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Thomas Pauls

# The Impact of Temporal Framing on the Marginal Propensity to Consume

SAFE Working Paper No. 308

**Leibniz Institute for Financial Research SAFE**  
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# The impact of temporal framing on the marginal propensity to consume\*

THOMAS PAULS<sup>1</sup>

*Preliminary first draft – do not cite without permission*

*Abstract* – We conducted a large-scale household survey in November 2020 to study how altering the time frame of a message (temporal framing) regarding an imminent positive income shock affects consumption plans. The income shock derives from the abolishment of the German solidarity surcharge on personal income taxes, effective in January 2021. We randomize across survey participants whether their extra disposable income is presented in Euros per month, Euros per year, or Euros per ten year-period. Our main findings are as follows: In General, we find our respondents' intended Marginal Propensity to Consume (MPC) is 28.2%. Across all three treatments, the MPC is a positive function of age and being female while it is a negative function of the income increase's size, self-control, and being unemployed. Temporal framing effects are statistically and economically highly significant as we find the monthly treatment groups' average MPC 5.6 and 8.7 percentage points higher compared to the yearly and 10-yearly treatment groups. We will be able to analyze the real consumption behavior of households throughout 2021 based on re-surveying the participants as well as by using transaction-based bank data.

*Keywords:* behavioral economics, saving, marginal propensity to consume, tax intervention, tax cut

*JEL-Codes:* E2, E6

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## 1. Introduction

Tax stimuli are powerful tools in the hand of policymakers to overcome times of crisis and recession. The underlying premise of tax interventions as an element of policy design is that households respond to tax-induced income changes. To measure such households responses, researchers draw on the Marginal Propensity to Consume (MPC), which has been proven effective for the evaluation of the macroeconomic impact and effectiveness of tax based interventions (Jappelli & Pistaferri, 2014).

Contrary to the standard Permanent Income Hypothesis, which predicts a linear consumption function, models that include precautionary savings and liquidity constraints generate a concave consumption function, implying that the MPC is heterogeneous across households (Carroll, 2001, 2009). A common finding of the papers researching MPCs is indeed strong evidence for MPC heterogeneity (e.g. Gelman, 2020 or Jappelli & Pistaferri, 2020). Elaborating on MPC heterogeneity, recent literature highlights the role that the design of policy interventions can play in constructing more effective stimulus policies. For example, tax cuts framed as “bonus” are more likely spent than tax cuts framed as a “rebate” (e.g., Congdon, Kling, & Mullainathan, 2009; Epley & Gneezy, 2007; Epley, Mak, & Idson, 2006). Other studies highlight the importance of how tax interventions are distributed. Here, tax refunds are more likely spent by the recipients if they are refunded monthly instead of in a lump sum (Shapiro & Slemrod, 1995, 2003b). Consequently, understanding how household consumption responds to the design and implementation of tax stimuli is an important topic for researchers and policymakers in order to build effective interventions.

In our paper, we study how the temporal framing of a tax cut affects households’ consumption, saving, and debt repaying decisions. For that purpose, we use an upcoming tax cut in Germany and conduct a large-scale survey experiment with more than 2,000 clients of a major German retail bank before the introduction of the tax cut. In our experiment, we calculate the respondents’ individual prospective income increase from the tax cut and analyze their use of the income increase after showing it to them as either monthly, yearly, or 10-yearly EUR amount.

Respondents in our sample will receive on average EUR 57.11 more per month, which 40.4% intend to ‘mainly spend’, 49.2% to ‘mainly save’, and 10.4% to ‘mainly repay debt’.

Thereby, we find significant heterogeneity in the use of the income increases among respondents. Respondents who receive a smaller income increase, i.e. households with either comparably low or comparably high taxable incomes, are less likely to spend the income increase but rather save it. Homeowners as well as older respondents more likely to spend their income increase. On the other side, we find liquidity constrained respondents less likely to save the income increase and more likely to repay debt. Further, we find that respondents with higher levels of self-control are less likely to spend the income increase and more likely to save it, while respondents who are prone to impulsive buying are less likely to save the income increase and more likely to use it for repaying debt.

In addition, we find that temporal framing affects how respondents intend to use their income increase. In particular, we find that the respondents in the yearly and 10-yearly framing groups are 9.2 and 8.0 percentage points less likely to use the income increase to ‘mostly increase spending’ and 5.9 and 5.1 percentage points more likely to use it to ‘mostly increase saving’ compared to the respondents in the monthly treatment group.

Looking at the respondents’ MPCs, we find that respondents on average intend to spend 28.3% on non-durable and 11.7% on non-durable goods. Thereby, non-durable consumption decreases with the income increases’ size and respondents’ self-control while it increases with the respondents’ age. Temporal framing strongly affects the respondents’ MPCs. In particular, respondents from the monthly treatment group have a significantly higher non-durable MPC compared to the other groups and allocate 5.6 and 8.7 percentage points more to non-durable consumption compared to the respondents of the yearly and 10-yearly treatment group, respectively. On the other side, respondents from the 10-yearly framing group allocate 4.5 percentage points more to durable consumption compared to the monthly treatment group.

Parallel, we ask the participants how they intend to save their individual income increase. We find that respondents on average allocate 21.1% of the income increase to risky assets and 10.8% to savings accounts/ bankbooks, which will yield no significant returns due to commonly low-interest rates. Further, the respondents intend to allocate 5.4% of the income increase to cash, which will not yield them any return at all. Temporal framing plays a significant role when it comes to the use of risky assets for saving, as we find respondents

from the monthly treatment group being less likely to use them in the form of one-off investments and somewhat more likely to use them in the form of savings plans.

Our paper adds to two strands of literature. First, it is part of a growing literature that examines the effectiveness of tax interventions on MPC heterogeneity. Shapiro and Slemrod (1995) and Feldman (2010) evaluated the effectiveness of the *1992 decrease in federal income tax withholding*. Even though the actual tax rate was unchanged, Shapiro and Slemrod (1995) find an increased propensity to spend out of a reduction in withholding rates and Feldman (2010) finds a decrease in the probability that households contributed to a tax-preferred retirement account. Shapiro and Slemrod (2003a) and Shapiro and Slemrod (2003b) evaluate the role of the *Tax Relief Reconciliation Act of 2001* and find that only 21.8% of the households would use the tax rebate to mostly increase spending. Complementary, Johnson, Parker, and Souleles (2006) document that households spent around 20-40% of their 2001 tax rebate. Evaluating the *Economic Stimulus Act 2008* stimulus payments, Sahm, Shapiro, and Slemrod (2010) and Shapiro and Slemrod (2009) find a considerable but small consumption effect. About 20% of the households implied that they would mostly increase spending but instead would either mostly save the rebate or use it to pay off debt. Parker, Souleles, Johnson, and McClelland (2013) document that households spent on average about 12% to 30% of their stimulus payments. Graziani, van der Klaauw, and Zafar (2016) investigate the intended and ex-post spending response to the *2011 pay-roll tax cuts*. While respondents in their sample on average intend to spend 14% of their tax cut, they ex post report spending 36%. Most recently, Coibion, Gorodnichenko, and Weber (2020) evaluate the effectiveness of the *2020 Coronavirus Aid, Relief, and Economic Security* stimulus payments. They find that only 15% of the households intend to spend most of their transfer payment while 33% intend to mostly save it and 52% intend to use it to pay down debt. Other studies approach the subject using *hypothetical income shocks* (e.g., Christelis, Georgarakos, Jappelli, Pistaferri, & van Rooij, 2019; Jappelli & Pistaferri, 2014, 2020). All studies typically find evidence of excess sensitivity of consumption to the income changes induced by tax interventions, with relatively larger responses among low-wealth and low-income

households, which is consistent with liquidity constraints.<sup>2</sup> In contrast to those studies, our paper elaborates on MPC heterogeneity considering a permanent positive monthly income shock from a tax cut and evaluating the ex-ante and ex-post self-reported MPC. In general, we find a comparably large ex-ante MPC from the permanent tax cut compared to MPCs from, for example, tax rebates.

Second, a recent strand of the literature considers the role of the tax interventions' design. We add to it by showing how timing affects households' decisions on how to use income increase. Early evidence on the role of the design of tax interventions comes from Epley et al. (2006) and Epley and Gneezy (2007). They highlight the role of tax interventions' *framing*, as they find that tax cuts framed as "bonus" are more likely spent than tax cuts framed as a "rebate". Shapiro and Slemrod (1995), Feldman (2010), and Chambers and Spencer (2008) find that that the *timing of a refund* affects its use. Thereby, Shapiro and Slemrod (1995) and Feldman (2010) examine the decrease in U.S. federal income tax withholding from 1992. The intervention only shifted the timing of income tax payments while leaving the ultimate tax burdens unchanged. In particular, households paid less throughout the 1992 tax year but then faced greater liability (or reduced refund) on filing their income tax return in the following year. Shapiro and Slemrod (1995) find the refunds are more likely spent by the recipients if they are refunded monthly instead of in a lump sum. Likewise, Feldman (2010) finds a decrease in the probability that households contributed to a tax-preferred retirement account shifting the tax rebate from a lump-sum to a monthly payment. While the 1992 change in tax withholding left the actual tax burdens unchanged, our paper evaluates the role of framing using an actual tax cut, eliciting the respondents MPC before and after the tax cut becomes effective.

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<sup>2</sup> For excellent overviews, see Jappelli and Pistaferri (2010, 2014).

