Consumption Smoothing and Periodic Income: Evidence from Japanese Public Pensions

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Abstract

A reconciliation of recent disparate results in the literature that examines whether household consumption is sensitive to predictable income changes is that behavior becomes consistent with the model as the utility loss from not doing so increases. In this paper, we examine the consumption response of retired Japanese households to substantial monthly income changes induced by the bi-monthly receipt of their public pension benefits. We identify the effect using both the seasonal fluctuation in income as well as variation in the benefit levels across households. We find significant but small effects on household consumption. Non-durable consumption changes by roughly one percent per month due to the timing of income receipt. The most responsive consumption category is recreational services which exhibits a sixteen percent monthly change but only comprises eleven percent of monthly non-durable consumption. Overall, these findings suggest that Japanese households behave in a manner consistent with the Life-Cycle/Permanent Income Hypothesis.

1 Introduction

The extent to which households smooth consumption as predicted by the Life-Cycle/Permanent Income Hypothesis (LCPIH) remains a

point of contention. When testing whether consumption responds to predictable changes in income, the literature has produced a range of results both consistent with and in contrast to the predictions of the model (Browning and Lusardi 1996; Browning and Crossley 2001). The recent literature focuses upon clearly identifiable income changes due to concerns with the income measures used in prior studies. However, studies using this methodological improvement still yield mixed findings.

One set of papers finds that consumption is responsive to predictable income changes. Shea (1995) finds a significant consumption response to pre-announced U.S. union wage increases. Parker (1999) finds that consumption increases towards the end of the calendar year among those U.S. households that can anticipate not having to pay Social Security taxes until the following year. Souleles (1999) finds that household consumption increases in the U.S. upon receipt of pre-determined tax refunds. Johnson, Parker, and Souleles (2006) find that the U.S. tax rebates of 2001 led to large consumption increases. Stephens (Forthcoming) finds that household consumption significantly increases once monthly vehicle loan payments are exhausted.

In contrast, another set of papers finds that households smooth consumption even when income fluctuates in a predictable manner. Paxson (1993) finds that seasonal consumption patterns in Thailand are similar across households with very different seasonal income patterns. Browning and Collado (2001) find comparable monthly consumption patterns across Spanish households although monthly paychecks are constant for one set of workers while another set of workers receives predictable bonus payments twice per year. Hsieh (2003) finds that the consumption of Alaskan residents does not respond to the sizable annual dividend payments from state government's oil royalties.

Since the recent literature still leads to differing conclusions when implementing improved empirical methodologies, the question still remains – do households smooth consumption in a manner consistent with the basic LCPIH? Browning and Crossley (2001) offer a reconciliation of the results. They suggest that boundedly-rational households

"choose not to calculate the optimal consumption response to an income change when the change is small and variable." (p.7). Thus, they might expect to reject the LCPIH in the first set of studies discussed above which examine small one-time and/or infrequent income changes. However, they would predict behavior to be consistent with the model when households face large income fluctuations as in the second set of studies. Testing of this proposed dichotomy requires an examination of consumption behavior when income changes are large and predictable.

The public pension system in Japan is a multi-tiered system that covers employees in the public and private sectors as well as self-employed workers. Depending upon the sector in which an individual participates, benefits are available as early as age 60 and no later than age 65. Since private pensions are uncommon in Japan, these benefits represent the primary source of income for retired Japanese households. Interestingly, Japanese public pension benefits are paid on the fifteenth of *every other* month. Therefore, the income of retired Japanese households exhibits a large, predictable seasonal pattern.

In this paper, we use the Japanese Family Income and Expenditure Survey (JFIES) which collects consumption and income information from households over a six month survey period. Although the survey is collected using daily diaries, the available data is compiled at monthly frequencies. We examine the impact of bi-monthly public pension benefit receipt on monthly household consumption using non-durable consumption. Since we are interested in consumption at a monthly frequency, however, we focus on consumption categories that, we argue, are non-durable at this higher frequency including food, in particular fresh food and food away from home, and recreational services consumption.

We identify the consumption response to public pension benefits by first examining the monthly fluctuations and then exploiting the variation in benefit amounts across households. Using the first source of variation, we find that monthly non-durable consumption increases by one to two percent in response to these income payments. We find

slightly larger responses for total food and fresh food consumption while the largest response is found in the recreational services category. When we use the second source of variation, which allows us to better control for seasonal consumption patterns, we only find a significant response for fresh foods and recreational services of one and sixteen percent, respectively. We also find that the response is larger for lower income households. Overall, given the relatively small magnitudes of the results, the findings indicate that the consumption behavior of retired Japanese households is generally consistent with the LCPIH.

The remainder of the paper proceeds as follows. In the next section we describe the Japanese public pension system. We then describe the dataset used in the paper, the JFIES. In section four we detail the identification strategy that we implement to determine the impact of public pension benefits on consumption. In section five we present our results. Section six concludes.

2 The Japanese Retirement Benefit System

The Japanese public pension benefit system involves a variety of pension plans that are both publicly and privately managed.[1] The public pension system is comprised of two tiers: the national pension and the employee pension. Whether or not an individual receives both of these public pensions depends upon their sector of employment. The private pension system for employees consists of both firm-specific pensions and, in more recent years, personal pension plans. The firm-specific benefits are typically distributed as a lump sum at retirement.[2] Recent legislative changes have created corporate defined benefit and de-

[1] Unless otherwise noted, the discussion in this section is based on Casey (2004).

[2] Employers at large firms (over 500 employees) are able to offer firm specific pension benefits which can replace part of the employee pension payments. Any amount of the firm specific pension that exceeds the employee pension can be either paid out as an annuity or can be taken as a lump sum.

fined pension plans which will eventually replace the aforementioned firm-specific pensions. There are also personal pension plans that are specifically available for self-employed workers who choose to make voluntary contributions to such a pension as well as personal savings plans that are available to the entire population.

The national pension (sometimes referred to as the basic pension) is a benefit available to everyone including those who are employed by either a private firm or a local or the central government as well as the self-employed. The benefit amount received by each participant in the national pension depends only on the number of years the participant made contributions. Earnings levels are not factored into national pension benefit payments.[3] In addition, since 1985, dependent, non-working spouses are beneficiaries of the national pension.[4]

The employee pension is actually a system of multiple pension plans. One plan, the Employee's Pension Insurance, covers private sector workers. There is a separate plan for central government workers as well as one that covers employees of local governments. Dependent spouses are also covered by employee pensions. Self-employed workers, certain agricultural workers, and employees in small businesses are not eligible for the employee pension.[5] Benefit levels in the employee pension depend upon the individual's earnings while they were working. Recipients who have reached retirement age can draw benefits while they are still working although the amount they receive is adjusted depending upon their current earnings.

The age of eligibility currently differs for the national pension and the employee pension. Before the pension reform of 1994, male public pension recipients were eligible to receive the national pension at age 65 while they could receive the employee pension at age 60.[6] In addition, men who were eligible to receive the employee pension could

[3] In 2007, the annual national pension benefit is 792,100 yen.

[4] Prior to 1985, these spouses could voluntarily enroll in the national pension.

[5] Also, part-time employees as well as workers on temporary contracts are ineligible for the employee pension.

[6] The age of eligibility currently differs for men and women in Japan. Since our analysis will focus on male headed households, the discussion of benefit ages will be limited to male

also receive a "bridge" national pension amount between ages 60 and 64 which equalled the full national pension amount that they would receive beginning at age 65. The bridge pension is only available to those who have completely left the labor force. Workers who are not eligible for the employee pension cannot receive this bridge national pension.

The reform in 1994 implemented a gradual increase in the eligibility age for the employee pension. Beginning in 2001, this eligibility age increased by one year every three years so that by 2013 men will have to be age 65 to receive their full employee pension. However, this reform also introduced a form of early retirement whereby men can begin receiving their employee pension as early as age 60 but that benefits will be reduced by 6 percent for each year they begin taking their benefits prior to their employee retirement eligibility age. Moreover, this reform also affected the bridge national pension. Recipients cannot receive their bridge national pension prior to their employee pension eligibility age.

During the period that we examine, public pension benefits are subject to an age-related earnings test which reduces the benefit amount if earned income exceeds a threshold. For recipients ages 60-64, there is a twenty percent lump sum reduction in benefits for the first yen of earned income. In addition, for every two yen that the sum of monthly earned income plus 80 percent of the monthly public pension benefit exceeds 280,000 yen, the recipient's benefit if reduced by a yen.[7] For 65-69 year old recipients, there is no lump sum benefit reduction. For every two yen that the sum of monthly earned income plus the monthly benefit exceeds 480,000 yen, the recipient's benefit if reduced by a yen. There is no earnings test for workers ages 70 and above.

benefit eligibility.

