Understanding the Decline in the Japanese Saving Rate in the New Millennium

Tokuo Iwaisako (Minstry of Finance and Hitotsubashi University)

Keiko Okada (Hosei University)

June 11, 2009

Understanding the Decline in the Japanese Saving Rate in the New Millennium[*]

Tokuo Iwaisako[†] and Keiko Okada[‡]

This Draft: June 2009

First Draft: October 2008

Abstract

This paper investigates why the Japanese household saving rate, which fell from the late 1990s to the first few years of the new millennium, suddenly stabilized after 2003. Analyzing income and spending data for different age groups, we argue that this is explained by Japanese corporate restructuring, prompted by the 1997 financial crisis, and the resulting labor income decrease being concentrated among older working households. We believe two important changes in income distribution are associated with this mechanism. First, the negative labor income shock, which was mostly borne by the younger generation in the initial stages of the "lost decade" finally spread to older working households in the late 1990s and early 2000s. Second, there was a significant income shift from labor to shareholders, associated with the corporate restructuring during this time. This resulted in a decline in the wage share, so that the increase in corporate saving offset the decline in household saving.

JEL classification: E2; E6; J4

Keywords: Japanese Saving Rate; Life Cycle Model; Corporate Saving; The 'Lost Decade'; Income Distribution; Household Saving.

</br>

[†]Corresponding author: Policy Research Institute, Ministry of Finance, Japanese Government and Institute of Economic Research, Hitotsubashi University. E-mail : <tokuo.iwaisako@mof.go.jp> Address: 3-1-1 Kasumigaseki, Chiyoda-ku, Tokyo 100-8940, JAPAN.</br>
[‡]Graduate School of Regional Policy Design, Hosei University

1   Introduction

More than twenty years have passed since Fumio Hayashi attempted to explain
the apparently high Japanese saving rate in his seminal article (Hayashi 1986).
Today, Japan is widely recognized as a country with a "declining saving rate".
As shown in Figure 1, the Japanese household saving rate was around 18% at
the beginning of 1980s. It has been declining ever since, falling to 3.3% in 2007.
The total decline is now about 15%, occurring over little more than a quarter of
a century. There is little doubt that this declining trend is mostly explained by
the aging of Japanese society (Horioka 1997; Dekle 2005; Chen, İmrohoroğlu,
and İmrohoroğlu 2006; Braun, Ikeda, and Joines 2008).

[Insert Figure 1 here]

However, in this paper, we would like to emphasize another feature observed
in Figure 1. As shown, there was a significant acceleration of the decline in
saving from the late 1990s to the first few years of the new millennium. In 1998,
the household saving rate was still 11.3%, but it then experienced a decline of
more than 7% decrease over the next five years, reaching 3.9% in 2003. However,
from the end of 2003 until 2007, the saving rate fluctuated in a narrow range
between 3% and 4%.

The first main subject of this paper explains the significant fall and sudden
halt in the declining household saving rate in recent years. We emphasize the
business cycle effect on the saving rate in explaining the decline from the late
1990s to the first few years of the 2000s, as pointed out by some authors in
a rather informal context.[1] Furthermore, we argue that this effect has been
amplified in recent years because the progress of aging makes Japanese house-
hold consumption relatively immune to labor income shocks. We analyze these
problems by investigating income and spending data for different age groups.
When the Japanese economy started to slow in the early 1990s, during the ini-
tial stage of the prolonged stagnation known as the "lost decade" (Hayashi and
Prescott 2002), firms saved labor costs by reducing the number of younger em-
ployees, mostly by not hiring recent graduates. However, in the later stages of

---

[1]See Chapter 2 of Fukuda and Teruyama (2005), for example.

the "lost decade," Japanese firms started seriously restructuring their existing labor force so that the decline in labor income spread to older employees. As the life cycle/permanent income hypothesis implies, we find that the decline in senior workers' spending in this period was limited compared with the decline in their labor income. This explains the sharp decline of household saving in the new millennium and its subsequent halt when the Japanese economy finally started to recover.

In the second half of the paper, we analyze another closely related implication of the Japanese corporate restructuring at the end of 1990s and in the first years of 2000s. We argue that there was a significant shift of income from labor to shareholders during the course of the corporate restructuring in the early 2000s, which resulted in the combination of a decline in household saving and an offsetting increase in corporate saving during this period.

The remainder of this paper is organized as follows. Section 2 considers the aggregate data on output, household income, and consumption in the System of National Accounts (SNA) statistics and uses it to highlight the problems that we investigate. Section 3 examines the income, consumption, and saving of different age groups. The evidence shows that the concentration of the income decline among older working households after the 1997 financial crisis generated a decline in the saving rate in this group and perhaps contributed to the acceleration of the decline in saving in the new millennium. Section 4 discusses why the labor income decline occurred. We emphasize two changes in income distribution underlying this decline: the shift from old to young households, and that from labor to shareholders. Section 5 provides a conclusion.

2   Output, Income, and Consumption in the GDP Data

In this section, we examine the aggregate data to highlight the problem and preview the analyses in the following sections. Table 1 provides the growth rates of real output, income, and consumption expenditure based on the GDP statistics. We split our 16-year sample into two subsamples, before and after 1998,

because, as Horioka (2006) pointed out, there was a series of banking panics in the second half of 1997, which created enormous uncertainty for households and set the stage for the prolonged stagnation of the Japanese economy from 1998.[2] As observed in Figure 1, there was a small hike in the saving rate in 1998 and a rapid decline from 1999. One interpretation of this hike is that households decreased their consumption because they anticipated the future decline of income that the financial crisis was going to cause, as implied by the permanent income hypothesis (Campbell 1987). Also the 1998 increase is often interpreted as a temporary increase of precautionary saving, a rational response by households to the uncertainty and anxiety created by the financial crisis in late 1997 (see also Doi 2001; Murata 2003; Saito and Shiratsuka 2003).

[Insert Table 1 here]

The figures in Table 1 reveal several interesting points. In 1990–98, household income and consumption exhibited very similar growth rates, but both grew more rapidly than GDP. At the same time, whereas average GDP growth rates are almost the same before and after 1998, household disposable income growth is much lower in the second subsample period. Consumption growth is also lower in the second subsample, although the difference between the subsamples is smaller than in the case of household disposable income growth.

We can draw some interesting implications from Table 1. First, the growth of household income and consumption at a faster rate than GDP suggests that the wage share in the Japanese economy was higher in the early stages of the post-bubble economic stagnation, the so-called "lost decade." This probably means that real wages had become too high in this period. Second, during the second subsample, commencing from the late 1990s, "consumption was weak" but the "saving rate was rapidly declining." At first, this may sound somewhat contradictory. The main reason why "consumption was weak" is that household income was growing at a lower rate than output, as pointed out by Horioka (2006). Therefore, the size of the total output 'pie' available for Japanese households

---

[2] Yamaichi securities and Hokkaido Takushoku bank failed in November 1997. See Hoshi and Kashyap (2001, Chapter 8; 2005) for details of the banking panics in Japan in the late 1990s.

3

was decreasing. At the same time, as consumption growth was higher than income growth, households were consuming an increasingly larger fraction of the pie in the second subsample. In other words, if the household saving rate had not decreased so rapidly, consumption growth would have been even weaker and output growth much lower in the first half of the 2000s.

3 The Effect of Aging on the Short-run Behavior of the Saving Rate

The discussion of the aggregate data in the previous section suggests that there are two questions to be addressed in attempting to understand the rapid decline in the saving rate from the late 1990s to the first half of the 2000s. First, it is puzzling why consumption growth did not fall as much as household income growth during this period. Aging explains why there is a declining trend in the Japanese household saving rate in the long run. However, sinceaging is such a monotonic trend, it is difficult to explain why the declining saving trend suddenly accelerated in the late 1990s and then stopped declining around 2003/04 by the effect of aging alone. Second, we have to understand why household income growth was much lower than GDP growth during this period. In this section, we discuss the first question and argue that the conventional life cycle model of consumption will provide a satisfactory answer. Then, we analyze the data for different age groups and the aggregate data and bearing.

3.1 The Effect of Aging on the Stability and Procyclicality of the Saving Rate

The basis of our explanations for the recent behavior of the Japanese saving rate is in the following straightforward conjectures, derived from the conventional life cycle model of consumption/saving.

Conjecture 1 *The household saving rate becomes unstable and more procyclical as the proportion of older households increases.*

Another conjecture, almost identical to the first one is as follows.

Conjecture 2 *The saving rate will be more unstable and procyclical if the aggregate income shocks are more concentrated among older households.*

These conjectures are derived from the fact that, in the life cycle model, the fraction of human wealth—the present value of the future labor income stream—in total wealth, or permanent income, becomes smaller as a household ages. There are two reasons why we believe that this mechanism is relevant and quantitatively important. First, the existence of precautionary saving and/or liquidity constraints significantly strengthens the correlation between a current income shock and the total wealth of a household in its earlier stage of life, by limiting its borrowing to finance current consumption. Second, existing empirical studies suggest that shocks in household incomes are mostly persistent. This implies that current income is correlated with human wealth more than with physical wealth, such as financial assets and housing. As consumption is a function of total wealth, this implies that the marginal propensity to consume out of labor income will become smaller as the household ages. As the marginal propensity becomes smaller, and if the average size of the income shocks remain unchanged, then the ratio of consumption to current labor income (the inverse of the saving rate) becomes unstable and more countercyclical.