## 2. Data

### 2.1. *The Solidary surcharge*

The solidarity surcharge was introduced in 1991 as a supplement to the income tax and was originally limited to one year. It was repeatedly extended until today and amounts to 5.5% of a household's income tax. From 2021 on, the solidarity surcharge is abandoned or at least reduced for most private households depending on their gross income<sup>3</sup>. Figure 1 displays the households' tax rebate from 2021 on with respect to their taxable income.

Households at the lower end of the income distribution, i.e. single households with a taxable income up to EUR 14,532 and couples with a taxable income up to EUR 29,065, did not pay the solidary surcharge and thus do not profit from the tax reduction. Singles with a taxable income up to EUR 61,717 and married couples who tax their incomes jointly with a taxable income up to EUR 123,434 will not have to pay any solidary surcharge from 2021 on. Households with higher taxable incomes up to EUR 96,409 for singles and EUR 192,818 for married couples will fall in a so-called "mitigation-zone", in which the solidary surcharge gradually increases with the households' taxable income. Households with higher taxable incomes will not benefit from the change and will continue to pay the surcharge in full. The households who profit will automatically receive more net of their gross wages with the first monthly salary payment in 2021. According to the German Federal Ministry of Finance (2019), the solidary surcharge will be dismissed entirely for 90.0% of German households and another 6.5% will be in the "mitigation-zone".

### 2.2. *The survey*

We utilize survey data from clients at a major German bank with a national branch network. The clients in our sample are part of a quarterly online survey panel that we started in 2018. For our research, we draw on the November 2020 wave, which is dedicated to our experiment and the upcoming tax reduction. Invitations for the November 2020 wave were sent via E-Mail on November 26<sup>th</sup>. It was designed to take about ten minutes and was

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<sup>3</sup> The solidarity surcharge is also levied on corporation tax and capital gains tax. For such, the surcharge will remain.



incentivized using a lottery of fifty EUR 50 online vouchers. In addition to the November wave, we draw on the panels' entrance survey, which every household who enters the panel has to complete. It elicits general information on households' income, (financial) wealth, socio-demographic characteristics, and attitudes as well as beliefs. To test if the ex-ante made household intentions hold ex-post, we will re-survey the households in our sample at the beginning of 2021 when the tax cut has been in place.

### 2.3. *Sample Characteristics*

Up to November 26, 5,209 households had completed the entrance survey and were invited to the November wave. 2,048 responded to our survey, which corresponds to a response rate of 39.3%. Of those, we exclude 99 households (4.8%) who do not complete the November 2020 wave. Appendix 4 shows demographic information for our initial sample and compares it to representative German survey data gathered from the Panel on Household Finances (PHF) dataset by the Deutsche Bundesbank (Kalckreuth, Eisele, Le Blanc, Schmidt, & Zhu, 2012). Compared to the general population, participants in our sample are more often male, younger, more educated, and earn higher incomes. Further, they possess a higher financial literacy and a lower risk tolerance.

To calculate the expected tax rebate, we asked the respondents for their taxable income as well as whether this income is taxed individually or jointly with a marital partner. Here, 97 (4.7%) of the households in our sample refused to report their marital status and 112 households (5.47%) refused to specify their last year's taxable income. Figure 2 depicts the taxable income distributions among the households in our initial sample whereby Panel A shows the distribution for singles, while Panel B shows the distribution for jointly taxed incomes, i.e. married couples.

Figure 2 shows that the majority of households in our sample is going to profit noticeably from the tax reduction. 67.7% of the single households report a taxable income between EUR 20,000 and EUR 90,000 and 79.4% of the married households report a taxable income between EUR 30,000 and EUR 190,000. Figure 3 shows the distribution of the expected tax rebates among households. The vast majority of those households will profit from the tax

reduction: 81.5% of the singles and 92.4% of the couples in our sample will profit from the tax reduction.

As we intend to research the determinants of the tax rebates allocation, we exclude the 217 households (10.4%) who will not profit from the solidary surcharge's abolition due to their taxable income being either too high (75 households, 3.6%) or too low (142 households, 6.8%). Our final sample thus comprises 1,524 households. Table 1 presents descriptive statistics for our final sample. On average, the households in our final sample report a taxable income of EUR 66,923 and will save EUR 57.11 from the tax reduction. For the vast majority of our sample, the upcoming tax reduction does not come as a surprise, as only around 21.0% of the participating households stated that they did not know about it.

#### 2.4. *The experiment*

To test whether temporal framing triggers different consumption, saving, debt repayment, and allocation decisions, we randomly assign the respondents into three groups. The tax rebate is then shown to the participants, whereby it is framed as a monthly amount for group one, a yearly amount for group two, and a 10-yearly amount for group three.<sup>4</sup> Apart from the differing presentation of the income increase, all survey questions are identical among groups. With the income being shown, we ask the participants how they intend to use the increase in a qualitative manner (Shapiro & Slemrod, 2003b) or (Coibion et al., 2020). Specifically, we re-show the monthly/ yearly/ 10-yearly income increase to the participants and ask:

*“Now that you have an idea of your income increase, how are you going to use it?”*

Participants had to choose among *“I will mostly save the income increase.”*, *“I will mostly spend the income increase.”*, or *“I will mostly use the increase to repay debt”*.<sup>5</sup> Following

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<sup>4</sup> Appendix 5 provides descriptive statistics on our whole sample and the different treatment groups we use in the regression analyses below.

<sup>5</sup> See Appendix 3 for an illustration of the qualitative MPC question and how the tax increase was presented to the respondents

the qualitative question, we repeat the display of the income increase and ask the participants to allocate their income increase in percent using the following question:

*“Now that you can estimate your increase, what proportion will you spend, what proportion will you save, and what proportion will you use to repay debts?”*

The participants had to allocate 100 percentage points to the options *“Share I will spend”*, *“Share I will save”*, and *“Share I will use to repay debt”*. Households who answered that they would save at least one percent of their income increase were then asked how they would allocate it among different categories.

*“How would you allocate the amount you want to save into the following categories?”*

The participants had to allocate 100 percentage points to the options *“Securities (e.g. stocks or funds) as a one-off investment”*, *“Securities (e.g. stocks or funds) as a savings plan”*, *“Automated asset management (“Robo-Advisor”)”*, *“Pension/ capital life insurance”*, *“Riester/ Rürup pension plan”*<sup>6</sup>, *“Savings account/ bankbook”*, *“Cash”*, and *“Other”*. Further, respondents who answered that they would spend at least one percent of their income increase were asked how they would allocate it among the following categories.

*“How would you allocate the amount you want to spend into the following categories?”*

The participants had to allocate 100 percentage points to the options *“Vacation, traveling, going to a restaurant or other leisure activities”*, *“Donations/ gifts”*, *“General cost of living”*, *“Larger purchases worth € 1,000 or less (e.g. Electrical appliances, sports equipment, clothing, ...)”*, *“Repairs/ renovations (e.g. of vehicles or real estate)”*, *“Own education/ education of members of the household”*, *“Larger purchases worth more than €*

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<sup>6</sup> Riester/ Rürup pension plans are state-subsidized and pension plans, for more information, refer to Meyll, Pauls, and Walter (2020) or Börsch-Supan, Bucher-Koenen, Goll, and Maier (2016).

1,000 (e.g. cars, ...)”, and “Others”. Appendix 2 provides more details on the just described dependent variables of our analyses.

### 3. Descriptive analyses

#### 3.1. How do households intend to use the income increase?

Panel A of Table 2 reports the households’ answers to the qualitative MPC question. Column (1) shows the answers for our whole sample while columns (2) to (4) present the answers for the monthly, yearly, and 10-yearly treatment groups. With respect to the qualitative question, roughly half (49.2%) of the respondents mostly want to save the income increase while 40.4% report that they mostly want to spend the increase. Repaying debt only plays a minor role for the households in our sample as only 10.4% intend to use the increase mostly to repay debt. Table 2 also provides first descriptive evidence in favor of our hypothesis. Looking at the qualitative answers with respect to the different treatment groups, Panel A of Table 2 shows that the share of households who intend to mostly spend the income increase decreases with the temporal framing from monthly to 10-yearly while the share of households who intend to mostly spend the increase decreases. In particular, 47.8% of the monthly-treatment group report that they intend to mostly use the increase for consumption, while only 37.0% and 36.6% if the yearly and 10-yearly treatment groups do so. In contrast, only 43.5% of the monthly treatment group report that they intend to use the income increase to mostly increase saving, while 51.3% and 52.6% of the yearly and 10-yearly treatment group do so. The share of households who intend to use the income increase mostly to repay debt is also lowest for the monthly treatment group (8.7%) and is moderately higher for the yearly (11.7%) and 10-yearly (10.8%) treatment groups. Panel B of Table 2 shows the corresponding results for the quantitative MPC question and essentially confirms the just described results from the qualitative question.

Looking deeper into the quantitative MPC question, Figure 4 plots the distribution of the income increase allocations. Looking at consumption, 22.7% of the respondents do not want to spend any share of the income increase while 20.2% intend to spend the entire increase. For saving, 26.6% of the respondents report that they will save nothing from their income

increase while 17.0% will save the entire increase.<sup>7</sup> Figure 4 also shows ‘heaping’ at rounded values (10%, 20%, etc.). However, heaping at ‘50%’, which is often interpreted as indicating respondent indecisiveness, is low in our sample. Only 9.0% of the spending, 9.4% of the saving, and 2.4% of the repaying debt answers were ‘50%’. In comparison, Jappelli and Pistaferri (2020) find around one-fourth of their answers heaping at ‘50%’. As our respondents are offered three categories for allocation, choosing ‘33%’ might reflect the respondents’ indecisiveness rather than choosing ‘50%’. However, we find no heaping towards the ‘33%’ in our sample as less than 1% of the respondents chose the ‘33%’ option. We take this as an indication that the responses in our sample are reliable.

