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Micro Data Studies on Japanese Tax Policy and Consumption in the 1990s

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Part II : Consumer Response to the 1994 Tax Cut: Evaluating the First Tax Cut in the 1990s.

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** We developed the research design together. Regarding econometric works, Shimizutani is responsible for all parts.

Part I

Consumer Response to the 1998 Tax Cut: Which of Tax Cut or Coupon Program is More Effective?

Abstract:

The Japanese Government implemented two tax cut packages in 1998. A unique feature of the 1998 tax cuts is that the tax cut amount for each household is based on the number of family members regardless of income level. A wage-earner's household receives the tax cut benefit as a decrease in withheld taxes. Wage earners are entitled to receive a national income tax cut of up to 18,000 yen plus 9,000 yen for each dependant (effective from February) as well as a local inhabitant's tax cut of up to 17,000 yen plus 8,500 yen for each dependant (effective from June). Using monthly data on worker's households from the *Family Income and Expenditure Survey* (FIES), in this study we explore the variation in the impact of the tax cut episode across families with different numbers of family members to identify its impact on consumption. The estimates using monthly change in consumption indicate that consumers responded to the 1998 tax cut with the implied MPC of 0.6 on impact with stimulating services consumption but the MPC declined in subsequent months. A comparison of the impact on consumption with the shopping coupons program administered in the spring of 1999 based on the same specification demonstrates that the 1998 tax cut and the coupon program affected consumption of different types of goods and that the estimated MPC was roughly comparable and followed the similar pattern.

1. Introduction

Keynesian economics tells us that consumers respond to temporary changes in income as opposed to the permanent income hypothesis. However, both theories do not discuss how consumption may respond differentially to different *forms* of income change. Thus, implicitly, consumption behavior is the same whether one receives a windfall in decrease in tax withheld or a coupon. Therefore, it is assumed that changes in income of the same amount have the same effect on consumption, regardless of the way the change in income is received. The objective of this paper is to evaluate the effect of a temporary tax cut implemented in Japan in 1998, and to compare the effectiveness with that of the 1999 shopping coupons program that we examined in our previous study (Hori, Hsieh, Murata and Shimizutani [2002]).

The Japanese economy peaked out in the spring of 1997 right after the consumption tax rate was raised from 3% to 5% in April and fiscal consolidation had been completed. The onset of the Asian financial crises and the financial crisis in Japan itself in the fall of 1997 exacerbated the economic downturn. In order to alleviate the weakness of the economy, the Japanese Government implemented temporary tax cuts, called “special tax cuts”, in two 1998 tax packages incorporating national income tax cuts and local inhabitant’s tax cuts.

In Japan, the amount of national income tax due from monthly salary is determined through the “withholding table”, based upon the number of dependants and current monthly income of a household. The amount of local inhabitant’s tax is a fixed amount per month between June and May determined by the previous year’s annual income. Both tax payments are withheld from salary and the amounts are exogenously determined. In the 1998 tax cuts, a household’s tax cut amount was based upon the number of dependants, regardless of income level. Thus, the Japanese tax cut episode in 1998 is a nice “natural experiment”, offering an opportunity to evaluate the effectiveness of tax cut policy.

In addition to its relevance for Japanese fiscal policy, this paper also contributes to the large literature on the empirical relevance of the life-cycle/permanent income hypothesis (LC/PIH) of consumption. Recent work in this area exploits quasi-natural experiments to identify households that are subject to anticipated income changes.¹ To our knowledge, our study is one of the first attempts to take tax cut episodes as a “natural experiment” to test the LC/PIH in Japan using individual micro data.

On tax policies, there are at least two recent papers that investigate Japanese experiences using other source of data. Watanabe et. al. (1999) tackles an empirical assessment of Japanese tax cuts after the mid 1970’s, distinguishing temporary and permanent as well as anticipated and unanticipated tax changes. Following the methodology of Poterba (1988)², they find that the impact of temporary

¹ See Browning and Collado (2001), Hsieh (2001), Shea (1995), Parker (1999), and Souleles (1999) and Hori, Hsieh, Murata and Shimizutani (2002).

² Consumers are divided into four types; current income consumers, permanent income consumers, near-rational consumers and Ricardian consumers. Watanabe et al. (1999) suggests that the Japanese consumers follow a near-rational decision

tax reductions is significantly smaller than that of permanent cuts and that 80% of Japanese consumers respond to tax changes at their implementation, not at their announcement. The other quantitative work on Japanese tax reduction is Carroll (1999). He uses a simulation methodology based on habit formation. He argues that habits imply an immediate marginal propensity to consume out of permanent shocks of much less one and that “the immediate MPC out of permanent tax cuts maybe as low as 30%, suggesting that calls for permanent income tax cut as a quick means of stimulating aggregate demand in Japan may be misguided”.

However, these findings are not fully convincing partly because they are not based upon micro-level data analysis. The impact of tax reductions on consumption is likely to be different across households with different characteristics or different liquidity positions, and it is critically important to consider heterogeneity of consumers when evaluating the effect of tax changes. As for the US case, Shapiro and Slemrod (1995) utilize a questionnaire survey to evaluate the effect of a reduction in standard rates of tax withholding on consumption in 1992. They conclude that 43% of households spent most of the extra take-home pay. However, they perform a similar survey in 2001 and conclude that only 22% of households spent the tax rebates administered in mid 2001 (Shapiro and Slemrod [2001]). But, as for Japan’s case, so far, our previous study (Hori, Hsieh, Murata and Shimizutani [2002]) is the only related research using micro data.

In this paper, we use monthly data on worker’s households in the *Family Income and Expenditure Survey* (FIES) to explore the variation in the impact of the tax cut episode across families with different numbers of family members to identify its impact on consumption. We control for normal seasonal patterns of consumption across families in consumption in 1998 with those in previous years without tax cut. The estimates indicate that the 1998 tax cuts stimulated consumption of services with the MPC of 0.6 on impact but it declined over subsequent months. A comparison of the impact on consumption with the 1999 shopping coupons program demonstrates that the 1998 tax cuts and the coupon program affected consumption of different types of goods and that the estimated MPC was roughly comparable and followed the similar pattern.

This paper is organized as follows. Section 2 briefly describes the 1998 tax cut episodes and Section 3 gives a description of the micro-data used to evaluate the 1998 tax cuts. Section 4 turns to evaluate the effect of the 1998 tax cuts quantitatively across households and Section 5 compares the effects of the tax cuts and the coupon program. The final section concludes.

2 The 1998 Tax Cut Episodes

In 1998, the Japanese government implemented two tax cut packages. Both packages included national income tax cuts and local inhabitant’s tax cut. The first tax cut package was announced on December 19 and the part of national income tax cut was enacted from the beginning of February

1998. The part of local inhabitant's tax cut was implemented from June 1998. This package was called a "special tax cut" and the name itself implied it was temporary. But in face of the stagnant economy, the Japanese government approved the "comprehensive economic measures" in April 24, 1998. As a part of this package, an additional national income tax cut package was implemented from the beginning of August and an additional local inhabitant's tax cut was implemented together with the first package in June 1998. As a result, households benefited from the tax cuts effective from February (national income tax), June (local inhabitant's tax) and August (national income tax). The sum of these tax cuts was 4 trillion yen (about 40 billion dollars).

As discussed below, this paper focuses on worker's households whose tax payments were withheld. The amount of national income tax due for workers each month is determined through the "withholding table", based upon the number of dependants and taxable income. The cumulative annual tax payment is adjusted at the end of each year. The local inhabitant's tax is a fixed amount per month between June and May, based upon the previous year's annual income. Both tax payments are withheld by salary payers and thus the amounts are exogenously determined. In the 1998 tax cuts, a household was exempted from paying national income tax or local inhabitant's tax up to its eligible amount, as determined by the number of household members, regardless of income level³. Since the tax cut amount is usually proportional to individual household's tax payment based on its income, the 1998 tax cuts were unusual⁴. In the first package, the eligible national income tax reduction for a household was set at 18,000 yen (for a household head) plus 9,000 yen for each dependant. For example, a household with three dependants would have been eligible for 45,000 yen in tax exemptions. The local inhabitant's tax reduction was calculated in a similar way: up to 8,000 yen (for a household head) plus 4,000 yen for each dependant. The second package allowed for national income tax deductions of up to 20,000 yen (for a household head) plus 10,000 yen for each dependant and for local inhabitant's tax deductions of up to 9,000 yen (for a household head) plus 4,500 yen for each dependant. Since the tax reduction in local inhabitant's tax was implemented at the same time, the total reduction in local inhabitant's tax, effective from June, was a total of 17,000 yen (8,000 yen from the first package plus 9,000 yen from the second package for a household head) plus 8,500 yen (4,000 yen from the first package plus 4,500 yen from the second package) for each dependant.

All these tax reductions were temporary⁵. Households realized the benefits of these tax cuts with tax withholding exemptions. In the case of the national income tax cut, a household did not have to have any tax withheld until it had used up the eligible amount. For example, consider a household

³ Non wage earner's households received tax cut benefits in other way. Typically, they pay due annual tax amount at once in February or March when they receive tax cut benefits. The sample of non wage earners is not used in this paper because the FIES lacks data on monthly income for such households and consumption pattern is different under different income pattern due to bonus for wage earners.

⁴ This method was adopted partly because the duration between anticipation and implementation was very short. The recommendation by the tax advisory commission of the Prime Minister in December 1998 said that this method was extraordinary and adopted in order to make the tax reduction implemented as soon as possible.

⁵ The "Comprehensive economic measures" announces an additional tax cut of the comparable amount in the next year, which was partly realized as the shopping coupons program.

with three dependants whose withheld income tax payment without the tax cut would have been 30,000 yen in February, 20,000 yen in March and 25,000 yen in April. This household was eligible for income tax cuts up to 45,000 yen in the first episode (18,000 yen for the head and 9,000 yen each for three dependants). In this case, the household did not have to pay tax (that is, no salary is withheld) in February (tax cut amount is 30,000 yen), only 5,000 yen would have been withheld from salary in March (tax cut amount is 15,000 yen) and 25,000 yen would have been withheld in April (no tax cut). As long as the total tax amount did not exceed the eligible amount, a household was exempt from withholding tax during 1998.

On the contrary, no local inhabitant's tax was withheld in June for any household and after July, a household was withheld an amount equal to the due amount without the tax cut minus the tax cut amount⁶. Consider the same example, a household with three dependants whose due amount of inhabitant tax without the tax cut would have been 10,000 yen. This household would have been eligible for an inhabitant's tax cut of up to 42,500 yen. In this case, the household's salary would not be withheld in June and the monthly tax amount would be 10,000 yen minus (42,500 yen - 10,000 yen) divided by eleven in the remaining months until May of the following year.

3 Data and Calculation of Tax Cut Amounts

The data source is micro-level data from the *Family Income and Expenditure Survey* (FIES) from 1990 to 2000⁷. This survey provides detailed information on income and expenditures for individual households as well as on the characteristics of these households. The monthly consumption data is compiled from a diary, which is collected twice a month. The survey covers approximately 8,000 households, which are representative at the national level⁸. Approximately, 1,300-1,400 households enter the sample and the comparable number of households exits the sample each month. 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.

To improve the reliability of the estimates, some households were dropped from the sample due to the following criteria. First, a household is deleted in which the household head is self-employed, which occupies roughly half of the sample. For two reasons we restrict our analysis to households whose household head is a wage-earner. First, monthly information on income is only available for these households. In addition, the monthly pattern of income for wage earners is very different than that of self-employed households due to the bonus system. Second, we also exclude a household if the reported age of the household head decreases or increases by more than one year

⁶ As stated above, in the Japanese local tax system, monthly due inhabitant's tax amount from June to May in the next year is constant, based on the previous year's annual income.

⁷ The FIES is the Japanese Government's main source of information on aggregate consumption. Hayashi (1986) also used the FIES for his work on the effect of durables on serial correlation in consumption patterns.

⁸ Single households and households employed in the agriculture or fishery industries are not surveyed. The FIES began to cover agriculture or fishery households in July 1999.

during 6 months or if the household's tenancy status changes from owner to renter (or from renter to owner), because these changes are likely to be due to large shocks that may also have large effects on the household's consumption. Third, a household is excluded if the number of family members is greater than 10 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.⁹

Moreover, we need to drop more samples in order to calculate the monthly tax cut amounts as precisely as possible (see Appendix for tax calculation for detail). Monthly income tax payments for individual households are determined by the withholding table, based upon information on both the amount of taxable income (defined as salary after deduction of social insurance premiums)¹⁰ and the number of dependants. In reality, non-taxable income is not included in calculating withholding tax, but only gross salary, including non-taxable income, is available in the FIES. Moreover, there is no explicit data on the number of dependants. Therefore, before following the withholding table, it is necessary to calculate the number of dependants and non-taxable income. First, in order to count the number of dependants precisely, we excluded any households in which more than three members are employed. Second, we excluded households in which two persons are employed and the spouse's annual income was greater than 1.03 million yen, the limitation to be eligible for a tax allowance for spouse¹¹. Based on the number of dependants and monthly actual income tax payment in the months without tax cut, we calculate the taxable income and then non-taxable income, the gap between gross salary available in the FIES and estimated taxable income. Now it becomes possible to calculate monthly due income tax payment following the reverse process and using the withholding table. We excluded households whose tax payment without a tax cut is not estimated precisely. This process generates nice estimates of income tax payment, as evidenced by the correlation coefficient of 0.97 between estimated due income tax payments and actual income tax payment in months without a tax cut for the January-June panel utilized below. After these adjustments to the data, we end up with a sample of roughly 400 households in each six-month panel.

In addition to calculating national income tax cuts, it is necessary to estimate the amount of local inhabitant's tax cut. The inhabitant's tax is based upon annual salary in the previous year and is effective from June. That is, the inhabitant tax payment from January to May in year t is based on the annual salary in year $t-2$ and that after June is based on the annual salary in year $t-1$. The FIES collected at year t lacks information in year $t-2$ so that inhabitant's tax cut amount had to be determined by information beyond that available in the FIES. We used the growth rate of annual

⁹ The number of household removed from the sample due to this criteria is very small.

¹⁰ Monthly social insurance premium is available in the FIES.

¹¹ Annual income of a spouse is calculated by doubling her total income in half a year when she is surveyed. If a spouse's annual income is less than 1,030,000 yen, she is counted as a dependant. We also excluded household with complex family member composition such as a household with relatives because it is difficult to identify who is whose dependant. The number of household removed from our sample due to this criteria is very small.

wage data from the *Basic Survey of Wage Structure*¹² by industry, age, sex and firm size matching with individual head of household.

We will use the panel from January to June to evaluate the effect of the 1998 tax cuts on consumption. There are several reasons to use this panel. In order to assess the tax cuts totally, the panel should cover not only the initial month when the tax cuts were implemented (i.e. February or August)¹³ but also the ending month when a household uses up its eligible amount of tax cuts. Households generally seem to have used up the eligible amount in June/July or December because large bonus payments in those months implied large tax payments. Moreover, the panel should include June, when the local inhabitant's tax cuts from the two packages were initiated simultaneously. Lastly, the January-June panel has precise estimates of tax cut amount as demonstrated by the high correlation coefficient of 0.97. Thus the January-June panel has little measurement error. Figure 1 shows the implementation of tax cuts initiated in February using the January-June panel. The figure shows that the cumulative monthly realized tax cut out of the eligible amount is more than 30% in the first month, about 60% in the second month, about 70% in the third month and more than 70% in the fourth month. Finally the figure increases up to 80%. These figures will be larger if a household, whose salary is below the minimum taxable income and therefore does not get benefit from the tax cut, is excluded¹⁴. In the following estimation, we disaggregate consumption into following categories: semi-durables, non-durables, and services.¹⁵ The summary statistics of the panel used in this paper can be seen in Table 1.

4 Impact of the 1998 Tax Cuts on Consumption

We begin by using the six-month panels from the FIES to estimate whether consumption changes when a consumer receives a tax cut benefit. We will compare whether consumption of families with a larger tax cut amount increases by more than families with a smaller tax cut amount, controlling for the cross-sectional differences between similar families in other years.

The basic empirical specification is the following linear Euler equation:

¹² The *Basic Survey of Wage Structure* is compiled by Ministry of Welfare and Labor.

¹³ Since we need change in consumption corresponding to tax cut, the panel should cover January or July.

¹⁴ A household is eligible for receiving tax cut benefits during 1998 and it is possible that the household get tax cut benefit in later months even the income level is below minimum taxable level in earlier months.

¹⁵ This classification follows that used by the Ministry of Public Management, Home Affairs, Posts, and Telecommunications in the published tabulations of this survey ("Annual report on the Family Income and Expenditure Survey"). Semi-durables include clothing, footwear, sporting goods, video games, computer hardware and software, and books. Non-durables include food (except eating out), fuel, light, and water charges, medicines, films, plants and gardening goods, and tobacco. Services include eating out, rents for housing, medical expenses, public transportation, communication (except communication equipment), education (except school textbooks and reference books), recreational services and personal care services.

$$(1) \quad \ln\left(\frac{C_{h,t+1}}{C_{h,t}}\right) = \sum_{n=0}^3 a_{1n} \cdot \left(\frac{\text{Taxcut}N_{h,t+1-n}}{\text{Monthly Income}_{h,t-1}}\right) + a_2 \cdot \left(\frac{\text{Taxcut}I_{h,6}}{\text{Monthly Income}_{h,t-1}}\right) \\ + Z_{h,t+1}' \cdot a_3 + \text{Month}_{t+1}' \cdot a_4 + e_{t+1}$$

where h indexes households and t refers to the month ($t=1,2,3,4,5$). The dependent variable is the log of the ratio of monthly consumption in household h in month t . The main independent variables are

$\frac{\text{Taxcut}N_{h,t+1}}{\text{Monthly Income}_{h,t-1}}$, which is the value of national income tax cuts received by a household

relative to the household's average monthly income in the previous year and

$\left(\frac{\text{Taxcut}I_{h,6}}{\text{Monthly Income}_{h,t-1}}\right)$, which is the value of local inhabitant's tax cut received by a household in

June relative to the household's average monthly income in the previous year. $\text{Monthly Income}_{h,t-1}$

is calculated as the previous year's pretax income divided by 12. Since the length of the panel is six months, each household has five observations of the dependent variable. We allow lags for up to

three months of $\frac{\text{Taxcut}N_{h,t+1}}{\text{Monthly Income}_{h,t-1}}$, the first main dependent variable, in order to address the

possibility that a household does not spend the tax cut immediately¹⁶. The monthly value of tax cuts implemented in 1998 is determined exogenously as calculated in the previous section. $Z_{h,t+1}$ is a vector of household characteristics (a quadratic in the age of the household head, the number of family members and change in the number of family members). Month_{t+1} is a vector of indicator variables for each month in each year. The coefficients of interest are a_1 and a_2 , which measure the elasticity of consumption to income due to the tax cuts. We excluded observations if the absolute change in monthly consumption exceeds the mean by more than three standard deviations. For all specifications, we run regressions using only the 1998 sample first and then we add the 1990-1997 sample as control years in order to confirm whether some specific shocks in 1998 are driving the results¹⁷. Obviously, the main independent variables are set to zero for those other years.

In order to address the possibility that other income shocks affect the estimates of a_1 and a_2 , we also employed the following alternative specification including income variables as independent variables:

¹⁶ The four-month lagged is not included because it is correlated with the other main variable (local inhabitant's tax cut) with the correlation coefficient of 0.85. Moreover, since the local inhabitant's tax cut was implemented in June, the ending month of the panel, no lagged variable is included for the second main independent variable.

¹⁷ From the sample in the control years, we also excluded any household with more than three persons with a job and households with two persons with a job for which the spouse's annual income was greater than the limitation to be eligible for a tax allowance for spouse.

$$\begin{aligned}
(2) \quad \ln\left(\frac{C_{h,t+1}}{C_{h,t}}\right) &= \sum_{n=0}^3 a_{1n} \cdot \left(\frac{Taxcut_{h,t+1-n}}{Monthly\ Income_{h,t-1}}\right) + a_2 \cdot \left(\frac{TaxcutI_{h,6}}{Monthly\ Income_{h,t-1}}\right) \\
&+ \sum_{n=0}^4 a_{3n} \cdot \left(\frac{Bonus_{h,t+1-n}}{Monthly\ Income_{h,t-1}}\right) + \sum_{n=0}^3 a_{4n} \cdot \left(\frac{AdjIncome_{h,t-n}}{Monthly\ Income_{h,t-1}}\right) \\
&+ Z_{h,t}' \cdot a_5 + Month_t' \cdot a_6 + \mathbf{e}_{t+1}
\end{aligned}$$

where $\frac{Bonus_{h,t+1}}{Monthly\ Income_{h,t-1}}$ is the value of bonus received by a household relative to the

household's average monthly income in the previous year. A household typically receives bonus payments in summer (June or July) and winter (December) in Japan. Moreover,

$\frac{AdjIncome_{h,t-n}}{Monthly\ Income_{h,t-1}}$, which is current monthly income adjusted for tax cuts and bonus payments

relative to average monthly income in the previous year. Lags of both variables are included in order to control for cyclical income movements other than tax cuts¹⁸.

In addition, we also use consumption before the implementation of tax cut as a normalization variable. That is, we use consumption in January as denominator instead of monthly income as follows.

$$\begin{aligned}
(3) \quad \ln\left(\frac{C_{h,t+1}}{C_{h,t}}\right) &= \sum_{n=0}^3 a_{1n} \cdot \left(\frac{TaxcutN_{h,t+1-n}}{Consumption_n_h}\right) + a_2 \cdot \left(\frac{TaxcutI_{h,6}}{Consumption_n_h}\right) \\
&+ Z_{h,t+1}' \cdot a_3 + Month_{t+1}' \cdot a_4 + \mathbf{e}_{t+1}
\end{aligned}$$

$$\begin{aligned}
(4) \quad \ln\left(\frac{C_{h,t+1}}{C_{h,t}}\right) &= \sum_{n=0}^3 a_{1n} \cdot \left(\frac{Taxcut_{h,t+1-n}}{Consumption_n_h}\right) + a_2 \cdot \left(\frac{TaxcutI_{h,6}}{Consumption_n_h}\right) \\
&+ \sum_{n=0}^4 a_{3n} \cdot \left(\frac{Bonus_{h,t+1-n}}{Consumption_n_h}\right) + \sum_{n=0}^3 a_{4n} \cdot \left(\frac{AdjIncome_{h,t-n}}{Consumption_n_h}\right) \\
&+ Z_{h,t}' \cdot a_5 + Month_t' \cdot a_6 + \mathbf{e}_{t+1}
\end{aligned}$$

where the notations are identical with (1) and (2) except $Consumption_n_h$ refers to consumption in January in household h .