Let us restate the above argument in a more concrete way. Consider the basic forward-looking consumption function usually contained in later chapters of macroeconomics textbooks (e.g., Blanchard 2008; Romer 1996):

$$C_t = C(TW_t) = C(A_t + H_t) \tag{1}$$

$$H_t \equiv \mathrm{E}_t \sum_{s=1}^{T} \left(\frac{1}{1+i_{t+s}} \right)^s Y_{t+s}, \tag{2}$$

where TW_t is household's total wealth. The second equality in (1) means that total wealth is the sum of nonhuman wealth A_t and human wealth H_t, where A_t consists mostly of financial and housing wealth. Equation (2) defines the human wealth H_t as the expected present value of current and future labor income at time t.

Empirically, C_t, A_t, and Y_t are observable, but H_t is not. However, we know that aggregate Y_t should be involve a highly persistent time series, as aggregate output is highly persistent. In addition, there is a great deal of recent microeconomic evidence suggesting that shocks to the labor income of households contain significant permanent components.[3][4] Hence, it is natural to approximate human wealth H_t by the linear function of current income Y_t, as in Laibson (2000) and Lettau and Ludvigson (2001).[5] The relevant point in the context of this paper is that, because of the persistence of Y_t, other things being equal, the correlation of current income with current human wealth should be much higher than its correlation with current financial wealth. Therefore, $\mathrm{Corr}(Y_t, H_t) >> \mathrm{Corr}(Y_t, A_t)$.

Next, we discuss how physical wealth and human wealth evolve over the life cycle. Young households that have just commenced working, typically have very little financial/housing wealth A_t, but have lots of human wealth H_t. During its working years, a household exchanges its human wealth for consumption C_t and physical wealth A_t (Carroll and Samwick 1997; Hubbard, Skinner, and Zeldes 1995). Because of our presumption that Y_t and H_t are more strongly correlated with each other than are Y_t and A_t, we expect that TW_t becomes less correlated with Y_t as a household ages. As household consumption is the function of its total wealth, this implies that the correlation between C_t and Y_t will be weaker as a household ages. In other words, the consumption of older households is relatively more independent of labor income fluctuations than is the consumption of young households.

The existence of precautionary saving and/or liquidity constraints will make this implication quantitatively much more important. The models of precautionary saving imply that labor income uncertainty prevents a young household from borrowing because of future labor income uncertainty. As a result, consumption and income move closely with each other while a household is at the early stage of its life. Based on his simulation studies using parameters matched

---

[3] See Meghir and Pistaferri (2004) for a recent example.

[4] *** We need more citations. We also need the citations of Japanese evidence here.***

[5] If we assume a constant growth rate of income g and a constant discount rate i, we obtain the approximating formula, $H_t \simeq Y_t/(i - g)$. Laibson (2000) used this equation, carefully choosing parameter values of i and g. Lettau and Ludvigson (2001), on the other hand, simply modeled $\log H_t$ as the linear function of $\log Y_t$, so that $h_t = \alpha + y_t + \epsilon_t$.

to US data, Carroll (1997, 2001) suggested that households only start to behave as suggested by the certainty-equivalent model of life cycle consumption after they reach the age of 50. This implies that current consumption becomes insensitive to the fluctuations of current labor income when the household has fewer than ten working years remaining.

Our argument here is a very straightforward extension of the life cycle/permanent income hypothesis. Although this claim has not gathered much attention, it will have significant implications for the stochastic behavior of the household saving rate s_t in aging economy:

$$s_t = 1 - \frac{C_t}{Y_t} = 1 - \frac{C\left(A_t + H_t\right)}{Y_t}.$$

As the population ages, aggregate C_t/Y_t increases so that s_t naturally decreases. However, aging also makes aggregate C_t/Y_t, so that the aggregate saving rate becomes more volatile. This is because individual consumption becomes less correlated with labor income as a household ages. Hence, as the aging of the economy progresses, the household saving rate s_t becomes more unstable and more strongly correlated with aggregate labor income, as stated in *Conjecture 1*. Based on the same logic, the saving rate will be more procyclical if the aggregate income shocks become more concentrated among the older groups in the economy, as claimed in *Conjecture 2*.

3.2 Analysis of the Age Group Data

In this subsection, keeping the argument in the previous subsection in mind, we examine the age group data on income and consumption from the Family Income and Expenditure Survey (FIES). The discrepancy between household saving rates in the GDP statistics and in FIES data is well known (Ueda and Ohno 1993; Iwamoto, Ozaki, and Maekawa 1995a, 1995b; Unayama 2008). In that sense, the following empirical analyses are somewhat bold attempts. However, there is no other really good data source that we can use for the examination of the consumption/saving behaviors of different age groups over a reasonably long time span. Even though the empirical results here have to be considered with caution, we believe that they provide many useful insights.

Figure 2 shows the saving rates of working households by age groups, based on the data on two or more family members in the FIES. Panel A shows the aggregate saving rate and the demographic change in this data source. In the first graph, the saving rate from the FIES data starts to decline only after 1999. This contrasts sharply with the household saving rate data from the GDP statistics, shown in Figure 1. However, we would like to emphasize here that the timing of the commencement of the decline corresponds to the timing of the acceleration of the decline in that shown in Figure 1. Another notable point from Panel A is the sharp contrast between the smooth aging trend in the working population and the rather large swings in the saving rate. The demographic trend is obvious — the percentage of individuals in their 50s and 60s doubled in the period from 1980 to 2007, growing from little more than 20% to over 40%. However, this trend is monotonic and very smooth. Hence, it is difficult to generate the observed large fluctuations in the aggregate saving rate as a result of the demographic change alone. In fact, if we fixed the relationship between age and saving rates according to the data in a particular benchmark year, it is impossible to generate more than a 0.3% fluctuation in the aggregate saving rate in the 1998–2005 period, no matter which benchmark year we choose, despite the fact that the aggregate saving rate fell about 3.5% in this period. Apparently, therefore, the dominant force behind the fluctuations in the aggregate saving rate decline from the late 1990s through to the first half of 2000s in the FIES data is the changes in the saving rates of individual age groups.

[Insert Figure 2 here]

Panels B to E examine the saving rate behaviors by age groups. In Panel B, the saving rates of age groups 30–34, 35–39, and 40–44 are shown. There is a relatively large decline in the saving rate in 2003–2005 and there is another much smaller decline in 1994, at the beginning of the slowdown of the real economy. Except for these two short time periods, the saving rates for these age groups mostly increase during our sample period. Although such a monotonic upward trend is an interesting and important question in itself, here we take it as given and concentrate our discussion on the differences in saving rate behaviors in different age groups. As these three age groups behave relatively similarly to

8

each other, they are merged into one group and used as the benchmark in the following discussion.

Panel C plots the youngest group, aged 25–29, against this benchmark. As the population of this age group is very limited, it exhibits significant ups and downs. However, the global peak of this age group's saving rate occurs in 1997. Panel D shows three relatively older age groups. The saving rates of these groups increase throughout the 1980s and peak sometime between 1994 and 1998. After bottoming out in 2004, these saving rates pick up in 2005–2007. For all age groups in their 20s to 50s, shown in Panels B, C, and D, the saving rates in 2007 have reached their 1990 levels, or higher. On the other hand, the saving rates of the groups in their 60s, shown in Panel E, have declined significantly in recent years. The saving rates of this group show an increasing trend in the first half of the sample but they begin to decline significantly after the financial crisis of 1997/98 and, by 2007, fall to the level of the early 1980s. Overall, we can conclude that the saving rates of working households started to decline only in the late 1990s and that this decline was much more pronounced in both the youngest and, especially, the oldest working households. Then, the decline suddenly stopped around 2005/2006. These patterns are mostly consistent with aggregate saving behavior shown in the GDP statistics from the late 1990s to 2007.

To see the mechanism behind the fluctuations of the saving rates, we plot the income and spending of each age group in Figure 3.[6] The notable common feature in all age groups is a plateau in the income trend during the mid-1990s. The increase in disposable income stopped as early as 1991/1992. However, the decline in income did not commence for another seven or eight years, until the late 1990s, after the 1997 financial crisis. Another notable feature is the parallel movements of consumption and saving in younger age groups, up to and including the 50–54 age group. For the 55–59 and above age groups, the fluctuations in consumption are much lower than those of the income variables. This pattern roughly matches the suggestion in the literature that precautionary saving occurred (Carroll 2001; Carroll and Summers 1991).

