

# Understanding Consumption Behavior: Evidence from Consumers' Reaction to Shopping Vouchers\*

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## Abstract

This paper advances our understanding of consumption behavior by employing a unique natural experiment, namely, the 2009 Taiwan Shopping Voucher Program, which is part of its government's fiscal stimulus package. This program is universally eligible and well publicized, and its payment to each individual is medium-sized. We apply survey techniques to collect data on household behavior in using shopping vouchers. Our estimation indicates nontrivial marginal propensity to consume. While the average marginal propensity to consume based on non-crowded-out consumption spending is about a quarter, the overall measure of the average marginal propensity to consume inclusive of out-of-pocket spending is almost one-third. Both estimates are statistically significant at conventional levels.

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# 1 Introduction

Should individuals adjust the total amount or the composition of their consumption in response to an anticipated change in their income? By the Friedman-Hall-McCurdy life cycle-permanent income hypothesis (LCPIH), the answer is negative. By the Keynesian conventions or the Thaler-Mankiw rule-of-thumb hypothesis (KCRTH), on the contrary, the answer is positive. Since the end of the 20th century, there has been a new wave of literature, devoting to testing these hypotheses using various fiscal policy changes as natural experiments. Such an endeavor is valuable not only from the economic theory perspective in understanding consumption behavior, but also from the public policy perspective in assessing whether various fiscal stimuli or tax/social security reforms may create any desirable real effects.

In this paper, we revisit this important issue by examining whether consumers in Taiwan respond to a recently implemented fiscal stimulus in the form of shopping vouchers. Taiwan's Shopping Voucher Program (TSVP) was pre-announced on December 5, 2008, and implemented on January 18, 2009, aiming to boost domestic consumption in the wake of the global economic downturn caused by the emerging financial crisis since Fall 2007. The TSVP is universal, entitling every Taiwanese citizen to receive shopping vouchers worth NT\$3,600 (approximately US\$110, about 1.05% of annual per capita family income) which cannot be cashed and have to be used up by September 30, 2009. The total distribution of the program is NT\$83.51 billion (roughly US\$2.57 billion), which is about 0.68% of Taiwan's 2008 GDP. In short, the TSVP is a fiscal stimulus leading to a temporary and anticipated income increase uniformly to all individual consumers in Taiwan. In contrast with tax rebates, the TSVP is not in the form of cash, though it yields "cash equivalence" because consumers may use the vouchers to simply pay for previously planned consumption and save the money for other purposes. However, an interesting phenomenon has been developed after the announcement of the TSVP: many vendors responded to the program with various promotions by providing consumers incentive to spend beyond the value of their vouchers and beyond their normally planned consumption items (see some examples provided in Section 2 below). Such endogenous responses by vendors break the cash equivalence nature of shopping vouchers, making the TSVP a unique natural experiment for studying consumption behavior.

To enable a fuller examination of the responses of Taiwan's consumers to the TSVP in the presence of the aforementioned vendor promotions, we apply survey techniques for our investigation. We collect individual data by telephone interviews conducted between April 15 and May 31, 2009, about 3-4.5 months since the program was implemented and 4 months prior to the deadline

of voucher redemption. A total of 3832 individuals were successfully interviewed, based on which we perform descriptive statistical analysis as well as econometric estimation.

To answer the above research questions, our survey is particularly designed to take into account the specific features of the program. Of greatest importance, we solicit information from respondents on *private-spending crowding-out effect* and *out-of-pocket spending*:

- (i) To what extent the use of shopping vouchers have “crowded out” private spending, i.e., shopping vouchers being used on previously planned consumption items?
- (ii) Whether or not the use of vouchers induces “out-of-pocket spendings” on top of shopping vouchers redeemed (where the out-of-pocket spendings refer to the additional spending incurred when using shopping vouchers)?
- (iii) Whether or not shopping vouchers generate noticeable changes in the composition of consumption?

Moreover, given the presence of promotions by vendors, we seek answers to the following question concerning the consumer’s response to such promotions:

- (i) whether or not his/her spending is induced by vendors’ promotion programs,
- (ii) his/her amount (in ranges) of spendings on various categories of consumption items (the spending amounts were asked in ranges in order to make it for respondents to answer because it is difficult for respondents to recall the exact amounts),
- (iii) whether or not his/her spendings on each category are on items which would have been purchased in the absence of shopping vouchers or in the absence of promotions by vendors, and
- (v) the amount of out-of-pocket spendings when using shopping vouchers (also in ranges).

Answers to these questions allow us to depict a respondent’s behavior in using shopping vouchers and the nature of his/her spendings.

In this study we use an econometric method which takes into consideration the nature of the data on our respondents’ amounts of shopping voucher spendings and out-of-pocket spendings, which are recorded in categories. More specifically, in our empirical analysis, we model respondents’ amounts of shopping vouchers used on each consumption category by means of the interval regression model, which is estimated jointly with models for their nature of these spendings (i.e., whether the vouchers are used on items which would have been purchased in the absence of shopping vouchers). In these models, respondents’ socioeconomic characteristics are used as explanatory variables. In addition to obtaining a set of parameters which enables us to have a better

understanding of an individual's shopping voucher usage behavior, the use of a respondent's socioeconomic characteristics to explain his/her shopping voucher spending behavior improves the efficiency of the MPC estimates.<sup>1</sup> Moreover, in order to conduct statistical inference, we derive the standard errors of our MPC estimates. Finally, to reflect the fact that a respondent may use more than the amount of shopping vouchers that he/she received from the government, we use the total amount of shopping vouchers at a respondent's disposal as weight to compute our MPC's.<sup>2</sup> That is, a higher weight is given to a respondent who has more shopping vouchers at his/her disposal because his/her shopping voucher spending behavior represents more than one person's behavior.

We find that while shopping vouchers have crowded out about three quarters of private spending, they also have generated new (or non-crowded-out) spendings inclusive of out-of-pocket spendings amounting to almost one-third of the total voucher disbursements. Moreover, in response to the TSVP, consumers shifted their consumption patterns temporarily from nondurable to durable and non-necessary services such as leisure products, dining in restaurants, touring, movies, and beauty saloons.

## 2 Related Literature

Our paper is related to the new wave of literature on studying how consumers react to large or small changes in anticipated income. The underlying empirical strategies employed by previous studies are basically of two strands, with one focusing on estimating marginal propensity to consume (MPC) and another on performing the excessive sensitivity test (EST).

Since the latter strand of literature is methodologically less relevant, our review will be brief. Based on EST, Parker (1999) establishes that (anticipated) changes in the U.S. social security cap have real effects on the consumption behavior. Similar conclusions are also reached by other economists applying the same empirical strategy to various natural experiments, including Souleles (1999) studying U.S. income tax refunds (anticipated and transitory) over 1979-1990, Stephens (2003) studying the behavior of U.S. social security recipients and Stephens (2006) studying British families' consumption responses to (anticipated) paycheck dates. On the contrary, Browning and Collado (2001) find that anticipated bonus payments (regular) to Spanish workers do not change their consumption behavior.

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<sup>1</sup>This improves the efficiency of our MPC estimates in the sense that our they have lower asymptotic standard errors.

<sup>2</sup>For example, family members may pool together their shopping vouchers to purchase an expensive item, and kids' shopping vouchers may have to be handed over to their parents.

Turning now to the strand of literature on estimating MPC, Souleles (2002) analyzes U.S. consumers' responses to Reagan's pre-announced tax cuts in 1982 and 1983 and obtains an unusually high MPC of 0.9 though with large standard errors. Using credit card data, Gross and Souleles (2002) find that while those close to the limits (i.e., likely liquidity constrained) respond more sensitively to credit supply, those well below the limits still have significantly positive MPC, with the average MPC about 10 – 14%. Hsieh (2003) shows that anticipated Alaska's Permanent Fund payments (large and regular) do not affect Alaskans' consumption behavior, though income tax refunds (small and irregular) do. He therefore concludes that when an anticipated change in income is small and irregular, consumers are more likely to respond. Using the Consumer Expenditure Survey (CEX), Johnson, Souleles and Parker (2006) identify that, in response to the U.S. tax rebates in 2001, households spent 20 – 40% of their rebates on nondurables within 3 months and about 2/3 cumulatively within 6 months. By investigating consumers' responses to the U.S. tax rebates in 2001, Agarwal, Liu and Souleles's (2007) utilize credit card data and find that consumers initially save the rebates by increasing their credit card payments, but afterward spend about 40% of the rebates cumulatively over 9 months, where the stimulated spendings are higher for those liquidity-constrained (though the estimates are mostly statistically insignificant, making it difficult for them to draw clear-cut inferences). By regressing personal consumption expenditure on its lag, the disposable personal income without tax rebates and the tax rebates, Taylor (2009) finds that the MPC is small and statistically insignificant.

The most closely related studies are Shapiro and Slemrod (2003, 2009) and Hori, Hsieh, Murata and Shimizutani (2002). While the former two are highly relevant because of the use of survey methodology, the latter is closely related due to similar types of natural experiment.

In their two research works, Shapiro and Slemrod investigate the response of consumers' spending to the U.S. tax rebates in 2001 and 2008, respectively, using survey techniques (the Survey of Consumers). They find that, in response to the U.S. tax rebates in 2001 (\$300/\$600 for single/married, about 1.5% of median annual income), only 21.8% of households receiving the rebate would spend it. In response to the more recent 2008 U.S. tax rebates (\$600/\$1,200 for single/married), about 20%, 32%, and 48% of households receiving the rebate would consume, save and pay their debt, respectively.

In Hori, Hsieh, Murata and Shimizutani (2002), they study the effects of Japan's Shopping Coupon Program implemented in 1999, which is, to our knowledge, the only large scale (nation-wide) noncash consumption stimulating program other than the TSVP examined in this paper. In that program, about US\$200 were distributed to each child and each senior citizen, which ac-

counts for about 15% of the population. Using difference-in-difference estimation, their estimated MPC is about 20 – 30% within a month, but drops to 10% 3 to 4 months after the disbursement of the vouchers. As argued in their paper, there exists Intertemporal substitution in that many consumers use coupons to pre-purchase for future consumption.

Overall, the findings in previous studies suggest that at least some consumers do respond to changes in predictable changes in income, especially when such changes are irregular and small. Except the early study by Souleles (2002) and the recent work by Taylor (2009), the MPC estimates fall in the range from 10% to 40%. Our paper contributes to this important line of research by using a unique shopping voucher program in Taiwan that is universal to all citizens. While the program leads to an irregular, medium-sized change in income, it need not be cash-equivalent due to endogenous venders' response with various promotions.

### **3 Taiwan's Shopping Voucher Program**

Taiwan's economy was hit hard by the financial tsunami broke out in Fall 2007. In response to this global economic slowdown, which culminated after the bankruptcy of Lehman Brothers in September 2008, many countries have introduced fiscal stimuli, in addition to interest rate reductions and financial liquidity injections. According to IMF (2009), fiscal stimulus plans adopted by the G20 countries amount to 0.5%, 1.5% and 1.1% of their GDP in 2009, 2010, and 2011.<sup>3</sup>

Taiwan, which depends heavily on exports, suffered severely from this world-wide recession: for example, its GDP during the fourth quarter of 2008 contracted by 8.36% year-on-year. To make up the short fall in aggregate demand, the Taiwan government launched a NT\$500 billion (approximately US\$15.38 billion) fiscal stimulus package, to be carried during 2009–2012, which is about 1.01% (annual average) of Taiwan's GDP in 2008. The Shopping Voucher Program is a major part of this stimulus package in its kickoff year: the total distribution of the program is NT\$83.51 billion (roughly US\$2.57 billion), which is about 0.68% of Taiwan's 2008 GDP.