As a benchmark, we estimate specification (1) and (2) for both total consumption excluding durables. The results are reported in Table 2(1). The results based on specification (1) indicate that the coefficients on the first main variable (national income tax cut) and its one-month lag are positive but those on the two-months lag are negative. These are also true for the results based on specification (2),

¹⁸ Since the monthly income used as denominator is the average pretax income in the previous year, the multi-collinearity is avoided. To avoid simultaneity bias, we used one-month lagged of $AdjIncome$ as instrument variable. Since the value of bonus is in general considered to reflect on past business condition of firms, $bonus_{h,t+1}$ is not instrumented.

which controls for other income shocks. These results suggest that the 1998 tax cut stimulated total consumption on impact but that the effect was cancelled out, though the relevant coefficients are not necessarily statistically significant. To take the results of the third column, the short-run marginal propensity to consume (MPC) of contemporaneous tax cut benefits is estimated to be about 0.4¹⁹ on impact but the estimates have large standard errors. The MPC increases to about 0.7 if one-month lag is included, but the implied MPC declined to about 0.1 when two-month lagged is included. On the contrary, the coefficients on the local inhabitant's tax cut are not significant in all columns. The results based on specification (3) and (4) reported in Table 2(2) indicates that the estimated MPC follows a similar pattern, though the relevant coefficients are statistically significant and slightly larger than those in Table 2(1)²⁰.

Although the coefficients on the main variables are not necessarily statistically significant if the sample in control years is included in Table 2(1), it is possible that the tax cut affected specific type of goods and that the effect might be clear and significant. Next, Table 3(1) reports the results of the specification (1) and (2) using consumption disaggregated by types of goods and services. The first and second columns of Table 3(1) show the 1998 tax cut did not stimulate semi-durable consumption. The coefficients on both main independent variables are insignificant with large standard errors. The third and fourth columns report the results on consumption of non-durables. Although the implied MPC of the current tax cut is zero, the coefficients on the one-month lag are positive and significant with the implied MPC of 0.2 and those on the two-month lagged are negative and significant with a comparable MPC. Furthermore, the fifth and sixth columns, which deal with services consumption, indicate that the 1998 tax cut had some effect on services consumption. The coefficients on the first main variable (national income tax cut) are positive and significant, followed by the small and insignificant coefficients on the one-month lag and those on the two-month lagged are negative and significant.

Since services consumption comprises about 19% of monthly pre-tax income, this estimated elasticity on the tax cut amount relative to monthly income implies a MPC of 0.6 for contemporaneous tax cuts, which is roughly consistent with the results discussed above, considering the negative MPC for semi-durables. Also, if when the two-month lag is included, the MPC is estimated to be 0.1, which indicates that the positive effect of the tax cut was cancelled out later due to substitution. That the tax cut stimulated services consumption is also true for the results based on specification (3) and (4), as reported in Table 3(2)^{21,22}.

¹⁹ $MPC = a_1 \times (C/Y)$. Table 1 indicates that consumption (excluding transfers, gifts or durables) /pre-tax monthly income=0.435, so $MPC = 0.96 \times 0.44 = 0.42$.

²⁰ Table 1 indicates that consumption (excluding transfers, gifts or durables) /consumption (including transfers, gifts or durables)=0.763, so $MPC = 1.15 \times 0.763 = 0.88$.

²¹ Though we do not report the coefficients on bonus terms to save space, they are positive and statistically significant in all cases for semi-durables and services in the regressions with control years. Moreover, the coefficients are much larger in semi-durables than non-durables and services. This suggests that household consumption is excessively sensitive to bonus payments and it is so especially for semi-durables. See our micro data study on the Japanese bonus payments (Hori and Shimizutani [2002]).

Finally, we examine the impact of the tax cut for households with different levels of income.²³ we split the sample by the mean of pre-tax annual income in the previous year. Table 4 (1) and (2) report the results²⁴. To take the example of the results of Table 4 (1) based on the specification (1), the response of total consumption level is similar for the richer households and the poorer households, though the coefficient for the richer are insignificant. The coefficient for the services on impact is larger for the poor households than the richer but it is substituted later.

In sum, the above estimates indicate that consumers responded to the 1998 tax cut with a MPC to current tax cut benefit of 0.6 on impact, but that the MPC declined over the successive months. Consumers spent the tax cut benefits on services. However, it's important to bear in mind the limitations of these estimates. First, the value of tax cut only accounted for a small fraction of a household's monthly income: the total value of the tax cuts received by a typical family which actually received tax cuts was only about 10 % percent of the family's monthly income and, in addition, households benefited from the tax cut over several months, not all at once. These income shocks are much smaller than bonus payments, which amount to about 58% of monthly income in June (see Table 1). Moreover, since the FIES does not contain all the information necessary to calculate tax amount, measurement error is inevitable and will bring a downward bias to the estimated impact of the tax cut. If direct information on tax cuts for individual household had been available, it would have made it possible to compare the effects across various panels.

5 Which of Tax Cut or Coupon Program is More Effective?

This last section investigates whether consumers react in different ways to different forms of a windfall. More specifically, the question is which of a tax cut or a coupon program is more effective. We address this by comparing the effect of the 1998 tax cut and the shopping coupon program implemented in March 1999, discussed in Hori, Hsieh, Murata, Shimizutani (2002)²⁵. The 1998 tax cuts and the 1999 shopping coupon program were implemented in a similar economic environment and are comparable in both amount and way in which the amount was determined. The only significant difference is in the form of implementation: a household gets the benefit as a decrease in

²² So far, we have analyzed the effect of the 1998 tax cuts at implementation, not at announcement. The tax cut effective from February was publicized in December 1997 and a forward-looking household may have already adjusted its consumption in December as stipulated by the canonical model of consumption, implying consumption should only change upon news of unexpected income changes and should not react to anticipated income changes. However this is not the case as discussed in Hori, Hsieh, Murata and Shimizutani (2002) which shows that consumers did not respond to the shopping coupon program at the announcement, but at the implementation.

²³ Hori, Hsieh, Murata and Shimizutani (2002) evaluates the effect of liquidity constraint, following Zeldes(1989), by matching the FIES and *Family Savings Survey* (henceforth, FSS) which collects data on financial assets data on December 31 in every year from the same households surveyed in the FIES. It is impossible to implement the same method in this paper because the sample of the FSS is households who entered the sample in August, September and October.

²⁴ The estimates based on specification (1) and (2) produce similar results so Table 4 (1) has only the results based on (1). Similarly, Table 4 (2) shows the results based on (3).

²⁵ Note that there is no household in the sample that received both 1998 tax cuts and 1999 coupon program since the length of the panel is six months.

taxes withheld during several months or by receiving shopping coupons at once. The question of whether a tax cut or coupon program is more effective is an important one for macroeconomic policy makers, in addition to being of interest to academics.

Hori, Hsieh, Murata and Shimizutani (2002) demonstrates that the coupon program stimulated consumption of semi-durables right after the coupons were distributed, particularly consumption of apparel and services. The MPC on these semi-durables is estimated to be 0.3-0.4 after the coupons were distributed, but the estimated elasticity (and the MPC) declines to 0.1 over longer time periods. On the contrary, the results in this paper show that the 1998 tax cut on consumption and finds that consumers responded to the 1998 tax cut with the implied MPC to current tax cut benefit of 0.6 but again the MPC declined in subsequent months. Consumers spent the tax cut benefits on services, not on semi-durables as in the shopping coupons program. In other words, both fiscal policies had roughly comparable effects on consumption, but the 1998 tax cut and the coupon program affected consumption of different types of goods. There are several possible explanations for this different pattern of expenditure across different policies. First, the amount of benefit is clearer and easier to calculate when a household receives it by getting coupons rather than by decreasing withheld taxes. Second, coupons in the program expire after six months while money does not expire for the tax cut case. Third, households receive coupons all at once but the benefits of the 1998 tax cut are spread over several months.²⁶ These differences in form seem to have influenced households to receive and spend their windfall gain from the coupon program earlier and on more expensive items than in the 1998 tax cut case. In addition, coupons were spent for items such as clothing that benefited children perhaps because the amount of coupons received was based on the number of children and families may have faced psychological pressure to spend the coupons on items for their children. This is not true in the case of the 1998 tax cuts.

To compare the effects of both fiscal policies using the same specification, we employ the following three specifications to assess the effect of the shopping coupon program. Although the amount of the tax cut benefit for individual households in each month is calculated as discussed above, it is impossible to identify when an eligible household received a coupon from the FIES data, which makes it hard to apply the specifications utilized above to the coupon program case. The basic idea is to regress in change in logs of consumption between January and *each* month on the tax cut amount a household received up until the month normalized by monthly income or consumption in the first month, which is characterized as the month-to-month specification.

$$(5-1) \quad \ln\left(\frac{C_{h,t+1(t=1,2,3,4,5)}}{C_{h,t}}\right) = a_1 \cdot \left(\frac{CUMTaxcut_{h,t+1}}{MonthlyIncome_h}\right) + a_2 \cdot \left(\frac{TaxcutI_{h,6}}{MonthlyIncome_h}\right) \\ + a_3 \cdot \left(\frac{Other_{h,t}}{MonthlyIncome_h}\right) + Z_{h,t}' \cdot a_4 + Month_t' \cdot a_5 + e_{t+1}$$

²⁶ It seems that a household is hardly motivated to receive higher salary so that it can receive more tax cut in earlier months.

where h indexes households and t refers to the year. $CUMTaxcut_h$ is the sum of the national tax cut benefit a household has received until each month corresponding to the dependent variable and $Other_h$ is the sum of income a household has received until one month before corresponding to the dependent variable²⁷. To take an example to investigate the effect of the tax cut on consumption in March, the dependent variable is the change in logs of consumption between January and April and the main independent variable is the sum of tax cut a household received in January and April relative to monthly income and the second independent variable is the sum of the household income between January and March. As for the coupon case, the specification (5-1) becomes

$$(5-2) \ln\left(\frac{C_{h,t+1(t=1,2,3,4,5)}}{C_{h,t}}\right) = a_1 \cdot \left(\frac{COUPON_h}{Monthly\ Income_h}\right) + Z_{h,t}' \cdot a_2 + Month_t' \cdot a_3 + \mathbf{e}_{t+1}$$

where the notations are identical with those in (5-1) except $COUPON_h$, the amount of coupons a household received²⁸. Since the coupon amount received a household is totally determined by the number of households, the sum of the national tax cut benefit a household has received until each month corresponding to the dependent variable is not included in this specification.

The second specification is to replace monthly income as consumption in January in each household as denominator in the main independent variables.

$$(6-1) \ln\left(\frac{C_{h,t+1(t=1,2,3,4,5)}}{C_{h,t}}\right) = a_1 \cdot \left(\frac{CUMTaxcut_{h,t+1}}{Consumption_h}\right) + a_2 \cdot \left(\frac{TaxcutI_{h,6}}{Consumption_h}\right) + a_3 \cdot \left(\frac{Other_{h,t}}{Consumption_h}\right) + Z_{h,t}' \cdot a_4 + Month_t' \cdot a_5 + \mathbf{e}_{t+1}$$

where the notations are identical with specification (5-1) except $Consumption_h$ refers to consumption in January in each household. Similarly, the specification for the coupon case becomes as follows.

$$(6-2) \ln\left(\frac{C_{h,t+1(t=1,2,3,4,5)}}{C_{h,t}}\right) = a_1 \cdot \left(\frac{COUPON_h}{Consumption_h}\right) + Z_{h,t}' \cdot a_2 + Month_t' \cdot a_3 + \mathbf{e}_{t+1}$$

Contrary to the month-to-month specification used in (5) and (6), the last specification is characterized as the cumulative specification.

$$(7-1) \ln\left(\frac{C_{h,t(after\ February)}}{C_{h,January}}\right) = a_1 \cdot \left(\frac{Taxcut_{h,t}}{Monthly\ Income_h}\right) + a_2 \cdot \left(\frac{Other_{h,t-1}}{Monthly\ Income_h}\right) + Z_{h,t}' \cdot a_3 + Year_t' \cdot a_4 + \mathbf{e}_{t+1}$$

where h indexes households and t refers to the year. The dependent variable is the log of the ratio of the *sum* of consumption in household h in year t in the period after February to the *average* of monthly consumption before February (in this case, this refers to January). The main independent

²⁷ Note that $Other_{h,t-1}$ is the sum of income a household has received until “one month before” to avoid the simultaneity.

²⁸ In the coupon regressions below, we exclude $Other_h$ terms since the $COUPON_h$ is orthogonal to the income variables.

variable is $\left(\frac{\text{Taxcut}_{h,t}}{\text{Monthly Income}_h} \right)$, which is the total value of tax cut amount received by a household relative to its monthly income. Since a household receives the tax cut benefit over several months, the numerator is the cumulative of tax cut amount. Similarly, (7-1) becomes as follows for the coupon case.

$$(7-2) \quad \ln \left(\frac{C_{h,t(\text{afterFebruary})}}{C_{h,\text{January}}} \right) = a_1 \cdot \left(\frac{\text{COUPON}_h}{\text{Monthly Income}_h} \right) + Z_{h,t}' \cdot a_2 + \text{Year}_t' \cdot a_3 + \mathbf{e}_{t+1}$$

We also tried specifications that replace *Monthly Income_h* by *Consumption_h*.

$$(8-1) \quad \ln \left(\frac{C_{h,t(\text{afterFebruary})}}{C_{h,\text{January}}} \right) = a_1 \cdot \left(\frac{\text{Taxcut}_{h,t}}{\text{Consumption}_h} \right) + a_2 \cdot \left(\frac{\text{Other}_{h,t-1}}{\text{Consumption}_h} \right) + Z_{h,t}' \cdot a_3 + \text{Year}_t' \cdot a_4 + \mathbf{e}_{t+1}$$

$$(8-2) \quad \ln \left(\frac{C_{h,t(\text{afterFebruary})}}{C_{h,\text{January}}} \right) = a_1 \cdot \left(\frac{\text{COUPON}_h}{\text{Consumption}_h} \right) + Z_{h,t}' \cdot a_2 + \text{Year}_t' \cdot a_3 + \mathbf{e}_{t+1}$$

In what follows, the upper tables for the 1998 tax cut include other income as a controlling variable, and the upper tables for the 1999 coupon program use the January- June panel. Those two results in upper tables are used to compare the effects between the two different policies. Table 5-(1), the month-to-month method, indicates that the sum of elasticity over first two months are slightly larger for the 1998 tax cut than that for the 1999 coupon program. The coefficients on semi-durables are unstable with large standard error for the 1998 tax cut while those are positive and large in earlier months for the 1999 coupon program. On the contrary, the coefficient on services in the second month is large and marginally significant for the 1998 tax cut while those are small and insignificant for the 1999 coupon program. Table 5-(2), the month-to-month method that uses consumption as a normalization variable, indicates that the sum of elasticity over first two months are almost identical. The pattern of the coefficients on semi-durables (observed in Table 5-(1)) holds for this case, and the coefficients on services are larger for the 1998 tax cut than the 1999 coupon program.

Table 5-(3) and (4) report the results based on the cumulative method. Roughly speaking, the pattern discussed above holds again, though the estimated elasticity of total consumption in the first month is smaller for the 1998 tax cut and the elasticity becomes smaller for semi-durables and larger for services in the 1999 coupon program.

6. Conclusion

This paper analyzed the effect of the 1998 tax cut on consumption, and found that consumers responded to the 1998 tax cut with the implied MPC to tax cut benefit of 0.6 on impact but the MPC declined in subsequent months. Consumers spent the tax cut benefits on services and non-durables, but not on semi-durables observed in the shopping coupons program. An application of the same specification both to the 1998 tax cut and to the 1999 shopping coupons program demonstrates that

while their effects on consumption are roughly comparable, the 1998 tax cut and the coupon program affected consumption of different categories of goods.

The policy implication of these findings is that the consumption reaction to a windfall of a comparable amount is similar in quantity but different in types of goods. A topic for further research would be to examine the effects of other tax cuts in various forms undertaken in the 1990's to compare how differently Japanese consumers reacted to various types of policy changes in the 1990s. Part II and Part III of this discussion paper tackle some of those issues. As macroeconomic policy makers struggle to react to the "Lost decade", it is warranted that the further research is fruitful and shed some light on policy questions relevant for the Japanese economy.

References

- Blinder, Alan. "Temporary Income Taxes and Consumer Spending," *Journal of Political Economy* 89 (1), February 1981, pp. 26-53.
- Browning, Martin and Dolores Collado. "The Response of Expenditures to Anticipated Income Changes: Panel Data Estimates," *American Economic Review*, June 2001.
- Carroll, Christopher. "'Risky habits' and the marginal propensity to consume out of permanent income, or, How much would a permanent tax cut boost Japanese consumption?," NBER. Working Paper 7839, August 2000.
- Hayashi, Fumio. "Testing the Life Cycle-Permanent Income Hypothesis on Japanese Monthly Panel Data," *Keizai Kenkyu* 101, 1986, pp. 1-23.
- Hsieh, Chang-Tai. "Do Consumers React to Anticipated Income Changes? Evidence from the Alaska Permanent Fund," Princeton University mimeo, 2001.
- Hori, Masahiro, Hsieh, Chang-Tai, Murata, Keiko and Shimizutani, Satoshi. "Did the Shopping Coupon Program Stimulate Consumption? : Evidence from Japanese Micro Data" *ESRI Discussion Paper Series no.12*, 2002.
- Hori, Masahiro, and Shimizutani, Satoshi. "New Evidence on the Response of Expenditure to Anticipated Income Changes: Panel Data Estimates on Japanese Bonus System" Economic and Social Research Institute, Cabinet Office, Japan, mimeo, 2002.
- Ishi, Hiromitsu. *The Japanese Tax System* (Third Edition), Oxford, Oxford University Press. 2001
- Ministry of Public Management, Home Affairs, Posts, and Telecommunications. *Annual report on the Family Income and Expenditure Survey*, various years.
- Parker, Jonathan. "The Reaction of Household Consumption to Predictable Changes in Payroll Tax Rates." *American Economic Review*, September 1999, 89(4), pp. 959-973.
- Poterba, James. "Are Consumers Forward Looking? Evidence from Fiscal Experiments," *American Economic Review (Papers and Proceedings)*, 78(2), May 1988, pp. 413-18.
- Shapiro, Matthew, and Slemrod, Joel. "Consumer Response to the Timing of Income: Evidence from a Change in Tax Withholding," *American Economic Review*, 85 (1), March 1995, pp. 274-283.
- Shapiro, Matthew, and Slemrod, Joel. "Consumer Response to Tax Rebates." Mimeo, 2001.
- Shimizutani, Satoshi. "Consumption and Tax Policy in Japan During the 1990: Evidence from Household Data." University of Michigan, mimeo, 2002.
- Shea, John. "Union Contracts and the Life-Cycle/Permanent-Income Hypothesis." *American Economic Review*, March 1995, 85(1), pp. 186-200
- Souleles, Nicholas. "The Response of Household Consumption to Income Tax Refunds." *American Economic Review*, September 1999, 89(4), pp. 947-958
- Souleles, Nicholas. "Consumer Response to the Reagan Tax Cuts." *Journal of Public Economics*, forthcoming
- Watanabe, Katsunori, Takayuki Watanabe and Tsutomu Watanabe. "Tax policy and consumer spending: Evidence from Japanese fiscal experiments" NBER. Working Paper 7252, July 1999

Zeldes, Stephen. "Consumption and Liquidity Constraints: An Empirical Investigation." *Journal of Political Economy*, 1989, vol.97, no 2.

Appendix Calculation of Tax Cut Amount

This appendix is designed to make the procedure clear to calculate monthly tax cut amount for individual households. As stated in the text, the data used in this paper is the FIES. The FIES contains a large set of data on income and expenditure as well as demographic variables. This paper used sub-sample of worker's households because of lack of monthly income data and different pattern of income reception for non-worker's households.

Monthly income tax payment for worker's households follows the tax-withholding table. This paper used the withholding table effective from 1995 to 1998. This table is a matrix of the taxable income (amount of salary after deduction of social insurance premiums) and number of dependants. Before using the table to calculate tax amount, it is necessary to calculate the number of dependants and non-taxable income, neither of which are explicitly available in the FIES.

First, in order to count the number of dependants precisely, we excluded households with more than three wage earners. Second, we excluded households with two wage earners in which the spouse's annual income was greater than 1.03 million yen, the limitation to be eligible for allowance for spouse²⁹. In addition, the number of dependants is added in some cases such that a dependant is a handicapped, a working student. Since the FIES does not contain complete information on all kinds of additional allowances, we adjusted the case of allowance for an aged person, eligible if the taxpayer attains the age of 65, and allowance for widow or widower. We eliminated households with more than seven dependants.

The next step is to calculate the taxable income. Information on actual tax payments and the number of dependants makes this possible³⁰. Data on both social insurance premiums and gross salary is available for individual households so it is possible to calculate non-taxable income, the gap between gross salary and taxable income estimated by using the withholding table³¹. Since we also need to know the tax amount in months in which the tax cuts were implemented, non-taxable income is defined as the average of that in the months without tax cuts³².

Then, we conduct the reverse process to calculate the monthly tax amount without tax cut. Conceptually, non-taxable income obtained in the above-mentioned way should be equal to the amount of gross salary minus estimated taxable income but there are cases in which non-taxable income is extremely high or negative. Therefore, we consider the following three cases: 1) gross

²⁹ One other reason is that a spouse with higher salary must pay social security premiums but the FIES has the data on only the sum of the payment of all household members, not of individual members. This makes it difficult to use the withholding table as discussed below.

³⁰ Since the amount of taxable income has a small range of 2,000 yen to 3,000 yen in the withholding table, we took the average of each range.

³¹ Social insurance premiums are not taxable.

³² When calculating the average of non-taxable income, we used that in the months of January, May, June 1998 because the subsequent three months beginning in February and August have large amount of tax cut.

salary minus the sum of estimated taxable income and social insurance premium is negative, 2) gross salary minus the sum of estimated taxable income and social insurance premium is positive but further subtracting individual or firm insurance payment yields a negative gross salary, and 3) gross salary minus the sum of estimated taxable income, social insurance premium and individual or firm insurance payment is positive³³. We classified the households into the three categories and when gross salary minus the sum of estimated taxable income and social insurance premium is negative (the first case), we decreased the number of dependants³⁴. The taxable income is gross salary minus the sum of estimated taxable income and social insurance premium for the second case and gross salary minus the sum of estimated taxable income, social insurance premium and individual or firm insurance payment for the third case. In this process, we eliminated households which apparently underreport its tax amount, that is, households of which salary is taxable given the number of dependants but actual tax payment are zero³⁵.

Income tax payments on bonus follow that of other withholding table. This indicates tax rate on bonus depending on the number of dependants and taxable income in the previous month. Taxable income in the previous month is calculated by subtracting nontaxable income estimated above from gross salary.

As stated in the text, this process generates very precise estimates of income tax payment, as demonstrated by the correlation coefficient of more than 0.97 between estimated due income tax payments and actual income tax payment in months without tax cut. After these adjustments to the data set, we end up with a sample of roughly 400 households.

The calculation of the local inhabitant's tax cut is based on growth rate of annual wage by industry, age, sex and firm size³⁶. The basic survey of wage structure has data on monthly salary in June and any bonus in the previous year. The amount of inhabitant's tax cut in June is that estimated without tax cut. The base is the average of inhabitant's tax between February and May³⁷.

³³ We considered this case because in most case individual or firm insurance payment is withheld so it is possible that a household reports gross salary as that after subtracting them.

³⁴ We do this just one time because the number of dependants is considered to be more precise. For example, consider a household with five dependants has negative number of the amount of gross salary subtracting estimated taxable income. In this case, we calculated non-taxable income as a household with four dependants but it is eliminated if it has still negative number in the case of four dependants.