---

[6] Many policy economists have provided similar analyses to those presented in Figure 3, emphasizing the increase in income inequality and the dispersion of the saving rate, for example, see Sadahiro (2005).

[Insert Figure 3 here]

In Table 2, we statistically check our observations about the graphs in Figure 3, by regressing the consumption–income ratio of each age group on its own lagged value, a constant term, and the linear time trend.[7] Estimated coefficients of the lagged consumption–income ratios are smaller and the trend terms are more statistically significant for the middle age groups compared with those in their 20s and those over 55. Hence, these regression results suggest that the fluctuations in the consumption–income ratios of the core working age groups, i.e., those aged 30 to 54 and, particularly, 35 to 49, exhibit significantly less persistence. Therefore, these age groups have more stable consumption–income ratios.

[Insert Table 2 here]

Table 3 examines the same problem, concentrating on the periods before and after the financial crisis. First, while income growth slowed between the pre-1998 and the post-1998 samples, the decline is more pronounced for the older generations, namely, age 55–59 (-1.4%), 60–64 (-1.54%), and "65 and over" (-2.2%). Second, the volatility of income growth is relatively lower for the younger age groups that were more likely to have stable regular jobs. For the age groups between 30 and 54, the standard error of Δy is 2.5%. The youngest group (age 25–29) and the age groups older than 55 have standard deviations higher than 3%. From these two observations, it is apparent that the income shock after the financial crisis of 1997/98 was concentrated among older households. Third, the correlations between income growth and the consumption–income ratio (C/Y) are negative for the youngest group and the groups aged 50 and above . This result is consistent with the regression results in Table 2. Finally, consumption–income ratios are more volatile for the age groups over 60. In summary, consumption–income ratios are countercyclical (and thus the saving rate is procyclical) for age groups older than 50, and consumption–income ratios are unstable for the group over age 60. Overall, the evidence in Tables 2 and

---

[7]Admittedly, these are strange regressions since the sample cohort consisting consumption-income ratio slightly changes year by year.

3 and Figures 2 and 3 supports our conjecture that the concentration of the income growth decline among older working households after 1998 contributed to an acceleration of the aggregate saving decline from the late 1990s to the early 2000s because the saving rates of the older working households were more sensitive to income shocks.

[Insert Table 3 here]

In Figure 4, we present additional evidence based on unemployment rates that the income shocks affected the younger generations in the early stages of the "lost decade", but did not extend to older working households until the late 1990s. Until 1997, the unemployment rate among persons aged 35 to 59 years did not increase significantly. Unemployment was more pronounced for younger age groups in their 20s and early 30s during 1993–1997. From 1998, the unemployment rate for all age groups increased, peaking in about 2001/2002. Then, unemployment rates significantly decreased from 2003/2004, the timing of which is consistent with the sudden halt in the decline in aggregate saving shown in Figure 1.

[Insert Figure 4 here]

3.3 Analysis of the Aggregate Data

In this subsection, we examine the aggregate data to see if our conjectures provide reasonable explanations for recent movements in the aggregate saving rate. We would like to test whether the saving rate has become unstable and more procyclical in recent years. However, our conjectures suggest that the aging population will cause a downward shift of the saving rate's time trend and, at the same time, increase its short-run volatility and procyclicality. Empirically distinguishing these two effects in the limited sample size is tricky, so that the empirical evidence in this section should be treated with caution.

Instead of examining the saving rate, we consider the aggregate consumption–income ratio, as in the previous subsection. In Table 4, we directly examine

11

whether the instability of the log consumption–income ratio $(c_t - y_t)$ increased after the financial crisis in the late 1990s, dividing the sample at the third/fourth quarter of 1997. The estimated coefficients differ depending on whether the various time trends. However, the overall estimation results in Table 4 strongly suggest that the consumption–income ratio became more volatile after the late 1990s, in the sense that consumption–income ratio $c_t - y_t$ is more dependent in relation to its own lagged variable, so that the shocks to the consumption–income ratio tend to have more persistent effects in the later subsample. We also check the countercyclicality of $c_t - y_t$ by including current income growth in the explanatory variables. In the specifications we have considered, consumption growth is equally significant in both subsamples in explaining current $c_t - y_t$, so that we could not find strong support for the second half of our conjectures.

[Insert Table 4 here]

In Table 5, we estimate the VAR system, consisting of consumption and income growth with the lagged consumption–income ratio. This is roughly same as the VAR system used in Cochrane (1994). The only difference is that our system includes household income instead of the GNP used in Cochrane's system. A comparison of the subsamples provide some interesting results. First, according to the results of the Granger causality test reported in Panel A, the lagged income Δy_t becomes more significant in explaining current consumption growth in the later subsample. This result is also confirmed by the variance decomposition for Δc_t in Panel B. Before the financial crisis, 97% of the fluctuations of Δc_t were explained by the shocks in Δc_t itself. However, after the financial crisis, 26% of them are attributed to Δy_t shocks. As discussed in the previous section and will be dicussed in details in the next section, the subsample after the financial crisis includes the special period from the late 1990s to early 2000s, during which the decline of household income caused a substantial decline in consumption. Therefore, the increased effect of income on consumption is quite understandable.

Second, in the earlier subsample, the most significant factors in the equation for Δy_t are its own lagged variables. On the other hand, in the subsample after

12

the financial crisis, the lagged consumption–income ratio becomes significant in explaining current Δy_t, whereas lagged Δy_t becomes insignificant. As $c_{t-1} - y_{t-1}$ can be considered to be an error correction term, this implies that the temporary component in income fluctuations, unrelated to permanent consumption shocks, has increased in significance after the financial crisis.

4   Understanding the Household Income Decline in the New Millennium

In this section, we examine the second question posited at the beginning of Section 3 and explore why household income growth was much lower than GDP growth from late 1990 until the new millennium. In addition, we draw some macroeconomic implications from the changes in the income and saving rates of the different age groups since the early 1990s.

4.1   Substitution between Household and Corporate Saving

Let us recall the relationship derived from the basic national income identities:

$$(I - S) + (G - T) + CA = 0, \tag{3}$$

where CA is the current account and the remaining variables are as usually defined. This equation states that net demand for funds in one country, comprising private sector $(I - S)$, government sector $(G - T)$, and foreign sector (CA) demands, must equal zero. Therefore, the sum of the current account surplus and the government deficit must equal the difference in private sector saving and investment (Sachs 1981). From the late 1990s until early 2008, the Japanese current account has been positive $(CA > 0)$ because of the weak Yen. Since the fiscal expansion of the Obuchi administration (July 1998–April 2004), the accumulating government debt has been a serious concern for economists and policy makers (Ihori, Doi, and Kondo 2001; Ito, Watanabe, and Yabu 2006; Doi, Ihori, and Mitsui 2007). $(G - T)$ has also been positive. Hence, the last two terms in the left-hand side of equation (3) have definitely been positive in recent years

On the other hand, as we have shown in this paper, the household saving rate declined very sharply in the late 1990s and the first half of the 2000s. To keep the left-hand side of the equation equal to zero, private investment should have declined more drastically than did household saving, but we have not observed such a significant decline in investment.

Only one explanation remains: corporate saving must have increased, thereby offsetting the decline in household saving.[8] Figure 5 confirms this is exactly what was happening. Around the turn of the century, household saving and corporate saving were moving in opposite directions, with aggregate private sector saving mostly unchanged.

[Insert Figure 5]

The apparent substitution between household saving and corporate saving during this period is evidence of a significant shift in the income distribution from labor to stockholders. This is the same phenomenon that Saito (2007) called "substitution between household consumption and corporate investment."

Looking at the wage shares, Figure 6 provides more direct evidence. We report three different wage shares in the 1990–2006 time period. Their peaks are slightly different, but all three wage share series are hump shaped, peaking around 1998–2001. Therefore, they are consistent with the evidence in the two previous sections that the restructuring of labor was delayed and real wages were becoming too high in the initial stages of the "lost decade". From the late 1990s, Japanese corporations increased their saving by cutting their labor costs drastically, as shown in Figure 4. This does not necessarily mean that they increased retained earnings. They also used their increased cash flows to write off nonperforming loans and to lower their outstanding debt, so that the net worth of Japanese firms increased substantially in the early 2000s. Hence, despite the household saving rate decline, this explains why GDP growth and stock prices were relatively strong in the first half of the 2000s.

---

[8] Our earlier paper (Iwaisako and Okada, 2008) and Matsubayashi (2008) independently pointed out the apparent substitution between corporate and household saving in Japan in recent data.

14

[Insert Figure 6]

When the restructuring of Japanese corporations finally picked up in the late 1990s to the early 2000s, a significant change in the income distribution occurred among stakeholders; that is, labor income declined, whereas shareholders income increased. Combined with the fact that the aging population made household consumption relatively insensitive to income shocks, this explains why Japanese household saving fell so rapidly at the dawn of the new millennium. Another perspective on the change in the income distribution at this time is that older workers in their late 50s and 60s bore the brunt of the Japanese corporate restructuring. This effect, which corresponds to our *Conjecture 2* in Section 3, is another important reason why aggregate household saving declined at the beginning of the century and then stopped declining when the economy started to recover. Overall, incorporating changes in income distribution into the analysis is quite important in gaining a better understanding of the consumption/saving and macroeconomic dynamics of the Japanese economy in the last 20 years.