The TSVP was approved and pre-announced on December 5, 2008, for implementation starting January 18, 2009. The program is universal, applied to all citizens of the Republic of China born before March 31, 2009. Each citizen is eligible to receive shopping vouchers worth NT\$3,600 (approximately US\$110). The vouchers are in two denominations: 6 in NT\$500 and 3 in NT\$200 – no change was provided for purchases smaller than the denomination. While the vouchers can-

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<sup>3</sup>These figures represent PPP weighted average.

not be cashed, they are fully transferable. Shopping vouchers are expired after September 30, 2009. The vouchers could be used for the purchase of all kinds of goods and services, and at registered or non-registered businesses, except the following items: (i) payment for public utilities (e.g., water and electricity), (ii) payment for loan principal/interest, bank fees and credit card bills, (iii) purchase of stocks, corporate bonds, warrants, beneficiary certificates, insurance policies, and other financial products, (iv) payment of fines, statutory penalties, taxes, fees payable to the government, labor insurance premiums, health insurance premiums, and national pension premiums, and (v) purchase from non-registered businesses.<sup>4</sup>

The distribution of shopping vouchers are carried out in several waves. The first wave, eligible recipients could collect their shopping vouchers at specific locations on January 18, 2009. In the second wave, shopping vouchers could be collected at any branch of the post office between Feb 7 to April 30. More than 91% of eligible recipients collected their shopping vouchers on the first day of issuance. By the time when our survey was conducted, more than 99% of the vouchers have been distributed.

In response to this consumption stimulus, many Taiwanese vendors set forth various promotions to enhance consumers' incentives to spend beyond the value of their vouchers in hand and to go beyond their normally planned consumption items. To illustrate this interesting phenomenon, let us provide some concrete examples. Some famous hotels offered 50% discount as long as a NT\$500 voucher is used as part of the payment.<sup>5</sup> One of the top wedding management company (wedding planning, gown-designing/renting, photo-shooting, catering, etc.) offered 75% discount with use of NT\$3,600 vouchers (i.e., the entire distribution to each citizen).<sup>6</sup> Many consumer durables can be purchased with vouchers with 20–50% discount, where the discount was particularly attractive for off-season goods (air condition at the early stage of the voucher distribution and space heater at the later stage of the distribution). Similar promotions have been offered by many beauty shops, make-up stores, jewelry/watch companies, as well as by many entertainment businesses. It has been reported that, to take advantage of such voucher-tied promotions, some individuals paid an *upcount* to exchange cash for vouchers, that is, the relative price of vouchers to currency has exceeded one at times. These promotions break the cash equivalence nature of

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<sup>4</sup>That is, only merchants with valid business registration would be able to redeem the vouchers at banks. Nonetheless, in practice, non-registered businesses also accepted vouchers and used them to purchase goods or services from registered businesses.

<sup>5</sup>One of the co-authors, who knows the future tax implications, took advantage of such promotions, enjoying a two-day hot-spring vacation on the east coast of Taiwan that would have not been taken without the voucher-tied promotion.

<sup>6</sup>With the promotion, one of the co-authors' niece decided to outsource her marriage to a top wedding management company rather than self-coordinating the event.

shopping vouchers, making the TSVP a unique natural experiment for studying how consumers respond to such types of fiscal stimulus.

Table 1: Summary of Various Fiscal Stimulus Programs

<b>Program</b>	<b>% of Eligibility</b>	<b>Payment (US\$)</b>	<b>Total Outlay</b>	<b>% of GDP</b>	<b>Restrictions</b>
2001 U.S. Tax Rebates	7.2% (less than \$600) 25.9% (\$600)	\$300–600	38 billion	0.4%	—
2008 U.S. Tax Rebates	38.8% <sup>†</sup>	\$600–1,200 <sup>‡</sup>	95.7 billion	1.3%	—
1999 Japan Consumption Coupons	25%	\$200	6.21 billion	0.12%	(a) minimum denomination: US\$10 (b) expired in 7 months
2009 Taiwan Shopping Vouchers	100%	\$110	2.57 billion	0.68%	(a) minimum denomination: US\$6.5 (b) expired in 8.5 months

<sup>†</sup>This is calculated based on the number of individuals having received the 2008 rebates (120 million) reported by Sahm, Shapiro, and Slemrod (2009).

<sup>‡</sup>In addition to the \$600–1,200 tax rebates, those with dependent children received an additional three hundred dollars per child.

In Table 1 below, we summarize some key features of the TSVP and compare the program with the Japanese Consumption Coupon Program and the 2001 and 2008 U.S. Tax Rebate Programs. We see in Table 1 that the TSVP, under which all citizens are eligible to receive vouchers of the same value, has a much broader coverage than other stimulus programs. While the payments of the two U.S. tax rebates programs depends on tax-paying status and income, only children 15 or younger or adults 65 or above are eligible to the Shopping Coupons programs. As the MPC would depend crucially on income and demographic composition in the household, full coverage of the TSVP enable us to estimate the MPC of the whole population.

In terms of total outlay as a percentage of GDP, compared with other programs, the scale of the TSVP, second only to the 2008 U.S. tax rebates program, is large. Moreover, while the U.S. tax rebate programs impose no restrictions on the use of the rebates, the TSVP imposes similar restrictions on the use of the vouchers as 1999 Consumption Coupons Program in Japan. The contrast in restrictions between the TSVP and the U.S. tax rebates programs makes it interesting to contrast the estimated MPC generated by these programs. The MPC generated by these different programs will yield implications on the design of an effective stimulus policy.



## 4 The Survey

We collect data using a telephone interview survey which was conducted through the Center for Survey Research of Academia Sinica. For the survey, the unit of analysis is the individual. The sample frame of the survey consists of all adults (i.e., 18 or above) who have a telephone in their residence. Our survey uses a multistage sampling scheme, where a subsample is selected from region (a county or a city). There are totally 23 counties and cities. The the proportion of individuals drawn from a region is proportional to its population size. Random subsamples for each region is drawn from the 2004–2005 version of the Chunghwa Telecom Inc. telephone directory, which cover all listed numbers.<sup>7</sup> Because some numbers are not listed and new numbers are not covered by the version of telephone directory that we use, to improve the representativeness of the set of telephone numbers drawn, for each number drawn from the electronic telephone directory, we substitute the last two digit with a random number.<sup>8</sup>

The second stage of our multistage sampling scheme involves within-household sampling. That is, from all the individuals above 18 in a household we random select one individual as an interviewee. For this purpose, we have prepared a set of tables, and conditional on the number of male and female qualified individuals in a household each table specifies which individual is to be selected as an interviewee. The selection of which table to be used for the within-household sampling is by the last two digits of a household's telephone number.

The targeted sample size is 4,000. The actual number of interviews completed is 3,832. Each interview took an average of 19 minutes and 17 seconds. All of these 3,832 respondents had collected their shopping vouchers. After deleting sample individuals with missing observations, we end up with 3,792 individuals in our sample, and 3,291 (86.79%) of them had used shopping vouchers or had shopping vouchers at their disposal, and 2,552 (67.30%) of them had actually used their shopping vouchers. For reference purposes, our survey questionnaire is provided in Appendix A.

To solicit information about how an interviewee use his/her shopping vouchers, we asked what

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<sup>7</sup>Chunghwa Telecom is the sole provider of fixed-line local telephone services in Taiwan.

<sup>8</sup>This may yield telephone numbers which are not in service, thus increasing the cost of the survey.

they have bought or how these shopping vouchers were used among 14 categories. Namely,

- ⟨ 1 ⟩ grocery,
- ⟨ 2 ⟩ household necessities (e.g., personal care products, kitchen supplies and utensils),
- ⟨ 3 ⟩ consumer durables (e.g., consumer electronics, furniture, electric appliances, cookware, automobiles, bicycles),
- ⟨ 4 ⟩ apparel and accessories, jewelry, home decor,
- ⟨ 5 ⟩ toys, books, magazine, CDs, and DVDs,
- ⟨ 6 ⟩ services (consumption at restaurants, barber shops, beauty saloon, traveling, etc),
- ⟨ 7 ⟩ drugs, health and fitness products,
- ⟨ 8 ⟩ tuition,
- ⟨ 9 ⟩ transportation fares,
- ⟨ 10 ⟩ rents,
- ⟨ 11 ⟩ donation,
- ⟨ 12 ⟩ as gifts to other people,
- ⟨ 13 ⟩ exchanging for cash with somebody else, and
- ⟨ 14 ⟩ other uses.

We exclude a individual from our sample if he/she indicated that his/her shopping vouchers were (a) donated, (b) given to other people, (c) exchanged for cash with somebody else, or (d) used in other ways. A total of 154 respondents were excluded.

To understand the nature and value of the spending using shopping vouchers, we asked a respondent to indicate whether or not a purchase would have been made even without the shopping vouchers and the value. Ideally respondents should be asked about the nature and value of spending for each of the categories ⟨ 1 ⟩ to ⟨ 10 ⟩. However, this is not practical for telephone interviews where respondents may hang up or may not response seriously if the questions are too tedious or hard to answer. Instead of asking the respondents about the nature and quantity for each of categories ⟨ 1 ⟩– ⟨ 10 ⟩, we group these categories into broader categories and asked about the nature and total value on the basis of these broader categories. The ten categories are grouped into four broader categories that are largely consistent with the *Family Income and Expenditure Survey*, Directorate-General of Budget, Accounting and Statistics (DGBAS), Taiwan, R.O.C.<sup>9</sup>

- ⟨ A ⟩ household necessities (i.e., categories ⟨ 1 ⟩ and ⟨ 2 ⟩),
- ⟨ B ⟩ durables and non-necessities (i.e., categories ⟨ 3 ⟩, ⟨ 4 ⟩, and ⟨ 5 ⟩),
- ⟨ C ⟩ services (i.e., category ⟨ 6 ⟩),
- ⟨ D ⟩ rent, tuition, drugs, and fares (i.e., categories ⟨ 7 ⟩– ⟨ 10 ⟩).

For value of each category of spending and the total value of shopping vouchers used, instead of asking for the exact amount, we ask a respondent to select a range within which the actual amount falls.

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<sup>9</sup>The government uses the *Family Income and Expenditure Survey* to construct the CPI and monitor income distribution across households.

Table 2: General Description of the Sample

<b>Sample size after deleting missing values</b>	3615
<b>Number of sample individuals who:</b>	
• have used or have shopping vouchers at disposal	2985
• have used shopping vouchers	2887
• Frequency of use in different categories:	
◦ have spent on $\langle A \rangle$ (i.e., grocery and household necessities)	1915 (66.33%)
· purchase would have been made even without shopping vouchers	81.41%
◦ have spent on $\langle B \rangle$ (i.e., durables)	1601 (55.46%)
· purchase would have made even without shopping vouchers	61.96%
◦ have spent on $\langle C \rangle$ (i.e., services)	651 (22.55%)
· purchase would have been made even without shopping vouchers	57.91%
◦ have spent on $\langle D \rangle$ (i.e., rent, tuition, drug, or fares)	452 (15.66%)
· purchase would have been made even without shopping vouchers	100% (assumed)

As reported in Table 2, there is some inconsistency between the total amount of shopping vouchers received and used, and the amount spent on each category of  $\langle A \rangle$ – $\langle C \rangle$ . For example, while no respondent indicates having received or used shopping vouchers worth more than NT\$20,000, there are 19, 28 and 1 respondents, respectively, indicating they have used shopping vouchers worth more than NT\$20,000 on categories  $\langle A \rangle$ ,  $\langle B \rangle$  and  $\langle C \rangle$ . It is likely that this is an recall errors arising from the respondents' mixing up of the total amount of the purchase (shopping vouchers and cash) and the amount of shopping vouchers used. However, there are not many such cases.

The nature of purchase using shopping vouchers for spending categories  $\langle A \rangle$ – $\langle C \rangle$  is reported in Table 2. As expected the purchase of household necessities including grocery has the highest rate of crowding. For those having used shopping vouchers on household necessities, 81.41% indicate that they would have purchased the same things even without the shopping vouchers. For the purchase of consumer durables/nonnecessities and services, the rate of crowding out is more moderate. In the our sample, 61.96% and 57.91%, respectively, respondents indicate that their purchase of consumer durables/nonnecessities and services would have been made irrespective of receiving shopping vouchers.

