The Pension System and Household Consumption and Saving Behavior*

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Abstract

This study examines the impact of the pension system on household consumption and saving behavior by focusing on individuals’ expectations of future pension benefits. Specifically, it starts by providing an overview of recent studies on the determinants of the accuracy of pension expectations and how those expectations affect household behavior. These studies suggest that those for whom it is relatively easy to obtain pension information (or who have a great stake in obtaining accurate pension information), those whose uncertainty with regard to the future is relatively small, and those with ample opportunity to exchange information on pensions tend to form more realistic pension expectations. Moreover, many studies show that as they approach retirement, individuals tend to update their expectations and expectations become more realistic as a result. There has also been considerable progress in research on households’ consumption and saving behavior based on pension expectations. In order to deal with the endogeneity of pension wealth, studies have used pension reforms as natural experiments and have obtained larger estimates regarding the substitutability of pension and household wealth than studies in the past.

Next, the accuracy of households’ pension expectations is examined by estimating the response of consumption to a change in income due to the start of pension benefit payments. The results indicate that consumption does increase significantly at the time that pension benefit payments start, but then returns to its original level in the following years. If the reason for the consumption increase were that households had underestimated the pension benefits they would receive, consumption should remain elevated in the following years. Therefore, the consumption increase likely is due to reasons other than the underestimation of pension benefits.

Keywords: Pension system; consumption and saving behavior; life-cycle/permanent-

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I. Introduction

In many countries, including Japan, pensions play an extremely important role in providing income security in old age and the design of pension systems is likely to have a large effect on people’s consumption and saving behavior throughout their lifetime. How people in practice take the existence of a pension system into account when making consumption and saving plans is an empirical issue and has been the subject of a large number of studies. Issues that studies on this topic have investigated include, for instance, the substitutability of pension and household wealth based on the life-cycle/permanent-income hypothesis (LC/PIH) and the determinants of when households start claiming pension benefits. Studies on these issues generally require two steps. The first is to examine people’s expectations with regard to their future pension, while the second is to investigate how such expectations affect household behavior.

Because pension expectations depend on the specific set-up of the future pension system and individuals’ assessment of their future income, it is not appropriate for scholars simply to assume that people’s expectations coincide with legally stipulated parameters such as a given pension benefit level or a given age at which pension benefit payments start. Rather, people’s pension expectations are influenced by a variety of factors, so that it is not straightforward to determine the mechanisms that affect pension expectations and accurately estimate such pension expectations. Reasons why it is difficult for both the individuals concerned and scholars to accurately estimate future pension benefits include the fact that pension levels may change as a result of political decisions (McHale, 2001) and that future pension benefits depend on recipients’ future labor income (Campbell et al., 2001).

Nevertheless, scholars seeking to analyze the role of pension expectations in household behavior in one form or another need to grasp the pension expectations of those they study. Consequently, substantial amounts of data have been gathered and used for the analysis of the mechanisms underlying the formation of pension expectations. Section II of the present study provides an overview of existing research on pension expectations and provides a summary of their findings with regard to what type of individuals with what type of characteristics form more accurate expectations and with regard to how pension expectations change as people approach retirement. Another important aspect is that, in recent years, substantial improvements have been made in the design of survey questionnaires to extract survey responses that more closely correspond to people’s actual pension expectations. Section II provides a description of such efforts to increase the information content of survey responses.

Next, regarding the link between pension expectations and household behavior, it seems reasonable to assume that present consumption and saving decisions are at least in part related to future pension expectations and there is a growing body of literature on the relationship
between the pension system and household consumption and saving behavior. Early research on the substitutability of pension wealth and household wealth going back to the pioneering study by Feldstein (1974) tended to find that substitution effects were not very large and some studies found no significant substitution effects whatsoever (Feldstein and Pellechio, 1979; Munnel, 1976; King and Dicks-Mireaux, 1982; Diamond and Hausman, 1984; Venti and Wise, 1996; Gale, 1998). However, because pension wealth and household or individual characteristics affect each other, pension wealth is likely to be endogenous, meaning that previous studies may have underestimated such substitution effects. More recently, therefore, a number of studies have been conducted that deal with the potential endogeneity of pension wealth by regarding pension reforms as natural experiments. Specifically, focusing on how the effect of pension reforms differs depending on, for example, individuals’ year of birth and occupation, such studies have used exogenous changes in pension wealth employing instrumental variable techniques. Using this approach, the endogeneity problem is alleviated and studies along these lines have obtained larger estimates of substitution effects between pension and household wealth than earlier studies. Section III provides an overview of studies along these lines and the various approaches they employed.

Finally, Section IV empirically examines the accuracy of households’ pension expectations in Japan by analyzing whether household consumption responds to an anticipated change in income as a result of the start of pension benefit payments. If household consumption follows the LC/PIH and pension wealth expectations were accurate, one would expect consumption not to respond to the start of pension benefit payments. Conversely, if pension wealth expectations were not accurate, one would expect consumption to be adjusted to the optimal level based on the actual pension amount which only became clear upon retirement. Therefore, by examining whether household consumption changes significantly after retirement, it is possible to assess the accuracy of households’ pension expectations. The results obtained in this study using data for Japan show that household consumption increases significantly at the time that pension benefit payments start but returns to the original level from the following year onward. This means that it is unlikely that the main reason for the increase in consumption in the year that pension benefit payments start is that households had underestimated the pension benefits they would receive, since in this case consumption should remain at elevated levels in the following years. A more plausible explanation therefore is that the increase in consumption in the year that pension benefit payments start reflects a temporary increase in expenditures on durable consumption goods and similar items on the part of households whose liquidity constraints were eased as a result of the start of pension benefit payments.

II. Overview of research on pension expectations

The aim of this section is to present an overview of preceding studies on the accuracy of pension expectations conducted in the United States, Italy, and Japan. Pension expectations matter because people base their consumption and saving decisions on such expectations and
overly optimistic expectations regarding their future pension receipts may force them to revise their plans and life-style upon retirement. Against this background, an issue of particular interest in preceding studies has been whether it is possible to improve the accuracy of pension expectations by educating and providing better information to pension program enrollees. Much of this research has focused on the United States, where there has long been ample data necessary for such studies. However, in recent years, the compilation of similar data has also started in Japan and studies using such data have been conducted. Table 1 provides a summary of the data and empirical approaches employed and estimation results obtained in the studies discussed below.

II-1. Studies on the United States

Let us start by looking at research on the United States, on which the largest number of studies have been conducted. The pension system of the United States consists of the Old-Age, Survivors, and Disability Insurance (OASDI) and public pensions for individuals in specific occupations such as civil servants, as well as private pensions such as corporate pension plans and Individual Retirement Accounts (IRAs). The OASDI is generally referred to as Social Security and is administered by the Social Security Administration. Moreover, corporate pension plans can be broadly divided into defined benefit (DB) and defined contribution (DC) plans.

One of the earliest studies on pension expectations in the United States is that by Bernheim (1988), who, using data from the Retirement History Survey (RHS), compares the response rate for questions regarding expected social security pension benefits, the forecast error (percentage difference between expected and realized benefits), and the correlation coefficient between expectations and realizations for the following population subgroups: married men, widows, widowers, single women, single men, wealthy married men, and high educated married men. His main findings are that although women (especially widows and single women) tend to underestimate the benefits they will receive, they have the most accurate pension expectations and the correlation between pension expectations and realizations is strongest for this subgroup. In contrast, married men have the most optimistic and least accurate expectations. Bernheim (1988) moreover finds that there is almost no link between the level of educational attainment or net wealth and the accuracy of expectations. Regarding the finding that widows and single women tend to underestimate the benefits they will receive, they have the most accurate pension expectations and the correlation between pension expectations and realizations is strongest for this subgroup. In contrast, married men have the most optimistic and least accurate expectations. Bernheim (1988) moreover finds that there is almost no link between the level of educational attainment or net wealth and the accuracy of expectations. Regarding the finding that widows and single women tend to make the most accurate forecasts, he speculates that unmarried women may depend more on social security benefits than other groups and therefore may have more of a stake in acquiring accurate information.