4.2 Discussions

Economic interpretation of recent increases in corporate saving requires careful discussion about underlying assumptions.[9] From an extreme neoclassical viewpoint, the assets of private corporations are ultimately owned by households, so that corporate saving and household saving are just different 'purses' belonging to the same person. If we adopt this "corporate veil view" there was no significant decline in private sector saving throughout the 1990s and 2000s. Therefore, no explanation is required, as there was no major saving decline. For example, in his discussion on the Japanese current account during this period, Matsubayashi (2008) argued that Japan does not have to worry about the saving rate decline, implicitly presuming that the "corporate veil view" definitely holds. There is some truth in this explanation because older households' losses in labor income were partially offset by the increase of stock prices if they were stockholders. However, as reported in Iwaisako (2003), household participation in the stock market is still very limited in Japan. In addition, it has been argued

---

[9]See Poterba (1987) for an economic interpretation of corporate saving in a more general context.

that many of the successful corporate restructures in Japan were achieved due to pressure from large foreign shareholders.[10]

A similar argument can be applied to the relationship between private sector and public sector saving. If we take the Ricardian equivalence theorem seriously, government saving and household saving are perfect substitutes. This implies that recent budget deficits by the Japanese government should have been incorporated into the consumption/saving decision by Japanese households. At the national level, as the Japanese current account surplus gradually fell, there was an obvious decline in Japanese saving. Recent studies adopting dynamic general equilibrium models and emphasizing productivity decline in explaining the saving rate decline, such as Chen et al. (2006) and Braun et al. (2008), implicitly took this view by discussing Japanese national saving, not household or private sector saving.

However, we are not fully comfortable with such recent neoclassical studies. First, the perfect foresight assumption about household expectations is critical for their explanations, as Chen et al. (2006) acknowledged. Hence, their simulation results will have difficulties in explaining the sudden acceleration in the saving decline from the late 1990s to the early 2000s and, especially, the slowdown of this trend in 2003/2004. Second, in these studies, the change in productivity growth affects the saving rate through its impact on the rate of return on capital. However, a change in the interest rate will have a major effect on household saving only if the change is persistent and the household has a sufficiently long investment horizon (Summers 1981). Accordingly, if the persistently low interest rates from the mid-1990s caused the rapid decline of the Japanese saving rate, the effect should have been more apparent in younger households. As shown in Figure 2, younger households actually *increased* their saving over the last 20 years, so that the saving rate profile became relatively more downward sloping with age in the cross-section data. This is inconsistent with the explanation of the low interest rate as the cause of the low saving rate.[11]

---

[10]***We need citations here****

[11]At least in the steady-state analysis, it is inconsistent. We still do not deny the possibility that the low interest rate actually caused the saving rate to decline as the transition dynamics can be much more complicated.

Hence, our standpoint in this paper is that it is difficult to fully comprehend the dynamics of the macroeconomic variables in the recent Japanese economy by adopting an extreme neoclassical viewpoint. Accordingly, it is important to pay attention to changes in the income distribution, such as between labor and shareholders and among different age groups.

5   Conclusions

This paper investigates why the Japanese household saving rate fell so significantly from the late 1990s to the first years of the new millennium and then suddenly stopped declining around 2003/2004. The aging population surely caused the declining trend in the saving rate. However, as an important side effect, the aging population also made the aggregate saving rate relatively unstable and more procyclical as older households' consumption tends to be less sensitive to income shocks. Analyzing the income and spending data of different age groups, we argue that the combination of such a side effect of aging and the significant labor income decline, prompted by the 1997 financial crisis, explains the sudden acceleration in the decline of the saving rate in the approximately five-year span surrounding the turn of the century. Two important changes in income distribution were associated with this mechanism. First, a negative labor income shock, which was mostly borne by the younger generation in the initial stages of the "lost decade" finally started to spread to older working households after 1997. This further accelerated the saving rate decline. Second, there was a significant shift of income from labor to shareholders during the course of the corporate restructuring in the early 2000s. The latter effect explains why consumption growth was so slow even though the saving rate was declining significantly at the same time.

We have not fully explored several important issues in this paper. First, we have not investigated which Japanese firms increased their saving in the early 2000s and what they really did with their increased saving. Second, it is widely speculated that the increased inequality also affects the aggregate saving rate.[12]

---

[12]***Need citations. Perhaps, only in popular discussions.***

The distribution of income shocks among different age groups is examined, but the effect of heterogeneous income shocks within the same cohort has not been analyzed in this paper.

This paper's findings have some general implications. First, as the saving rate becomes unstable and more procyclical, the deterministic simulations based on a life cycle/OLG model, widely used in policy research related to aging studies, create a potential overfitting of data. In general, policy makers in the aging economy should not be too sensitive to the short-run decline of the saving rate, especially during the recession. Second, the theoretical prediction that older working households do not change their consumption as much as younger households suggests that expansionary policies directly affecting household income, such as tax cuts or the distribution of coupons, will be less effective in an aging economy. Third, the fact that Japanese wage shares have fluctuated so much in recent years has important implications for consumption-based asset pricing models. The canonical consumption-based model is perhaps a good approximation if the wage share is very stable over time. However, if the share fluctuates over time, it implies shifts in the income distribution between labor and stockholders. Hence, unless all stocks are held by workers and all workers hold identical portfolios, the labor/capitalist distinction will matter for the pricing of assets. Put differently, good times for retired investment bankers can be bad times for young factory workers. This argument is closely related to the stockholder/nonstockholder distinction in asset pricing (Mankiw and Zeldes 1991; Vissing-Jorgensen 2002; Lustig and Van Nieuwerburgh 2006) and perhaps adds some important insights to this problem.[13]

To conclude, the main message derived from this paper's analyses is clear. As the aging population makes the saving rate unstable and more procyclical, we should not be excessively concerned if there is a sudden saving rate decline in a recession, such as occurred in the late 1990s and the first few years of the new millennium in Japan. The effect of the ongoing global financial crisis will present an ideal litmus test for this argument: if our analyses are correct, we

---

[13]One of the authors of the present paper has written a paper applying Lettau and Ludvigson's (2001) version of the consumption-based model to Japanese data (Aono and Iwaisako 2008) and found that the Japanese consumption–wealth ratio has become very unstable in recent years. Such instability in the consumption–wealth ratio is likely to be closely related to the instability of the propensity to consume studied in this paper.

will observe another significant decline in the Japanese household saving rate when the 2008 GDP data are released. At a more profound level, our analyses suggest that the changes in income distribution have played important roles in the recent macroeconomic dynamics, especially in the consumption/saving dynamics of the Japanese economy. Hence, researchers should devote more time and effort to researching this area.

References

- Aono, Kohei and Tokuo Iwaisako (2008) "The Consumption–Wealth Ratio, Real Estate Wealth, and the Japanese Stock Market," Institute of Economic Research Discussion Paper, #A.504, Hitotsubashi University.

- Blanchard, Olivier (2008) *Macroeconomics*, 5th ed., Prentice Hall.

- Braun, R. Anton, Daisuke Ikeda, and Douglas H. Joines (2008) "The Saving Rate in Japan: Why it has Fallen and Why It Will Remain Low," *CARF Working Paper, CARF F 117*, January 2008, University of Tokyo.

- Campbell, John. Y. (1987), "Does Saving Anticipate Declining Labor Income? An Alternative Test of the Permanent Income Hypothesis," *Econometrica* 55(6):1249–73.

- Carroll, Christopher D. (1997) "Buffer Stock Saving and the Life Cycle/Permanent Income Hypothesis," *Quarterly Journal of Economics* CXII(1):1–56.

- — (2001) "A Theory of the Consumption Function, With and Without Liquidity Constraints," *Journal of Economic Perspectives* Summer 15(3):23–46.

- Carroll, Christopher D. and Andrew A. Samwick (1997) "The Nature of Precautionary Wealth," *Journal of Monetary Economics* 40(1):41–71.

- Carroll, Christopher D. and Lawrence H. Summers (1991), "Consumption Growth Parallels Income Growth: Some New Evidence," in B. Douglas Bernheim and John B. Shoven eds., *National Saving and Economic Performance*, Chicago: University of Chicago Press.

- Chen, Kaiji, Ayşe İmrohoroğlu, and Selo İmrohoroğlu (2006) "The Japanese Saving Rate," *American Economic Review* 96(5):1850–58.

- Cochrane, John H. (1994) "Permanent and Transitory Components of GNP and Stock Prices," *Quarterly Journal of Economics* CIX:241–66.

