Using Financial Tips to Guide Debt Repayment: Experimental Evidence from Low- and Moderate-Income Tax Filers

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Abstract: A large majority of U.S. households have debt, and lower-income households tend to have heavier debt burdens than the general population. These households commonly report using tax refunds to pay existing debts. Building on the limited evidence about the efficacy of providing rules of thumb around debt management generally, we administered a field experiment that delivered low-touch financial tips to lower-income tax filers after they prepared their taxes. The experiment tested whether providing debt management tips can impact how households manage their debts in the months following tax filing. We find that the delivery of financial tips can impact the incidence of owing unsecured debt, especially for tax filers who received a tax refund and for those who had debt prior to the intervention. There is also suggestive evidence that tax filers saw some reduction in the amount of unsecured debt as a result of their exposure to certain financial tips. As financial education moves away from traditional classes and toward well-timed, low-touch interventions, this research presents important evidence about the effectiveness of such interventions.

Keywords: debt management; unsecured debt; field experiment; financial tips; behavioral economics.

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1. Introduction

Households in the U.S. hold substantial amounts of debt, and household debt continues to grow (Pew Charitable Trusts, 2015; Aspen Institute, 2018; Federal Reserve Bank of New York, 2019). Approximately 80 percent of U.S. adults reported holding some debt in 2015, and most considered borrowing to be an important part of their financial lives (Pew Charitable Trusts, 2015). While mortgage debt is the largest contributor to total household debt (Pew Charitable Trusts, 2015), consumer debt is a large and growing component of household balance sheets: One study found that 44 percent of households reported owing credit card debt, 34 percent had car loans, and 22 percent had student loans in 2016 (Aspen Institute, 2018), and a separate study found that 21 percent of Americans reported having medical debt in 2015 (FINRA Foundation, 2016). The experience of consumer debt is a common one in U.S. households, but lower-income households tend to bear heavier debt burdens; the debt-to-income ratio of households in the bottom income quintile is three times higher than that of the top income quintile (Aspen Institute, 2018).

The tax filing process represents an opportunity for many low- and moderate-income (LMI) households to address their debt burdens. The federal tax refund, which is a function of the amount of income withheld throughout the year and the receipt of tax credits like the Earned Income Tax Credit (EITC), often provides LMI households with the single largest amount of money they will receive in a given year (Roll et al., 2018). It is thus not surprising that tax filing plays a significant role in financial lives of lower-income households. Prior research demonstrates that tax filing presents a unique opportunity for many lower-income households to boost savings (Beverly, Schneider, & Tufano, 2006; Tufano, 2011; Grinstein-Weiss, Cryder et al., 2017; Grinstein-Weiss et al., 2015; Grinstein-Weiss, Russell, Gale, Key, & Ariely, 2017; Roll et al., 2018), which may subsequently translate to improved capacity to withstand

emergencies and reduce reliance on borrowing (Tucker, Key, & Grinstein-Weiss, 2014; Key, Tucker, Grinstein-Weiss, & Comer, 2015).

Most of the existing interventions surrounding tax filing and the receipt of the tax refund focus on motivating tax filers to save their refund. However, given that the most commonly cited use of the tax refund among LMI filers is to pay down existing debt (Mendenhall et al., 2012; Grinstein-Weiss et al., 2015), tax filing also presents a timely opportunity to encourage LMI households to focus on addressing their debt burdens. How these households choose to pay down their debt may impact the amount they pay in interest and fees and affect both their short- and long-term financial health. At the same time, tax filing may also represent a new source of debt for many U.S. households who owe taxes. Although the vast majority of U.S. tax filers receive a tax refund in a typical year, roughly one-fifth of households either break even or owe additional taxes at the time of tax filing (Internal Revenue Service, 2019). These additional tax liabilities may create additional financial strain on households—particularly those with lower incomes—and result in these households incurring additional debt to meet their tax obligations.

Financial education around debt repayment provides a potential avenue to help households optimize their debt behaviors and improve their debt outcomes. For example, programs raising awareness about the costs of different debts could potentially improve households' ability to choose lower-cost borrowing options or provide guidance on how best to manage multiple debt repayment obligations in order to minimize the total amount of paid interest and fees. Despite theoretical arguments as to why financial literacy programs may be expected to improve financial behaviors of LMI households, evidence suggests that financial education programs tend to be effective only under the right circumstances—for example, when financial education coincides with the timing of specific financial decisions like home purchase (Fernandes, Lynch, & Netemeyer, 2014; Kaiser & Menkhoff, 2017).

As an alternative to traditional financial education, less costly and lower-touch interventions that provide simple, easy to understand information have demonstrated efficacy in building household financial capability and helping individuals address their debt and credit issues (Drexler, Fischer, & Schoar, 2014; Skimmyhorn, Davies, Mun, & Mitchell, 2016; Homonoff, O'Brien, & Sussman, 2019; Karlan, McConnell, Mullainathan, & Zinman, 2010; Cadena & Schoar, 2011). For example, providing extremely low-touch financial rules of thumb has been shown to contribute to the reduction of credit card debt among credit card users who tend to carry monthly debt (Theodos et al., 2016). This emerging evidence indicates that low-touch, low-cost financial initiatives can be effective and cheaper alternatives to traditional financial education programs.

Building on this research concerning the efficacy of providing rules of thumb around debt management, we administered a randomized controlled trial (RCT) that delivered simple financial tips to LMI tax filers after they learned the amount of their tax refund or tax liability. The purpose of the experiment was to test whether providing low-touch debt management tips tied to the tax filing process can impact how households use their tax refunds to manage their debts. We embedded the experiment in a survey delivered to 13,683 tax filers immediately after tax filing. Survey participants were randomized into six experimental groups: a control group that received no financial tips, a treatment group that received one of four possible tips, and a treatment group that allowed respondents to select one financial tip that was most relevant to their financial circumstances. This experimental design allowed us to test both the differential impacts of the information delivered through various tips, as well as the relative efficacy of two different ways of delivering the information in the tips (e.g., providing a single tip versus allowing respondents to pick what they perceive as the most relevant tip for them).

Our findings reveal that the delivery of low-cost, low-touch financial tips at the time of tax filing can help tax filers reduce the incidence—and in some cases the amount—of unsecured debt. Specifically, we find that the delivery of debt management tips can reduce the incidence of unsecured debt liabilities, particularly for individuals who have reported having debt at tax filing and who received a tax refund. This debt reduction worked mostly through the delivery of two specific tips that emphasized prioritizing the smallest debt balance and the highest cost debts held by a tax filer. We also find some evidence that the delivery of financial tips emphasizing the repayment of the highest cost debt contributed to the reduction in the amount of unsecured debt, though this finding was sensitive to sample specification. We observed no effects of delivering low-touch financial tips on the total amount of debt held. Finally, our results suggest that the impact of this low-touch intervention may vary across different subgroups of tax filers.

This study makes two primary contributions to the literature. First, this work extends the small but growing body of research on the use of tips and rules of thumb as tools to impact financial behaviors. Given that recent research has cast doubt on the efficacy of traditional financial education (e.g., Fernandes, Lynch, & Netemeyer, 2014), it is important to understand how to design and optimize effective information-based interventions. Second, this work represents a substantial expansion of the experimental work linking the tax filing moment with financial security outcomes. While a large body of research has shown that low-touch behavioral interventions delivered in the online tax filing environment can increase the saving of the tax refund (Duflo, Gale, Liebman, Orszag, & Saez, 2006; Grinstein-Weiss et al., 2015; Grinstein-Weiss, Cryder et al., 2017; Grinstein-Weiss, Russell et al., 2017; Key et al., 2015; Roll et al., 2019), less is known about whether debt-related interventions delivered at tax time can also be effective in improving financial behaviors and outcomes of LMI tax filers. In presenting evidence on the efficacy of delivering low-cost, low-touch, and scalable alternatives to

traditional financial education approaches, this research will inform the design and implementation of messages that can easily be incorporated into many financial capability-oriented settings, including financial technology applications, financial coaching services, and Volunteer Income Tax Assistance programs.

2. Background

Households may take on debt for a variety of reasons—to smooth consumption, to make investments in assets such as cars and houses, to facilitate life-cycle considerations such as education, or to deal with emergencies like unexpected income declines or expense shocks. While borrowing can enhance household welfare in the short- and long-run, unsustainable levels of household debt and excessive accumulation of unsecured debt are associated with many adverse financial, health, and psychological problems (e.g., Richardson, Elliott, & Roberts, 2013; Clayton, Liñares-Zegarra, & Wilson, 2015). Lower-income households may be particularly vulnerable to these risks (Aspen Institute, 2018), and evidence from behavioral economics suggests that households living under conditions of financial scarcity are more prone to over-borrow and engage in high-cost borrowing to meet pressing financial needs (Shah, Mullainathan, & Shafir, 2012; Mullainathan & Shafir, 2013).

As households, and especially lower-income households, accumulate more debt over time, it becomes more important for them to be able to manage debt sustainably. The rational perspective on debt management implies that households should always prioritize paying down their highest-interest debts first in order to minimize the amount of interest paid. However, substantial research suggests that households with multiple debts often do not optimally allocate their debt payments (Ponce, Seira, & Zamarripa, 2017) and instead use a number of other strategies to allocate debt repayments across multiple debts. For example, households may rely on the "balance-matching heuristic," where the relative amount of debt payments for each credit

card is proportional to their total credit card balance (Gathergood, Mahoney, Stewart, & Weber, 2019). Households may also choose to pay down their smallest debts first in order to more quickly close their accounts (Amar, Ariely, Ayal, Cryder, & Rick, 2011; Besharat, Carrillat, & Ladik, 2014); a strategy that is predictive of debt elimination even after controlling for the dollar balance of the accounts (Gal & McShane, 2012).

There are a number of potential motivating factors for why households may choose to follow alternative debt repayment strategies. It may be that households have other financial concerns that they prioritize over minimizing total interest payments. Sabat and Gallagher (2019) show that LMI households who choose to keep cash on hand while owing unsecured debts were less likely to experience material hardships. It may also be the case that behavioral biases and other seemingly irrelevant external factors shape individuals' decision making in negative ways. For example, the presence of minimum payment recommendations on a credit card bill tends to lead individuals towards making the minimum required monthly payments (Stewart, 2009; Navarro-Martinez et al., 2011), increasing the overall cost of debt repayment. Similarly, the presence of additional payoff scenarios on credit card statements may reduce the likelihood of households fully paying off their debt balances (Hershfield & Roese, 2015; Navarro-Martinez et al., 2011).

A potential underlying reason why individuals fail to optimally allocate payments across multiple debts, or are influenced by seemingly irrelevant external factors, is the low level of financial sophistication and financial knowledge among borrowers (Lusardi & Mitchell, 2014; FINRA, 2016; Hilgert, Hogarth, & Beverly, 2003). Individuals may have a limited understanding of different financial choices and products and how their financial decisions correspond with both their short- and long-run financial security. The challenge of managing debts optimally may

be exacerbated by a growing number of financial options, predatory or misleading practices of financial institutions, and the increasing complexity of financial instruments.