³⁵ It is also possible that a household benefits other exemptions such as those for obtaining or reforming own house. But such information is not available in the FIES.

³⁶ Although the basic survey of wage structure has data on education too, it is not available in the FIES.

³⁷ The inhabitant's tax includes all due tax on income receipt, not only from salary but also business or rent income. In most cases, inhabitant's tax from business income is due in June, August, October and January.

Figure 1: Timing of Receipt of Tax Cut Benefits

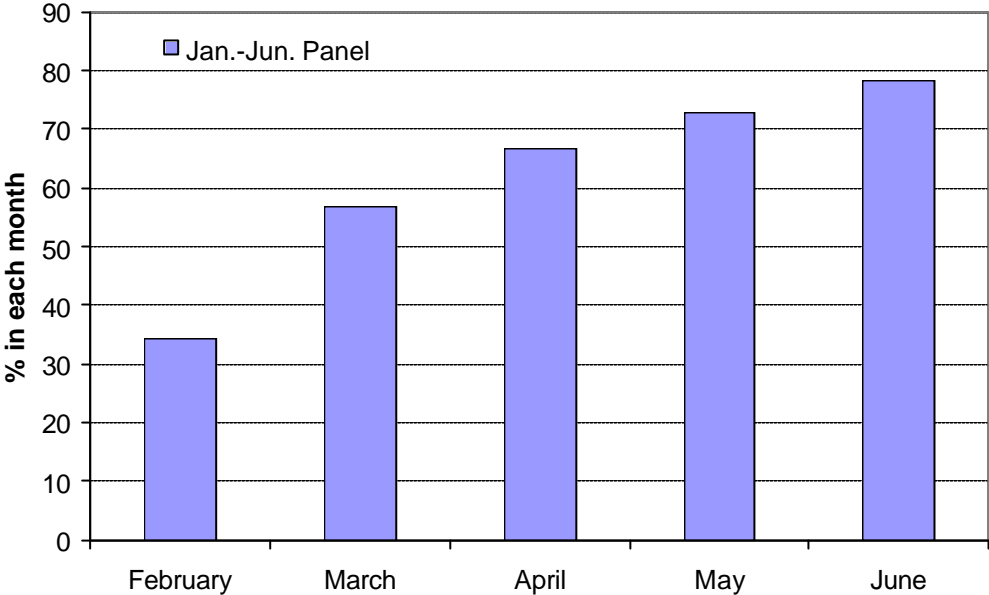


Table 1: Summary Statistics

	<u>Mean</u>	<u>S. D.</u>
<i>January-June Panel (N=4,578)</i>		
Consumption (inc. transfer or gift)	324,225	240,037
Consumption (exc. transfer or gift)	264,158	203,006
Consumption (exc. transfer or gift or durables)	247,496	157,514
Durables	16,663	111,878
Semi-durables	33,185	43,681
Non-durables	107,961	40,654
Services	106,349	127,480
Amount of Income Tax Cuts (all households) ¹	31,366	17,238
Amount of Income Tax Cuts (households that received a part of tax cuts) ¹	35,960	13,245
Amount of Inhabitant's Tax Cuts (all households) ¹	17,031	18,846
Amount of Inhabitant's Tax Cuts (households that received a part of tax cuts) ¹	19,928	18,918
Bonus	56,088	241,388
Bonus (June)	328,689	533,707
Monthly income ²	568,776	248,223
Age (household head)	44.5	10.7
Number of family members	3.5	1.2

¹ Only for 1998 Panel. The sum of tax cut during six months.

² Pretax annual income/12.

Note: Unit of observation is a household.

Consumption refers to average monthly consumption in current yen.

**Table 2 (1): Impact of the 1998 Tax Cuts on Total Consumption
(normalized by average monthly income)**

Dependent var.	Exc. durables	Exc. durables	Exc. durables	Exc. durables
Specification	(1)	(2)	(1)	(2)
$\frac{TaxcutN_{h,t+1}}{Monthly\ Income_{h,t-1}}$	1.30* (0.69)	1.29* (0.70)	0.96 (0.65)	0.83 (0.65)
$\frac{TaxcutN_{h,t}}{Monthly\ Income_{h,t-1}}$	0.99 (0.80)	1.40* (0.82)	0.72 (0.77)	0.83 (0.77)
$\frac{TaxcutN_{h,t-1}}{Monthly\ Income_{h,t-1}}$	-1.80** (0.82)	-1.84** (0.85)	-1.35* (0.79)	-1.02 (0.79)
$\frac{TaxcutN_{h,t-2}}{Monthly\ Income_{h,t-1}}$	0.98 (0.87)	0.93 (0.91)	0.71 (0.83)	0.36 (0.84)
$\frac{TaxcutI_{h,6}}{Monthly\ Income_{h,t-1}}$	-0.50 (0.86)	-0.30 (0.90)	-0.68 (0.83)	-0.93 (0.84)
Lags of Current Income and bonus	No	Yes	No	Yes
Control Year	No	No	Yes	Yes
F test (Prob.>F)	2.64 (0.03)	2.94 (0.02)	1.56 (0.18)	1.20 (0.31)
Sum of <i>TaxcutN</i>	1.48 (1.35)	1.77 (1.40)	1.04 (1.24)	1.00 (1.25)
Adj.R ² s.e.e	0.06 0.36	0.07 0.36	0.05 0.35	0.06 0.34
Number of Observation	2,221	2,221	18,331	18,331

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly total consumption except durables. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and indicator variable for each year and month. In addition, specification (2) includes four lags of (i) current income minus tax cut and bonus amount relative to the monthly income in previous year and (ii) bonus relative to monthly income. The null hypothesis for F test is all coefficients on national income tax cut relative to monthly income are zero. Sum of *TaxcutN* refers the sum of the coefficients on national tax cuts and the standard errors.

**Table 2 (2): Impact of the 1998 Tax Cuts on Total Consumption
(normalized by consumption in the first month)**

Dependent var.	Exc. durables	Exc. durables	Exc. durables	Exc. durables
Specification	(3)	(4)	(3)	(4)
$\frac{TaxcutN_{h,t+1}}{Consumption_h}$	1.28** (0.29)	1.33** (0.29)	1.15** (0.27)	1.15** (0.28)
$\frac{TaxcutN_{h,t}}{Consumption_h}$	-0.06 (0.35)	0.03 (0.36)	-0.13 (0.34)	-0.07 (0.34)
$\frac{TaxcutN_{h,t-1}}{Consumption_h}$	-0.52 (0.32)	-0.49 (0.34)	-0.40 (0.31)	-0.29 (0.31)
$\frac{TaxcutN_{h,t-2}}{Consumption_h}$	0.30 (0.33)	0.18 (0.36)	0.22 (0.32)	0.06 (0.33)
$\frac{TaxcutI_{h,6}}{Consumption_h}$	-0.29 (0.29)	-0.35 (0.31)	-0.32 (0.28)	-0.51 (0.29)
Lags of Current Income and bonus	No	Yes	No	Yes
Control Year	No	No	Yes	Yes
F test (Prob.>F)	5.97 (0.00)	6.06 (0.00)	4.95 (0.00)	4.77 (0.00)
Sum of $TaxcutN$	1.00* (0.53)	1.05* (0.60)	0.85 (0.50)	0.85* (0.51)
Adj.R ² s.e.e	0.06 0.36	0.07 0.36	0.05 0.35	0.06 0.34
Number of Observation	2,221	2,221	18,331	18,331

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly total consumption except durables. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to consumption in January. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and indicator variable for each year and month. In addition, specification (4) includes four lags of (i) current income minus tax cut and bonus amount relative to consumption in January and (ii) bonus relative to consumption in January. The null hypothesis for F test is all coefficients on national income tax cut relative to monthly income are zero. Sum of $TaxcutN$ refers the sum of the coefficients on national tax cuts and the standard errors.

**Table 3 (1) : Impact of the 1998 Tax Cuts on Consumption by Type of Goods
(normalized by average monthly income)**

Dependent var.	Semi-durables	Semi-durables	Non-durables	Non-durables	Services	Services
Specification	(1)	(2)	(1)	(2)	(1)	(2)
$\frac{TaxcutN_{h,t+1}}{Monthly Income_{h,t-1}}$	-1.52 (2.34)	-2.49 (2.35)	0.03 (0.43)	-0.05 (0.43)	3.38** (1.26)	3.32** (1.26)
$\frac{TaxcutN_{h,t}}{Monthly Income_{h,t-1}}$	2.99 (2.69)	3.32 (2.69)	0.84* (0.49)	0.90* (0.50)	-0.29 (1.47)	-0.23 (1.47)
$\frac{TaxcutN_{h,t-1}}{Monthly Income_{h,t-1}}$	0.73 (2.79)	1.65 (2.80)	-1.26** (0.51)	-1.13** (0.52)	-2.83* (1.53)	-2.50 (1.53)
$\frac{TaxcutN_{h,t-2}}{Monthly Income_{h,t-1}}$	-3.02 (3.00)	-4.72 (3.07)	0.86 (0.55)	0.56 (0.56)	2.62 (1.59)	2.50 (1.62)
$\frac{TaxcutI_{h,6}}{Monthly Income_{h,t-1}}$	3.91 (2.98)	2.09 (3.04)	-0.01 (0.54)	-0.32 (0.56)	-0.69 (1.57)	-0.76 (1.60)
Lags of Current Income and bonus	No	Yes	No	Yes	No	Yes
F test (Prob.>F)	0.63 (0.64)	1.18 (0.32)	2.12 (0.08)	1.69 (0.15)	3.00 (0.02)	2.70 (0.03)
Sum of <i>TaxcutN</i>	-0.81 (4.51)	-2.23 (4.57)	0.47 (0.82)	-0.04 (1.04)	2.88 (2.38)	3.09 (2.40)
Adj.R ² s.e.e	0.03 1.22	0.03 1.22	0.06 0.23	0.06 0.23	0.02 0.66	0.03 0.65
Number of Observation	17,671	17,671	18,490	18,490	18,304	18,304

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and indicator variable for each year and month. In addition, specification (2) includes four lags of (i) current income minus tax cut and bonus amount relative to the monthly income in previous year and (ii) bonus relative to the monthly income. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on national income tax cut relative to monthly income are zero. Sum of *TaxcutN* refers the sum of the coefficients on national tax cuts and the standard errors.

**Table 3 (2) : Impact of the 1998 Tax Cuts on Consumption by Type of Goods
(normalized by consumption in the first month)**

Dependent var.	Semi-durables	Semi-durables	Non-durables	Non-durables	Services	Services
Specification	(3)	(4)	(3)	(4)	(3)	(4)
$\frac{TaxcutN_{h,t+1}}{Consumption_h}$	0.59 (0.98)	0.28 (0.98)	0.25 (0.18)	0.21 (0.18)	2.23** (0.57)	2.25** (0.58)
$\frac{TaxcutN_{h,t}}{Consumption_h}$	0.07 (1.06)	0.17 (1.07)	0.21 (0.20)	0.20 (0.20)	0.04 (0.57)	0.19 (0.57)
$\frac{TaxcutN_{h,t-1}}{Consumption_h}$	0.61 (1.09)	0.92 (1.10)	-0.43** (0.20)	-0.40** (0.20)	-0.87 (0.58)	-0.75 (0.59)
$\frac{TaxcutN_{h,t-2}}{Consumption_h}$	-0.25 (1.16)	-0.99 (1.18)	0.44** (0.21)	0.32 (0.21)	0.57 (0.61)	0.39 (0.62)
$\frac{TaxcutI_{h,6}}{Consumption_h}$	0.73 (1.01)	-0.16 (1.05)	-0.02 (0.18)	-0.16 (0.19)	-0.36 (0.53)	-0.56 (0.55)
Lags of Current Income and bonus	No	Yes	No	Yes	No	Yes
F test (Prob.>F)	0.20 (0.94)	0.37 (0.83)	2.57 (0.04)	1.86 (0.11)	4.54 (0.00)	4.57 (0.00)
Sum of <i>TaxcutN</i>	1.01 (1.82)	0.37 (1.86)	0.47 (0.33)	0.34 (0.33)	1.97* (0.97)	2.08** (0.98)
Adj.R ² s.e.e	0.03 1.22	0.03 1.22	0.06 0.23	0.06 0.23	0.02 0.66	0.02 0.66
Number of Observation	17,671	17,671	18,490	18,490	18,304	18,304

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to tax cuts is the coefficient on tax cuts relative to consumption in January. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and indicator variable for each year and month. In addition, specification (4) includes four lags of current income minus tax cut and bonus amount relative to consumption in January and (ii) bonus relative to consumption in January. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on national income tax cut relative to monthly income are zero. Sum of *TaxcutN* refers the sum of the coefficients on national tax cuts and the standard errors.

**Table 4 (1): Impact of the 1998 Tax Cuts by Income Levels
(normalized by average monthly income)**

Dependent var.	All	All	Semi-durables	Semi-durables
Specification	(1)	(1)	(1)	(1)
Annual income	Above Mean	Below mean	Above Mean	Below mean
$\frac{TaxcutN_{h,t+1}}{Monthly\ Income_{h,t-1}}$	-0.42 (1.14)	1.86** (0.82)	3.05 (3.77)	-4.88 (3.10)
$\frac{TaxcutN_{h,t}}{Monthly\ Income_{h,t-1}}$	1.94 (1.18)	-0.90 (1.08)	-4.03 (3.93)	7.59** (3.85)
$\frac{TaxcutN_{h,t-1}}{Monthly\ Income_{h,t-1}}$	-1.63 (1.22)	-0.98 (1.09)	-1.12 (4.07)	2.13 (4.03)
$\frac{TaxcutN_{h,t-2}}{Monthly\ Income_{h,t-1}}$	0.64 (1.32)	1.58 (1.16)	-0.23 (4.45)	-5.52 (4.39)
$\frac{TaxcutI_{h,6}}{Monthly\ Income_{h,t-1}}$	0.76 (1.22)	-2.49* (1.43)	5.99 (4.11)	3.52 (5.43)
F test (Prob.>F)	1.00 (0.41)	1.76 (0.13)	0.42 (0.80)	1.74 (0.14)
Sum of <i>TaxcutN</i>	0.52 (2.29)	1.55 (1.51)	-2.34 (7.71)	-0.69 (5.79)
Adj.R ² s.e.e	0.06 0.36	0.03 0.33	0.04 1.21	0.03 1.23
Number of Observation	7,923	10,408	7,830	9,841

Dependent var.	Non-durables	Non-durables	Services	Services
Specification	(1)	(1)	(1)	(1)
Annual income	Above mean	Below mean	Above Mean	Below mean
$\frac{TaxcutN_{h,t+1}}{Monthly\ Income_{h,t-1}}$	-0.12 (0.70)	0.14 (0.57)	-0.15 (2.13)	5.59** (1.61)
$\frac{TaxcutN_{h,t}}{Monthly\ Income_{h,t-1}}$	0.36 (0.72)	1.12 (0.71)	3.04 (2.22)	-3.19 (2.06)
$\frac{TaxcutN_{h,t-1}}{Monthly\ Income_{h,t-1}}$	-0.49 (0.75)	-2.12** (0.74)	-4.11* (2.30)	-2.49 (2.18)
$\frac{TaxcutN_{h,t-2}}{Monthly\ Income_{h,t-1}}$	1.24 (0.81)	0.95 (0.81)	1.82 (2.50)	4.38* (2.24)
$\frac{TaxcutI_{h,6}}{Monthly\ Income_{h,t-1}}$	0.50 (0.75)	-0.12 (1.00)	1.11 (2.31)	-2.79 (2.74)
F test (Prob.>F)	0.69 (0.60)	2.25 (0.06)	1.18 (0.32)	4.01 (0.00)
Sum of <i>TaxcutN</i>	0.99 (1.40)	0.08 (1.05)	0.60 (4.31)	4.29 (2.92)
Adj.R ² s.e.e	0.06 0.22	0.05 0.23	0.02 0.68	0.01 0.63
Number of Observation	8,072	10,418	7,962	10,342

**Table 4 (2) : Impact of the 1998 Tax Cuts by Income Levels
(normalized by consumption in the first month)**

Dependent var.	All	All	Semi-durables	Semi-durables
Specification	(3)	(3)	(3)	(3)
Annual income	Above Mean	Below Mean	Above Mean	Below mean
$\frac{TaxcutN_{h,t+1}}{Consumption_h}$	1.11** (0.46)	1.27** (0.36)	3.61** (1.51)	-1.51 (1.34)
$\frac{TaxcutN_{h,t}}{Consumption_h}$	-0.01 (0.47)	-0.53 (0.55)	-3.69** (1.57)	2.47* (1.50)
$\frac{TaxcutN_{h,t-1}}{Consumption_h}$	-0.21 (0.49)	-0.45 (0.42)	0.27 (1.63)	1.07 (1.53)
$\frac{TaxcutN_{h,t-2}}{Consumption_h}$	0.46 (0.51)	0.33 (0.44)	-1.23 (1.74)	0.91 (1.64)
$\frac{TaxcutI_{h,6}}{Consumption_h}$	-0.10 (0.34)	-1.32 (0.86)	1.08 (1.16)	-1.04 (3.37)
F test (Prob.>F)	1.73 (0.14)	3.45 (0.01)	2.51 (0.04)	1.26 (0.28)
Sum of <i>TaxcutN</i>	1.36 (0.84)	0.62 (0.66)	-1.03 (2.87)	2.94 (2.46)
Adj.R ² s.e.e	0.06 0.36	0.04 0.33	0.04 1.21	0.03 1.23
Number of Observation	7,923	10,408	7,830	9,841

Dependent var.	Non-durables	Non-durables	Services	Services
Specification	(3)	(3)	(3)	(3)
Annual income	Above Mean	Below Mean	Above Mean	Below mean
$\frac{TaxcutN_{h,t+1}}{Consumption_h}$	0.36 (0.28)	0.19 (0.24)	1.80** (0.85)	2.52** (0.84)
$\frac{TaxcutN_{h,t}}{Consumption_h}$	-0.17 (0.29)	0.40 (0.28)	0.47 (0.89)	-0.05 (0.78)
$\frac{TaxcutN_{h,t-1}}{Consumption_h}$	-0.03 (0.30)	-0.81** (0.28)	-1.08 (0.92)	-1.10 (0.78)
$\frac{TaxcutN_{h,t-2}}{Consumption_h}$	0.37 (0.31)	0.67* (0.30)	0.90 (0.97)	0.32 (0.84)
$\frac{TaxcutI_{h,6}}{Consumption_h}$	0.12 (0.21)	-0.40 (0.60)	-0.33 (0.65)	0.67 (1.65)
F test (Prob.>F)	0.78 (0.54)	3.18 (0.01)	1.76 (0.13)	2.75 (0.03)
Sum of <i>TaxcutN</i>	0.53 (0.52)	0.45 (0.44)	2.10 (1.59)	1.68 (1.28)
Adj.R ² s.e.e	0.06 0.22	0.05 0.23	0.02 0.68	0.01 0.63
Number of Observation	8,072	10,418	7,962	10,342

Notes: Standard errors in parenthesis. See the note of Table 2 (1) and 3 (1).

Table 5: Impact of the 1998 Tax Cut and the 1999 Coupon Program

5-(1) Month to Month Specification (Normalized by income in the previous year)

	First	Second	Third	Fourth	Fifth	
a) The 1998 Tax Cut (The February Tax Cut)						
<i>January-June Panel</i>						
Specification (5-1)						
	February	March	April	May	June	
					nat'l	Local
Total Consumption: (N=4,190)	-0.24 (1.16)	1.13 (0.77)	0.32 (0.67)	0.61 (0.59)	-0.05 (0.56)	1.82 (0.88)
s.e.e.	0.33	0.36	0.36	0.35	0.35	
R squared (adj)	0.03	0.02	0.01	0.01	0.02	
Semi-durables: (N=3,867)	-4.70 (4.45)	0.55 (2.89)	-0.66 (2.39)	0.92 (2.20)	1.71 (2.05)	1.22 (3.11)
s.e.e.	1.28	1.29	1.23	1.21	1.22	
R squared (adj)	0.00	0.01	0.01	0.00	0.00	
Non-durables: (N=4,236)	0.36 (0.78)	0.32 (0.49)	0.17 (0.46)	0.02 (0.43)	-0.16 (0.42)	0.36 (0.66)
s.e.e.	0.24	0.23	0.25	0.25	0.27	
R squared (adj)	0.02	0.03	0.03	0.03	0.04	
Services: (N=4,157)	0.41 (2.32)	2.50 (1.40)	-0.26 (1.22)	0.27 (1.08)	-0.78 (0.98)	3.37 (1.65)
s.e.e.	0.63	0.64	0.65	0.63	0.62	
R squared (adj)	0.01	0.00	0.00	0.00	0.00	

Specification (5-1) without adjusting income other than tax cut						
	February	March	April	May	June	
					nat'l	Local
Total Consumption: (N=4,190)	-0.96 (1.17)	0.90 (0.77)	0.31 (0.67)	0.57 (0.59)	-0.11 (0.56)	1.79 (0.88)
s.e.e.	0.34	0.36	0.36	0.35	0.35	
R squared (adj)	0.00	0.01	0.01	0.01	0.02	
Semi-durables: (N=3,867)	-5.38 (4.45)	0.31 (2.88)	-0.74 (2.38)	0.96 (2.19)	1.32 (2.05)	1.11 (3.11)
s.e.e.	1.28	1.30	1.23	1.21	1.22	
R squared (adj)	0.00	0.01	0.01	0.00	0.00	
Non-durables: (N=4,236)	0.18 (0.79)	0.28 (0.49)	0.19 (0.46)	0.02 (0.43)	-0.17 (0.42)	0.36 (0.66)
s.e.e.	0.24	0.23	0.25	0.25	0.27	
R squared (adj)	0.02	0.03	0.03	0.03	0.04	
Services: (N=4,157)	-0.10 (2.33)	2.34 (1.40)	-0.21 (1.22)	0.22 (1.08)	-0.81 (0.98)	3.37 (1.65)
s.e.e.	0.63	0.64	0.65	0.63	0.62	
R squared (adj)	0.00	-0.00	0.00	0.00	0.00	

b) The Shopping Coupon Program (1999)					
<i>January-June Panel (Specification (5-2))</i>					
	March	April	May	June	July
<u>Total Consumption:</u> (N=5,211)	0.51 (0.34)	-0.02 (0.34)	-0.47 (0.32)	-0.72 (0.33)	
s.e.e.	0.35	0.35	0.33	0.34	
R squared (adj)	0.00	0.01	0.00	0.00	
<u>Semi-durables:</u> (N=4,900)	1.56 (1.34)	1.09 (1.29)	-2.26 (1.28)	-2.18 (1.28)	
s.e.e.	1.34	1.29	1.28	1.28	
R squared (adj)	0.01	0.01	0.00	0.00	
<u>Non-durables:</u> (N=5,280)	-0.03 (0.22)	-0.33 (0.22)	-0.18 (0.23)	-0.49 (0.23)	
s.e.e.	0.23	0.22	0.24	0.24	
R squared (adj)	0.00	0.01	0.01	0.01	
<u>Services:</u> (N=5,208)	0.40 (0.64)	0.04 (0.64)	-0.45 (0.61)	-1.01 (0.61)	
s.e.e.	0.66	0.66	0.63	0.63	
R squared (adj)	0.00	0.01	0.00	0.00	

<i>February-July Panel (Specification (5-2))</i>					
<u>Total Consumption:</u> (N=5,275)	0.27 (0.34)	0.18 (0.34)	0.22 (0.32)	-0.14 (0.33)	-0.29 (0.36)
s.e.e.	0.36	0.36	0.33	0.35	0.37
R squared (adj)	0.01	0.01	0.00	0.00	0.01
<u>Semi-durables:</u> (N=4,897)	2.22 (1.38)	1.61 (1.32)	1.09 (1.29)	-0.49 (1.30)	-0.80 (1.33)
s.e.e.	1.33	1.27	1.24	1.25	1.28
R squared (adj)	0.01	0.01	0.00	0.00	0.00
<u>Non-durables:</u> (N=5,360)	0.25 (0.23)	0.31 (0.22)	0.11 (0.23)	0.10 (0.23)	0.19 (0.26)
s.e.e.	0.24	0.23	0.24	0.24	0.27
R squared (adj)	0.01	0.01	0.01	0.01	0.02
<u>Services:</u> (N=5,237)	-0.03 (0.64)	-0.03 (0.64)	0.30 (0.60)	0.26 (0.61)	-0.31 (0.66)
s.e.e.	0.66	0.66	0.62	0.63	0.68
R squared (adj)	0.00	0.00	0.00	0.00	0.00

(The 1998 tax cut)

Notes: Standard errors in parenthesis. Data are January-June panels from 1990 to 1999. The dependent variable is the log of the ratio of consumption in each month after February to the consumption in January. The estimated elasticity to tax cut is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, the number of family members (the number of children under 15 and others respectively for the shopping coupons), and indicator variables for year. A household is eliminated if the number of family member is changed. Total consumption exclude durables.