[7]Beginning in April 2005, the earnings test was relaxed so that there is no longer a lump sum reduction for 60-64 year old workers.

3 Data

3.1 The Japanese Family Income and Expenditure Survey

The data we use are drawn from the 1995-2005 Japanese Family Income and Expenditure Survey (JFIES). The survey excludes agricultural workers and households of single individuals. The JFIES is a panel survey in which households are interviewed once a month for six consecutive months. The panel is rotating meaning that in any given month approximately one-sixth of households are being interviewed for the first time, one-sixth for the second time, etc. Roughly 8,000 households are interviewed in any given month. In each monthly interview, households record daily household expenditures and income receipt in a diary which is collected twice a month. However, the available micro data only identify the month in which each expenditure and income item is recorded in the diary. In addition, retrospective income is collected for the year preceding the first interview. Household demographic and labor force information is also collected in the JFIES.

To examine the impact of bi-monthly public pension benefit arrival on monthly consumption, we impose some sample restrictions due to the public pension eligibility rules and the sampling scheme of the JFIES. First, although we have access to JFIES data from earlier years, we can only use data beginning in 1995 since before that public pension income was not separately identified from other social security income in the JFIES. Second, we limit the sample to male-headed households where the male head is at least 65 years old since national pension benefit receipt begins at this age, regardless of work status, for everyone who is eligible for these benefits. Third, we limit the sample to households where the head's job status does not change (e.g., employed to out of the labor force, or job to job changes) during the six month sample period so that public pension benefit payments (which are subject to an earnings test) are not affected by contemporaneous labor force decisions. Fourth, we limit the sample to households that

appear in the JFIES for all six months of the survey. Sample attrition in the JFIES is limited so any bias from dropping these households is presumably very minimal.[8]

We limit the sample to "nuclear families" which we define as two person households with a husband and wife. By limiting the sample to nuclear families, we increase the importance of public pension income as the source of household income since we have eliminated the earnings of adult children as a potential source of income. While intergenerational households in which adult children reside with their parents co-reside are relatively more common in Japan than in the U.S., Casey (2004) notes that between 7 and 10 percent of couples ages 65 and up live in intergenerational households in Japan while the comparable figure is 1 percent in the United States.[9] Therefore, since the JFIES does not sample single person households and very few elderly couples have children under age 18, only a small share of elderly couples will be excluded by dropping those in intergenerational households.

To further increase the focus on public pension benefits, we limit the sample to household heads that are not employed. This additional restriction eliminates the impact of other seasonal income fluctuations (such as annual bonus income) on our estimates. After imposing the restrictions listed above, only eleven percent of the elderly couples are dropped by focusing on the non-employed.

We construct household consumption measures from the data found in the recorded in the JFIES diaries. The first consumption measure we use is non-durable consumption. This consumption category is comparable to the non-durable consumption measure found in studies using the U.S. Consumer Expenditure Survey (e.g., Parker (1999), Hsieh (2003), and Stephens (Forthcoming) use this measure.).[10] One

[8] Over 90% of households complete all six JFIES interviews.

[9] The co-residency figures are much greater for single elderly individuals in Japan with 10 percent of single people ages 65-74 and 35 percent of those ages 75 and above live in intergenerational households. The comparable numbers for the U.S. are 5 and 9 percent, respectively.

[10] Non-durable consumption includes food at home and away from home, utilities (elec-

concern is that some of the items that are classified as non-durable may in fact, have a durable component. For example, while footwear is classified as a non-durable good, consumers may enjoy the benefits for such items for multiple years. As such, we follow the approach of Lusardi (1996) which is to define a category of strictly non-durable consumption which restricts items that can be consumed within a quarter. We define strictly non-durables as food at home and away from home, utilities, domestic non-durables, supplement, automotive maintenance, communication, toiletries, tobacco, clothing services, medical services, public transportation, recreational services, and personal care services.

In this study we focus on consumption measures that are non-durable over a monthly interval. We use total food consumption, both at home and away from home, as one such measure. Whereas in the United States families may be able to store large quantities of food that are purchased every other month when benefit checks arrive, household space is far more constrained in Japan. For example, we find that households in the JFIES report purchasing milk an average of 5.73 times per month which suggestions that trips to stores are rather frequent. Therefore, we believe that total food consumption is a useful measure in this context. We also examine fresh food consumption as a separate category. Fresh food comprises roughly one-third of total food spending in Japan while fresh fish accounts for about one-third of total fresh food spending. In addition, we examine food away from home consumption as a separate category since such purchases are certainly non-durable within a monthly frequency. Finally, we use a category of recreational services which includes recreational goods, hotel charges, and admission fees for movies, sporting events, etc.

We also examine if household wealth affects consumption behavior

tricity, gas, water, and other fuel), domestic non-durables (e.g., kitchen items such as plastic wrap and dishwashing detergent), nutritional supplements, automotive maintenance, communication (e.g., phone bills and postage stamps), toiletries, tobacco, clothing services, medical goods and services, public transportation, recreational goods and services, personal care services, domestic utensils, clothing, footwear, readings, and personal effects.

by exploiting the link between the JFIES and the Family Saving Survey (FSS). From the roughly 8,000 households that participate in the January JFIES, about 3,000 are randomly sampled and asked to participate in the FSS. These households are then asked questions about the amount of savings, investments, and liabilities as of December 31 and about changes in these values during the preceding year. For the households that appear in the FSS, we can examine the extent to which consumption responses depend upon the household's position in the wealth distribution.

The summary statistics for monthly variables, after imposing the above sample restrictions, are shown in the first section of Table 1 under the heading of Full Sample which uses 99,870 monthly observations from 16,645 households. The table indicates that, on average, over 90 percent of income for these households is due to the public pension. We also see that households receive no income in nearly one-third the monthly observations. At the same time, households have positive consumption in every month in the total, non-durable, strictly non-durable, food, and fresh food consumption categories. For the recreational services and food away from home categories, consumption is zero in nearly 30 percent of the monthly observations.

3.2 Public Pension Income in the JFIES

In this paper, we are interested in whether monthly household consumption is responsive to the receipt of public pension income in alternating months. Public pension income is delivered on the 15th of the even months, that is, in February, April, June, August, October, and December. Examination of the magnitude of the consumption response, if one exists, requires the use of the self-reported public pension income in the JFIES. Given the importance of public pension income, we first examine the reporting of this measure in the JFIES by month as well as examine the importance of public pension income as a source of income for the households in our sample.

Figure 1 presents the share of sample households reporting the re-

ceipt of public pension income and the share reporting any income at all by the household's month in the survey. Since households enter the JFIES in each month due to the rotating panel structure, we can divide households based upon whether they enter the JFIES in an even month, i.e., a month in which a public pension check is delivered, or if they enter in an odd month (the remaining months). Panel A of the Figure presents the results for the even month entry households while Panel B shows the results for the odd month households. During months in which public pension income is delivered, over 80 percent of these households report receiving income of this type. Of course, not all households with a non-working male household head will necessarily receive a public pension, although there are likely missing income values in the data since virtually all households ages 65 and over should be eligible to receive the national pension. In fact, we also find that between three and four percent of households report receiving public pension income during months in which these checks are *not* delivered which is consistent with a degree of mis-reporting.

Figure 1 also presents the share of households reporting income from *any* source by month in the survey. Roughly 90 percent of households report receiving income during the public pension benefit months while approximately 50 percent of households receive income during the intervening months. Thus, in any given month, at least 10 percent of households do not report any income at all. Table 1 indicates that the share of households not reporting any income for all six months is three percent.

Average monthly amounts of public pension income and total income are shown in Figure 2. As with Figure 1, the results are shown by month in the survey and are split by whether the household began the JFIES in an odd or an even month. This figure clearly indicates that, on average, nearly all monthly income for these households is due to public pension benefits. Average public pension benefits in months when these benefits are delivered equal 425,000 yen while average total income in these months is 460,000 yen. In the months in which pension benefits are not received, reported average public pension in-

come is 12,000 yen and average total income is 45,000 yen. In addition, Figure 2 indicates that although roughly half of households report receiving non-public pension income during the months in which public pension benefits are not paid (see Figure 1), these other income sources represent a very small share of total income.[11]

Two distributions related to public pension benefits are shown in Figure 3. First, we calculate the share of income over the entire six month sample period that is due to public pension benefits and its distribution in Panel A of the Figure. Over two-thirds of the sample receives more than 90 percent of its income from public pension benefits. In addition, five percent of the sample does not receive any income from the public pension. Panel B of the Figure shows the distribution of the number of months reporting the receipt of public pension benefits. The vast majority of households report receiving these benefits for exactly three months although some households report receipt of these benefits in more than three months.