If low levels of financial literacy are leading to worse debt outcomes, one might reasonably conclude that policymakers and practitioners should prioritize delivering financial education to improve financial literacy, which could subsequently help LMI households address their debt problems and contribute to improved financial behaviors. While financial education programs have been shown to have positive impacts on financial knowledge (Carpena, Cole, Sahapiro, & Zia, 2011; Bruhn, de Souza Leao, Legovini, Marchetti, & Zia, 2013; Kaiser & Menkhoff, 2017), evidence indicates that traditional financial education has limited impacts on downstream financial behaviors (Fernandes, Lynch, & Netemeyer, 2014; Kaiser & Menkhoff, 2017). However, this research also finds that financial education that is tailored to recipient needs and occurs at the point when important financial decisions are being made—such as providing homeownership counseling to new homebuyers—can make positive and sustained impacts on behaviors.

As an alternative to traditional financial education programs, other lower-touch and less costly strategies may positively impact financial outcomes. One promising strategy is to provide text and email reminders, which can draw households' focus to specific financial priorities or obligations and help them navigate the many competing demands on their attention (Mullainathan & Shafir, 2013). Reminder-based interventions have been shown to be effective in improving a number of positive financial behaviors. For example, Karlan et al. (2010) demonstrated that offering text reminders to savings account holders in three developing countries increased savings deposits. There is also experimental evidence that text reminders can improve loan-repayment behaviors. Cadena and Schoar (2011) found that sending text messages to microloan borrowers in Uganda reminding them to repay their loans was as effective at

reducing loan delinquency as a 25 percent reduction in the loan's interest rate. Roll and Moulton (2019) found that automated reminders sent to credit counseling consumers in the United States both improved credit scores and reduced the likelihood of incurring debt payment delinquencies. A similar study found that text reminders can improve the credit scores of individuals who had low initial credit scores (though reminders had the opposite effect on individuals who had higher initial credit scores) (Bracha & Meyer, 2014). With specific regard to debt repayment, Carlin, Olafsson, and Pagel (2017) found that the introduction of a financial management app that consolidated and summarized bank account information and transaction histories was associated with reductions in both financial fees and interest on short-term debt, indicating that even passively reminding people about their financial situation (versus the active use of text- or email-based reminders) may prompt changes in financial behaviors.

Beyond the use of attention-based strategies like reminders, a growing body of literature has explored the potential of information-based interventions in improving financial behaviors. These interventions are distinct from traditional financial education in that they tend to focus on discrete, actionable pieces of information or specific guidance on financial management strategies. For example, behavioral nudges that help individuals develop implementation strategies for how they will repay their debts have been shown to increase the likelihood that they will repay delinquent debts (Mazar, Mochon, and Ariely, 2018). Providing student loan borrowers with access to their credit scores paired with short explanations of the factors lowering their scores has been shown to positively affect some financial behaviors, such as the lower incidence of past due credit payments and increased credit scores (Homonoff et al., 2019). Additionally, showing households the monetary costs of high-interest borrowing can reduce the likelihood of such borrowing (Bertrand & Morse, 2011).

The literature on targeted information provision and financial management strategies has also generated a small body of work highly relevant to the current study, which concerns the use of heuristics or rules of thumb to help guide household financial decisions. Extremely low-touch financial rules of thumb can contribute to the reduction of credit card debt among credit card users who tend to carry monthly debt (Theodos et al., 2016), and these low-touch financial initiatives tend to be cheaper and can be as (or more) effective as traditional financial education programs (Drexler, Fischer, & Schoar, 2014; Skimmyhorn et al., 2016). This emerging body of research demonstrates that targeted, low-touch interventions can be cost-effective in changing individual financial behaviors because they provide individuals with simple information that is easy to understand, remember, and follow.

3. Data and Experimental Design

3.1. Data

Longitudinal data for this paper come from two waves of the 2018 Household Financial Survey (HFS), which was offered to a random sample of LMI households who filed their 2017 federal taxes using TurboTax Freedom Edition (TTFE).[1] To qualify for TTFE in 2018, household adjusted gross income (AGI) could not exceed $34,000 or households had to qualify for the EITC.[2] The vast majority of TTFE users (over 98.4 percent in 2017) qualified for the free tax filing software based on either the income or EITC criteria. A third of all TTFE filers in 2018 were randomly invited to participate in the HFS immediately after they filed their taxes between January and April of 2018, of which 5.4 percent (N=16,014) consented to participate and began the survey.[3] In total, 13,683 of the individuals over the age of 18 who consented to participate in

[1] TTFE is a free tax preparation software for qualified low-income users offered as part of the IRS Free File Alliance (https://freefilealliance.org/).
[2] Active duty military tax filers faced looser AGI requirements.
[3] Despite this relatively low participation rate, a comparison of TTFE users in prior years showed that those who took the HFS were for the most part statistically similar to those who did not agree to participate in the survey, though survey takers had slightly higher incomes on average (Grinstein-Weiss et al., 2015).

the first wave of the HFS completed the survey. Of those whose who finished the first iteration of the survey, 3,827 respondents also completed the follow-up survey six months later (a 28 percent response rate), between July and October of 2018. Adjusting for nonresponse on the dependent variables in the study reduced the sample to 3,262, and after dropping observations with missing information on key demographic and financial variables the final analytical sample included 2,971 observations. Study participants received $5 gift codes for the completion of each of these surveys. Each survey iteration collected detailed information about demographics, employment, education, ownership of financial and non-financial assets, and debts.

3.2. Experimental Design

The purpose of this field experiment was to test how the provision of simple financial tips describing different debt management strategies can help tax filers manage their debts. Financial tips can be described as simple, concrete statements about household finances—debt management in the case of our study—that can guide individual financial decisions and behaviors (Commonwealth, 2016).

To develop the financial tips used in this study, we followed guidelines outlined in a toolkit on the development of rules of thumb for use in financial capability programs (Commonwealth, 2016). First, we conducted exploratory research using prior years of HFS data to better understand debt-related problems and behaviors in our LMI population and reviewed the limited existing academic and non-academic literature on debt management rules of thumb. Following this exploratory step, we compiled a preliminary list of financial tips and gathered feedback on these potential tips (as well as ways of delivering these tips) from academics and practitioners in the field of consumer finance. As part of this step, we conducted a focus group with financial coaches to better understand the ways in which financial capability practitioners communicated debt management rules of thumb or tips to their clients. This expert feedback

allowed us to narrow down and refine the list of tips through several iterations of internal review. Lastly, we tested different potential framings of the narrowed list of financial tips on individuals through a pilot study in Amazon Mechanical Turk (MTurk), which helped us finalize the framing of the four financial tips used in this intervention.

The design of the financial tips employed in this experiment is illustrated in Table 1. Each message had a brief eye-catching statement followed by a short tip on how one can manage outstanding debt payments in the context of managing one or more debts. The "extra payment" message suggested that tax filers make an extra payment on at least one of their debts, thus aiming to minimize the total amount of interest payments on debts and accelerate the process of debt repayment. The "largest credit card debt" tip prompted tax filers to prioritize repayment of their largest credit card balances. Since credit cards typically charge high interest rates that may lead to the accrual of substantial debt balances, this approach to debt reduction could help realize substantial savings in interest payments. The "smallest debt balance" message was based on the "snowball method" discussed both in the research literature and by popular finance writers (Amar et al., 2011; daveramsey.com, 2019), which encourages tax filers to focus on paying off the smallest debt balances while making minimum payments on other debts. Once their smallest debt is paid in full, tax filers would roll the money into the next smallest balance. The method aims to induce the feeling of accomplishment and progress, motivating individuals so that they can be successful in tackling their debts. Finally, the "highest cost debt" tip asked tax filers to focus on repaying the most expensive debts, which may include high-interest credit card debts, large-balance mortgages, or high-fee payday and auto title loans. This approach to debt reduction can help tax filers minimize total interest and fee payments on their debts, though it can also discourage tax filers if their most costly debts correspond to large debts such as mortgages. The design of financial tips varied by the status of the federal tax refund: Those who received a

federal tax refund after completing their taxes saw a message tied explicitly to the use of the tax refund to pay down debt, whereas those who broke even or owed taxes saw a message structured around using available extra funds for debt management more generally.

The experiment delivering financial tips to TTFE users was conducted directly in the HFS. In addition to detailed questions on respondent demographic and financial characteristics, the first survey wave of the 2018 HFS conducted immediately after tax-filing also randomized TTFE tax filers who agreed to participate in the survey into the six experimental groups shown in Table 1: a control group that received no financial tip, a treatment group that randomly saw one of four possible debt management tips ("pre-determined" groups), and a treatment group in which respondents were asked to select which of the four financial tips they found to be most relevant to their financial situations ("pick-your-own" group). The motivation for including the pick-your-own condition was to test the effectiveness of allowing tax filers to choose their own debt-repayment strategy. No restrictions were imposed on the choice of a financial message for this group, and treated filers may have selected a tip that they were already following, a tip they felt was the easiest to follow, or the one that was most relevant to their financial situations. In total, 1/7 of tax filers who agreed to participate in the first wave of the survey immediately after completing their tax returns were randomly assigned to the control group, 3/7 were assigned to the pick-your-own group, and 3/7 were assigned to the pre-determined treatment group. Within the pre-determined treatment group, tax filers were equally randomized into four different treatment arms.[4] Table 1 reports the number of people included in the final analytical sample who were exposed to one of the experimental conditions within the first wave of the survey.

[4] The "highest cost debt" message was delivered in two ways. The first delivery approach was equivalent to the delivery of other financial tips, with the tip simply being presented to a tax filer. The second approach both presented the tip and asked tax filers to type the financial tip; an approach intended to maximize recollection. Since the two messages are equivalent, we combine the two treatment conditions for this analysis.

The intervention first appeared approximately in the middle of the survey, immediately following survey questions about the ownership of different debt types and the levels of debt held. This allowed us to assess baseline measures of debt behaviors and outcomes prior to the treatment group's exposure to the intervention. The same financial tip was presented three more times in different places throughout the survey to maximize the exposure of study participants to their financial tip. In addition, one month after tax filing, each study participant who completed the first survey wave received an email that contained both their compensation for participating in the survey (an online gift code) and, for individuals in the treatment conditions, a reminder of the financial tip they were randomly assigned or they selected. The tip reminder was included in the gift code compensation email as a way of maximizing the chances that respondents would open the email and see the reminder.

Table 1. Experimental Conditions

Experimental group	Initial assignment ratio	Analytical sample	Treatment description	
			Received tax refund	Did not receive tax refund
Control group	1/7	415	Did not receive any financial tip	Did not receive any financial tip
Extra payment	3/35	239	"Get ahead on your debt! When you get your tax refund, *use it to make at least one extra payment on one of your debts.*"	"Get ahead on your debt! When you have extra money, *use it to make at least one extra payment on one of your debts.*"
Largest credit card debt	3/35	247	"Higher debts can lead to lower credit! When you get your tax refund, *use it to pay down your largest credit card debts first.*"	"Higher debts can lead to lower credit! When you have extra money, *use it to pay down your largest credit card debts first.*"
Smallest debt balance	3/35	281	"Build momentum toward being debt free! When you get your tax refund, *use it to pay off your smallest debts first.*"	"Build momentum toward being debt free! When you have extra money, *use it to pay off your smallest debts first.*"
Highest cost debt	6/35	474	"Dig yourself out from expensive debts! When you get your tax refund, *use it to pay off your highest cost debt first.*"	"Dig yourself out from expensive debts! When you have extra money, *use it to pay off your highest cost debt first.*"
Pick-your-own	3/7	1,315	Picked a financial tip from the list above	Picked a financial tip from the list above

Notes: N=2,971. Italics added to emphasize the key element of each tip.

