

**ESRI Discussion Paper Series No.191**

**The Reaction of Household Expenditure to an Anticipated Income Change:**

Clean Evidence from Bonus Payments to Public Employees in Japan

by

Masahiro Hori and Satoshi Shimizutani

November 2007



Economic and Social Research Institute  
Cabinet Office  
Tokyo, Japan

## **The Reaction of Household Expenditure to an Anticipated Income Change:**

### **Clean Evidence from Bonus Payments to Public Employees in Japan\***

by

Masahiro Hori and Satoshi Shimizutani\*\*

November 2007

---

\* This paper forms part of our research at ESRI on Japanese consumption and macroeconomic policies in the 1990s. We are grateful to the Ministry of Internal Affairs and Communications for providing the micro-data from the Family Income and Expenditure Survey (FIES). We would like to thank Masahiro Kuroda, Noriki Hirose, Mitsuo Hosen and Ralph Paprzycki for useful comments. Moreover we are very grateful to Orazio Attanasio, Richard Blundell, Fumio Hayashi, Yukinobu Kitamura and Yasuyuki Sawada for very helpful remarks at the International Conference on Consumption organized by the COE program at Hitotsubashi University (March 2007). Special thanks go to Hidehiko Ichimura for his very constructive comments. The views expressed in this paper are completely personal and do not represent those of any institutions we belong to, including the Economic and Social Research Institute, the Cabinet Office, or the Government of Japan.

\*\* Masahiro Hori : Former Research Fellow, Economic and Social Research Institute, Cabinet Office; Address: 3-1-1 Kasumigaseki, Chiyoda-ku, Tokyo, JAPAN 100-8970; E-mail: [masahiro.hori@cao.go.jp](mailto:masahiro.hori@cao.go.jp).

Satoshi Shimizutani : Senior Research Fellow, Institute for International Policy Studies; Address: Toranomon 30 Mori Building, 6F Toranomon 3-2-2, Minato-ku, Tokyo 105-0001 JAPAN; E-mail: [sshimizutani@iips.org](mailto:sshimizutani@iips.org).

### **Abstract:**

Exploiting an ideal experiment situation, this paper provides clear evidence of consumption smoothing against an anticipated income change. Until FY2002, Japanese public employees received large and predictable bonus payments three times a year, but the third bonus in March was abolished in FY2003, with advance notice. Using micro data, we explore how the change in the bonus payment pattern altered the seasonality of public employees' consumption. We find that the impact of the change in bonus patterns on consumption seasonality is negligibly small, which is consistent with the life-cycle/permanent-income hypothesis and earlier studies analyzing large and regular predictable income movements.

Key words: consumption smoothing, excess sensitivity.

JEL Classification Codes: E21

## 1. Introduction

One of the central tenets of the life-cycle/permanent-income hypothesis (LC/PIH) is that people engage in consumption smoothing and, as a result, income changes that are anticipated should not affect consumption at the time they occur. Rather, according to the hypothesis, individuals optimizing their consumption path dynamically over their life-time respond to a predicted change in income at the time they become aware of the change, not when it materializes.

However, notwithstanding the theoretical prediction, several empirical studies have reported that consumers do respond to predicted income changes at the time they occur and this “excess sensitivity” is not caused by liquidity constraints (Shea, 1995; Souleles, 1999, 2002; Parker, 1999; Shapiro and Slemrod, 1995, 2003).<sup>1</sup> At the same time, there are a few studies suggesting that the LC/PIH describes consumption behavior well when the predictable movements in income are large and regular (Paxson 1993; Browning and Collado, 2001; and Hsieh, 2003) .

One possible explanation for the inconclusive findings of earlier studies is that they focus on episodes of different types to identify the effect of predicted income changes on consumption. Broadly speaking, studies that concentrate on relatively small

---

<sup>1</sup> Campbell and Mankiw (1989) and Wilcox (1989), moreover, present evidence based on aggregate data showing that consumption responds to predictable income changes while Akerlof (2007) provides a discussion of the role of social norms in consumption and suggests they might help to explain the excess sensitivity.

anticipated income movements caused by policy changes found excess sensitivity in consumption, while studies that examine large and regular predictable income movements found consumption smoothing.<sup>2</sup> In order to account for this difference, some scholars have employed the bounded rationality argument that consumers are rational in the sense that they optimally adjust their consumption only in the face of a large and regular income change.