Figure 4 pools across the households in the sample and yields the share reporting and amount of public pension income and total income by calendar month. Panel A indicates that both the share receiving public pension income and any income does not systematically vary by calendar month. Panel B shows that average total income is slightly higher (by roughly 10,000 yen) in December while public pension income remains constant across the calendar months.

Overall, these figures indicate that households in our sample are highly dependent upon public pension benefits for income. Moreover, among the households receiving the benefits, nearly all report a pattern of benefit receipt that is consistent with the actual disbursement of public pension benefits.

[11] For the remaining income, a small share is from the spouse's income and an even smaller share is from other transfer income. The primary source for the difference is the category in the JFIES title "Other Income" which includes returns from assets, gifts, or remittances.

4 Empirical Methodology

We use a number of empirical specifications to examine whether Japanese households smooth consumption in response to receiving public pension benefits in alternating months. We first investigate consumption fluctuations between months in which the benefit check is received and months in which it is not. The first specification is

$$\Delta C_{i,t+1} = \alpha_D D_{i,t+1} + \beta \Delta X_{i,t+1} + \delta YEAR_{t+1} + \epsilon_{i,t+1} \qquad (1)$$

where $\Delta C_{i,t+1}$ is the change in a consumption measure between months t and $t+1$ for household i, $D_{i,t+1}$ is a measure of receiving the public pension receipt in month $t+1$, $\Delta X_{i,t+1}$ is a set of demographic household characteristics at $t+1$, $YEAR_{i,t+1}$ is a full set of year-specific indicators to control for economy-wide shocks, and $\epsilon_{i,t+1}$ is a household month-specific error term. Given that we focus on two-person households and no demographic characteristics vary at the monthly level, $\Delta X_{i,t+1}$ only contains age of the household head and its square.

As we discussed in the Data section, we use the consumption measures which are shown in Table 1. When estimating equation (1), we will specify $\Delta C_{i,t+1}$ both in levels and logs. We take this approach for a number of reasons. First, Table 1 indicates that nearly 30 percent of the month values equal zero for the smaller consumption categories which precludes the use of a log consumption measure. Second, the previous literature primarily presents results using log consumption measures, although some papers use level consumption measures (e.g., Souleles 1999).[12] Third, as we discuss below, the additional specifications we examine will require the use of level consumption measures so it is useful to compare the results from using both the log and level consumption measures in the specification that can use either measure.

The regressor of interest in equation (1) is $D_{i,t+1}$ which indicates

[12]The log consumption measure is justified by assuming that consumers have constant relative risk aversion utility functions while the level consumption measure results from assuming that consumers have constant absolute risk aversion utility functions. Typically, the results from using one, but not both, of these measures are reported.

whether or not the household received its public pension benefit in month $t+1$. When the household receives its public pension benefit in month $t+1$ but did not in month t we set the public pension receipt variable $D_{i,t+1}$ equal to 1. Notice that when the household receives the benefit in month t but does not in month $t+1$, we want to allow for an equal but *opposite* consumption response. Therefore, we set $D_{i,t+1}$ equal to -1 if the public pension benefit is not received in month $t+1$. The estimated coefficient α_D is the average monthly change in consumption measured in yen due to public pension benefits when using the level consumption measure and is the percentage monthly change in consumption when using the log consumption measure.

Equation (1) cannot include calendar month dummies since all households receive public pension benefits in the same six (even) months. Therefore, the approach is susceptible to a spurious correlation problem if public pension benefits are received in months in which consumption increases for other reasons. One potential problem is due to the increased holiday spending in December. Figure 5 presents average monthly consumption for all of the measures used in the analysis except for total consumption. The larger categories all exhibit a spike in December. Therefore, we present results in which we exclude observations in which either month t or month $t+1$ is December. Since we limit the sample to households where the head does not work and there are no (potentially working) adult children, we already circumvent the issue of employment bonuses which primarily arrive in December. However, since we cannot control for seasonal spending patterns with equation (1), we also present the results excluding the observations that overlap December.

To estimate equation (1), we impose further restrictions. First, we only use households that report receipt of public pension payments. Although we suspect that there is missing public pension income data in some households where the head is at least 65 years of age, we want to avoid incorrectly including households that are not eligible for these payments. Second, we exclude households that incorrectly report public pension benefit months (i.e., that report receiving public pension

benefits in odd months). Third, we only use households that report the receipt of public pension benefits in exactly three months. We impose this restriction since we want to exclude households that begin receiving public pension benefits during the sample period so that we do not falsely attribute other contemporaneous income changes to the impact of public pension receipt.

After imposing these additional restrictions, we have 68,322 monthly observations from 11,387 households. The sample statistics for these households are shown in the second section of Table 1 under the heading of Regression Sample. After differencing the monthly observations to implement the regression specification, we have 56,935 first-differenced observations.

One important issue with equation (1) is that we cannot include calendar month dummy variables to account for seasonal consumption fluctuations. However, we can exploit the fact that public pension benefit levels vary across households to identify the impact of these benefits on consumption using the variation in benefit levels. The second specification is

$$\Delta C_{i,t+1} = \alpha_Y \Delta Y_{i,t+1} + \beta \Delta X_{i,t+1} + \delta YEAR_{t+1} + \gamma MONTH_{t+1} + \epsilon_{i,t+1} \tag{2}$$

This specification differs from equation (1) in two dimensions. First, we now allow for calendar month indicators in order to capture seasonal fluctuations in consumption. Even though we can now account for holiday consumption increases in December, we again present specifications which control for drop observations where either month t or month $t+1$ is December. Second, we replace $D_{i,t+1}$ from equation (1) with $\Delta Y_{i,t+1}$ which is the change in the total income between months t and $t+1$. As we demonstrated above, public pension benefits are the primary source of total income for households in our sample. But since we are interested in the whether consumption responds to expected income changes, we present results in which instrument for the change in total income, $(\Delta Y_{i,t+1})$, in (2) with the change in public pension income, $\Delta PPP_{i,t+1}$.

Notice that in equation (2), $\Delta Y_{i,t+1}$ is measured in yen. In studies using log consumption as the dependent variable, is common to use a percentage (or log) change in income as the regressor of interest. In the current study, we are unable to give such an interpretation to the monthly income changes since monthly income equals zero during the months in which public pension benefits are not paid for a large share of households. Thus, equation (2) will only use the level consumption measure as the dependent variable. The estimated coefficient α_Y is the change in consumption for each additional yen.

5 Results

The monthly fluctuations in both total income and public pension income for the regression sample are shown in Table 2.[13] The first two columns in the Table present the results of estimating equation (1) where the monthly change in the income measures is the dependent variable. When using all of the months in the sample (Panel A), the first column shows that monthly public pension income changes by over 550,000 yen between months in which these benefits are received and the months in which it is not. As can be seen in the second column, the monthly fluctuations in total income are of the same magnitude. When we limit the sample by excluding months in which either month t or month $t+1$ is December (Panel B), we find nearly identical results. Consistent with public pension benefits remaining constant throughout the year and these households being so dependent on public pension income, the monthly fluctuations in these benefits are unaffected when we control for seasonal effects.

Table 2 also presents the results of regressing the monthly change in total income on the monthly change in public pension benefits using

[13]The results in all of the tables report standard errors that are adjusted for arbitrary forms of serial correlation within households over time.

the equation

$$\Delta Y_{i,t+1} = \psi \Delta PPP_{i,t+1} + \beta \Delta X_{i,t+1} + \delta YEAR_{t+1} + \gamma MONTH_{t+1} + u_{i,t+1} \tag{3}$$

The results of estimating this equation are the first stage estimates for (2) when we instrument for monthly total income changes using monthly public pension income changes. These findings are shown in the last two columns of Table 2. The estimated coefficient on $\Delta PPP_{i,t+1}$ is very close to 1 and highly significant whether we exclude calendar month indicators from the specification (a comparison of columns (3) and (4)) or we drop observations that overlap December (a comparison of Panels A and B).

