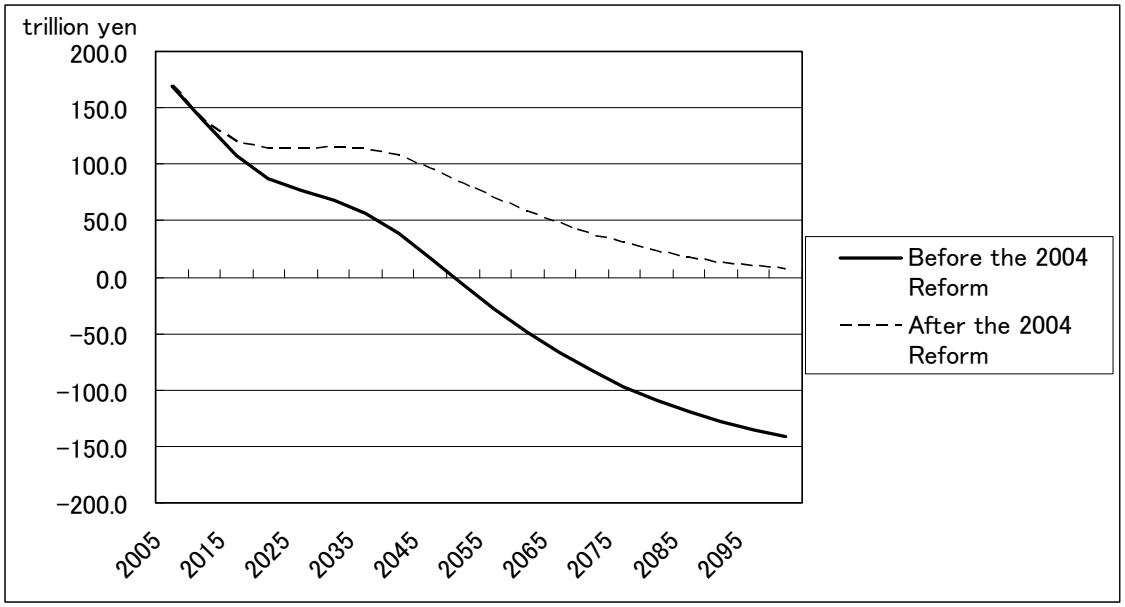
Source: Department of National Accounts, Economic and Social Research Institute, Cabinet Office, Government of Japan, ed., *Annual Report on National Accounts*, 2007 edition (Tokyo: Mediarando Kabushiki Kaisha, 2007), and the 2004, 2005, and 2006 editions of the same.

Figure 2: Lifetime Contribution Rate and Lifetime Benefit Rate Before and After the 2004 Reform



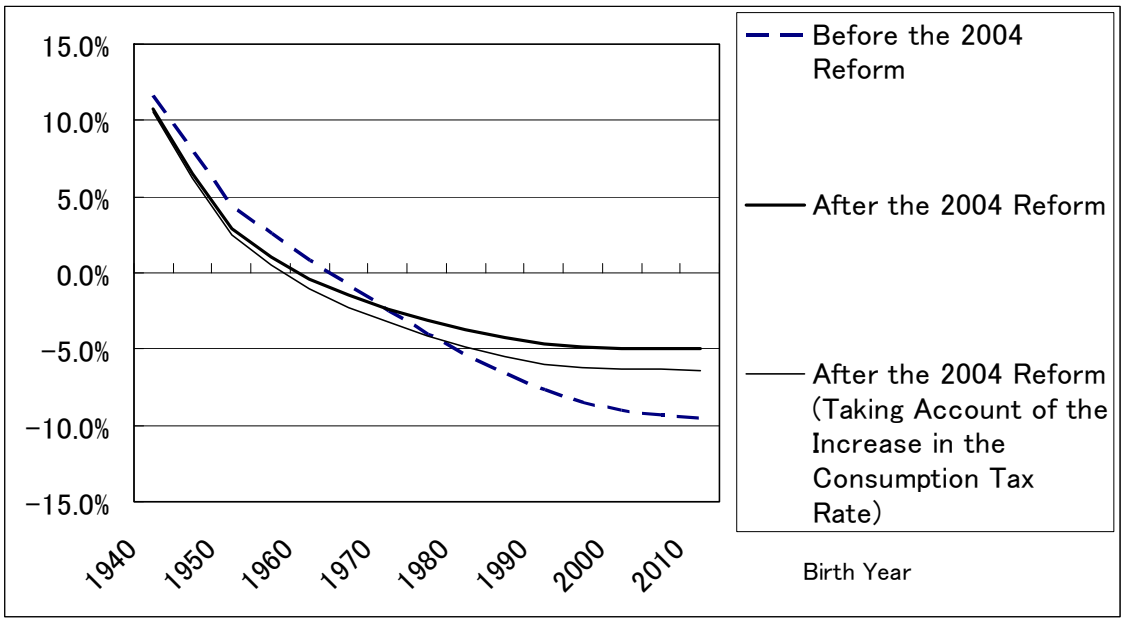
Notes: The lifetime benefit rate is the ratio of the present discounted value of lifetime benefits to the present discounted value of lifetime wages (including bonus income) where lifetime benefits include the wife's basic pension, survivors' benefits, and other supplementary benefits. The lifetime contribution rate is the ratio of the present discounted value of lifetime contributions to the present discounted value of lifetime wages.

