



# Asymmetric Responses to Tax-Induced Changes in Personal Income: The 2013 Payroll Tax Hike versus Anticipated 2012 Tax Refunds

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**Abstract:**

As part of the Boston Earned Income Tax Credit Coalition's free tax preparation service offered at the Boston Roxbury Resource Center between January and April 2013, 945 low-to-moderate income individuals were asked about payroll tax changes, financial planning, and their personal characteristics. Using these survey responses, the authors calculated how these individuals planned to respond to the payroll tax hike and their tax refund. The results show that their marginal propensity to consume (MPC) out of the tax refund is 30 percentage points lower than their spending reaction to the tax hike. Specifically, for every dollar less of income due to the payroll tax increase, consumption *declines* by 90 cents, while for each additional dollar of income from a tax refund, consumption *increases* by 60 cents. This asymmetric response is persistent across race, gender, and proxies of financial constraints such as credit scores, credit utilization, and so on. The lack of observable explanations for individuals' asymmetric behavior could be the result of the tax changes themselves being different in terms of their timing and method of delivery.

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This paper presents preliminary analysis and results intended to stimulate discussion and critical comment. The views expressed herein are those of the author and do not indicate concurrence by the Federal Reserve Bank of Boston, or by the principals of the Board of Governors, or the Federal Reserve System.

This brief, which may be revised, is available on the web site of the Federal Reserve Bank of Boston at <http://www.bostonfed.org/economic/ppb/index.htm>.

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## 1. Introduction

For a long time economists have sought to test the implications of the permanent income hypothesis (PIH) and investigate how household consumption responds to expected and unexpected income shocks. The PIH states that households consume the annuity value of their expected lifetime resources (wealth) and thus implies that in a frictionless world consumption should only respond to permanent and unexpected changes in household income.<sup>1</sup> Since 2001 there have been a number of legislated tax changes in the United States that have resulted in a series of household income shocks, a situation that has allowed researchers to test the implications of the PIH (see, for example, Johnson, Parker, and Souleles 2006; Shapiro and Slemrod 2003, 2009). In addition, Sahn, Shapiro, and Slemrod (2012) investigate if the manner by which the tax-induced income change is delivered—a mailed rebate check versus a change in the payroll tax deduction—influences how the income change is perceived, and thus how consumption adjusts in response.

Until January 2013, when the payroll tax *increased* as part of the U.S. fiscal cliff resolution, all of the previous federal income tax changes since 2001 had *lowered* individuals' taxes and raised their income. A relevant question therefore is whether individuals respond differently to income losses stemming from tax increases than they do to income gains resulting from tax cuts or rebates.<sup>2</sup>

This study examines the difference in individuals' responses to income changes resulting from tax increases versus decreases by using answers to survey questions posed to a group of mid- to low-income taxpayers in Boston, Massachusetts. The surveys were conducted in 2013 between January 29 and April 13 as part of the Boston Earned Income Tax Credit (EITC) Coalition's free tax preparation service.<sup>3</sup> Participants were asked about their planned response to the 2013 payroll tax increase as well as what they would do with their 2012 tax refund (if any) that the Boston EITC Coalition's tax preparers calculated for them. The results show a 30

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<sup>1</sup> In practice, the PIH often does not hold due to household borrowing constraints and other factors.

<sup>2</sup> The PIH implies that an individual's reaction to any income gain or loss should depend on his or her perception of the permanence of the change in resources. Transitory income changes should lead to little if any consumption response, assuming an individual can freely borrow and lend.

<sup>3</sup> The surveys were given to all the taxpayers who had their tax returns prepared at the Boston EITC Coalition's Roxbury Resource Center. The aim of the coalition is to help low-to-moderate income individuals in Boston improve their financial situations.

percentage point difference in individuals' marginal propensities to consume (MPC) out of these two tax-induced income fluctuations. Taxpayers are much more likely to reduce spending in response to the payroll tax increase than they are to increase spending based on their anticipated tax refund. This gap in spending behavior is robust to controls for various individual demographic, behavioral, and financial characteristics.

## **2. Background**

The U.S. payroll tax cut enacted in 2011 expired on January 1, 2013. During 2011 and 2012 workers' incomes were taxed at a 4.2 percent rate for Social Security and Medicare benefits rather than the usual 6.2 percent rate. Payroll taxes returned to their former level in January 2013 as part of the U.S. fiscal cliff resolution. For individuals earning \$15,600, the median annual income in our sample, the payroll tax hike reduced their annual after-tax earnings by \$312. The 2011 payroll tax cut raised their after-tax earnings by approximately the same amount, assuming constant real income.<sup>4</sup>