5.1 Identification Using Month of Receipt

The consumption effect of monthly income changes due to public pension receipt is shown in Table 3. These estimates follow the equation (1) which regresses on consumption changes on the variable $D_{i,t+1}$ which equals 1 if the public pension is received in month $t+1$ and equals -1 otherwise in order to treat the fluctuations symmetrically between months in which the benefit is received and months in which it is not. As discussed above, this specification identifies the consumption response using only the variation across months due to the receipt of public pension benefits.

Panel A of Table 3 finds significant increases in the level of consumption across all seven consumption categories. Non-durable consumption increases by over 6,000 yen when public pension benefits while strictly non-durable consumption increases by nearly the same amount. Most of this increase is due to food consumption which increases by nearly 5,000 yen. A significant increase in fresh food consumption is also observed when public pension benefits are received. Somewhat surprisingly, given the results in other studies, there is no effect on food away from home. For recreational services, on the other hand, consumption increases by roughly 1,000 yen per month.

Most studies examining the consumption response to predictable in-

come changes use the CRRA utility specification which yields changes in log consumption as a dependent variable. This specification is useful in terms of measuring the consumption response as an approximate percentage change. These results are shown in Panel B of Table 3. For total, non-durable, and strictly non-durable consumption, household consumption increases by more than four percent during the months in which public pension benefits are received. For total food consumption and fresh food consumption, this increase is over seven percent. The impact on recreational services is approximately seven percent as well although these results must be cautiously interpreted since, as Table 1 shows, this measure equals zero in nearly 30 percent of the monthly observations. It is also useful to note that dividing the point estimates from the level consumption regressions in Panel A by the sample averages in Table 1 yields implied percentage changes that are very close to the log consumption results in Panel B.

As we mentioned above, one potential concern with this identification strategy is that the results may be spuriously correlated with seasonal changes in consumption. In particular, we are concerned that holiday spending in December, which coincides with public pension receipt, may confound the results. In the remaining Panels of Table 3, we drop observations in which either month t or month $t+1$ is December so that we avoid including the holiday spending increases in our analysis. As shown in Panel C of Table 3, excluding these observations still yields estimates that are statistically significant with the exception of total consumption. However, the point estimates for these level consumption changes are much smaller than those found in Panel A. The results from the log consumption specification (Panel D) show that monthly consumption changes by one roughly one percent for non-durables, strictly non-durable, and food consumption. The increase for fresh food is over two percent. Recreational services consumption again changes by nearly seven percent. Somewhat surprisingly, the change in food away from home is significant but *negative* in sign. Overall, these results suggest a small but statistically significant impact of bi-monthly public pension income receipt on household consumption.

5.2 Identification Using Variation in Benefit Levels

We next turn to estimating equation (2). This specification identifies the impact of the public pension benefits on household consumption using the variation in the monthly benefit changes across households as opposed to the timing of benefit receipt across months. Moreover, equation (2) includes calendar month effects to control for seasonal consumption patterns that may confound the prior specification.

The first set of results in Table 4 examines the impact of monthly fluctuations in total income on household consumption (Panel A).[14] Each additional 100,000 yen received corresponds to a 6,000 yen increase in total consumption. While statistically significant, the estimated increases for the remaining consumption categories imply less than a 1,000 yen increase in spending for each 100,000 yen in benefits.

While we have seen that the vast majority of income for these households is due to the public pension benefits, the monthly total income change may be contaminated with unexpected income changes. Following the literature, we instrument the total income change with the expected income change due to the public pension benefit. The resulting estimate on the instrumented total income change represents the excess sensitivity of consumption in responses to predictable income changes. The public pension change is a valid instrument in this context since it is known in advance and, as we have already seen in Table 2, it is a powerful predictor of the total income change.[15]

The instrumental variable results are shown in Panel B of Table 4. With the exception of the estimated effect on total consumption,

[14] Recall that since a large fraction of these households have zero income during the months when the benefits are not received, we cannot construct a measure of the log change in income.

[15] In Table 2, we find that the estimated coefficient on the public pension change equals one in the first stage regression of total income changes on public pension income changes. Therefore, the coefficient on the instrumented total income change is (essentially) the same as the coefficient found on the public pension change when estimating the reduced form regression of consumption changes on public pension changes. We do not report the reduced form results for this reason.

the point estimates when applying the instrumental variables strategy are nearly identical to those found when using OLS. This result may not appear surprising because since a high fraction of income for these households is due to public pension benefits. However, if the differences between total income and public pension income are comprised primarily of unexpected income events, then it is quite plausible that there would be evidence of differences between the two estimation methods. In fact, the differences between the point estimates in the OLS and IV specifications for the total consumption category is consistent with this rationale for implementing the IV strategy.

To assess the implied magnitude of the instrumental variable estimates, we evaluate the results using at the estimated change in monthly public pension income from Table 2 (550,000 yen) and the average monthly consumption for each category found in Table 1. Using this benchmark, total monthly consumption increases by 9,400 yen which is roughly four percent of average monthly consumption. The implied changes in non-durable and strictly non-durable consumption are both just over two percent of the monthly consumption levels in these categories while the implied increases in monthly consumption for total food and fresh food consumption is over two percent. Recreational services are the most responsive. Evaluated at the sample average, the monthly increase in recreational services is 2,000 yen. Given that the average monthly consumption in this category are 16,000, the estimates imply an impact on consumption in this category of twelve percent.

Our earlier findings indicate that the results are sensitive to the exclusion of observations that overlap the December holiday period. The specification that is implemented in the first two panels of Table 4 includes calendar month effects to control for seasonal fluctuations. However, to test the robustness of our findings, the bottom two panels again estimate equation (2) but now exclude observations that overlap December. While we examine the instrumental variable results in Panel D, only fresh food consumption and recreational services exhibit significant responses. The implied effect for fresh foods is one percent

of monthly consumption. Recreational services show a much larger implied effect of over sixteen percent of monthly consumption. This category is only eleven percent of non-durable consumption and seven percent of total consumption which suggests that, although this response is significant, it only represents a small share of total household consumption.

5.3 Response Heterogeneity By Income and Wealth

While the basic LCPIH model predicts that consumption should not be excessively sensitive to predictable income fluctuations, alternative models predict that consumption movements will be timed with income changes. Zeldes (1989) and Deaton (1991) show that liquidity (borrowing) constraints will cause consumption to respond to predictable income changes since households that desire to borrow from future income to raise current consumption are unable to do so. Numerous studies have found evidence that consumption tracks income for constrained households but does not for unconstrained households where either the households assets or the households asset to income ratio is used a as proxy for liquidity constraints (e.g., Zeldes 1989). Models that allow for precautionary savings, or saving for a rainy day, also generate consumption growth that is faster than predicted by the basic LCPIH. Carroll (1997) shows that among buffer stock consumers, those with higher predictable permanent income growth with also have higher levels of consumption growth.

For elderly Japanese households receiving public pension income, these standard explanations for rejecting the basic LCPIH seem less plausible. Among these households, real income growth is zero since benefits are only adjusted for changes in the price level. While income does fluctuate between zero and the benefit amount from month to month, households are not constrained from borrowing from higher future income. Rather, households can save income from the month in which benefits are paid to spend during the intervening month. As such, liquidity constraints should not be an area of concern. In

addition, there is essentially no income uncertainty that would call for precautionary savings. Moreover, Gourinchas and Parker (2002), when calibrating the parameters of a life-cycle model using data from the U.S., find that households transition from saving for precautionary reasons to life-cycle (i.e., retirement) reasons in their early 40s. Therefore, we would not expect these models to explain the consumption fluctuations due to public pension receipt.

Following the previous literature, we split the sample between based on the likelihood of being liquidity constrained. We take two approaches here. Our first method is to split households based upon where they fall into the income distribution. To avoid concerns that measured income during the sample period may be correlated with consumption during the sample period, we use the yearly income measure that is reported at the first household sample month. Households are asked about their income for the year prior to the sample period. Therefore, we have a measure of lagged income which can be considered exogenous to current consumption decisions.

Using this yearly income measure, we split households into income quartiles. In Table 5, we present the results from estimating equation (2) separately for each quartile using the instrumental variables strategy. While we find significant results across nearly all of hte consumption categories when we use all of the months in the sample (Panel A), we concentrate our discussion on the results which exclude the months which overlap December (Panel B). For the bottom two income quartiles, we find significant responses in non-durable and strictly non-durable consumption. The magnitude of the estimated coefficients fall in half when examining the top two quartiles and our statistically insignificant. The estimated effects for the recreational services categories are significant across all four quartiles.