Figure 3: Projected Reserves of the Employees' Pension System Before and After the 2004 Reform



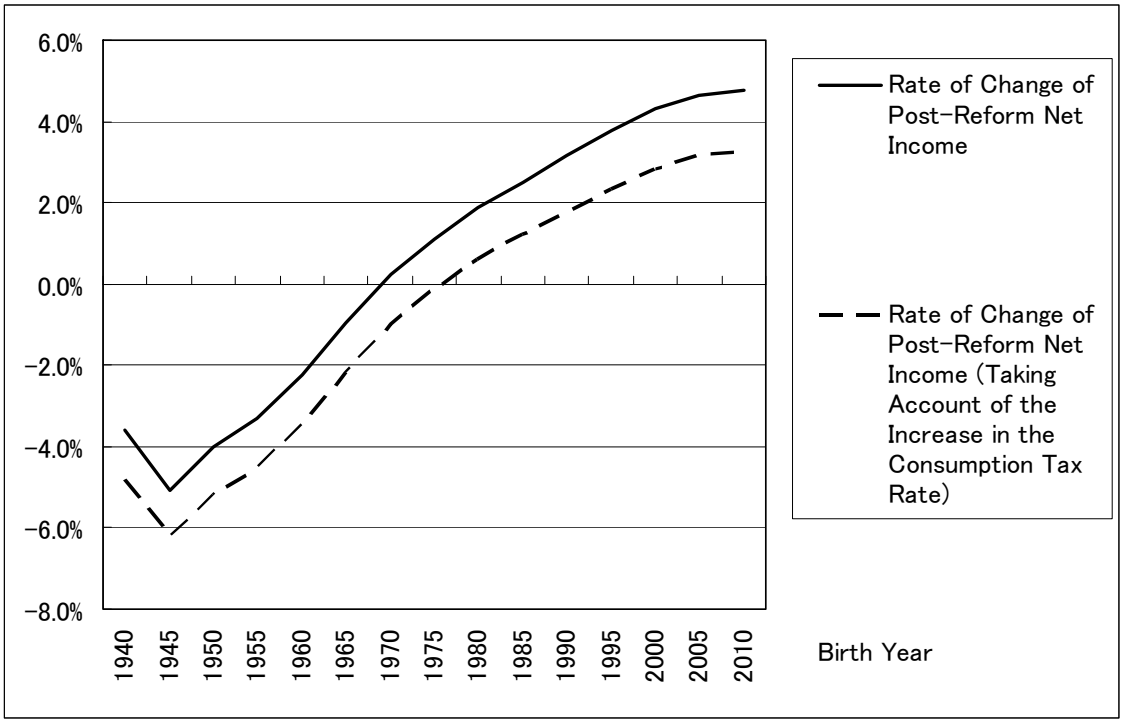
Note: Shows the present discounted value as of 2005.

Figure 4: Net Lifetime Benefit Rate Before and After the 2004 Reform



Note: The net lifetime benefit rate is defined as the lifetime benefit rate minus the lifetime contribution rate.

Figure 5: Rate of Change of Post-Reform Net Income



Note: See the main text for the definition.

Endnotes

[1] However, Japan's household saving rate was high (in excess of 15 percent) during the 1935-37 period according to the former System of National Accounts.

[2] A detailed discussion of the conceptual differences between the 1968 SNA and the 1993 SNA is beyond the scope of this paper, but the main difference between the two lies in their treatment of bad loans. Under the 1968 SNA, write-offs of bad loans to households and unincorporated businesses are treated as a current transfer from financial institutions to households. Thus, bad loan write-offs increase the incomes of households, and because their consumption does not change, their measured saving increases. In contrast, the 1993 SNA treats write-offs of bad loans to households and unincorporated businesses as a decline in the asset holdings of financial institutions, and thus they do not affect the saving rate of households.