Two recent studies by researchers at the Federal Reserve Bank of New York analyze what individuals planned to do and did do in response to the income fluctuations caused by the 2011 and 2013 payroll tax changes. Using the RAND American Life Panel, Graziani, Van der Klaauw, and Zafar (2013) surveyed individuals to capture their planned versus actual response to the 2011 payroll tax cut. They find a significant difference between individuals' planned spending response and their actual consumption changes. Indeed, only 9 percent of the respondents said they planned to consume most of their increase in after-tax income, whereas 35 percent of individuals reported actually consuming most of the extra funds. The related gap in individuals' MPC is 22 percentage points—workers had a planned MPC of 14 percent versus what turned out to be an actual 36 percent MPC.<sup>5</sup> Expanding on the analysis in Graziani, Van der Klaauw, and Zafar (2013), in a subsequent research note Livingston, Van der Klaauw, and Zafar (2013) surveyed households regarding their planned response to the 2013 payroll tax increase and

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<sup>4</sup> In the overall U.S. population households earning \$51,100, the median level of income in 2011, experienced an annual income gain of \$1,022 from the payroll tax cut, and saw their income drop by a similar amount in 2013. These calculations are based on Census Table H-6: Regions by Median and Mean Income: All Races, available at <http://www.census.gov/hhes/www/income/data/historical/household/>.

<sup>5</sup> Comparison based on reported MPCs in Livingston, Van der Klaauw, and Zafar (2013), Table 3: All Observations.

compared the answers to what they reported planning to do in response to the 2011 payroll tax cut. The authors find that while individuals on average spent 14 percent of the extra funds from the tax cut, they planned to cut their spending by 72 percent, on average, due to the tax hike—a gap of 58 percentage points in their MPC.

There are a few reasons why the analysis in this policy brief differs from these two recent New York Fed studies. First, our sample only consists of low- and middle-income taxpayers, whereas their two samples are somewhat more representative of the overall U.S. population. Including only lower income individuals in our analysis is not necessarily a drawback, since these persons are more likely to be financially constrained and thus more affected by short-term income fluctuations. Our data contain good measures of the participants' individual financial constraints so we can directly test whether such financial frictions help explain the differential responses to tax increases versus decreases. In addition, rather than asking the participants what they did in response to the 2011 payroll tax cut, we compare their reported response to the 2013 payroll tax increase to their planned use of their 2012 tax refund. Since both events occurred in early 2013, using this approach means our data does not depend on individuals' often unreliable memories of how they responded to an income gain in the past.

### **3. Data Collection and Sample**

Each year the Boston EITC Coalition prepares tax returns free of charge for over 1,000 low-to middle-income individuals at the Roxbury Resource Center in Boston, Massachusetts. This policy brief draws from data obtained from a 2013 study conducted by the Federal Reserve Bank of Boston that asked participants in this tax preparation program to complete three surveys during their visit. Taken together, the surveys gathered information about the participants' financial standing, behavioral traits, reaction to the 2013 payroll tax hike, and, if applicable, plans for allocating their newly calculated 2012 tax refund amount. In our sample, 83 percent of the respondents (729 people) received a refund; the average refund was \$2,063. In addition, the participants were offered free counseling on how to improve their credit score—a process that included examining and collecting data from their credit report. Unrelated to the Boston Fed's study, the Boston EITC Coalition surveys all the taxpayers who use its free tax preparation service at the time of the service, and the Coalition kindly shared their survey responses with us.

We also have information on the participants' demographic characteristics and tax filing status from their actual individual tax returns.

Although we use data from all of these sources, the analysis in this brief focuses on two main survey questions: (1) how an individual intends to respond to the payroll tax hike, and (2) how an individual plans to allocate his or her tax refund. The text of these two questions is reported below in figures 1 and 2. Other survey questions of interest are presented in the appendix.

**Figure 1**  
**Questions Regarding the Response to Payroll Tax Hike**

<p>Effective January 1, 2013, payroll taxes <u>increased</u> by 2% (from 4.2% to 6.2%). This increase affects all taxpayers in the United States (if you are self-employed, this changes the taxes you pay quarterly). The tax increase means that for the same pay from your employer, the amount you take home after taxes is lower.</p>
<p>What is <u>the biggest change</u> you made or plan to make to adjust to the reduction in your take-home pay due to the tax increase?</p> <p><input type="checkbox"/> Reduce spending    <input type="checkbox"/> Reduce savings    <input type="checkbox"/> Borrow more/Use more credit    <input type="checkbox"/> Other: _____</p>
<p>If you plan to make <u>other changes</u> in addition to the one above, what is the <u>next biggest change</u> you made or plan to make to adjust to the reduction in your take-home pay due to the tax increase?</p> <p><input type="checkbox"/> Reduce spending    <input type="checkbox"/> Reduce savings    <input type="checkbox"/> Borrow more/Use more credit    <input type="checkbox"/> Other: _____</p> <p><input type="checkbox"/> No change</p>
<p>If you are planning to make more than one change due to the tax increase, how would you describe the combination of changes you will make to adjust to lower take-home pay?</p> <p>____% of the adjustment is by <b>reducing monthly spending</b>,</p> <p>____% of the adjustment is by <b>reducing monthly savings</b>,</p> <p>____% of the adjustment is by <b>borrowing more (which may include increasing your credit card balance)</b></p>

**Figure 2**  
**Questions Regarding an Individual's Tax Refund**

**Are you getting a refund this year?**       Yes       No

If you are getting a refund (answered YES above):

**How much is your total refund (federal and state refunds together)?** \$ \_\_\_\_\_

**How are you going to spend your refund?**  
 If you have already put some of your refund in a savings bond, please include this in the savings amount below.

