

***TAX-TIME SAVING AND THE EARNED INCOME TAX CREDIT: RESULTS FROM
ONLINE FIELD AND SURVEY EXPERIMENTS***

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Tax refunds are an opportunity for Earned Income Tax Credit (EITC) recipients to build emergency savings. Randomly assigned behavioral interventions in 2015 and 2016 have statistically significant impacts on refund saving take-up and amounts among EITC recipients who filed their taxes online. From a survey experiment, we also find that EITC recipients have a 49 percent and 59 percent increased likelihood of deferring 20 percent of their refunds for six months when hypothetically offered 25 and 50 percent savings matches ($p < .001$), respectively. These findings can inform policy development related to encouraging emergency saving at tax time.

Keywords: earned income tax credit, saving, behavioral economics, tax refunds, low-income

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I. INTRODUCTION

Enacted in 1975 as a modest work bonus and expanded substantially in 1993 as part of welfare reform policy (Hoffman and Seidman, 2003; Ozawa, 1995), the Earned Income Tax Credit (EITC) is the largest anti-poverty social welfare program targeting working families in the US (Nichols and Rothstein, 2016) providing nearly 29 million low-income tax filers with \$68 billion in earnings subsidies (Hoynes and Rothstein, 2016). The EITC is a refundable tax credit that comprises an important component of the social safety net for low- and moderate-income (LMI) households (Bitler, Hoynes, and Kuka, 2017; Danziger, et al., 2002; Hoffman and Seidman, 2003), helping these households cope with income and expense shocks (Tach et al., 2019). The EITC is lauded for its low administrative costs and high take-up rate and more importantly for its effectiveness in raising after-tax earnings and lifting working families with children out of poverty (Dahl, DeLeire, and Schwabish, 2009; Gundersen and Ziliak, 2004; Hardy, Smeeding, and Ziliak, 2018; Hoynes and Patel, 2018), though sharp reductions in the credit when children age out reduces labor force participation (Moulton, Graddy-Reed, and Lanahan, 2016).

The EITC conveys other, non-financial benefits. Recipients report psychological rewards, including relief from stress associated with unpaid bills and the threat of utility cut-offs, and a sense of social inclusion by receiving a non-stigmatized, work-related benefit (Sykes et al., 2015). EITC receipt is also linked to healthy food purchases (McGranahan and Schanzenbach, 2013), health insurance coverage (Baughman, 2005) and improved birth (Hill and Gurley-Calvez, 2019; Hoynes, Miller, and Simon, 2015), maternal health (Evans and Garthwaite, 2014) and child development (Hamad and Rehkopf, 2016) outcomes.

Still, the EITC has policy limitations and weaknesses due to its design as a refundable tax credit. Recipients must wait until they file their federal income tax returns to receive lump sum refunds from the credit – effectively providing a zero-interest loan to the federal government (Jones, 2012). By contrast, other public assistance programs such as the Supplemental Nutrition Assistance Program (SNAP) offer monthly benefits to support immediate household consumption (Holt, 2015). The decision to structure the EITC as a one time, lump-sum payment may lead households to rely on credit or high-cost financial products to cover their expenses in the months prior to EITC receipt; eligible households spend 5 percent of the value of the EITC on credit card interest to smooth consumption (Jones and Michelmore, 2016).

On the other hand, lump sum tax refunds represent an opportunity for EITC recipients to build emergency savings (Jones, 2012; Rhine et al., 2006; Smeeding, 2002) – short-term savings that can be used (i.e., dissaved) by households to cope with dips in income or spikes in expenses. In the context of receiving tax refunds, saving all or part of one's refund can smooth consumption in the months following tax filing. Weber (2016) found that EITC rules discourage saving for recipients in the phase-out region, yet the study examined interest-bearing accounts as opposed to no or low-interest savings accounts recipients would likely use for emergency and short-term saving.

Though EITC recipients use tax refunds for many other purposes—paying overdue bills, reducing debt, and making large purchases (Barrow and McGranahan, 2000; Mendenhall et al., 2012; Sykes et al., 2015; Tach et al., 2018), LMI tax filers increase refund saving when they receive encouragement, incentives, and facilitation (Azurdia and Freeman, 2016; Beverly, Schneider, and Tufano, 2006; Beverly, Tescher, and Romich, 2004; Key et al., 2015; Tucker, Key, and Grinstein-Weiss, 2014).