Another possibility is that some of the episodes examined in previous papers are not necessarily appropriate to test the consumption response to anticipated income changes. As Johnson, Parker and Souleles (2006) point out, the household income changes examined in previous studies were constructed using observed household characteristics, making it difficult to obtain consistent estimates of the consumption response. In other words, most studies fail to validate the assumption that household characteristics are uncorrelated with all other unobserved determinants of the consumption growth rate, making their arguments less persuasive.

The purpose of this paper is to exploit an ideal experiment to provide much clearer evidence on consumption smoothing in response to a predictable income change

---

<sup>2</sup> However, even with regard to large and regular income changes, no consensus has been reached. Hori and Shimizutani (2003), for example, using data on Japan, found significant associations between bonus payments and seasonality, although these associations, while statically significant, were not economically significant. The estimate of the short-run marginal propensity to consume was only about 0.03 for total consumption.

in an unusually refined setting: until FY2002, Japanese officials conventionally received large and predictable bonus payments in June, December, and March; however, the March bonus was abolished from FY2003 (i.e., from March 2004), with sufficient advance notice. Representing a large and predictable income change, we utilize this episode to explore how the change in the pattern of bonus payments altered the seasonality of officials' consumption in FY2003 and after.

This episode provides an unusually desirable setting for the examination of consumers' response to an anticipated income change. First, it means that in our study, unlike in other studies on the same topic, we can focus on the consumption pattern of a homogenous group – government officials who are in long-term employment and are unlikely to lose their job. Moreover, the payment of salaries and bonuses of these officials is completely predetermined, which means that it is highly unlikely that consumption growth is correlated with unobserved household characteristics. In contrast, although bonus payments in Japan's private sector are also large, highly institutionalized, and predictable, it could be argued that bonuses are performance-based, leaving room for discriminating payments, and that whether a worker falls into the bonus or the non-bonus group may not be random. Therefore, to avoid these objections, we focus on public employees and study the effects of a policy change in the bonus

payment system. As described in the following section, bonus payments to public employees are regulated by law, leaving no room for performance-based adjustments, and are therefore anticipated without uncertainty. By comparing the seasonality of public employees' consumption before and after the bonus payment policy change, we can escape any potential endogeneity from the non-randomness of observations.

Second, the episode allows us to focus on consumers' response to a completely exogenous change in the timing of income payments. Although the March bonus was abolished, the total amount of bonus payments remained almost unchanged as larger bonuses are now paid in June and December. As in Shapiro and Slemrod's (1995) study, this episode allows us to distill the effect of an anticipated income change without considering other factors that affect a household's permanent income or a change in preferences.

Third, our study represents an examination of a one-off policy change whose size is relatively large. Since earlier studies supporting the LC/PIH only deal with large and regular predictable income movements, and studies not supporting LC/PIH examine only small and one-off income changes, our study on an anticipated large one-off policy change<sup>3</sup> may help to fill the gap between such earlier studies which have produced

---

<sup>3</sup> For comparison: the magnitude of anticipated income movements analyzed by Browning and Collado (2001) and by Hsieh (2003) are 1.0 monthly regular income and 0.7 monthly regular income, respectively,

conflicting findings.

Our question is whether the seasonal consumption patterns of public employees were significantly affected by the exogenous change in income which the abolition of the March bonus represents. To precisely measure the impact, we compare the monthly pattern of public employees' consumption in 2004 with that of a "normal" year constructed from previous years (1991-2002), using private sector employees as our control group. Contrary to earlier studies that report sizable excess sensitivity to anticipated policy changes, we find that consumers' reaction to the anticipated March bonus abolishment was negligibly small. Although we find that consumption in March 2004 was weak, this cannot be attributed to the abolition of the March bonus, since not only public employees' consumption was weak but also that of private-sector employees who had never received a March bonus from the outset.

Thus, our findings based on a crystal-clean institutional change suggest that the LC/PIH holds for Japanese consumers, irrespective of the one-off nature of the examined predictable income change. We speculate that the difference between our findings and those obtained in the study by Johnston, Parker and Souleles (2006), which

---

while that of this paper is 0.5 monthly regular income.

is the most recent representative work to observe excess sensitivity, comes from the size of anticipated income changes.