- Dekle, Robert (2005) *Understanding Japanese Saving: Does Population Aging Matter?* Routledgecurzon Studies in the Growth Economies of Asia, Routledge.

- Doi, Takero (2001) "Chochiku ritsu Kansuu ni motozuku Yobi teki Chochiku Kasetsu no Kenshou (A Test of the Precautionary Saving Hypothesis using a Saving Rate Function)," ESRI Discussion Paper No. 1, Economic and Social Research Institute, Cabinet Office, Government of Japan (in Japanese).

- Doi, Takero, Toshihiro Ihori, and Kiyoshi Mitsui (2007) "Sustainability, Debt Management, and Public Debt Policy in Japan," in Takatoshi Ito and Andrew Rose eds., *Fiscal Policy and Management in East Asia*, East Asia Seminar on Economics 16, 377–412, Chicago: University of Chicago Press.

- Fukuda, Shin-ichi and Hiroshi Teruyama (2005) *Macroeconomics: Introduction* (in Japanese, Macro Keizaigaku: Nyumon), 3rd ed., Yuhikaku.

- Hall, Robert E. (1978) "Stochastic Implications of the Life Cycle–Permanent Income Hypothesis: Theory and Evidence," *Journal of Political Economy* 86(6): 971–87.

- Hayashi, Fumio (1986) "Why is Japan's Saving Rate so Apparently High?," in S. Fischer ed., *NBER Macroeconomics Annual*, MIT Press, 147–210.

- Hayashi, F. and E.C. Prescott (2002) "The 1990s in Japan: A Lost Decade," *Review of Economic Dynamics* 5(1):206–35.

- Horioka, Charles Y. (1997) "A Cointegration Analysis of the Impact of the Age Structure of the Population on the Household Saving Rate in Japan," Review of Economics and Statistics 79 (3):511–516.

- — (2006) "The Causes of Japan's 'Lost Decade': The Role of Household Consumption," *Japan and the World Economy* 18:378–400.

- Hoshi, Takeo and Anil K. Kashyap (2001) *Corporate Financing and Governance in Japan: The Road to the Future*, MIT Press.

- — and — (2005) "Solutions to Japan's Banking Problems: What Might Work and What Definitely Will Fail," in Takatoshi Ito, Hugh Patrick, and David E. Weinstein eds., *Reviving Japan's Economy: Problems and Prescriptions*, MIT Press.

- Hubbard, R. Glenn, Jonathan Skinner, and Stephen P. Zeldes (1995) "Precautionary Saving and Social Insurance", J*ournal of Political Economy*, Vol.103, No.2., pp.360-399.

- Ihori, Toshihiro, Takeo Doi, and Hironori Kondo (2001) "Japanese Fiscal Reform: Fiscal Reconstruction and Fiscal Policy," *Japan and the World Economy* 13:351–370.

- Ito, Arata, Tsutomou Watanabe, and Tomoyoshi Yabu (2006) "Fiscal Policy Switching: Evidence from Japan, US, and UK." http://www.nber.org/~confer/2006/jpmf06/watanabe.pdf.

- Iwaisako, Tokuo (2003) "Household Portfolios in Japan" NBER working paper #9647, forthcoming in *Japan and the World Economy.*

- Iwaisako, Tokuo and Keiko Okada (2008) "Consumption and Saving in Japan: Overview since the 1980s (in Japanese)," Paper prepared for the Cabinet Office project.

- Iwamoto, Yasushi, Tetsu Ozaki, and Yuki Maekawa (1995a) "The Discrepancy of Saving Rate Behaviors in Family Income and Expenditure Survey and in GDP Statistics: (1) Differences in Concept and Sample Bias (in Japanese)," *Financial Review (Ministry of Finance)*, No.34.

- —, —, and, — (1995b) "The discrepancy of Saving Rate Behaviors in Family Income and Expenditure Survey and in GDP Statistics: (2) Inconsistency between Micro and Macro Data (in Japanese)," *Financial Review (Ministry of Finance)*, No.34.

- Japan Institute for Labor Policy and Training (2008) *Useful Labor Statistics 2008*, http://www.jil.go.jp/kokunai/statistics/kako/.

- Laibson, David (2000) "Comment to 'Spendthrift in America? On Two Decades of Decline in the US Saving Rate' by Jonathan A. Parker," in Ben S. Bernanke and Julio Rotemberg eds., *NBER Macroeconomics Annual 1999.*

- Lettau, Martin and Sydney Ludvigson (2001) "Consumption, Aggregate Wealth, and Expected Stock Returns," *Journal of Finance* 56:815–49.

- Lustig, Hanno and Stijn Van Nieuwerburgh (2006) "The Returns on Human Capital: Good News on Wall Street is Bad News on Main Street," *Review of Financial Studies*, 21(5):2097–2137

- Matsubayashi, Y. (2008) "Household Saving, Corporate Saving and Government Saving; Substitutability for Saving by Sectors in Japan and the US (in Japanese)," Economic Research, Cabinet Office, forthcoming.

- Mankiw, N. Gregory and Stephen P. Zeldes (1991) "The Consumption of Stockholders and Nonstockholders," *Journal of Financial Economics* 29(1):97–112.

- Meghir, Costas and Luigi Pistaferri (2004) "Income Variance Dynamics and Heterogeneity," *Econometrica* 72 (1):1–32.

- Murata, Keiko (2003) "Precautionary Savings and Income Uncertainty: Evidence from Japanese Microdata," IMES Discussion Paper No. 2003 E 9, Institute for Monetary and Economic Studies, Bank of Japan.

- Poterba, James M. (1987) "Tax Policy and Corporate Saving," *Brookings Papers on Economic Activity*, 18(2):455–516.

- Romer, David (1996) *Advanced Macroeconomics*, McGraw-Hill.

- Sachs, Jeffrey D. (1981) "The Current Account and Macroeconomic Adjustment in the 1970s," *Brookings Papers on Economic Activity* 1:201–82.

- Sadahiro, Akira (2005) *Macroeconomic Analyses of Postwar Japan* (in Japanese: Sengo Niho no Macro Keizai Bunseki), Toyo keizai Shinposha.

- Saito, Makoto (2007) "Substitution between Household Consumption and Equip Investment: Based on Capital Accumulation in Japanese Economy in Recent Years (in Japanese)," Ishikawa Prize Lecture, Japanese Economic Association Meeting, October.

- Summers, Lawrence H. (1981) "Capital Taxation and Accumulation in a Life Cycle Growth Model," *American Economic Review* 71(4):533–44.

- Unayama, Takashi (2008) "The Discrepancy of Saving Rates in SNA and in Family Income and Expenditure Survey: An Analysis of Japanese Saving

Rate Decline (in Japanese)," mimeo., Department of Economics, Kobe University: Kobe.

- Ueda, Kazuo and Tomonori Ohno (1993) "The Puzzle of Household Saving Rate: The Discrepancy between Survey Data and GDP Statistics (in Japanese)," *BOJ Monetary Economic Studies* 12:2, 127–45.

- Vissing-Jorgensen, Annette (2002) "Limited Asset Market Participation and the Elasticity of Intertemporal Substitution," *Journal of Political Economy*, 110(4):825–53.

Table 1

Growth of GDP, Household Income, and Consumption

Average growth rates of real GDP, disposable income (*income*), and total consumption expenditure (*consumption*) of the household sector. "*nondurables*" is expenditure on nondurables and services. "*durables*" is expenditure on durable goods. .

	1991–98	1999–2006
GDP	1.5	1.6
income	1.7	0.3
consumption	1.8	1.4
nondurables	1.8	0.9
durables	2.8	7.1
GDP − income	−0.2	1.3
GDP − consumption	−0.3	0.2
income − consumption	−0.1	−1.1

Notes: The data source is the Japanese Government (Cabinet Office) web site: http://www.esri.cao.go.jp/en/sna/menu.html

Table 2

Stability of the Consumption–Income Ratios of Age Groups

Log consumption–income ratio of age groups $(c_t - y_t)$ are regressed on their own lagged values, a constant term, and the linear time trend:

$$c_t - y_t = \alpha + \beta(c_{t-1} - y_{t-1}) + \gamma \cdot trend$$

We utilize annual data from 1980 to 2007, so that the sample size is 28. The numbers in brackets are heteroskedasticity-robust standard errors calculated by White (1980).

age groups	$c_{t-1} - y_{t-1}$	constant	trend	R^2 $Adj.R^2$	population[1]
25–29	0.707**	−0.067*	−0.001	0.73	5.5(%)
	[0.139]	[0.030]	[0.001]	0.71	
30–34	0.641**	−0.084**	−0.002	0.87	12.6
	[0.164]	[0.033]	[0.001]	0.86	
35–39	0.475**	−0.129**	−0.003**	0.91	15.7
	[0.128]	[0.030]	[0.001]	0.90	
40–44	0.239	−0.186**	−0.004**	0.91	16.0
	[0.164]	[0.038]	[0.001]	0.90	
45–49	0.301	−0.150*	−0.003**	0.84	14.7
	[0.198]	[0.040]	[0.001]	0.83	
50–54	0.566**	−0.110*	−0.001	0.54	13.7
	[0.158]	[0.037]	[0.001]	0.50	
55–59	0.733**	−0.070*	−0.001	0.68	11.8
	[0.131]	[0.033]	[0.001]	0.65	
60–64	0.719**	−0.058*	0.001	0.55	5.9
	[0.116]	[0.024]	[0.001]	0.51	
65 and over	0.705**	−0.053	−0.000	0.49	3.2
	[0.140]	[0.041]	[0.001]	0.45	

Notes: Family Income and Expenditure Survey (two or more family members) data taken from the Statistics Bureau's home page: http://www.stst.go.jp/english/index.htm.