Another key study is that by Mitchell (1988). Using data from the 1983 Survey of Consumer Finances (SCF), she examined to what extent respondents accurately knew about the type of corporate pension plan that they had joined (DC or DB), contribution provisions (i.e., whether both employees and employers contribute to the pension fund), and retirement requirements (i.e., rules regarding benefit eligibility). The merit of the SCF data is that respondents’ pension information and their administrative pension records can be matched,
Table 1. Preceding studies on pension expectations

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Data source</th>
<th>Survey year(s)</th>
<th>Country</th>
<th>Variable of interest (or dependent variable)</th>
<th>Empirical approach</th>
<th>Main (significant) variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bernheim (1988)</td>
<td>Retirement History Survey</td>
<td>1971, 1973</td>
<td>United States</td>
<td>Response rate to questions about expected social security benefits</td>
<td>Descriptive statistics</td>
<td>Educational attainment (+)2</td>
</tr>
<tr>
<td>Gustman and Steinmeier (2005)</td>
<td>Health and Retirement Study</td>
<td>1992</td>
<td>United States</td>
<td>Knowledge of type of employer-provided pension plan (dummy)</td>
<td>Logit</td>
<td>No significant explanatory variables</td>
</tr>
<tr>
<td>Okumura and Usui (2011)</td>
<td>Japanese Study of Aging and Retirement</td>
<td>2007, 2008, 2009</td>
<td>Japan</td>
<td>Plan to receive public pension benefits (dummy)</td>
<td>Probit</td>
<td>Working for pay (+), assets (−), working at age 75 (−), married (−), low schooling (−), type of retirement plan (−)</td>
</tr>
</tbody>
</table>

Notes:
1) Bernheim compares the values for the various subgroups (married men, widows, widowers, single women, single men, wealthy married men, and high educated married men).
2) Because the results for the 1971 and 1973 surveys differ considerably, there are few variables for which it is possible to discern a clear pattern.
3) Because the SEE is conducted once every few months rather than annually, the years given here indicate the survey range rather than the survey years.
4) Least absolute deviation.
and by comparing each individual’s responses and their pension records, it is possible to examine the accuracy of their pension expectations. Mitchell (1988) found that while 80-90 percent of the responses to basic questions such as the type of corporate pension plan an individual was enrolled in and the contribution rate were consistent with individuals’ pension records, the accuracy of responses requiring more detailed knowledge of the pension plan was low. For example, the share of respondents who provided accurate answers regarding eligibility rules for early retirement was only 32 percent (among those that knew of the early retirement program in the first place). Moreover, employing logit estimations in which whether respondents correctly knew the corporate pension type they had joined or the contribution rate are used as the dependent variable, Mitchell (1988) found that union members, employees in large firms, whites, and women tended to give more accurate responses.

A further major study on the accuracy of pension forecasts is that by Gustman and Steinmeier (2005) using the Health and Retirement Study (HRS) that started in 1992. Because the data in the HRS can also be matched to Social Security Administration pension records and detailed information on corporate pension plans, it is possible to compare respondents’ own pension expectations and estimated benefits based on the provisions of pension schemes at the time of the survey. Gustman and Steinmeier (2005) find that 27 percent of respondents estimated their Social Security benefits relatively accurately within a range of plus or minus 25 percent of the amount estimated by the authors based on respondents’ earning records, while 14 percent substantially underestimated their benefits (expecting 75 percent or less of the amount estimated by the authors based on respondents’ earning records) and 10 percent overestimated their benefits (expecting 125 percent or more of the estimated amount), and 49 percent responded that they did not know. The results for corporate pensions were similar. Moreover, they found that union members, those with higher educational attainment, those with a larger pension present value, whites, men, and those who had thought a lot about retirement tended to respond more accurately.

The studies by Bernheim (1988), Mitchell (1988), and Gustman and Steinmeier (2005) show that while some individuals are well informed and have realistic expectations about their future pensions, this is not the case for everyone. This raises the question whether individuals with unrealistic pension expectations will continue to hold such expectations until they retire or whether they adjust them over time. If individuals adjust their pension expectations over time, so that forecasts become more realistic as individuals approach retirement, the adjustment in consumption such individuals will have to make once they retire is also likely to be small compared to the case when no such adjustment in pension expectations takes place. To examine this issue, Gustman and Steinmeier (2005), in addition to analyzing the accuracy of pension benefit expectations, also look at whether people’s pension expectations change over time. Focusing on those that participated in both the 1992 and 1998 surveys and that in 1998 had not yet started receiving a pension, they compare the responses of such individuals to examine how their pension expectations had changed. They find that the share of those that responded that they did not know what pension benefits to
expect had decreased from 49 percent in 1992 to 37 percent in 1998, indicating that over time the accuracy of expectations increased.¹

A study that directly focuses on how individuals’ expectations with regard to their Social Security benefits change over time is that by Rohwedder and Kleinjans (2006) using HRS data from 1992 to 2002. Specifically, they examine whether those who at one point in time gave an incorrect answer, answered “don’t know,” or provided no answer, subsequently gave the same answer or appeared to give the correct response. The first issue Rohwedder and Kleinjans (2006) look at is individuals’ expectations with regard to whether they would receive a pension or not. They find that among those who did in fact start to receive pension benefits, about 8 percent had not expected to receive any benefits four survey waves (eight years) earlier, and that this share gradually declines toward one wave (two years) before the start of benefit receipts. Next, to look at expectations with regard to the age at which benefit payments start, the authors focus on those for whom the difference between the expected and the actual age of starting to receive benefits is less than one year. They find that the share of these individuals tends to become higher the closer the survey is to the start of receiving benefits, rising from 61 percent four waves before the start of receiving Social Security benefits to 82 percent in the survey closest to the start of receiving benefits. Similarly, the share of those reporting pension expectations tends to become higher the closer the survey is to the start of benefit receipts, rising from 55 percent four waves before the start of benefit receipts to 74 percent in the survey closest to the start of benefit receipts.

In recent years, there have been various improvements in survey questionnaire design to extract more accurate answers. The data employed in the studies mentioned so far to a large extent consisted of answers to be provided in terms of specific values for the age when pension benefit payments start and the amount of pension benefits. In contrast with this, the Survey of Economic Expectations (SEE) – used, for example, in the studies by Dominitz et al. (2002) and Dominitz and Manski (2006) – asks respondents to give their subjective probability that they will receive a pension and the subjective distribution of the pension amount they will receive. The design of earlier surveys meant that it was not possible to ask those who replied that they did not expect to receive any pension in the future about the expected pension amount, even though among such respondents there were likely to be some

¹ A possible reason for the increase in the accuracy of expectations could be that because survey participants have been administered the same survey before, they may feel that they should provide some sort of response. To address this issue, Gustman and Steinmeier (2005), using the cohort of 51 to 56 year old respondents that were newly included in the 1998 survey and the same age cohort in the 1992 survey, therefore compare the responses of the two groups and find that the percentage of those responding “don’t know” was lower for the former group. This finding indicates that the increase in the accuracy of pension expectations is not the result of being administered the survey repeatedly and the authors argue that instead it could be explained by the provision of more information by the Social Security Administration. Examples of such activities include the following. First, from 1995, the Social Security Administration started to provide annual notifications to Social Security enrollees of their pension records. And second, from 1994, the Social Security Administration started to publicize information on the internet. According to the 1999 Accountability Report of the Social Security Administration, visits to the website of the Social Security Administration rapidly increased from 22,212 in 1994 to 4,921,218 in 1998.
whose probability of receiving a pension was not zero. In order to extract the expectations of such respondents, the SEE first asks respondents about the subjective probability that they will be receiving a pension at the age of 70 and asks those who gave a positive value to provide a probability distribution of future pension receipts. Dominitz and Manski (2006) report that the share of those providing a response for future pension receipts is 97 percent, and the share of those providing a distribution of expected pension benefits is 66 percent. Comparing the response rate for the distribution of expected pension benefits (66 percent) with the response rate for expected pension benefits in the HRS (which asked for a specific amount) (56 percent), they argue that one of the reasons for the higher response rate of the SEE is the difference in the way questions are asked.