### 3.2. How do households intend to save/ spend the income increase?

Panel B of Table 2 reports the respondents’ allocations of their income increase to the quantitative categories. When it comes to how respondents spend their income increase, Panel B of Table 2 shows that the ‘*costs of living*’ represent the most important consumption category. In particular, the respondents in our sample intend to allocate 15.5% of their income increases here. Adding the allocations to the ‘*vacation*’ (10.3%) and ‘*donation/ gift*’ (2.5%) categories, the MPC from non-durable consumption amounts to 28.3%. The allocation to durable goods amounts to 11.7%, whereby the most important categories are represented by ‘*reparation & renovation*’ (4.7%), and ‘*durable goods < EUR 1,000*’ (3.9%). The other categories play only minor roles. Thereby, the allocation of the income increase seems to be strongly related to temporal framing. For example, respondents from the monthly treatment group allocate 21.7% of their income increases to ‘*costs of living*’, the respondents from the yearly and 10-yearly treatment groups intend to allocate less, namely 14.3% and 10.6%, respectively. On the other hand, allocation to the categories ‘*vacation*’, ‘*reparation & renovation*’, and ‘*durable goods > EUR 1,000*’ seems to increase from monthly to 10-yearly temporal framing.

Looking at the allocation to different saving vehicles, we find that ‘*risky assets*’ represent the most important. In particular, the respondents in our whole sample (column (1)) intend

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<sup>7</sup> For repaying debt, 76.8% of the respondents indicate that they will not allocate any of their income increase.

to allocate 10.7% of the income increase to ‘*risky assets as one-time investment*’ and another 10.4% to ‘*risky assets as savings plans*’. Although there will be no significant returns due to commonly low-interest rates, the respondents in our sample intend to allocate 10.8% to ‘*savings accounts*’. Further, the respondents intend to save 5.4% of the income increase in ‘*cash*’, which will not yield them any return. Interestingly, classical ‘*pension insurances*’ as well as modern ‘*Robo-advisors*’ do not play a significant role in the respondents’ intentions to allocate their income increases. Looking at the effect of temporal framing (columns (2) to (4)), we find that the allocation to ‘*risky assets as one-time investment*’ seems to be strongly affected. In particular, respondents to which the income increase was shown in a monthly manner intend to allocate 7.0% to risky assets as a one-time investment while respondents to which the increase was shown in a 10-yearly manner intend to allocate 12.7%.

## 4. Regression results

### 4.1. Does temporal framing affect how respondents use the income increase?

To multivariately test whether temporal framing affects households’ use of a permanent income increase, we estimate a series of Probit regression models of the following form:

$$D_{j,i} = \alpha + \beta_1 TreatmentGroup + \delta' X_i + \epsilon_i \quad (1)$$

Where  $D_{j,i}$  is a set of binary variables equal to one if a respondent  $i$  indicates to use the permanent income increase to ‘*mostly increase spending*’, ‘*mostly increase saving*’, or ‘*mostly repay debt*’, respectively.<sup>8</sup>  $TreatmentGroup_i$  represents a categorical variable indicating if respondent  $i$  is in the monthly, yearly, or 10-yearly treatment group. In the regression models, respondents in the monthly group are omitted. To mitigate potential confounding effects, we include a battery of demographic and income shock-related control variables as well as several measures of the respondents’ preferences and attitudes in vector  $X_i$ . For the exact definition of the variables, please refer to Appendix 1 and Appendix 2.

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<sup>8</sup> Appendix 2 shows the definitions of our dependent variables.

Table 3 reports average marginal effects from just described Probit models and provides evidence for our hypothesis that temporal framing affects the respondents' use of the income increase. Compared to the respondents in the monthly treatment group, which is the baseline in our models, the respondents in the yearly and 10-yearly framing groups are 9.2 percentage points and 8.0 percentage points less likely to use the income increase to '*mostly increase spending*' (column (1)). Further, the respondents in the yearly and 10-yearly framing groups are 5.9 percentage points and 5.1 percentage points more likely to use the income increase to '*mostly increase saving*' compared to the respondents in the monthly treatment group (column (2)). When it comes to using the income increase to '*mostly repay debt*', we find a 3.5 percentage points higher probability to choose that option for respondents in the yearly treatment group compared to the respondents in the monthly treatment group. However, this effect is only borderline significant at the 10%-level. To ensure that this effect is actually due to the framing and not to the income increases' actual (monthly) size, we include the monthly logged income increase to our models. We find the income increase to significantly reduce the probability that the respondents use the increase for spending and to significantly increase the probability that the respondent will use it to increase saving. Interestingly, we do not find the tax cut being unanticipated to affect their decision on how to use it. Rather, proxies of their wealth and liquidity seem to play a role. Homeowners and respondents with lower incomes are significantly less likely to save and more likely to mostly spend the income increase. Households who have no 'rainy day savings' are less likely to save the income increase and more likely to use it to repay debt

Several other observable factors significantly affect how respondents use their income increases. For example, older respondents are less likely to save the income increase and rather spend it compared to younger respondents. Looking at respondents' preferences and attitudes, respondents who are more prone to impulsive buying behavior are less likely to mostly save the income increase while they are more likely to mostly use it to repay debt. Thereby, the latter might be a result of impulsive buyers being more likely to take on debt in the first place as found by, for example, Gathergood and Weber (2014). Respondents with higher self-control are less likely to spend the income increase, while they are more likely to mostly save it.

#### 4.2. Does temporal framing affect how respondents spend/ save the income increase?

We perform analyses on how the respondents intend to spend and save the income increase, respectively.

For allocation of the income increase to spending categories, we estimate a series of OLS regression models of the following form:

$$C_{j,i} = \alpha + \beta_1 \text{TreatmentGroup} + \delta' X_i + \epsilon_i \quad (2)$$

Where  $C_{j,i}$  is a set of variables containing respondent  $i$ 's allocation of the income increase to the consumption category  $j$ . The allocation options were “General cost of living”, “Larger purchases worth EUR 1,000 or less (e.g. Electrical appliances, sports equipment, clothing, ...)”, “Larger purchases worth more than EUR 1,000 (e.g. cars, ...)”, “Repairs/ renovations (e.g. of vehicles or real estate)”, “Own education/ education of members of the household”, “Donations/ gifts”, “Vacation, traveling, going to a restaurant or other leisure activities”, and “Others”. In Table 4 column 1, we summarize the categories “General cost of living”, “Donations/ gifts”, and “Vacation, traveling, going to a restaurant or other leisure activities” to non-durable consumption, and “Larger purchases worth EUR 1,000 or less (e.g. Electrical appliances, sports equipment, clothing, ...)”, “Larger purchases worth more than EUR 1,000 (e.g. cars, ...)”, “Repairs/ renovations (e.g. of vehicles or real estate)”, and “Own education/ education of members of the household” to durable consumption. In Table 5, we use the categories separately. For the allocation to saving categories, we estimate a series of OLS regression models of the following form:

$$S_{j,i} = \alpha + \beta_1 \text{TreatmentGroup} + \delta' X_i + \epsilon_i \quad (2)$$

Where  $S_{j,i}$  is a set of variables containing respondent  $i$ 's allocation of the income increase to the saving vehicle  $j$ . The allocation options were “Securities (e.g. stocks or funds) as a one-off investment”, “Securities (e.g. stocks or funds) as a savings plan”, “Automated asset management (‘Robo-Advisor’)”, “Pension/ capital life insurance”, “Riester/ Rürup pension



*plan*”, “*Savings account/ ‘Sparbuch’*”, “*Cash*”, and “*Other*”<sup>9</sup>. As in previous regression analyses, we include *TreatmentGroup<sub>i</sub>* as a categorical variable indicating if respondent *i* is in the monthly, yearly, or 10-yearly treatment group and omit the monthly treatment group to use it as baseline category. Also as in previous regression analyses, we include the vector  $X_i$ , which includes a battery of demographic and income shock-related control variables as well as several measures of the respondents’ preferences and attitudes. The analyses’ results are presented in Table 6.

Looking at the determinants of non-durable and durable consumption, Table 4 shows great heterogeneity among the respondents in our sample. Male respondents, respondents with a higher income, and respondents with higher self-control allocate significantly lower shares to non-durable consumption (column (1)). On the other side, older respondents and respondents with a higher risk tolerance allocate a larger share of their income increase to non-durable consumption. Table 4 also shows that temporal framing significantly affects the respondents’ MPC. In particular, respondents from the monthly treatment group allocate 5.6 and 8.7 percentage points more to non-durable consumption compared to the respondents of the yearly and 10-yearly treatment group, respectively. On the other side, respondents from the 10-yearly framing group allocate 4.5 percentage points more to durable consumption compared to the monthly treatment group.

Going more into detail, Table 5 shows how temporal framing affects the respondents’ allocation of the income increase to the non-aggregated consumption categories. Most notably, respondents who have been displayed the income increase yearly and 10-yearly compared to monthly allocate 6.7 and 9.7 percentage points less to the cost of living, respectively (column (1)). The results hold after controlling for the size of the income increase, which is strongly negatively related to allocating the income increase to the cost of living. In addition, temporal framing plays a role when it comes to durable goods smaller and larger than EUR 1,000 (columns (2) and (3)). Here, we do not find a statistically different allocation between the respondents in the monthly and yearly treatment group. However, compared to those in the monthly treatment group, the respondents in the 10-yearly treatment

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<sup>9</sup> Appendix 2 shows the definitions of our dependent variables.

group are significantly more likely to allocate shares of their income increase into these categories.