As a second approach to test for liquidity constraints, we split the sample based on their position in the wealth distribution. As we noted above, a sample of January JFIES participants are selected to participate in the Family Saving Survey (FSS). From the FSS we have information on both gross and net household wealth. In the current

draft, we split households into "quintiles" based on their location in the wealth distribution.[16]

In Table 6, we present the instrumental variable estimates of equation (2) for households based on their location in the wealth distribution.[17] When using all of the months in the sample (Panel A), we find significant results in the larger consumption categories across the entire wealth distribution. Once we only use observations that do overlap December (Panel B), we do not find significant results in any category. Since the FSS is comprised of households that participate in the January JFIES, we reduce the sample since considerably once we drop observations that overlap December. As such, we are unable to estimate the results are precisely in this last Panel as we were in the previous Tables.

6 Conclusions

A proposed dichotomy of the recent literature that examines whether households smooth consumption as predicted by the LCPIH is that households will behave in a manner consistent with the model when the income fluctuations are large and predictable. In this paper, we examine the monthly consumption response of retired Japanese households to their bi-monthly public pension benefits. We identify the effect using both the seasonal fluctuation in income as well as variation in the benefit levels across households. We find significant but small effects on household consumption. The most responsive consumption category is recreational services which change by over sixteen percent when the public pension benefits are received. However, these expenditures comprise eleven percent of monthly non-durable consumption

[16]The bottom "quintile" is comprised of households reporting zero wealth. The remaining "quintiles" are created by evenly dividing the positive asset households into four groups. In subsequent versions, we plan to divide households based on their wealth to yearly income ratio.

[17]For comparison purposes, Appendix Table 1 presents estimates analogous to those found in Table 4 but limited to the wealth sample.

and only seven percent of total monthly consumption. Overall, these findings suggest that Japanese households behave in a manner consistent with the Life-Cycle/Permanent Income Hypothesis.

In the context of Browning and Crossley's (2001) dichotomy, the results presented here provide further evidence that households smooth large and predictable seasonal income fluctuations. However, these findings stand in contrast to those in previous studies that examine the consumption response to high frequency income receipt. Stephens (2003) finds strict non-durable consumption increases by ten percent during the week following the receipt of U.S. Social Security checks. Using data from the UK, Stephens (2006) finds a seven percent increase in strict non-durable consumption during the week in which monthly paychecks arrive. Since extending the basic LCPIH to allow for either liquidity constraints or precautionary savings cannot provide a satisfactory explanation for the findings in these prior studies, further investigating the differences in these responses across countries may yield additional insights into household consumption behavior.

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Table 1: Descriptive Statistics
Nuclear Households With Non-Working Heads Ages 65 and Over
(Income and Consumption in 1,000 Yen)

	Full Sample			**Regression Sample**			**Wealth Sample**		
Variable	Mean	Std. Dev.	Share Zero	Mean	Std. Dev.	Share Zero	Mean	Std. Dev.	Share Zero
Total Income for 6 months	1,496	793	0.03	1,781	637	0	1,760	634	0
Total Income	251	308	0.31	300	319	0.25	298	320	0.26
Public Pension Payment	231	297	0.57	277	309	0.5	277	309	0.5
Total Household Consumption	246	224	0	250	215	0	254	222	0
Nondurables	146	84	0	148	83	0	149	83	0
Strictly Non-Durable	124	71	0	126	69	0	128	69	0
Food Consumption	60	25	0	60	25	0	60	26	0
Fresh Food	22	11	0	22	11	0	22	11	0
Recreational Service	16	46	0.28	17	44	0.27	17	42	0.27
Food away Home	6	9	0.28	6	9	0.28	6	6	0.27
Spouse Employed	0.06	0.24	—	0.06	0.24	—	0.06	0.24	—
Age of HH Head	72.5	5.34	—	72.4	5.24	—	72.6	5.27	—
Monthly Observations		99,870			68,322			37,800	
Number of Households		16,645			11,387			6,300	

Table 2: Monthly Income Changes Due to The Receipt of Public Pension OLS Regressions[a]

	Public Pension (1)	Total Income (2)	Total Income (3)	Total Income (4)
A. All Months				
$D_{i,t+1}$	555***	558***		
	(1.8)	(1.8)		
$\Delta PPP_{i,t+1}$			1.004***	0.990***
			(0.001)	(0.002)
Month Effects?	No	No	No	Yes
B. Excluding Observations Overlapping December				
$D_{i,t+1}$	555***	556***		
	(1.8)	(1.8)		
$\Delta PPP_{i,t+1}$			1.001***	0.995***
			(0.002)	(0.002)
Month Effects?	No	No	No	Yes

[a]All regressions include a full set of year effects, husband's age, and its square. Panels B and C also include calendar month effects. All income data are in 1,000 yen. $D_{i,t+1} = 1$ if public pension income is received in month $t+1$ and -1 otherwise. $\Delta PPP_{i,t+1}$ is the change in public pension income between months t and $t+1$. The standard errors allow for arbitrary forms of serial correlation within households over time. *, ** , and *** represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 3: The Impact of Public Pension Receipt on Consumption
OLS Regressions[a]

	Total Consumption (1)	Nondurable Consumption (2)	Strictly Nondurable (3)	Food Consumption (4)	Fresh Foods (5)	Recreational Service (6)	Food away home (7)
A. Level Consumption Changes							
$D_{i,t+1}$	10.8*** (1.5)	6.4*** (0.5)	6.0*** (0.4)	4.8*** (0.1)	1.7*** (0.04)	1.1*** (0.3)	–0.012 (0.05)
B. Log Consumption Changes							
$D_{i,t+1}$	0.041*** (0.003)	0.045*** (0.002)	0.048*** (0.002)	0.074*** (0.002)	0.073*** (0.002)	0.071*** (0.011)	–0.004 (0.008)
C. Level Consumption Changes (Without Observations Overlapping December)							
$D_{i,t+1}$	–1.0 (1.6)	0.9* (0.5)	1.4*** (0.4)	0.6*** (0.1)	0.5*** (0.04)	1.4*** (0.4)	–0.1** (0.05)
D. Log Consumption Changes (Without Observations Overlapping December)							
$D_{i,t+1}$	-0.001 (0.003)	0.007*** (0.002)	0.010*** (0.002)	0.011*** (0.002)	0.022*** (0.002)	0.068*** (0.012)	–0.021** (0.008)

[a]All regressions include a full set of year effects, husband's age, and its square. All consumption data are in 1,000 yen. $D_{i,t+1} = 1$ if public pension income is received in month $t+1$ and -1 otherwise. The standard errors allow for arbitrary forms of serial correlation within households over time. *, ** , and *** represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 4: The Impact of Total Income Changes on Consumption Level Consumption Changes[a]

	Total Consumption (1)	Nondurable Consumption (2)	Strictly Nondurable (3)	Food Consumption (4)	Fresh Foods (5)	Recreational Service (6)	Food away home (7)
A. OLS: Changes in Total Income							
$\Delta Y_{i,t+1}$	0.058***	0.0075***	0.0051**	0.0027***	0.0009***	0.0027*	–0.0001
	(0.011)	(0.0025)	(0.0020)	(0.0005)	(0.0002)	(0.0016)	(0.0002)
B. IV: Changes in Public Pension Income							
$\Delta Y_{i,t+1}$	0.017*	0.0059**	0.0050**	0.0031***	0.0011***	0.0037**	–0.0002
	(0.009)	(0.0028)	(0.0022)	(0.0005)	(0.0002)	(0.0018)	(0.0003)
Implied Effect at the Mean	0.037	0.022	0.022	0.028	0.028	0.120	–0.018
C. OLS: Changes in Total Income (Without Observations Overlapping December)							
$\Delta Y_{i,t+1}$	0.040***	0.0042	0.0039*	0.0004	0.0003	0.0041**	–0.0002
	(0.012)	(0.0027)	(0.0023)	(0.0005)	(0.0002)	(0.0019)	(0.0002)
D. IV: Changes in Public Pension Income (Without Observations Overlapping December)							
$\Delta Y_{i,t+1}$	–0.003	0.002	0.0031	0.0003	0.0004**	0.0051**	–0.0003
	(0.009)	(0.003)	(0.0025)	(0.0005)	(0.0002)	(0.0021)	(0.0003)
Implied Effect at the Mean	–0.007	0.007	0.014	0.003	0.010	0.165	–0.028