The remainder of this paper is organized as follows. Section 2 describes the bonus system for Japanese public employees and the abolition of the March bonus in FY2003. Section 3 explains the dataset used in this study. Section 4 compares the monthly expenditure patterns of public employees in 2004 and in a “normal” year constructed from previous years (FY1991-FY2002). Section 5 further examines whether the observed change in consumption in March 2004 is attributable to the change in the bonus scheme. Finally, Section 6 summarizes our findings.

## **2. Bonus Payments to Public Employees and the Abolition of the March Bonus**

In Japan, the salaries and allowances of workers in the central government are uniformly regulated by law, with the National Personnel Authority (*Jinji in*, henceforth, NPA) in charge of administration, detailed working conditions, etc.<sup>4</sup> The salary schedules and allowances including bonus payments for national government employees are annually revised based on NPA recommendations (the “Remuneration

---

<sup>4</sup> Salaries consist of a monthly salary, salary adjustment pay, and teacher’s duty pay. Allowances include living allowances, area allowances, and overtime allowances as well as bonus payments. Bonus payments consist of a term-end allowance (*kimatsu teate*) and a diligence allowance (*kinben teate*).

Report and Recommendation”) for the next fiscal year,<sup>5</sup> mainly taking account of the salary gap between the private and the public sector. The proposal is then debated in parliament and, in most cases, approved without modification in the fall of the preceding year before taking effect. The process is open to the public and widely reported in the mass media, making payment schedules in the next year fairly predictable.

It is important to stress here that monthly salary payments and bonuses for public officials are completely predetermined and, unlike in firms, unaffected by personal performance. Moreover, unlike bonus payments in the private sector that fluctuate depending on current business conditions, the bonus amount and payment date are completely scheduled in advance and anticipated without uncertainty. Salaries and allowances for local government employees follow the pay schedule for central government employees, although there are minor variations across prefectures and municipalities.

Japanese public employees’ bonus payments and the distribution of bonus payments within a year for FY1990 to FY2004 are reported in Table 1, where they are shown as ratios to monthly regular income. The annual amounts of bonus payments

---

<sup>5</sup> The fiscal year in Japan begins in April and ends in March.

have been sizable and payments are spread out over the fiscal year (i.e. June, December, and March). As we shall see in the basic statistics of our dataset, total annual bonuses relative to monthly regular income are very similar for public sector employees and for employees in large private firms, although in the case of private sector employees, bonuses are paid only in June and December, but not in March.

While the ratio of bonus payments to monthly regular income has been gradually falling in the public sector – probably in response to smaller bonus payments in the private sector since the late 1990s –, the change that is more important for our analysis here is the abolition of the March bonus in FY2003 (April 2003 – March 2004), of which employees were notified more than a year in advance, in August 2002. As shown in the table, the bonus had amounted to about half of a monthly regular salary.

### **3. Data description**

The data used in this study are micro-level data from the *Family Income and Expenditure Survey* (FIES) covering the period from January 1991 to December 2004. The FIES is the Japanese Government's main source of information on aggregate consumption and is administrated by the Statistic Bureau, Ministry of Internal Affairs and Communications. The survey covers approximately 8,000 households from all over

Japan. Single households and households employed in agriculture or fisheries are not surveyed.<sup>6</sup>

The sampling design is based on three steps. First, approximately 170 municipalities (cities/towns/villages) are chosen using stratified sampling based on location, population and other factors. Second, survey units (a unit consists of 100 households) are randomly chosen from all selected municipalities. Third, six non-single households are randomly chosen in each survey unit. Each household is surveyed for six months and one-sixth of the households are replaced by new households every month, making it possible to construct six-month panels. This survey provides detailed information on income and expenditures for individual households as well as on the characteristics of these households and the jobs of household heads. The monthly consumption data are compiled from a diary collected twice a month.