[3] Note, however, that Japan's national saving rate has not declined as sharply as her household saving rate in recent years because corporate saving has been increasing and that it has been *increasing* since 2004 due in part to continued increases in corporate saving and in part to the turnaround in government saving in 2005.

[4] Of course, there is the possibility that the sharp decline in Japan's household rate during the 1990s and early 2000s was due, in part, to temporary factors such as price deflation, negative growth, and an unstable banking system.

[5] Note, however, that changes in the public pension system, economic growth rates, the labor force participation rate of the aged, etc., may affect future trends in the household

saving rate (see section 4 for a discussion of the impact of the public pension system).

[6] In 1999, Hatta and Professor Noriyoshi Oguchi of Senshu University released the OSU (Osaka and Senshu Universities) Model, which uses the publicly available data and projections of the Ministry of Health and Welfare and can roughly replicate the results of the Ministry of Health and Welfare's simulation analysis of pension finances (see Hatta and Oguchi, 1999). The OSU II Model is an updated version of the OSU Model that incorporates the 2004 revision of the public pension system. The OSU Model was widely used during the policy debate concerning pension reform because it was made publicly available, unlike the Ministry of Health and Welfare's model, which was not publicly available. The primary variables that are projected are the finances and reserves of the Employees' Pension and National Pension Systems; the Mutual Aid Association Pension System is not included in the model because virtually no data are available on this system.

[7] The OSU II Model consists of the following five blocks: (1) the insuree block, (2) the contribution rate block, (3) the beneficiary block, (4) the benefit amount block, and (5) the fiscal balance block. First, we derive estimates of the future enrollment probabilities of each public pension system using the estimates of future population of the National Institute of Population and Social Security Research. We then estimate the population of each age in the (1) insuree block and (3) the beneficiary block. (2) The contribution rate block calculates contributions by multiplying (1) the number of insurees by future expected wages at each age and the contribution rate. In (4) the beneficiary block, we calculate

expenditures by multiplying by the number of beneficiaries in each public pension system from block (3) by the benefits of each public pension system. Finally, in (5) the fiscal balance block, we calculate the fiscal balance as contributions minus expenditures and estimate future reserves.

[8] The difference between the performance of the OSU II and MHLW Models, measured as the average deviation rate through 2100, was 4.97% in the case of the Employees' Pension System.

[9] Other pension simulation models of the post 2004 reform include Okamoto (2003) and Kawase, et al. (2007). Neither of these models reflects the full complexities of the actual pension system; for example, neither incorporates survivors' benefits or disability benefits. Thus, neither model is suited for conducting policy evaluations. However, it should be noted that Okamoto (2003) employs an overlapping generations model to endogenize some of the variables we treat as exogenous and that the comprehensive model of Kawase, et al. (2007) contains a macro-econometric model but that this model is not used when making their pension projections.

[10] The 2004 fiscal projections assume that the growth rate of nominal wages, the nominal long-term interest rate, and the inflation rate remain constant at 2.1%, 3.2%, and 1.0%, respectively, in 2009 and later.

[11] In January 2002, three population projections (the low estimates, the medium estimates, and the high estimates) were released. The benchmark projection uses the medium estimates of population

[12] This reform, heavily influenced by the 1999 reform of Sweden's public pension system,

largely incorporated Hatta and Oguchi's (1999) recommendation that the system shed its pay-as-you-go nature.

[13] Kawase, et al. (2007) and Kitamura, et al. (2006), who compared the impacts of the two systems on intergenerational equity, are more critical of the 2004 reform. Their criticism is based on the rather peculiar comparison they make. They compare the pre-2004 system, whose contribution schedule was based on the 1999 demographic projections, to the post-2004 system, whose contribution schedule is based on the 2004 demographic projections. As discussed in the main text of this paper, the 1999 system had become fiscally unsustainable even before the 2004 reform. The 2004 reform can be evaluated fairly only if the post-2004 system is compared to the pre-2004 system after adjusting the contribution rate schedule of the latter system in such a way that the two systems would attain the same degree of fiscal solvency given the same demographic projections. This is exactly what we do in the current paper.

[14] Regarding the conversion to a consumption tax rate, we forecast future aggregate consumption and thence the future schedule of the consumption tax rate using the future rate of decrease of population and the future income growth rate.

[15] Note, however, that to the extent that a labor shortage emerges, firms will substitute capital for labor, which will increase the demand for investment, which in turn will partially offset the reduction in the demand for investment causes by population declines.