In this context, Rohwedder and Kleinjans (2006) point out that even though survey participants may have expectations regarding the age range at which they will start receiving a pension and the range that pension benefits may take, they may give a “don’t know” response or not respond at all if the survey questions that ask for specific values, thus raising the share of such responses. Therefore, survey participants may find it easier to respond to questions that enquire about the range of expectations. In fact, Rohwedder and Kleinjans (2006) find that when brackets were introduced in the 2002 HRS, response rates increased substantially, with non-response rates dropping from 39 percent to 13 percent if bracketed responses are counted as a response.

II-2. Studies on Italy

Italy’s pension system is divided into different occupational pension schemes and the schemes that private sector workers, public sector workers, and the self-employed are enrolled in each have their own specific characteristics. Until the early 1990s, public pension benefits were very generous: enrollees could take early retirement and receive their pension in their 50s, and were guaranteed pension benefits calculated based on their salary during the last few years before retirement. The public pension scheme thus was extremely advantageous for enrollees. As a result, however, the scheme was placing a heavy burden on public finances and pressure for reforms mounted.

Focusing on the impact on different cohorts and employment groups of the sweeping pension reforms carried out in 1992 and 1995, Bottazzi et al. (2006), examine the accuracy of workers’ expected ratio of pension benefits to pre-retirement income (i.e., the expected replacement rate). The main elements of the two reforms in 1992 and 1995 were an increase in the age at which pension benefit payments start, an increase in the contribution period necessary for the receipt of a pension, and changes in the way pension benefits are calculated. Specifically, regarding the way in which pension benefits are calculated, the 1995 reform

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2 Specifically, those that provide a positive value for the subjective probability that they will be receiving a pension at the age of 70 are asked about the minimum and the maximum of the annual amount that they expect to receive and are then asked to provide a probability distribution of the expected amount within the range given by this maximum and minimum.
meant that for individuals with at least 18 years of pension contributions the previous earnings model was maintained, while for those with less than 18 years, a pro-rata model was introduced based on earnings before 1995 and contributions after 1995. Finally, for those entering the labor market after 1995, benefits are entirely contributions-related. As a result of these changes, the replacement rates for those with less than 18 years of contributions and those that newly entered the labor market fell considerably, while that for those with at least 18 years of contributions remained more or less unchanged.

Using data from the Survey of Household Income and Wealth (SHIW) for the period 1989 to 2002, Bottazzi et al. (2006) compare respondents’ expected income replacement rate before and after the reform by sex, occupation, and year of birth. They find that before the reform, the replacement rate was in the range of 65.3 to 81.8 percent, while after the reform it had fallen to 57.4 to 79.9 percent. Moreover, comparing respondents’ expected replacement rate and the statutory replacement rate computed based on pension rules after the reform, they find that both before and after the pension reform, in many cases survey respondents’ expectations exceeded the statutory rate, suggesting that respondents overestimated the income replacement rate. Further, regressing the expectation error, that is, the difference between expected and statutory replacement rates, on respondents’ characteristics, they find that the expectation error was smaller for older respondents and for civil servants. This result indicates that the closer individuals are to retirement, or if they work in the public sector, where unionization rates are high, the more likely they are to form accurate expectations of the replacement rate. They further find that replacement rate expectations were least accurate for the self-employed and for those residing in the southern part of Italy. Given that income risk tends to be higher for the self-employed and residents of the South, this result indicates that the higher the variability in income, the more difficult it is for individuals to accurately forecast their pension benefits and the replacement rate.

Bottazzi et al. (2006) further find that households in which a family member had already retired and households in which several family members worked and earned an income tended to have more accurate pension expectations, suggesting that opportunities to obtain information on retirement and pensions from family members and friends can raise the accuracy of pension expectations. Finally, using differences-in-differences estimation, where workers who saw a large drop in the replacement rate as a result of the reform are used as the treatment group and other workers as the control group, they estimate the size of the reform-induced change in the expected replacement rate and find that although expectations changed significantly, they did not change as much as the statutory replacement rate. The authors suggest that the most likely reason for this is that many workers did not fully understand the implications of the new pension regime.

II-3. Studies on Japan

Until recently, data that can be used for the analysis of pension expectations has been relatively scarce in Japan, meaning that there are very few studies on this issue. However,
with the start of the *Japanese Study of Aging and Retirement* (JSTAR) in 2007, research on pension expectations has become possible. Using this data, Okumura and Usui (2011) examine how individuals’ expectations regarding the age at which they will be able to receive pension benefits, the benefit amount, the income replacement rate, and the probability that pension benefits could be reduced by 10 percent or more in the future differ depending on the pension system that individuals are enrolled in, their sex, and their year of birth. They find that older individuals tend to have a better grasp of the pensionable age for the National Pension Insurance (*Kokumin Nenkin*, hereafter NPI), which for all enrollees is 65 years of age. On the other hand, the pensionable age for the Employees’ Pension Insurance (*Kosei Nenkin*; hereafter EPI) was successively raised in the two pension reforms undertaken in the 1990s, as a result of which the pensionable age differs depending on individuals’ year of birth. The responses of EPI beneficiaries to some extent reflect this, with the increase in the pensionable age having led individuals to update their pension expectations. Looking at expected pension benefit levels, Okumura and Usui (2011) find that these are more narrowly distributed (as indicated by the interquartile range) for beneficiaries of the NPI, which consists only of a basic pension, than for beneficiaries of the EPI, which contains an earnings-related component. Further, for both pension systems, the interquartile range of expectations is larger for younger than for older cohorts, suggesting that uncertainty in the amount of expected benefits is greater in the younger cohorts. Moreover, focusing on the replacement rate of the EPI, they find that younger cohorts were more likely to reply “don’t know” with regard to the expected replacement rate. With regard to the probability that future benefit levels could be reduced by 10 percent or more in the future, younger cohorts tended to be more pessimistic. This likely reflects that younger cohorts think that future benefit levels are highly uncertain.

Moreover, focusing on the fact that the impact of the pension reforms differs depending on individuals’ birthday even when they were born in the same year, Okumura and Usui (2011) use regression discontinuity design to examine how the reforms changed respondents’ expectations. Taking their analysis when the pensionable age is the dependent variable as an example, the 1994 pension reform means that for male enrollees of the EPI the pensionable age for the flat-rate benefit was raised from 60 to 61 years of age for those born between April 2, 1941, and April 1, 1943. Therefore, the pensionable age for those born in the same year, 1941, differs for those born on either side of April 2. Using this difference and estimating the effect of the pension reform, they find that the expected pensionable age is significantly higher, by approximately one year, for those born on or after April 2. However, with regard to the benefit amount and the replacement rate, Okumura and Usui (2011) did not obtain any clear results. Thus, at least with regard to the pensionable age, EPI enrollees more or less accurately grasped the changes brought about by the reform.