Each panel consists of 1,200 to 1,300 households on average. To improve the reliability of our estimates, we screen our data as follows. First, we delete households in which the household head is self-employed. We restrict our analysis to households with wage earners, which account for more than half of all households in the sample,

---

<sup>6</sup> The FIES began covering households engaged in agriculture or fisheries in July 1999 and singles in January 2002, adding a further 1,000 households to the sample for a current sample size of 9,000 households. Moreover, the FIES was merged with the *Family Savings Survey* (FSS) in January 2002, which contains information on households' financial assets and liabilities.

since monthly income information is not available for self-employed households.

Second, we exclude a household if the reported age of the household head decreases or increases by more than one year during the six months, if the household's tenancy status changes from owner to renter (or from renter to owner), or if the family size changes, because these changes are likely to be due to large shocks that may lead to large changes in the household's consumption quite unrelated to bonus payments. Third, a household is excluded if the number of family members is greater than ten because the consumption patterns of large extended households are likely to be significantly different from that of smaller households that are the norm in Japan.<sup>7</sup> As a result, the number of households in the sample is reduced to about a half of the total sample (600–700 in each panel).

Furthermore, we confine our sample to households where the head of household is an office worker in the public sectors or a large private firm with more than 100 employees. Our main interest is to test whether changes in the seasonality of public employees' (the "public employee group") consumption is observed using employees in large private companies (the "private employee group") as our control group.

---

<sup>7</sup> The number of households removed from our sample due to this criterion is very small.

In order to minimize the effect of reporting errors, we further exclude public employee households that did not report their bonus payment either in June, December or March (except March 2004) since all such employees are entitled to receive bonuses in these months. Moreover, we exclude public employee households that report bonus payments in months other than June, December and March. For households in the private employee group, we limit our sample to those who receive bonuses only in June and December. This cut is necessary to identify whether the household head works for a company that pays bonuses and to decrease the possibility of measurement errors in the main variable.

The basic statistics are reported in Table 2. The number of observations in our data set is 63,000, consisting of 38,000 households in the private employee group and 25,000 households in the public employee group. We report the basic statistics for all observations (“All Months”) and, separately, for the bonus payment months, i.e. March, June, and December. As the statistical features except those related to bonus payments are very similar across months, we begin by focusing on the numbers for all months.

They show that, first, the monthly income of the household head is similar for the two groups. Second, total monthly consumption, slightly more than 300,000 yen, and the shares of household consumption components, i.e., durables, semi-durables,

non-durables, and services, are also not very different for the groups. Third, the two groups are similar also in household demographics: the average age of the household head is around 42, and the average family size is 3.6. Household heads are male in more than 95 percent of our sample households.

As for the bonus-related variables, we notice that the monthly (average) bonus income and its ratio to regular monthly income are not very different between the two groups, at least in the “All Months” table. Even in the tables for June and December, the difference in bonus payments is small, although June bonus payments look slightly lower for the public employee group. Only for March do we observe a striking difference: the public employee group receives bonus payments worth 43 percent of regular monthly income, while the private employee group receives no bonus payments.

These observations show that households in the public employee group and those in the private employee group are very similar except for the bonus in March (until FY2002). In other words, households where the family head is employed at a large private firm that pays bonuses represent a useful control group to control for factors that are common to all households (such as macroeconomic shocks) and unrelated to the abolition of March bonuses in FY2003.

#### 4. Changes in income and consumption patterns after FY2003

This section examines whether the seasonality of public employees' income and consumption changed following the abolition of the March bonus in 2004 (FY2003).

First, we concentrate on public employee households only to see whether the monthly income and expenditure patterns observed in a regular year until FY2001 differ from those in FY2003 and thereafter. Since the abolition of the March bonus was announced in FY2002, we exclude household observations for FY2002 from our control years. In order to statistically capture any changes in income and consumption after FY2002, we run regressions with the following specification:

$$\begin{aligned} \ln(X_{it} / X_{it-1}) = & \sum_{m=1}^{12} a_m \times MDummy(m) \\ & + \sum_{m=1}^{12} b_m \times MDummy(m) \times FY2003ADUMMY, \text{ where } X_{it} = Y_{it} \text{ or } C_{it}. \\ & + \beta Z_{it} + \varepsilon_{it} \end{aligned} \tag{1}$$

The dependent variables are monthly changes in the logarithm of household head income ( $Y_{it}$ ) or household consumption expenditure ( $C_{it}$ ). We use both total and disaggregated consumption categories for the  $C_{it}$  regressions. Both variables are converted to real terms using the consumer price index. The independent variables consist of month dummies to capture seasonality in a normal year and interaction terms

between the month dummies and a dummy variable for FY2003 and after, which takes 1 for each month after April 2003 and zero otherwise. If there was a change in monthly income/consumption patterns from FY2003 onward, the estimated coefficients on the interaction terms should be statistically significant. On the other hand, if there was no such change, these coefficients should be insignificant. In addition, we include the nominal interest rate as our control variable ( $z_t$ ). The last term is a well-behaved error term.