Savings: \$ \_\_\_\_\_       Paying bills: \$ \_\_\_\_\_

Buying stuff (including groceries): \$ \_\_\_\_\_       Paying debt (including old taxes):

Paying for school/child expenses: \$ \_\_\_\_\_       Other (Specify \_\_\_\_\_):

Vacation: \$ \_\_\_\_\_

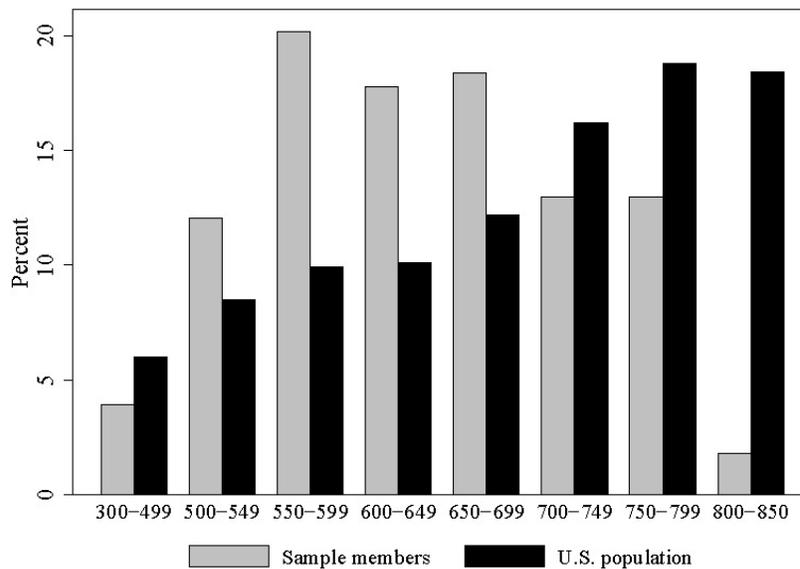
Overall, 945 people answered the survey, and the resulting sample includes all of the 879 respondents who reported having a positive gross monthly income. Nonearners were excluded because they were not impacted by the payroll tax hike, and thus were not relevant for the analysis conducted in this brief. The vast majority of the sample individuals are minorities: 66 percent are black, 13 percent are Hispanic, and only 1 percent is white. The respondents' mean and median age was approximately 45 years and 45 percent reported at least some college attendance. In addition, 32 percent of the respondents reported working full time for 2012, while 54 percent worked at least part time that year. The respondents' median reported annual gross income was \$15,600—well below the annual median income for the overall U.S. population.

Of the 502 individuals in the sample who participated in credit counseling and consented to have their TransUnion credit report pulled, only 332 had a FICO score, which averaged 642 for

this group.<sup>6</sup> Figure 3 shows the distribution of these 332 credit scores compared to the overall distribution of FICO credit scores in the United States. The distribution of the general public is clearly right-skewed toward higher credit scores, while the distribution for the lower-income taxpayers in our sample is highly left-skewed toward lower FICO scores. This contrast in distributions is likely due to our sample including many low-income individuals who struggle financially and whose ability to service their debt and obtain additional credit is particularly susceptible to even small economic shocks.

**Figure 3**

**FICO Score Distribution: Sample versus U.S. Population**



*Notes:* Sample distribution is based on TransUnion scores. U.S. population distribution is based on FICO scores found on FICO Banking Analytics Blog at: <http://bankinganalyticsblog.fico.com/2013/04/fico-score-distribution-remains-mixed.html>.

Table 1 compares the key summary statistics from our sample the two survey results from Graziani, Van der Klaauw, and Zafar (2013). Again, our sample is less representative of the

<sup>6</sup> An individual may not have a credit score for several reasons. The most common one in our sample was because some participants did not use credit products. Specifically, those individuals who do not use credit cards, do not have a loan, or had used credit but so long ago that they no longer had a credit score. There were also instances of people who did use credit, but the length of time was insufficient to calculate a score.

overall U.S. population, as it focuses on a group of individuals who are likely to be financially constrained and whose consumption is particularly susceptible to income fluctuations.

**Table 1: Comparative Summary Statistics**

	Our Sample	G/VdK/Z (2013)	
		Survey 1	Survey 2
Percent White	1	94	94
Mean Annual Income (\$)	18,810	92,161	90,903
Percent College Degree	18	59	58
Percent Male	37	48	51
Mean Age	44	55	56
Percent Employed Full Time	32	55	54

*Notes:* Graziani, Van der Klaauw, and Zafar (2013) used two surveys (Survey 1 and Survey 2 above) to compare planned and actual measures of MPC. Further restricting their sample, they only used the responses of people surveyed in both surveys. Livingston, Van der Klaauw, and Zafar (2013) do not report summary statistics.