(The 1999 shopping coupon program)

Notes: Sample are panels from January-June and February-July from 1990 to 1999. Standard errors in parenthesis. The dependent variable is the log of consumption in each month relative to consumption in February and the estimated elasticity is the coefficient on the amount of the shopping coupon (computed as the number of children x 20,000 yen) relative to monthly income in the previous year. All regressions also include a quadratic in the age of the household head, the number of children under the age of 15, the number of other family members, and indicator variables for year. Total consumption excludes durables.

5-(2) Month to Month Specification (Normalized by consumption in the first month)

	First	Second	Third	Fourth	Fifth	
a) The 1998 Tax Cut (The February Tax Cut)						
<i>January-June Panel</i>						
Specification (6-1)						
	February	March	April	May	June	
Total Consumption: (N=4,190)	0.38 (0.36)	0.73 (0.25)	0.32 (0.23)	0.48 (0.19)	0.14 (0.20)	0.01 (0.001)
s.e.e.	0.33	0.34	0.34	0.32	0.33	
R squared (adj)	0.05	0.10	0.12	0.16	0.15	
Semi-durables: (N=3,867)	-0.05 (1.21)	0.45 (0.92)	-0.25 (0.82)	0.50 (0.78)	0.93 (0.80)	0.02 (0.002)
s.e.e.	1.27	1.28	1.21	1.19	1.20	
R squared (adj)	0.01	0.03	0.03	0.04	0.03	
Non-durables: (N=4,236)	0.16 (0.21)	0.16 (0.15)	-0.04 (0.15)	0.10 (0.14)	0.03 (0.15)	0.01 (0.005)
s.e.e.	0.24	0.23	0.25	0.25	0.26	
R squared (adj)	0.03	0.06	0.07	0.07	0.08	
Services: (N=4,157)	1.47 (0.69)	1.46 (0.46)	0.70 (0.42)	0.64 (0.37)	0.07 (0.37)	0.02 (0.001)
s.e.e.	0.63	0.63	0.63	0.60	0.60	
R squared (adj)	0.02	0.05	0.06	0.08	0.07	

Specification (6-1) without adjusting income other than tax cut						
	February	March	April	May	June	
Total Consumption: (N=4,190)	1.10 (0.36)	1.37 (0.26)	1.06 (0.24)	1.25 (0.21)	0.72 (0.21)	0.76 (0.25)
s.e.e.	0.34	0.36	0.36	0.34	0.35	
R squared (adj)	0.01	0.01	0.02	0.02	0.02	
Semi-durables: (N=3,867)	0.85 (1.21)	1.59 (0.92)	0.95 (0.82)	1.90 (0.79)	2.01 (0.81)	-0.11 (0.87)
s.e.e.	1.28	1.30	1.23	1.21	1.22	
R squared (adj)	0.00	0.01	0.01	0.00	0.00	
Non-durables: (N=4,236)	0.41 (0.21)	0.45 (0.15)	0.27 (0.15)	0.43 (0.14)	0.30 (0.15)	0.17 (0.18)
s.e.e.	0.24	0.23	0.25	0.25	0.27	
R squared (adj)	0.02	0.03	0.03	0.03	0.04	
Services: (N=4,157)	2.26 (0.69)	2.27 (0.47)	1.64 (0.42)	1.60 (0.38)	0.76 (0.38)	1.45 (0.45)
s.e.e.	0.63	0.64	0.65	0.63	0.62	
R squared (adj)	0.00	0.00	0.00	0.01	0.01	

b) The Shopping Coupon Program (1999)					
<i>January-June Panel (Specification (6-2))</i>					
	March	April	May	June	July
<u>Total Consumption:</u> (N=5,211)	0.54 (0.16)	0.30 (0.16)	0.12 (0.15)	-0.02 (0.15)	
s.e.e.	0.35	0.35	0.33	0.34	
R squared (adj)	0.01	0.01	0.00	0.00	
<u>Semi-durables:</u> (N=4,900)	1.08 (0.63)	1.14 (0.60)	0.07 (0.60)	-0.36 (0.60)	
s.e.e.	1.34	1.29	1.28	1.28	
R squared (adj)	0.01	0.01	0.00	0.00	
<u>Non-durables:</u> (N=5,280)	0.05 (0.10)	-0.02 (0.10)	0.01 (0.11)	-0.22 (0.11)	
s.e.e.	0.23	0.22	0.24	0.24	
R squared (adj)	0.00	0.01	0.01	0.01	
<u>Services:</u> (N=5,208)	0.70 (0.30)	0.42 (0.30)	0.30 (0.28)	0.02 (0.29)	
s.e.e.	0.66	0.66	0.63	0.63	
R squared (adj)	0.00	0.01	0.00	0.00	

<i>February-July Panel (Specification (6-2))</i>					
<u>Total Consumption:</u> (N=5,275)	0.45 (0.14)	0.49 (0.14)	0.45 (0.13)	0.44 (0.14)	0.31 (0.15)
s.e.e.	0.36	0.36	0.33	0.35	0.37
R squared (adj)	0.01	0.01	0.01	0.01	0.01
<u>Semi-durables:</u> (N=4,897)	0.94 (0.63)	1.23 (0.61)	0.94 (0.59)	0.27 (0.60)	0.64 (0.61)
s.e.e.	1.33	1.27	1.24	1.25	1.28
R squared (adj)	0.01	0.01	0.01	0.00	0.00
<u>Non-durables:</u> (N=5,360)	0.13 (0.09)	0.27 (0.09)	0.13 (0.09)	0.22 (0.10)	0.19 (0.11)
s.e.e.	0.24	0.23	0.24	0.24	0.27
R squared (adj)	0.01	0.02	0.01	0.01	0.02
<u>Services:</u> (N=5,237)	0.80 (0.27)	0.65 (0.26)	0.72 (0.25)	0.98 (0.25)	0.40 (0.27)
s.e.e.	0.66	0.66	0.62	0.63	0.68
R squared (adj)	0.00	0.01	0.00	0.00	0.00

(The 1998 tax cut)

Notes: Standard errors in parenthesis. Data are January-June panels from 1990 to 1999. The dependent variable is the log of the ratio of consumption after February to the consumption in January. The estimated elasticity to tax cut is the coefficient on tax cuts relative to consumption in January. All regressions also include a quadratic in the age of the household head, the number of family members (the number of children under 15 and others respectively for the shopping coupons), and indicator variables for year. A household is eliminated if the number of family member is changed. Total consumption excludes durables.

(The 1999 shopping coupon program)

Notes: Sample are panels from January-June and February-July from 1990 to 1999. Standard errors in parenthesis. The dependent variable is the log of consumption in each month relative to consumption in February and the estimated elasticity is the coefficient on the amount of the shopping coupon (computed as the number of children x 20,000 yen) relative to consumption in February. All regressions also include a quadratic in the age of the household head, the number of children under the age of 15, the number of other family members, and indicator variables for year. Total consumption excludes durables.

5-(3) Cumulative specification (normalized by income in the previous year)

	First	Second	Third	Fourth	Fifth
a) 1998 Tax Cut (The February Tax Cut)					
<i>January-June Panel</i>					
Specification (7-1)					
	Feb.	Feb.-Mar.	Feb.-Apr.	Feb.-May	Feb.-Jul.
Total Consumption (N= 4,274)	-0.38 (1.15)	0.39 (0.64)	0.03 (0.54)	0.12 (0.48)	0.12 (0.35)
s.e.e.	0.33	0.30	0.30	0.29	0.28
R squared (adj)	0.03	0.01	0.02	0.02	0.02
Semi-durables (N=4,121)	-4.83 (4.35)	-2.01 (2.42)	-2.09 (1.99)	-0.57 (1.79)	-0.50 (1.27)
s.e.e.	1.28	1.11	1.05	1.01	1.00
R squared (adj)	0.00	0.01	0.00	0.00	0.00
Non-durables (N=4,295)	0.44 (0.78)	0.42 (0.43)	0.29 (0.37)	0.19 (0.34)	0.17 (0.25)
s.e.e.	0.24	0.21	0.20	0.20	0.20
R squared (adj)	0.02	0.03	0.04	0.04	0.05
Services (N= 4,267)	0.91 (2.18)	0.76 (1.18)	-0.06 (0.98)	0.02 (0.88)	0.14 (0.63)
s.e.e.	0.63	0.56	0.54	0.52	0.51
R squared (adj)	0.01	-0.00	0.00	0.00	0.01

Specification (7-1) without adjusting income other than tax cut					
	Feb.	Feb.-Mar.	Feb.-Apr.	Feb.-May	Feb.-Jul.
Total Consumption (N= 4,274)	-1.10 (1.16)	0.29 (0.64)	0.10 (0.54)	0.21 (0.48)	0.21 (0.35)
s.e.e.	0.34	0.30	0.30	0.29	0.28
R squared (adj)	0.01	0.01	0.02	0.02	0.02
Semi-durables (N= 4,121)	-5.49 (4.35)	-2.18 (2.42)	-1.98 (1.99)	-0.10 (1.78)	-0.43 (1.27)
s.e.e.	1.29	1.11	1.05	1.01	1.00
R squared (adj)	0.00	0.01	0.00	0.00	0.00
Non-durables (N= 4,295)	0.26 (0.79)	0.39 (0.43)	0.29 (0.37)	0.22 (0.34)	0.20 (0.25)
s.e.e.	0.24	0.21	0.20	0.20	0.20
R squared (adj)	0.02	0.03	0.04	0.04	0.05
Services (N=4,267)	0.07 (2.19)	0.74 (1.18)	0.16 (0.98)	0.20 (0.88)	0.34 (0.63)
s.e.e.	0.64	0.56	0.54	0.52	0.51
R squared (adj)	-0.00	-0.00	0.00	0.00	0.00

b) Shopping Coupon Program (1999)					
<u>January-June Panel (Specification (7-2))</u>					
	Mar.	Mar.-Apr.	Mar.-May	Mar.-Jun.	Mar.-Jul.
<u>Total Consumption:</u> (N=5,305)	0.53 (0.34)	0.34 (0.30)	0.10 (0.28)	-0.10 (0.27)	
s.e.e.	0.35	0.31	0.29	0.28	
R squared (adj)	0.00	0.02	0.01	0.01	
<u>Semi-durables:</u> (N=5,147)	1.49 (1.33)	1.44 (1.16)	0.59 (1.10)	-0.07 (1.08)	
s.e.e.	1.35	1.17	1.12	1.09	
R squared (adj)	0.01	0.01	0.00	0.00	
<u>Non-durables:</u> (N=5,348)	-0.01 (0.22)	-0.14 (0.19)	-0.15 (0.18)	-0.21 (0.18)	
s.e.e.	0.23	0.19	0.19	0.18	
R squared (adj)	0.00	0.01	0.01	0.01	
<u>Services:</u> (N=5,297)	0.50 (0.64)	0.53 (0.56)	0.15 (0.53)	-0.15 (0.52)	
s.e.e.	0.67	0.58	0.55	0.54	
R squared (adj)	0.00	0.01	0.01	0.01	
<u>February-July Panel (Specification (7-2))</u>					
<u>Total Consumption:</u> (N=5,401)	0.28 (0.34)	0.28 (0.30)	0.31 (0.28)	0.20 (0.28)	0.05 (0.27)
s.e.e.	0.36	0.32	0.30	0.29	0.29
R squared (adj)	0.01	0.01	0.01	0.01	0.01
<u>Semi-durables:</u> (N=5,207)	2.37 (1.33)	2.31 (1.16)	2.25 (1.09)	1.76 (1.06)	1.26 (1.05)
s.e.e.	1.34	1.17	1.10	1.07	1.06
R squared (adj)	0.01	0.01	0.00	0.00	0.00
<u>Non-durables:</u> (N=5,436)	0.21 (0.22)	0.28 (0.19)	0.21 (0.18)	0.15 (0.18)	0.14 (0.18)
s.e.e.	0.24	0.20	0.19	0.19	0.19
R squared (adj)	0.01	0.01	0.01	0.01	0.02
<u>Services:</u> (N=5,385)	0.00 (0.64)	-0.11 (0.56)	-0.01 (0.53)	0.07 (0.52)	-0.15 (0.52)
s.e.e.	0.67	0.59	0.56	0.55	0.54
R squared (adj)	0.00	0.01	0.01	0.01	0.01

Notes: Standard errors in parenthesis. Data are panels from 1990 to 1999. The dependent variable is the log of the ratio of the *sum* of consumption after March to consumption in January (tax cut) or February (coupon program). The estimated elasticity in the tax cut is the coefficient on tax cuts (see the text) relative to monthly pre-tax income in the previous year and that in the shopping coupons is the coefficient on coupons (computed as number of children x 20,000 yen) relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, the number of family members (the number of children under 15 and others respectively for the shopping coupons), and indicator variables for year. A household is eliminated if the number of family member is changed. Total consumption excludes durables.

(4) Cumulative specification (normalized by consumption in the first month)

	First	Second	Third	Fourth	Fifth
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a) 1998 Tax Cut (The February Tax Cut)***January-June Panel***

Specification (8-1)					
	Feb.	Feb.-Mar.	Feb.-Apr.	Feb.-May	Feb.-Jul.
Total Consumption (N= 4,274)	0.43 (0.35)	0.46 (0.20)	0.26 (0.17)	0.34 (0.15)	0.15 (0.09)
s.e.e.	0.33	0.28	0.26	0.25	0.25
R squared (adj)	0.05	0.16	0.21	0.24	0.26
Semi-durables (N=4,121)	-0.35 (1.19)	-0.09 (0.76)	-0.38 (0.67)	0.30 (0.63)	-0.03 (0.37)
s.e.e.	1.28	1.09	1.02	0.98	0.96
R squared (adj)	0.01	0.04	0.06	0.06	0.06
Non-durables (N=4,295)	0.15 (0.21)	0.15 (0.13)	0.06 (0.12)	0.06 (0.11)	0.02 (0.07)
s.e.e.	0.24	0.20	0.20	0.20	0.20
R squared (adj)	0.03	0.07	0.09	0.10	0.11
Services (N= 4,267)	1.34 (0.67)	0.86 (0.38)	0.61 (0.32)	0.63 (0.29)	0.34 (0.18)
s.e.e.	0.63	0.53	0.50	0.49	0.47
R squared (adj)	0.02	0.09	0.12	0.13	0.15

Specification (8-1) without adjusting income other than tax cut					
	Feb.	Feb.-Mar.	Feb.-Apr.	Feb.-May	Feb.-Jul.
Total Consumption (N=4,274)	1.25 (0.35)	1.26 (0.21)	1.12 (0.18)	1.14 (0.17)	0.75 (0.10)
s.e.e.	0.34	0.30	0.29	0.29	0.28
R squared (adj)	0.01	0.02	0.03	0.03	0.03
Semi-durables (N= 4,121)	0.64 (1.19)	1.19 (0.77)	1.15 (0.68)	1.77 (0.64)	1.03 (0.38)
s.e.e.	1.29	1.11	1.05	1.01	0.99
R squared (adj)	0.00	0.01	0.01	0.00	0.00
Non-durables (N=4,295)	0.39 (0.21)	0.44 (0.13)	0.36 (0.12)	0.36 (0.11)	0.25 (0.07)
s.e.e.	0.24	0.21	0.20	0.20	0.20
R squared (adj)	0.02	0.04	0.04	0.05	0.05
Services (N=4,267)	2.25 (0.66)	1.95 (0.39)	1.78 (0.33)	1.73 (0.30)	1.16 (0.19)
s.e.e.	0.63	0.56	0.53	0.52	0.51
R squared (adj)	0.00	0.00	0.01	0.01	0.01

b) Shopping Coupon Program (1999)					
<u>January-June Panel (Specification (8-2))</u>					
	Mar.	Mar.-Apr.	Mar.-May	Mar.-Jun.	Mar.-Jul.
<u>Total Consumption:</u> (N=5,240)	0.86 (0.20)	0.48 (0.19)	0.25 (0.17)	0.04 (0.17)	
s.e.e.	0.44	0.43	0.37	0.38	
R squared (adj)	0.01	0.01	0.00	0.01	
<u>Semi-durables:</u> (N=5,206)	0.23 (0.07)	0.07 (0.07)	-0.02 (0.06)	-0.01 (0.06)	
s.e.e.	0.16	0.15	0.13	0.13	
R squared (adj)	0.02	0.01	0.00	0.00	
<u>Non-durables:</u> (N=5,272)	0.01 (0.05)	-0.04 (0.05)	-0.01 (0.05)	-0.08 (0.05)	
s.e.e.	0.12	0.11	0.12	0.11	
R squared (adj)	0.01	0.01	0.01	0.01	
<u>Services:</u> (N=5,249)	0.51 (0.14)	0.36 (0.16)	0.17 (0.13)	0.10 (0.13)	
s.e.e.	0.32	0.35	0.28	0.29	
R squared (adj)	0.00	0.01	0.00	0.00	
<u>February-July Panel (Specification (8-2))</u>					
<u>Total Consumption:</u> (N=5,247)	0.53 (0.18)	0.59 (0.17)	0.49 (0.15)	0.47 (0.15)	0.34 (0.17)
s.e.e.	0.44	0.42	0.36	0.38	0.43
R squared (adj)	0.01	0.01	0.01	0.01	0.01
<u>Semi-durables:</u> (N=5,248)	0.09 (0.07)	0.09 (0.06)	0.15 (0.05)	0.08 (0.05)	0.03 (0.06)
s.e.e.	0.16	0.14	0.13	0.13	0.15
R squared (adj)	0.01	0.01	0.01	0.00	0.00
<u>Non-durables:</u> (N=5,304)	0.03 (0.05)	0.07 (0.05)	0.02 (0.05)	0.01 (0.05)	0.03 (0.06)
s.e.e.	0.12	0.11	0.12	0.12	0.13
R squared (adj)	0.01	0.01	0.01	0.01	0.02
<u>Services:</u> (N=5,231)	0.30 (0.13)	0.25 (0.13)	0.35 (0.11)	0.33 (0.11)	0.28 (0.12)
s.e.e.	0.32	0.33	0.27	0.28	0.31
R squared (adj)	0.00	0.00	0.01	0.00	0.00

Notes: Standard errors in parenthesis. Data are panels from 1990 to 1999. The dependent variable is the log of the ratio of the *sum* of consumption after March to consumption in January (tax cut) or February (coupon program). The estimated elasticity in the tax cut is the coefficient on tax cuts (see the text) relative to consumption in January and that in the shopping coupons is the coefficient on coupons (computed as number of children x 20,000 yen) relative to consumption in February. All regressions also include a quadratic in the age of the household head, the number of family members (the number of children under 15 and others respectively for the shopping coupons), and indicator variables for year. A household is eliminated if the number of family member is changed. Total consumption excludes durables.

Table Appendix 1 : Impact of *Announcement* on Seasonal Consumption Patterns

	Sep.-Feb.	Oct.-Mar.	Nov.-Apr.	Nov.-Apr.
<i>Taxcut</i> _{h,t}	Eligible amount	Eligible amount	Eligible amount	Actual amount
Semi-durables	0.36 (0.30)	-0.08 (0.34)	0.28 (0.42)	2.69 1.79
<i>N.of obs.</i>	5,141	4,886	4,913	4,913
Non-durables	-0.13 (0.06)	-0.08 (0.06)	-0.09 (0.08)	-0.03 (0.36)
<i>N.of obs.</i>	5,175	4,911	5,000	5,000
Services	0.15 (0.19)	-0.07 (0.19)	-0.58 (0.21)	0.30 (0.94)
<i>N.of obs.</i>	5,129	4,878	4,956	4,956

Notes: Standard errors in parenthesis. The sample comes from 1990 and 1998. The specification is

$$\ln \left(\frac{C_{h,t(\text{afterDecember})}}{C_{h,t(\text{BeforeDecember})}} \right) = a_1 \cdot \left(\frac{\text{Taxcut}_{h,t}}{\text{Monthly Income}_h} \right) + Z_{h,t}' \cdot a_2 + \text{Year}_t' \cdot a_3$$

where the dependent variable is the log of the ratio of the sum of consumption after December to the average monthly consumption before December, and the main independent variable is the value of tax cuts relative to monthly pre-tax income in the previous year. “Eligible amount” refers the upper limit for each household and “actual amount” does to the sum of tax cut amount a household received during February and April.