Column [1] of Table 3 reports the result for the income regression. The coefficients on the monthly dummies ( $\alpha_m; m=1,2,\dots,12$ ) reflect income seasonality for a normal year until FY2001. The seasonality from FY2003 can be derived as the sums of the month dummy coefficients and the interaction term coefficients ( $\alpha_m + b_m; m=1,2,\dots,12$ ). As can be seen in Figure 1, the income seasonality appears to result solely from the bonus payments, and we can observe a substantial income reduction for public employees in March 2004. While in normal years, household head monthly income used to increase in March from February by 37 percent, the interaction term for March completely offsets the increase from FY2003 by a significantly negative coefficient of 38 percent, implying that the abolition of the March bonus virtually eliminated the March income increase for public employees. The policy

effect is also seen in April income. For the control years until FY2001, April income used to decline by 37 percent from March income, but the decline shrunk to only 7 percent in April 2004. The estimated coefficients clearly confirm that the abolition of the March bonus in 2004 substantially affected the seasonality of public employees' household income.

Given the clear change in income seasonality for public employee households, we turn to the changes in their consumption around March 2004 (columns [2]-[7]). The significantly positive coefficients on the month dummy for March indicate that, in normal years, households consumed more in March. However, what matters for us here is whether the seasonality is associated with the income seasonality. Therefore, we focus on the coefficients on the interaction terms. If household consumption was affected by the income reduction in March, the coefficient on the March interaction term ( $b_3$ ) is expected to be negative and statistically significant.

The results, shown in Table 3, seem to be consistent with this expectation. The coefficients on the March interaction term are negative and significant, implying weak consumption in March 2004. This is the case not only for aggregate consumption but also for individual consumption components except service consumption. However, conceivably, the observed pattern may be affected by our choice of control years, which

include all years from FY1991 to FY2001, with varying bonus payments (Table 1). In order to address this issue, we perform alternative estimations using FY1999 and FY2000 only as our control years. In FY1999, total bonus payments decreased by 0.3 monthly regular incomes (from FY1998) and in FY2000, by 0.2 monthly regular incomes (from FY1999) – declines that are comparable to the 0.25 monthly regular income reduction in FY2003 (from FY2002).

Table 4 reports the results for these alternative estimations. We still obtain negative coefficients on the March interaction terms. However, in the expenditure regressions, most of the coefficients become statistically insignificant. In sum, while we find that consumption in March 2004 is weak, the findings seem to be sensitive to the choice of control years. There are a number of possible explanations to account for the differences between Table 3 and Table 4. One is that the choice of the control years in Table 4 is more accurate in the sense that the change in total annual bonus income in FY1999 and FY2000 was more in line with that in FY2003 than were changes in the FY1991–FY2001 period overall (as a cursory glance at Table 1 confirms). Another possibility is that the insignificant results in Table 4 resulted from the smaller sample size. In either case, we have not yet controlled for the possibility that other factors may have affected consumption in March 2004. We address this issue in the following

section.

## **5. Including private-sector employee households as a control group**

The results discussed in the previous section confirm that there was a change in the seasonality of public employee households' consumption in March 2004 (FY2003).

Although the abolition of the March bonus in 2004 seems the most obvious candidate to account for the change, we have not yet excluded other possible factors unrelated to the abolition of the March bonus that may have affected consumption patterns in that month.

To examine this issue, we use our sample of private-sector employees as a control group.

If something unrelated to the abolition of the March bonus, such as macroeconomic shocks, are responsible for the changes in consumption patterns in 2004, the inclusion of the control group in our sample should alter the coefficients on the interaction terms in which we are interested.