## 4. Results

This brief draws its findings from surveys that began to be administered at the end of January 2013, well after the change in U.S. payroll taxes was announced and went into effect. However, only 28 percent of the survey respondents reported knowing that payroll taxes were higher in 2013 than in the previous two years—despite the widespread publicity regarding the payroll tax change and the fact that many individuals in our sample likely live from paycheck to paycheck and should be aware of changes in their take-home pay. This result holds both for those taxpayers who reported having a fixed monthly income (29 percent) and for those who reported receiving a variable paycheck (29 percent).<sup>7</sup>

Turning to households' saving and spending plans, our data show that on average the survey participants had already responded to or intended to respond to the payroll tax increase by cutting their spending by about 90 percent of the resulting decline in their take-home pay, while

<sup>7</sup> There were several respondents who did not indicate whether or not they have fixed or stable income. Among this group, only 11 percent reported being aware of the payroll tax increase. When these individuals are included in the analysis, the overall share of respondents cognizant of the tax increase is 28 percent rather than 29 percent.

adjusting their saving to account for about an additional 9 percent of the change in their income. In contrast, the same respondents planned to *increase* their spending by only about 60 percent of the amount of their tax refund, on average, while they intended to increase their saving by 33 percent of the refund amount and reduce debt by about 7 percent. In other words, for every dollar less of income due to the payroll tax increase consumption *declines* by 90 cents, while consumption *increases* by 60 cents for each additional dollar of income from the tax refund—suggesting that individuals’ planned spending responses to tax-induced income gains versus losses are not symmetric. Indeed, the implied MPCs differ by 30 percentage points.

There are several possible explanations for this asymmetric spending response to a tax increase versus a tax refund. For instance, taxpayers may anticipate their refund amount and plan to save all or some of it while planning to use their monthly income primarily for consumption. It is also possible that the observed asymmetric response is due to financial constraints. If people are constrained, meaning that they cannot borrow and have little or no savings, then they have no other option but to reduce their spending to make up for the income loss resulting from the tax hike. Expectations also are fundamental to individual consumption decisions: if someone expects the payroll tax hike to be permanent, s/he should respond by cutting spending more than someone who anticipates that the tax hike will be temporary.<sup>8</sup>

We use different proxies to examine whether one’s tax refund is expected and thus factored in when deciding what to consume out of current income. If an individual does anticipate and factor in the refund amount, then s/he should have a lower intended MPC out of those funds than someone who did not incorporate the refund into their spending and saving plans. The first proxy we use is whether an individual’s calculated refund amount for the 2012 tax year is similar to the actual refund s/he received for the 2011 tax year.<sup>9</sup> Individuals with similar annual refund amounts are more likely to factor the refund into their year’s spending plans. In the results shown in table 2, the variable *Const. Refund* takes a value of 1 if the calculated refund amount for 2012 is similar to the individual’s actual 2011 refund.

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<sup>8</sup> If the tax increase is assumed to be temporary, then reducing spending requires that the individual either borrows or engages in dissaving to cover the income shortfall.

<sup>9</sup> Data on an individual’s 2011 tax refund are recorded as part of the Boston EITC Coalition’s survey. Tax filers were asked how much their previous year’s refund amounted to using a range of amounts (\$1 to \$100, \$101-\$500, and so on). We consider a taxpayer’s 2012 refund to be similar to his or her refund last year if the calculated refund amount for 2012 falls into the same bin as the individual’s 2011 refund amount.

Another proxy is whether an individual’s income fluctuates from paycheck to paycheck. The variable *Steady Income* takes a value of 1 if an individual reports having a stable paycheck and is zero otherwise. Individuals with consistent paychecks are more able to accurately predict their tax refund at the end of the year. These workers also are more apt to have greater certainty about their income stream and likely are better able to smooth their consumption over time and thus save the extra income, like a tax refund, that they receive. A third proxy termed *MPS Shift* captures whether an individual allocates tax refund dollars similarly across years. A person who incorporates anticipated tax refunds into his or her yearly spending plans is more likely to allocate the refund similarly across years than an individual who does not make such plans. We therefore examine whether an individual’s marginal propensity to save (MPS) is similar for their 2012 and 2011 refunds.<sup>10</sup> Table 2 examines whether the average MPC and the average MPC gap differ systematically across these subgroups.

**Table 2: Average Marginal Propensity to Consume by Survey Subgroups**

	All	Const. Refund		Steady Income		MPS Shift		
		1	0	1	0	1	0	-1
Payroll	90	91	89	89	91	89	89*	94*
Refund	60	60	61	62	58	43***	64*****	91***
Gap	29	29	27	27	31	45***	24*****	3.5***

*Notes:* The stars indicate the significance level of a two-way t-test of means by the categorical group. The symbol \* indicates significance at the 10 percent level; \*\*\* indicates significance at the 1 percent level. Red stars show the t-tests between the MPS Shift that are equal to 0 and 1, while the blue stars show the t-tests between the MPS Shift that are equal to 0 and -1. All reported mean MPCs (except that for the gap on the MPS Shift equal to 1) are significantly different from 0 at the 5 percent level. *Const. Refund:* recorded as 1 if the 2012 refund is similar to the 2011 refund (see footnote 9); *Steady Income:* recorded as 1 if an individual reported having steady paychecks from month to month; *MPS Shift:* recorded as 1 if there is an observed shift in proportion of savings across years (see footnote 10). *Payroll* refers to the MPC based on the survey question regarding the payroll tax hike adjustment. *Refund* refers to the MPC based on the survey question regarding plans to allocate the tax refund. *Gap* refers to the difference between the MPC based on adjusting to the payroll tax hike and the MPC based on allocating the tax refund.