[a]All regressions include a full set of year and month effects, husband's age, and its square. All consumption and income data are in 1,000 yen. $\Delta Y_{i,t+1}$ is the change in total income between months t and $t+1$. The IV estimates use $\Delta PPP_{i,t+1}$, the change in public pension income between months t and $t+1$, as an instrument for $\Delta Y_{i,t+1}$. The implied effect at the mean is the point estimate multiplied by estimated monthly change in public pension benefits from Table 2 divided by average monthly consumption in the category. The standard errors allow for arbitrary forms of serial correlation within households over time. *, ** , and *** represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 5: The Impact of Total Income Changes on Consumption By Income Quartile
Instrumental Variable Regressions

Level Consumption Changes[a]

	Total Consumption (1)	Nondurable Consumption (2)	Strictly Nondurable (3)	Food Consumption (4)	Fresh Foods (5)	Recreational Service (6)	Food away home (7)
A. All Observations							
Bottom Quartile	0.011	0.0071	0.0059	0.0018*	0.0001	0.0061**	–0.0003
	(0.013)	(0.0045)	(0.0039)	(0.0010)	(0.0003)	(0.0030)	(0.0005)
Second Quartile	0.020*	0.0094**	0.0087**	0.0027***	0.0007***	0.0063***	–0.0006
	(0.011)	(0.0037)	(0.0030)	(0.0008)	(0.0003)	(0.0023)	(0.0004)
Third Quartile	0.011	0.0069**	0.0058**	0.0033***	0.0019***	0.0044**	–0.0002
	(0.010)	(0.0034)	(0.0028)	(0.0007)	(0.0002)	(0.0022)	(0.0003)
Top Quartile	0.017*	0.0061**	0.0052**	0.0026***	0.0018***	0.0043**	–0.0003
	(0.010)	(0.0030)	(0.0024)	(0.0006)	(0.0002)	(0.0019)	(0.0003)
B. Excluding Observations Overlapping December							
Bottom Quartile	0.0017	0.0082*	0.0082*	0.0010	–0.0001	0.0088**	–0.0001
	(0.014)	(0.0048)	(0.0043)	(0.0010)	(0.0004)	(0.0034)	(0.0005)
Second Quartile	0.0072	0.0081**	0.0089**	0.0010	0.0002	0.0082***	–0.0004
	(0.012)	(0.0039)	(0.0033)	(0.0008)	(0.0003)	(0.0027)	(0.0004)
Third Quartile	–0.0048	0.0043	0.0049	0.0011	0.0002	0.0066***	–0.0001
	(0.010)	(0.0035)	(0.0030)	(0.0007)	(0.0003)	(0.0025)	(0.0003)
Top Quartile	–0.0006	0.0035	0.0044*	0.0003	0.0003	0.0060***	–0.0003
	(0.010)	(0.0032)	(0.0027)	(0.0006)	(0.0002)	(0.0022)	(0.0003)

[a]All regressions include a full set of year and month effects, husband's age, and its square. All consumption and income data are in 1,000 yen. $\Delta Y_{i,t+1}$ is the change in total income between months t and $t+1$. The IV estimates use $\Delta PPP_{i,t+1}$, the change in public pension income between months t and $t+1$, as an instrument for $\Delta Y_{i,t+1}$. The standard errors allow for arbitrary forms of serial correlation within households over time. *, ** , and *** represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Table 6: The Impact of Total Income Changes on Consumption By Wealth Quantile
Instrumental Variable Regressions

Level Consumption Changes[a]

	Total Consumption (1)	Nondurable Consumption (2)	Strictly Nondurable (3)	Food Consumption (4)	Fresh Foods (5)	Recreational Service (6)	Food away home (7)
A. All Observations							
Bottom Quintile	0.014	0.0117**	0.0083*	0.0037***	0.0007	0.004	–0.0001
	(0.015)	(0.0057)	(0.0047)	(0.0012)	(0.0005)	(0.0036)	(0.0005)
Second Quantile	0.024*	0.0115**	0.0084**	0.0039***	0.0005	0.0015	–0.0001
	(0.013)	(0.0045)	(0.0033)	(0.0010)	(0.0004)	(0.0023)	(0.0005)
Third Quantile	0.022	0.0067	0.0045	0.0037***	0.0009**	0.0021	0.00004
	(0.015)	(0.0042)	(0.0031)	(0.0009)	(0.0004)	(0.0023)	(0.0004)
Fourth Quantile	0.017	0.0073*	0.0067**	0.0040***	0.0014***	0.0025	–0.00004
	(0.012)	(0.0043)	(0.0031)	(0.0009)	(0.0003)	(0.0023)	(0.0004)
Top Quintile	0.020	0.0056	0.0030	0.0036***	0.0010***	0.0019	–0.00004
	(0.014)	(0.0039)	(0.0030)	(0.0008)	(0.0003)	(0.0023)	(0.0004)
B. Excluding Observations Overlapping December							
Bottom Quintile	–0.0060	0.0060	0.0049	0.0001	–0.0000	0.0052	–0.0002
	(0.016)	(0.0061)	(0.0052)	(0.0011)	(0.0004)	(0.0040)	(0.0006)
Second Quantile	0.0079	0.0064	0.0060	0.0014	0.0003	0.0019	–0.0002
	(0.014)	(0.0047)	(0.0037)	(0.0010)	(0.0004)	(0.0027)	(0.0005)
Third Quantile	–0.0058	–0.0001	0.0001	0.0002	–0.0000	0.0031	–0.0001
	(0.013)	(0.0043)	(0.0035)	(0.0009)	(0.0003)	(0.0027)	(0.0004)
Fourth Quantile	–0.0021	0.0011	0.0034	0.0007	0.0005	0.0031	0.0001
	(0.013)	(0.0048)	(0.0034)	(0.0008)	(0.0003)	(0.0028)	(0.0004)
Top Quintile	–0.0054	0.00056	0.0003	0.0002	0.0002	0.0034	–0.0001
	(0.015)	(0.0041)	(0.0034)	(0.0007)	(0.0003)	(0.0027)	(0.0004)

[a]All regressions include a full set of year and month effects, husband's age, and its square. All consumption and income data are in 1,000 yen. $\Delta Y_{i,t+1}$ is the change in total income between months t and $t+1$. The IV estimates use $\Delta PPP_{i,t+1}$, the change in public pension income between months t and $t+1$, as an instrument for $\Delta Y_{i,t+1}$. The standard errors allow for arbitrary forms of serial correlation within households over time. *, ** , and *** represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

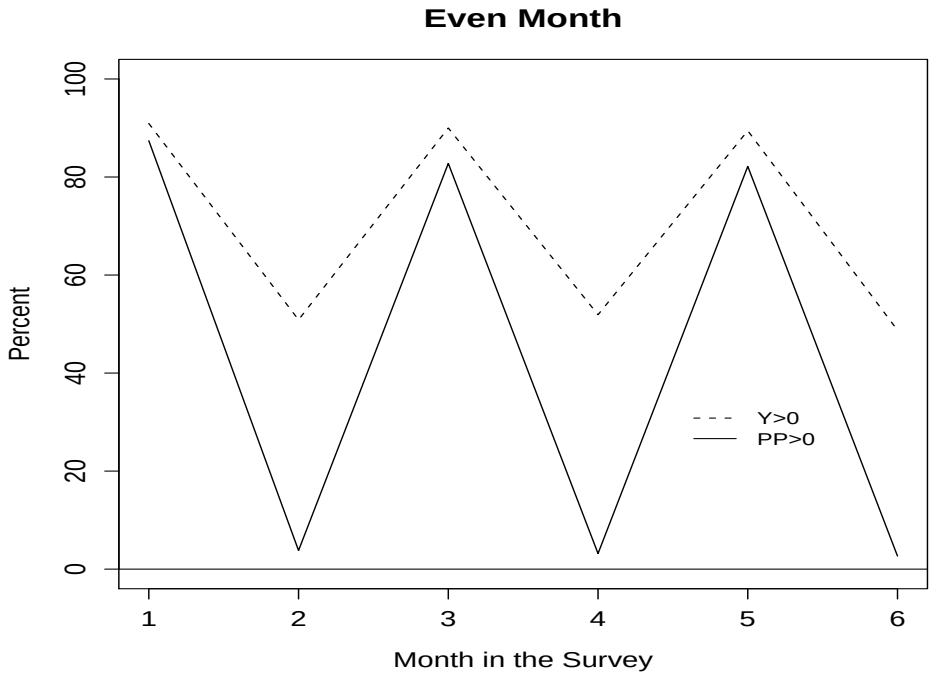
Appendix Table 1: The Impact of Total Income Changes on Consumption
Wealth Sample Only