**Table Appendix 2: Elasticity from Shopping Coupons: Cross-Sectional Estimates (1999).
Month-to month specification normalized by the pretax income in the previous year.**

	$C_{\text{mar}} - C_{\text{feb}}$	$C_{\text{apr}} - C_{\text{feb}}$	$C_{\text{may}} - C_{\text{feb}}$	$C_{\text{jun}} - C_{\text{feb}}$	$C_{\text{jul}} - C_{\text{feb}}$
<i>January-June Panel</i>					
<u>Total</u>	0.32	0.09	-0.49	-0.63	
<u>Consumption:</u>	(0.37)	(0.37)	(0.36)	(0.39)	
(N=482)					
s.e.e.	0.35	0.34	0.33	0.36	
R squared (adj)	0.01	-0.00	-0.00	0.01	
<u>Semi-durables:</u>	4.50	3.06	-1.63	-1.28	
(N=460)	(1.52)	(1.40)	(1.41)	(1.41)	
s.e.e.	1.37	1.27	1.28	1.27	
R squared (adj)	0.02	0.01	-0.00	0.00	
<u>Non-durables:</u>	-0.17	-0.33	-0.39	-0.68	
(N=490)	(0.24)	(0.24)	(0.25)	(0.25)	
s.e.e.	0.22	0.22	0.23	0.23	
R squared (adj)	-0.00	0.01	0.01	0.01	
<u>Services:</u>	-0.77	-0.46	-0.29	-0.74	
(N=477)	(0.68)	(0.65)	(0.62)	(0.70)	
s.e.e.	0.64	0.61	0.58	0.66	
R squared (adj)	0.01	0.00	-0.01	-0.00	
<i>February-July Panel</i>					
<u>Total</u>	0.13	0.34	0.35	0.11	-0.45
<u>Consumption:</u>	(0.36)	(0.38)	(0.35)	(0.37)	(0.39)
(N=499)					
s.e.e.	0.34	0.36	0.33	0.35	0.37
R squared (adj)	-0.00	0.00	-0.00	0.00	0.01
<u>Semi-durables:</u>	3.23	3.54	2.59	-0.67	-1.21
(N=450)	(1.52)	(1.50)	(1.44)	(1.47)	(1.50)
s.e.e.	1.33	1.31	1.25	1.28	1.31
R squared (adj)	0.02	0.01	0.01	-0.00	-0.00
<u>Non-durables:</u>	0.37	0.50	0.18	0.21	0.29
(N=502)	(0.23)	(0.23)	(0.25)	(0.26)	(0.29)
s.e.e.	0.22	0.21	0.23	0.24	0.27
R squared (adj)	0.00	0.01	0.01	0.01	0.02
<u>Services:</u>	-0.92	-0.58	0.65	0.55	-0.35
(N=490)	(0.70)	(0.70)	(0.63)	(0.63)	(0.71)
s.e.e.	0.66	0.66	0.59	0.59	0.67
R squared (adj)	0.01	0.01	-0.00	-0.01	0.01

Notes: Sample are panels from January-June 1999 and February-July 1999. Standard errors in parenthesis. The dependent variable is the log of consumption in each month relative to consumption in February and the estimated elasticity is the coefficient on the amount of the shopping coupon (computed as the number of children x 20,000 yen) relative to monthly income in the previous year. All regressions also include a quadratic in the age of the household head. Total consumption excludes durables.

Table Appendix 3: Elasticity from Shopping Coupons: Cross-Sectional Estimates (1999).
Cumulative specification normalized by the pretax income in the previous year

	$C_{\text{mar}} - C_{\text{feb}}$	$C_{\text{apr}} - C_{\text{feb}}$	$C_{\text{may}} - C_{\text{feb}}$	$C_{\text{jun}} - C_{\text{feb}}$	$C_{\text{jul}} - C_{\text{feb}}$
<u>January-June Panel</u>					
Total	0.26	0.11	-0.17	-0.32	
Consumption:	(0.37)	(0.33)	(0.31)	(0.30)	
(N=491)					
s.e.e.	0.34	0.31	0.29	0.28	
R squared (adj)	0.01	0.01	0.00	0.00	
Semi-durables:	4.35	3.34	1.92	1.17	
(N=478)	(1.52)	(1.27)	(1.21)	(1.19)	
s.e.e.	1.39	1.16	1.10	1.09	
R squared (adj)	0.02	0.01	-0.00	-0.00	
Non-durables:	-0.11	-0.22	-0.25	-0.34	
(N=497)	(0.24)	(0.20)	(0.20)	(0.19)	
s.e.e.	0.22	0.19	0.18	0.18	
R squared (adj)	-0.00	0.00	0.01	0.01	
Services:	-0.51	-0.44	-0.52	-0.55	
(N=493)	(0.71)	(0.62)	(0.56)	(0.55)	
s.e.e.	0.66	0.58	0.53	0.51	
R squared (adj)	0.00	0.00	0.00	0.00	
<u>February-July Panel</u>					
Total	0.10	0.09	0.17	0.11	-0.03
Consumption:	(0.36)	(0.33)	(0.30)	(0.29)	(0.29)
(N=509)					
s.e.e.	0.34	0.31	0.28	0.28	0.28
R squared (adj)	-0.00	0.00	-0.00	0.00	0.01
Semi-durables:	3.92	3.94	3.52	2.66	1.70
(N=480)	(1.47)	(1.29)	(1.21)	(1.18)	(1.17)
s.e.e.	1.34	1.18	1.10	1.08	1.07
R squared (adj)	0.02	0.02	0.02	0.01	0.01
Non-durables:	0.31	0.40	0.28	0.23	0.21
(N=510)	(0.23)	(0.19)	(0.19)	(0.19)	(0.19)
s.e.e.	0.21	0.18	0.18	0.18	0.18
R squared (adj)	0.00	0.01	0.00	0.01	0.01
Services:	-0.96	-1.13	-0.74	-0.57	-0.63
(N=507)	(0.70)	(0.62)	(0.57)	(0.55)	(0.56)
s.e.e.	0.67	0.59	0.54	0.53	0.53
R squared (adj)	0.01	0.01	0.01	0.00	0.01

Notes: Sample are panels from January-June 1999 and February-July 1999. Standard errors in parenthesis. The dependent variable is log of cumulative consumption up to each month relative to consumption in February and the estimated MPC is the coefficient on the amount of the shopping coupon (computed as the number of children x 20,000 yen). All regressions also include a quadratic in the age of the household head. Total consumption excludes durables.

Table Appendix 4: Consumption Effects of *Announcement* of Shopping Coupon Program

	$C_{nov} - C_{oct}$	$C_{dec} - C_{oct}$	$C_{jan} - C_{oct}$	$C_{feb} - C_{oct}$
<u>July-December Panel</u>				
<u>Total Consumption:</u>	-0.08	-0.52		
(N=5,066)	(0.35)	(0.37)		
s.e.e.	0.34	0.36		
R squared (adj)	0.00	0.02		
<u>Semi-durables:</u>	0.11	0.02		
(N=4,874)	(1.30)	(1.26)		
s.e.e.	1.20	1.16		
R squared (adj)	0.00	0.01		
<u>Non-durables:</u>	-0.10	-0.48		
(N=5,110)	(0.24)	(0.27)		
s.e.e.	0.23	0.26		
R squared (adj)	0.00	0.07		
<u>Services:</u>	-0.21	-0.39		
(N=5,060)	(0.66)	(0.69)		
s.e.e.	0.64	0.66		
R squared (adj)	0.00	0.00		
<u>August-January Panel</u>				
<u>Total Consumption:</u>	0.20	-0.08	0.09	
(N=5,017)	(0.31)	(0.34)	(0.33)	
s.e.e.	0.32	0.36	0.35	
R squared (adj)	0.00	0.01	0.01	
<u>Semi-durables:</u>	-0.05	-1.35	-0.58	
(N=4,750)	(1.15)	(1.15)	(1.25)	
s.e.e.	1.17	1.17	1.28	
R squared (adj)	-0.00	0.00	0.00	
<u>Non-durables:</u>	0.01	-0.05	-0.20	
(N=5,058)	(0.22)	(0.25)	(0.24)	
s.e.e.	0.23	0.26	0.25	
R squared (adj)	0.00	0.06	0.01	
<u>Services:</u>	0.31	-0.29	-0.21	
(N=4,982)	(0.58)	(0.62)	(0.60)	
s.e.e.	0.60	0.65	0.63	
R squared (adj)	0.00	0.00	0.00	
<u>September-February Panel</u>				
<u>Total Consumption:</u>	-0.23	-0.45	-0.15	-0.13
(N=5,021)	(0.30)	(0.31)	(0.31)	(0.30)
s.e.e.	0.34	0.35	0.36	0.35
R squared (adj)	0.00	0.02	0.01	0.01
<u>Semi-durables:</u>	-0.62	-0.78	0.68	-2.04
(N=4,686)	(1.05)	(1.01)	(1.10)	(1.16)
s.e.e.	1.18	1.13	1.23	1.29
R squared (adj)	0.00	0.00	0.00	0.00
<u>Non-durables:</u>	0.06	-0.14	-0.17	-0.09
(N=5,096)	(0.20)	(0.22)	(0.22)	(0.20)
s.e.e.	0.23	0.26	0.25	0.24
R squared (adj)	0.00	0.06	0.02	0.00
<u>Services:</u>	-0.39	-0.37	-0.32	0.26
(N=4,996)	(0.54)	(0.56)	(0.55)	(0.55)
s.e.e.	0.62	0.65	0.64	0.64
R squared (adj)	0.00	0.00	0.00	0.01

Note: The sample are panels from July-December, August-January, and September-February from 1990 to 1999. Standard errors in parenthesis. The dependent variable is the log of consumption in each month relative to consumption in February. The estimates presented in the table are the coefficient on the anticipated amount of the shopping coupon (computed as the number of children x 20,000 yen) relative to monthly income in the previous year for the 1998 and 1998-1999 panels (and zero for the other panels). All regressions also include a quadratic in the age of the household head, the number of children under the age of 15, the number of other family members, and indicator variables for year. Total consumption excludes durables.

Table Appendix 5: Impact of Coupons by Asset Levels

	A/Y > mean	A/Y < mean.	A/Y > 1	A/Y < 1	A/Y > 1/2	A/Y < 1/2
Semi-durables	-4.17 (3.26)	6.09 (1.91)	1.35 (2.25)	6.11 (2.38)	1.57 (1.96)	8.77 (2.95)
N of Obs.	1,116	2,153	1,673	1,596	2,608	661
s.e.e.	1.32	1.36	1.35	1.35	1.36	1.32
R squared (adj)	0.03	0.01	0.02	0.01	0.01	0.02

Note: Regressions are difference in difference estimates on matched panels of the FIES and FSS from 1990 to 1999. The dependent variable is the log of the ratio of consumption of semi-durables in March to consumption in February. A/Y is the ratio of gross assets to annual pre-tax income.

Part II

Consumer Response to the 1994 Tax Cut: Evaluating the First Tax Cut in the 1990s

Abstract:

This paper explores the reaction of Japanese consumers to the 1994 tax cut, which was the first tax cut administered by the Japanese government in the 1990s. Micro-level data from the *Family Income and Expenditure Survey* (FIES) is used to evaluate the effect of the 1994 tax cut on consumption. The estimates weakly suggest that tax cuts undertaken to stimulate the weak economy in 1994 had some effect on consumption of non-durables or semi-durables. An MPC of 0.1 – 0.2 is estimated right after implementation, but the positive effect was substituted immediately in subsequent months. In other words, consumers reacted to the temporary tax cut but the effect was small and transitory.

1. Introduction

The purpose of this paper is to evaluate the consumer reaction to the 1994 tax cut, which was the first among a number of tax reductions undertaken by the Japanese government in the 1990s. The 1994 tax cut was called a “special tax cut”, implying that the tax cut is temporary. If consumers behave according to the canonical permanent income hypothesis, a temporary tax cut would not affect current consumption since it does not alter permanent income. If consumers are “excessively sensitive” to changes in current income, however, he might respond to temporary tax cuts. Therefore, temporary tax cuts episodes offer nice “natural experiments” to test the permanent income hypothesis.

The 1994 tax cut is uniquely suited to this type of analysis. First, the tax cut was the first administered by the Japanese government in the 1990s. There were no tax reductions between the late 1980's and 1993 and therefore there is not concern that the effects of previous tax cuts undertaken before the 1994 tax cut might overlap. Second, the 1994 tax cut consists of only a temporary tax cut. The 1995, 1996 and 1999 tax cuts consist of both permanent (institutional) and temporary cuts. Third, many characteristics of the 1994 tax cut are similar to the 1998 tax cut and the 1999 shopping coupons program, which were also temporary. These two episodes have been already analyzed by past research and it is possible to compare the 1994 tax cut with those other events.

Quantitative assessment of tax reductions is an important topic for policy makers and academic researchers. Nonetheless, it is surprising that few studies quantitatively evaluate Japan's tax cuts episodes. There is no empirical research on these tax cuts using micro-level consumer data except Part I, which tackles with the 1998 tax cut episode and Hori, Hsieh, Murata and Shimizutani (2002), which analyzes the shopping coupon program in 1999. Like these two papers, this study utilizes micro-level data of consumers available from the *Family Income and Expenditure Survey* (henceforth, FIES), monthly consumption data compiled by the Japanese government.

This paper is organized as follows. The next section gives a survey of related literature and then Section 3 describes the 1994 tax cut policy. Section 4 provides a description of the data and calculation of tax reduction. Section 5, the main part of this paper, describes the methodology used to evaluate the effects of the 1994 tax cut on consumption. The last section concludes by highlighting policy implications of this study.

2. Literature survey

There is little empirical research quantitatively assessing the effectiveness of Japanese tax cuts in the 1990s.

Watanabe et. al.(1999) tackles the empirical assessment of Japanese tax cuts after the mid 1970's, distinguishing temporary and permanent as well as anticipated and unanticipated tax changes. They find that the impact of temporary tax reductions is significantly smaller than that of permanent

cuts and that 80% of Japanese consumers respond to tax changes at their implementation, not at their announcement.

The other quantitative work on tax reduction in Japan is Carroll (1999). Based on the theory of habit formation behaviors, he argues that the immediate marginal propensity to consume out of permanent shocks should be much less one. Carroll evaluates that “the immediate MPC out of permanent tax cuts maybe as low as 30%, suggesting that calls for permanent income tax cuts as a quick means of stimulating aggregate demand in Japan may be misguided”.

These finding are not fully convincing partly because of the analysis lacked micro-level data. The impact of tax reductions on consumption is plausibly different across households with different characteristics or different liquidity constraints and it is critically important to consider the heterogeneity of consumers in evaluating the tax change effect. Hori, Hsieh, Murata and Shimizutani (2002) analyze the effect of the 1999 Japanese shopping coupon program on consumption using micro-level data and conclude that the MPC out of the coupons was 0.3-0.4 in the first month the coupons were distributed and only 0.1 over subsequent months. Part I uses the same data set to compare the impact of the 1999 shopping coupons program with the impact of the 1998 tax cut. The study demonstrates that while the effects on consumption are roughly comparable, the 1998 tax cut and the 1999 coupon program affected consumption of different types of goods.

As for the US case, Blinder (1981) and Poterba (1988) use aggregate consumption data and find that a temporary income tax cut in 1975 had significant effects on consumption. Shapiro and Slemrod (1995) utilize survey data to evaluate the effect of the reduction in standard rates of tax withholding on consumption in 1992. They conclude that 43% of the sample planned to spend most of the extra take-home pay. However, using the same survey method for the same sample, Shapiro and Slemrod (2001) show that only 22 percent of households which got a tax rebate in 2001 expected to spend it.

3. The 1994 tax cut

The 1994 tax reduction was announced on February 10 1994 and implemented in June and December of 1994¹. This was the first tax cut in the 1990s, implemented with the aim of stimulating the weak economy after the collapse of the “Bubble economy”. It was also administered in anticipation of an increase in the consumption tax rate, planned for 1997. This tax reduction was thought to be temporary and was to be ended in the following year. The total amount was 5,500 billion yen. Ishi (2001) wrote,

¹ Following Watanabe (1999), the date of anticipation in this study was the day when the Liberal Democratic Party (LDP) tax committee submitted the “Outline of tax reform,” which provided consumers with a significant amount of information of future tax reform. The other candidates for anticipation dates are the date of (1) the tax advisory commission of the Prime Minister making a policy recommendation, (2) the Cabinet approving the proposal, (3) the Diet approving the bill. See note 7 in Watanabe (1999).

“ a temporary reduction of 5,500 billion yen in individual income taxes was actually enforced in 1994, which it had been planned to terminate in the following year. Thus, the 1994 tax reduction was originally thought of as a single-year cut on an *ad hoc* basis.”²

Under this tax reduction program, in principle, 20 % of total income tax paid between January and June was refunded in June (the upper limit was one million yen) and 20% of income tax paid between July and December was refunded in December 1994. The limitation to be refunded was two million yen as a whole. In addition, the local inhabitants' tax was reduced. The inhabitants' tax payment was suspended in June and July and between August 1994 and May 1995 the upper limit of 200,000 yen was reduced by 20%.³

As discussed below, this research focuses on investigating the response of worker's households whose tax payment is withheld at source. In Japan, monthly national income tax withholding is determined through the “withholding table” based on the number of dependants and taxable income of a household. The local inhabitant's tax is a fixed amount per month between June and May based upon the previous year's annual income. Both tax payments are withheld by salary payers and thus the amounts are exogenously determined.

4. Data Description and Tax Cut Calculation

The data used in this study is the micro-level data from the *Family Income and Expenditure Survey* (FIES).⁴ 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. In order to improve the reliability of our estimates, a household is excluded if (1) the reported age of the household head decreases or increases by more than one year during 6 months or; (2) the household's tenancy status changes from owner to renter or the reverse or (3) if the number of family members is greater than 10.

Moreover, we aggregate the different consumption items into four categories: durables, semi-durables, non-durables, and services. The summary statistics of the panels used in this paper can be seen in Table 1.

The national income tax cut amounts for individual households are calculated as follows.

$$(A1) \text{ Tax cut amount} = \text{Tax6}^* - \text{Tax6} = 0.2 * (\text{Tax1} + \text{Tax2} + \text{Tax3} + \text{Tax4} + \text{Tax5} + \text{Tax6}^*)$$

² Ishi (2001) continues “[h]owever, as time passed, the original idea had be amended in view of the necessity of continued expansionary measures Against earlier expectation, it was decided that a part of the tax reduction (i.e. 3500 billion yen) should continue as a permanent measure in 1995. . . . The remaining portion of the original tax cut (2000 billion yen) was used as a temporary instrument and was postponed until 1996”.

³ Note that the inhabitants' tax payment is based upon the previous year's annual income (January to December). The inhabitants' tax from employment income is collected monthly in equal payments. The inhabitants' tax payment based on other sources of income (business income, rent etc.) is in principal collected four times each year, in most cases, June, August, October and January, depending on local governments.

⁴ See Section 3 in Part I for detail description of the FIES.

where Tax1-Tax5 are tax payment in each month between January and May and Tax6* is tax payment in June without tax reduction, which is not available in the FIES.

Rearranging (A1), we get

$$(A2) \text{ Tax cut amount} = (0.2 * (\text{Tax1} + \text{Tax2} + \text{Tax3} + \text{Tax4} + \text{Tax5}) + \text{Tax6}) / 0.8 - \text{Tax6}$$

where all variables in the right hand side are available. If the calculated tax cut amount is greater than one million yen, it is set to be one million yen.

In addition to calculating national income tax cuts, it is necessary to estimate the amount of local inhabitant's tax cut. The inhabitant's tax base is annual salary in the previous year and is effective from June. That is, the inhabitant tax payment from January to May in year t is based on the annual salary in year $t-2$ and that after June is based on the annual salary in year $t-1$. Apparently, the FIES collected at year t lacks information in year $t-2$ so that inhabitant's tax cut amount had to be determined by information beyond that available in the FIES. We used the growth rate of annual wage data from the basic survey of wage structure⁵ by industry, age, sex and firm size matching with individual household head.

In the following sections, we will use the panels of March to August and April to September to evaluate the effect of the 1994 tax cut. The panels used in this paper should cover June and July because the national income tax cut benefit was refunded in June and the local inhabitant tax benefit was implemented in June and July. Moreover, the panels should include August or September to evaluate the total effect of the tax cut on consumption because previous studies on Japanese tax cuts such as Hori, Hsieh, Murata and Shimizutani (2002) and Part I demonstrate that the effect on impact is cancelled out in subsequent months⁶. Since national income tax cut amounts are based on the total tax payment between January and June, the panels beginning in March or April lack data on tax payment in January, February and/or March. We calculated tax payments in these months as the average of tax payment in months with no bonus payment.

5. Impact of the 1994 Tax Cut on Consumption

We begin with using the six-month panels from the FIES to estimate whether consumption changes when consumers receive tax cuts. We will compare whether consumption of families with a larger tax cut amount increases by more than families with a smaller tax cut amount, controlling for the cross-sectional differences between similar families in other years.

The basic empirical specification employed to evaluate the effect of temporary tax cuts on consumption is the following linear Euler equation:

⁵ The *Basic Survey of Wage Structure* is compiled by Ministry of Welfare and Labor.

⁶ The 1995 tax cut was announced in September 1994 but Hori, Hsieh, Murata and Shimizutani (2002) and Part I demonstrate that consumers did not respond to the 1998 tax cut or the 1999 shopping coupons program when they were anticipated. However, this result might differ for permanent cut.

$$(1) \ln \left(\frac{C_{h,t+1}}{C_{h,t}} \right) = \sum_{n=0}^2 a_{1n} \cdot \left(\frac{Taxcut_{h,t+1-n}}{Monthly\ Income_{h,t-1}} \right) + Z_{h,t}' \cdot a_3 + Month_t' \cdot a_4 + e_t$$

where h indexes households and t refers to the month. The dependent variable is the log of the ratio of monthly consumption in household h in month t . The main independent variable is $\frac{TaxcutN_{h,t+1-n}}{Monthly\ Income_{h,t-1}}$, which is the value of tax cuts received by a household relative to the

household's monthly income. $Monthly\ Income_{h,t-1}$ is calculated as the previous year's pretax income divided by 12. We include lags of both main independent variables to allow for the possibility that a household does not spend the tax cut benefit immediately. The monthly amount of tax cut is assumed to be exogenous and is calculated as described in the previous section. For years in which

there was no tax cut, the value of $\frac{TaxcutN_{h,t+1-n}}{Monthly\ Income_{h,t-1}}$ is zero. The coefficients on the main

independent variable measure the elasticity of consumption to income due to the tax cuts. $Z_{h,t}$ is a vector of household characteristics (a quadratic in the age of the household head, the number of family members and change in the number of family members). $Month_t$ is a vector of indicator variables for each month in each year. We excluded observations if the absolute change in monthly consumption exceeds the mean by more than three standard deviations.

As long as the main independent variables are orthogonal to other income shocks, the estimated coefficients on these are not affected. In order to address the possibility that omission of other income shocks as independent variables affected the estimates of the coefficients on the main variables, I also employed the following alternative specification.

$$(2) \ln \left(\frac{C_{h,t+1}}{C_{h,t}} \right) = \sum_{n=0}^2 a_{1n} \cdot \left(\frac{Taxcut_{h,t+1-n}}{Monthly\ Income_{t-1}} \right) + \sum_{n=0}^2 a_{2n} \cdot \left(\frac{Bonus_{h,t+1-n}}{Monthly\ Income_{t-1}} \right) + \sum_{n=0}^3 a_{3n} \cdot \left(\frac{AdjIncome_{h,t-n}}{Monthly\ Income_{t-1}} \right) + Z_{h,t}' \cdot a_4 + Month_t' \cdot a_5 + e_t$$

where $\frac{Bonus_{h,t+1-n}}{Monthly\ Income_{h,t-1}}$ is the value of bonus received by a household relative to the household's

monthly income. In Japan, bonuses are usually received in June or July. $\frac{AdjIncome_{h,t-n}}{Monthly\ Income_{h,t-1}}$ is other

income in each month, adjusted for any tax cuts and bonuses. Lags are included in order to control for cyclical income movements other than tax cuts⁷.

⁷ To avoid simultaneity bias, we used one-month lagged $AdjIncome_{h,t-n}$ as an instrument variable. Since the value of bonus is in general considered to reflect on past business condition of firms, there is no need to instrument for $bonus_{h,t+1}$.