[1] "population" indicate the average percentage in the same year sample. The total number of the sample each year is set to 10,000. Although the original data include a 20–24 age group, this age group is excluded here as its population is too small. It contains around 50 or fewer observations after 2002.

Table 3

Income Growth and the Propensity to Consume of Different Age
Groups Before and After 1998

Δy : Average annual growth rate of household disposable income (percent).

C/Y : **C**onsumption expenditure divided by disposable income (percent).

$S.D.$: Standard deviations in 1991–2007.

$\rho(\Delta y, c/y)$: Correlation in 1991–2007.

	age 25–29		age 30–34		age 35–39	
	Δy	C/Y	Δy	C/Y	Δy	C/Y
$1991-98$	0.57	72.0	0.73	70.0	0.31	70.1
$1999-07$	-0.36	73.7	-0.88	68.1	-0.62	67.2
$S.D.$	3.4	2.2	1.7	2.2	1.1	2.2
$\rho(\Delta y, c/y)$	-0.14		0.13		0.21	

	age 40–44		age 45-49		age 50–54	
	Δy	C/Y	Δy	C/Y	Δy	C/Y
$1991-98$	0.39	71.9	0.11	76.1	0.44	73.7
$1999-07$	-0.18	69.0	-0.48	74.0	-0.81	75.0
$S.D.$	2.3	2.1	2.1	1.5	1.9	1.9
$\rho(\Delta y, c/y)$	0.10		0.14		-0.25	

	age 55–59		age 60–64		Over 65	
	Δy	C/Y	Δy	C/Y	Δy	C/Y
$1991-98$	0.38	71.7	0.25	80.3	2.09	74.4
$1999-07$	-1.38	73.5	-1.54	87.1	-2.19	83.6
$S.D.$	3.2	2.0	3.8	4.7	4.9	6.3
$\rho(\Delta y, c/y)$	-0.16		-0.22		-0.23	

Notes: Calculations based on *Family Income and Expenditure Survey* (two or more
family members) data. The data source is the Statistics Bureau home page: http://www.stst.go.jp/english/index.htm.

Table 4

Stability of the Aggregate Consumption–Income Ratio

Regression for log consumption–income ratio:

$$c_t - y_t = \alpha + \beta_1(c_{t-1} - y_{t-1}) + \beta_2 \Delta ly_t + \gamma_1 \cdot trend + \gamma_2 \cdot DT90$$

	$c_{t-1}-y_{t-1}$	Δly_t (×100)	constant	trend (×100)	DT90 (×100)	R^2 / $Adj.R^2$
1980:Q4	0.567**		−0.155**			0.35
–1997:Q3	[0.105]		[0.039]			0.32
(58 obs.)	0.350		−0.245	0.070*	0.056*	0.44
	[0.140]		[0.053]	[0.027]	[0.027]	0.39
	0.236*	−0.939**	−0.280**	0.081**	−4.038**	0.64
	[0.121]	[0.129]	[0.045]	[0.023]	[1.076]	0.61
1997:Q4	0.876**		−0.035**			0.84
–2007:Q4	[0.043]		[0.013]			0.84
(36 obs.)	0.918**	−0.847**	−0.022**			0.89
	[0.030]	[0.143]	[0.009]			0.88

Notes: y_t is log real income and c_t is log real consumption (nondurables plus services) from the GDP statistics. See the notes for Table 1 for details of the data source. All regressions for the subsample 1980:Q4–1997:Q3 include the dummies for 1997:Q1 and 1997:Q2. $\Delta ly_t \equiv 0.5\,(\Delta y_t + \Delta y_{t-1})$. $DT90$ is the time trend for the subsample after 1990:Q1 and zero before that.

Table 5 VAR including the Consumption–Income Ratio

A VAR(3) model for consumption and income growth containing the lagged consumption–income ratio is estimated.

$$\Delta c_t = \alpha_1 + \beta_{11}\Delta c_{t-1} + \beta_{12}\Delta y_{t-1} + \gamma_1(c_{t-1} - y_{t-1})$$

$$\Delta y_t = \alpha_2 + \beta_{21}\Delta c_{t-1} + \beta_{22}\Delta y_{t-1} + \gamma_2(c_{t-1} - y_{t-1})$$

InPanel A, the significance levels of corresponding explanatory variables in the F-test are reported. SD is the standard deviation of dependent variables. $S.D.^*$ indicates the standard deviations for the 1980:Q4–1996:Q4 subsample, excluding the effect of the consumption tax hike in April 1997. The VAR system for the earlier sample includes the dummies for the first and second quarter of 1997. Time dummies are included to control for the effect of consumption tax rate hike in April 1997. Panel B reports variance decomposition using the VAR systems in Panel A.

Panel A: Granger causality tests

	1980:Q4–1997:Q3					
	lag Δc	lag Δy	$c_{t-1} - y_{t-1}$	R^2	SD	SD^*
Δc_t	0.00	0.74	0.17	0.47	0.93	0.89
Δy_t	0.43	0.01	0.11	0.38	1.54	1.55

	1997:Q4–2007:Q4				
	lag Δc	lag Δy	$c_{t-1} - y_{t-1}$	R^2	SD
Δc_t	0.54	0.03	0.92	0.29	0.43
Δy_t	0.46	0.63	0.04	0.19	0.87

Panel B: Variance decomposition

	1980:Q4–1997:Q3		1997:Q4–2007:Q4	
	Δc shock	Δy shock	Δc shock	Δy shock
Δc_t	97%	3%	74%	26%
Δy_t	8%	92%	5%	95%

Figure 1

Japanese Household Saving Rate: 1980–2007

The net household saving rate from Annual Reports on the National Accounts is shown. The 1995 benchmark data are from the 2005 Annual Report and the 2000 benchmark data are from 2008 Annual Report. The data source is the Japanese Government (Cabinet Office) web site: http://www.esri.cao.go.jp/en/sna/menu.html.
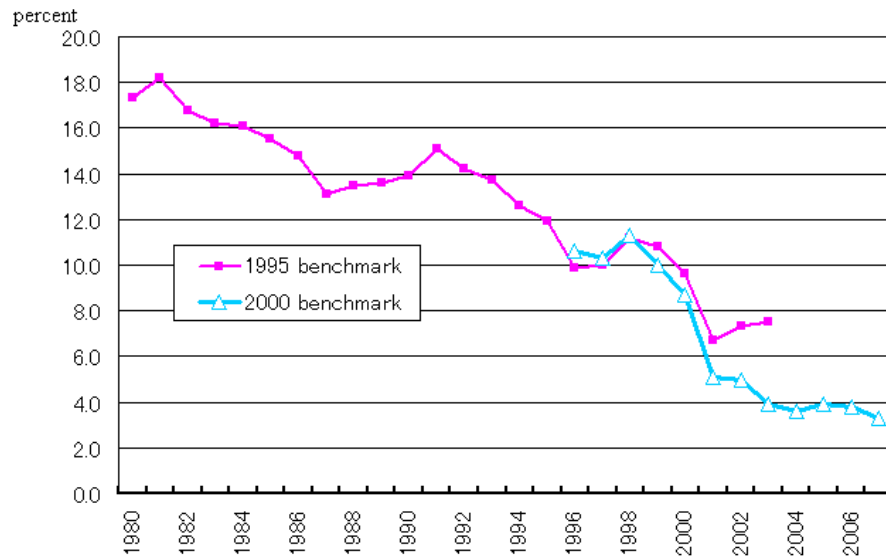
Figure 2

The Saving Rate by Age Groups in FIES Data: 1980–2007

The saving rates of working households (two or more family members) by five-year age groups are calculated the Family Income and Expenditure Survey (FIES) data. The data source is the Statistics Bureau home page: http://www.stst.go.jp/english/index.htm.