**II-4. Summary and policy implications**

To conclude this section, let us summarize the findings of the studies presented above and
consider their policy implications. Table 1 provides an overview of the various findings regarding what characteristics are relevant to the accuracy of pension expectations (right-most column). What the studies show is that for those for whom the cost of obtaining information on pensions (union members, the highly educated), those that have a great stake in obtaining accurate information on their pension (those with large pension benefits), those for whom future uncertainty is low (those in good health, those for whom the likelihood of being unemployed in the future is low), and those with plenty of opportunities to exchange information (those who attended retirement meetings, those who have the opportunity to talk with relatives and friends about retirement) tend to form more accurate pension expectations. Moreover, even if individuals’ expectations are inaccurate at any particular point in time, they tend to update and form more accurate expectations as they approach the pensionable age. This means that there may be room for measures to help people form more accurate pension expectations and plan accordingly for their old age. Based on this line of reasoning, Liebman and Luttmer (2011) conducted a field experiment measuring the effect of providing pension information to individuals. Specifically, they report that after sending participants an informational brochure on life-planning after retirement and the social security pension system, and having participants take a web-based tutorial, the labor market participation rate among subjects one year later had increased by 4 percentage points. The experiment thus shows that by providing relatively inexpensive, discretionary information, it is possible to affect peoples’ behavior.

III. Research on the substitutability between pension wealth and household wealth

The overview of preceding studies in Section II suggested that people to some extent adjust their expectations in response to a reform of the pension system. Since the 2000s, a growing number of studies have sought to examine the impact of this kind of reform-induced change in people’s pension expectations on their wealth accumulation. A summary of these studies and their findings is provided in Table 2. Until this new wave of studies, the substitutability between household and pension wealth was typically estimated by estimating a wealth function in which household wealth was used as the dependent variable and a range of other variables including estimates of pension wealth were used as explanatory variables. However, because pension wealth is an endogenous variable, obtaining accurate estimates of this substitutability was difficult. Potential reasons for endogeneity include omitted variables, such as individuals’ unobservable ability, and measurement error in pension wealth. Both give rise to bias leading to the underestimation of the degree of substitutability. An important research trend in recent years therefore has been to deal with this problem by using exogenous changes in pension benefits resulting from pension reforms. The aim of this section is to discuss the findings of such studies on the substitutability between household wealth and pension wealth on Italy, the United Kingdom, and Japan.
Table 2. Recent studies on the substitutability of pension wealth and household wealth

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Data source</th>
<th>Survey year(s)</th>
<th>Country</th>
<th>Dependent variable</th>
<th>Key explanatory variable(s)</th>
<th>Estimation method</th>
<th>Estimation results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attanasio and Brugiavini (2003)</td>
<td>Survey of Household Income and Wealth</td>
<td>1989, 1991, 1993, 1995</td>
<td>Italy</td>
<td>Savings rate</td>
<td>Pension wealth (relative to income)</td>
<td>2SLS</td>
<td>For the average individual, a 10% increase in pension wealth (relative to income) is associated with a decline in the savings rate from 8.65% to 4.4%.</td>
</tr>
<tr>
<td>Attanasio and Rohwedder (2003)</td>
<td>Family Expenditure Survey</td>
<td>Annually from 1974 to 1987</td>
<td>United Kingdom</td>
<td>Savings rate</td>
<td>SERPS and BSP pension wealth (relative to income)</td>
<td>2SLS</td>
<td>Substitution rate between household wealth and pension wealth ranges from 54.7% to 74.9% for SERPS and is 30.6% for BSP (results for the latter are significant only for the youngest cohort).</td>
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<tr>
<td></td>
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<td></td>
<td>2SLS</td>
<td>Substitution rate between household wealth and pension wealth: 44.1-81.0%</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>2SLS</td>
<td>Substitution rate between household wealth and pension wealth: 0.4-0.5%</td>
<td></td>
</tr>
<tr>
<td>Hamaaki (2010)</td>
<td>NEEDS-RADAR Survey on Financial Behavior</td>
<td>1996, 2000</td>
<td>Japan</td>
<td>Household wealth (relative to income)</td>
<td>Pension wealth (relative to income)</td>
<td>OLS</td>
<td>Substitution rate between household wealth and pension wealth: 22.6-72.4%</td>
</tr>
<tr>
<td>Okumura and Usui (2011)</td>
<td>Japanese Study of Aging and Retirement</td>
<td>2007, 2008, 2009</td>
<td>Japan</td>
<td>Savings goal</td>
<td>Expected amount of public pension benefits, expected pension claiming age, expected probability of a more-than-10% drop in public pension benefits, dummy for response &quot;don't know&quot; with regard to probability of a more-than-10% drop in public pension benefits</td>
<td>OLS</td>
<td>Subjective probability that the expected benefit level could be reduced by 10 percent or more (+), dummy for response &quot;don't know&quot; with regard to probability of a more-than-10% drop in public pension benefits (+)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>2SLS</td>
<td>Answered &quot;don't know&quot; to subjective probability that the expected benefit level could be reduced by 10 percent or more (+)</td>
</tr>
</tbody>
</table>

Note:
*) Kakei to chochiku ni kansuru chosa.
III-1. Studies on Italy and the United Kingdom

As explained in Section II-2, Italy implemented sweeping reforms of its pension system in 1992 and 1995. The 1992 reform brought about an increase in the pensionable age and a decrease in pension wealth through the increase in required pension contribution years, and Attanasio and Brugiavini (2003) examine the effect of these changes on the saving rate. Moreover, focusing not only on the 1992 pension reform but also the one in 1995, Bottazzi et al. (2006) consider the decrease in pension wealth brought about by the change in the way pension benefits are computed and estimate the effect of the change in pension wealth on household wealth. Because the decrease in pension wealth as a result of the pension reforms differs by individuals’ age and occupation, both studies conduct regressions using the interaction between age, occupation, and dummies for the post-reform period as instrumental variables for pension wealth. In all estimations, the studies obtain results suggesting the presence of substitution effects between pension wealth and household wealth, which, moreover, are larger than those found in any of the preceding studies. The larger estimates of the degree of substitution between pension and household wealth are likely due to the reduction of endogeneity problems as a result of the use of the exogenous change in pension wealth brought about by the pension reforms. Bottazzi et al. (2006) furthermore separately estimate the degree of substitution for those that are well informed about their pension wealth and those that are not, and find that the degree of substitution is larger for the former. Therefore, it can be said that the behavior of households that are able to form accurate expectations of their pension benefits is more consistent with the LC/PIH.

In their study along similar lines, Attanasio and Rohwedder (2003) examine the impact of the two pension reforms carried out in the United Kingdom in the 1970s and 1980s. In the UK, private pensions traditionally play a large role, and the UK’s pension system at the beginning of the 1970s consisted of a Basic State Pension (BSP) that all citizens had to enroll in after finishing compulsory education, and private pension schemes. The first reform concerns the method in which BSP pension benefit levels were revised. Until the beginning of the 1970s, pension benefits were revised on an ad hoc basis and at times were raised above the rate of earnings increases. In the 1975 reform, this adjustment mechanism was revised and pension benefit increases were linked to earnings increases. This was further changed in 1980-81, when pension benefit adjustments came to be linked to changes in the price level rather than earnings. As a result of these changes, the replacement rate, which at its peak had reached 20 percent, fell considerably. While these reforms of the pension system affected all those enrolled, the size of the effect depended on enrollees’ age at the time that the reforms were implemented. The second reform was the introduction of the State Earnings-Related Pension Scheme (SERPS) in 1978, which was compulsory for all employees whose employer did not provide an occupational pension. Therefore, the increase in pension wealth through the introduction of SERPS can be said to be exogenous for employees that were not enrolled in an occupational pension scheme. However, in 1988, an “opting out” scheme was introduced, so that membership in SERPS was no longer compulsory and employees could compare
membership in SERPS with other pension schemes and choose for themselves. Focusing on the period from 1974 to 1987, i.e., just before the introduction of the “opting out” scheme, Attanasio and Rohwedder (2003) estimate the effect of changes in both individuals’ SERPS pension wealth and their BSP pension wealth on the saving rate. Similar to the studies focusing on Italy mentioned above, in order to deal with the endogeneity of pension wealth, they use the interaction of birth year, occupation, and dummies for before and after the pension reform as instrumental variables. Their estimation results indicate a considerable degree of substitutability between pension wealth and household wealth.