We use specifications (1) and (2) to assess the 1994 tax cut as discussed above. We used the sample between 1990 and 1993 as the control years to detect whether some specific shocks in 1998 are driving the results.

Table 2 reports the results on total consumption based on the specification (1) and (2). Focusing on the results based on the April-September panel, the coefficients are positive and significant for one-month lag but coefficients on the two-month lagged variables are negative and significant. These results suggest that the 1994 tax cut stimulated consumption temporarily but that the effect did not last for some months. These coefficients in columns (3) and (4) indicate that the estimated MPC on impact is 0.2⁸.

In order to investigate the possibility that the tax cut did stimulate some specific type of good and services, Table 3-1 and 3-2 report the results by types of consumption. Table 3-1 shows the results of specification (1) on consumption disaggregated by type of goods and services and Table 3-2 reports those of specification (2). Both tables indicate that the coefficients for one month lag in non-durables are positive and significant and that for two month lag is negative and comparable with the one-month lag. Since consumption of non-durables occupies 19% of monthly pre-tax income, the estimated coefficient reported in column (5) implies a marginal propensity to consume (MPC) is estimated to be 0.1 on impact but it declines in subsequent months. Moreover, the coefficient in semi-durables for one month lag is significantly positive in Table 3-2 though that is not significant in Table 3-1⁹. The coefficients in semi-durables for two month lag are negative and significant in both tables. As in the non-durable consumption, the effect on impact is substituted soon.

This indicates the 1994 tax cut stimulated services consumption with an MPC of 0.1-0.2, but that the effect was substituted immediately in subsequent months¹⁰. These findings are roughly consistent with past research on Japanese tax cuts in the 1990's. Hori, Hsieh, Murata and Shimizutani (2002) demonstrate that the 1999 shopping coupon program stimulated consumption of semi-durables with an MPC of 0.3-0.4 in the first month but that the MPC falls to 0.1 over the next 3 or 4 months. Part I demonstrates that the 1998 tax cut stimulated consumption of services with a comparable MPC and that it was substituted in the subsequent months¹¹.

⁸ Table 1 indicates that consumption occupies roughly 50 % of the pretax-monthly income.

⁹ Table 1 indicates that consumption of semi-durables occupies as small as 3% of the pretax-monthly income.

¹⁰ So far, we have analyzed the effect of the tax cut at implementation, not at anticipation. The tax cut was publicized in advance and a forward-looking household may have already adjusted its consumption. The model implies that consumption should only change upon news of unexpected income changes and should not react to anticipated income changes. Hori, Hsieh, Murata and Shimizutani (2002) and Part I demonstrate that consumers did not respond when the 1998 tax cut or the 1999 shopping coupons program was anticipated. It is difficult to apply the methodology adopted in these papers to the 1994 tax cut because the amount of tax cut in 1994 depended on actual tax payment and it is difficult to estimate eligible amount for individual households when it was anticipated in February 1994. In the 1998 tax cut or 1999 shopping coupons program, the eligible amount was determined by demographic factors such as number of children under 15 (1999 coupon program) or family size (1998 tax cut).

We also estimate specification (1) and (2) by normalizing average consumption between the first month of each panel and May, instead of monthly income in the previous year. See Appendix 1 and 2-1 and 2-2.

¹¹ In order to examine the impact of liquidity constraints, we examine the impact of the 1994 tax cut by income levels. We use the panel from April to September to cover the period after the implementation as long as possible. We divide the sample by the average of annual pre-tax income in the previous year. The results shown in Appendix 3-1 and 3-2 indicate that there

6. Conclusion

This paper explores the reaction of Japanese consumers to the 1994 tax cut, which was the first tax cut administered by the Japanese government in the 1990s. Micro-level data from the Family Income and Expenditure Survey (FIES) is used to evaluate the effect of the 1994 tax cut on consumption. The estimates weakly suggest that tax cuts undertaken to stimulate the weak economy in 1994 had some effect on consumption of services or semi-durables. An MPC of 0.1-0.2 is estimated right after implementation, but the positive effect was substituted immediately in subsequent months. In other words, consumers reacted to the temporary tax cut but the effect was small and transitory. These findings are roughly consistent with the effect of the 1998 tax cut and the 1999 shopping coupon program.

An important topic for further research would be to evaluate the effect of permanent tax cuts, which were implemented in 1995 and 1999. Especially, a comparison with the 1994 and 1995 tax cut would be interesting because the total tax cut benefits for individual households were similar but more than half of the 1995 tax cut was permanent. An empirical investigation on the effect of permanent tax cuts compared with temporary tax cuts will bring strong implications for both policy-makers and academic researchers.

is no clear tendency for households with lower income, which are likely to be liquidity constrained, have larger or more significant coefficients.

References

- Blinder, Alan. (1981) "Temporary Income Taxes and Consumer Spending," *Journal of Political Economy* 89 (1), pp. 26-53.
- Browning, Martin and Dolores Collado. (2001) "The Response of Expenditures to Anticipated Income Changes: Panel Data Estimates," *American Economic Review*.
- Carroll, Christopher. (2000) "'Risky habits' and the marginal propensity to consume out of permanent income, or, How much would a permanent tax cut boost Japanese consumption?," NBER. Working Paper 7839.
- Hayashi, Fumio. (1986) "Testing the Life Cycle-Permanent Income Hypothesis on Japanese Monthly Panel Data," *Keizai Kenkyu* 101, pp. 1-23.
- Hsieh, Chang-Tai. (2002) "Do Consumers React to Anticipated Income Changes? Evidence from the Alaska Permanent Fund," Princeton University mimeo.
- Hori, Masahiro, Hsieh, Chang-Tai, Keiko, Murata and Shimizutani, Satoshi (2002) "Did the Shopping Coupon Program Stimulate Consumption? Evidence from Japanese Micro Data," *ESRI Discussion Paper Series No.12*, Economic and Social Research Institute, Cabinet Office, Tokyo, Japan.
- Ishi, Hiromitsu. (2001) *The Japanese Tax System* (Third Edition), Oxford, Oxford University Press.
- Ministry of Public Management, Home Affairs, Posts, and Telecommunications. *Annual report on the Family Income and Expenditure Survey*, various years.
- Parker, Jonathan. (1999) "The Reaction of Household Consumption to Predictable Changes in Payroll Tax Rates." *American Economic Review*, 89(4), pp. 959-973.
- Poterba, James. (1988) "Are Consumers Forward Looking? Evidence from Fiscal Experiments," *American Economic Review (Papers and Proceedings)*, 78(2), pp. 413-18.
- Shapiro, Matthew, and Slemrod, Joel. (1995) "Consumer Response to the Timing of Income: Evidence from a Change in Tax Withholding," *American Economic Review*, 85 (1), pp. 274-283.
- Shapiro, Matthew and Slemrod, Joel. (2001) "Consumer Response to Tax Rebates" mimeo.
- Shea, John. (1995) "Union Contracts and the Life-Cycle/Permanent-Income Hypothesis." *American Economic Review*, 85(1), pp. 186-200
- Shimizutani, Satoshi. (2002) "Consumption and Tax Policy in Japan during the 1990s; Evidence from Household Data" University of Michigan, mimeo.
- Souleles, Nicholas. (1999) "The Response of Household Consumption to Income Tax Refunds." *American Economic Review*, 89(4), pp. 947-958
- Souleles, Nicholas. "Consumer Response to the Reagan Tax Cuts." *Journal of Public Economics*, forthcoming.
- Watanabe, Katsunori, Watanabe, Takayuki and Watanabe Tsutomu. (1999) "Tax policy and consumer spending: Evidence from Japanese fiscal experiments" NBER. Working Paper 7252;

Zeldes, Stephen. (1989) "Consumption and Liquidity Constraints: An Empirical Investigation."
Journal of Political Economy, vol.97, no 2.

Table 1: Summary Statistics

	<u>Mean</u>	<u>S. D.</u>
<u>March-August Panel (N=3,090)</u>		
Consumption (exc. Transfer or gift)	278,753	208,074
Durables	19,498	110,637
Semi-durables	36,370	49,676
Non-durables	113,648	42,859
Services	109,237	131,330
National Income Tax Cut Benefit ¹	30,432	37,933
Local Inhabitant Tax Cut Benefit ¹	22,756	76,974
Bonus	95,860	294,656
Bonus (June)	290,153	494,867
Monthly income ²	587,439	263,310
Age (household head)	44.3	10.1
Number of family members	3.7	1.2
<u>April-September Panel (N=2,908)</u>		
Consumption (exc. Transfer or gift)	273,167	230,544
Durables	18,924	130,304
Semi-durables	34,456	63,100
Non-durables	111,418	41,980
Services	108,369	134,827
National Income Tax Cut Benefit ¹	31,950	41,572
Local Inhabitant Tax Cut Benefit ¹	23,651	66,526
Bonus	92,007	293,118
Bonus (June)	322,036	500,252
Monthly income ²	584,132	259,281
Age (household head)	44.6	10.3
Number of family members	3.6	1.2

¹ The number is June for the national tax cut and June or July for the local inhabitant tax cut.

² Pretax annual income/12.

Note: Unit of observation is a household. Consumption refers to average monthly consumption in current yen.

Table 2: Impact of the 1994 Tax Cuts on Total Consumption

Column	(1)	(2)	(3)	(4)
Panel	Mar. - Aug	Mar. - Aug.	Apr. - Sep.	Apr. - Sep.
Specification	(1)	(2)	(1)	(2)
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h}$	0.10 (0.17)	-0.09 (0.17)	0.11 (0.19)	-0.01 (0.19)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h}$	-0.09 (0.20)	0.07 (0.20)	0.37 * (0.21)	0.43 ** (0.22)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h}$	-0.38 * (0.22)	-0.29 (0.22)	-0.74 ** (0.23)	-0.77 ** (0.23)
$\frac{Taxcut_{h,t-2}}{Monthly\ Income_h}$			0.01 (0.25)	-0.07 (0.25)
Sum of the Coefficients on tax cut	-0.37 (0.24)	-0.30 (0.24)	-0.26 (0.28)	-0.41 (0.29)
Bonus (current, lagged)	No	Yes	No	Yes
Lags of Current Income	No	Yes	No	Yes
F test (Prob.>F)	2.01 (0.11)	0.66 (0.57)	4.60 (0.00)	4.91 (0.00)
R squared (adjusted)	0.03	0.02	0.03	0.05
s.e.e.	0.35	0.35	0.35	0.35
Number of Observation	15,133	15,133	14,238	14,238

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly total consumption except durables. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies. The sample is 1990-1994. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

**Table 3-1 : Impact of the 1994 Tax Cuts on Consumption by Type of Goods
(Specification (1):Euler Equation)**

Column	(1)	(2)	(3)	(4)	(5)	(6)
Panel	Mar. - Aug	Mar. - Aug	Mar. - Aug	Apr. - Sep	Apr. - Sep	Apr. - Sep
Dependent var.	Semi-durables	Non-durables	Services	Semi-durables	Non-durables	Services
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h}$	0.20 (0.58)	-0.09 (0.12)	0.14 (0.33)	0.22 (0.62)	-0.05 (0.13)	0.54 (0.35)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h}$	-0.45 (0.68)	0.00 (0.14)	0.00 (0.39)	0.90 (0.71)	0.29 ** (0.15)	-0.23 (0.40)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h}$	-0.60 (0.75)	-0.11 (0.15)	-0.50 (0.43)	-1.65 ** (0.76)	-0.33 ** (0.16)	-0.09 (0.43)
$\frac{Taxcut_{h,t-2}}{Monthly\ Income_h}$				0.51 (0.84)	-0.02 (0.17)	-0.52 (0.47)
Sum of the coefficients on tax cut	-0.86 (0.80)	-0.19 (0.16)	-0.36 (0.46)	-0.03 (0.94)	-0.11 (0.20)	-0.32 (0.53)
F test (Prob.>F)	0.83 (0.48)	0.48 (0.69)	0.74 (0.53)	1.67 (0.15)	2.17 (0.07)	1.28 (0.28)
R squared (adjusted)	0.02	0.02	0.01	0.02	0.03	0.01
s.e.e.	1.18	0.24	0.68	1.17	0.24	0.66
Number of Observation	14,574	15,216	15,089	13,770	14,324	14,203

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies as well as bonus and lagged current income relative to monthly income in the previous year. All regressions include control years. The sample is 1990-1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

**Table 3-2 : Impact of the 1994 Tax Cuts on Consumption by Type of Goods
(Specification (2))**

Column	(1)	(2)	(3)	(4)	(5)	(6)
Panel	Mar. - Aug	Mar. - Aug	Mar. - Aug	Apr. - Sep	Apr. - Sep	Apr. - Sep
Dependent var.	Semi-durables	Non-durables	Services	Semi-durables	Non-durables	Services
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h}$	-0.10 (0.59)	-0.14 (0.12)	-0.09 (0.33)	-0.10 (0.63)	-0.07 (0.13)	0.34 (0.35)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h}$	-0.09 (0.68)	0.03 (0.14)	0.20 (0.39)	1.21 * (0.72)	0.32 ** (0.15)	-0.04 (0.41)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h}$	-0.37 (0.76)	-0.03 (0.15)	-0.41 (0.43)	-1.71 ** (0.77)	-0.35 ** (0.16)	-0.24 (0.43)
$\frac{Taxcut_{h,t-2}}{Monthly\ Income_h}$				0.44 (0.86)	-0.04 (0.18)	-0.49 (0.48)
Sum of the coefficients on tax cut	-0.56 (0.81)	-0.14 (0.16)	-0.30 (0.46)	-0.16 (0.96)	-0.13 (0.20)	-0.43 (0.54)
F test (Prob.>F)	0.19 (0.91)	0.52 (0.67)	0.30 (0.82)	1.70 (0.15)	2.45 (0.04)	1.10 (0.36)
R squared (adjusted)	0.03	0.03	0.03	0.02	0.03	0.03
s.e.e.	1.17	0.24	0.68	1.17	0.24	0.65
Number of Observation	14,574	15,216	15,089	13,770	14,324	14,203

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies as well as bonus and lagged current income relative to monthly income in the previous year. All regressions include control years. The sample is 1990-1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

Appendix 1. Impact of the 1994 Tax Cuts on Total Consumption
(Normalization: Average Consumption before June)

Column	(1)	(2)	(3)	(4)
Panel	Mar. - Aug	Mar. - Aug.	Apr. - Sep.	Apr. - Sep.
Specification	(1)	(2)	(1)	(2)
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h}$	0.05 (0.06)	-0.00 (0.06)	0.01 (0.05)	-0.02 (0.05)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h}$	-0.04 (0.07)	0.04 (0.07)	0.12 ** (0.06)	0.12 ** (0.06)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h}$	-0.11 (0.07)	-0.14 * (0.08)	-0.12 ** (0.06)	-0.11 * (0.06)
$\frac{Taxcut_{h,t-2}}{Monthly\ Income_h}$			-0.25 (0.23)	-0.45 * (0.23)
Sum of the Coefficients on tax cut	-0.09 (0.08)	-0.09 (0.08)	-0.24 (0.22)	-0.45 ** (0.23)
Bonus (current, lagged)	No	Yes	No	Yes
Lags of Current Income	No	Yes	No	Yes
F test (Prob.>F)	1.84 (0.14)	1.16 (0.32)	3.06 (0.02)	3.59 (0.01)
R squared (adjusted)	0.03	0.04	0.03	0.04
s.e.e.	0.35	0.35	0.35	0.35
Number of Observation	15,133	15,133	14,328	14,238

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly total consumption except durables. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to average consumption between the first month of each panel and May. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies. The sample is 1990-1994. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

Appendix 2-1: Impact of the 1994 Tax Cuts on Consumption by Type of Goods
(Normalization: Average Consumption before June, Specification(1))

Column	(1)	(2)	(3)	(4)	(5)	(6)
Panel	Mar. - Aug	Mar. - Aug	Mar. - Aug	Apr. - Sep	Apr. - Sep	Apr. - Sep
Dependent var.	Semi-durables	Non-durables	Services	Semi-durables	Non-durables	Services
$\frac{\text{Taxcut}_{h,t+1}}{\text{Monthly Income}_h}$	0.07 (0.19)	0.01 (0.04)	0.02 (0.11)	0.20 (0.18)	0.02 (0.04)	0.07 (0.10)
$\frac{\text{Taxcut}_{h,t}}{\text{Monthly Income}_h}$	-0.10 (0.23)	-0.05 (0.05)	0.06 (0.13)	0.08 (0.20)	0.06 (0.04)	0.07 (0.11)
$\frac{\text{Taxcut}_{h,t-1}}{\text{Monthly Income}_h}$	-0.26 (0.25)	0.02 (0.05)	-0.19 (0.15)	-0.20 (0.20)	-0.05 (0.04)	-0.06 (0.11)
$\frac{\text{Taxcut}_{h,t-2}}{\text{Monthly Income}_h}$				-0.22 (0.77)	-0.15 (0.16)	-0.48 (0.43)
Sum of the coefficients on tax cut	-0.29 (0.27)	-0.02 (0.05)	-0.11 (0.15)	-0.14 (0.74)	-0.12 (0.15)	-0.39 (0.42)
F test (Prob.>F)	0.91 (0.44)	0.46 (0.71)	0.66 (0.58)	0.91 (0.46)	1.62 (0.17)	1.02 (0.39)
R squared (adjusted)	0.02	0.02	0.01	0.02	0.03	0.01
s.e.e.	1.18	0.24	0.68	1.17	0.24	0.66
Number of Observation	14,574	15,216	15,089	13,770	14,324	14,203

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies as well as bonus and current income relative to the average consumption between the first month of each panel and May. All regressions include control years. The sample is 1990-1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

**Appendix 2-2 : Impact of the 1994 Tax Cuts on Consumption by Type of Goods
(Normalization: Average Consumption before June, Specification(2))**

Column	(1)	(2)	(3)	(4)	(5)	(6)
Panel	Mar. - Aug	Mar. - Aug	Mar. - Aug	Apr. - Sep	Apr. - Sep	Apr. - Sep
Dependent var.	Semi-durables	Non-durables	Services	Semi-durables	Non-durables	Services
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h}$	-0.01 (0.20)	-0.01 (0.04)	-0.05 (0.11)	0.14 (0.18)	0.02 (0.04)	0.02 (0.10)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h}$	0.03 (0.23)	-0.03 (0.05)	0.17 (0.13)	0.08 (0.20)	0.06 (0.04)	0.12 (0.11)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h}$	-0.26 (0.26)	0.04 (0.05)	-0.24 (0.15)	-0.22 (0.21)	-0.06 (0.04)	-0.05 (0.12)
$\frac{Taxcut_{h,t-2}}{Monthly\ Income_h}$				-0.47 (0.78)	-0.19 (0.16)	-0.66 (0.44)
Sum of the coefficients on tax cut	-0.24 (0.27)	-0.01 (0.05)	-0.12 (0.15)	-0.47 (0.75)	-0.17 (0.16)	-0.57 (0.42)
F test (Prob.>F)	0.44 (0.72)	0.35 (0.79)	0.99 (0.40)	0.94 (0.44)	2.30 (0.06)	1.37 (0.24)
R squared (adjusted)	0.03	0.03	0.02	0.02	0.03	0.03
s.e.e.	1.17	0.24	0.68	1.17	0.24	0.65
Number of Observation	14,574	15,216	15,089	13,770	14,324	14,203

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies as well as bonus and current income relative to average consumption between the first month of each panel and May. All regressions include control years. The sample is 1990-1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

Appendix 3-1 : Impact of the 1994 Tax Cuts by Income Levels (Specification (1))

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel	Apr.-Sep	Apr.-Sep	Apr.-Sep	Apr.-Sep	Apr.-Sep	Apr.-Sep	Apr.-Sep	Apr.-Sep
INCOME level	Above	Below	Above	Below	Above	Below	Above	Below
Dependent var.	Total	Total	Semi-durables	Semi-durables	Non-durables	Non-durables	Services	Services
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h}$	-0.00 (0.24)	0.24 (0.40)	-0.07 (0.74)	1.54 (1.42)	0.03 (0.15)	-0.54* (0.30)	0.54 (0.43)	0.97 (0.76)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h}$	0.48* (0.27)	0.41 (0.45)	0.83 (0.86)	0.84 (1.59)	0.33* (0.18)	0.74** (0.33)	-0.18 (0.50)	-0.75 (0.86)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h}$	-0.97** (0.29)	-0.42 (0.48)	-1.58* (0.92)	-2.97* (1.69)	-0.40** (0.19)	-0.39 (0.35)	-0.49 (0.54)	1.17 (0.91)
$\frac{Taxcut_{h,t-2}}{Monthly\ Income_h}$	0.29 (0.33)	-0.51 (0.53)	0.86 (1.03)	2.18 (1.87)	-0.04 (0.21)	-0.05 (0.39)	-0.28 (0.61)	-1.53 (1.00)
Sum of the coefficients on tax cut	-0.20 (0.36)	-0.29 (0.63)	0.04 (1.12)	1.59 (2.20)	-0.08 (0.23)	-0.23 (0.46)	-0.41 (0.66)	-0.15 (1.19)
F test (Prob.>F)	3.53 (0.01)	1.26 (0.29)	0.81 (0.52)	1.38 (0.24)	2.54 (0.04)	1.62 (0.17)	1.26 (0.28)	0.92 (0.45)
R squared (adjusted)	0.03	0.03	0.02	0.01	0.02	0.03	0.01	0.02
s.e.e.	0.38	0.33	1.18	1.16	0.25	0.24	0.70	0.63
Number of Observation	5,958	8,280	5,846	7,924	6,022	8,302	5,955	8,248

Notes: Standard errors in parenthesis. The panel from April to September is used. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies as well as bonus and lagged current income relative to monthly income in the previous year. All regressions include control years. The sample is 1990-1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

Appendix 3-2 : Impact of the 1994 Tax Cuts by Income Levels (Specification (2))

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel	Apr.-Sep	Apr.-Sep	Apr.-Sep	Apr.-Sep	Apr.-Sep	Apr.-Sep	Apr.-Sep	Apr.-Sep
INCOME	Above	Below	Above	Below	Above	Below	Above	Below
Dependent var.	Total	Total	Semi-durables	Semi-durables	Non-durables	Non-durables	Services	Services
$\frac{Taxcut_{h,t+1}}{Monthly Income_h}$	-0.06 (0.24)	-0.10 (0.40)	0.11 (0.77)	0.46 (1.41)	0.07 (0.16)	-0.65 ** (0.30)	0.29 (0.45)	0.64 (0.76)
$\frac{Taxcut_{h,t}}{Monthly Income_h}$	0.56 ** (0.28)	0.58 (0.45)	0.61 (0.89)	1.74 (1.60)	0.34 * (0.18)	0.82 ** (0.33)	0.25 (0.52)	-0.75 (0.86)
$\frac{Taxcut_{h,t-1}}{Monthly Income_h}$	-1.07 ** (0.31)	-0.32 (0.48)	-1.69 * (0.96)	-2.80 * (1.70)	-0.47 ** (0.20)	-0.34 (0.35)	-0.83 (0.57)	1.51 (0.90)
$\frac{Taxcut_{h,t-2}}{Monthly Income_h}$	0.26 (0.34)	-0.56 (0.53)	0.85 (1.06)	1.71 (1.89)	-0.05 (0.22)	-0.03 (0.39)	-0.15 (0.63)	-1.41 (1.01)
Sum of the coefficients on tax cut	-0.31 (0.37)	-0.39 (0.63)	-0.12 (1.17)	1.12 (2.22)	-0.11 (0.24)	-0.19 (0.46)	-0.44 (0.69)	-0.02 (1.19)
F test (Prob.>F)	4.02 (0.00)	1.09 (0.36)	0.90 (0.47)	0.92 (0.45)	3.26 (0.01)	1.99 (0.09)	1.33 (0.26)	0.86 (0.49)
R squared (adjusted)	0.04	0.05	0.02	0.02	0.02	0.04	0.03	0.04
s.e.e.	0.38	0.33	1.18	1.16	0.25	0.24	0.69	0.62
Number of Observation	5,958	8,280	5,846	7,924	6,022	8,302	5,955	8,248

Notes: Standard errors in parenthesis. The panel from April to September is used. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies as well as bonus and current income relative to monthly income in the previous year. All regressions include control years. The sample is 1990-1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

Part III

Consumer Response to the 1995/1996 Tax Cut: Are Temporary Tax Cuts Effective in Anticipation of Tax Increase?