Concretely, we extend our dataset to include the private employee group and run the following regressions to see whether our findings on excess sensitivity obtained in the previous section are affected:

$$\begin{aligned}
\ln(X_{i,t} / X_{i,t-1}) = & \sum_{m=1}^{12} a_m \times MDummy(m) \\
& + \sum_{m=1}^{12} b_m \times MDummy(m) \times PUBLIC \\
& + \sum_{m=1}^{12} c_m \times MDummy(m) \times FY2003ADUMMY \\
& + \sum_{m=1}^{12} d_m \times MDummy(m) \times PUBLIC \times FY2003ADUMMY \\
& + \beta Z_t + \varepsilon_{i,t}
\end{aligned} \tag{2},$$

where  $X_{it} = Y_{it}$  or  $C_{it}$ . The variables other than *PUBLIC* are the same as those in the previous section. *PUBLIC* is a dummy variable for public employees to distinguish them from private-sector employees.  $a_m + b_m$  captures the seasonality of public employees' income or consumption in a normal year, while  $a_m + b_m + c_m + d_m$  captures that for FY2003 and after. In this new specifications, we are able to decompose the reduction in consumption in March 2004 into the effect of the abolition of the March bonus ( $d_3$ ) and other factors affecting March 2004 consumption ( $c_3$ ). As in Table 3, we first use observations for FY1991 to FY2001 to control for the normal seasonal pattern.

Table 5 reports the coefficient estimates for the income regression (column [1]) and the consumption regressions (columns [2]-[7]). The result of the income regression confirms that the income seasonality change in March 2004 took place only for public employee households. For the private employee group, the coefficient on the March dummy capturing income increases from February to March in a normal year is only 1

percent (see  $a_3$  in column [1]), i.e., very small, while that for the public employee group is 36 percent. The coefficient on the March interaction term ( $c_3$ ) is also not significant, confirming that the negative impact of the abolition of the March bonus in 2004 was specific to public employee households.

Our main interest is, of course, to see how the interaction terms between the month dummy for March and the dummy for FY 2003 and after in the consumption regressions ( $d_3$ ) are affected by the inclusion of the control group. Interestingly, the results indicate that once we add the private-sector employees as our control group, the negative coefficients on the interaction term seem to halve and completely lose their statistical significance. This is true not only for the total consumption regression but also for the disaggregated consumption regressions (see columns [2]-[7] in Table 5).

Thus, what we find is consumption smoothing, which becomes much clearer if we confine our control years to FY1999 and FY2000, years with a comparable reduction in total annual bonuses. Table 6 reports the results. With FY1999 and FY2000 as the control years, the economic significance of the coefficients on the interaction term ( $d_3$ ) decreased further. If we take the results of the total consumption regression (column [2]), the coefficient now shrinks to a statistically insignificant -0.01 from a statistically significant -0.11 in Table 3. Thus, it appears that the weakness in

consumption in March 2004 is not attributable to the abolition of the March bonus. In other words, our experiment at best produces very weak support for excess sensitivity, despite the fact that the predicted income change analyzed in our paper came from a one-off large-sized exogenous change.<sup>8</sup>

## 6. Summary and conclusion

Despite the large literature on consumers' response to anticipated income changes, the empirical evidence remains inconclusive. This paper exploited an ideal experiment situation to provide more persuasive evidence on consumption smoothing in response to a predictable income change – the abolition of the March bonus from March 2004 (FY2003). Using household level panel data from the *Family Income and Expenditure Survey*, we explored how the change in bonus payments altered the seasonal consumption patterns of public employees in FY2003 and after.

---

<sup>8</sup> The analysis presented here has concentrated on the consumption response in March 2004, i.e., the month that bonus was not paid for the first time. However, as described in Section 2, the bonus schedule was announced in the summer of the preceding year. A rational consumer who behaves dynamically therefore could have adjusted his or her consumption schedule already in summer 2002 in anticipation of the change. In order to examine this possibility, we replaced the dummy for FY2003 and after in regressions (1) and (2) with a dummy for FY2002. Using FY1991 and FY2000 as our control years and observations on public employees only, we found that the seasonal consumption pattern in FY2002 is different from that in a normal year; however, what we found is an *increase* (not a *decrease*) in consumption in August 2002 when the March bonus reduction was announced (see Appendix Table 1). Therefore, the hypothesis that consumers adjusted their expenditures one year ahead in anticipation of the abolition of the March bonus in 2004 seems to be rejected. This result does not change even if we add our control group of private-sector employee households (see Appendix Table 2). Consequently, we have to reconcile this insensitivity in consumption with our findings regarding the LC/PIH. The obvious explanation is that the change in the distribution of bonus payments within a year across months had only a very limited impact on the level of lifetime income for public-sector employee households.