In recent years, a number of studies have also sought to examine the effect of pension reforms and pension wealth uncertainty not on the amount of household wealth but on its composition. Bottazzi et al. (2011), employing the approach used in Bottazzi et al. (2006) to estimate the substitutability of pension and household wealth, estimate the impact of the pension reforms in Italy on the composition of household wealth. They find that the decrease in pension wealth as a result of the reforms was compensated for by an increase in real assets and safe financial assets and that, despite the reduction in pension wealth, no increase in the propensity to purchase private pension funds or life insurance could be observed. Other studies examining the impact of increased pension wealth uncertainty on households’ assets composition include those by Guiso et al. (2009) and Delavande and Rohwedder (2011). Specifically, employing the standard deviation of the subjective distribution of the replacement rate for each individual as an indicator of pension wealth uncertainty, Guiso et al. (2009) find that the greater the pension wealth uncertainty, the greater is the probability that individuals will join a private pension scheme or purchase life insurance or private health insurance.3 Similarly, Delavande and Rohwedder (2011), using the standard deviation of the distribution of respondents’ pension expectations as an indicator of the uncertainty of future pension wealth, find that the greater the uncertainty of future pension wealth, the smaller is the share of wealth that respondents hold in stocks. The finding suggests that households consider future pension benefits as one of the assets in their portfolio and aim to reduce the risk in their remaining portfolio the higher the uncertainty of future pension benefits.

III-2. Studies on Japan

In recent years, a number of studies on Japan have similarly used changes in pension wealth as a result of pension reforms to measure the substitutability between pension and household wealth. Studies conducted between the 1980s and the early 2000s have sought to examine the relationship between household consumption and saving using cross-section data, but the results they obtained were inconsistent with the LC/PIH (Ando et al., 1986; Takayama et al., 1990; Aso and He, 2001). One likely reason for these results is that the relevant coefficients were biased due to the endogeneity of pension wealth. To overcome this

3 Of interest in this context is also a later study by the same authors (Guiso et al., 2013), in which they examine the determinants of pension uncertainty and find that individuals who are a long way from retirement and thus face more career uncertainty report more subjective pension uncertainty.
problem, the studies by Suzuki (2008) and Hamaaki (2010), similar to those on Italy and the United Kingdom, take advantage of the large decrease in EPI pension benefits as a result of the 1999 pension reform to estimate the impact on the saving rate and household wealth employing pooled data for the periods before and after the reform. The 1999 pension reform, in addition to raising the pensionable age as explained in Section II-3, also reduced the earnings-related component of pension benefits by 5 percent and replaced its link to earnings growth with price indexation. The studies by Suzuki (2008) and Hamaaki (2010) find evidence of substitutability between pension and household wealth, suggesting that employing the exogenous change in pension wealth brought about by the pension reform mitigated the endogeneity of pension wealth. Focusing on the fact that NPI benefits remained largely unchanged in the 1999 pension reform, while the impact of the reform on EPI enrollees differed by their year of birth, Suzuki (2008), moreover, attempts to estimate a saving function using the interaction of dummies for the pension scheme household heads were enrolled in, household heads’ year of birth, and a post-reform dummy as instrument. He obtains a significant negative coefficient on pension wealth, which is consistent with the LC/PIH.4

Another study of interest in this context is that by Okumura and Usui (2011), who examine the impact of pension wealth on wealth accumulation by estimating how expectations regarding the replacement rate and the pensionable age, as well as the subjective probability that pension benefits could be reduced by 10 percent or more in the future and other individual characteristics affect savings decisions. They find that for those that answered “don’t know” with regard to the probability that pension benefits could be reduced by 10 percent or more, the savings goal was significantly larger than for other respondents. Moreover, although the coefficients were not significant, they found that the higher respondents thought the probability that future benefits could be reduced by 10 percent or more, the smaller the expected income replacement rate, and the higher the expected pensionable age, the larger the savings goal tended to be.5

III-3. Summary

A summary of the findings of the studies considered in the overview here is provided in Table 2. As the overview has shown, there is considerable evidence of the substitutability of pension and household wealth. That being said, most of the studies suggest that this

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4 The coefficients in Suzuki’s (2008) instrumental variable (IV) estimations are only one tenth of the size of those in the ordinary least squares (OLS) estimations. It may be necessary to examine whether his IVs satisfy the two conditions for valid instruments, i.e., instrument relevance and instrument exogeneity.

5 Because pension enrollees in Japan can to some extent delay or bring forward the age at which they claim their pensions, the age at which they do so is potentially endogenous. In order to address this issue, Okumura and Usui (2011) conduct an IV estimation using the exogenous increase in the pensionable age as a result of the pension reforms. Doing so, they find that although the coefficient on the age at which individuals start claiming their pension benefits is insignificant, the sign of the coefficient changes from negative (when using ordinary least squares (OLS) estimation) to positive, suggesting that when the pensionable age is raised and pension wealth decreases, people tend to increase their savings in order to offset this.
substitutability is only partial and few of the studies provide evidence of perfect substitutability. One possible reason is that expectations of future pension benefits are not necessarily accurate. As shown by Bottazzi et al. (2006), the substitutability is smaller for households with inaccurate pension expectations than those with more accurate expectations. Consequently, there are concerns that households with inaccurate pension expectations do not sufficiently offset decreases in pension wealth through saving and therefore may be making inadequate provisions for old age. Thus, as already argued in Section II-4, there may be scope to reduce the number of people facing a savings shortage in old age by encouraging a more accurate formation of pension expectations through policy measures.

IV. The response of household consumption to the start of pension benefit payments: Empirical analysis using the micro-data of the Statistical Survey on Farm Management and Economy

Following the overview of studies on pension expectations and the substitutability of pension and household wealth in the preceding sections, this section presents an empirical analysis of the response of household consumption to the start of pension benefit payments in order to examine the accuracy of people’s pension expectations. According to the study by Okumura and Usui (2011) mentioned earlier, expectations of the age at which individuals will start receiving their pensions are quite accurate. Therefore, the change in household income through the start of pension benefit payments can be thought to represent an expected change in income. In fact, as shown later in this section, household income significantly increases on average through the start of pension benefit payments. This is probably because, in Japan, after reaching retirement age, many, especially males, tend to be re-employed as non-regular employees and earn an income until their late 60s (i.e., beyond the pensionable age). However, because it is possible that individuals’ expectations regarding the amount of pension benefits and the replacement rate were not accurate, the size of the income change upon the start of pension receipts may differ from what beneficiaries’ had expected. According to the LC/PIH, consumption may respond to such an unexpected change in income.

A study based on these considerations is that by Rohwedder and Soest (2006), who investigate the effect of deviations between predicted and realized pension benefits on consumption expenditures at retirement. They find that the more individuals’ overestimated (underestimated) their pension benefits, the more they decrease (increase) their consumption at retirement.

IV-1. Description of data

The data used for the empirical analysis in this section is the micro-panel data from the Statistical Survey on Farm Management and Economy (SSFME) implemented annually by the Ministry of Agriculture, Forestry and Fisheries (MAFF), which aims at gauging the economic situation of farm households in Japan. The target population of the survey consists
of farm households with more than 0.1ha of arable land area under cultivation (0.3ha in the case of Hokkaido), and among farm households that do not meet this condition, those that in the past year sold agricultural produce worth more than 150,000 yen. This target population is divided into farm households producing for the market (farm households with arable land of 0.3ha as well as those that in the past year sold agricultural produce worth more than 500,000 yen) and farm households engaged in self-production (farm households with arable land of less than 0.3ha and with sales of less than 500,000 yen), and survey households are chosen through stratified random sampling. Survey items include (1) the number of household members and workers; (2) hours of work; (3) area of land operated; (4) property; (5) planted (or grazing) area for agricultural produce and output; (6) agricultural gross receipts; (7) agricultural expenditures; (8) non-agricultural receipts; (9) non-agricultural expenditures; (10) pension and other financial income; (11) taxes, public imposts, and obligations; (12) living expenditure; and (13) income and expenses on assets. The survey consists of both a self-administered part, where survey households are asked to record the various items in a diary, and interviews by surveyors.