When making a purchase using shopping vouchers, an individual may also spending some money out-of-pocket, particularly when responding to venders' promotions or being not forward-looking. This is also possibly to have happened because shopping vouchers are only in two denominations, NT\$200 and NT\$500, and shops were not allowed to give change when shopping

vouchers were used. In the survey, respondents were asked how much they have spent out-of-pocket when using their shopping vouchers. The distribution of such spendings is exhibited in Table B1. As expected a majority of our sample respondents (84.56%) have spent extra amount of money when using their shopping vouchers. However, the amount of these spendings is not very large. Among those who have spent out-of-pocket money, over twenty percent of them have spent more than NT\$4,000 out-of-pocket. We note that among respondents who indicated having used shopping vouchers there is a nontrivial proportion (11.95%) where their out-of-pocket amounts are missing because they answered “don’t know” to the question soliciting this. It is likely that “don’t know” is due to the difficulty in recalling the exact amount and this is most likely when the amount is small. In our empirical analysis, we will control for these missing values in order to prevent them from biasing our results.

In addition to the above questions and some standard questions concerning income, education and family demographics, our survey also includes several specially designed questions to better understand the consumption behavior in response to the TSVP. We asked whether the respondent’s consumption expenditure exceeded his/her planned amount. While more than half responded negatively, 38.4% reported excessive spending. We then asked specifically whether the respondent’s purchase is induced by shopping vouchers, or by vendors’ promotions (or by both). Interestingly, only 10.5% and 6.4% of household necessities were induced by shopping vouchers and vendors’ promotions, respectively. In contrast, the corresponding figures for durables/nonnecessities are 25.7% and 9.8%, respectively, whereas those for services are 24.6% and 15.7%, respectively, much larger than the comparable figures for household necessities. To further assess the roles played by the income effect of shopping vouchers and vendors’ promotions in stimulating private spending, we asked in the survey how the respondent would respond in a hypothetical scenario where shopping vouchers (NT\$3,600 per person ) are disbursed again in Fall 2009. Among all respondents with definite answers, 68.5% intended to purchase previously planned items, 4.0% to purchase unplanned goods/services, and 27.5% to purchase both types of items. We further asked hypothetically whether the respondent might increase consumption as a result of a reduction in the income tax rate or a hypothetical income tax rebate. Among all with definite answers, 22.7% replied positively in response to an income tax cut, whereas 77.3% responded negatively. Concerning a hypothetical tax rebates program, 55.0% of respondents with definite answers intended to use the tax rebates to purchase previously planned items, 5.7% to purchase unplanned goods/services, 14.1% to save or invest (which is not an option with shopping vouchers), and 25.2% to have a combination of all uses. By comparing these responses with that to the hypothetical question on a second shopping voucher program, it is clearly seen that those intended to

purchase previously planned items with vouchers are now split between planned purchases and the saving/investment options.

To detect whether the respondent is currently financially constrained, we asked whether he/she has recently experienced any earning shortfall (the first quarter of 2009 relative to the last quarter of 2008). Among all respondents giving a definite response, 25.4% reported having experienced a severe shortfall and 11.9% reported a moderate one. We view those with positive earning up to NT\$20,000 monthly income (about 1/6 of the sampled respondents) who have recently experienced a severe shortfall as being financially constrained—they account for 7.3% of the respondents. The construction of this financially constrained group is useful as it is likely that they are more responsive to the TSVP.

To detect whether a respondent is currently pessimistic about the future, we asked whether he/she was generally pessimistic about the Taiwan economy in 2010 as well as specifically whether he/she is pessimistic about the family financial status. Among all definitive respondents, 12.2% were very optimistic about the future economy whereas 16.8% were very pessimistic, with the remaining 71.0% not feeling strongly one way or the other. Concerning their next year family financial status, 21.2% felt optimistic and 21.5% felt pessimistic, with the rest (57.3%) feeling indifferent from their current status. By two different sets of answers, we can categorize the respondents into optimistic, neutral and pessimistic groups. It is expected that a forward-looking rational consumer would have lower MPC if he/she is pessimistic and higher MPC if he/she is optimistic.

Finally, to detect whether the respondent is aware of the future tax implications of the TSVP, we asked whether he/she agreed that the implementation of the TSVP would widen the government budget deficit. While 45.7% of respondents agreed or agreed strongly, 40.7% disagreed or disagreed strongly. This may indicate that not all but still a substantial fraction of the respondents are Ricardian consumers, being aware of the future tax implications of the fiscal stimulus. We further asked whether the respondent agreed with another round of shopping voucher disbursement. Some what surprisingly, 57.3% of respondents agreed or agreed strongly whereas 36.6% disagreed or disagreed strongly. The lower number in disapproval than acknowledging the future tax implications (by about 9%) suggests that some individuals preferred to have the TSVP despite they likely know that their lifetime wealth is basically unchanged. By cross-group analysis, we find them not necessarily financially constrained. Such responses, if they are behaviorally self-consistent, are likely to be caused by hyperbolic preferences with which individuals tend to discount heavily against the future.

## 5 Basic Statistical Analysis

Prior to formal, systematic econometric estimation, it is informative to conduct some basic statistical exercises. To begin, we provide the summary statistics of our survey data as follows.

Two observations based on the summary statistics are noteworthy. From Table 3, we see that the average family size of our respondents is about 4.10, slightly higher than the comparable figure of the 2008 DGBAS data of 3.35. Moreover, while about 61.2% of our respondents are employed (the comparable DGBAS figure is 55.9%), about 15.4%, 58.5% and 26.1%, respectively, are elementary or lower, high school (including vocational and junior college), and 4-year college or above (the comparable DGBAS figures are 10.2%, 66.8% and 23.0%, respectively). Thus, a slightly larger fraction of our respondents are employed and better-educated. Overall, we view the sample of our respondents as reasonably representative.

We then summarize in Table 4 the proportions of respondents spending on various categories of consumption items by (a) income groups and (b) expectations about the future of the Taiwan economy (see the discussion of constructing the two groups in expectations about the future in Section 4 above). We can see that, by ignoring the no-income group (which includes the retired), the higher the respondent's income is, the more he/she spends on durables/non-necessities (category  $\langle B \rangle$ ) and services (category  $\langle C \rangle$ ). When the respondent is more optimistic about the future, he/she tends to spend more on durables/non-necessities and services. Moreover, we also report in Table 4 the amount of out-of-pocket spending by income and expectations about the future. The results indicate that those with higher income or more optimistic expectations about the future incur larger out-of-pocket spending.

## 6 Empirical Strategy and Estimation Results

In this section, we delineate the empirical strategy and present the econometric estimation results. We also attempt to provide economic theoretical reasoning toward understanding how consumers behave in response to a fiscal stimulus in the form of noncash distributions.

### 6.1 Empirical Strategy

The main purpose of our empirical analysis is to examine consumers' responses to the TSVP in a systematic fashion. In particular, we estimate the increase in private consumption induced by

Table 3: Summary Statistics

<b>Variable</b>	<b>Definition</b>	<b>Mean (Std. Dev.)</b>
age30	Respondent's age below 31.	0.212 (0.409)
age40	Respondent's age 31–40.	0.275 (0.447)
age50	Respondent's age 41–50.	0.198 (0.399)
age60	Respondent's age 60 or above.	0.178 (0.383)
shopper	Respondent is the main shopper of the household.	0.646 (0.478)
female	Respondent is female	0.532 (0.499)
nkid	Number of children in household.	0.739 (1.001)
nparent	Number of respondent's parents or in-laws in household.	0.527 (0.819)
married	Respondent is married.	0.699 (0.459)
single	Respondent is single.	0.189 (0.392)
nreceipt	Number of individuals eligible to receive shopping vouchers.	4.098 (1.952)
work	Respondent has a job.	0.612 (0.487)
swork	Respondent's spouse has a job.	0.425 (0.494)
fincome	Respondent and spouse's total labor income.	3.673 (6.126)
mfincome	fincome missing.	0.095 (0.293)
incdec	Respondent experienced a drop in labor income.	0.150 (0.358)
elem	Education of respondent: elementary school or less.	0.154 (0.361)
college	Education of respondent: college.	0.261 (0.439)
north	Respondent live in the northern part of Taiwan.	0.457 (0.498)
central	Respondent live in the central part of Taiwan.	0.259 (0.438)
south	Respondent live in the southern part of Taiwan.	0.188 (0.391)
east	Respondent live in the eastern part of Taiwan.	0.0888 (0.284)
economyvb	Expect Taiwan's economy to do very well.	0.150 (0.357)
economyvg	Expect Taiwan's economy to be very bad.	0.111 (0.314)
fiscal	The shopping voucher program will exacerbate Taiwan's fiscal problem.	0.456 (0.498)
<b>Observations</b>		<b>3615</b>

Table 4: Proportion of Respondents Spending on Each Category and Out-of-pocket Spending\*

Subsample	Observations	Expenditure Category			Out-of-pocket spending
		$\langle A \rangle$	$\langle B \rangle$	$\langle C \rangle$	
<b>By income Group</b>					
No income	818	0.7535 (0.4313)	0.5354 (0.4991)	0.1932 (0.3951)	0.6737 (0.4692)
1st quartile	457	0.7700 (0.4214)	0.6666 (0.4720)	0.1862 (0.3897)	0.7812 (0.4139)
2nd and 3rd quartiles	917	0.7561 (0.4297)	0.7111 (0.4535)	0.3016 (0.4592)	0.8424 (0.3646)
4th quartile	420	0.6754 (0.4688)	0.7259 (0.4466)	0.3581 (0.4800)	0.8495 (0.3580)
<b>By expectations about the economy in 2010</b>					
Optimistic	1405	0.7366 (0.4407)	0.6329 (0.4822)	0.2349 (0.4241)	0.7414 (0.4380)
Pessimistic	1473	0.7362 (0.4408)	0.6885 (0.4633)	0.3034 (0.4599)	0.8278 (0.3777)

\*Standard errors in parentheses.

the shopping voucher program that are non-crowded out and that feature out-of-pocket spending.

Denote  $v_{ji}$  as individual  $i$ 's total amount of shopping voucher used on category  $\langle j \rangle$  and  $s_{ji}$  as the proportion of crowded out spending when using shopping vouchers to make the purchase.<sup>10</sup> Further denote  $v_{Xi}$  as the amount of out-of-pocket spending incurred by individual  $i$ ,  $v_{Ui} \equiv \sum_{j \in \{A, B, C, D\}} v_{ji}$  as the total value of shopping vouchers that  $i$  has used, and  $v_{Ti}$  as the total value of shopping vouchers at  $i$ 's disposal.

If we had information on  $v_{ji}$  and  $s_{ji}$ , we could compute the ratio of non-crowded-out spending to the total value of his/her shopping voucher as:<sup>11</sup>

$$n_i = \sum_j \frac{v_{ji}}{v_{Ui}} (1 - s_{ji}), \quad j = \{A, B, C\},$$

which is a weighted average of  $(1 - s_{ji})$ . The estimated value of  $n_i$ , denoted by  $\hat{n}_i$ , is a measure of the MPC. The sample average of  $\hat{n}_i$  is denoted by  $\hat{n}_\mu$ .

In addition, due to the presence of voucher-tied promotions by vendors, a more accurate measure of the effect of shopping vouchers is the overall measure of consumption induced by one dollar's worth of shopping vouchers taking into account the amount of out-of-pocket spending,

<sup>10</sup>This measures the spending that would have been undertaken even without the shopping voucher program.

<sup>11</sup>Recall that all purchases in category D feature 100% crowding-out.



which is given by,

$$m_i = \frac{\sum_{j \in \{A, B, C\}} (1 - s_{ji}) v_{ji} + n_i v_{xi}}{v_{ui}},$$

which is a better measure of the MPC. The sample average of the estimate  $\hat{m}_i$  is denoted by  $\hat{m}_\mu$ . This more adequate overall measure will be referred to as the total MPC.

Below we explain how these MPC measures are estimated. The rate of overall induced consumption spending  $m_i$  is a function of  $v_{ji}$  and  $s_{ji}$ , where  $j \in \{A, B, C, D, X, U, T\}$ . In the survey we asked our respondents to indicate the range of the value of shopping voucher that he/she has spent on a category of items. A respondent can select from 30 categories, the first indicates that the spending was 0, and the last indicates that the spending was NT\$20,001 or above (see Table B-1 in Appendix B). For our empirical analysis we need to convert these categorical answers into a continuous variable. One can do that by using the mid-point of each range. However, this is not precise and cannot handle cases when a respondent indicates that his/her spending is NT\$20,001 or above.