Abstract:

This paper tries to evaluate the effects of the 1995/1996 tax cuts administered by the Japanese government. These tax cuts were implemented exactly in the same manner at different timing. Especially, the 1996 tax cut is unique in the timing, i.e. it was implemented only three months before the consumption tax rate *increase* from 3% to 5%. We use micro-level data of the *Family Income and Expenditure Survey* (FIES) to evaluate the effect of the 1995 and 1996 tax cuts implemented in December in these two years on individual household's consumption, focusing on the difference between the two episodes. The estimates indicate that these tax cuts actually stimulated consumption on impact, though the effect decreased in following months, and also suggest that the effect was smaller for the 1996 tax cut than the 1995 tax cut. This finding probably suggests that the Ricardian equivalence story might hold and individual households do not respond to a tax cut in anticipation of coming tax increase, when the timing of tax reduction and tax increase is very close

1. Introduction

The continued stagnation of Japanese economy motivated the government to implement a series of tax reductions in the mid 1990s in order to stimulate the economy. At the same time, some of these tax cuts were devised to neutralize the negative impacts of a planned tax increase, that is the consumption tax rate increase from 3% to 5% in April 1997.¹

This paper tries to evaluate the effects of two tax reduction policies implemented in 1995 and 1996, shortly before the tax *increase* in the spring of 1997. The two tax cuts were implemented exactly in the same manner at different timing. Specifically, the timing of the 1996 tax cut is unique; it was implemented only three months before the consumption tax rate hike. This feature of these two tax cuts motivates us to compare them to see how the effect of tax cuts on consumption implemented in the same way might differ with different intervals to coming tax increase. If consumers anticipate tax increase in near future, those who behave dynamically might not respond to the tax cut. On the contrary, if consumers are myopic or constrained by liquidity, they might increase consumption despite of the anticipated increase in their tax burden. Therefore, how consumers respond to temporary changes in income depends on expectation as well as economic or fiscal conditions. We use the two tax cut episodes in 1995 and 1996 to empirically evaluate the validity of the Ricardian equivalence in this paper.

Although there are little earlier studies on the Japanese tax policy in the 1990s, we have already tackled some of critical issues, using micro-level consumption data. Hori, Hsieh, Murata and Shimizutani (2002) focuses on the 1999 shopping coupon program and Part I and Part II of this discussion paper examine the 1998 tax cut episode as well as the 1994 tax cut. These works on three Japanese episodes in the 1990s demonstrate consistent finding that temporary tax cut stimulated consumption on impact right after it was implemented, with the marginal propensity to consume (MPC) of 0.1 to 0.6, but it declined in subsequent months. This paper (Part III) also deals with temporary tax cuts in Japan, but what is unique about this paper is that it compares the effects of similar tax cuts at different timing, or at different economic and fiscal conditions. The 1996 episode was very close to the expected tax increase in near future (the tax cut was implemented after the announcement of the consumption tax increase), which is not the case for other tax cuts in the 1990s. This unique feature of the 1996 tax cut offers a nice opportunity to evaluate consumers' dynamically optimizing behavior. Like our other three papers, this research takes advantage of utilizing micro-level data of consumers available from the *Family Income and Expenditure Survey* (henceforth, FIES), monthly consumption data compiled by the Japanese government.

This paper is organized as follows. The next section gives a survey of related literature and then Section 3 describes the 1995 and 1996 tax cut policy. Section 4 offers data description and

¹ See Ishi (2001) for further discussion.

calculation of tax reduction. Section 5, the main part of this paper, illustrates the strategy to evaluate the 1995 and 1996 tax cut effects on consumption. The last section concludes.

2. Literature survey

On tax policies, there are at least two papers that investigate Japanese experiences. Watanabe et. al. (1999) empirically evaluated the effect of Japanese tax cuts after the mid 1970s. Following the methodology by Poterba (1988), they find that the impact of temporary tax reductions is significantly smaller than that of permanent cuts and that 80% of Japanese consumers respond to tax changes at their implementation, not at their announcement. The other quantitative work on Japanese tax cut is Carroll (1999). He uses a simulation based on the habit formation hypothesis. He argues that habits imply an immediate MPC out of permanent shocks of much less one and that “the immediate MPC out of permanent tax cuts may be as low as 30%, suggesting that calls for permanent income tax cut as a quick means of stimulating aggregate demand in Japan may be misguided”.

However, these findings are not fully convincing since they are not based on micro observations. The impact of tax reductions on consumption is likely to be different across households with different characteristics, and it is critically important to take account of heterogeneity of consumers when evaluating the effect of tax policies. As for the U.S., Shapiro and Slemrod (1995) utilize the questionnaire survey to evaluate the effect of the reduction in standard rates of tax withholding on consumption in 1992. They concludes 43% of the sample responded to spend most of the extra take-home pay. However, they perform a similar survey in 2001 and conclude that only 22% of households spent the tax rebates administrated in mid 2001.

Turning to Japan, despite the urgent need for stimulative policies, there are few studies on the Japanese tax cut using micro-level consumption. Hori, Hsieh, Murata and Shimizutani (2002) uses micro data from the FIES to analyzes the effect of the Japanese shopping coupon program in 1999 on consumption and concludes that the MPC out of the coupons was 0.3-0.4 in the month when the coupons were distributed, but the MPC falls to 0.1 when the change in consumption is measured over the next 3 or 4 months. Part I and II of this discussion paper also use the same micro data to evaluate the impacts of tax cuts in 1994 and 1998. All of these studies all demonstrates that the effect of tax cuts on consumption are roughly comparable to that of the coupon program, and it declines over following months.

3. The 1995/1996 tax cut

The 1995/1996 tax cuts occupy the last part of the serial tax cut packages implemented in the middle of 1990s. A brief description of the tax cuts in these period would be useful to understand the position of the 1995/1996 tax cut. As detailed below, this paper focuses on the response of worker's households whose tax payment is withheld at source. In Japan, monthly national tax payment from salary is determined through the “withholding table” that bases on the number of dependants and

taxable income of a household. The local inhabitant's tax is a fixed amount per month between June (of year t) and May (of year $t+1$), and the amount is determined by the previous year's, i.e. year $t-1$'s, annual income. Both tax payments are withheld by salary payers and thus the amounts are exogenously determined.

The 1994 tax reduction was the first tax cut in the 1990s to stimulate the weak economy after the collapse of the "Bubble economy". It was also a tax cut in anticipation of a consumption tax rate hike planned in 1997. This tax reduction was thought to be temporary and to end in the following year. The total amount was 5,500 billion yen. Under this tax reduction program, in principle, 20% of total income tax payment between January and June was refunded in June (the upper limit was one million yen) and 20% of income tax amount paid between July and December was refunded in December 1994². The limit of the tax refunds was two million yen as a whole. At the same time, a tax reduction in the local inhabitants' tax was also enforced. The inhabitants' tax payment was exempted in June and July and the due amount after 20% reduction up to the upper limit of 200,000 yen was collected between August 1994 and May 1995.

Although the 1994 tax reduction was planned to be one shot, no sign of economic recovery made the Japanese government continue the tax reduction policy. The 1995 tax reform package was of the same amount (5,500 billion yen) as that of 1994 tax cut, and contained both institutional (permanent) tax cut (3,500 billion yen) and temporary tax cut (2,000 billion yen)³. The 1996 tax reduction was implemented exactly in the same manner as that of the 1995 tax reduction. The permanent part of 1995 tax cut was retained even after 1996 and the temporary tax cut was implemented in the same manner in 1996.

Under these reduction programs, the temporary tax cut was implemented in the following way: 15 % of total income tax payment between January and June was refunded in June (the upper limit was 25,000 yen) and 15% of income tax amount paid between July and December was refunded in December. Note that the limitation to be refunded was 50,000 yen as a whole, which was significantly lower than that in 1994 because the part of the temporary tax cuts in 1995 and 1996 occupied 2,000 billion yen while 5,500 billion yen in the 1994 tax cut. In addition, tax reduction in inhabitants' tax (local tax) was also enforced as in 1994. The inhabitants' tax payment was exempted in June only and the due amount after 15% reduction was collected between July and May in the next year. The limit to be refunded was also significantly lowered up to 20,000 yen⁴.

² See Shimizutani (2002) for further discussion. The "tax refund" is to subtract income tax payment worth to the tax reduction from due amount withheld, with upper limit of tax payments in June or December.

³ As in the 1994 tax cut, the 1995 tax cut was accompanied with an increase in the consumption tax rate from 3% to 5%, which was to be implemented in April 1997.

⁴ On the other hand, the institutional tax cut, effective from January 1995, focuses on abbreviating tax burden for middle class. Under the five income brackets as before 1995, the corresponding income classes for each tax rate were raised; the tax rate of 10% was applicable if taxable income class is equal or less than 3.3 million yen (3.0 million before 1995), 20% between 3.3 and 9.0 million yen (between 3.0 and 6.0 million yen), 30% between 9.0 and 18.0 million yen (between 6.0

4. Data Description and Tax Cut Calculation

The data used in this study is the micro-level data from the *Family Income and Expenditure Survey* (FIES), conducted by the Ministry of Public Management, Home Affairs, Posts and Telecommunications.⁵ The survey covers approximately 8,000 households, which are representative at the national level. Approximately, 1,300-1,400 households enter the sample and the comparable size of households gets out of the sample. This study uses only worker's household information, which occupies more than half of the sample, because monthly information on receipts is only available for worker's households and the monthly pattern of income for worker's households is very different than that of other households due to the bonus system.

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. In order to improve the reliability of our estimates, a household is excluded if (1) the reported age of the household head decreases or increases by more than one year during 6 months or; (2) the household's tenancy status changes from owner to renter or the reverse, because these changes are likely to be due to large shocks that may also have large effects on the household's consumption.⁶ Moreover, a household is excluded if the number of family members is greater than 10 because consumption of such large households is different from that of smaller households⁷.

The national income tax cut amounts for individual households in the case of the 1995 and 1996 tax cut implemented in December are calculated as follows.

$$(A1) \text{ Tax cut amount} = \text{Tax12}^* - \text{Tax12} = 0.15 * (\text{Tax7} + \text{Tax8} + \text{Tax9} + \text{Tax10} + \text{Tax11} + \text{Tax12}^*)$$

where Tax7-Tax12 are tax payment in each month between July and December and Tax12* is tax payment in December without tax reduction, which is not available in the FIES. Rearranging (A1), the following relation is obtained.

$$(A2) \text{ Tax cut amount} = (0.15 * (\text{Tax7} + \text{Tax8} + \text{Tax9} + \text{Tax10} + \text{Tax11}) + \text{Tax12}) / 0.85 - \text{Tax12}$$

where all variables in the right hand side are available. If the calculated tax cut amount is greater than 25,000 yen, it sets to be 25,000 yen. Since the amount of the inhabitant tax cut in each month is same and small between July and May in the next year, this paper ignores the effect of the inhabitant tax cut.

In what follows, we will use the panels of August to January and September to February to evaluate the effect of the 1995/1996 tax cut. These panels are necessary to evaluate the effect totally because previous studies demonstrate that the effect of tax cut on consumption on impact was substituted in later months. The panels beginning after October are not used in this paper because consumption increased substantially in March 1997, just before the implementation of the

and 10.0 million yen), 40% between 18.0 and 30.0 million yen (between 10.0 and 20.0 million yen) and 50% above 30.0 million (above 20.0 million). There are other changes in the 1995 tax cut such as amounts of exemptions and deduction.

⁵ See section 3 of Part I of this discussion paper for detail description of the FIES.

⁶ Hayashi (1986, 1997) also excludes a household if (3) total expenditure or disposable income increases or decreases by ten-folds or (4) for each of the four expenditure groups excluding durables, the amount exceeds one million yen. Hayashi reports that there was no observation meeting these criterions in his FY 1981 dataset.

⁷ The number of household by this criterion is very small.

consumption tax increase. Since national tax cut amounts are based on the total tax payment between July and December, the panels beginning in August or September lacks data on tax payment in July and/or August. We calculated tax payments in these months as the average of tax payment in months without bonus payment.

Moreover, we disaggregate the different items into four consumption categories: durables, semi-durables, non-durables, and services. The summary statistics of the panels used in this paper can be seen in Table 1.

5. Impact of the 1995/1996 Tax Cut on Consumption

We begin with using the six-month panels from the FIES to estimate whether consumption changes when consumer receives tax cut benefit. We will compare households to see whether families with a larger tax cut amount increases their consumption by more than families with a smaller tax cut amount, controlling for the cross-sectional differences between similar families in other years.

The basic empirical specification employed is the following linear Euler equation:

$$(1) \quad \ln\left(\frac{C_{h,t+1}}{C_{h,t}}\right) = \sum_{n=0}^2 a_{1n} \cdot \left(\frac{Taxcut_{h,t+1-n}}{MonthlyIncome_{h,t-1}}\right) + \sum_{n=0}^2 a_{2n} \cdot \left(\frac{Taxcut_{h,t+1-n}}{MonthlyIncome_{h,t-1}}\right) * 1996 DUM \\ + Z_{h,t}' \cdot a_3 + Month_t' \cdot a_4 + e_{t+1}$$

where h indexes households and t refers to the month. The dependent variable is the log of the ratio of monthly consumption in household h in month t . The main independent variables are

$\frac{TaxcutN_{h,t+1-n}}{MonthlyIncome_h}$, which is the value of national income tax cuts in December received by a

household relative to the household's monthly income⁸. Moreover, the specification includes the interaction term between the main independent variable and a dummy variable for 1996 to address the possibility that the impacts on consumption might be different between 1995 and 1996. We allow lags of both main independent variables to address the possibility that a household does not spend the tax cut immediately. The monthly value of tax cut is exogenously determined as documented in the previous section. The main independent variables are of course set to zero for other control years. $Z_{h,t}$ is a vector of household characteristics (a quadratic in the age of the household head, the number of family members and change in the number of family members). $Month_t$ is a vector of dummy variables for each month in each year. The coefficients of our interests are $a_{10} - a_{12}$ and $a_{20} - a_{22}$, which measure the elasticity of consumption to income variation due to the tax cuts. We excluded observations if the absolute change in monthly consumption exceeds the mean by more than three standard deviations.

As long as the main independent variables are orthogonal to other income shocks, the

⁸ Monthly income is calculated as the previous year's pretax income divided by 12.

estimated $a_{10} - a_{12}$ and $a_{20} - a_{22}$ are not affected. In order to detect whether omission of other income shocks as independent variables affects the coefficient estimates, we also tried the following specification.

$$(2) \quad \ln\left(\frac{C_{h,t+1}}{C_{h,t}}\right) = \sum_{n=0}^2 a_{1n} \cdot \left(\frac{Taxcut_{h,t+1-n}}{MonthlyIncome_{h,t-1}}\right) + \sum_{n=0}^2 a_{2n} \cdot \left(\frac{Taxcut_{h,t+1-n}}{MonthlyIncome_{h,t-1}}\right) * 1996DUM \\ + \sum_{n=0}^3 a_{3n} \cdot \left(\frac{Bonus_{h,t+1}}{MonthlyIncome_{h,t-1}}\right) + \sum_{n=0}^3 a_{4n} \cdot \left(\frac{OtherIncome_{h,t+1}}{MonthlyIncome_{h,t-1}}\right) + Z_{h,t}' \cdot a_5 + Month_t' \cdot a_6 + e_{t+1}$$

where $\frac{Bonus_{h,t+1}}{MonthlyIncome_{h,t-1}}$ is the value of bonus received by a household relative to the household's

monthly income. A household typically receives bonus in December in Japan. Moreover,

$\frac{OtherIncome_{h,t+1}}{MonthlyIncome_{h,t-1}}$, which is total monthly receipt except tax cut and bonus relative to monthly

income and its lags in order to control for delayed responses.⁹

We use specification (1) and (2) to evaluate the 1995/1996 tax cut as discussed above. We use the sample between 1990 and 1993 as the control years to confirm whether some specific shocks in 1995 or 1996 are driving the results¹⁰.

Table 2 demonstrates the results on total consumption based on the specification (1) and (2). Except Column (2), the coefficients on the contemporaneous tax cut are positive and significant, followed by negative coefficients on one-month lag terms. To take an example of the results of Column (1), the MPC on impact is estimated to be 0.7-0.8 but it declines over months. Note that the interaction term between the current tax cut and dummy variable for the 1996 sample are large and negative, though they are not statistically significant, which implies that the effect of tax cut was smaller in 1996 than in 1995, despite the fact that the tax reduction was implemented in the same manner. This suggests the possibility that consumers are less excessively sensitive to change in income at the timing close to future tax increase.

A closer examination of more disaggregated type of consumption shows the same pattern. The results reported in Table 3-1 and 3-2 suggest that the 1995/1996 tax cut stimulated consumption on impact but it was followed by a negative coefficient on one month lag, and most of the interaction terms between the current tax cut and dummy variable for the 1996 sample are large and negative. Some coefficients on the interaction terms between one month lagged tax cut term and the 1996 dummy are positive but the sum of these coefficients is zero or negative¹¹.

⁹ To avoid simultaneity bias, we used one-month lagged $OtherIncome_{h,t+1}$ as instrument variable. Since the value of bonus is in general considered to reflect on past business condition of firms, $bonus_{h,t+1}$ is not instrumented.

¹⁰ We did not use the 1994 sample because the seasonal pattern in 1994 might have been affected by temporary tax cuts administrated in that year.

¹¹ So far, we have analyzed the effect of the tax cut at implementation, not at anticipation. The tax cut was publicized in advance for all cases and a forward-looking household may have already adjusted its consumption in February as stipulated by the canonical model of consumption to imply consumption should only change upon news of unexpected income changes and should not react to anticipated income changes. Hori, Hsieh, Murata and Shimizutani (2002) and

In order to examine the impact of liquidity constraints, we examine the effect of the 1995/1996 tax cut by income levels. We use the panel from September to February to cover the period after the implementation as long as possible. We divide the sample by the average of annual pre-tax income in the previous year. The results reported in Table 4-1 and 4-2 indicate that the coefficients are larger for households with lower income, which are likely to be liquidity constraint. At the same time, these households have large and negative coefficients for the interaction term between the current tax cut and the 1996 dummy. This means that households under liquidity constraint were less sensitive to temporary change in income in anticipation of tax increase in near future.

These findings are consistent with past research on Japanese tax cuts in the 1990s. Hori, Hsieh, Murata and Shimizutani (2002) demonstrate that the 1999 shopping coupon program stimulated consumption of semi-durables with the MPC of 0.3-0.4 in the first month but the MPC falls to 0.1 over the next 3 or 4 months. Shimizutani (2002) evaluates the 1998 tax cut stimulated consumption of services with the comparable MPC and it was substituted in the subsequent months and it is also true for the 1994 tax cut though the estimated MPC is smaller to be 0.1-0.2.

6. Conclusion

This paper explores the consumer reaction to the 1995/1996 tax cuts. These tax cuts were implemented in the same way but at different timing, and thus this study emphasizes the difference of these tax cuts on consumption. Especially, the 1996 tax cut is unique in the timing; only three months before the *increase* in consumption tax rate from 3% to 5%. Using micro-level data of the Family Income and Expenditure Survey (FIES), the estimates demonstrate that these tax cuts actually stimulated consumption on impact, though the effect decreased in following months, and also suggest that the effect was smaller for the 1996 tax cut than the 1995 tax cut. This finding weakly suggests the possibility that the Ricardian equivalence story might hold when the timing of tax cut and tax increase is very close and individual households did not respond to a temporary tax cut in anticipation of tax increase undertaken shortly after.

There are two directions for fruitful further research. One is to evaluate the effect of permanent tax cut on consumption, which was implemented in 1995 and 1999. Especially, a comparison of consumption effect between the institutional tax cuts and temporary tax cuts implemented in 1995 would be interesting. An empirical investigation on the effect of permanent tax cut compared with temporary tax cut will bring substantial implication for both policy-makers and academic researchers. The other is to explore the “non-Keynesian effect” using micro-level data. There have been several studies on the non-Keynesian effect using international cross-sectional data and some of them did find the effect in Denmark or Sweden. However, to our best knowledge, there is not research to tackle the topic the using household-level data. The finding in this paper implies that

Shimizutani (2002) demonstrate that consumers did not respond when the 1998 tax cut or the 1999 shopping coupons program was anticipated.

Ricardian equivalence story might have held shortly before tax increase and dynamic behavior of consumers should be investigated more deeply to bring several important policy implications for macro policy makers.

References

- Blinder, Alan. (1981) "Temporary Income Taxes and Consumer Spending," *Journal of Political Economy* 89 (1), pp. 26-53.
- Browning, Martin and Dolores Collado. (2001) "The Response of Expenditures to Anticipated Income Changes: Panel Data Estimates," *American Economic Review*.
- Carroll, Christopher. (2000) "'Risky habits' and the marginal propensity to consume out of permanent income, or, How much would a permanent tax cut boost Japanese consumption?," NBER. Working Paper 7839.
- Hayashi, Fumio. (1986) "Testing the Life Cycle-Permanent Income Hypothesis on Japanese Monthly Panel Data," *Keizai Kenkyu* 101, pp. 1-23.
- Hsieh, Chang-Tai. (2002) "Do Consumers React to Anticipated Income Changes? Evidence from the Alaska Permanent Fund," Princeton University mimeo.
- Hori, Masahiro, Hsieh, Chang-Tai, Murata, Keiko and Shimizutani, Satoshi (2002) "Did the Shopping Coupon Program Stimulate Consumption? Evidence from Japanese Micro Data," *ESRI Discussion Paper Series No.12*, Economic and Social Research Institute, Cabinet Office, Tokyo, Japan.
- Ishi, Hiromitsu. (2001) *The Japanese Tax System* (Third Edition), Oxford, Oxford University Press.
- Ministry of Public Management, Home Affairs, Posts, and Telecommunications. *Annual report on the Family Income and Expenditure Survey*, various years.
- Parker, Jonathan. (1999) "The Reaction of Household Consumption to Predictable Changes in Payroll Tax Rates." *American Economic Review*, 89(4), pp. 959-973.
- Poterba, James. (1988) "Are Consumers Forward Looking? Evidence from Fiscal Experiments," *American Economic Review (Papers and Proceedings)*, 78(2), pp. 413-18.
- Shapiro, Matthew, and Slemrod, Joel. (1995) "Consumer Response to the Timing of Income: Evidence from a Change in Tax Withholding," *American Economic Review*, 85 (1), pp. 274-283.
- Shapiro, Matthew and Slemrod, Joel. (2001) "Consumer Response to Tax Rebates" mimeo.
- Shea, John. (1995) "Union Contracts and the Life-Cycle/Permanent-Income Hypothesis." *American Economic Review*, 85(1), pp. 186-200
- Shimizutani, Satoshi. (2002) "Consumption and Tax Policy in Japan during the 1990s: Evidence from Household Data" University of Michigan, mimeo.
- Souleles, Nicholas. (1999) "The Response of Household Consumption to Income Tax Refunds." *American Economic Review*, 89(4), pp. 947-958
- Souleles, Nicholas. "Consumer Response to the Reagan Tax Cuts." *Journal of Public Economics*, forthcoming

Watanabe, Katsunori, Watanabe, Takayuki and Watanabe, Tsutomu. (1999) "Tax policy and consumer spending: Evidence from Japanese fiscal experiments" NBER. Working Paper 7252.