The data period we can use for this study is 1995 to 2003, and the total number of observations for each year is about 4,100. Among these, the number of households which start receiving a pension during the observation period and for which the variables used for the analysis do not include outliers or missing values is 2,425. It is assumed that the start of pension receipts occurred in the year that the value of “public pension payments” changed from zero to a positive value. Table 3 provides descriptive statistics of the main variables. The definitions of the variables shown in Table 3 are as follows. Household consumption is the sum of “living expenditure” (including own consumption of agricultural produce) and “commuter pass fares” (which are included in “non-agricultural expenditures”). “Living expenditure” consist of expenditure on food; housing; fuel, light, and water; furniture and household articles; clothing and footwear; healthcare; transportation and communication; education; culture and recreation; as well as miscellaneous expenses and incidental expenses. Household disposable income is defined as gross farm household income (agricultural income plus non-agricultural income) plus pension and other financial income minus taxes, public imposts, and obligations. For the analysis, consumption, disposable income, and public pension benefits are converted into real values using the consumer price index (general, excluding imputed rent). Public pension benefits, apart from NPI and EPI benefits as well as Mutual Aid Insurance (MAI) benefits, include benefits from the Farmers’ Pension Fund for those enrolled in this. Household consumption and disposable income per equivalent household member are obtained by dividing the original values by the square root of the number of household members and are referred to simply as “equivalent household

---

6 The upper and lower 1 percent tails of the rates of change from the previous year in disposable income per equivalent household member and household consumption per equivalent household member are excluded as outliers.

7 Because rates of change were used to identify outliers, the table does not provide descriptive statistics for variables for 1995, for which rates of change cannot be calculated.
consumption” and “equivalent disposable income” for brevity. Moreover, regarding the types of employment of the household head and the spouse, the SSFME distinguished the following six categories: family-operated farming; those engaged in by-employments; seasonal work; temporary wage labor; salaryman/salarywoman, and not working.8

Looking at the descriptive statistics in Table 3, we find that household consumption and equivalent household consumption tend to decrease over time, but this is likely mainly due to the aging of household heads and their spouses. Household disposable income and equivalent household disposable income decrease until around the year 2000, but then increase slightly or remain largely unchanged. This trend likely reflects the change in the age of household heads and the start of pension benefit receipts. Looking at the trend in the type

---

8 Those working 60 or more days per year are classified according to their main type of employment during the year, while those working less than 60 days per year are classified as not in employment. However, students are also classified as not in employment even if they work 60 or more days per year. Further, those that have a fixed place of employment at the end of the year are classified as salarymen/salarywomen even if they work for less than 60 days per year. Those who fall under a variety of categories during a particular year are classified according to the type of employment in which they spend the largest number of days in that year. Specifically, those that spend the largest number of days working in family farming are classified as working in family farming, while those who are engaged in by-employments (in forestry, fisheries, retail, etc.) while engaged in family farming, but spend the largest number of days in those by-employments are classified into the by-employment category.
of employment of the household head, we observe a decline in the share of those working as “salarymen/salarywomen” and an increase in the share of those devoting themselves to agriculture, which probably is one of the reasons for the downward trend in household income until around 2000. However, after that, household incomes tend to stabilize as pension benefit receipts increase. The fact that the average value of public pension receipts increases throughout the observation period is consistent with this.

In order to get a sense of how the farm households in the SSFME stack up to households in Japan more generally, let us briefly compare them with worker households in the Family Income and Expenditure Survey implemented by the Ministry of Internal Affairs and Communications. For the comparison, data for the year 2003, for which there are 4,017 households in the SSFME with no missing information on household consumption, disposable income, age of household head, and number of household members, are used. In the SSFME, average living expenditure in 2003 (1/12th of the annual value) is 391,443 yen and average disposable income (1/12th of the annual value) is 606,920 yen, while the average age of the household head is 60.0 years and the average number of household members is 4.17. On the other hand, average (monthly) consumption expenditure in the Family Income and Expenditure Survey for 2003 is 292,217 yen and average (monthly) disposable income is 401,787 yen, while the average age of the household head is 44.3 years and the average number of family members is 2.86. Thus, compared with the Family Income and Expenditure Survey, household heads in the SSFME tend to be older and households tend to be larger. Although a direct comparison is difficult because the age of household heads and the number of household members differs, the expenditure and disposable income figures suggest that households in the SSFME tend to be quite well off.

IV-2. Empirical model

In order to examine whether household consumption responds to the change in disposable income at the start of pension benefit payments, the following specification, in which the rate of change in equivalent household consumption is the dependent variable, is used:

\[
\ln\left(\frac{C_{i,t}}{C_{i,t-1}}\right) = \alpha_1 + \beta_1 \text{Pension start}_i + \gamma_1 X_{1i,t} + \Phi_1 Z_t + \nu_{1i,t},
\]

where \( C_{i,t} \) is equivalent household consumption in household \( i \) in year \( t \), \( \text{Pension start}_i \) is a dummy variable for the year in which household \( i \) starts receiving pension benefits, \( X_{1i,t} \) is a vector of other explanatory variables (the rate of change in equivalent disposable income excluding public pension payments; the age of the household head and its square; the age of the spouse and its square; dummies for the type of employment of the household head; dummies for the type of employment of the spouse; a dummy that takes 1 if there are children below the age of 7 in the household; and a dummy that takes 1 if there are children

9 The estimation results remain largely unchanged if household consumption instead of equivalent household consumption is used. The same applies disposable income.
aged 7-18 in the household), and $Z_t$ is a set of year dummies. $\beta_1$ is expected to be positive and significant if consumption responds to the start of pension benefit payments.

Moreover, in order to examine whether disposable income in practice increases significantly as a result of the start of pension benefit payments, the following specification is estimated:

$$\ln(Y_{it}/Y_{it-1}) = \alpha_2 + \beta_2 \text{Pension start}_t + \gamma_2 Z_{2it} + \Phi_2 Z_t + \nu_{2it},$$

(2)

where $Y_{it}$ is equivalent disposable income of household $i$ in year $t$ and $X_{2it}$ is a vector of explanatory variables consisting of the same variables as in $X_{1it}$ above except for the rate of change in equivalent disposable income excluding public pension payments. $\beta_2$ is expected to be positive and significant if disposable income increases at the start of pension benefit payments.

Before looking at the estimation results for specifications (1) and (2), let us examine the movements in the dependent variables in the two specifications, the rate of change in equivalent household consumption and equivalent household income. Setting the year in which pension benefit payments start as year 0, Figure 1 shows the median of $\ln(C_{it}/C_{it-1})$ and $\ln(Y_{it}/Y_{it-1})$ from three years before to three years after the start of pension benefit payments. The figure indicates that the rate of change in equivalent disposable income jumps in the year that pension benefit payments start. On the other hand, while the rate of change in equivalent household consumption generally is very similar to that in equivalent disposable income, no similar jump in the year that pension benefit payments start is
observed. However, in the figure, other variables are not controlled for, and to do so, the change in consumption in the year in which pension benefit payments start is estimated using equation (1).