3.3. Analytical Approach

We estimate the average treatment effects of delivering simple financial tips at tax filing on debt indicators six months after tax filing through the following regression models:

$$y_i = \delta + \beta_1 PD_i + \beta_2 PYO_i + H_i\pi + \varepsilon_i \qquad (1)$$

$$y_i = \delta + \gamma_1 PD\_1_i + \gamma_2 PD\_2_i + \gamma_3 PD\_3_i + \gamma_4 PD\_4_i + \beta_2 PYO_i + H_i\pi + \upsilon_i \qquad (2)$$

where y_i is an outcome for tax filer *i* six months after tax filing; PD_i and PYO_i in Equation 1 are treatment group indicator variables for tax filer *i* in predetermined and pick-your-own experimental conditions, respectively; PD_n_i, where $n \in \{1,2,3,4\}$ in Equation 2 correspond to indicators for the four pre-determined treatment conditions—e.g., "extra payment," "largest credit card debt," "smallest debt balance," and "highest cost debt" tips; and H_i is a vector of individual-level control variables measured at the time of tax filing, including tax filer's gender, race/ethnicity, age, age squared, marital status, highest educational attainment, student status, employment status, housing situation, the number of children in the household, the experience of income volatility in the past six months, the presence of health insurance, the ability to come up with emergency funds, self-reported income, log unsecured debt, an indicator for receiving a tax refund, and the month of tax filing. Finally, ε_i and v_i are heteroscedasticity-robust unobserved error terms. Parameters β_1 and β_2 in Equation 1 describe the differential impacts of pre-determined and pick-your-own treatments, respectively; and parameters γ_n where $n \in \{1,2,3,4\}$ in Equation 2 identify the average treatment effects of each pre-determined financial tip. This approach yields average treatment effects across all survey takers randomized into experimental conditions, regardless whether they actually followed the assigned or selected tip.

Regression estimates are reported, with and without controls, for four self-reported outcomes measured six months after tax filing: debt-related behaviors in the prior six months, the incidence of unsecured debt, the amount of unsecured debt, and the total amount of current debt. To measure debt-related behaviors, survey takers in the second wave of the survey were asked to report if they followed particular debt reduction strategies in the prior six months, such as making an extra payment on one of their debts, paying their largest credit card debt first, paying their smallest debts first, and paying their highest cost debt first. Each of these potential behaviors directly corresponded to financial tips included in the pre-determined condition,

allowing us to construct dummy variables reflecting five debt-related behaviors: one measuring whether tax filers followed any of these strategies, and four measuring separate debt-related behaviors corresponding to each of the four financial tips (e.g., if respondents actually reported paying off their highest cost debt first). The second outcome assesses the incidence of unsecured debt reported six months post filing, which includes credit card balances, payday loans, and negative balances in savings and checking accounts. The last two outcomes measure self-reported balances of unsecured debt and total household debt. Unsecured debt is defined as above, and total household debt includes mortgage, car debt, credit card balances, education loans, personal loans from friends and family, personal loans from a bank or a credit union, payday or auto title loans, medical debt, past-due regular bills or rent, back taxes or money owed to the government, negative balances on bank accounts, legal fees, and other debt. The values of both variables have been log-transformed and top-coded at the one percent level.

For each of the analyses, we present findings for (1) the full sample of tax filers, (2) the subsample who received federal tax refunds, (3) the subsample that either broke even or owed taxes, (4) the subsample who had any debt at baseline, and (5) the subsamples who had any debt at baseline as well as either receive tax refunds or broke even/owed taxes at tax filing.

3.4. Experimental Sample and Attrition

Table 1A in the Appendix compares the baseline characteristics of treatment and control survey takers who have agreed to participate in the first HFS wave, regardless of whether they completed the first survey or participated in the second survey. To ensure that reporting of baseline financial circumstances was not influenced by treatment assignment, we report financial characteristics that appeared prior to the survey section that randomly assigned tax filers into the control and treatment groups. The general absence of significant differences between treatment and control participants prior to the intervention verifies that randomization was successful.

Even as randomization ensured similar treatment and control groups on observable characteristics, a major threat to internal validity in this study is non-random attrition for treated and non-treated tax filers. Our conclusions on the effectiveness of financial tips may be biased if the treatment and control groups exhibit different survey non-completion rates or attrited individuals in the treatment group are systematically different from those in the control group on their demographic and financial characteristics. Our findings indicate that non-random attrition is unlikely to be an issue in this study. In total, 28 percent of tax filers that started the survey immediately after tax filing completed both survey waves, and survey response rates were similar between the treatment and control groups (p=0.92), corroborating that treatment status is uncorrelated with the survey completion rate. In addition, comparing key baseline characteristics in the analytical sample in Table 2 (Columns 2 and 3)—which includes study participants who participated and completed both survey waves, and thus accounts for survey attrition—suggests that there is little evidence for differential attrition across the groups.

Key characteristics of the analytical sample are presented in Table 2 (Column 1). The average age of respondents was 33.8 years. The majority of respondents were women (54 percent), Non-Hispanic White (75 percent), single (73 percent), without any children in their households (80 percent), had at least a Bachelor's degree (53 percent), were not enrolled in an educational program at tax time (68 percent), and lived in a rented property (55 percent). Forty-four percent of tax filers were employed full-time, one-third were employed part-time, and approximately one-fifth were unemployed. Almost all respondents had some health insurance (91 percent). In terms of financial characteristics, roughly one-fifth of tax filers completed their taxes in January, over 40 percent in February, and the remaining 37 percent in March or April. The vast majority of tax filers received a tax refund (84 percent) averaging $1,511. Those who owed taxes at the time of tax filing owed $574 on average. Overall, 83 percent of tax filers had

any household debt at the time of tax filing (a sample average of $31,646), and 56 percent had unsecured debt (a sample average of $1,953). Thirty-seven percent of the sample experienced income volatility in the six months prior to tax-filing and roughly two-thirds reported being able to access $2,000 within a month's time if an emergency arose. Generally, the incomes of the sample were quite low: 68 percent of the sample had annual incomes of $25,000 or less. For outcomes measured six months after tax filing, one half of the sample reported following any financial behavior identified by pre-determined messages (e.g., paying the highest cost debt first) in the past six months, 53 percent reported having some unsecured debt six months after tax filing (averaging $2,000 in the sample), and total household debt averaged $33,614 in the second survey wave. Of treated tax filers who completed both survey waves, 26.5 percent recalled seeing a financial tip in the email reminder they received a month after tax filing.[5]

[5] Most respondents were already familiar with the tips they were either given (in the pre-determined condition) or that they selected (in the pick-your-own condition); the level of reported prior usage of financial was lower, however (Kondratjeva, Roll, Bufe, & Grinstein-Weiss, 2019).

Table 2. Baseline Characteristics of Analytical Sample, HFS Wave 1 and 2

Characteristic	Full	Control	Treatment	Treatment-Control	
	Prop/Mean	Prop/Mean	Prop/Mean	Diff.	p-value
	(1)	(2)	(3)	(4)	(5)
Month of tax filing: January	0.22	0.21	0.22	0.01	0.76
Month of tax filing: February	0.42	0.42	0.41	-0.01	0.72
Month of tax filing: March	0.19	0.18	0.19	0.01	0.84
Month of tax filing: April	0.18	0.18	0.18	0.00	0.94
Age (in years)	33.8	32.6	34.0	1.40	0.05*
Gender: Female	0.54	0.53	0.54	0.01	0.71
Gender: Male	0.45	0.45	0.45	0.00	0.96
Gender: Other	0.02	0.02	0.02	0.00	0.21
Race/ethnicity: Non-Hispanic White	0.75	0.72	0.75	0.03	0.17
Race/ethnicity: Non-Hispanic Black	0.04	0.05	0.04	-0.01	0.68
Race/ethnicity: Non-Hispanic Asian	0.07	0.06	0.07	0.01	0.64
Race/ethnicity: Hispanic	0.08	0.11	0.08	-0.03	0.06*
Race/ethnicity: Other	0.06	0.07	0.06	-0.01	0.61
Student status: Not a student	0.68	0.65	0.68	0.03	0.18
Student status: Part-time student	0.06	0.06	0.06	0.00	0.99
Student status: Full-time student	0.27	0.30	0.26	-0.04	0.15
Education: HS degree or less	0.10	0.10	0.10	0.00	0.98
Education: Some college or less than Bachelor's	0.37	0.34	0.37	0.03	0.32
Education: Bachelor's degree or higher	0.53	0.55	0.53	-0.02	0.34
Marital status: Married	0.11	0.12	0.11	-0.01	0.86
Marital status: Unmarried, living with a partner	0.16	0.15	0.16	0.01	0.84
Marital status: Unmarried, living without a partner	0.73	0.73	0.73	0.00	0.97
Employment status: Employed full-time	0.44	0.42	0.44	0.02	0.45
Employment status: Employed part-time	0.35	0.38	0.34	-0.04	0.14
Employment status: Unemployed	0.22	0.20	0.22	0.02	0.43
Number of children: 0	0.80	0.80	0.80	0.00	0.88
Number of children: 1	0.12	0.11	0.12	0.01	0.56
Number of children: 2	0.05	0.06	0.04	-0.02	0.22
Number of children: 3+	0.03	0.03	0.04	0.01	0.49
Housing situation: Owns	0.17	0.16	0.17	0.01	0.78
Housing situation: Rents	0.55	0.50	0.55	0.05	0.05*
Housing situation: Other (rent-free, dormitory)	0.29	0.33	0.28	-0.05	0.02**
Has health insurance	0.91	0.91	0.91	0.00	0.93
Experienced income volatility (past 6 mo.)	0.37	0.38	0.37	-0.01	0.62
Could access $2,000 in an emergency	0.68	0.69	0.67	-0.02	0.47
Has any debt[1]	0.83	0.83	0.83	0.00	0.93
Has unsecured debt[2]	0.56	0.57	0.56	-0.01	0.58
Received federal tax refund	0.84	0.86	0.84	-0.02	0.39
Annual HH income: Under $10,000[3]	0.27	0.31	0.26	-0.05	0.05*
Annual HH income: $10,001–25,000[3]	0.41	0.40	0.41	0.01	0.58
Annual HH income: $25,001 and above[3]	0.32	0.29	0.33	0.04	0.20
Debt value: Total debt ($)	31,646.5	33,879.7	31,281.3	-2,598.45	0.34
Debt value: Unsecured debt ($)	1,953.3	1,831.1	1,973.1	141.96	0.51
Amount owed in taxes at tax time ($)	574.2	492.8	584.0	91.15	0.49
Amount of federal tax refund ($)	1,511.2	1,403.5	1,529.0	125.57	0.23
Outcome at HFS2: Followed any behavior	0.50	0.49	0.50	0.00	0.86
Outcome at HFS2: Had unsecured debt	0.53	0.56	0.53	0.04	0.17
Outcome at HFS2: Amount of unsecured debt	1,999.1	1,885.8	2,017.5	131.7	0.56
Outcome at HFS2: Total amount of debt	33,614.1	34,550.1	33,460.1	1,088.0	0.68
Observations	2,971	415	2,556		

Notes: Statistical significance: * $p<0.1$, ** $p<0.05$. [1]Any household debt includes mortgage, car debt, debt on other property, credit card balances, education loans, personal loans from friends and family, personal loans from a bank or a credit union, payday or auto title loans, medical debt, past-due regular bills or rent, back taxes or money owed to government, negative balances on bank accounts, legal fees, and other non-mortgage debt. [2]Unsecured debt includes credit card debt, payday loans, and negative balances in savings and checking accounts. [3]Measured in HFS Wave 2.