Table 6 presents regression results on how temporal framing affects the respondents' allocation of their income increase. Temporal framing has the most notable effect on securities as a one-off investment. In particular, respondents in the yearly and 10-yearly framing groups allocate 5.1 and 5.0 percentage points more into securities as a one-off investment compared to respondents in the monthly treatment group (column (1)). On the other side, respondents in the monthly treatment group allocate 2.9 percentage points more into risky assets as savings plans, whereby the effect is only significant at the 10%-level (column (2)).

## **5. Conclusion**

We use a large-scale survey of German retail bank customers and study how temporal framing from an income tax cut affects households' consumption, saving, and debt repay decisions. We draw on an income tax cut in Germany to explore heterogeneity in the use of the income increase. We find large positive consumption responses for older respondents, homeowners, and households with self-control issues. Also, we find that the reported spending decreases with the size of the income increase and we find strong heterogeneity in the specific allocation to spending and saving categories. In general, we find a 28.2% *ex-ante* non-durable MPC from the permanent tax cut.

The main aspect of our paper is to investigate how households allocate their income increase depending on temporal framing, meaning whether the increase is presented in a monthly, yearly, or 10-yearly manner. We find that the increase's temporal framing strongly affects its usage. Monthly payments are more likely spent compared to income increases that were framed yearly or 10-yearly. Likewise, temporal framing affects the allocation of the income increase into spending categories and saving vehicles. In particular, the income increase is less likely allocated to the cost of living if the income increase is presented monthly. Further, the income increase is more like allocated to larger durable goods (more than EUR 1,000) if presented in a 10-yearly manner. Looking at the allocation to saving

vehicles, our results show that respondents allocate less to risky assets as a once-off investment if the income increase is presented monthly.

Our paper highlights that the design of tax interventions is important to achieve the desired public policy and that temporal framing is an important determinant of households' use of tax increases. Other yet to be explored aspects of the design might be equally important in order to create efficient policy interventions.

## 6. Tables

**Table 1: Sample descriptive statistics**

Sample Statistics	Mean	SD	Min	Median	Max	N
Age	50.88	15.08	22.00	51.00	95.00	1,523
Male	0.69	0.47	0.00	1.00	1.00	1,524
Married	0.60	0.49	0.00	1.00	1.00	1,524
Household size	2.37	1.00	1.00	2.00	4.00	1,524
Taxable income	66,923	34,339	20,000	60,000	190,000	1,524
Income increase	57.11	36.89	3.77	47.55	148.80	1,524
Tax cut unanticipated	0.21	0.40	0.00	0.00	1.00	1,524
College	0.50	0.50	0.00	1.00	1.00	1,524
Retired	0.17	0.37	0.00	0.00	1.00	1,524
Self-employed	0.06	0.24	0.00	0.00	1.00	1,524
Unemployed	0.02	0.13	0.00	0.00	1.00	1,524
Homeowner	0.56	0.50	0.00	1.00	1.00	1,524
Financial literacy score	2.67	0.69	0.00	3.00	3.00	1,524
Risk tolerance	3.47	1.51	1.00	4.00	7.00	1,524
Patience	4.70	1.63	1.00	5.00	7.00	1,524
Rainy day savings - none	0.19	0.39	0.00	0.00	1.00	1,524
Rainy day savings - na	0.04	0.21	0.00	0.00	1.00	1,524
Impulsive buying	1.95	1.33	1.00	1.00	7.00	1,524
Self-control	5.18	1.46	1.00	5.00	7.00	1,524

**Table 2: Use of tax rebate**

Sample Statistics	Whole Sample		Treat: Monthly		Treat: Yearly		Treat: 10-yearly	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Panel A: Qualitative MPC</i>								
Spending (qual.)	0.404	0.491	0.478	0.500	0.370	0.483	0.366	0.482
Saving (qual.)	0.492	0.500	0.435	0.496	0.513	0.500	0.526	0.500
Repay debt (qual.)	0.104	0.306	0.087	0.283	0.117	0.322	0.108	0.311
<i>Panel B: Quantitative MPC</i>								
Spending (quant.)	0.442	0.380	0.496	0.413	0.422	0.370	0.410	0.349
Non-durable consumption	0.282	0.338	0.340	0.380	0.274	0.325	0.236	0.299
Cost of living	0.155	0.284	0.217	0.341	0.143	0.271	0.106	0.221
Vacation	0.103	0.206	0.096	0.211	0.102	0.203	0.111	0.206
Donation/ Gift	0.025	0.090	0.027	0.101	0.028	0.095	0.019	0.070
Durable consumption	0.117	0.204	0.100	0.209	0.107	0.200	0.141	0.200
Durable goods <EUR 1,000	0.039	0.118	0.031	0.116	0.042	0.134	0.043	0.103
Durable goods >EUR 1,000	0.019	0.077	0.013	0.068	0.010	0.061	0.032	0.096
Reparation/ Renovation	0.047	0.133	0.046	0.146	0.043	0.131	0.053	0.121
Education	0.012	0.056	0.010	0.065	0.012	0.049	0.014	0.053
Other	0.044	0.154	0.056	0.190	0.041	0.140	0.035	0.126
Saving (quant.)	0.447	0.379	0.410	0.403	0.464	0.373	0.466	0.359
Risky assets	0.107	0.242	0.070	0.217	0.121	0.260	0.127	0.242
Risky assets (plan)	0.104	0.233	0.112	0.270	0.086	0.210	0.114	0.214
Robo advisor	0.008	0.056	0.006	0.056	0.009	0.066	0.008	0.044
Pension Insurance	0.017	0.083	0.016	0.085	0.017	0.080	0.020	0.085
Riester/ Rürup	0.008	0.059	0.007	0.054	0.004	0.026	0.012	0.083
Savings Account	0.108	0.231	0.105	0.244	0.119	0.241	0.101	0.207
Cash	0.054	0.148	0.048	0.147	0.068	0.169	0.046	0.123
Other	0.041	0.140	0.045	0.151	0.039	0.135	0.038	0.134
Repaying debt (quant.)	0.111	0.257	0.094	0.248	0.115	0.259	0.124	0.262
Observations	1,524		492		513		519	

**Table 3: Regression Analyses: Use of tax rebate (Probit Regressions)**

Sample Statistics	Spending (qual.)	Saving (qual.)	Repay debt (qual.)
	(1)	(2)	(3)
Treat: Yearly	-0.092*** (0.029)	0.059** (0.030)	0.035* (0.018)
Treat: 10-Yearly	-0.080*** (0.029)	0.051* (0.030)	0.028 (0.018)
Taxable income (log)	-0.076* (0.041)	0.077* (0.043)	-0.006 (0.033)
Income increase (log)	-0.053** (0.022)	0.044* (0.023)	0.018 (0.018)
Tax cut unanticipated	-0.005 (0.030)	-0.010 (0.031)	0.014 (0.018)
Male	-0.025 (0.028)	0.019 (0.028)	0.009 (0.017)
Household size	0.006 (0.014)	-0.029** (0.014)	0.021** (0.009)
Married	0.056* (0.032)	-0.076** (0.032)	0.023 (0.021)
Age	0.017*** (0.005)	-0.018*** (0.006)	0.004 (0.004)
Age <sup>2</sup>	-0.000** (0.000)	0.000** (0.000)	-0.000 (0.000)
College	-0.013 (0.024)	-0.016 (0.025)	0.024 (0.016)
Retired	0.054 (0.042)	-0.078* (0.044)	0.018 (0.032)
Self-employed	0.016 (0.049)	-0.025 (0.051)	0.009 (0.031)
Unemployed	-0.067 (0.094)	0.004 (0.097)	0.055 (0.053)
Homeowner	0.065** (0.027)	-0.083*** (0.028)	0.020 (0.019)
Financial literacy score	0.011 (0.018)	0.008 (0.019)	-0.017 (0.011)
Risk tolerance	-0.005 (0.009)	0.013 (0.009)	-0.008 (0.005)
Patience	-0.004 (0.008)	0.004 (0.008)	-0.000 (0.005)
Impulsive buying	0.014 (0.009)	-0.040*** (0.010)	0.021*** (0.006)
Self-control	-0.040*** (0.008)	0.034*** (0.009)	0.005 (0.005)
Rainy day savings - none	0.047 (0.033)	-0.104*** (0.033)	0.051*** (0.020)
Rainy day savings - na	0.005 (0.059)	0.030 (0.060)	-0.023 (0.042)
Observations	1523	1523	1523
Chi <sup>2</sup>	194.1	181.8	82.6
p-value	0.000	0.000	0.000

**Table 4: Regression Analyses: Non-durable and durable consumption**

Sample Statistics	Non-durable consumption	Durable consumption
	(1)	(2)
Treat: Yearly	-0.056*** (0.021)	0.008 (0.013)
Treat: 10-Yearly	-0.087*** (0.021)	0.045*** (0.013)
Taxable income (log)	-0.038 (0.031)	-0.037** (0.017)
Income increase (log)	-0.066*** (0.018)	0.018* (0.010)
Tax cut unanticipated	-0.006 (0.020)	0.018 (0.014)
Male	-0.071*** (0.019)	0.019 (0.012)
Household size	0.011 (0.009)	0.007 (0.006)
Married	0.027 (0.023)	0.014 (0.013)
Age	0.010** (0.004)	0.004* (0.002)
Age <sup>2</sup>	-0.000 (0.000)	-0.000 (0.000)
College	-0.012 (0.017)	0.008 (0.011)
Retired	0.003 (0.036)	-0.003 (0.023)
Self-employed	0.030 (0.036)	-0.021 (0.021)
Unemployed	-0.136** (0.064)	0.027 (0.049)
Homeowner	0.007 (0.019)	0.019 (0.012)
Financial literacy score	0.019 (0.013)	0.000 (0.009)
Risk tolerance	0.013** (0.006)	-0.007* (0.004)
Patience	0.005 (0.005)	0.001 (0.003)
Impulsive buying	0.013* (0.007)	0.004 (0.004)
Self-control	-0.029*** (0.006)	-0.003 (0.004)
Rainy day savings - none	-0.014 (0.022)	0.012 (0.015)
Rainy day savings - na	-0.021 (0.034)	0.027 (0.028)
Constant	0.684** (0.297)	0.301* (0.166)
Observations	1,514	1,514
R <sup>2</sup>	0.134	0.030