In the current study, we convert these categorical answers into a variable by first estimating fitting interval regression to these categorical answers and then compute their expected values based on the estimation result. We assume that the unobservable variable  $v_{ji}$  is a linear function of controls summarized by the vector,  $\mathbf{x}_{ji}$ :

$$v_{ji} = \mathbf{x}_{ji} \boldsymbol{\beta}_j + e_{ji}^v, \quad (1)$$

where  $e_{ji}^v$  is assumed to be a normally distributed error term with variance  $\sigma_j^2$ . Denoting the categorical variable  $v_{ji}^o$  to indicate the shopping value of spending group  $j$ , we can then specify the relationship between  $v_{ji}$  and  $v_{ji}^o$  below:

$$v_{ji}^o = r \text{ if } \theta_i^{r-1} < v_{ji} < \theta_i^r \text{ or } \theta_i^{r-1} - e_{ji}^v < \mathbf{x}_{ji} \boldsymbol{\beta}_j < \theta_i^r - e_{ji}^v. \quad (2)$$

where  $r \in \{1, 2, \dots, 31\}$  indicates the range where  $v_{ji}$  falls, and  $\{\theta_i^{r-1}, \theta_i^r\}$  denote the upper and lower limits of range  $r$ , with  $\theta_i^0 = 0$  and  $\theta_i^{31} = \infty$  by construction.

In estimating  $\boldsymbol{\beta}_j$  and  $\sigma_j^2$ , we take into account zeros in  $v_{ji}$  by means of a two-part specification, where zero values of  $v_{ji}$  are modeled by means of binary choice as follows:

$$d_{ji} = \begin{cases} 1, & \text{if } \mathbf{x}_{ji} \boldsymbol{\alpha}_j + e_{ji}^d \geq 0 \\ 0, & \text{otherwise,} \end{cases} \quad (3)$$

where  $e_{ji}^d$  is assumed to be standard normally distributed and  $\boldsymbol{\alpha}_j$  is a vector of parameters to be estimated. It is noted that the error term in (3) is assumed to be independent of other error terms,

implying that the specification of (3) does not have any statistical implications on the estimates of other parameters. The estimation of (3) is mainly for the purpose of understanding consumers' behavior when using shopping vouchers.

Moreover, we attempt to control for missing values in  $v_{Xi}$  by modeling the incidence of a missing value and allowing for a correlation between the incidence of a missing value and  $v_{Xi}$ . Letting  $k_i$  be an indicator for the incidence of a missing value for  $v_{Xi}$ , we model  $k_i$  as:

$$k_i = \begin{cases} 1, & \text{if } \mathbf{x}_i \boldsymbol{\delta}_j + e_i^k \geq 0 \\ 0, & \text{otherwise,} \end{cases} \quad (4)$$

where  $e_i^k$  and  $e_{Di}^d$  are allowed to be correlated with their correlation coefficient being denoted by  $\rho$ .

The parameters  $\{\boldsymbol{\beta}_j, \sigma_j\}$  can now be estimated by maximizing the likelihood function  $\sum_i \log L_i^v$  with

$$\begin{aligned} L_i^v = & \left\{ \prod_{j \in \{A, B, C, X\}} \left[ \Phi \left( \frac{\theta_j^r - \mathbf{x}_i \boldsymbol{\beta}_j}{\sigma_j} \right) - \Phi \left( \frac{\theta_j^{r-1} - \mathbf{x}_i \boldsymbol{\beta}_j}{\sigma_j} \right) \right]^{d_{ji}} \times \Phi \left( \mathbf{x}_i \boldsymbol{\alpha}_j \times (2 v_{ji}^o - 1) \right) \right\}^{d_{U_i} \times (1 - k_i)} \\ & \times \left\{ \left[ \Phi_b \left( \frac{\theta_U^r - \mathbf{x}_i \boldsymbol{\beta}_U}{\sigma_U}, -\mathbf{x}_i \boldsymbol{\delta}; \rho \right) - \Phi_b \left( \frac{\theta_j^{r-1} - \mathbf{x}_i \boldsymbol{\beta}_U}{\sigma_j}, -\mathbf{x}_i \boldsymbol{\delta}; \rho \right) \right]^{d_{U_i} \times (1 - k_i)} \right. \\ & \quad \left. \times \Phi \left( \mathbf{x}_i \boldsymbol{\delta} \right)^{k_i} \times \Phi \left( \mathbf{x}_i \boldsymbol{\delta}_j \right)^{k_i} \times \Phi \left( \mathbf{x}_i \boldsymbol{\alpha}_j \times (2 d_{U_i} - 1) \right) \right\}^{d_{T_i}} \\ & \times \left[ \Phi \left( \frac{\theta_T^r - \mathbf{x}_i \boldsymbol{\beta}_T}{\sigma_T} \right) - \Phi \left( \frac{\theta_j^{r-1} - \mathbf{x}_i \boldsymbol{\beta}_T}{\sigma_j} \right) \right]^{d_{T_i}} \times \Phi \left( \mathbf{x}_i \boldsymbol{\alpha}_j \times (2 d_{T_i} - 1) \right), \end{aligned} \quad (5)$$

where  $\Phi(\cdot)$  and  $\Phi_b(\cdot)$ , respectively, denote the univariate and bivariate standard normal cumulative density functions. Conditional on the estimates  $\{\boldsymbol{\beta}_j, \sigma_j\}$ ,  $v_{ji}^o$ , and  $\mathbf{x}_i$ , the predicted value of  $v_{ji}$  can be computed as:

$$\hat{v}_{ji} = \mathbf{x}_i \hat{\boldsymbol{\beta}}_j + \frac{\phi \left( \frac{\theta_{ij}^r - \mathbf{x}_i \hat{\boldsymbol{\beta}}_j}{\hat{\sigma}_j} \right) - \phi \left( \frac{\theta_{ij}^{r-1} - \mathbf{x}_i \hat{\boldsymbol{\beta}}_j}{\hat{\sigma}_j} \right)}{\Phi \left( \frac{\theta_{ij}^r - \mathbf{x}_i \hat{\boldsymbol{\beta}}_j}{\hat{\sigma}_j} \right) - \Phi \left( \frac{\theta_{ij}^{r-1} - \mathbf{x}_i \hat{\boldsymbol{\beta}}_j}{\hat{\sigma}_j} \right)}, \quad (6)$$

where  $\phi(\cdot)$  stands for the standard normal density function.

In the survey, we have solicited information on whether the spending on a category of items using shopping vouchers would have been made even without the program. The answer to this question is binary (yes/no). This piece of information could have been utilized by assuming that respondents indicating "yes" would have undertaken 100% of the spending. Alternatively and more reasonably, a respondent indicating "yes" implies that over half of the spending on a category of items would be undertaken irrespective of the shopping voucher program. The latter

approach is taken in our analysis. The main advantage of this approach is that it yields more efficient estimates of  $\hat{n}_i$  and  $\hat{m}_i$ . This is because with some of the variation in  $s_{ji}$  captured by  $\mathbf{x}_i$ , the variances of  $\hat{n}_i$  and  $\hat{m}_i$  are lower.

Assume that there is a latent variable  $s_{ji}^*$  which indicates the likelihood of spending the shopping vouchers on purchases which would not have been made without receiving shopping vouchers, specified as a linear function of  $\mathbf{x}_i$ :

$$s_{ji}^* = \mathbf{x}_i \boldsymbol{\gamma}_j + e_{ji}^s, \quad j = \{A, B, C\}, \quad (7)$$

$$s_{ji} = \begin{cases} 1, & \text{if } s_{ji}^* \geq 0 \\ 0, & \text{otherwise,} \end{cases} \quad (8)$$

where  $s_{ji}$  denotes the variable pertaining to “whether the spending would have undertaken even without the shopping voucher program”,  $e_{ji}^s$  is a standard normally random variable, and  $\boldsymbol{\gamma}_j$  is a vector of coefficients to be estimated. The proportion of spending which would have been undertaken even without the shopping voucher program is thus given by,

$$\hat{s}_{ji} = \Phi(\mathbf{x}_i \hat{\boldsymbol{\gamma}}_j). \quad (9)$$

It is noted that, according to this specification, the proportion of out-of-pocket spending is greater than 50% if  $s_{ji}^* > 0$ , which implies that  $s_{ji} = 1$  according to (8).

We estimate the parameters  $\{\beta_j, \sigma_j\}$  and  $\boldsymbol{\alpha}_j$  jointly with  $\boldsymbol{\gamma}_j$  by maximizing the log likelihood function:

$$\log L = \sum_i \log \left[ L_i^v \times \prod_{j \in \{A, B, C\}} \Phi(\mathbf{x}_i \boldsymbol{\gamma}_j \times (2s_{ji} - 1))^{d_{ji}} \right]. \quad (10)$$

In the data there are cases where the estimate of a respondent’s sum of spending for the three categories of consumption is greater than the estimate of the total shopping voucher spending reported by him/her. To rectify this inconsistency problem, in computing the MPC’s we make the following adjustments when the sum of estimates of spendings on categories  $\langle A \rangle - \langle C \rangle$  is greater than the estimate of total spending:

- (i) We use the sum of estimates of voucher spendings on categories  $\langle A \rangle - \langle C \rangle$  i.e.,  $\sum_{\{A, B, C\}}^j \hat{v}_j$ , as the total voucher spendings for respondents who reported having spent no vouchers on category  $\langle D \rangle$  (spendings on rent, tuition, drugs, transportation fares, etc).
- (ii) We delete an observation when the respondent reported having spent on category  $\langle D \rangle$  and the sum of estimates of voucher spendings on categories  $\langle A \rangle - \langle C \rangle$  is greater than the estimate of total voucher spending (i.e.,  $\sum_{\{A, B, C\}}^j \hat{v}_j > \hat{v}_U$ ) because the inconsistency cannot be resolved.

Thus, we take the estimate of the total voucher spending  $\hat{v}_U$  as the total voucher spending in calculating our MPC's only when the estimate of total voucher spending is greater than the sum of estimates of spendings on categories  $\langle A \rangle - \langle C \rangle$ . There are 627 cases among the 2887 respondents in the sample requiring adjustments, among which 44 respondents are discarded because the inconsistency cannot be resolved.

We use  $\hat{v}_{Ti}$  as weights to compute the sample average of  $\hat{m}_i$  and  $\hat{n}_i$ , which are our measures of the MPC:

$$\hat{n}_\mu = \frac{\sum_i \hat{v}_{Ti} \hat{n}_i}{\sum_i \hat{v}_{Ti}}, \quad \hat{m}_\mu = \frac{\sum_i \hat{v}_{Ti} \hat{m}_i}{\sum_i \hat{v}_{Ti}}. \quad (11)$$

It is worth emphasizing that while  $\hat{m}_\mu$  is an overall measure of MPC because it takes into account out-of-pocket spending,  $\hat{n}_\mu$  is a more conventional narrow measure since it only accounts for spendings using shopping vouchers.