IV-3. Estimation results

To start with, the size of the change in disposable income as a result of the start of pension benefit payments is estimated using specification (2). Table 4 shows the results employing ordinary least squares (OLS) estimation, which specification tests show is the preferred approach. Beginning with the results in column (A), the coefficient on the Pension start dummy is positive and significant, indicating that equivalent disposable income increases by 15.5 percent as a result of the start of pension benefit payments. However, in Japan, many who have worked as regular employees receive a lump-sum retirement payment, so that the result in column (A) may overstate the effect of the start of pension benefit payments. Column (B) therefore shows the estimation results when households that received such a lump-sum retirement payment during the observation period are excluded. Here, too, the coefficient on the Pension start dummy is positive and significant, but the coefficient is smaller than in column (A), suggesting that the effect of the start of pension benefit payments is overestimated as a result of lump-sum retirement payments to some households. Further, columns (C) and (D) show the estimation results when households where the household head or his/her spouse stopped working (the employment type changed from one of the other categories to “not working”) are excluded (column (C)) and when households where the number of household members changed during the observation period are excluded (column (D)). If, as a result of

| Table 4. Response of equivalent disposable income to the start of pension benefit payments |
|-----------------------------------------------|--------|--------|--------|--------|
| Dependent variable | ln(\( \frac{Y_t}{Y_{t-1}} \))            |
| Estimation method  | OLS       | (A)  | (B)  | (C)  | (D)  |
| **Pension start** | 0.155 *** | 0.126 *** | 0.116 *** | 0.125 *** |
| (0.025)            | (0.025)   | (0.029) | (0.039) |       |
| Excluding households that received a lump-sum retirement payment | No | Yes | Yes | Yes |
| Excluding households where the head or his/her spouse stopped working | No | No | Yes | Yes |
| Only households where the number of household members did not change | No | No | No | Yes |
| Number of observations | 2425 | 1881 | 1471 | 798 |
| F-value             | 3.38 *** | 2.8 *** | 2.39 *** | 1.71 ** |
| Adjusted R-squared  | 0.0183 | 0.0163 | 0.0159 | 0.0113 |

Notes: ** and *** denote statistical significance at the 5% and 1% level, respectively. Heteroskedasticity-robust errors are shown in parentheses. In addition to the Pension start dummy, the age of the household head and its square, the age of the spouse and its square, dummies for the type of employment of the household head, dummies for the type of employment of the spouse, a dummy that takes 1 if there are children below the age of 7 in the household, a dummy that takes 1 if there are children aged 7-18 in the household, and year dummies are included in the estimations.
the start of pension benefit payments, the household head or his/her spouse stopped working, the change in disposable income includes the effect of the start of pension payments and the effect of stopping to work. Moreover, if the number of household members changes substantially, then even though the number of household members is adjusted for by using equivalent scales (using the square root of the number of household members), disposable income may change considerably. As can be seen, however, the estimation results in columns (C) and (D) are not very different from those in column (B), suggesting that the effect of the start of pension benefit payments is not under- or overestimated due to changes in disposable income as a result of the household head or his/her spouse stopping to work or changes in the number of household members.

Next, using specification (1), the size of the change in consumption as a result of the start of pension benefit payments is estimated. Table 5 shows the results obtained using OLS. In all the columns, the coefficients on the Pension start dummies are positive and significant. The results imply that as a result of the start of pension benefit payments, equivalent household consumption increases between 2.8 and 6.1 percent. Comparing the results in the various columns, in the estimations shown in columns (A) to (C), the coefficients have more or less the same size, but those in columns (D) and (E) are considerably larger. The estimation in column (D) excludes households where the number of household members changes, and a possible reason for the larger coefficient is that the results in column (A) to (C) include the effect of children moving out around the time that pension benefit payments start, which would reduce household consumption. This effect is excluded in column (D), leading to the

Table 5. Response of equivalent household consumption to the start of pension benefit payments

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>ln(C_t/C_{t-1})</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A)</td>
</tr>
<tr>
<td></td>
<td>0.028 **</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
</tr>
<tr>
<td>Excluding households that received a lump-sum retirement payment</td>
<td>No</td>
</tr>
<tr>
<td>Excluding households where the head or his/her spouse stopped working</td>
<td>No</td>
</tr>
<tr>
<td>Only households where the number of household members did not change</td>
<td>No</td>
</tr>
<tr>
<td>Excluding households receiving NPI benefits</td>
<td>No</td>
</tr>
<tr>
<td>Number of observations</td>
<td>2425</td>
</tr>
<tr>
<td>F-value</td>
<td>4.4 ***</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.0288</td>
</tr>
</tbody>
</table>

Notes: *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively. Heteroskedasticity-robust errors are shown in parentheses. In addition to the Pension start dummy, the rate of change in equivalent household disposable income excluding public pension benefits, the age of the household head and its square, the age of the spouse and its square, dummies for the type of employment of the household head, dummies for the type of employment of the spouse, a dummy that takes 1 if there are children below the age of 7 in the household, a dummy that takes 1 if there are children aged 7-18 in the household, and year dummies are included in the estimations.
larger coefficient. Next, the estimation in column (E) excludes households receiving NPI benefits. The reason for excluding such households is that the year in which they start receiving their benefits may be endogenous, since NPI beneficiaries can claim their benefits early, i.e., before the regular pensionable age of 65, and households in our sample may have chosen to do so because a household member had to be hospitalized or receive nursing care. Such households likely have large consumption needs, and if they claim their NPI early, the timing of the start of pension benefit payments would be endogenously determined and the coefficient on the Pension start dummy may be overestimated. Unfortunately, the SSFME does not make it possible to determine which pension scheme(s) households are enrolled in, so that households are assumed to receive NPI benefits and excluded from the estimation in column (E) if they meet the following two conditions. The first condition is that the type of employment of the household head and his/her spouse throughout the observation period was family-operated farming, while the second is that throughout the observation period they never received a salary or wages or a lump-sum retirement payment. The coefficient in column (E) is larger than in the other columns, suggesting that the coefficients in the other columns are not overestimated as a result of endogeneity.

The estimations presented in Tables 4 and 5 showed that household consumption significantly increases in response to the increase in disposable income from the preceding year to the year in which pension benefit payments start. However, an important question is whether such an increase in consumption can only be seen in the year that pension benefit payments start. If the cause of the consumption increase is that households had underestimated the pension amount they would receive, one would expect the consumption level to continue to be higher in the years following the start of pension benefit payments. The next task therefore is to estimate the size of the increase in household consumption from the year before pension benefit payments start to one, two, and three years after the start of such payments, using the following equation:

$$
\ln(c_{i,t}/c_{i,t-s-1}) = \alpha_3 + \sum_{u=0}^{s} \beta_{3,u} \text{Pension start}_{i,u} + \gamma_3 X_{1i,t} + \Phi_3 Z_{t} + \nu_{3i,t}, \ s = 1, 2, 3, \quad (3)
$$

where Pension start$_{i,0}$ is the same dummy variable as Pension start$_i$ in specifications (1) and (2), while Pension start$_{i,1}$, Pension start$_{i,2}$, and Pension start$_{i,3}$ respectively are

10 According to the 2003 Annual Report on the Employees’ Pension and the National Pension, the share of those newly claiming early retirement benefits during the observation period of this study ranged from 23.8 percent (in FY2000) to 36.8 percent (in FY1995). On the other hand, the share of those newly deferring their pension benefits in FY2003 was extremely low at 2.2 percent. Meanwhile, EPI enrollees also have the option to claim their benefits early. With regard to the specially-provided old-age employees’ pension (fixed component), from FY2001 to FY2003, the pensionable age for men born between April 2, 1941, and April 1, 1943, was raised from 60 to 61 years of age. Although these individuals had the option to claim their benefits early, they are not considered in this study because there are very few of them among those included in the dataset used here.

11 The “salary and wages” in the SSFME are “all wages received by those employed permanently in an establishment belonging to an industry other than agriculture and forestry and mainly engaged in production work and those employed in an establishment in any industry engaged mainly in managerial, clerical, and technical tasks.”
dummies that take a value of 1 for one year, two years, and three years after the start of pension benefit payments for household \(i\).