**Table 5: Regression Analyses: Use of tax rebate (Consumption categories)**

Sample Statistics	Durable goods		Reparation / Renovation	Education	Donation /			Other
	Cost of living	<EUR 1,000			>EUR 1,000	Gift	Vacation	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treat: Yearly	-0.067*** (0.019)	0.011 (0.008)	-0.003 (0.004)	-0.002 (0.009)	0.001 (0.004)	0.002 (0.006)	0.009 (0.013)	-0.014 (0.010)
Treat: 10-Yearly	-0.097*** (0.017)	0.012* (0.007)	0.020*** (0.005)	0.010 (0.008)	0.004 (0.004)	-0.007 (0.006)	0.017 (0.013)	-0.020** (0.010)
Taxable income (log)	-0.022 (0.026)	-0.005 (0.010)	-0.003 (0.007)	-0.023** (0.010)	-0.006 (0.005)	-0.009 (0.008)	-0.007 (0.022)	-0.004 (0.011)
Income increase (log)	-0.077*** (0.016)	0.001 (0.006)	0.006** (0.003)	0.010 (0.006)	0.001 (0.003)	0.002 (0.004)	0.009 (0.012)	0.008 (0.006)
Tax cut unanticipated	-0.017 (0.017)	-0.003 (0.008)	0.008 (0.006)	0.009 (0.010)	0.004 (0.004)	0.003 (0.005)	0.007 (0.012)	-0.011 (0.009)
Male	-0.017 (0.017)	0.017** (0.007)	0.003 (0.004)	-0.000 (0.008)	-0.002 (0.003)	-0.009* (0.005)	-0.045*** (0.013)	0.009 (0.010)
Household size	0.008 (0.008)	-0.001 (0.003)	0.001 (0.002)	0.003 (0.004)	0.004** (0.002)	-0.001 (0.002)	0.003 (0.006)	-0.003 (0.004)
Married	0.027 (0.020)	0.001 (0.008)	0.000 (0.006)	0.007 (0.009)	0.005** (0.003)	0.002 (0.007)	-0.003 (0.014)	0.001 (0.010)
Age	0.003 (0.003)	0.002 (0.001)	0.002*** (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.000 (0.001)	0.007*** (0.002)	-0.002 (0.002)
Age <sup>2</sup>	-0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000** (0.000)	0.000 (0.000)
College	0.010 (0.014)	-0.004 (0.006)	0.000 (0.004)	0.007 (0.008)	0.005 (0.003)	0.004 (0.005)	-0.026** (0.011)	-0.013 (0.008)
Retired	-0.007 (0.032)	0.020 (0.014)	-0.005 (0.007)	-0.011 (0.015)	-0.007 (0.005)	0.007 (0.011)	0.003 (0.024)	0.049*** (0.017)
Self-employed	0.005 (0.029)	-0.006 (0.011)	-0.010 (0.007)	-0.005 (0.013)	-0.001 (0.006)	-0.010* (0.005)	0.036 (0.026)	0.001 (0.015)
Unemployed	-0.114** (0.051)	0.009 (0.025)	-0.002 (0.015)	0.031 (0.044)	-0.011*** (0.003)	0.018 (0.027)	-0.040 (0.033)	-0.027** (0.014)
Homeowner	0.014 (0.016)	-0.002 (0.007)	0.005 (0.005)	0.018** (0.008)	-0.002 (0.003)	0.007 (0.005)	-0.015 (0.012)	0.005 (0.009)
Financial literacy score	0.020* (0.011)	-0.007 (0.006)	0.002 (0.002)	0.005 (0.005)	0.000 (0.002)	0.002 (0.003)	-0.003 (0.008)	-0.014* (0.008)
Risk tolerance	-0.003 (0.005)	-0.003 (0.002)	0.001 (0.001)	-0.005* (0.003)	-0.001 (0.001)	0.002 (0.002)	0.014*** (0.004)	-0.008*** (0.003)
Patience	0.003 (0.005)	-0.001 (0.002)	-0.000 (0.001)	0.002 (0.002)	0.001 (0.001)	0.001 (0.001)	0.001 (0.003)	-0.005* (0.003)
Impulsive buying	0.012** (0.006)	0.001 (0.003)	0.003* (0.001)	0.003 (0.002)	-0.002** (0.001)	-0.002 (0.002)	0.003 (0.004)	-0.003 (0.003)
Self-control	-0.009* (0.005)	-0.003 (0.002)	0.000 (0.001)	0.000 (0.002)	-0.001 (0.001)	0.000 (0.001)	-0.020*** (0.004)	-0.005 (0.003)
Rainy day savings - none	0.018 (0.019)	-0.002 (0.009)	0.009 (0.007)	0.004 (0.009)	0.001 (0.004)	-0.000 (0.005)	-0.033*** (0.012)	0.009 (0.012)
Rainy day savings - na	-0.020 (0.025)	0.050** (0.025)	0.011 (0.012)	-0.028*** (0.007)	-0.007 (0.004)	0.015 (0.015)	-0.015 (0.021)	-0.001 (0.021)
Constant	0.555** (0.247)	0.091 (0.100)	-0.050 (0.067)	0.187** (0.090)	0.073 (0.050)	0.097 (0.079)	0.031 (0.208)	0.225** (0.114)
Observations	1,514	1,514	1,514	1,514	1,514	1,514	1,514	1,514
R <sup>2</sup>	0.121	0.023	0.035	0.026	0.018	0.025	0.055	0.046

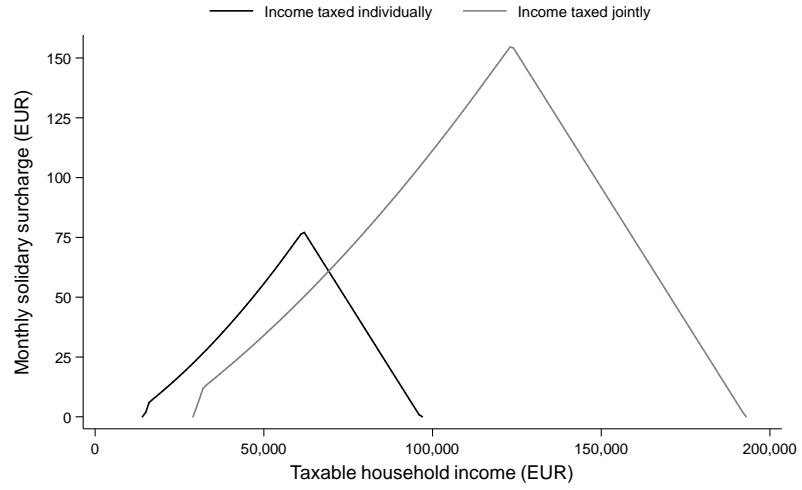
**Table 6: Regression Analyses: Use of tax rebate (Saving product-categories)**