To measure the precision of the estimates  $\hat{n}_\mu$  and  $\hat{m}_\mu$ , we compute their variance  $\sigma_{\hat{n}}^2$  and  $\sigma_{\hat{m}}^2$ . We do that by means of the delta method. We note that  $\hat{n}_\mu = N(\hat{\theta})$  and  $\hat{m}_\mu = M(\hat{\theta})$  are functions of the parameter estimates:

$$\hat{\theta} \equiv \{\hat{\beta}_A, \dots, \hat{\beta}_T, \hat{\alpha}_A, \dots, \hat{\alpha}_T, \hat{\delta}, \hat{\gamma}_A, \dots, \hat{\gamma}_C, \sigma_A, \dots, \sigma_T, \hat{\rho}\}.$$

Let  $\mathbf{V}(\hat{\theta})$  denote the variance-covariance matrix of  $\hat{\theta}$ . The variances  $\sigma_{\hat{n}}^2$  and  $\sigma_{\hat{m}}^2$  are therefore obtained by

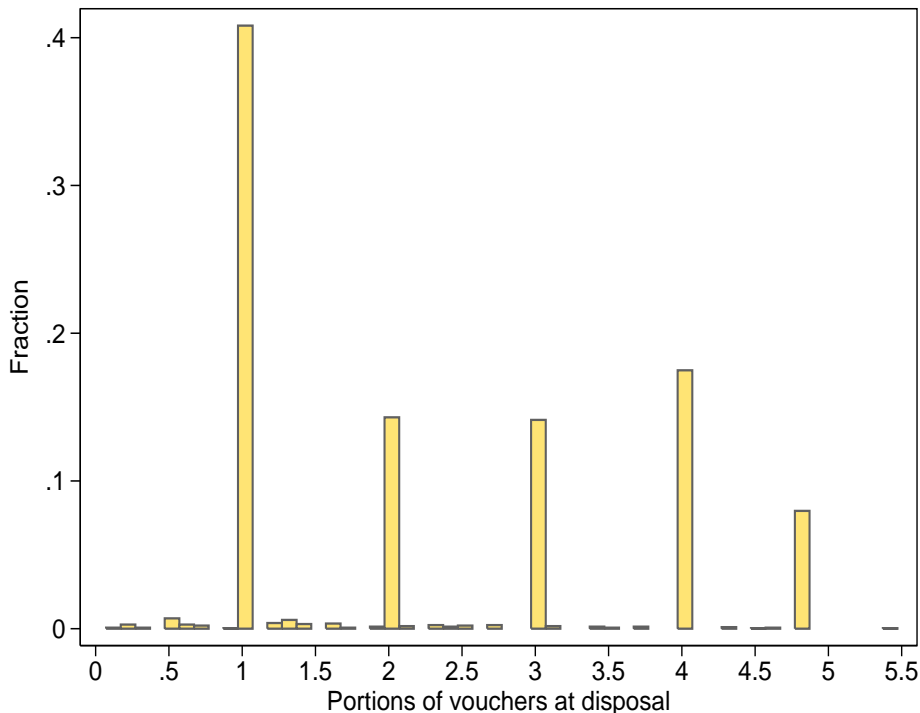
$$\sigma_{\hat{n}}^2 = \left[ \frac{\partial N(\hat{\theta})}{\partial \hat{\theta}} \right]' \mathbf{V}(\hat{\theta}) \left[ \frac{\partial N(\hat{\theta})}{\partial \hat{\theta}} \right], \quad \sigma_{\hat{m}}^2 = \left[ \frac{\partial M(\hat{\theta})}{\partial \hat{\theta}} \right]' \mathbf{V}(\hat{\theta}) \left[ \frac{\partial M(\hat{\theta})}{\partial \hat{\theta}} \right]. \quad (12)$$

## 6.2 Estimation Results

We relegate the detailed econometric estimates  $\hat{\theta}$  in an appendix (Table B2 in Appendix B). We focus in the main text on presenting only the key results concerning the estimates of  $\{\hat{n}_\mu, \hat{m}_\mu\}$ , that is, the average MPC measure based on non-crowded-out consumption spending using shopping vouchers ( $\hat{n}_\mu$ ) and the overall average MPC inclusive of out-of-pocket spending ( $\hat{m}_\mu$ ). Because a respondent might have more than NT\$3,600's worth of vouchers at his/her disposal and such a respondent should be given a higher weight in computing the MPC's, we use the weighted estimates, with the total value of shopping vouchers at a respondent's disposal being the weight, as the baseline results. The importance of using the total value of shopping vouchers at a respondent's disposal can be best illustrated by Figure 1, which displays the estimated portions

of shopping vouchers at a respondent’s disposal (i.e., the value of shopping vouchers at disposal divided by 3,600) among respondents with some shopping vouchers on hand. Figure 1 shows that about 40% of our respondents have exactly one portion of shopping vouchers (i.e., worth NT\$3,600) on hand, while more than 50% of them have more than one portion.

Figure 1: Portion of Shopping Vouchers at Disposal



Before examining the estimates  $\{\hat{n}_\mu, \hat{m}_\mu\}$ , we explore the estimation results visually by looking at the distributional features of the estimated out-of-pocket spendings and MPC’s, which are depicted in Figures 2–4. In Figure 2, we plot the distributions of weighted and unweighted estimates of out-of-pocket spendings. It shows that a large proportion of our respondents have spent extra money out-of-pocket when using shopping vouchers. When looking at the weighted estimates, more than 50% of our respondents have incurred money out-of-pocket. Moreover, while about 50% of them have spent NT\$1 – 500 out-of-pocket, over 40% have spent more than NT\$500.

We next turn to the distribution of our MPC estimates. Figure 3 exhibits different estimates of the MPC out of vouchers. The unweighted MPC out of vouchers should be within the unit interval. However, this is not the case without adjustment to rectify the inconsistency problem in the voucher spending amount reported by respondents (see panel (d)). After adjustment in the reported spending amounts, the MPC estimates are within the unit interval (see panel (c)), as expected. After applying weights to the estimates, the adjusted MPC estimates (see panel (a)) become more skewed and dispersed.

Figure 2: Density of Out-of-Pocket Spending

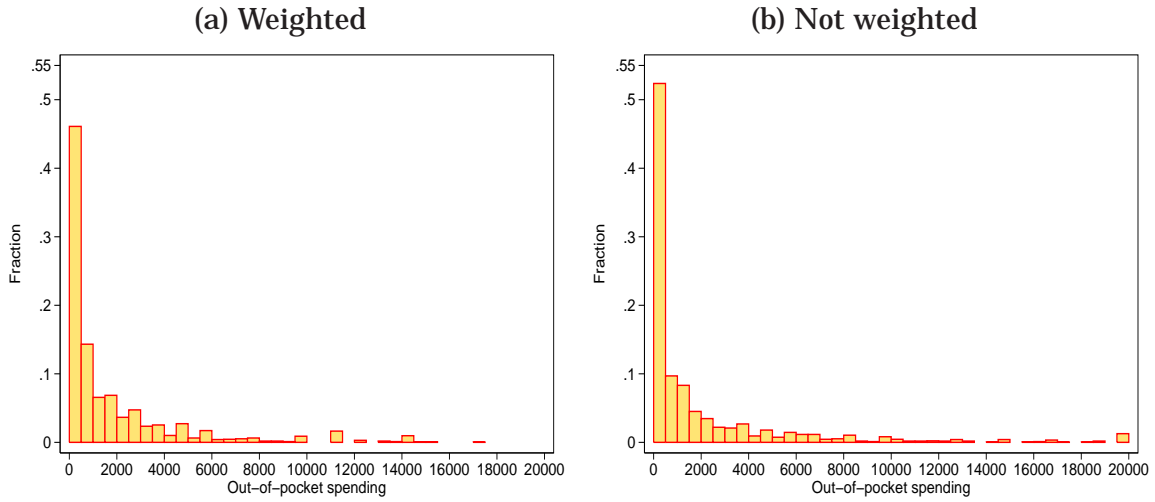


Figure 4 summarizes our estimates of the total MPC. The graphs suggest that adjusted and unadjusted estimates have very similar distributions, while the distributions of the unadjusted estimates have a slightly heavier right tail. Moreover, as in the case of MPC out of vouchers, the distributions of the weighted total MPC's estimates are more dispersed.

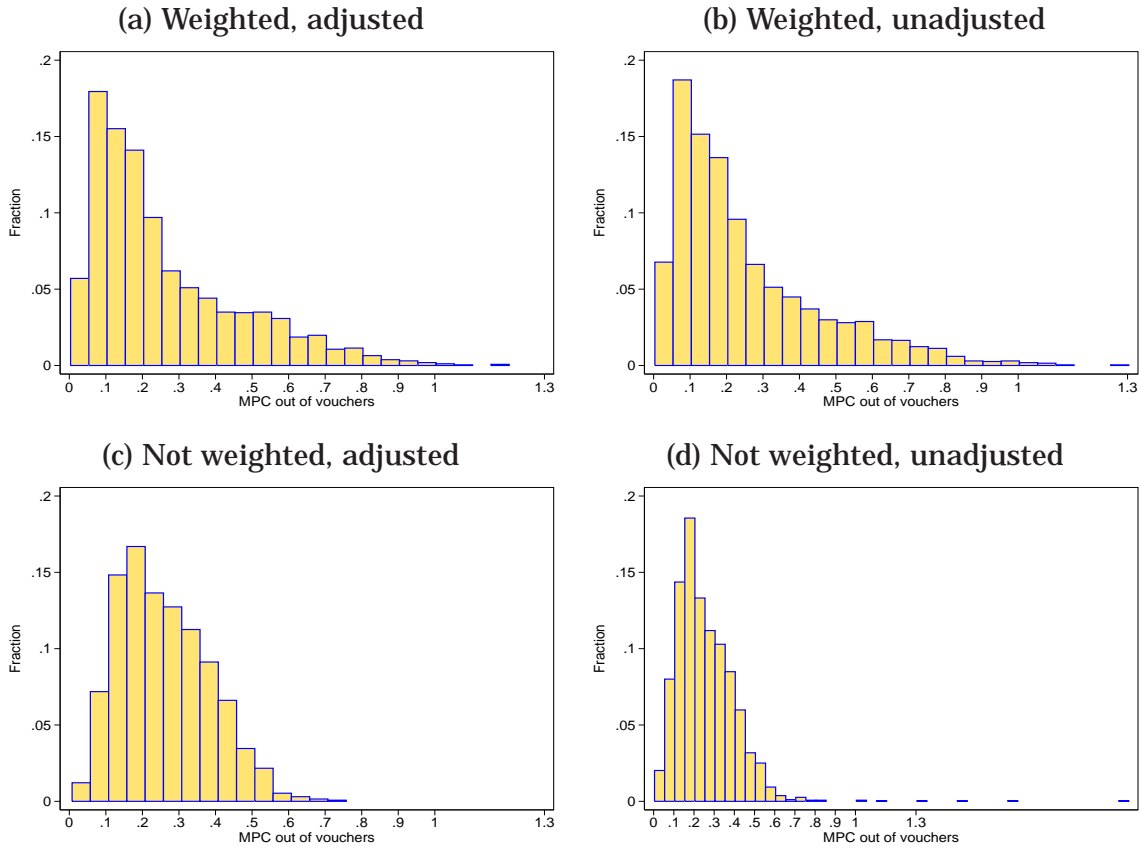
The estimation results are reported in Table 5 below. Based on the adjusted estimates (see column 1), the results show a significant private-spending crowding-out effect: our estimate of MPC out of vouchers  $\hat{\eta}_\mu$  suggests that the vouchers crowd out 74.33% of previously planned private spending. Moreover, our estimates point to a sizable out-of-pocket spending effect: according to our estimate of the total MPC  $\hat{m}_\mu$ , for each dollar of shopping voucher received, there are 0.3249 dollars out-of-pocket spending generated. As shown in Table 5, the unadjusted estimates show similar results.<sup>12</sup>

Taiwan's shopping voucher program is well publicized and in response to the programs venders and shops launched various promotion programs for users of shopping vouchers. This implies that individuals' consumption behavior in using shopping vouchers may be affected by these promotions. Thus, our MPC estimates in Table 5 may reflect the stimulation of shopping vouchers and the effect of venders' promotion.

One may be curious just how important venders' promotions are to mitigate consumption crowding out, or what is the net effect of shopping vouchers *per se* is. To address this issue, we carry out a counterfactual analysis. In the counterfactual analysis, we re-estimate the model under a hypothetical scenario as if there were no discounts by venders or shops. That is, for

<sup>12</sup>We note that the unweighted estimates are comparable to the weighted ones: while the vouchers crowd out 74.06% of previously planned spending, the out-of-pocket spending for each dollar of shopping voucher received is about 0.3436 dollar.