Similarly, to estimate the size of the increase in disposable income from the year before pension benefit payments start to one, two, and three years after the start of such payments, the following equation is used:

\[
\ln\left(\frac{Y_{i,t}}{Y_{i,t-s-1}}\right) = \alpha_4 + \sum_{u=0}^{s} \beta_{4,u} \text{Pension start}_{i,u} + \gamma_4 X_{2i,t} + \Phi_4 Z_t + \nu_{4i,t}, \quad s = 1, 2, 3 \tag{4}
\]

As a first step, the size of changes in disposable income from the year pension benefit payments start to one, two, and three years after the start of pension benefit payments is estimated using equation (4). The results are presented in Table 6 and indicate that except when \(s=3\) (columns (A), (C), and (D)), the coefficient \(\beta_{4,s}\) is positive and significant in all cases. The coefficients suggest that, as a result of the start of pension benefit payments, disposable income increased by 9 to 16 percent compared to before the start of pension benefit payments. If households erred in their pension expectations and did not anticipate such an increase in disposable income, then in the years following the start of pension benefit payments household consumption should remain at the higher level observed at the time that benefit payments started. If this is the case, \(\beta_{3,s}\) in specification (3) should be positive and significant. The estimation results for specification (3) are shown in Table 7, but show that except when \(s=1\) (columns (A), (C), and (D)), the coefficients are not significant. Moreover, the coefficients become gradually smaller the longer the time since the start of pension benefit payments. Figures 2(a) to 2(c) show the marginal propensity to consume out of the pension benefits calculated based on the estimates from Tables 4 to 7.\(^1\) The figures show that in the year that pension benefit payments start, the marginal propensity to consume is around 18-27 percent, but it tends to gradually decrease thereafter, suggesting that the consumption response to the start of pension benefit payments is extremely short-lived.

The estimation results above indicate that, for households in the SSFME, a significant increase in consumption can only be observed in the year that pension benefit payments start and the following year, before consumption returns to its original level. If the cause of the consumption increase in the year that pension benefit payments start is that households had underestimated the pension benefits they would receive, consumption should continue to be elevated in the following years. However, in practice, the consumption increase at most lasts until the year after pension benefit payments start, meaning that it is unlikely that an underestimation of pension benefits by households is the main cause for the consumption increase. A more plausible interpretation is that households that had been liquidity constrained saw those constraints eased as a result of the start of pension benefit payments and temporarily increased their expenditure by purchasing consumer durables and the like in the year that

\(^1\) Because the estimation results for all households that were identified as having started to receive pension benefit payments likely include the effect of the receipt of lump-sum retirement payments, of the household head or his/her spouse stopping to work, and of changes in the number of household members, the marginal propensity to consume for all households is not shown.
Table 6. Change in equivalent disposable income from the year after the start of pension benefit payments

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.107 ***</td>
<td>-</td>
<td>-</td>
<td>0.128 ***</td>
<td>-</td>
<td>-</td>
<td>0.132 ***</td>
<td>-</td>
<td>-</td>
<td>0.138 **</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>0.088 **</td>
<td>-</td>
<td>-</td>
<td>0.120 ***</td>
<td>-</td>
<td>-</td>
<td>0.140 ***</td>
<td>-</td>
<td>-</td>
<td>0.155 **</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>-</td>
<td>0.084</td>
<td>-</td>
<td>-</td>
<td>0.095 *</td>
<td>-</td>
<td>-</td>
<td>0.069</td>
<td>-</td>
<td>0.087</td>
</tr>
</tbody>
</table>

Notes: *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively. Heteroskedasticity-robust errors are shown in parentheses. In addition to the Pension start dummies, the age of the household head and its square, the age of the spouse and its square, dummies for the type of employment of the household head, dummies for the type of employment of the spouse, a dummy that takes 1 if there are children below the age of 7 in the household, a dummy if there are children aged 7-18 in the household, and year dummies are included in the estimations.
### Table 7. Change in equivalent household consumption from the year after the start of pension benefit payments

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Estimation method</th>
<th>ln($C_{t}/C_{t-1}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(A)</td>
<td>(B)</td>
</tr>
<tr>
<td></td>
<td>$s=1$ Coef.</td>
<td>$s=2$ Coef.</td>
</tr>
<tr>
<td>Pension start 1</td>
<td>0.038 *  (0.02)</td>
<td>- -</td>
</tr>
<tr>
<td>Pension start 2</td>
<td>- - (0.024)</td>
<td>- - (0.026)</td>
</tr>
<tr>
<td>Pension start 3</td>
<td>- - 0.017</td>
<td>- - -0.016</td>
</tr>
<tr>
<td>Excluding households that received a lump-sum retirement payment</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Excluding households where the head or his/her spouse stopped working</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Only households where the number of household members did not change</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Number of observations</td>
<td>1900</td>
<td>1450</td>
</tr>
<tr>
<td>F-value</td>
<td>5.66 ***</td>
<td>8.08 ***</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.0520</td>
<td>0.0846</td>
</tr>
</tbody>
</table>

Notes: * and *** denote statistical significance at the 10% and 1% level, respectively. Heteroskedasticity-robust errors are shown in parentheses. In addition to the Pension start dummies, the rate of change in equivalent household disposable income excluding public pension benefits, the age of the household head and its square, the age of the spouse and its square, dummies for the type of employment of the household head, dummies for the type of employment of the spouse, a dummy that takes 1 if there are children below the age of 7 in the household, a dummy that takes 1 if there are children aged 7-18 in the household, and year dummies are included in the estimation.
Figure 2(a). Excluding households receiving a lump-sum retirement payment

Figure 2(b). Excluding households that received a lump-sum retirement payment and where the head or his/her spouse stopped working

Figure 2(c). Excluding households that received a lump-sum retirement payment, where the head or his/her spouse stopped working, and the number of household members changed
pension benefit payments start. Therefore, the results of our empirical analysis do not suggest that households’ expectations with regard to their pension benefits were inaccurate. At the same time, though, it should be noted that because the analysis here focuses on farm households, it is likely that the data include many households that receive NPI benefits, which are smaller than EPI benefits. And because NPI benefits are rather small, it is also possible that it is not that difficult to predict the amount, so that a separate analysis for EPI and MAI benefit expectations may be necessary.

V. Concluding remarks

This study set out by providing an overview of the literature on how people assess the pension they will receive in the future and how this assessment affects household behavior. With regard to pension expectations, those for whom the cost of obtaining pension information is low, those who have more of a stake in obtaining accurate pension information, those for whom future uncertainty is low, and those with more opportunities to exchange pension-related information tend to form more accurate pension expectations. Many studies have found that although at any particular point in time there are many individuals that cannot correctly answer questions that require detailed knowledge of the pension scheme they are enrolled in and that fail to form accurate expectations based on a good understanding of their pension scheme, people do tend to update their expectations as they approach retirement. Given these findings, studies increasingly started to focus on the relationship between pension systems and households’ consumption and saving behavior. More recently, there has been a spate of studies using pension reforms as a natural experiment to deal with the endogeneity of pension wealth and, doing so, have obtained larger estimates than earlier studies regarding the substitutability between pension wealth and household wealth.

Next, by examining whether household consumption responds to an income change as a result of the start of pension benefit payments, the accuracy of households’ pension expectations in Japan was assessed. The analysis showed that household consumption significantly increases at the time that pension benefit payments start, but in subsequent years returns to its original level. If the reason for the increase in consumption in the year that pension benefit payments start is that households had underestimated their pension benefits, consumption should continue to be higher in the following years, so that it is unlikely that the underestimation of pension benefits is the main reason for the consumption increase. A more plausible interpretation therefore is that households that had been liquidity constrained temporarily increased their expenditure by purchasing consumer durables and the like in the year that pension benefit payments start.

References