Sample Statistics	Risky assets (1)	Risky assets (plan) (2)	Robo advisor (3)	Pension Insurance (4)	Riester/Rürup (5)	Savings Account (6)	Cash (7)	Other (8)
Treat: Yearly	0.051*** (0.014)	-0.029* (0.015)	0.003 (0.004)	0.001 (0.005)	-0.004 (0.003)	0.005 (0.015)	0.019* (0.010)	-0.008 (0.009)
Treat: 10-Yearly	0.050*** (0.014)	-0.008 (0.015)	0.002 (0.003)	0.003 (0.005)	0.005 (0.004)	-0.013 (0.014)	-0.004 (0.009)	-0.008 (0.009)
Taxable income (log)	0.066** (0.028)	0.041* (0.025)	0.009 (0.007)	0.020 (0.013)	-0.004 (0.003)	-0.064*** (0.017)	0.003 (0.013)	0.003 (0.014)
Income increase (log)	-0.008 (0.013)	-0.004 (0.013)	-0.003 (0.003)	-0.006 (0.006)	0.004*** (0.001)	0.033*** (0.008)	0.005 (0.007)	-0.001 (0.007)
Tax cut unanticipated	-0.004 (0.014)	-0.012 (0.014)	-0.002 (0.003)	-0.007 (0.004)	-0.002 (0.003)	0.008 (0.015)	0.004 (0.010)	-0.004 (0.009)
Male	0.019 (0.012)	0.001 (0.013)	-0.001 (0.004)	-0.004 (0.004)	0.004 (0.003)	0.001 (0.014)	0.005 (0.009)	0.010 (0.009)
Household size	-0.011 (0.007)	-0.018*** (0.007)	0.000 (0.002)	-0.004 (0.003)	0.002 (0.002)	0.006 (0.007)	-0.003 (0.004)	-0.001 (0.004)
Married	-0.047*** (0.018)	-0.016 (0.016)	-0.007 (0.004)	-0.006 (0.008)	0.000 (0.004)	0.026* (0.015)	-0.007 (0.011)	-0.006 (0.010)
Age	-0.004 (0.003)	-0.007** (0.003)	-0.000 (0.000)	0.000 (0.001)	0.000 (0.001)	-0.001 (0.002)	-0.000 (0.002)	-0.000 (0.002)
Age <sup>2</sup>	0.000 (0.000)	0.000* (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
College	0.031*** (0.012)	-0.009 (0.013)	-0.002 (0.004)	0.000 (0.005)	0.004 (0.003)	-0.008 (0.012)	-0.001 (0.007)	-0.015** (0.007)
Retired	-0.020 (0.024)	-0.032 (0.019)	-0.002 (0.005)	-0.003 (0.003)	-0.000 (0.003)	-0.004 (0.022)	0.001 (0.015)	-0.001 (0.012)
Self-employed	-0.009 (0.025)	0.001 (0.028)	-0.002 (0.006)	-0.001 (0.012)	0.021 (0.014)	-0.043** (0.018)	0.007 (0.019)	0.009 (0.020)
Unemployed	0.046 (0.046)	-0.003 (0.033)	-0.003 (0.004)	0.056 (0.041)	-0.001 (0.004)	-0.004 (0.044)	-0.009 (0.025)	0.023 (0.039)
Homeowner	-0.019 (0.014)	-0.002 (0.014)	0.002 (0.003)	-0.006 (0.005)	-0.008** (0.004)	-0.026* (0.014)	-0.005 (0.009)	0.005 (0.008)
Financial literacy score	0.005 (0.007)	0.017** (0.008)	0.001 (0.001)	0.002 (0.003)	-0.002 (0.002)	-0.001 (0.009)	-0.006 (0.007)	-0.003 (0.006)
Risk tolerance	0.029*** (0.004)	0.023*** (0.004)	0.001 (0.001)	-0.002 (0.001)	-0.000 (0.001)	-0.031*** (0.004)	-0.005 (0.003)	-0.003 (0.003)
Patience	0.002 (0.004)	0.006 (0.004)	-0.001 (0.001)	0.002* (0.001)	-0.000 (0.001)	-0.006 (0.004)	-0.002 (0.003)	-0.001 (0.002)
Impulsive buying	-0.011*** (0.004)	0.001 (0.004)	-0.000 (0.001)	-0.001 (0.002)	0.002 (0.001)	-0.012*** (0.004)	-0.008*** (0.003)	-0.005** (0.002)
Self-control	0.008* (0.004)	0.013*** (0.004)	0.001 (0.001)	0.001 (0.001)	0.002** (0.001)	0.000 (0.005)	0.002 (0.003)	0.005* (0.002)
Rainy day savings - none	-0.017 (0.013)	-0.019 (0.014)	0.001 (0.003)	0.016** (0.008)	-0.006** (0.003)	-0.048*** (0.015)	0.011 (0.011)	0.001 (0.010)
Rainy day savings - na	-0.038** (0.019)	0.028 (0.031)	0.001 (0.008)	0.005 (0.016)	-0.006 (0.005)	0.007 (0.034)	0.014 (0.024)	-0.002 (0.018)
Constant	-0.660*** (0.256)	-0.278 (0.236)	-0.071 (0.065)	-0.173 (0.116)	0.021 (0.031)	0.925*** (0.182)	0.066 (0.123)	0.053 (0.133)
Observations	1,521	1,521	1,521	1,521	1,521	1,521	1,521	1,521
R <sup>2</sup>	0.102	0.078	0.008	0.035	0.024	0.083	0.017	0.013

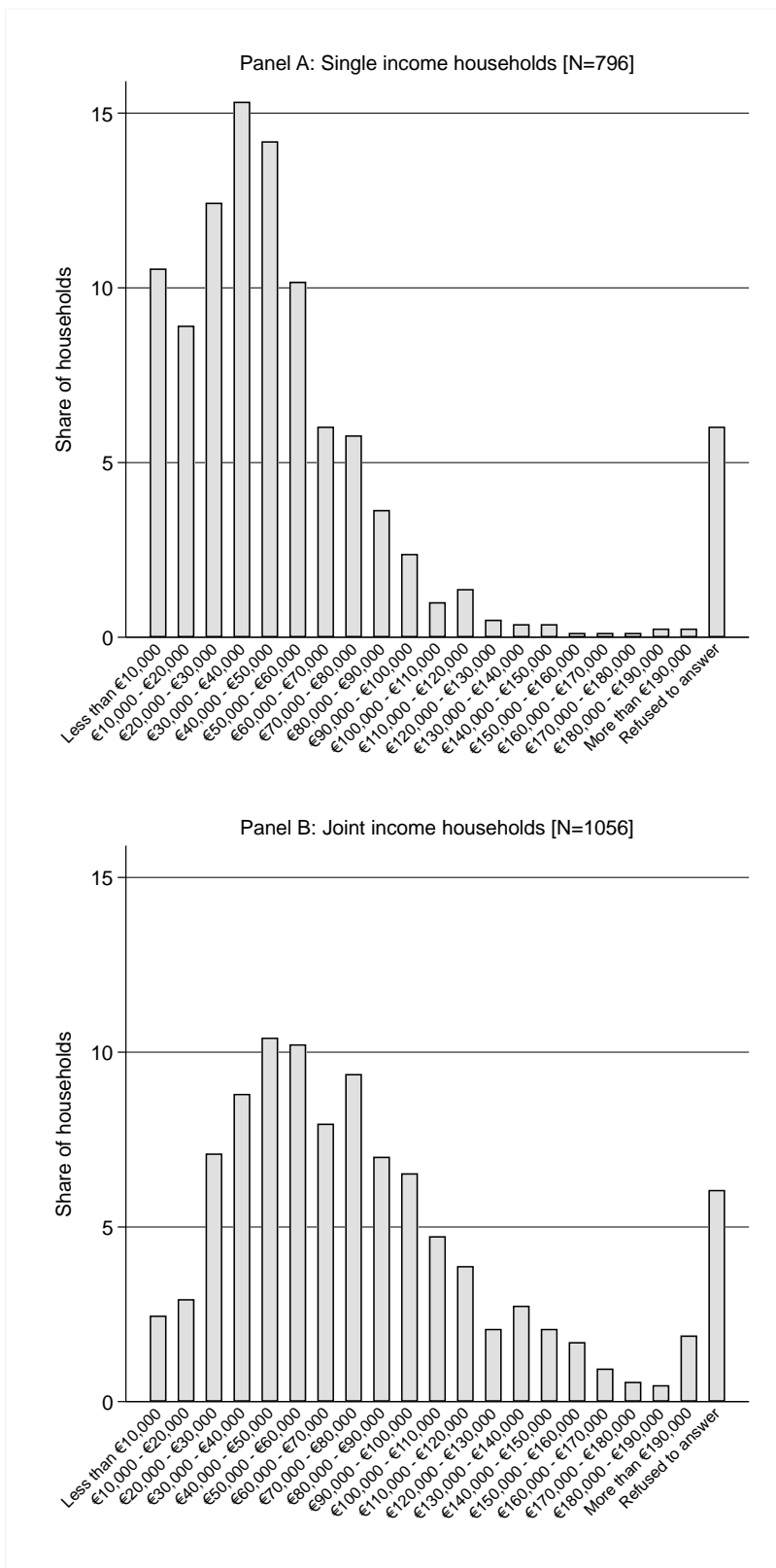


## 7. Figures

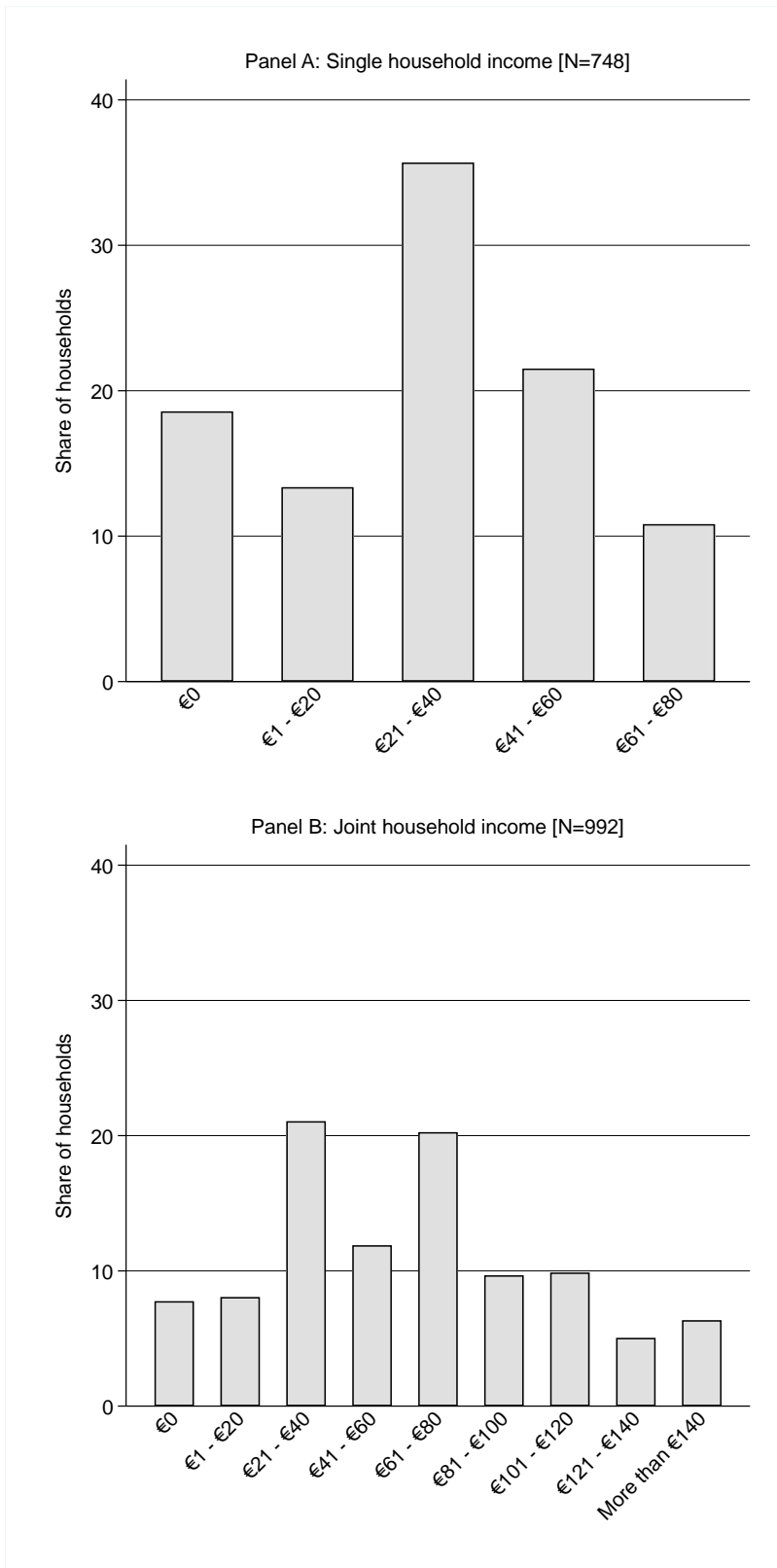
Figure 1: Solidary surcharge as function of taxable income