<sup>10</sup> *MPS Shift* takes on one of three values depending on the relationship between an individual’s previous year’s MPS out of the refund, and the current year’s MPS. If an individual did not save any of their refund in either year, he or she was coded as -1. If the individual did save some in at least one year, and the MPS in the previous year was within 20 percent of the current year’s MPS, then that person was coded as 0. If the taxpayer saved some of the refund in at least one year and his or her previous year’s MPS was more than 20 percent different from the current year’s MPS then that person was coded as 1.

Surprisingly, we find no systematic differences in the MPC across those individuals who did or did not have a similar refund amount in 2011 and 2012, or across those who reported having a fixed or fluctuating monthly income. These results suggest that the different responses to the tax-induced income gain and loss are not due to the tax refund being treated as spendable income in one's overall expenditure plan. Rather, we find that the MPC out of the tax refund, and hence the MPC gap, varies based on an individual's saving behavior (MPS Shift). Relative to the other subgroup splits, the difference seems not to come from those individuals with consistent saving behavior across years (MPS Shift = 0), but rather from those taxpayers who reported that their saving behavior varies over time and/or those who do not save at all. Those individuals with stable savings behavior who potentially incorporate the tax refund into their overall spending budget exhibit the common asymmetric response to the tax-induced income gain versus loss. The MPC gap, however, is much larger for those persons with variable saving behavior (MPS Shift = 1), while those who never save have essentially no MPC gap. The large observed asymmetry could be symptomatic of erratic behavior in general: if these taxpayers/individuals cannot keep track of their spending and saving from one event to the next, they may react to income shocks without thinking about their past decisions or future desired behavior. One explanation for such erratic behavior is an individual living paycheck to paycheck who does not have the income flexibility or credit capacity to smooth his/her expenditures (saving) over time.

An individual's reported MPC may also be impacted by whether or not s/he is financially constrained. We therefore split the sample based on whether individuals report having gross monthly income above the sample average of \$1,291 or income that is at or below-average. As noted earlier, the reported earnings in our sample are low compared to the average personal income in the United States, but this split enables us to capture individuals who are potentially less constrained than others and thus relatively more able to smooth their consumption over time.

Using their credit records, we also identify taxpayers who may be financially constrained. In particular, we have rich credit report data for those individuals who participated in the credit advising part of the Boston EITC Coalition tax assistance program. For these individuals we construct a dummy variable, *Good Credit*, that takes a value of 1 if an individual has an above-median FICO score (above 638.5) relative to the other advisory participants and is 0 otherwise. Higher credit scores are presumably correlated with greater credit availability, and thus an individual's potential to smooth consumption over time by borrowing. This ability reduces an individual's need to adjust to the payroll tax hike by dramatically cutting consumption and/or to

spend all of the extra cash from his or her tax refund. We use these additional binary measures of potential financial constraints: *Liquid*, which takes a value of 1 if the share of an individual's available credit relative to their gross monthly income is over 20 percent; *Credit User*, which equals 1 for an individual with above-median credit utilization in the sample and is 0 otherwise;<sup>11</sup> and *High Debt*, which equals 1 if an individual's outstanding debt on their credit report exceeds the median outstanding debt in the sample (\$590). Individuals in the *Liquid* group have a greater relative amount of available credit than the other participants and hence may be less constrained, while those who use a high percentage of their available credit or have a high absolute amount of debt are more likely to be financially constrained.

The data presented in table 3, however, do not support the idea that financially constrained individuals will respond differently to the tax-induced changes in their income. Indeed, the average MPC and MPC gaps are similar across the individual subgroups and it does not appear that financial constraints, as measured, matter for an individual's response to tax-induced income changes. Still, it is possible that our measures of financial constraints do not fully capture the differences in the ability of the individuals in our sample to borrow. Alternatively, the income of these individuals may be so low relative to the majority of the U.S. population that they never smooth consumption over time the way the PIH would suggest, but rather consume and borrow (if possible) as much as their current income allows.

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<sup>11</sup> The credit reports included information on both an individual's total credit availability and the percent of total credit currently available for borrowing. Combining these two measures yields the dollar amount of an individual's available credit. Our measure of liquidity is the ratio of available credit to an individual's gross income. The median of this liquidity metric was 19 percent, which we rounded to 20 percent for our high versus low liquidity cut-off point. The sample median for credit utilization (1 minus available credit) is 69 percent.