Figure 3: MPC out of Vouchers

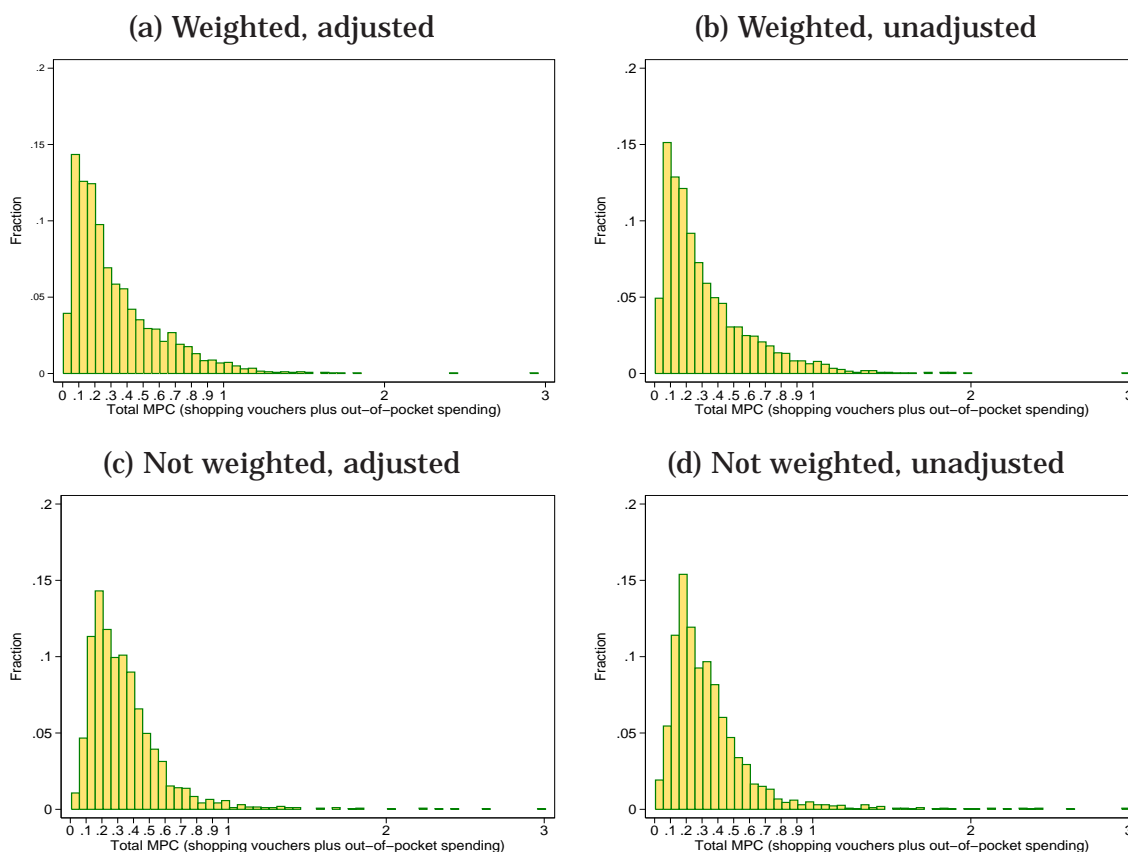


all respondents who indicated that a purchase using shopping vouchers was made because of discounts, we assume that they would have spent their shopping vouchers on items that they would have purchased even without shopping vouchers. The MPC's are computed based on this new set of parameter estimates. We report the results in columns 3 and 4 of Table 5. It is clear that, in the absence of venders' promotion, both estimates are lower: for the MPC out of shopping vouchers  $\hat{n}_\mu$  the crowding out effect rises by about 8.1 percentage points to 82.45%, implying an MPC out of shopping vouchers of 0.1755, whereas the total MPC  $\hat{m}_\mu$  (inclusive of out-of-pocket spendings) reduces sharply to 0.2230. Interestingly, our counterfactual estimate of MPC out of shopping vouchers (0.1755) is not far from Shapiro and Slemrod's (2003, 2009) MPC estimates, which are around 20%, based on the 2001 and 2008 U.S. tax rebates.

It is informative to compare the overall average MPC estimates  $\hat{m}_\mu$  (inclusive of out-of-pocket spending) by income and by expectations about the future. The results are reported in Table 6. Evidentially, by ignoring the no-income category (column 1), those with higher income or more optimistic expectations about the future have slightly higher MPC estimates.

Moreover, we can compare the consumption patterns using shopping vouchers with those in 2006, 2007 and 2008, which are based on the *Survey of Family Income and Expenditure*, DGBAS

Figure 4: Total MPC (inclusive of out-of-pocket spendings)



(2006,2007,2008). We present the results in Table 7. Obviously, our sampling may not precisely represent the national distribution and the consumption behavior of Spring 2009 without shopping vouchers need not be identical to that in 2006–2008. Yet, the fraction of consumption on household necessities estimated based on our survey and econometric model is quite consistent with the DGBAS data. While the fraction of consumption on durables/nonnecessities obtained in our paper is higher, that on services is lower. The former is due in part to the presence of vendors' promotions and the indivisibility of the denomination of shopping vouchers (both encouraging the usage of shopping vouchers for durables), whereas the latter is due primarily to the inability to use voucher to pay for maid and professional services.

Generally speaking, the aforementioned empirical findings based on the unique natural experiment of the TSVP suggest that most of the Taiwanese consumers do intertemporally substitute, using their shopping vouchers to purchase previously planned consumption items. These consumers behave as suggested by the LCPIH. However, a nonnegligible proportion (about a quarter) of private spending incurred in response to the TSVP is non-crowding-out, that is, at least some consumers respond to the temporary and anticipated income by consuming more, with many even disposing out-of-pocket money in excess of the value of vouchers received. Our estimation indicate that only part of such less-than-fully-crowding-out and extra money out-of-pocket outcomes



Table 5: Marginal Propensity to Consume\*

		Baseline Estimates <sup>†</sup>		Counterfactual <sup>§</sup> (Assuming no discounts)	
		Adjusted <sup>†</sup>	Unadjusted	Adjusted	Unadjusted
Total MPC (vouchers plus out of pocket spending)	$\hat{m}_\mu$	0.3249 (5.64)	0.3171 (3.39)	0.2230 (3.75)	0.2161 (2.19)
MPC out of vouchers	$\hat{n}_\mu$	0.2567 (3.49)	0.2499 (3.74)	0.1755 (2.21)	0.1701 (2.37)

\*  $t$ -statistic in parentheses.

<sup>†</sup>Adjustment for the situation when the sum of the three categories of spending is greater than the total shopping voucher values used as reported by the respondent. There are 627 such cases among the 2887 respondents in the sample and 44 of the 627 respondents are discarded because the inconsistency cannot be resolved.

<sup>‡</sup>Weighed by the total values shopping vouchers that a respondent has.

<sup>§</sup>In the counterfactual analysis, we re-estimate the model assuming that all respondents who indicated that a purchase using shopping vouchers was made because of discounts when using shopping vouchers would have spent their shopping vouchers on items that they would have purchase even without shopping vouchers. The MPC's are computed based on this new set of parameter estimates.

Table 6: MPC Estimates by Income and by Expectations about the Economy in 2010\*

	By income group			
	No income	1st quartile	2nd & 3rd quartiles	4th quartile
Total MPC $\hat{m}_\mu$	0.3084 (1.76)	0.3106 (2.95)	0.3260 (3.09)	0.3341 (1.25)
	By expectations about the 2010 economy			
	Optimistic	Pessimistic		
Total MPC $\hat{m}_\mu$	0.2936 (2.74)	0.3382 (2.93)		

\*  $t$ -statistic in parentheses.

can be attributed to vendors' promotions.

There are three possible explanations for these intriguing findings concerning the individual consumption behavior.

First, it is foreseeable that some consumers may be initially financially constrained, especially during such serious economic downturns. When their constraints are temporarily relaxed by the TSVP, they would have positive MPC in response to even a temporary and anticipated income increase.

Second, it is plausible that some consumers may have mental accounts, setting some saving targets based on behavioral rules of thumb. Under such decision rules, consumers would lower their nonnecessity consumption to build up their savings in economic downturns in order

Table 7: Expenditure Patterns Compared

		Category (%)		
		$\langle A \rangle$	$\langle B \rangle$	$\langle C \rangle$
Our Survey		50.7	39.5	9.8
	2006	46.6	13.4	40.0
DGBAS-1	2007	48.7	13.5	37.9
	2008	49.7	13.5	36.8
	2006	54.5	15.7	29.8
DGBAS-2	2007	55.7	15.4	28.8
	2008	56.2	15.3	28.5

- Note:
1. Figures in DGBAS-1 and DGBAS-2 exhibit expenditure pattern based on the *Survey of Family Income and Expenditure* conducted by the DGBAS.
  2. DGBAS-1: Category *C* includes Recreation, entertainment, education, cultural service, and Miscellaneous.
  3. DGBAS-2: Category *C* only includes Recreation, entertainment, education, cultural service.

to achieve their targets. Since the TSVP relaxes their saving building requirements for achieving their targets, it would induce nontrivial MPC.

Third, one cannot exclude the possibility that some consumers may not be forward-looking. For example, some may fail to recognize that the implementation of the TSVP will cause future taxes to increase and hence believe that such a program yields a positive wealth effect. As a result, they would behave accordingly by consuming more. Some consumers may even have temporal income illusion in the sense that they feel richer when they have the vouchers in hands. As a consequence, the TSVP generates a positive “Pigou effect” that would trigger eluted consumers to spend temporarily more than they are used to.

Finally, it may be interesting to examine the consumption behavior based on two hypothetical questions: one concerning a repeated issuance of shopping vouchers in the future (see Table 8) and another concerning a tax rebate in the future (see Table 9). This analysis also serves as a robustness check of our MPC estimates.

In our interviews, respondents were asked two questions about their response to a hypothetical shopping vouchers program and another about their response to a hypothetical tax refunds program. In these questions, we asked how would the respondents use their vouchers and tax refunds. In the hypothetical shopping vouchers question (i.e., Q21 in Appendix A), we ask whether they would spend on items that would have been purchased even without receiving shopping

vouchers or on items that would not have been purchased without receiving shopping vouchers, where we allow our respondents to answer “spending on both types of items” (i.e., option 3). Likewise, in the hypothetical tax refunds question (i.e., Q22), we asked whether they would save up, invest, spend on items that would have been purchased even without the refunds, or spend on items that would have been purchased without the tax refunds, allowing them to answer “use some of them on shopping, and savings or investment” (i.e., option 4).

In order to obtain a clear cut pattern of our respondents’ reaction to these two programs, we assume that respondents choosing options 3 of Q21 and options 4 of Q22 use a certain proportion of their receipts (i.e., vouchers or tax refunds) on a certain usage. We have considered two alternative ways to assign these proportions. One way is to assume that respondents choosing option 3 in Q21 spend half of their vouchers on items what would have been purchased even without shopping vouchers and the other half on the other type of items. Similarly, it is assumed that respondents choosing option 4 in Q22 use half of their tax refunds on purchasing items that would have been purchased even without the tax refunds and the other half on the other type. Consumption pattern under this assumption, presented in column (2) in Tables 8 and column (3) in Table 9, suggest that the MPC estimates are approximately 17.5% and 20.2% for the hypothetical shopping vouchers and tax refunds programs, respectively. The first figure is remarkably close to our MPC out-of-vouchers estimate and the second one is close to the total MPC (inclusive of out-of-pocket spendings) estimates. See Table 5.

Table 8: Hypothetical Question 1–Second Shopping Vouchers Program\*

<i>Q21. If the government have a second voucher program, how would you use your shopping vouchers from the second shopping voucher program?</i>	Percentage		
	(1)	(2) <sup>†</sup>	(3) <sup>‡</sup>
1 Spend on items that I would have purchased even without receiving shopping vouchers	67.4	67.4+13.5=80.9	67.4+25.49=92.89
2 Spend on items that I would not have purchased without receiving shopping vouchers	4.0	4.0+13.5=17.5	4.0+1.51=5.51
3 Spend some on each category of items	27.0		
4 Other (i.e., donation)	1.7	1.7	1.7
<b>Total</b>	<b>100.0</b>	<b>100</b>	<b>100</b>

\*Wording of the question: *Suppose the government hand out shopping vouchers worth \$3600 per person in the second half of 2009 again, how will you use them if there is no discount for using shopping vouchers?*

<sup>†</sup>In column (2), we assume that half of those respondents answering response C (“Spend some on each category of items”) will spend their shopping vouchers on items in response A, and the other half on those in response B.