Zeldes, Stephen. (1989) "Consumption and Liquidity Constraints: An Empirical Investigation." *Journal of Political Economy*, vol.97, no 2.

Table 1: Summary Statistics

	<u>Mean</u>	<u>S. D.</u>
<u>March-August Panel (N=4,372)</u>		
Consumption (exc. Transfer or gift)	281,463	236,501
Durables	20,627	136,394
Semi-durables	36,663	55,035
Non-durables	116,657	47,410
Services	107,518	139,502
National Income Tax Cut Benefit (95 Dec.)	12,682	9,641
National Income Tax Cut Benefit (96 Dec.)	13,910	9,825
Bonus	103,591	326,233
Bonus (95 Dec.)	556,223	546,620
Bonus (96 Dec.)	620,553	585,809
Monthly income ¹	596,864	263,417
Age (household head)	45.8	10.9
Number of family members	3.6	1.2
<u>April-September Panel (N=4,413)</u>		
Consumption (exc. Transfer or gift)	278,946	232,058
Durables	19,639	126,146
Semi-durables	36,575	64,216
Non-durables	115,063	47,572
Services	107,668	142,584
National Income Tax Cut Benefit (95 Dec.)	13,500	9,581
National Income Tax Cut Benefit (96 Dec.)	13,362	9,721
Bonus	103,364	326,203
Bonus (95 Dec.)	614,609	588,439
Bonus (96 Dec.)	589,250	582,338
Monthly income ²	598,829	257,828
Age (household head)	46.0	11.0
Number of family members	3.6	1.2

¹ Pretax annual income/12.

Note: Unit of observation is a household. Consumption refers to average monthly consumption in current yen.

Table 2: Impact of the 1995/1996 Tax Cuts on Total Consumption

Column	(1)	(2)	(3)	(4)
Panel	Aug.-Jan.	Aug.-Jan.	Sep.-Feb.	Sep.-Feb.
Specification	(1)	(2)	(1)	(2)
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h}$	1.70 * (0.99)	1.02 (1.00)	3.06 ** (0.96)	2.81 ** (0.97)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h}$	-1.09 (0.98)	-0.54 (0.99)	-1.51 (0.95)	-0.81 (0.97)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h}$			-0.12 (0.96)	0.48 (0.97)
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h} * 96DUM$	-1.21 (1.41)	-1.23 (1.40)	-1.91 (1.41)	-1.94 (1.40)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h} * 96DUM$	0.13 (1.41)	0.20 (1.40)	1.37 (1.41)	1.11 (1.40)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h} * 96DUM$			-0.32 (1.42)	-0.51 (1.41)
Sum of the Coefficients on tax cut (exc. interaction term)	0.61 (1.40)	0.48 (1.41)	1.43 (1.67)	2.49 (1.69)
Sum of the Coefficients on tax cut (all)	-0.47 (1.43)	-0.56 (1.44)	0.58 (1.82)	1.15 (1.82)
Bonus (current, lagged)	No	Yes	No	Yes
Lags of Current Income	No	Yes	No	Yes
F test (exc. Interaction term) (Prob.>F)	2.11 (0.12)	0.67 (0.51)	4.22 (0.01)	3.11 (0.03)
R squared (adjusted)	0.21	0.22	0.20	0.21
s.e.e.	0.40	0.40	0.40	0.40
Number of Observation	21,418	21,418	21,669	21,669

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly total consumption except durables. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies. The sample is 1990-1996 except 1994. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

**Table 3-1 : Impact of the 1995/1996 Tax Cuts on Consumption by Type of Goods
(Specification (1):Euler Equation)**

Column	(1)	(2)	(3)	(4)	(5)	(6)
Panel	Aug.-Jan.	Aug.-Jan	Aug.-Jan	Sep.-Feb	Sep.-Feb	Sep.-Feb
Dependent var.	Semi-durables	Non-durables	Services	Semi-durables	Non-durables	Services
$\frac{Taxcut_{h,t+1}}{Monthly Income_h}$	3.86 (3.09)	0.25 (0.65)	2.60 (1.65)	3.79 (3.00)	1.63 ** (0.62)	2.92 * (1.59)
$\frac{Taxcut_{h,t}}{Monthly Income_h}$	-6.67 ** (3.10)	-0.37 (0.66)	-0.54 (1.66)	-4.59 (3.01)	-0.23 (0.62)	-1.87 (1.60)
$\frac{Taxcut_{h,t-1}}{Monthly Income_h}$				1.93 (3.06)	-0.72 (0.62)	2.05 (1.60)
$\frac{Taxcut_{h,t+1}}{Monthly Income_h} * 96DUM$	-4.20 (4.45)	0.25 (0.93)	-0.91 (2.37)	-0.25 (4.41)	-2.66 ** (0.92)	-2.65 (2.35)
$\frac{Taxcut_{h,t}}{Monthly Income_h} * 96DUM$	6.70 (4.47)	-0.59 (0.94)	-1.13 (2.37)	1.62 (4.45)	0.50 (0.92)	1.19 (2.39)
$\frac{Taxcut_{h,t-1}}{Monthly Income_h} * 96DUM$				-2.02 (4.52)	0.13 (0.91)	-0.89 (2.36)
Sum of the coefficients on tax cut (exc. Interaction term)	-2.81 (4.39)	-0.11 (0.93)	2.06 (2.34)	1.12 (5.25)	0.68 (1.08)	3.10 (2.77)
Sum of the coefficients on tax cut (all)	-0.31 (4.55)	-0.45 (0.95)	0.02 (2.41)	0.47 (5.71)	-1.35 (1.18)	0.74 (3.05)
F test (exc. Interaction term) (Prob.>F)	3.10 (0.05)	0.23 (0.79)	1.29 (0.28)	1.45 (0.23)	2.79 (0.04)	2.13 (0.09)
R squared (adjusted)	0.08	0.39	0.02	0.09	0.41	0.02
s.e.e.	1.22	0.27	0.67	1.23	0.26	0.67
Number of Observation	20,731	21,605	21,352	20,962	21,786	21,548

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies. All regressions include control years. The sample is 1990-1996 except 1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

Table 3-2 : Impact of the 1995/1996 Tax Cuts on Consumption by Type of Goods (Specification (2))

Column	(1)	(2)	(3)	(4)	(5)	(6)
Panel	Aug.-Jan.	Aug.-Jan	Aug.-Jan	Sep.-Feb	Sep.-Feb	Sep.-Feb
Dependent var.	Semi-durables	Non-durables	Services	Semi-durables	Non-durables	Services
$\frac{Taxcut_{h,t+1}}{Monthly Income_h}$	2.16 (3.14)	0.39 (0.66)	1.51 (1.67)	1.20 (3.06)	1.71 ** (0.64)	2.09 (1.62)
$\frac{Taxcut_{h,t}}{Monthly Income_h}$	-5.23 * (3.14)	-0.45 (0.67)	0.16 (1.67)	-3.28 (3.07)	-0.22 (0.64)	-1.09 (1.63)
$\frac{Taxcut_{h,t-1}}{Monthly Income_h}$				3.00 (3.12)	-0.22 (0.63)	2.39 (1.62)
$\frac{Taxcut_{h,t+1}}{Monthly Income_h} * 96DUM$	-4.29 (4.45)	0.30 (0.93)	-1.02 (2.36)	0.21 (4.40)	-2.71 ** (0.92)	-2.59 (2.34)
$\frac{Taxcut_{h,t}}{Monthly Income_h} * 96DUM$	6.82 (4.46)	-0.61 (0.94)	-1.03 (2.36)	1.15 (4.44)	0.45 (0.92)	0.80 (2.38)
$\frac{Taxcut_{h,t-1}}{Monthly Income_h} * 96DUM$				-1.91 (4.52)	0.02 (0.91)	-1.06 (2.35)
Sum of the coefficients on tax cut (exc. Interaction term)	-3.07 (4.44)	-0.06 (0.94)	1.67 (2.37)	0.92 (5.36)	1.27 (1.11)	3.39 (2.82)
Sum of the coefficients on tax cut (all)	-0.54 (4.63)	-0.36 (0.97)	-0.37 (2.44)	0.38 (5.78)	-0.97 (1.19)	0.55 (3.07)
F test (exc. Interaction term) (Prob.>F)	1.63 (0.20)	0.41 (0.67)	0.41 (0.66)	0.74 (0.53)	2.47 (0.06)	1.43 (0.23)
R squared (adjusted)	0.08	0.39	0.03	0.09	0.41	0.03
s.e.e.	1.22	0.27	0.67	1.23	0.26	0.66
Number of Observation	20,731	21,605	21,352	20,962	21,786	21,548

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies as well as bonus and lagged current income relative to monthly income in the previous year. All regressions include control years. The sample is 1990-1996 except 1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

Table 4-1 : Impact of the 1995/1996 Tax Cuts by Income Levels (Specification (1))

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel	Sep.- Feb	Sep.- Feb	Sep.- Feb	Sep.- Feb	Sep.- Feb	Sep.- Feb	Sep.- Feb	Sep.- Feb
INCOME level	Above	Below	Above	Below	Above	Below	Above	Below
Dependent var.	Total	Total	Semi- durables	Semi- durables	Non- durables	Non- durables	Services	Services
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h}$	2.43** (1.04)	5.07** (2.16)	2.90 (3.46)	5.13 (6.20)	1.53** (0.72)	1.63 (1.29)	1.29 (1.73)	7.75** (3.57)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h}$	-1.32 (1.04)	-1.97 (2.15)	-3.83 (3.45)	-7.67 (6.28)	-0.16 (0.71)	-0.09 (1.30)	0.13 (1.75)	-8.78** (3.54)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h}$	-0.12 (1.04)	0.33 (2.15)	0.75 (3.48)	6.00 (6.61)	-0.70 (0.71)	-0.89 (1.28)	2.33 (1.75)	1.80 (3.53)
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h} * 96DUM$	-0.56 (1.56)	-6.33** (3.06)	3.56 (5.17)	-8.65 (8.76)	-1.65 (1.08)	-6.08** (1.81)	-0.51 (2.63)	-9.87 (5.02)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h} * 96DUM$	1.99* (1.56)	0.74 (3.04)	0.86 (5.25)	5.02 (8.74)	-0.35* (1.08)	3.72** (1.82)	0.02 (2.69)	6.31 (5.01)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h} * 96DUM$	0.24 (1.59)	-2.43 (3.01)	3.30 (5.31)	-15.19* (9.06)	0.79 (1.08)	-2.06 (1.81)	-1.00 (2.66)	-1.33 (4.94)
Sum of the coefficients on tax cut (exc. Interaction term)	0.99 (1.80)	3.43 (3.75)	-0.19 (6.01)	3.47 (11.09)	0.68 (1.24)	0.65 (2.25)	3.75 (3.03)	0.77 (6.18)
Sum of the coefficients on tax cut (all)	2.67 (2.05)	-4.58 (3.75)	7.53 (6.86)	-15.35 (10.78)	-0.53 (1.41)	-3.77* (2.23)	2.25 (3.50)	-4.13 (6.14)
F test (exc. Interaction term) (Prob.>F)	2.37 (0.07)	2.13 (0.09)	0.66 (0.57)	1.00 (0.39)	1.86 (0.13)	0.70 (0.55)	0.78 (0.51)	3.72 (0.01)
R squared (adjusted)	0.21	0.19	0.09	0.09	0.38	0.45	0.02	0.02
s.e.e.	0.38	0.43	1.24	1.22	0.26	0.26	0.64	0.70
Number of Observation	12,419	9,250	11,848	9,114	12,456	9,330	12,311	9,237

Notes: Standard errors in parenthesis. The panel from March to August is used. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies. All regressions include control years. The sample is 1990-1996 except 1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

Table 4-2 : Impact of the 1995/1996 Tax Cuts by Income Levels (Specification (2))

Column	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel	Sep.- Feb	Sep.-Feb	Sep.- Feb	Sep.- Feb	Sep.- Feb	Sep.- Feb	Sep.- Feb	Sep.- Feb
INCOME	Above	Below	Above	Below	Above	Below	Above	Below
Dependent var.	Total	Total	Semi- durables	Semi- durables	Non- durables	Non- durables	Services	Services
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h}$	2.28** (1.05)	5.07** (2.18)	0.23 (3.53)	3.17 (6.31)	1.76** (0.73)	1.57 (1.32)	0.46 (1.76)	7.33** (3.61)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h}$	-1.00 (1.05)	0.06 (2.17)	-3.29 (3.53)	-4.59 (6.40)	-0.33 (0.73)	0.30 (1.33)	0.96 (1.78)	-7.26** (3.60)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h}$	0.81 (1.05)	0.78 (2.17)	1.62 (3.56)	8.15 (6.72)	-0.28 (0.73)	-0.01 (1.31)	2.99* (1.78)	2.00 (3.58)
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h} * 96DUM$	-0.59 (1.55)	-6.28** (3.03)	4.15 (5.16)	-8.52 (8.75)	-1.75 (1.08)	-6.07 * (1.81)	-0.38 (2.61)	-9.71* (4.99)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h} * 96DUM$	2.00 (1.55)	-0.07 (3.01)	0.81 (5.25)	3.87 (8.74)	-0.28 (1.08)	3.46 * (1.82)	-0.23 (2.68)	5.41 (4.98)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h} * 96DUM$	-0.02 (1.57)	-2.61 (2.98)	3.83 (5.32)	-15.70* (9.05)	0.64 (1.08)	-2.18 (1.81)	-1.10 (2.66)	-1.50 (4.91)
Sum of the coefficients on tax cut (exc. Interaction term)	2.09 (1.83)	5.91 (3.79)	-1.44 (6.15)	6.73 (11.29)	1.15 (1.27)	1.86 (2.30)	4.41 (3.09)	2.07 (6.28)
Sum of the coefficients on tax cut (all)	3.48 (2.06)	-3.04 (3.77)	7.36 (6.94)	-13.61 (10.94)	-0.23 (1.43)	-2.93 (2.26)	2.71 (3.53)	-3.72 (6.20)
F test (exc. Interaction term) (Prob.>F)	2.07 (0.10)	1.84 (0.14)	0.36 (0.78)	0.75 (0.52)	2.05 (0.10)	0.49 (0.69)	1.06 (0.37)	2.85 (0.04)
R squared (adjusted)	0.22	0.21	0.09	0.10	0.38	0.45	0.03	0.03
s.e.e.	0.38	0.42	1.24	1.22	0.26	0.26	0.64	0.70
Number of Observation	12,419	9,250	11,848	9,114	12,456	9,330	12,311	9,237

Notes: Standard errors in parenthesis. The panel from March to August is used. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies as well as bonus and lagged current income relative to monthly income in the previous year. All regressions include control years. The sample is 1990-1996 except 1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

Appendix 1. Impact of the 1995/1996 Tax Cuts on Total Consumption
(Normalization: Average Consumption before December)

Column	(1)	(2)	(3)	(4)
Panel	Aug-Jan	Aug-Jan.	Sep.-Feb.	Sep.-Feb.
Specification	(1)	(2)	(1)	(2)
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h}$	0.84 ** (0.35)	0.22 (0.35)	2.15 ** (0.35)	1.43 ** (0.36)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h}$	-0.70 ** (0.35)	-0.51 (0.35)	-0.95 ** (0.35)	-0.63 * (0.36)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h}$			-0.00 (0.35)	0.06 (0.36)
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h} * 96DUM$	0.02 (0.48)	0.08 (0.48)	-1.47 ** (0.47)	-1.32 ** (0.47)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h} * 96DUM$	0.61 (0.49)	0.56 (0.48)	1.12 ** (0.47)	1.09 ** (0.47)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h} * 96DUM$			-0.07 (0.48)	-0.03 (0.47)
Sum of the Coefficients on tax cut (exc. interaction term)	0.14 (0.49)	-0.29 (0.50)	1.19 * (0.61)	0.86 (0.63)
Sum of the Coefficients on tax cut (all)	0.77 (0.48)	0.36 (0.50)	0.77 (0.56)	0.60 (0.58)
Bonus (current, lagged)	No	Yes	No	Yes
Lags of Current Income	No	Yes	No	Yes
F test (exc. Interaction term) (Prob.>F)	4.99 (0.01)	1.26 (0.28)	15.00 (0.00)	6.33 (0.00)
R squared (adjusted)	0.21	0.22	0.20	0.21
s.e.e.	0.40	0.40	0.40	0.40
Number of Observation	21,418	21,418	21,669	21,669

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly total consumption except durables. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to average consumption between the first month of each panel and May. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies. The sample is 1990-1996 except 1994. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

**Appendix 2-1: Impact of the 1995/1996 Tax Cuts on Consumption by Type of Goods
(Normalization: Average Consumption before December, Specification(1))**

Column	(1)	(2)	(3)	(4)	(5)	(6)
Panel	Aug.-Jan.	Aug.-Jan	Aug.-Jan	Sep.-Feb	Sep.-Feb	Sep.- Feb
Dependent var.	Semi- durables	Non- durables	Services	Semi- durables	Non- durables	Services
$\frac{Taxcut_{h,t+1}}{Monthly Income_h}$	2.38 ** (1.09)	0.20 (0.23)	0.96 (0.58)	2.64 ** (1.10)	0.93 ** (0.23)	1.66 ** (1.58)
$\frac{Taxcut_{h,t}}{Monthly Income_h}$	-2.84 ** (1.10)	-0.21 (0.23)	-0.48 (0.58)	-1.93 * (1.11)	-0.18 (0.23)	-1.17 ** (0.58)
$\frac{Taxcut_{h,t-1}}{Monthly Income_h}$				0.52 (1.12)	-0.01 (0.22)	0.53 (0.59)
$\frac{Taxcut_{h,t+1}}{Monthly Income_h} * 96DUM$	-2.11 (1.56)	0.06 (0.32)	0.11 (0.82)	-1.06 (1.51)	-1.10 ** (0.31)	-1.23 (0.79)
$\frac{Taxcut_{h,t}}{Monthly Income_h} * 96DUM$	3.05 (1.56)	-0.05 (0.32)	0.57 (0.82)	2.69 * (1.48)	0.24 (0.31)	1.56 ** (0.79)
$\frac{Taxcut_{h,t-1}}{Monthly Income_h} * 96DUM$				-0.87 (1.54)	0.02 (0.30)	-0.52 (0.79)
Sum of the coefficients on tax cut (exc. Interaction term)	-0.46 (1.55)	-0.01 (0.33)	0.48 (0.83)	1.23 (1.93)	0.75 * (0.39)	1.02 (1.01)
Sum of the coefficients on tax cut (all)	0.48 (1.57)	0.00 (0.32)	1.16 (0.81)	1.99 (1.80)	-0.11 (0.36)	0.83 (0.93)
F test (exc. Interaction term) (Prob.>F)	5.70 (0.00)	0.80 (0.45)	1.70 (0.18)	3.02 (0.03)	5.89 (0.00)	4.38 (0.00)
R squared (adjusted)	0.08	0.39	0.02	0.09	0.41	0.02
s.e.e.	1.22	0.27	0.67	1.23	0.26	0.67
Number of Observation	20,731	21,605	21,352	20,962	21,786	21,548

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies. All regressions include control years. The sample is 1990-1996 except 1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.

**Appendix 2-2 : Impact of the 1995/1996 Tax Cuts on Consumption by Type of Goods
(Normalization: Average Consumption before December, Specification(2))**

Column	(1)	(2)	(3)	(4)	(5)	(6)
Panel	Aug.-Jan.	Aug.-Jan	Aug.-Jan	Sep.-Feb	Sep.-Feb	Sep.- Feb
Dependent var.	Semi- durables	Non- durables	Services	Semi- durables	Non- durables	Services
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h}$	1.59 (1.12)	0.10 (0.24)	0.35 (0.59)	1.15 (1.14)	0.74 ** (0.23)	0.94 (0.60)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h}$	-2.38 ** (1.12)	-0.21 (0.24)	-0.27 (0.60)	-1.57 (1.14)	-0.02 (0.24)	-0.97 (0.60)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h}$				0.76 (1.16)	0.07 (0.23)	0.76 (0.61)
$\frac{Taxcut_{h,t+1}}{Monthly\ Income_h} * 96DUM$	-2.15 (1.56)	0.10 (0.32)	0.25 (0.81)	-0.83 (1.51)	-1.07 ** (0.31)	-1.11 (0.79)
$\frac{Taxcut_{h,t}}{Monthly\ Income_h} * 96DUM$	2.93 * (1.56)	-0.08 (0.32)	0.54 (0.81)	2.60 * (1.48)	0.20 (0.31)	1.54 * (0.79)
$\frac{Taxcut_{h,t-1}}{Monthly\ Income_h} * 96DUM$				-0.83 (1.54)	0.01 (0.30)	-0.50 (0.79)
Sum of the coefficients on tax cut (exc. Interaction term)	-0.80 (1.60)	-0.11 (0.34)	0.08 (0.85)	0.34 (2.01)	0.79 (0.41)	0.74 (1.05)
Sum of the coefficients on tax cut (all)	-0.02 (1.63)	-0.09 (0.33)	0.86 (0.84)	1.27 (1.87)	-0.06 (0.38)	0.66 (0.97)
F test (exc. Interaction term) (Prob.>F)	3.27 (0.04)	0.45 (0.63)	0.28 (0.76)	1.12 (0.34)	3.38 (0.02)	2.26 (0.08)
R squared (adjusted)	0.08	0.39	0.03	0.09	0.41	0.03
s.e.e.	1.22	0.27	0.67	1.23	0.26	0.67
Number of Observation	20,731	21,605	21,352	20,962	21,786	21,548

Notes: Standard errors in parenthesis. The dependent variable is change in the log of monthly consumption by type of goods. The estimated elasticity to the tax cuts is the coefficient on tax cuts relative to monthly pre-tax income in the previous year. All regressions also include a quadratic in the age of the household head, number of family members, change in number of family members and month dummies as well as bonus and lagged current income relative to average consumption between the first month of each panel and May. All regressions include control years. The sample is 1990-1996 except 1994. ** indicates 5% level significance and * does 10% level. The null hypothesis for F test is all coefficients on tax cut relative to monthly income are zero.