Level Consumption Changes[a]

	Total Consumption (1)	Nondurable Consumption (2)	Strictly Nondurable (3)	Food Consumption (4)	Fresh Foods (5)	Recreational Service (6)	Food away home (7)
A. OLS: Changes in Total Income							
$\Delta Y_{i,t+1}$	0.065***	0.0068**	0.0035	0.0032***	0.0009***	0.0008	0.0001
	(0.016)	(0.0032)	(0.0025)	(0.0006)	(0.0003)	(0.0017)	(0.0003)
B. IV: Changes in Public Pension Income							
$\Delta Y_{i,t+1}$	0.019	0.0060	0.0041	0.0037***	0.0012***	0.0022	–0.00004
	(0.012)	(0.0036)	(0.0027)	(0.0007)	(0.0003)	(0.0020)	(0.0003)
Implied Effect at the Mean	0.041	0.022	0.018	0.034	0.030	0.071	–0.004
C. OLS: Changes in Total Income (Without Observations Overlapping December)							
$\Delta Y_{i,t+1}$	0.043**	0.0017	0.0010	0.0004	0.0001	0.0019	0.0001
	(0.019)	(0.0036)	(0.0029)	(0.0006)	(0.0002)	(0.0021)	(0.0003)
D. IV: Changes in Public Pension Income (Without Observations Overlapping December)							
$\Delta Y_{i,t+1}$	–0.006	0.0004	0.0009	0.0002	0.0003	0.0035	–0.00004
	(0.013)	(0.004)	(0.0030)	(0.0007)	(0.0003)	(0.0024)	(0.0004)
Implied Effect at the Mean	–0.013	0.001	0.004	0.002	0.008	0.113	–0.004

[a]All regressions include a full set of year and month effects, husband's age, and its square. All consumption and income data are in 1,000 yen. $\Delta Y_{i,t+1}$ is the change in total income between months t and $t+1$. The IV estimates use $\Delta PPP_{i,t+1}$, the change in public pension income between months t and $t+1$, as an instrument for $\Delta Y_{i,t+1}$. The implied effect at the mean is the point estimate multiplied by estimated monthly change in public pension benefits from Table 2 divided by average monthly consumption in the category. The standard errors allow for arbitrary forms of serial correlation within households over time. *, ** , and *** represent significance at the 10 percent, 5 percent, and 1 percent levels, respectively.

Figure 1: Share Receiving Any Monthly Income



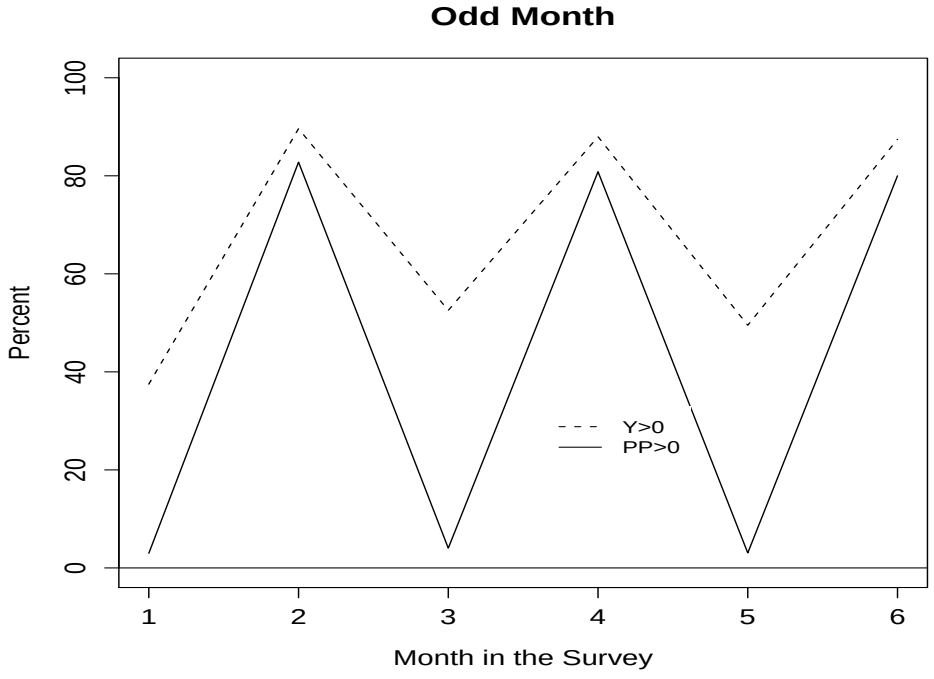
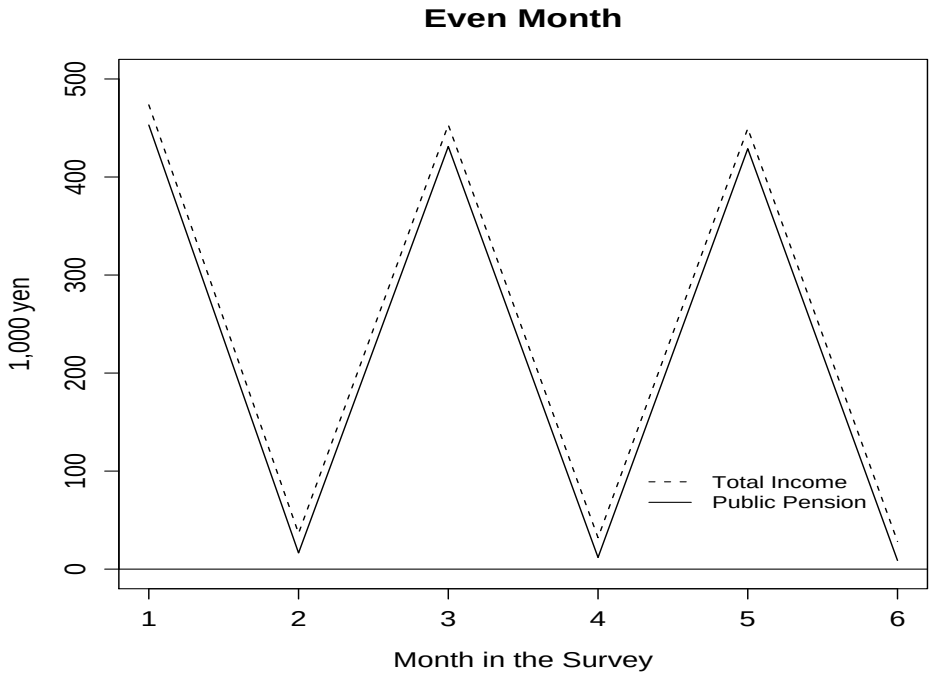