<sup>‡</sup>In column (3), we assume that 94.40% of those respondents answering response C (“Spend some on each category of items”) will spend their shopping vouchers on items in response A, and 5.60% on those in response B, as proportional to the percentage of respondents answering response A and B.

Table 9: Hypothetical Question 2–Tax Refund\*

<i>Q22. If the government refunds part of your income tax, how would you use your tax refund?</i>		<b>Percentage</b>			
		(1)	(2)	(3) <sup>†</sup>	(4) <sup>‡</sup>
1	Spend on items that I would have purchased even without receiving the tax refund	54.0	} 67.8	67.8+12.4=80.2	67.8+22.91=90.71
2	Savings or investment	13.8			
3	Spend on items that I would not have purchased without receiving the tax refund	5.6	5.6	5.6+12.4=18.0	5.6+1.89 = 7.49
4	Use some of them on shopping, and savings or investment	24.8	24.8		
5	Other (i.e., donation)	1.8	1.8	1.8	1.8
<b>Total</b>		<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

\*Wording of the question: *Suppose the government decides to refund your 2008 personal income tax, and the amount is roughly \$3600 per person (the same amount as the value of shopping vouchers received by your household) in the second half of 2009, how will you use the income tax refund?*

<sup>†</sup>In column (3), we assume that half of those respondents answering response D (“Use some of them on shopping, and savings or investment”) will spend their shopping vouchers on items in responses A and B, and the other half on those in response C.

<sup>‡</sup>In column (4), we assume that 92.37% of those respondents answering response D (“Use some of them on shopping, and savings or investment”) will spend their shopping vouchers on items in response A and B, and 7.63% on those in response C, as proportional to the percentage of respondents answering response A and B.

An alternative way of inferring the consumption pattern of respondents choosing options 3 of Q21 and options 4 of Q22 is to assume that the proportion of receipts spending on an option is equal to the proportion of respondents choosing that option relative to the proportion respondents choosing the other option. For example, in the case of hypothetical tax refunds, we assume that for respondents choosing option 4, the proportion of refunds being used for savings, investments, and purchasing on items that would have been purchased even without receiving tax refunds is proportional to the proportion of respondents choosing these options relative to those choosing to spend the refunds on purchasing on items that would not have been purchased without receiving the refunds. The consumption pattern under this assumption, reported in columns (3) in Table 8 and column (4) in Table 9, suggests the MPC’s generated by the hypothetical shopping vouchers program and tax refunds program are 5.51% and 7.48%, respectively. These are substantially lower than the MPC’s computed under the alternative assumption. Nonetheless, these two figures are by no means trivial.

Overall, the results in Tables 8 and 9, suggest that shopping vouchers and tax refunds are both effective in generating non-crowded-out consumption and their effects are largely similar in magnitude. These exercises also reconfirm that some consumers are likely to deviate from the behavior predicted by the life cycle-permanent income hypothesis.

## 7 Conclusion

This paper has investigated consumers' response to a median-sized, anticipated change in income based on a natural experiment, namely Taiwan's shopping voucher program, using survey techniques. Our analysis has been specially designed to enable precise estimation, with statistical inferences, of consumers' non-crowded-out marginal propensity to consume inclusive of out-of-pocket spendings, as well as to obtain estimates in a counterfactual exercise assuming the absence of vendors' promotion offers. Our results indicate that about three quarters of consumers' private spendings are crowded out when using shopping vouchers. Inclusive of out-of-pocket spendings, the marginal propensity to consume is estimated about 0.325. According to our counterfactual analysis in the absence of vendors' promotion programs, the marginal propensity to consume estimate drops sharply to 0.223.

There are several implications from our empirical results. First of all, the LCPIH is not fully supported by our results as some consumers do react to temporary and anticipated rises in income by spending more. However, it captures the spirits of the LCPIH that consumers do exhibit intertemporal substitution behavior, thereby yielding a sizable private-spending crowding-out effect of shopping vouchers and a temporary shift in consumption composition. Such less-than-full-crowding-out outcome and the presence of out-of-pocket spendings are only partly due to vendors' promotions. Thus, these findings may be attributed to the fact that: (i) some consumers may be financially constrained and the TSVP relaxes at least partially such constraints, (ii) some consumers may have mental accounts which set some spending or saving targets (rules of thumb), and (iii) some consumers may not be forward-looking, either not accounting for future tax increases or feel richer when they receive the vouchers (temporal income illusion). While our estimates of the average marginal propensity to consume are generally in line with those obtained by previous studies, the result that one dollar voucher disbursed can create out-of-pocket spending may deliver a useful message to policy makers if the temporary boost in domestic spending to mitigate the detrimental outcomes during economic downturns is the objective of the fiscal stimulus.

We would like to acknowledge that our study does bear some limitations. First, in the absence of a precise measure of the amount of non-crowded-out expenditure including those using vouchers and out-of-pocket spendings, we have used discrete indicators of the nature of the respondent's spendings. Thus, our estimation is an approximation. Second, while we have tried to investigate the effect of financial constraints on consumption behavior based on expected earning shortfalls,

without knowing consumers' financial constraint status we are unable to provide precise estimates of their differential responses. Third, by the nature of shopping vouchers which are to be spent within a certain time limit, consumers cannot use to for saving or debt payment purposes directly. Although consumers may intertemporally substitute, they can do so only in a very subtle manner. As a consequence, to design a questionnaire to detect such behaviors is very difficult if not impossible. For example, without being able to fully quantify the consumer's Intertemporal substitution behavior, it is difficult to test alternative consumption theories such as the rule-of-thumb hypothesis under this current setting. Clever designs to address these aforementioned issues would be interesting avenues for future research.

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# Appendix A: Survey Questionnaire

(To be posted on the authors' websites, not intended for publication.)

## Selected Questions from the Survey Questionnaire

Q4. Did anyone in your household give you his/her shopping vouchers to you or use his/her vouchers jointly with yours?

- (1) Yes (Go to Q4\_1)
- (2) No (Go to Q5)
- (8) Refuse (Go to Q5)

Q5. Was there anyone who does not live with you giving you his/her shopping vouchers to you or using his/her vouchers jointly with you?

- (1) Yes, \_\_\_\_\_ persons
- (2) No
- (8) Refuse

Q7. What is the total value of shopping vouchers that is at your disposal?

- |                      |                    |                    |
|----------------------|--------------------|--------------------|
| (01) \$0 (go to Q18) | (02) \$1–500       | (03) \$501–1000    |
| (04) \$1001–1500     | (05) \$1501–2000   | (06) \$2001–2500   |
| (07) \$2501–3000     | (08) \$3001–3500   | (09) \$3501–4000   |
| (10) \$4001–4500     | (11) \$4501–5000   | (12) \$5001–5500   |
| (13) \$5501–6000     | (14) \$6001–6500   | (15) \$6501–7000   |
| (16) \$7001–7500     | (17) \$7501–8000   | (18) \$8001–8500   |
| (19) \$8501–9000     | (20) \$9001–9500   | (21) \$9501–10000  |
| (22) \$10001–12000   | (23) \$12001–13000 | (24) \$13001–14000 |
| (25) \$14001–15000   | (26) \$15001–16000 | (27) \$16001–17000 |
| (28) \$17001–18000   | (29) \$18001–19000 | (30) \$19001–20000 |
| (31) 20001 and Over  | (97) Don't know    | (98) Refuse        |

Q8. Have you used any of the shopping vouchers that are at your disposable?

- (1) Yes, have used all of them (Please go to Q10)
- (2) Yes, have used some of them
- (3) No, have not used any of them (Please go to Q18)
- (7) Don't know
- (8) Refuse

Q9. How much amount of shopping vouchers have you used?

- |                    |                    |                      |
|--------------------|--------------------|----------------------|
| (01) \$1-500       | (02) \$501-1000    | (03) \$1001-1500     |
| (04) \$1501-2000   | (05) \$2001-2500   | (06) \$2501-3000     |
| (07) \$3001-3500   | (08) \$3501-4000   | (09) \$4001-4500     |
| (10) \$4501-5000   | (11) \$5001-5500   | (12) \$5501-6000     |
| (13) \$6001-6500   | (14) \$6501-7000   | (15) \$7001-7500     |
| (16) \$7501-8000   | (17) \$8001-8500   | (18) \$8501-9000     |
| (19) \$9001-9500   | (20) \$9501-10000  | (21) \$10001-12000   |
| (22) \$12001-13000 | (23) \$13001-14000 | (24) \$14001-15000   |
| (25) \$15001-16000 | (26) \$16001-17000 | (27) \$17001-18000   |
| (28) \$18001-19000 | (29) \$19001-20000 | (30) \$20001 or more |
| (97) Don't know    | (98) Refuse        |                      |

Q10. What kinds of goods have you used shopping vouchers to pay for?

- (01) Food and drinks (i.e., grocery, alcohol and tobacco) (Answer Q12)
- (02) Household necessities (e.g., personal care products, kitchen supplies and utensils) (Answer Q12)
- (03) Consumer durables (e.g., consumer electronics, furniture, electric appliances, cookware, automobiles, bicycles) (Answer Q13)
- (04) Apparel and accessories, jewelry, home decor (Answer Q13)
- (05) Toys, books, stationery, magazine, CDs, and DVDs (Answer Q13)
- (06) Services (meals at restaurants, barber shops, beauty saloon, leisure travel, etc) (Answer Q14)
- (07) Drugs, health and fitness products (Go to Q15 after answering Q11)
- (08) Tuition or tutoring fees (Go to Q15 after answering Q11)
- (09) Transportation fares (i.e., taxi fare, train tickets) (Go to Q15 after answering Q11)
- (10) Rent (i.e., rent for apartment or shop) (Go to Q15 after answering Q11)
- (11) Donation (Go to Q15 after answering Q11)
- (12) Give away as gifts (Go to Q15 after answering Q11)
- (13) Sold to others (Go to Q15 after answering Q11)
- (14) Other use \_\_\_\_\_ (Go to Q15 after answering Q11)
- (97) Don't know
- (98) Refuse

Q12. How much of the shopping vouchers at your disposal have been spent on food and drinks or household necessities (items in (01) and (02) of Q10)?

- |                    |                    |                      |
|--------------------|--------------------|----------------------|
| (01) \$500 or Less | (02) \$501–1000    | (03) \$1001–1500     |
| (04) \$1501–2000   | (05) \$2001–2500   | (06) \$2501–3000     |
| (07) \$3001–3500   | (08) \$3501–4000   | (09) \$4001–4500     |
| (10) \$4501–5000   | (11) \$5001–5500   | (12) \$5501–6000     |
| (13) \$6001–6500   | (14) \$6501–7000   | (15) \$7001–7500     |
| (16) \$7501–8000   | (17) \$8001–8500   | (18) \$8501–9000     |
| (19) \$9001–9500   | (20) \$9501–10000  | (21) \$10001–12000   |
| (22) \$12001–13000 | (23) \$13001–14000 | (24) \$14001–15000   |
| (25) \$15001–16000 | (26) \$16001–17000 | (27) \$17001–18000   |
| (28) \$18001–19000 | (29) \$19001–20000 | (30) \$20001 or more |
| (97) Don't know    | (98) Refuse        |                      |

Q12\_1. What is the nature of these purchases?

- (1) Would have made the purchases even without receiving shopping vouchers (Go to Q12\_2)
- (2) Having made the purchases only because of receiving shopping vouchers (Go to Q15)
- (3) The purchases were made because of discounts when using shopping vouchers (Go to Q15)
- (4) All of the above are true to some extent (Go to Q12\_2)
- (8) Refuse (Go to Q15)

Q12\_2. Were the items that you bought more or less expensive than, or almost the same price as you originally planned?

- (1) More expensive
- (2) Less expensive
- (3) Almost the same price
- (6) Other \_\_\_\_\_
- (7) Don't know
- (8) Refuse

Q13. How much of the shopping vouchers at your disposal have been spent on consumer durables, apparel and accessories, toys, books, stationery, magazine, CDs, and DVDs (items in (03)–(05) of Q10)?