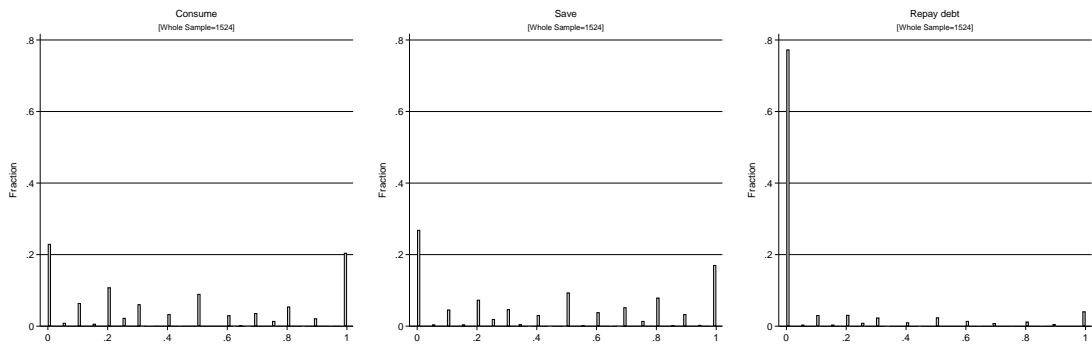
**Figure 2: Taxable income distribution among households**



**Figure 3: Distribution of monthly tax increase**



**Figure 4: Histogram of the income increase allocation distribution**



## 8. Appendix

### Appendix 1: Description of explanatory variables

Name	Survey	Description
Age	Entry	Describes the respondent's age in years.
Male	Entry	Dummy variable that equals one if the respondent is male; zero for female.
Married	Entry	Dummy variable that equals one if the respondent's income is taxed jointly; zero otherwise.
Household size	Entry	Describes the number of persons living in the respondent's household.
Taxable income	Nov20	Describes the household's self-reported taxable income in steps of EUR 10,000.
Taxable income taxed jointly	Nov20	Dummy variable that equals one if the taxable income is taxed jointly with a marital partner; zero otherwise.
Income increase	Nov20	Describes the household's monthly tax increase calculated from the Households reported taxable income and whether it was taxed jointly with a marital partner.
Tax cut unanticipated	Nov20	Dummy variable that equals one if a respondent indicated that he/she did not know if the upcoming abandonment of the solidary surcharge; zero otherwise.
College	Entry	Dummy variable that equals one if a respondent has obtained a college degree or a higher qualification; zero otherwise.
Retired	Entry	Dummy variable that equals one if a respondent is retired; zero otherwise.
Self-employed	Entry	Dummy variable that equals one if a respondent is self-employed; zero otherwise.
Unemployed	Entry	Dummy variable that equals one if a respondent is unemployed; zero otherwise.
Homeowner	Entry	Dummy variable that equals one if a respondent owns a house; zero otherwise.
Financial literacy score	Entry	Ordinal variable that measures the respondents' correctly answered Financial literacy question {0-3}; We use the three financial literacy questions by Lusardi and Mitchell (2008)..
Risk tolerance	Entry	Ordinal variable that measures the respondents' propensity to take financial risks {1-7}. Corresponding question from the survey: "How would you rate your personal willingness to take risks when taking savings or investment decisions?" 1= "not willing to take any risks", 7= "very willing to take risks";
Patience	Nov20	Ordinal variable that measures the respondents' self-assessed patience {1-7}. Corresponding question from the survey: "To what extent do you agree with the following statements? In general, I am a patient person." 1 = "do not agree at all", 7 = "fully agree"
Rainy day savings - none	Entry	Dummy variable that equals one if a respondent has no rainy day savings; zero otherwise. Corresponding survey question: "Have you put aside enough money to cope with a potential emergency that would leave you 3 months without an income?" 1 = "Yes" 2 = "No" 3 = "No answer"
Rainy day savings - na	Entry	Dummy variable that equals one if a respondent refused to answer the question on rainy day savings; zero otherwise. Corresponding survey question: "Have you put aside enough money to cope with a potential emergency that would leave you 3 months without an income?" 1 = "Yes" 2 = "No" 3 = "No answer"
Impulsive buying	Nov20	Ordinal variable that measures the respondents' self-assessed tendency towards impulsive buying {1-7}. Corresponding question from the survey: "To what extent do you agree with the following statements? I am impulsive and tend to buy things even when I can't really afford them." 1 = "do not agree at all", 7 = "fully agree"
Self-control	Nov20	Ordinal variable that measures the respondents' self-assessed self-control {1-7}. Corresponding question from the survey: "To what extent do you agree with the following statements? I am willing to forego something today in order to benefit more from it in the future." 1 = "do not agree at all", 7 = "fully agree"
Treat: Monthly	Nov20	Dummy variable that indicates the respondent's allocation to the <i>monthly</i> treatment group; zero otherwise.
Treat: Yearly	Nov20	Dummy variable that indicates the respondent's allocation to the <i>yearly</i> treatment group; zero otherwise.
Treat: 10-yearly	Nov20	Dummy variable that indicates the respondent's allocation to the <i>10-yearly</i> treatment group; zero otherwise.

## Appendix 2: Definition of dependent variables

Name	Description
<b>Qualitative MPC question</b>	Set of dummy variables that equal 1 if the respondent intends to use the income increase mostly for spending, saving, or repaying debt, respectively; zero otherwise. See section 2.4 for the exact wording of the corresponding survey question.
Saving (qual.)	Dummy variable that equals 1 if the respondent answers the quantitative MPC questions with <i>"I will mostly save the income increase"</i> ; zero otherwise. Derived from the qualitative MPC question.
Spending (qual.)	Dummy variable that equals 1 if the respondent answers the quantitative MPC questions with <i>"I will mostly spend the income increase"</i> ; zero otherwise. Derived from the qualitative MPC question.
Repay debt (qual.)	Dummy variable that equals 1 if the respondent answers the quantitative MPC questions with <i>"I will mostly save the income increase"</i> ; zero otherwise. Derived from the qualitative MPC question.
<b>Quantitative MPC question</b>	Set of ordinal variables that indicate the share of the income increase allocated to spending, saving, and repaying debt, respectively. The minimum value of each category is 0 and the maximum is 100. The sum of all three must not be larger than 100. See section 2.4 for the exact wording of the survey question.
Spending (quant.)	Ordinal variable that indicates the allocation of the income increase to <i>"spending"</i> {0-100}.
Saving (quant.)	Ordinal variable that indicates the allocation of the income increase to <i>"saving"</i> {0-100}.
Repay debt (quant.)	Ordinal variable that indicates the allocation of the income increase to <i>"repaying debt"</i> {0-100}.
<b>Saving allocation question</b>	Set of Ordinal variables that indicate the respondent's allocation of the income increase to the different saving categories. The question was only asked if Saving (quant.) >0. The minimum value of each category is 0 and the maximum is 100. The sum of all allocations must not be larger than 100. See section 2.4 for the exact wording of the corresponding survey question. The Shares were multiplied with 'Saving (quant.)'.
Risky assets	Ordinal variable that indicates the allocation of income increase to the saving category <i>"Securities (e.g. stocks or funds) as a one-off investment"</i> {0-100}. Derived from the saving allocation question.
Risky assets (plan)	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Securities (e.g. stocks or funds) as a savings plan"</i> {0-100}. Derived from the saving allocation question.
Robo advisor	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Automated asset management (Robo-Advisor)"</i> {0-100}. Derived from the saving allocation question.
Pension Insurance	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Pension/ capital life insurance"</i> {0-100}. Derived from the saving allocation question.
Riester/ Rürup	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Riester/ Rürup pension plan"</i> {0-100}. Derived from the saving allocation question.
Savings Account	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Savings account/ bankbook"</i> {0-100}. Derived from the saving allocation question.
Cash	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Cash"</i> {0-100}. Derived from the saving allocation question.
Other	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Other"</i> {0-100}. Derived from the saving allocation question.
<b>Spending allocation question</b>	Set of ordinal variables that indicate the allocation of the income increase to different spending categories. The question was only asked if Spending (quant.) >0. The minimum value of each category is 0 and the maximum is 100. The sum of all three must not be larger than 100. See section 2.4 for the exact wording of the corresponding survey question. The Shares were multiplied with 'Spending (quant.)'.
Cost of living	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"General cost of living"</i> , {0-100}. Derived from the Spending allocation question.
Durable goods > EUR 1,000	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Larger purchases worth more than € 1,000 (e.g. cars, ...)"</i> {0-100}. Derived from the spending allocation question.
Durable goods < EUR 1,000	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Larger purchases worth € 1,000 or less (e.g. Electrical appliances, sports equipment, clothing, ...)"</i> {0-100}. Derived from the spending allocation question.
Repairs/ renovations	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Repairs/ renovations (e.g. of vehicles or real estate)"</i> {0-100}. Derived from the spending allocation question.
Education	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Own education/ education of members of the household"</i> {0-100}. Derived from the spending allocation question.
Vacation	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Vacation, traveling, going to a restaurant or other leisure activities"</i> , {0-100}. Derived from the spending allocation question.
Donations/ gifts	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Donations/ gifts"</i> {0-100}. Derived from the spending allocation question.
Other	Ordinal variable that indicates the allocation of the income increase to the saving category <i>"Other"</i> {0-100}. Derived from the spending allocation question.