**Table 3: Marginal Propensity to Consume by the Sample Subgroups**

	All	Good Credit		Liquid		Credit User		High Debt	
		1	0	1	0	1	0	1	0
Payroll	90	90*	87*	88	89	89	90	88	90
Refund	60	61	58	62	62	62	63	61	60
Gap	29	30	27	25	26	26	26	27	30

*Notes:* The stars indicate the significance level of a two-way t-test of means by categorical group. The symbol \* indicates significance at the 10 percent level. All reported mean MPCs are significantly different from 0 at the 5 percent level. *Good Credit:* recorded as 1 if an individual had a credit score above the sample median; *Liquid:* recorded as 1 if credit available proportional to income was higher than the sample median; *Credit User:* recorded as 1 if an individual used a higher percent of available credit than the sample median; *High Debt:* recorded as 1 if an individual had total debt in excess of the sample median. *Payroll* refers to the MPC based on the survey question regarding the payroll tax hike adjustment. *Refund* refers to the MPC based on the survey question regarding plans to allocate the tax refund. *Gap* refers to the difference between the MPC based on adjusting to the payroll tax hike and the MPC based on allocating the tax refund.

Beyond the question of whether an individual internalizes a potential tax refund in their consumption behavior and the related effect of financial constraints on this decision, there are personal characteristics that may impact an individual’s spending response to tax-related income changes. For instance, the mere decision to participate in the credit counseling at the tax preparation site may indicate that someone is more financially responsible than others and may therefore be more likely to respond to the payroll tax increase by reducing spending rather than by borrowing more or reducing savings. It is also possible that the people who self-selected into the credit advising have more savings to begin with and therefore may behave differently in response to tax-related income changes. We also examine whether one’s apparent financial awareness influences his or her reported MPC. Our measure of financial awareness is based on a taxpayer’s response to the question regarding whether they noticed the change in the payroll taxes. Familiarity with the payroll tax change may indicate that the taxpayer pays more attention to details related to his/her personal finances than those participants who indicated they had not noticed this change in their paycheck. Lastly, financial decision making may systematically differ across gender and race.<sup>12</sup> For example, females are known to be more risk averse and may therefore tend to save more relative to males (for a review, see Croson and

<sup>12</sup> See Charles, Hurst, and Roussanov (2009) for research on racial differences in consumption.

Gneezy 2009). Table 4 shows the reported MPCs based on individuals' personal and demographic characteristics.

**Table 4: Marginal Propensity to Consume by the Sample Subgroups**

	All	Consent		Black		Female		Noticed Tax	
		1	0	1	0	1	0	1	0
Payroll	90	88**	92**	91*	87*	90	89	92*	89*
Refund	60	59	62	60	61	60	62	61	60
Gap	29	27	32	31	25	30	27	33	27

*Notes:* The stars indicate the significance level of a two-way t-test of means by categorical group. The symbol \* indicates significance at the 10 percent level; \*\* indicates significance at the 5 percent level. All reported mean MPCs are significantly different from 0 at the 5 percent level. *Consent*: recorded as 1 if an individual consented to credit advising; *Black*: recorded as 1 if an individual reported race as black or African-American; *Female*: recorded as 1 if an individual reported gender as female; *Noticed Tax*: recorded as 1 if an individual noticed that the payroll tax had increased in 2013. *Payroll* refers to the MPC based on the survey question regarding the payroll tax hike adjustment. *Refund* refers to the MPC based on the survey question regarding plans to allocate the tax refund. *Gap* refers to the difference between the MPC based on adjusting to the payroll tax hike and the MPC based on allocating the tax refund.

We find that splitting the sample by race (*Black*) and by those who consented to credit counseling (*Consent*) are meaningful: those who consented to the credit counseling tend to have a lower propensity to reduce their spending in response to the payroll tax increase, while blacks tend to have a higher propensity to cut spending. However, there are not meaningful differences in behavior based on gender (*Female*) and/or respondents noticing the payroll tax increase (*Noticed Tax*). We also asked taxpayers whether they expected the payroll tax increase to be permanent. Again, their perceptions of the expected longevity of this tax change did not impact their spending behavior (not shown).

In addition, we conduct a regression analysis to isolate the conditional factors that drive the MPCs stemming from the payroll tax hike and the tax refund, and the asymmetric response (the gap in the two MPCs). We control for personal characteristics such as age, age squared, gender, the log of an individual's gross monthly income, and an individual's number of dependents. We further control for whether an individual has present bias—a measure of the extent to which s/he is impatient regarding decisions about consumption in the present compared to decisions about

consumption in the future.<sup>13</sup> If an individual has present bias then s/he should want to maintain current consumption despite the increase in taxes, at the cost of less saving or increased borrowing, and thus have a more modest consumption response to the rise in payroll taxes than someone without present bias. Similarly, if someone with present bias views their anticipated tax refund as money to spend in the future—when they think they would be more impatient—then they may be more willing to plan to save more of it compared to another person without present bias. This difference suggests a negative relationship between present bias and one’s MPC. Present bias may differ by age and gender, and we therefore include the appropriate interactions in the analysis. Lastly, given the concerns that individuals may internalize the tax refund in their consumption response and that financial constraints can influence the observed MPC and the gap, we include, one at a time, dummy variables to control for an individual’s credit-related liquidity, his or her outstanding debt, and his or her credit utilization.