- |                    |                    |                      |
|--------------------|--------------------|----------------------|
| (01) \$500 or Less | (02) \$501–1000    | (03) \$1001–1500     |
| (04) \$1501–2000   | (05) \$2001–2500   | (06) \$2501–3000     |
| (07) \$3001–3500   | (08) \$3501–4000   | (09) \$4001–4500     |
| (10) \$4501–5000   | (11) \$5001–5500   | (12) \$5501–6000     |
| (13) \$6001–6500   | (14) \$6501–7000   | (15) \$7001–7500     |
| (16) \$7501–8000   | (17) \$8001–8500   | (18) \$8501–9000     |
| (19) \$9001–9500   | (20) \$9501–10000  | (21) \$10001–12000   |
| (22) \$12001–13000 | (23) \$13001–14000 | (24) \$14001–15000   |
| (25) \$15001–16000 | (26) \$16001–17000 | (27) \$17001–18000   |
| (28) \$18001–19000 | (29) \$19001–20000 | (30) \$20001 or more |
| (97) Don't know    | (98) Refuse        |                      |

Q13\_1. What is the nature of these purchases?

- (1) Would have made the purchases even without receiving shopping vouchers (Go to Q13\_2)
- (2) Having made the purchases only because of receiving shopping vouchers (Go to Q15)
- (3) The purchases were made because of discounts when using shopping vouchers (Go to Q15)
- (4) All of the above are true to some extent (Go to Q13\_2)
- (8) Refuse (Go to Q15)

Q13\_2. Were the items that you bought more or less expensive than, or almost the same price as you originally planned?

- (1) More expensive
- (2) Less expensive
- (3) Almost the same price
- (6) Other \_\_\_\_\_
- (7) Don't know
- (8) Refuse

Q14. How much of the shopping vouchers at your disposal have been spent on meal at restaurants, barber shops, beauty saloons, leisure travel, etc. (items in (06) of Q10)?

- |                    |                    |                      |
|--------------------|--------------------|----------------------|
| (01) \$500 or Less | (02) \$501-1000    | (03) \$1001-1500     |
| (04) \$1501-2000   | (05) \$2001-2500   | (06) \$2501-3000     |
| (07) \$3001-3500   | (08) \$3501-4000   | (09) \$4001-4500     |
| (10) \$4501-5000   | (11) \$5001-5500   | (12) \$5501-6000     |
| (13) \$6001-6500   | (14) \$6501-7000   | (15) \$7001-7500     |
| (16) \$7501-8000   | (17) \$8001-8500   | (18) \$8501-9000     |
| (19) \$9001-9500   | (20) \$9501-10000  | (21) \$10001-12000   |
| (22) \$12001-13000 | (23) \$13001-14000 | (24) \$14001-15000   |
| (25) \$15001-16000 | (26) \$16001-17000 | (27) \$17001-18000   |
| (28) \$18001-19000 | (29) \$19001-20000 | (30) \$20001 or more |
| (97) Don't know    | (98) Refuse        |                      |

Q14\_1. What is the nature of these purchases?

- (1) Would have made the purchases even without receiving shopping vouchers (Go to Q14\_2)
- (2) Having made the purchases only because of receiving shopping vouchers (Go to Q15)
- (3) The purchases were made because of discounts when using shopping vouchers (Go to Q15)
- (4) All of the above are true to some extent (Go to Q14\_2)
- (8) Refuse (Go to Q15)

Q14\_2. Were the items that you bought more or less expensive than, or almost the same price as you originally planned?

- (1) More expensive
- (2) Less expensive
- (3) Almost the same price
- (6) Other \_\_\_\_\_
- (7) Don't know
- (8) Refuse

Q15. When using shopping vouchers, have you used cash or credit cards because the total purchase amount exceeded the value of your shopping vouchers?

- (1) Yes
- (2) No (Go to Q16)
- (8) Refuse to Answer (Go to Q16)

Q15\_1. How much more have you spent?

- |                    |                    |                      |
|--------------------|--------------------|----------------------|
| (01) \$500 or Less | (02) \$501-1000    | (03) \$1001-1500     |
| (04) \$1501-2000   | (05) \$2001-2500   | (06) \$2501-3000     |
| (07) \$3001-3500   | (08) \$3501-4000   | (09) \$4001-4500     |
| (10) \$4501-5000   | (11) \$5001-5500   | (12) \$5501-6000     |
| (13) \$6001-6500   | (14) \$6501-7000   | (15) \$7001-7500     |
| (16) \$7501-8000   | (17) \$8001-8500   | (18) \$8501-9000     |
| (19) \$9001-9500   | (20) \$9501-10000  | (21) \$10001-12000   |
| (22) \$12001-13000 | (23) \$13001-14000 | (24) \$14001-15000   |
| (25) \$15001-16000 | (26) \$16001-17000 | (27) \$17001-18000   |
| (28) \$18001-19000 | (29) \$19001-20000 | (30) \$20001 or more |
| (97) Don't know    | (98) Refuse        |                      |

Q19\_2. Do you agree with the following claim:

*The shopping vouchers program has worsen Taiwan's fiscal situation.*

- (1) Strongly agree
- (2) Agree
- (3) Somewhat agree
- (4) Disagree
- (5) Strongly Disagree
- (7) Don't know
- (8) Refuse

Q21. Suppose the government hand out shopping vouchers worth \$3,600 per person in the second half of 2009 again, how will you use them if there is no discount for using shopping vouchers?

- (1) Spend on items that I would have purchased even without receiving shopping vouchers
- (2) Spend on items that I would not have purchased without receiving shopping vouchers
- (3) Half and half
- (4) Other (i.e., donation) \_\_\_\_\_
- (7) Don't know
- (8) Refuse

Q22. Suppose the government decides to refund part of your 2008 personal income tax, and the amount is roughly \$3,600 per person (the same amount as the value of shopping vouchers received by your household) in the second half of 2009, how will you use the income tax refund?

- (1) Spend on items that I would have purchased even without receiving the tax refund
- (2) Spend on items that I would not have purchased without receiving the tax refund
- (3) Savings or investment
- (4) Use some of them on shopping, and savings or investment
- (5) Other (i.e., donation) \_\_\_\_\_
- (7) Don't know
- (8) Refuse

Q32. Are you optimistic about Taiwan's economy next year (2010)?

- (1) Very optimistic
- (2) Somewhat optimistic
- (3) Somewhat pessimistic
- (4) Very pessimistic
- (7) Don't know
- (8) Refuse

## Appendix B

Table B1: Pattern of Shopping Vouchers Received and Used

Amount	Frequency (Percentage)					
	Amount Received	Amount Used	Household Necessities	Consumer Durable	Services	Out-of-Pocket Spending*
\$0	630 (17.43%)	728 (20.14%)	972 (33.67%)	1,286 (44.54%)	2,236 (77.45%)	395 (15.54%)
\$1– 500	2 (0.06%)	19 (0.53%)	56 ( 1.94%)	73 ( 2.53%)	68 ( 2.36%)	572 (22.50%)
\$501–1000	10 (0.28%)	26 (0.72%)	98 ( 3.39%)	123 ( 4.26%)	98 ( 3.39%)	395 (15.54%)
\$1001–1500	2 (0.06%)	33 (0.91%)	84 ( 2.91%)	115 ( 3.98%)	72 ( 2.49%)	180 ( 7.08%)
\$1501–2000	21 (0.58%)	40 (1.11%)	134 ( 4.64%)	136 ( 4.71%)	74 ( 2.56%)	187 ( 7.36%)
\$2001–2500	8 (0.22%)	39 (1.08%)	108 ( 3.74%)	98 ( 3.39%)	57 ( 1.97%)	105 ( 4.13%)
\$2501–3000	6 (0.17%)	37 (1.02%)	108 ( 3.74%)	115 ( 3.98%)	41 ( 1.42%)	131 ( 5.15%)
\$3001–3500	1 (0.03%)	33 (0.91%)	73 ( 2.53%)	61 ( 2.11%)	30 ( 1.04%)	63 ( 2.48%)
\$3501–4000	1,248 (34.52%)	1,063 (29.41%)	459 (15.90%)	308 (10.67%)	93 ( 3.22%)	70 ( 2.75%)
\$4001–4500	11 (0.30%)	36 (1.00%)	46 ( 1.59%)	31 ( 1.07%)	11 ( 0.38%)	27 ( 1.06%)
\$4501–5000	18 (0.50%)	23 (0.64%)	57 ( 1.97%)	54 ( 1.87%)	17 ( 0.59%)	76 ( 2.99%)
\$5001–5500	9 (0.25%)	19 (0.53%)	56 ( 1.94%)	34 ( 1.18%)	5 ( 0.17%)	17 ( 0.67%)
\$5501–6000	10 (0.28%)	17 (0.47%)	60 ( 2.08%)	39 ( 1.35%)	13 ( 0.45%)	48 ( 1.89%)
\$6001–6500	2 (0.06%)	22 (0.61%)	25 ( 0.87%)	11 ( 0.38%)	2 ( 0.07%)	12 ( 0.47%)
\$6501–7000	4 (0.11%)	40 (1.11%)	40 ( 1.39%)	30 ( 1.04%)	5 ( 0.17%)	13 ( 0.51%)
\$7001–7500	425 (11.76%)	353 (9.76%)	147 ( 5.09%)	83 ( 2.87%)	21 ( 0.73%)	14 ( 0.55%)
\$7501–8000	6 (0.17%)	10 (0.28%)	41 ( 1.42%)	22 ( 0.76%)	6 ( 0.21%)	17 ( 0.67%)
\$8001–8500	7 (0.19%)	24 (0.66%)	16 ( 0.55%)	12 ( 0.42%)	4 ( 0.14%)	5 ( 0.20%)
\$8501–9000	4 (0.11%)	8 (0.22%)	35 ( 1.21%)	15 ( 0.52%)	1 ( 0.03%)	5 ( 0.20%)
\$9001–9500	6 (0.17%)	23 (0.64%)	13 ( 0.45%)	4 ( 0.14%)	1 ( 0.03%)	3 ( 0.12%)
\$9501–10000	7 (0.19%)	51 (1.41%)	51 ( 1.77%)	30 ( 1.04%)	6 ( 0.21%)	25 ( 0.98%)
\$10001–12000	419 (11.59%)	340 (9.41%)	87 ( 3.01%)	86 ( 2.98%)	15 ( 0.52%)	45 ( 1.77%)
\$12001–13000	6 (0.17%)	23 (0.64%)	19 ( 0.66%)	10 ( 0.35%)	1 ( 0.03%)	8 ( 0.31%)
\$13001–14000	4 (0.11%)	20 (0.55%)	11 ( 0.38%)	11 ( 0.38%)	2 ( 0.07%)	5 ( 0.20%)
\$14001–15000	510 (14.11%)	390 (10.79%)	53 ( 1.84%)	63 ( 2.18%)	6 ( 0.21%)	32 ( 1.26%)
\$15001–16000	3 (0.08%)	8 (0.22%)	3 ( 0.10%)	4 ( 0.14%)	1 ( 0.03%)	10 ( 0.39%)
\$16001–17000	3 (0.08%)	11 (0.30%)	5 ( 0.17%)	2 ( 0.07%)	1 ( 0.03%)	2 ( 0.08%)
\$17001–18000	232 (6.42%)	168 (4.65%)	30 ( 1.04%)	30 ( 1.04%)	0 (0.00%)	5 ( 0.20%)
\$18001–19000	0 (0.00%)	1 (0.03%)	0 (0.00%)	0 ( 0.00%)	0 ( 0%)	1 ( 0.04%)
\$19001–20000	1 (0.03%)	10 (0.28%)	0 (0.00%)	0 (0.00%)	1 (0.03%)	6 ( 0.24%)
\$20001 or above	0 (0%)	0 (0%)	0 (0.00%)	1 (0.3%)	1 (0.03%)	68 ( 2.68%)
<b>Observations</b>	<b>2985</b>	<b>2887</b>	<b>2887</b>	<b>2887</b>	<b>2887</b>	<b>2542</b>

\*There are 345 respondent who indicated "don't know" to the question pertaining to the amount of their out-of-pocket spending.