4. Results

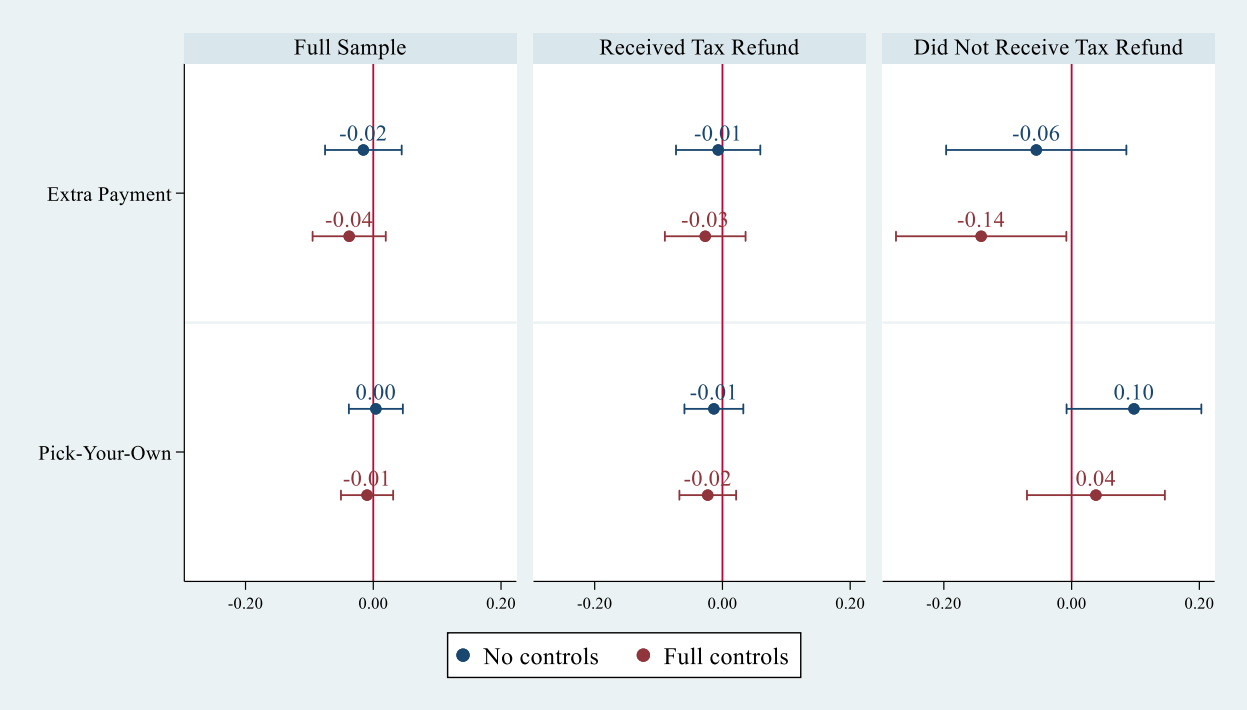
4.1. Overall Treatment Effects

In Figures 1a through 1d, we report the effects of the interventions on the rate of following each of the specific debt-repayment behaviors described by pre-determined messages. Results are presented for the full sample (Column 1), for respondents who received a federal tax refund (Column 2), and for those who did not receive a federal tax refund (Column 3). Findings are reported at the 0.1 significance level for regression models with and without controls.

Figure 1a shows the effects of the interventions on the rate of following the "extra payment" strategy. Generally, the interventions did not have a statistically significant impact on the rate of following this strategy. However, we do find that, after controlling for other observable factors, respondents who did not receive a refund and were randomly shown the "extra payment" pre-determined intervention were less likely to follow this strategy than people in the control group ($p<0.1$). For the "largest credit card debt" tip (Figure 1b), the relationship between the interventions and following of the given repayment strategy was statistically insignificant in each of our analyses. Figure 1c shows the average effects of the interventions on the application of the "smallest debt balance" debt repayment strategy. The pick-your-own treatment increased the rate of following the "smallest debt balance" strategy by four percentage points for the full sample ($p<0.1$) and by five percentage points among respondents who received the refund ($p<0.05$). We also find that the "smallest debt balance" pre-determined intervention increased the rate of following this strategy by six percentage points ($p<0.1$) among refund recipients, regardless of the presence of controls. We do not observe any statistically significant effects of the interventions on respondents who did not receive tax refunds. Finally, findings for the "highest cost debt" message reported in Figure 1d show that random assignment to the pre-

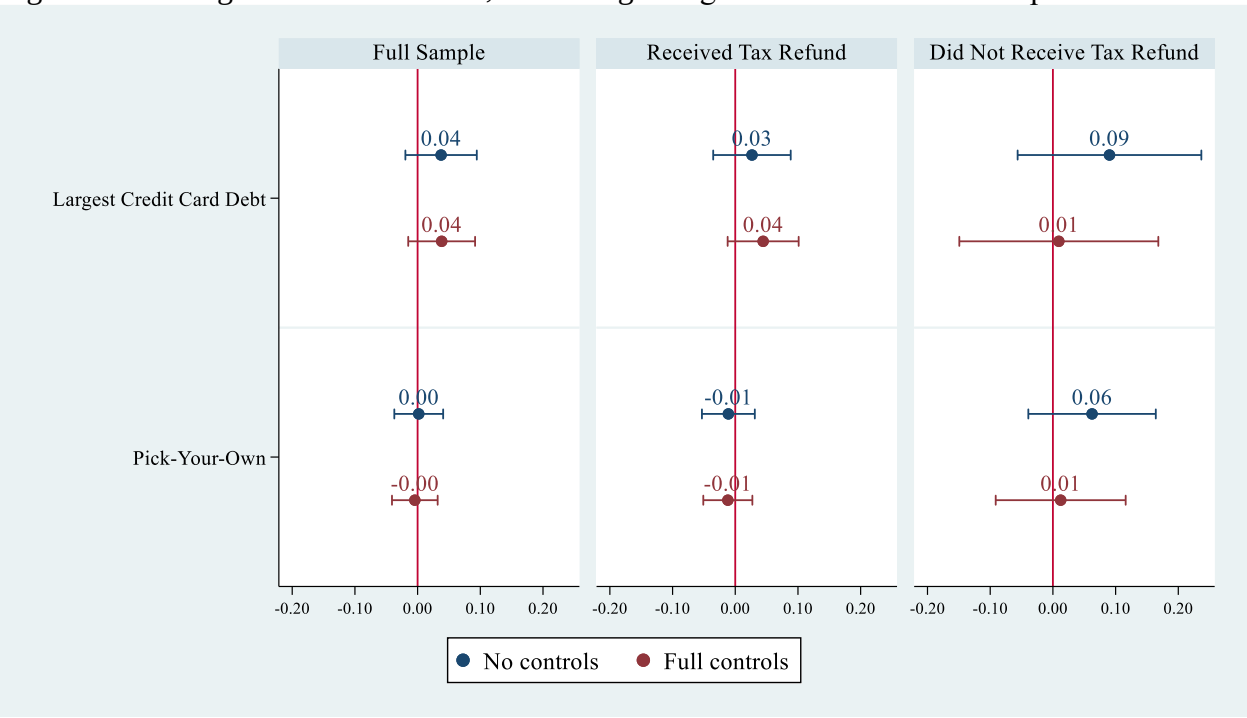
determined intervention group increased the rate of following this strategy by five percentage points for the full sample ($p<0.1$) but these effects were statistically insignificant in the subsample analyses. Generally, the effects of the pick-your-own intervention on the rate of following the "highest cost debt" strategy were statistically insignificant. Although some evidence suggests that the intervention increased the rate of following the "highest cost debt" behavior among filers who did not receive refunds ($p<0.1$), the statistical significance of this finding dissipates after adjusting for controls.

Figure 1a. Average Treatment Effects, Following "Extra Payment" Tip



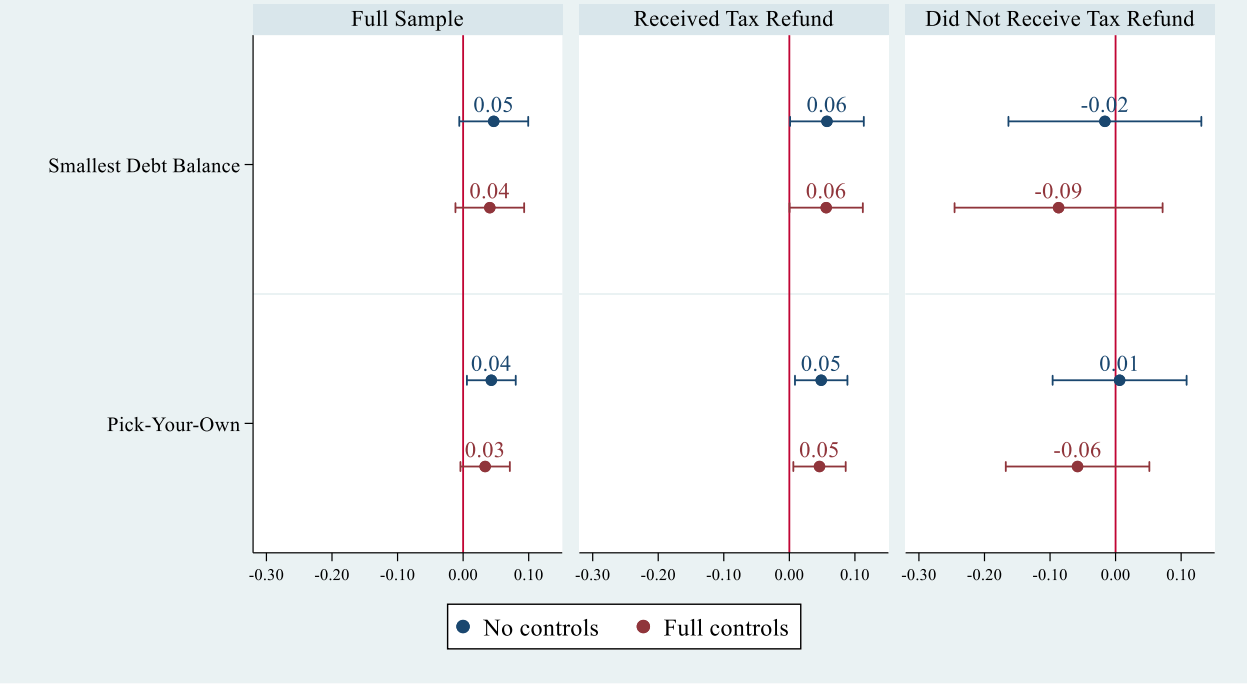
Notes: 90% confidence intervals. Full sample: N=2,148 (without controls); N=1,952 (with controls).