The regression analysis confirms that financial constraints have no effect on an individual’s MPC out of the tax increase or tax refund nor on the gap between the two (not shown), as suggested by the means comparisons in table 3. We therefore drop the financial constraint indicators from the regression estimates and instead include the *MPS Shift* variable, which captures how much individuals internalize the tax refund and influenced their MPCs in the simple mean analysis. The results are reported below in Table 5.

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<sup>13</sup> We follow Meier and Sprenger (2010) in formulating a measure of present bias. Each participant answers two sets of questions (see appendix) to measure their patience. Both sets of questions ask the respondent to choose one monetary prize between two available options, which differ in amount and are one month apart (waiting yields a larger prize). One set of questions has the prize awarded today or in one month, and the second set of questions has the prize awarded six or seven months from now. Someone who is more patient (willing to wait a month to get a higher prize) in the second set of questions that involves only future periods displays present bias. In contrast, someone who is more patient in the first set of questions that involves the present displays future bias (present bias coded as  $-1$ ), and someone who is equally patient in the present and the future is neither present nor future biased and is thus coded as 0.

**Table 5: MPC Regression Analysis**

	Payroll		Refund		Gap	
	(OLS)	(Tobit)	(OLS)	(Tobit)	(OLS)	(Tobit)
Present bias	-0.05 (0.08)	-0.37 (0.32)	0.14 (0.12)	0.18 (0.18)	-0.19 (0.15)	-0.17 (0.17)
Gender	-0.05* (0.03)	-0.40** (0.16)	-0.07 (0.05)	-0.12 (0.07)	0.01 (0.06)	0.02 (0.07)
Present bias * gender	0.09* (0.05)	0.55** (0.23)	0.01 (0.08)	0.04 (0.12)	0.12 (0.10)	0.11 (0.11)
Present bias * age	-0.00 (0.00)	-0.00 (0.01)	-0.00 (0.00)	-0.01 (0.00)	0.00 (0.00)	0.00 (0.00)
Age	-0.01** (0.01)	-0.04 (0.03)	0.01 (0.01)	0.01 (0.01)	-0.03** (0.01)	-0.03** (0.01)
Age sq.	0.00** (0.00)	0.00* (0.00)	-0.00 (0.00)	-0.00 (0.00)	0.00* (0.00)	0.00* (0.00)
Log(gross income)	-0.00 (0.02)	-0.02 (0.08)	-0.05 (0.03)	-0.07 (0.05)	0.05 (0.04)	0.05 (0.04)
Num. of dependents	0.02 (0.02)	0.05 (0.08)	-0.02 (0.03)	-0.05 (0.04)	0.02 (0.04)	0.01 (0.04)
MPS difference	0.02 (0.02)	0.12 (0.12)	0.18*** (0.03)	0.25*** (0.05)	-0.14*** (0.04)	-0.16*** (0.05)
R <sup>2</sup>	0.05		0.13		0.08	
N	255	255	285	285	255	255

*Notes:* The standard errors are reported in parentheses. The symbol \* indicates significance at the 10 percent level; \*\* indicates significance at the 5 percent level; \*\*\* indicates significance at the 1 percent level. The Tobit specifications were run with an upper limit of 1. *Payroll* refers to the MPC based on the survey question regarding the payroll tax hike adjustment. *Refund* refers to the MPC based on the survey question regarding plans to allocate the tax refund. *Gap* refers to the difference between the MPC based on adjusting to the payroll tax hike and the MPC based on allocating the tax refund.

The regression analysis shows that only gender and the interaction of gender with present bias, and at times age, are significant in explaining the observed MPC as measured in response to the payroll tax hike. As for the MPC out of the tax refund, the only significant factor is the MPS shift. When the MPC gap is the dependent variable, only age and the shift in MPS remain significant. The results in table 2 hinted at these findings, as those individuals who do not save at all respond symmetrically to the tax-induced income changes, and those who do save but change their saving percentages over the years tend to have greater asymmetric responses. As discussed earlier, this uneven saving behavior could be the result of these individuals behaving erratically and/or not being able to smooth consumption well over time.

Taken together, the regression analysis reinforces the results of the means comparison exercise by showing that the gap between one's MPC out of a tax refund and one's consumption response to the 2013 payroll tax hike is not explained by behavioral, demographic, or financial distinctions within our sample. It is possible that the composition of our sample is such that the majority of those surveyed live paycheck to paycheck and do not behave as we might expect or as the previous literature using samples more representative of the entire U.S. population might suggest. In other words, individuals' responses and intended behavior to income changes may be more reactive than thoughtfully considered by taking into account their future needs and other factors. Alternatively, there may be a behavioral response to the tax-related income changes that we do not fully capture with our analysis. More specifically, individuals may view income gains versus income losses as separate events when considering their finances. They may also view a small monthly fluctuation in income, like the 2013 payroll tax hike, as part of their current income account for which their MPC is almost one, while regarding the one-time larger tax refund as part of their future account for which their MPC is considerably lower (Thaler 1990). Hence, it may not be surprising that their planned response to a large annual income gain is very different than their response to a small monthly loss of income.