Panel A: Aggregate Saving Rate and Demographic Change in the FIES Data
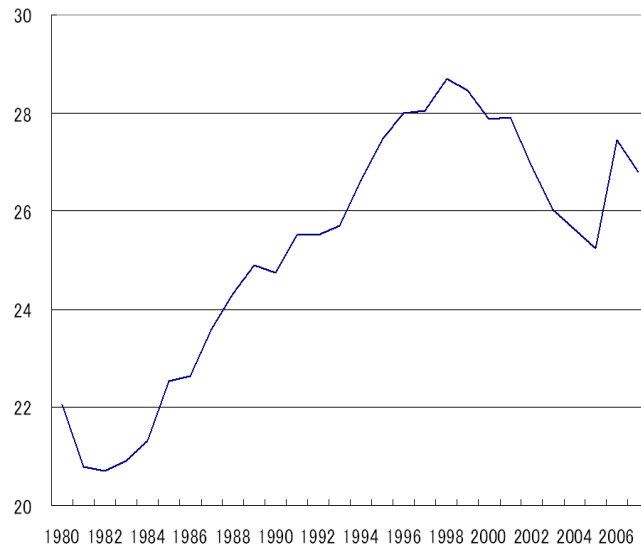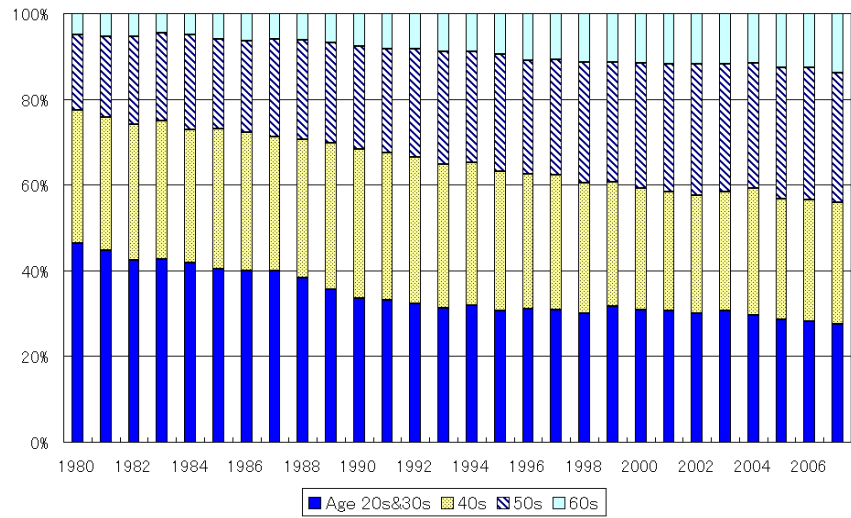
Figure 2 (continued)

Panel B: Saving rate of the benchmark age group

(Ages 30–34, 35–39, and 40–44)
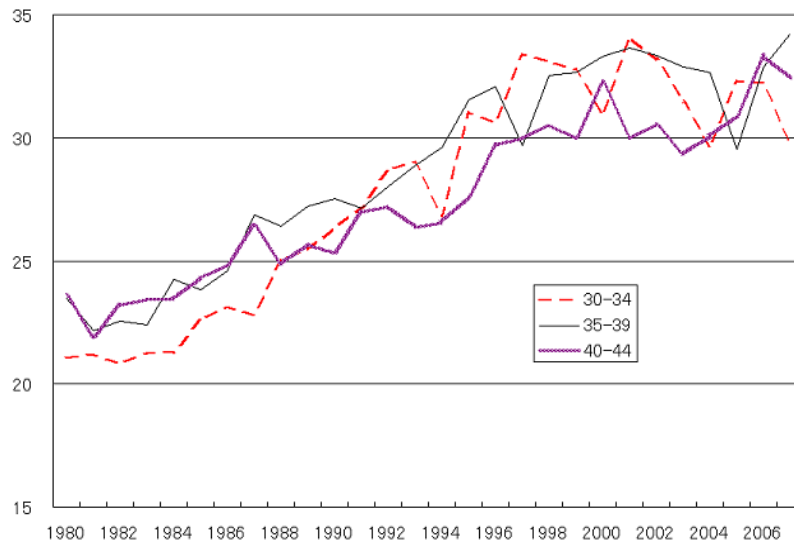
Panel C: Ages 20–29
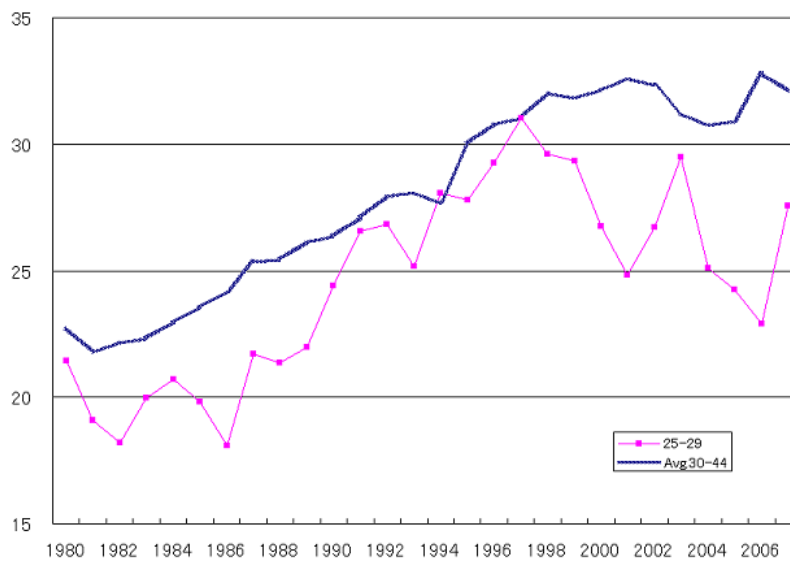
Figure 2 (continued)

Panel D: Ages 45–49, 50–54, and 55–59
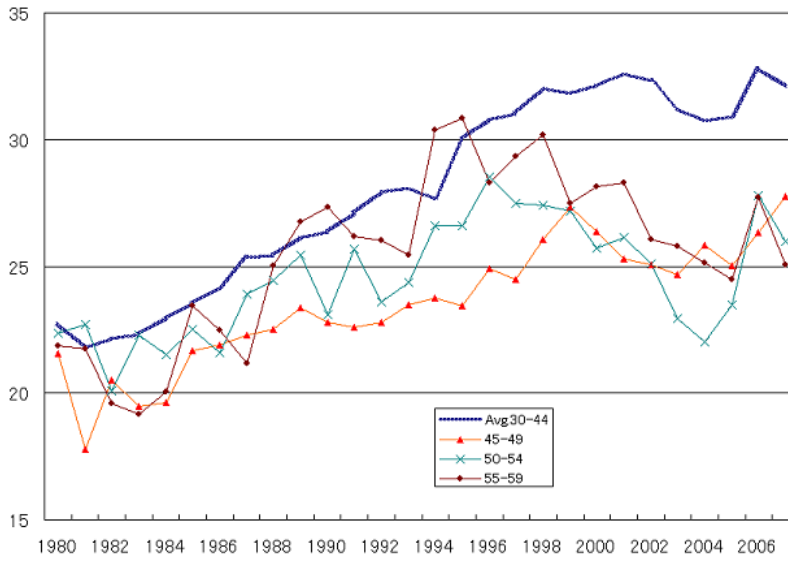
Panel E: Ages 60–64 and over 64

35
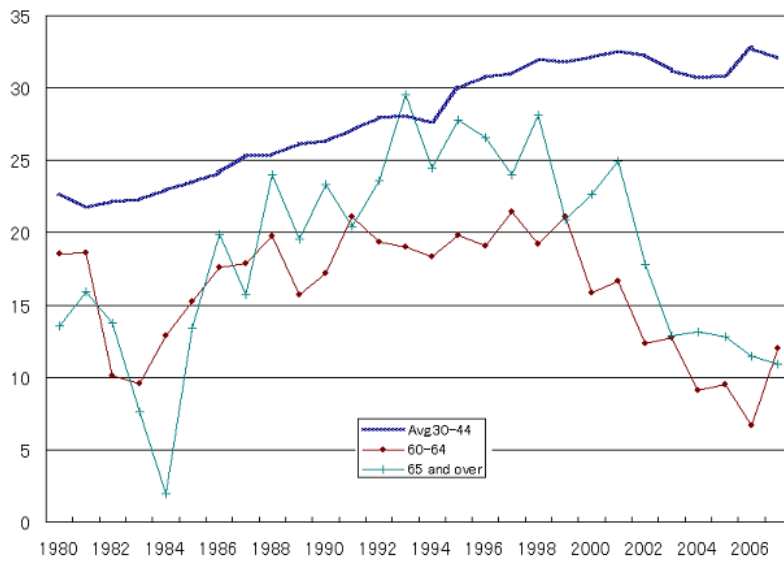
Figure 3

Figure 3

The Income and Consumption of Different Age Groups: 1981–2007

The real income and consumption expenditure by five-year age group in FIES
data are shown. The data source is the Statistics Bureau home page: http://www.stst.go.jp/english/index.htm.
Nominal series are normalized by the CPI (general, excluding imputed rent;
2005=100).