Figure 1b. Average Treatment Effects, Following "Largest Credit Card Debt" Tip



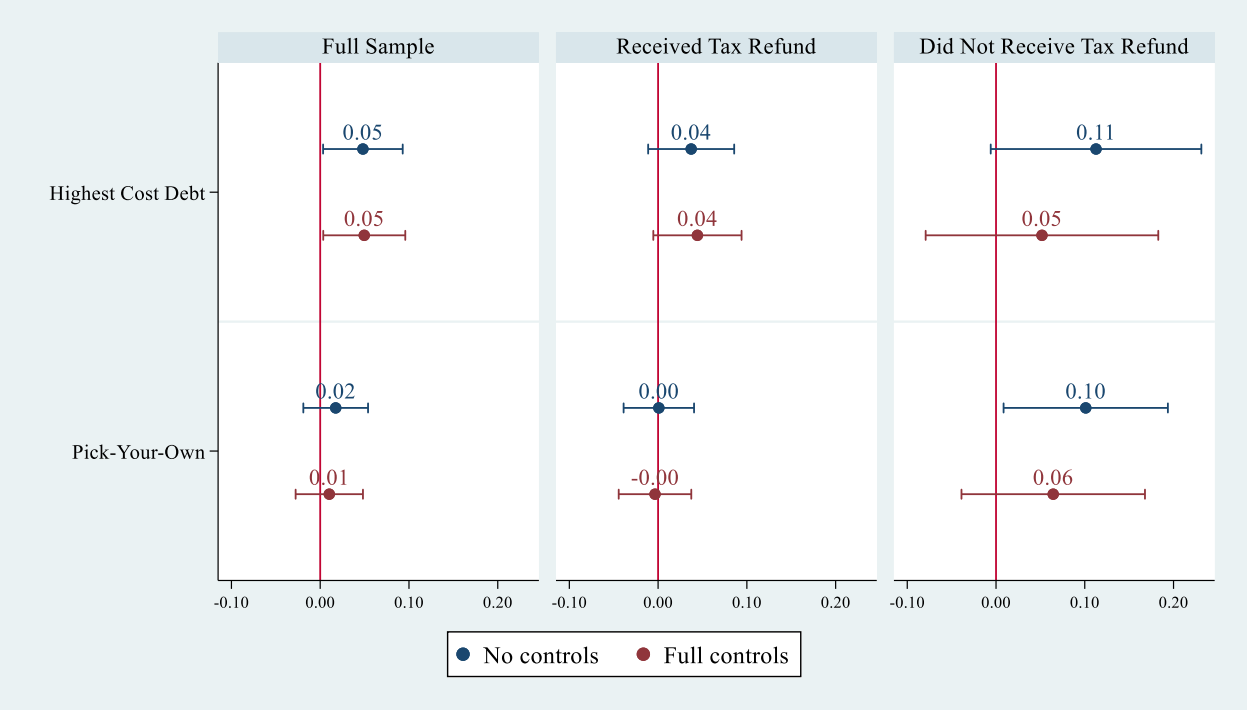
Notes: 90% confidence intervals. Full sample: N=2,153 (without controls); N=1,962 (with controls).

Figure 1c. Average Treatment Effects, Following "Smallest Debt Balance" Tip



Notes: 90% confidence intervals. Full sample: N=2,183 (without controls); N=1,993 (with controls).

Figure 1d. Average Treatment Effects, Following "Highest Cost Debt" Tip



Notes: 90% confidence intervals. Full sample: N=2,403 (without controls); N=2,191 (with controls).

Table 3 shows the effects of random assignment into the pre-determined or pick-your-own treatment conditions on four debt-related outcomes: the rate of following a debt-repayment behavior (Panel A), ownership of unsecured debt (Panel B), log amount of unsecured debt (Panel C), and log amount of total debt (Panel D). Columns 1-2 present the effects of the interventions on the full sample and Columns 3-12 report the results from analyses on five subsamples: (i) respondents who received a tax refund, (ii) respondents who did not receive a tax, (iii) respondents who had some debt liabilities at the time of tax filing, (iv) respondents who initially had debt liabilities and received a refund, and (v) respondents who initially had debt liabilities and broke even/owed taxes. We report treatment effects of being randomly assigned to one of the treatment conditions (parameters β_1 and β_2 in Equation 1) both with and without the presence of additional controls.

Results from Panel A in Table 3 indicate that random assignment to the pre-determined and pick-your-own treatment conditions were generally not associated with statistically significant changes in debt behaviors. There is some marginally significant evidence ($p<0.1$) that respondents in the pick-your-own condition who initially had some debt liabilities but did not receive tax refunds were more likely than filers in the control condition to follow a debt-repayment behavior from the tips (Column 11). However, in all other specifications, the differences in debt-repayment behaviors were statistically insignificant between treatment and control groups.

Panel B shows the effects of random assignment to the treatment conditions on the ownership of unsecured debt. In Column 2, we find that random assignment to the pre-determined condition reduced the rate of owing unsecured debt by 4.8 percentage points ($p<0.05$) when we control for observable differences between groups. Similar findings are observed for refund recipients and those who had initially owed some debt. After controlling for other observable factors, random assignment into the pre-determined treatment condition reduced the rate of owing some unsecured debt by 4.9 percentage points (Column 4, $p<0.05$) for tax filers who receive a refund and by 4.5 percentage points (Column 8, $p<0.1$) for tax filers who reported having debt at baseline. Correspondingly, we observe the same pattern in our analyses of respondents who both had some initial debt levels and received a tax refund. In Column 9, random assignment to the pre-determined treatment condition reduced the rate of unsecured debt ownership by 5.1 percentage points ($p<0.1$). The coefficient estimate showed a reduction in the rate of unsecured debt ownership by 5.3 percentage points ($p<0.05$) after the inclusion of controls (Column 10). Finally, Panels C and D suggest that the effects of the pre-determined and

pick-your-own interventions on the log unsecured debt and log overall debt levels were statistically insignificant at the 0.1 level.

Table 3. Average Treatment Effects, Following Any Behavior and Debt Outcomes

	Full sample		Received tax refund		Did not receive tax refund		Had any debt		Had debt + Received tax refund		Had debt + Did not receive tax refund	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Outcome = Followed any behavior												
Pre-determined vs. Control	0.021	0.008	0.009	0.004	0.089	0.022	0.009	-0.002	-0.002	-0.004	0.091	-0.016
	(0.027)	(0.026)	(0.029)	(0.028)	(0.069)	(0.069)	(0.030)	(0.029)	(0.032)	(0.031)	(0.083)	(0.083)
Pick-your-own vs. Control	0.024	0.008	0.011	-0.003	0.109	0.055	0.026	0.004	0.007	-0.009	0.149*	0.061
	(0.027)	(0.026)	(0.029)	(0.028)	(0.068)	(0.066)	(0.029)	(0.029)	(0.032)	(0.031)	(0.080)	(0.080)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,262	2,971	2,741	2,506	521	465	2,699	2,462	2,307	2,110	392	352
R-squared	0.000	0.179	0.000	0.173	0.005	0.264	0.000	0.124	0.000	0.119	0.010	0.233
Panel B: Outcome = Had unsecured debt												
Pre-determined vs. Control	-0.036	-0.048**	-0.039	-0.049**	-0.019	-0.033	-0.036	-0.045*	-0.051*	-0.053**	0.061	0.013
	(0.027)	(0.023)	(0.029)	(0.024)	(0.071)	(0.064)	(0.029)	(0.025)	(0.031)	(0.027)	(0.080)	(0.074)
Pick-your-own vs. Control	-0.004	-0.021	0.004	-0.017	-0.045	-0.043	0.021	-0.011	0.024	-0.009	0.009	-0.026
	(0.027)	(0.023)	(0.029)	(0.024)	(0.069)	(0.063)	(0.029)	(0.025)	(0.031)	(0.026)	(0.078)	(0.073)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,262	2,971	2,741	2,506	521	465	2,699	2,462	2,307	2,110	392	352
R-squared	0.001	0.395	0.002	0.391	0.001	0.451	0.003	0.347	0.005	0.351	0.003	0.375
Panel C: Outcome = Amount of unsecured debt (log)												
Pre-determined vs. Control	-0.120	-0.211	-0.135	-0.194	-0.032	-0.151	-0.117	-0.170	-0.204	-0.201	0.451	0.171
	(0.201)	(0.158)	(0.218)	(0.169)	(0.515)	(0.428)	(0.220)	(0.175)	(0.236)	(0.186)	(0.599)	(0.514)
Pick-your-own vs. Control	0.077	-0.074	0.137	-0.030	-0.200	-0.261	0.254	-0.017	0.283	0.009	0.105	-0.120
	(0.199)	(0.155)	(0.217)	(0.166)	(0.504)	(0.426)	(0.217)	(0.174)	(0.234)	(0.184)	(0.591)	(0.504)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,262	2,971	2,741	2,506	521	465	2,699	2,462	2,307	2,110	392	352
R-squared	0.001	0.495	0.001	0.492	0.001	0.545	0.002	0.455	0.004	0.458	0.003	0.485
Panel D: Outcome = Amount of total debt (log)												
Pre-determined vs. Control	0.146	0.123	0.102	0.071	0.431	0.411	0.011	0.047	-0.072	-0.026	0.579	0.507
	(0.220)	(0.208)	(0.236)	(0.222)	(0.595)	(0.579)	(0.188)	(0.192)	(0.201)	(0.204)	(0.523)	(0.537)
Pick-your-own vs. Control	-0.108	-0.084	-0.090	-0.139	0.009	0.296	0.015	0.045	0.045	0.045	0.011	0.124
	(0.221)	(0.206)	(0.236)	(0.220)	(0.588)	(0.576)	(0.186)	(0.189)	(0.197)	(0.200)	(0.532)	(0.547)
Controls	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observations	3,262	2,971	2,741	2,506	521	465	2,699	2,462	2,307	2,110	392	352
R-squared	0.001	0.224	0.001	0.216	0.002	0.266	0.000	0.118	0.000	0.125	0.007	0.140

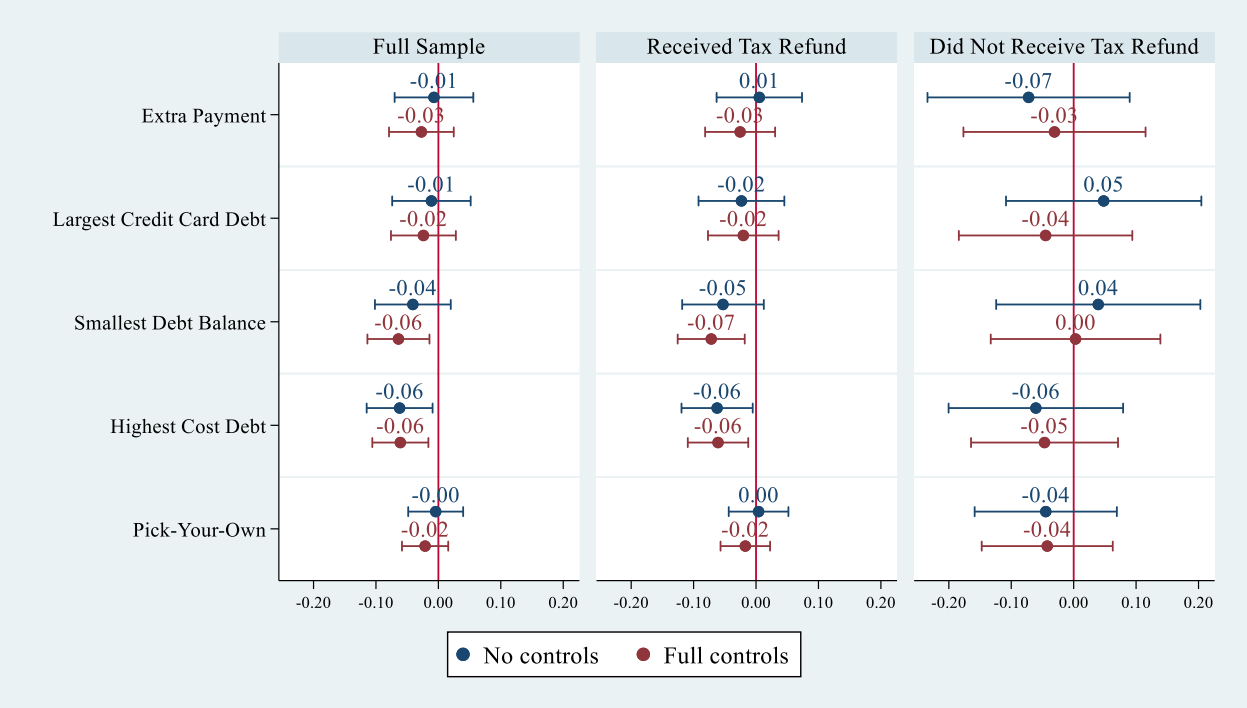
Notes: Statistical significance: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Robust standard errors in parentheses. Panels A-D report results from Equation 1 for four debt-related outcomes. Control variables include baseline measures of tax filer's gender, race/ethnicity, age, age squared, marital status, highest educational attainment, student status, employment status, housing situation, the number of children in the household, the experience of income volatility in the past six months, health insurance, access to emergency funds, income category, log amount of unsecured debt, an indicator for receiving a tax refund, and the month of tax filing.