## **5. Conclusion**

Among those individuals who received a tax refund and experienced a payroll tax hike, there is a significant gap in their consumer spending plans. In particular, we find that a group of low-to-middle income Boston taxpayers plan to respond to the 2013 payroll tax hike by reducing their spending 30 percentage points more than they plan to increase spending in response to receiving their 2012 tax refund.

This gap in taxpayers' planned spending response does not appear to be affected by financial constraints or to vary based on whether someone anticipated the amount of their tax refund. The lack of observable explanations for individuals' asymmetric behavior—especially compared to what one might expect as explanations—could be the result of the tax changes themselves being different in terms of their timing and method of delivery. Given their financial situation, low-income individuals may focus more on income losses rather than on income gains—especially in terms of their need to reduce consumption given their limited

resources and limited options to mitigate their budget constraints. In contrast, they have more flexibility to respond to income gains.

The gap we observe is smaller than those found by researchers at the Federal Reserve Bank of New York. There are two reasons why our results are different. First, our analysis examines a low income and financially constrained segment of the U.S. population that likely relies heavily on spending-based adjustment to income changes because they lack other resources to smooth the consumption changes. A second feature of our analysis is that we compare individuals' planned response to the payroll tax increase, which is spread over the course of the entire year, with their intended use of their one-time payment of the 2012 tax refund. The planning required to allocate the funds from a one-time payment are likely less than the effort needed to adjust to a tax change that affects every pay period, so the two adjustments made in response to these income changes may indeed lead to different spending and saving behavior.

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## Appendix

### Figure A.1 Additional Payroll Tax and Paycheck Related Questions

In addition to possible federal income taxes, all workers in the United States pay Social Security and Medicare taxes on their earnings. These taxes, also known as payroll taxes, are automatically withheld from a worker's paycheck.

As far as you know, were there any changes in the payroll tax rate applied to your earnings in 2013 compared to 2012? (Only think about changes in Social Security and Medicare taxes, not other taxes)

Yes, I noticed this tax was higher  Yes, I noticed this tax was lower  No, I did not notice any change in this tax Note: if you are self-employed, you pay payroll taxes quarterly.

**If you noticed any change in the payroll taxes, by how much did it change your earnings per month?**

It increased by \$\_\_\_\_  It decreased by \$\_\_\_\_  I am not sure  I did not notice any change

**Is your paycheck usually for the same amount, or does the amount change from paycheck to paycheck?**

Usually the same  Changes from paycheck to paycheck

**Do you think the payroll tax will remain at its new level?**

Yes, for a very long time.  
 Not for long. I think it will probably be reduced later this year or next year.

**Figure A.2**  
**Present Bias Questions**

<b>Imagine that you win a prize in a lottery, and you can select the prize from the following two options.</b>	
<b>Which one would you choose?</b>	
a. <input type="checkbox"/> \$50 <b>today</b> [in 6 months]	b. <input type="checkbox"/> \$55, <b>but in 1 month</b> [but in 7 months]
What would you do if instead you have to select the prize from the following two options. <b>What would you choose?</b>	
a. <input type="checkbox"/> \$50 <b>today</b> [in 6 months]	b. <input type="checkbox"/> \$65, <b>but in 1 month</b> [but in 7 months]
What would you do if instead you have to select the prize from the following two options. <b>What would you choose?</b>	
a. <input type="checkbox"/> \$50 <b>today</b> [in 6 months]	b. <input type="checkbox"/> \$75, <b>but in 1 month</b> [but in 7 months]

**Figure A.3**  
**Previous Year (2011) Refund Questions**

<b>DID YOU FILE TAXES LAST YEAR?</b> <input type="radio"/> Yes <input type="radio"/> No (If yes, complete this box. If no, skip to next section.)		
Did you receive a refund? <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Don't remember		
If so, how much was your refund? <input type="radio"/> 0 <input type="radio"/> \$1-\$100 <input type="radio"/> \$101-\$500 <input type="radio"/> \$501-\$1,000		
<input type="radio"/> \$1,001-\$2,000 <input type="radio"/> \$2,001-\$3,000 <input type="radio"/> \$3,001-\$4,000 <input type="radio"/> More than \$5000		
<b>If so, what did you do with it? (please mark all that apply)</b>		
<input type="radio"/> Buy groceries	<input type="radio"/> Pay medical bills	<input type="radio"/> Pay for school
<input type="radio"/> Pay child expenses	<input type="radio"/> Save for a home	<input type="radio"/> Pay old taxes
<input type="radio"/> Buy a home	<input type="radio"/> Pay back debts	<input type="radio"/> Save for school
<input type="radio"/> Save for emergencies	<input type="radio"/> Go on vacation	
<input type="radio"/> Pay bills	<input type="radio"/> Home improvement	