In contrast with previous studies on anticipated income changes, which report excess sensitivity, we find only weak evidence that seasonal expenditure patterns were affected by an anticipated decrease in income, that is, the abolition of the March bonus. This result suggests that the LC/PIH broadly holds also in the case of an anticipated *one-off* large-sized income change and is in line with the findings of studies on large and regular income movements, such as Browning and Collado (2001) and Hsieh (2003).

It could be argued that our finding is inconsistent with Johnson, Parker and Souleles's (2006) study, which is the most recent representative work to observe excess sensitivity, based on an analysis of the 2001 tax rebates in the U.S.. However, it is important to point out that the value of the tax rebate in 2001 was US\$300 or US\$600, while that of the March bonus before its abolition exceeded US\$1,000. We therefore suspect that the difference between our findings and those of Johnston, Parker and Souleles (2006) comes from the different sizes of the anticipated income change. In other words, even in the case where a policy change is a one-off, consumers are rational in the sense that they optimally adjust their consumption if the anticipated income change is relatively large. We conclude that the consumption smoothing predicted by the LC/PIH is a good approximation of actual consumer behavior.

## REFERENCES

- Akerlof, George A. (2007). "The Missing Motivation in Macroeconomics," *American Economic Review*, vol.97(1), pp.5-36.
- Browning, Martin and Dolores Collado (2001). "The Response of Expenditures to Anticipated Income Changes: Panel Data Estimates," *American Economic Review*, vol.91(3), pp.681-692.
- Campbell, John Y., and N. Gregory Mankiw (1989). "Consumption, Income, and Interest Rates: Reinterpreting the Time Series Evidence," *NBER Macroeconomics Annual*, vol.4: pp.185-216.
- Hsieh, Chang-Tai. (2003). "Do Consumers React to Anticipated Income Changes? Evidence from the Alaska Permanent Fund," *American Economic Review*, vol.93(1), pp.397-405.
- Hori, Masahiro and Satoshi Shimizutani (2003). "Micro Data Studies on Japanese Household Consumption," *ESRI Discussion Paper Series No.15*, Economic and Social Research Institute, Cabinet Office, Tokyo, Japan.
- Johnson, David S., Jonathan A. Parker and Nicholas S. Souleles (2006). "Household Expenditure and the Income Tax Rebates of 2001," *American Economic Review*, vol.96(5), pp.1589-1610.

- Parker, Jonathan A. (1999). "The Reaction of Household Consumption to Predictable Changes in Social Security Taxes." *American Economic Review*, vol.89(4), pp.959-73.
- Paxson, Christina H, (1993). "Consumption and Income Seasonality in Thailand," *Journal of Political Economy*, vol.101(1), pp.39-72.
- Shapiro, Matthew D. and Joel Slemrod (1995). "Consumer Response to the Timing of Income: Evidence from a Change in Tax Withholding." *American Economic Review*, vol.85(1), pp.274-283.
- Shapiro, Matthew D. and Joel Slemrod (2003). "Consumer Response to Tax Rebates," *American Economic Review*, vol.93(1), pp.381-396.
- Shea, John. (1995) "Union Contracts and the Life-Cycle/Permanent-Income Hypothesis," *American Economic Review*, vol.85(1), pp.186-200.
- Souleles, Nicholas S. (1999). "The Response of Household Consumption to Income Tax Refunds," *American Economic Review*, vol.89(4), pp.947-58.
- Souleles, Nicholas S. (2002). "Consumer Response to the Reagan Tax Cuts," *Journal of Public Economics*, vol.85(1), pp.99-120.
- Wilcox, David W. (1989) "Social Security Benefits, Consumption Expenditure, and the Life Cycle Hypothesis." *Journal of Political Economy*, vol.97(2), pp.288-304.