Considering that our analysis thus far has shown that the delivery of financial tips appeared effective in changing unsecured debt ownership, the next set of analyses focused on exploring which specific financial tips contributed to these results by estimating Equation 2. Figures 2a and 2b show the average treatment effects of the specific predetermined tips and the pick-your-own treatment on the rate of owing some unsecured debt six months after the intervention. Column 1 shows the effects among the full sample while Columns 2 and 3 respectively show analyses of refund recipients and non-recipients. Although the pick-your-own intervention and the "extra payment" and "largest credit card debt" pre-determined interventions did not have statistically significant impacts on unsecured debt in any of the analyses, we find that the "smallest debt balance" and "highest cost debt" tips reduced the likelihood of owning unsecured debt. In Figure 2a, we see that, after controlling for observable characteristics, the "smallest debt balance" pre-determined intervention reduced the probability of owing some unsecured debt level by 6 percentage points for the full sample ($p<0.05$) and by seven percentage points for respondents who received tax refunds ($p<0.05$). Regardless of whether or not other controls were included, the "highest cost debt" pre-determined intervention reduced the probability of owing unsecured debt six months after the intervention by six percentage points for the full sample ($p<0.1$) and for respondents who received a tax refund ($p<0.05$). These tips did not have statistically significant impacts on respondents who did not receive tax refunds.

The results in Figure 2b are generally similar to those in Figure 2a. The "smallest debt balance" pre-determined intervention did not have a statistically significant impact on unsecured debt ownership for all debt owners. However, after controlling for observable characteristics, we find that this intervention did reduce the rate of unsecured debt ownership by seven percentage points ($p<0.1$) among respondents who initially owed some debt and received a tax refund. At

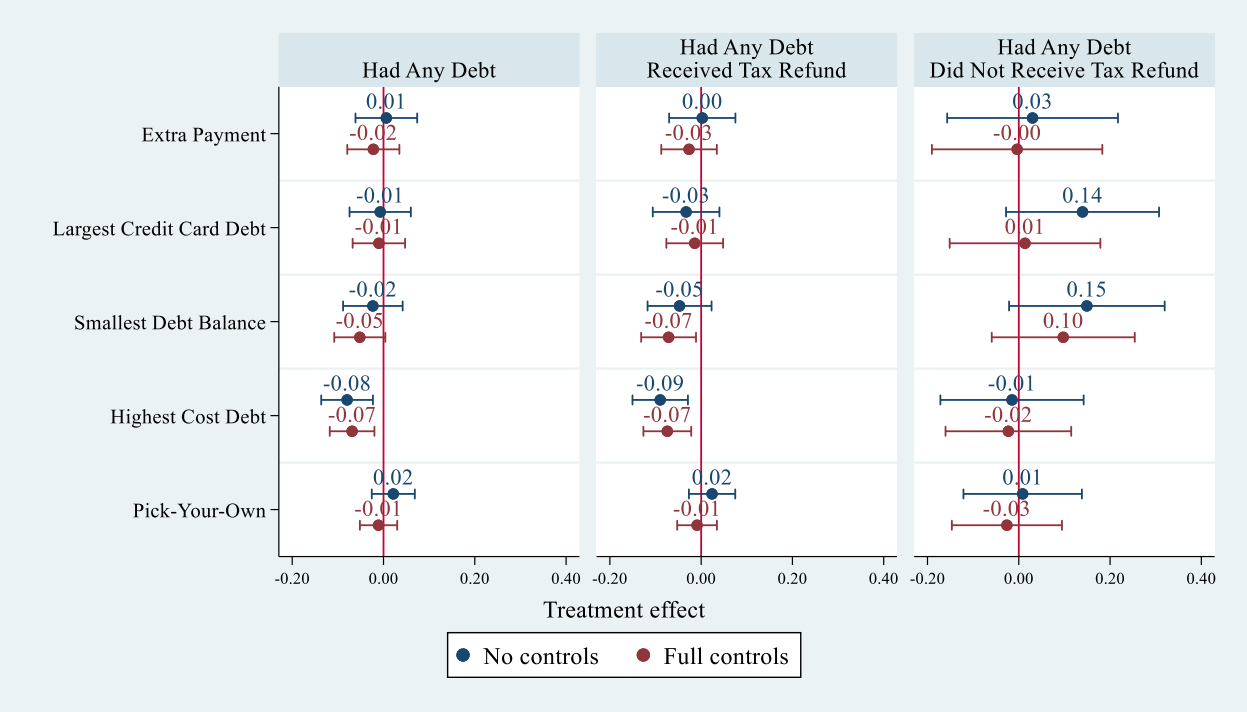
the same time, for the full sample of all debt owners, the "highest cost debt" pre-determined intervention reduced the rate of unsecured debt ownership by eight percentage points in our model that did not include controls ($p<0.05$) and by seven percentage points in our model that did include controls ($p<0.05$). The "highest cost debt" pre-determined intervention had similar, statistically significant effects on the rate of debt ownership among respondents who initially owed debt and received tax refunds (both significant at the 0.05 level).

Figure 2a. Average Treatment Effects, Probability of Having Unsecured Debt (Full Sample)



Notes: 90% confidence intervals. Full sample: N=3,262 (without controls); N=2,971 (with controls).

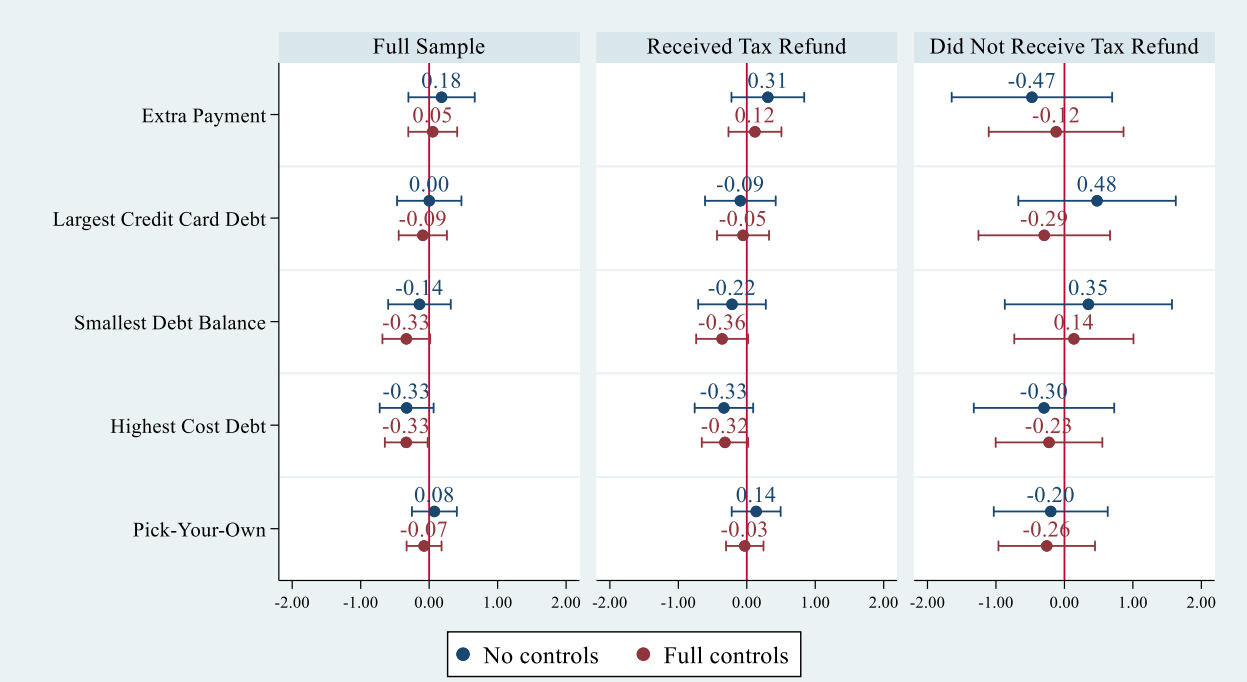
Figure 2b. Average Treatment Effects, Probability of Having Unsecured Debt (Conditional on Having Any Debt at Wave 1)



Notes: 90% confidence intervals. Full sample: N=2,699 (without controls); N=2,462 (with controls).

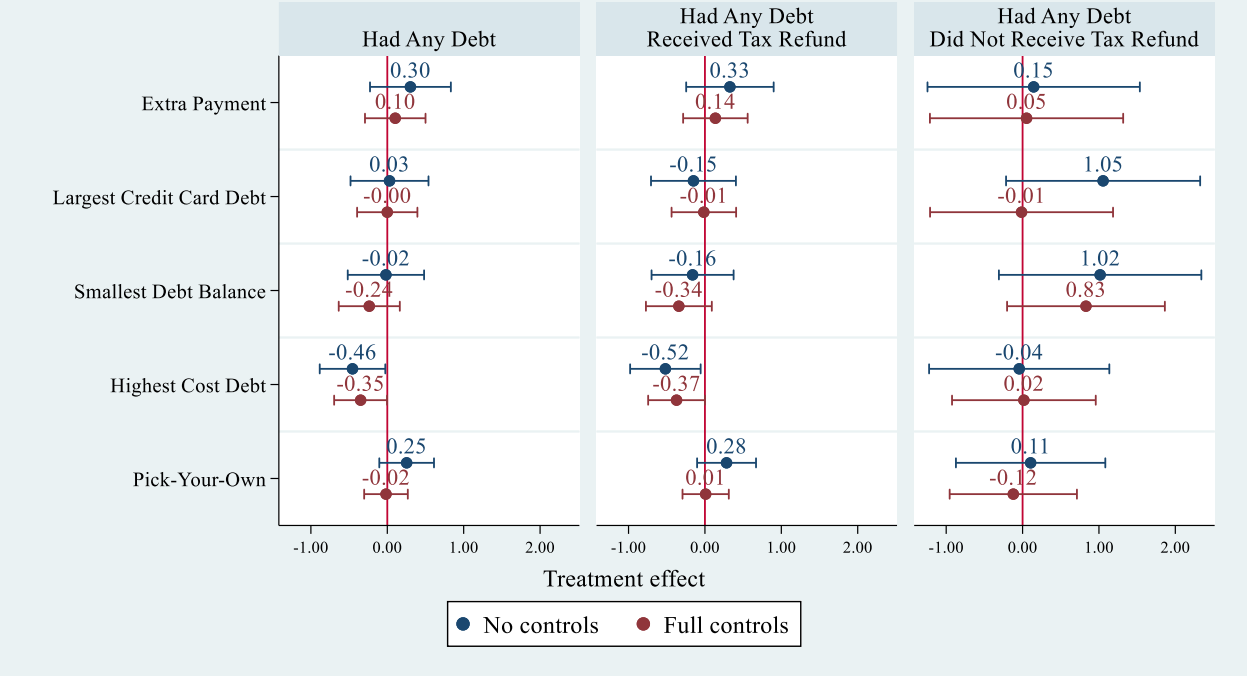
Building on these findings, we conducted a similar analysis for the log level of unsecured debt six months after tax filing (Figures 2c and 2d). In Figure 2c, we find some evidence that the impact of the "highest cost debt" pre-determined intervention reduced the log unsecured debt levels. After controlling for observable characteristics, random assignment into the "highest cost debt" pre-determined intervention reduced the level of unsecured debt by 33 percent ($p<0.1$). In Figure 2d, we see that these effects were observed for tax filers who owed some debt at the time of the intervention: after controlling for observable characteristics, this intervention led to a reduction in unsecured debt balance of 35 percent ($p<0.1$) among those who initially owed some debt (46 percent in model without controls, $p<0.1$). Likewise, statistically significant effects were observed for respondents who initially owed some debt and received tax refunds. The impacts of the other tips on unsecured debt balance were statistically insignificant.