36

Figure 3 (continued)

30 - 34

10thd Yen

- household head income — consumption expenditure
- disposable income

35 - 39

10thd Yen

40 - 44

10thd Yen

Figure 3 (continued)

10thd Yen 45 − 49

60
55
50
45
40
35
30

household head income
consumption expenditure
disposable income

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006

10thd Yen 50 − 54

60
55
50
45
40
35
30

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006

10thd Yen 55 − 59

55
50
45
40
35
30

1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006

40

Figure 3 (continued)

10thd Yen

60 - 64

legend: household head income — consumption expenditure — disposable income

10thd Yen

65 and over

41

Figure 4

Unemployment Rates by Age Group: 1980–2007

Unemployment by age group data are from the Labor Force Survey. The data source is the web page of the Statistics Bureau:
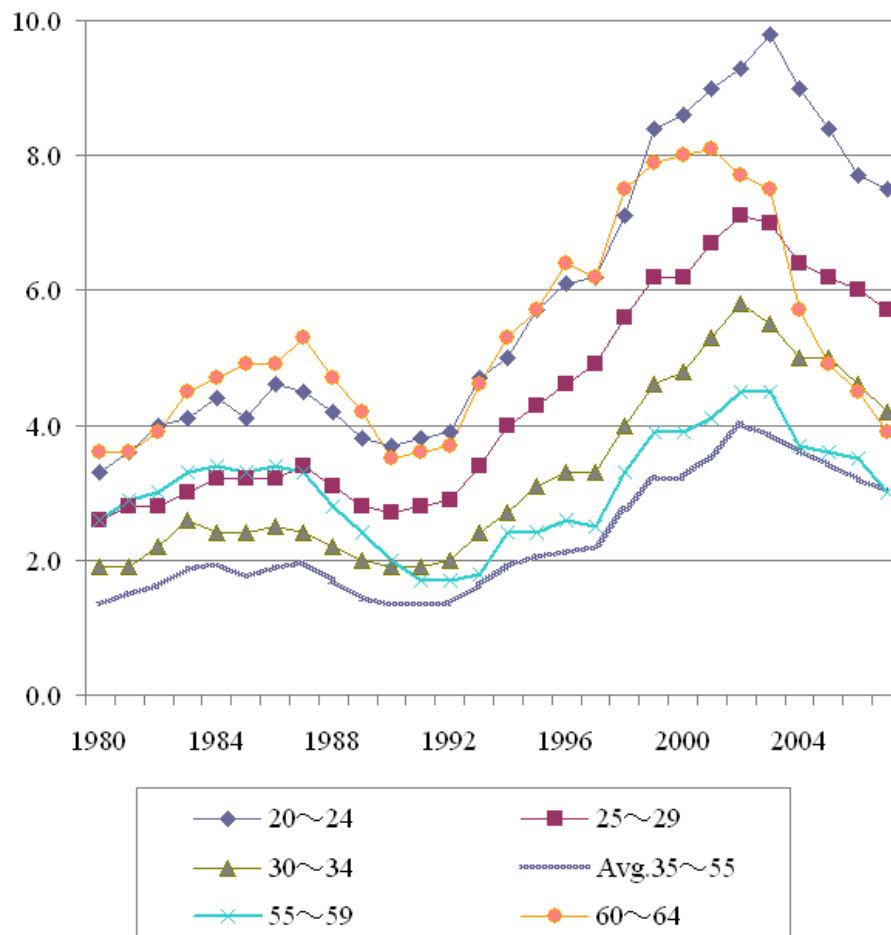
http://www.stat.go.jp/english/data/rouodou.

Figure 5

Substitution between Corporate and Household Saving

Household saving and corporate saving as a share of GDP (percent). See the notes to Table 1 for the data source.
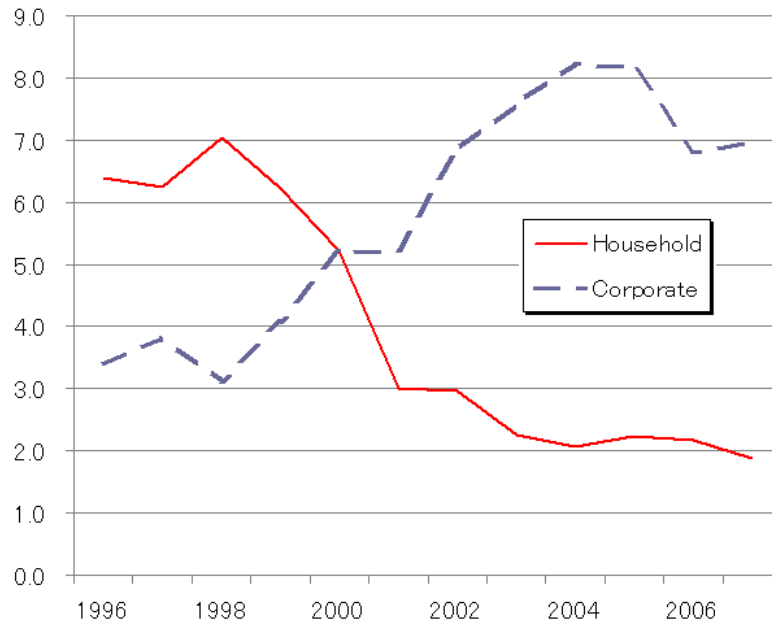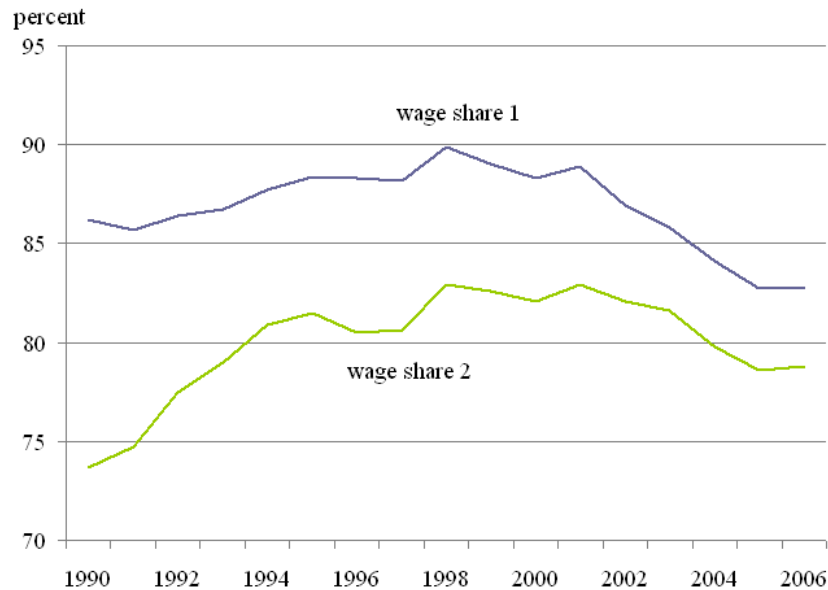
Figure 6

**Wage Shares in Japan: 1990–2006**

Japanese wage shares calculated by different definitions and different data sources are shown. First two wage shares, **wage share 1** and **wage share 2** are based on annual data calculated from SNA statistics. **Wage share 3** is based on fiscal year data calculated from the Financial Statements Statistics of Corporations by Industry, published from Ministry of Finance. The data source is the Japan Institute for Labor Policy and Training (2008).

percent

wage share 1: (compensation of employees/number of employees)/(GDP/number of persons in employment).

wage share 2: compensation of employees/GDP.

Figure 6 (continued)
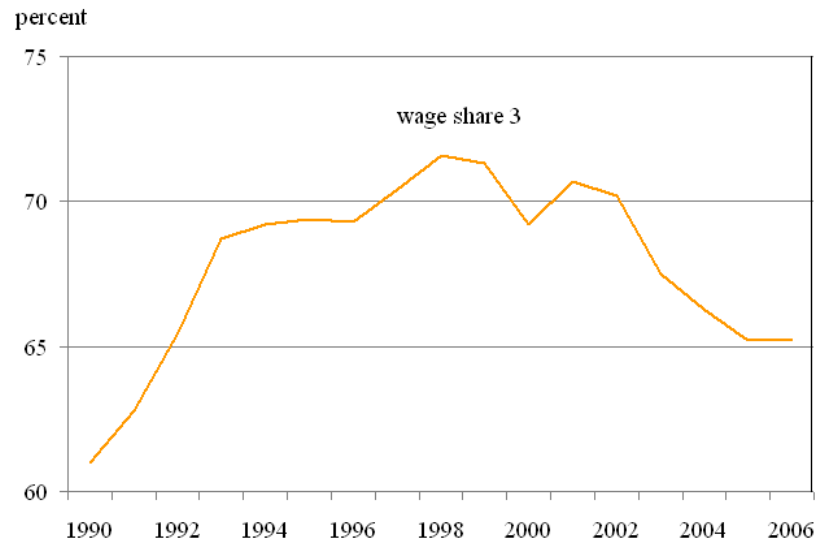
wage share 3: personnel expenses/(personnel expenses + ordinary profits + interest expense + depreciation).