### Appendix 3: Display of the income increase for the three treatment groups

Appendix 3 illustrates the display of the income increase at the example of a respondent with a taxable income of EUR 60,000 to EUR 70,000 and whose income is taxed jointly with a marital partner. Panel A presents a screenshot showing the survey-page of the qualitative MPC question. Panel B shows the altered text displays with respect to the treatment groups.

Panel A: Screenshot of the qualitative MPC questions

GOETHE UNIVERSITÄT FRANKFURT AM MAIN Umfrage verlassen und Antworten löschen

30%

Bei den derzeitigen Planungen der Bundesregierung beträgt Ihre voraussichtliche monatliche Soli-Ersparnis bis zu:

**62€**

Eigene Berechnungen, Angaben ohne Gewähr

Jetzt wo Sie Ihren Soli-Bonus grob einschätzen können, wie werden Sie den Soli-Bonus nutzen?

- Ich werde den Soli-Bonus größtenteils ausgeben.
- Ich werde den Soli-Bonus größtenteils sparen.
- Ich werde den Soli-Bonus größtenteils nutzen, um Schulden zurück zu zahlen.

**Weiter**

Hinweise zum Datenschutz  
Benötigen Sie Hilfe?

Panel B: Altered texts for the treatment groups

Group	Displayed Text	Original displayed text in German
Treat: Monthly	According to current planning of the Government, your expected <b>monthly</b> "Soli"-savings are up to:  <b>62€</b>	Bei den derzeitigen Planungen der Bundesregierung beträgt Ihre voraussichtliche <b>monatliche</b> Soli-Ersparnis bis zu:  <b>62€</b>
Treat: Yearly	According to current planning of the Government, your expected "Soli"-savings <b>in the next year</b> are up to:  <b>744€</b>	Bei den derzeitigen Planungen der Bundesregierung beträgt Ihre voraussichtliche Soli-Ersparnis <b>im kommenden Jahr</b> bis zu:  <b>744€</b>
Treat: 10-Yearly	According to current planning of the Government, your expected "Soli"-savings in the <b>next 10 years</b> are up to:  <b>7,440€</b>	Bei den derzeitigen Planungen der Bundesregierung beträgt Ihre voraussichtliche Soli-Ersparnis <b>in den nächsten 10 Jahren</b> bis zu:  <b>7.440€</b>

#### Appendix 4: Representativeness of sample

Sample Statistics	Whole Sample			PHF			Diff	T-stat
	Mean	SD	N	Mean	SD	N		
Male	0.676	0.468	1,740	0.578	0.494	4,942	0.098	7.403***
Household size	2.356	1.004	1,740	2.277	1.149	4,942	0.079	2.715***
Married	0.570	0.495	1,740	0.625	0.484	4,942	-0.055	4.009***
Age	50.3	15.4	1,740	57.3	16.2	4,942	-6.990	16.029***
College	0.500	0.500	1,740	0.386	0.487	4,942	0.114	8.234***
Household income	5,124	2,730	1,740	4,602	2,894	4,942	522	6.746***
Retired	0.165	0.371	1,740	0.371	0.483	4,942	-0.206	18.329***
Self-employed	0.062	0.240	1,740	0.082	0.274	4,942	-0.021	2.95***
Financial literacy score	2.634	0.733	1,740	2.558	0.762	4,942	0.076	3.681***
Risk tolerance	3.457	1.507	1,740	4.114	2.212	4,935	-0.657	13.709***
Patience	4.687	1.640	1,740	4.678	2.467	4,938	0.009	0.171

#### Appendix 5: Descriptive Statistics among treatment groups

Sample Statistics	Whole Sample		Treat: Monthly		Treat: Yearly		Treat: 10-yearly	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age	50.88	15.08	51.69	15.15	51.09	15.01	49.91	15.07
Male	0.69	0.47	0.67	0.47	0.70	0.46	0.68	0.47
Married	0.60	0.49	0.63	0.48	0.59	0.49	0.58	0.49
Household size	2.37	1.00	2.39	0.98	2.41	1.02	2.30	1.00
Taxable income	66,923	34,339	66,484	34,928	66,472	34,537	67,784	33,622
Income increase	57.11	36.89	56.35	37.67	56.11	35.95	58.82	37.07
Tax cut unanticipated	0.21	0.40	0.23	0.42	0.20	0.40	0.19	0.40
College	0.50	0.50	0.52	0.50	0.49	0.50	0.51	0.50
Retired	0.17	0.37	0.19	0.39	0.16	0.37	0.16	0.36
Self-employed	0.06	0.24	0.07	0.25	0.06	0.24	0.05	0.22
Unemployed	0.02	0.13	0.02	0.15	0.02	0.14	0.01	0.10
Homeowner	0.56	0.50	0.60	0.49	0.57	0.50	0.53	0.50
Financial literacy score	2.67	0.69	2.62	0.73	2.70	0.68	2.68	0.66
Risk tolerance	3.47	1.51	3.51	1.46	3.41	1.48	3.49	1.58
Patience	4.70	1.63	4.62	1.65	4.69	1.62	4.78	1.61
Rainy day savings - none	0.19	0.39	0.21	0.41	0.17	0.38	0.17	0.38
Rainy day savings - na	0.04	0.21	0.04	0.20	0.04	0.20	0.05	0.21
Impulsive buying	1.95	1.33	2.01	1.38	1.97	1.31	1.88	1.30
Self-control	5.18	1.46	5.18	1.47	5.20	1.41	5.17	1.50
Observations	1,524		492		513		519	



**Appendix 6: Regression Analyses: Use of tax rebate (OLS/LPM Regressions) qualitative measure**

Sample Statistics	Spending (qual.)	Saving (qual.)	Repay debt (qual.)
	(1)	(2)	(3)
Treat: Yearly	-0.092*** (0.030)	0.058* (0.030)	0.034* (0.019)
Treat: 10-Yearly	-0.079*** (0.029)	0.049 (0.030)	0.030 (0.019)
Taxable income (log)	-0.078* (0.042)	0.081* (0.044)	-0.003 (0.029)
Income increase (log)	-0.055** (0.022)	0.040* (0.022)	0.015 (0.015)
Tax cut unanticipated	-0.005 (0.030)	-0.011 (0.031)	0.016 (0.021)
Male	-0.027 (0.028)	0.019 (0.028)	0.008 (0.017)
Household size	0.005 (0.014)	-0.029** (0.014)	0.024** (0.010)
Married	0.059* (0.032)	-0.078** (0.033)	0.018 (0.020)
Age	0.015*** (0.005)	-0.018*** (0.006)	0.002 (0.003)
Age <sup>2</sup>	-0.000* (0.000)	0.000** (0.000)	-0.000 (0.000)
College	-0.014 (0.024)	-0.013 (0.025)	0.027* (0.016)
Retired	0.064 (0.045)	-0.078* (0.044)	0.014 (0.023)
Self-employed	0.017 (0.051)	-0.023 (0.052)	0.006 (0.035)
Unemployed	-0.067 (0.103)	0.002 (0.100)	0.065 (0.068)
Homeowner	0.066** (0.028)	-0.086*** (0.029)	0.020 (0.020)
Financial literacy score	0.012 (0.019)	0.009 (0.019)	-0.021 (0.013)
Risk tolerance	-0.004 (0.009)	0.012 (0.009)	-0.008 (0.006)
Patience	-0.003 (0.008)	0.004 (0.008)	-0.000 (0.005)
Impulsive buying	0.015 (0.010)	-0.040*** (0.009)	0.025*** (0.008)
Self-control	-0.040*** (0.009)	0.034*** (0.009)	0.006 (0.006)
Rainy day savings - none	0.048 (0.034)	-0.108*** (0.034)	0.060** (0.026)
Rainy day savings - na	-0.000 (0.059)	0.031 (0.062)	-0.031 (0.036)
Constant	1.090*** (0.412)	-0.026 (0.429)	-0.064 (0.282)
Observations	1,523	1,523	1,523
R <sup>2</sup>	0.136	0.128	0.053

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