Figure 2c. Average Treatment Effects, Log Amount of Unsecured Debt (Full Sample)



Notes: 90% confidence intervals. Full sample: N=3,262 (without controls); N=2,971 (with controls).

Figure 2d. Average Treatment Effects, Log Amount of Unsecured Debt (Conditional on Having Any Debt at Wave 1)



Notes: 90% confidence intervals. Full sample: N=2,699 (without controls); N=2,462 (with controls).

4.2. Heterogeneous Treatment Effects

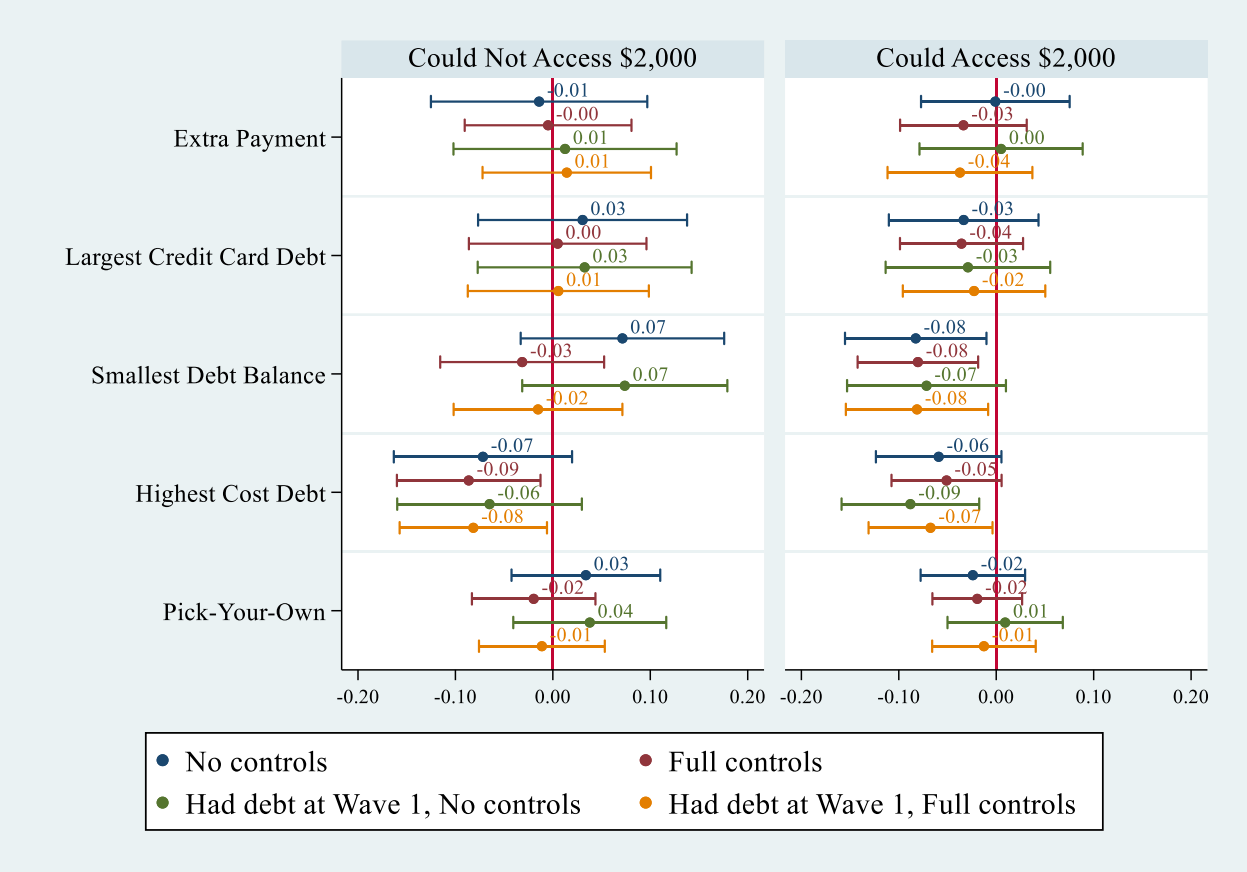
We also explored the degree to which the observed treatment effects differ for key subgroups. Specifically, we divided the full sample based on self-reported emergency liquidity access, as defined by whether or not a participant could access $2,000 in an emergency, and based on refund size. The motivation for these subsample analyses is that the level of liquidity available to a participant may in part govern their ability to alter their financial management strategies based on the tips. For example, a household that has access to a reasonable amount of liquidity may have the flexibility to make advance payments on their debts or reallocate existing funds to paying off their highest-cost debt relative to a liquidity-constrained household, and the same may hold true for a household that has just received a relatively large refund. Figures 3a and 3b explore the heterogeneity in the effects of the interventions in each of these subsamples for the incidence of unsecured debt.

Figure 3a compares the effects of the interventions on the rate of unsecured debt ownership by a respondent's ability to access $2,000 in emergency liquidity. As above, the pick-your-own intervention and the "extra payment" and "largest credit card debt" pre-determined interventions had statistically insignificant effects on the ownership of unsecured debt six months after the intervention. Although the "smallest debt balance" pre-determined intervention did not have statistically significant effects among respondents who lacked access to $2,000 in emergency liquidity, this intervention was found to reduce the rate of owing unsecured debt among those who had access to $2,000. Similarly, after controlling for observable characteristics, the "highest cost debt" pre-determined intervention reduced the rate of unsecured debt ownership by 9 percentage points ($p<0.1$) among all respondents who lacked access to $2,000 in emergency liquidity and by 8 percentage points ($p<0.1$) among respondents who lacked access to $2,000 in

emergency liquidity and owed some debt at baseline. We also find that this intervention reduced the rate of unsecured debt ownership among respondents who initially owed some debts while having access $2,000 in emergency liquidity by 7 percentage points in the model with controls ($p<0.1$) and 9 percentage points in the model without controls ($p<0.05$).

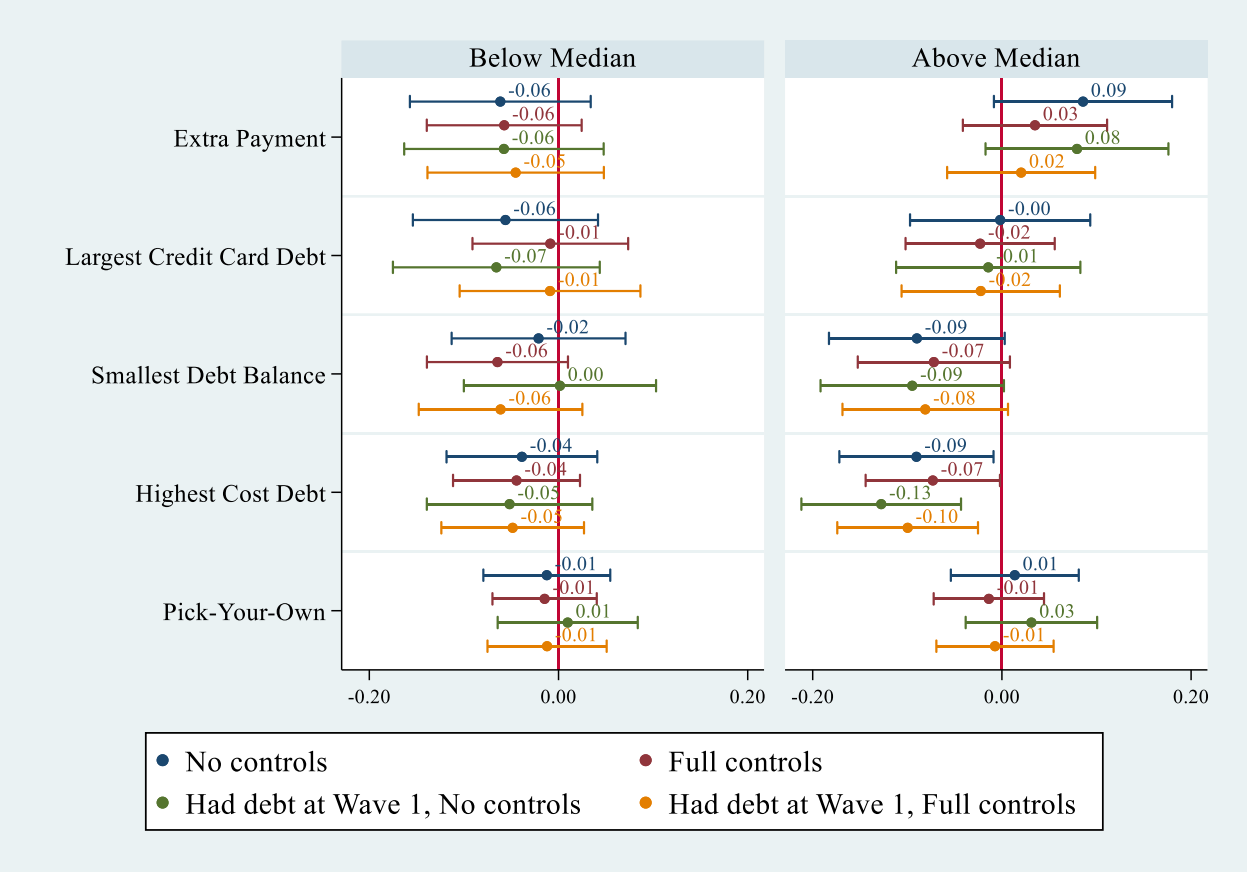
Figure 3b compares the effects of the interventions by federal tax refund size (for tax filers who reported receiving tax refund), splitting the sample into tax filers whose refunds were below or above the median of $898.5. None of the interventions had statistically significant effects on respondents with a relatively small refund. The pick-your-own intervention and the "extra payment," largest credit card debt," and "smallest debt balance" pre-determined interventions also had statistically insignificant impacts among respondents with relatively large tax refunds. At the same time, the "highest cost debt" pre-determined intervention reduced the rate of unsecured debt ownership for tax filers with a larger refunds, effects which tended to be larger among respondents who reported having some debt liability at the time of the intervention ($p<0.05$).