Figure 2: Average Monthly Income



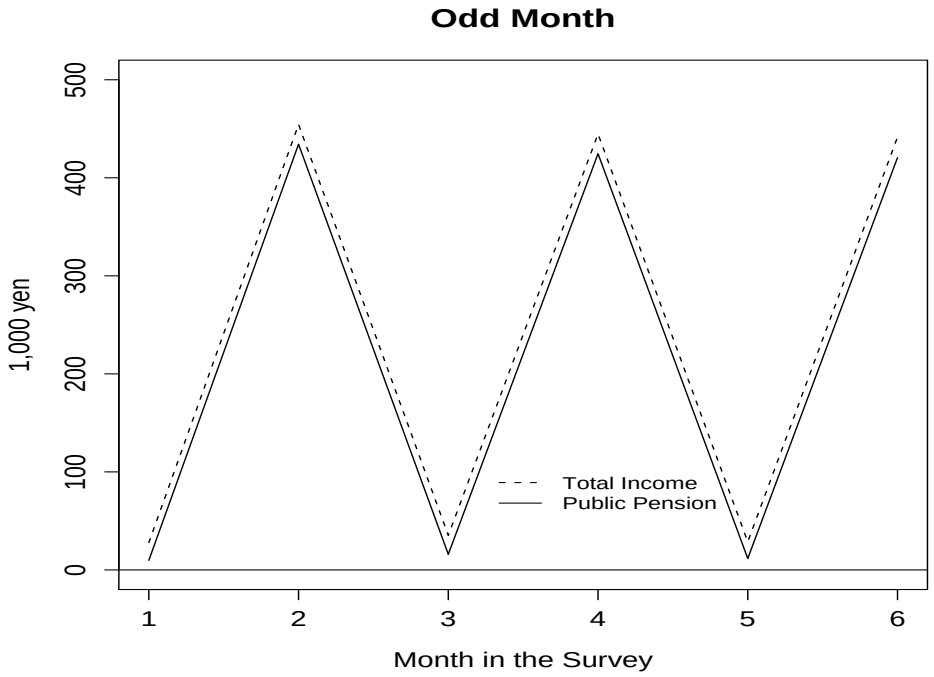


Figure 3: Distribution of Public Pension Benefits

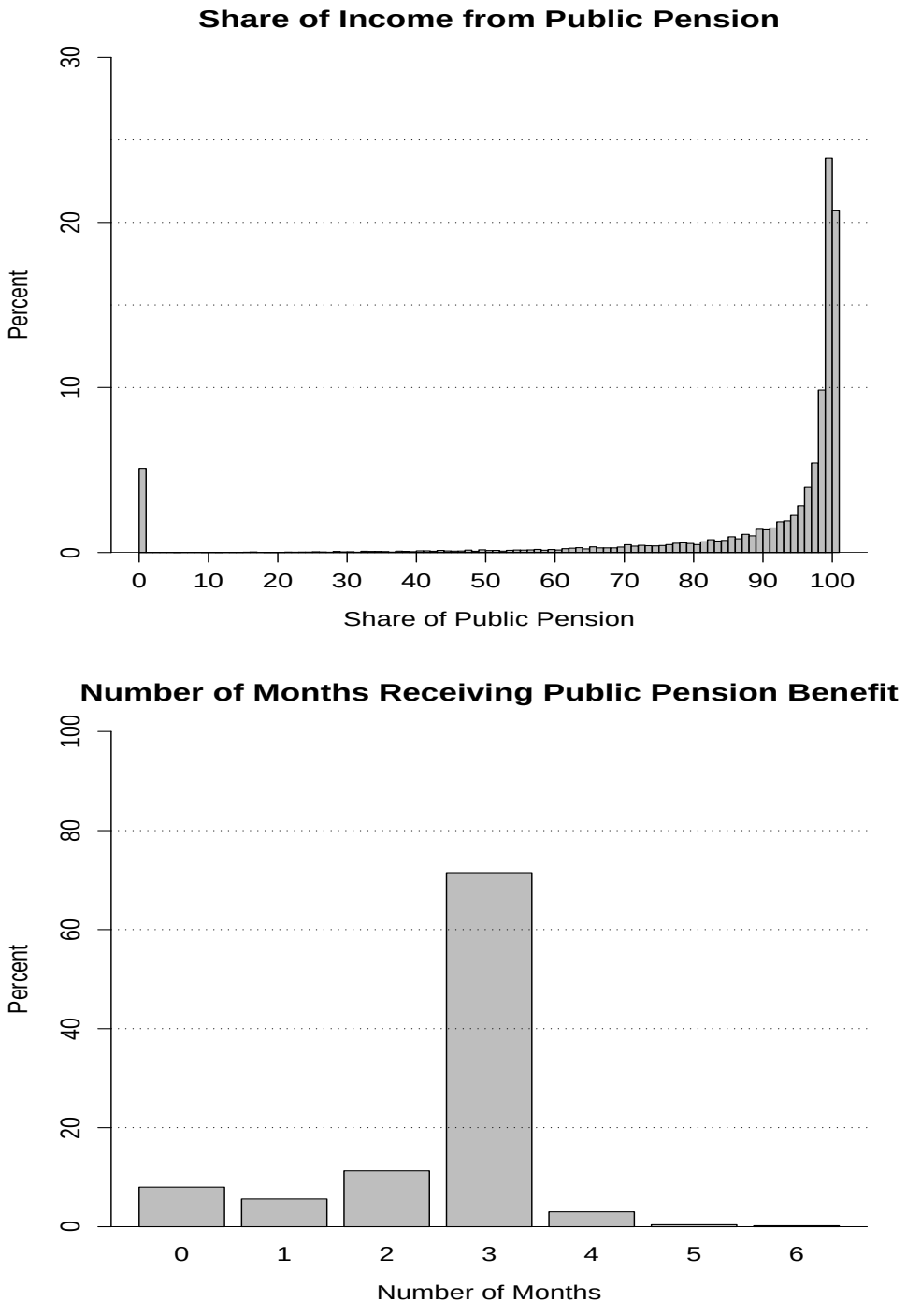
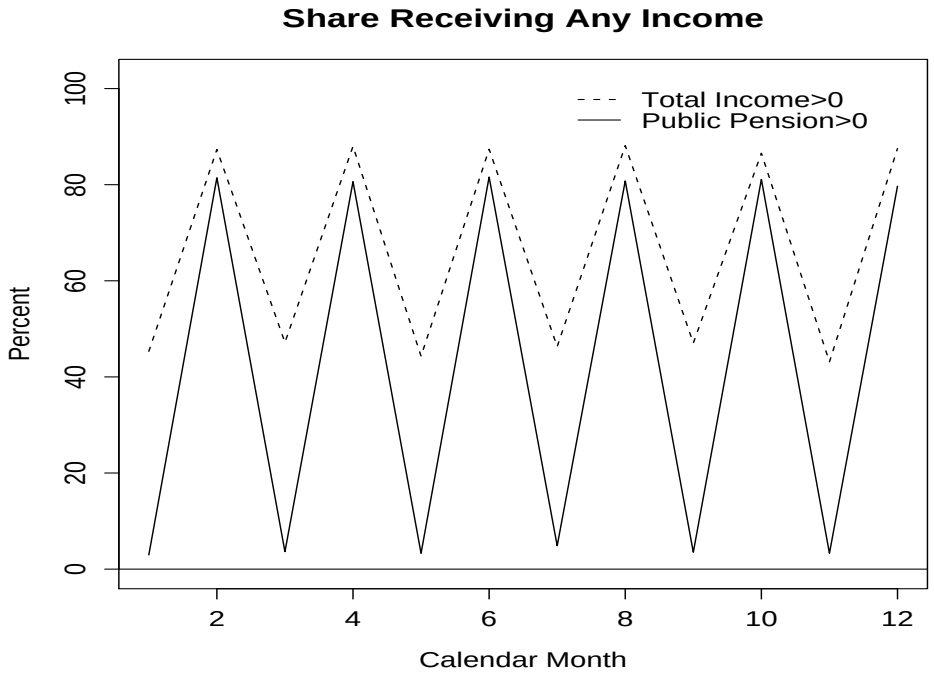


Figure 4: Income Receipt and Amount by Calendar Month



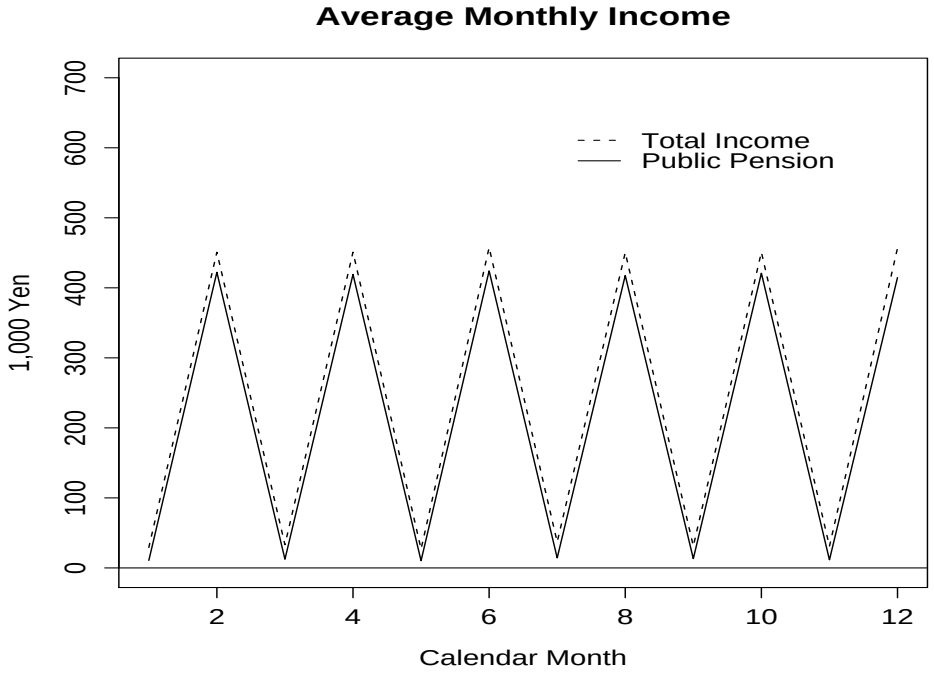


Figure 5: Consumption by Calendar Month