Figure 3a. Heterogeneous Treatment Effects, Probability of Having Unsecured Debt, by Access to Liquidity



Notes: 90% confidence intervals. Households that could not access $2,000 in an emergency (full sample): N=1,054 (without controls); N=962 (with controls). Households that could access $2,000 in an emergency (full sample): N=2,202 (without controls); N=2,009 (with controls).

Figure 3b. Heterogeneous Treatment Effects, Probability of Having Unsecured Debt, by Tax Refund Size



Notes: 90% confidence intervals. Tax refund is below median (full sample): N=1,369 (without controls); N=1,259 (with controls). Tax refund is above median (full sample): N=1,369 (without controls); N=1,245 (with controls).

5. Conclusion and Discussion

In this field experiment, we used longitudinal survey data collected on LMI tax filers to test how the provision of financial tips describing different debt management strategies could help LMI households manage their debts. We consistently found that the delivery of debt repayment tips reduced the incidence of unsecured debt liabilities, particularly for individuals who previously reported having debt and received a tax refund. The average effects are primarily observed through the delivery of the pre-determined tips that emphasized the "smallest debt balance" and "highest cost debt" approaches to debt repayment. We also found evidence that the impact of the "highest cost debt" pre-determined intervention reduced the amount (in addition to the incidence)

of unsecured debt. We further observed some heterogeneity in the impacts of the interventions; the "smallest debt balance" intervention was most successful in reducing the incidence of debt among filers who had access to liquidity while the "highest cost debt" tip was most effective among tax filers with larger federal refunds. Generally, these subsample analyses indicate that households with relatively few liquidity constraints (either in the form of emergency liquidity access or larger refunds) were more responsive to certain financial tips. While the unsecured debt impacts are encouraging, we also found that the delivery of low-touch financial messages to LMI tax filers immediately after tax filing did not produce a significant effect on the total amount of debt held. This is not altogether surprising, given that total debt includes debt obligations with fixed payment terms (such as mortgage or car payments) that may be less sensitive to the types of information conveyed by the specific tips chosen for this study.

This research extends the existing literature on financial management interventions in several ways. First, this paper contributes to the emerging research on the use of financial management tips and rules of thumb as tools to impact financial behaviors (e.g., Theodos et al., 2016). There is currently very little rigorous evidence on this class of interventions, and our findings indicate that even extremely low-touch deliveries of tips or rules of thumb (as was the case for our study) can shift specific financial behaviors. Further, in testing two different ways of delivering tips against each other—the pre-determined versus the pick-your-own conditions—we also examined the impacts of two different modes of presenting tips to recipients. Interestingly, we did not find systematic differences in the rates of following the tips based on the mode of tip delivery, but we did observe that the pre-determined tips were more effective at driving unsecured debt reductions in the months after tax filing. The precise mechanism underlying this difference is not clear. It may be that allowing participants to pick the tip that they identified as

most relevant to them simply led to their opting to select a strategy they were already following prior to the intervention. It may also be that displaying several different tips at once reduced the salience and, therefore, the efficacy of any individual tip in the pick-your-own condition. Regardless of the mechanism, however, the implication of this finding is that individuals may benefit more from simple, clear financial management strategies than from a menu of different options.

Second, this study adds to the existing evidence on the effectiveness of low-touch, behaviorally-informed interventions delivered to LMI households at tax time. Research on tax time interventions overwhelmingly focuses on promoting short- and long-term savings through the tax refund (e.g., Duflo et al., 2006; Key et al., 2015; Grinstein-Weiss, Cryder et al., 2017; Roll et al., 2019). While the receipt of the tax refund is an opportune moment to encourage households to build savings, research also demonstrates that tax filers use a substantial portion of their tax refunds to meet debt obligations (Mendenhall et al., 2012), and that paying down debt is the most prominent usage of the refund for online LMI tax filers (Grinstein-Weiss et al., 2015). This study thus represents a first step in building rigorous evidence about the degree to which financial interventions delivered at tax time can potentially help tax filers address their debt problems. Our findings indicate that these extremely low-cost, low-touch tips can be relatively effective, and future research should investigate the degree to which these and other tips can be integrated into other settings such as online tax preparation interfaces, Volunteer Income Tax Assistance services, and mobile and online financial management tools that intersect with tax filing.

This study also has some limitations that must be noted. First, the intervention was delivered through a survey-based experiment rather than through a more natural setting like a

website or app, and measured self-reported financial behaviors and debt levels as opposed to debt levels from administrative data sources such as credit records. This limits both the degree to which we can generalize the results of our study and the precision of our impact estimates. However, we would anticipate that applications of similar interventions in other settings may be more impactful than this study as the tips in our study were delivered through extremely low-touch formats: participants only saw the tips twice when they were taking the first wave of the survey, and then received a single email reminder containing their tip. Other contexts, such as texting services or financial technology apps, could deliver debt management tips in much more salient and consistent ways. Additionally, the lack of administrative data on credit usage and debt levels prevents us from precisely measuring the indebtedness and credit profiles of participants. For example, we are unable to identify participants who held multiple unsecured debts. Given that these participants would likely stand to benefit the most from tips on how to prioritize across multiple debts, an inability to identify these participants limits our ability to estimate the impacts of the tips on a key population segment.

Another limitation of this study concerns our sample. The intervention was administered to a sample of LMI online tax filers who responded to two waves of a survey in the months after tax filing. A similar intervention delivered in a different setting to a different population may yield different results. For example, while LMI households may stand to benefit from optimizing debt prioritization strategies relative to higher-income households, higher-income households may have more budgetary capacity to actually shift their debt repayment strategies and may thus exhibit stronger responses to tips or rules of thumb. Furthermore, tips delivered by a trusted representative (e.g., a financial coach) may be more effective than tips delivered in a relatively neutral setting like the one in this study.

Despite these limitations, these results present encouraging evidence concerning the use of very low-touch, targeted financial management interventions to help households address their financial needs. While the delivery of financial tips or rules of thumb cannot replace larger institutional reforms such as payday loan regulations or caps on bank account fees in terms of improving household financial security, our work indicates that they may be a productive part of a broader ecosystem that nudges people toward improved financial capability. Given the evidence pointing toward the relative inefficacy of traditional financial literacy education (e.g., Fernandes, Lynch, & Netemeyer, 2014) and the rising levels of consumer debt (Federal Reserve Bank of New York, 2019), simple financial management strategies in the form of tips or rules of thumb may be an appealing tool for practitioners looking for scaleable ways of impacting household financial security.

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APPENDIX

Table 1A. Baseline Characteristics, HFS Wave 1

Characteristic	Control Group		Treatment Group		Treatment-Control	
	Obs.	Prop. Or Mean	Obs.	Prop. or Mean	Diff.	p-value
Month of tax filing: January	2,062	0.16	12,362	0.16	0.00	0.97
Month of tax filing: February	2,062	0.32	12,362	0.32	0.00	0.95
Month of tax filing: March	2,062	0.21	12,362	0.21	0.00	0.99
Month of tax filing: April	2,062	0.30	12,362	0.31	0.01	0.96
Age (in years)	2,060	35.3	12,360	35.5	0.20	0.57
Gender: Female	1,941	0.50	11,545	0.51	0.01	0.45
Gender: Male	1,941	0.48	11,545	0.47	-0.01	0.42
Gender: Other	1,941	0.02	11,545	0.02	0.00	0.85
Race/ethnicity: Non-Hispanic White	1,900	0.71	11,325	0.73	0.02	0.19
Race/ethnicity: Non-Hispanic Black	1,900	0.06	11,325	0.05	-0.01	0.15
Race/ethnicity: Non-Hispanic Asian	1,900	0.06	11,325	0.06	0.00	0.98
Race/ethnicity: Hispanic	1,900	0.10	11,325	0.10	0.00	0.47
Race/ethnicity: Other	1,900	0.07	11,325	0.06	-0.01	0.85
Student status: Not a student	1,974	0.70	11,703	0.69	-0.01	0.36
Student status: Part-time student	1,974	0.06	11,703	0.06	0.00	0.37
Student status: Full-time student	1,974	0.24	11,703	0.25	0.01	0.63
Education: HS degree or less	1,949	0.16	11,595	0.16	0.00	0.97
Education: Some college or less than Bachelor's	1,949	0.40	11,595	0.41	0.01	0.35
Education: Bachelor's degree or higher	1,949	0.44	11,595	0.43	-0.01	0.34
Married	2,055	0.11	12,346	0.12	0.01	0.74
Unmarried, living with a partner	2,055	0.15	12,346	0.15	0.00	0.9
Unmarried, living without a partner	2,055	0.74	12,346	0.73	-0.01	0.73
Employed full-time	2,052	0.42	12,325	0.42	0.00	0.7
Employed part-time	2,052	0.33	12,325	0.33	0.00	0.82
Unemployed	2,052	0.25	12,325	0.25	0.00	0.85
Number of children: 0	2,036	0.79	12,290	0.79	0.00	0.83
Number of children: 1	2,036	0.14	12,290	0.13	-0.01	0.32
Number of children: 2	2,036	0.05	12,290	0.05	0.00	0.8
Number of children: 3+	2,036	0.03	12,290	0.03	0.00	0.28
Housing status: Owns	2,032	0.18	12,192	0.18	0.00	0.93
Housing status: Rents	2,032	0.50	12,192	0.52	0.02	0.07*
Housing status: Other (rent-free, dormitory)	2,032	0.32	12,192	0.30	-0.02	0.04**
Has health insurance	1,955	0.89	11,617	0.89	0.00	0.99
Experienced income volatility (past 6 mo.)	1,973	0.39	11,737	0.37	-0.02	0.02**
Could access $2,000 in an emergency	2,016	0.60	12,013	0.61	0.01	0.42
Has any debt[1]	2,027	0.83	12,136	0.84	0.01	0.36
Has unsecured debt[2]	2,008	0.55	12,063	0.57	0.02	0.28
Received federal tax refund	2,045	0.84	12,232	0.84	0.00	0.52
Annual HH income: Under $10,000[3]	576	0.29	3,465	0.26	-0.03	0.15
Annual HH income: $10,001–25,000[3]	576	0.40	3,465	0.41	0.01	0.86
Annual HH income: $25,001 and above[3]	576	0.30	3,465	0.33	0.03	0.24
Debt value: Total debt ($)	1,772	31,252.4	10,537	30,440.5	-811.9	0.52
Debt value: Unsecured debt ($)	1,892	1,831.7	11,290	1,923.6	91.9	0.36
Amount owed in taxes ($)	165	536.2	1,013	597.1	61.0	0.32
Amount of federal tax refund ($)	1,706	1,509.0	10,285	1,515.9	7.0	0.88

Notes: Statistical significance: * $p<0.1$, ** $p<0.05$, *** $p<0.01$. Amounts are winsorized at the one percent level. [1]Any household debt includes mortgage, car debt, debt on other property, credit card balances, education loans, personal loans from friends and family, personal loans from a bank or a credit union, payday or auto title loans, medical debt, past-due regular bills or rent, back taxes or money owed to government, negative balances on bank accounts, legal fees, and other non-mortgage debt. [2]Unsecured debt includes credit card debt, payday loans, and negative balances in savings and checking accounts. [3]Measured in HFS Wave 2.