Federal policy proposals may better promote refund saving among EITC recipients. The Refund to Rainy Day Savings Act (S.1018) would significantly expand tax-time savings by offering LMI households the opportunity to set aside 20 percent of their refund for six months to receive a 50 percent match on the deferred portion (Halpern-Meekin et al., 2018). A similar bill introduced in recent sessions of Congress, the Financial Security Credit Act, would provide a 50 percent match of refund amounts deposited into one of several eligible savings products. A competing policy proposal is to offer periodic, advance payment of the EITC so that households would receive a portion of their expected credit to help smooth consumption during the tax year (Bellisle and Marzahl, 2015; Holt, 2015).

The purpose of this study is to inform EITC policy development related to tax-time savings among LMI households in three ways. First, we draw on field experiments conducted in 2015 and 2016 to assess the effectiveness of randomly assigned message-based and choice architecture interventions on refund savings allocations among a large sample of EITC recipients who filed their federal income tax returns online. To our knowledge, this is the first study to assess online tax-time savings intervention outcomes exclusively among a large sample of EITC recipients using direct observations of savings behavior from administrative tax data. Second, we use a survey experiment to test the feasibility of refund saving policy proposals by assessing the probability that EITC recipients would defer a portion of their refund for six months if offered 0, 25, or 50 percent refund savings matches. Third, we assess whether refund saving behaviors and preferences vary by refund amounts. Findings from our study can inform EITC policies concerning savings message and deferred refund saving interventions to help EITC recipients build emergency savings and cope with financial uncertainties.

We find that interventions delivered in 2015 and 2016 have statistically significant impacts on the refund saving take-up rate and on amounts of refunds saved among EITC recipients that are largely independent of refund size. Although the magnitude of these impacts is relatively modest, behavioral interventions delivered through an online tax filing platform that reaches hundreds of thousands of tax filers can encourage refund savings among EITC recipients to help cope with economic instability. We also find that modest savings incentives have the potential to dramatically increase refund saving take-up among EITC recipients, and that refund deferral preferences rise with the size of the refund. However, responses to hypothetical match responses are mostly insensitive to refund amounts.

Our study arrives at an important time in tax policy, given the aforementioned policies to promote savings, as well as the recently passed Tax Cuts and Jobs Act of 2017 (TCJA), which increases the child tax credit from \$1,000 to \$2,000 per child, the first \$1,400 of which is refundable. The TCJA did not alter the EITC or tax-time savings inducements for LMI filers, and our findings can inform policymakers on how to help EITC recipients build emergency savings amidst substantial economic constraints.

II. TAX REFUNDS AS AN OPPORTUNITY TO BUILD EMERGENCY SAVINGS

Low- and moderate-income (LMI) households struggle with many forms of economic instability – income volatility, periods of unemployment, public assistance cycling, and large, unplanned expenses (Acs, Loprest, and Nichols, 2009; Despard et al., 2018a; Heflin, 2006; Moore, Wood, and Rangarajan, 2012; Morduch and Siwicky, 2017; Pew Charitable Trusts, 2015a; Roll et al., 2017; Seefeldt, 2016). These sources of economic instability heighten risk for material hardship (Despard et al., 2018b; Leete and Bania, 2010; McKernan, Ratcliffe, and

Vinopal, 2009; Pilkauskas, Currie, and Garfinkel, 2012), such as food insecurity (Tarasuk, McIntyre, and Li, 2007) and eviction (Desmond and Kimbro, 2015).

Having emergency savings—money set aside to use in the event of unexpected dips in income or large expenses—lessens risk for material hardship (Gjertson, 2016; Lusardi, 1998; McKernan et al., 2009), retirement account hardship withdrawals (Lusardi, 2011), and credit dependence (Jones and Michelmore, 2016). However, LMI households typically lack sufficient emergency savings. Most LMI households (85 percent) did not have enough in emergency savings to cover at least three months of living expenses at the federal poverty level (McKernan et al., 2009). Households in the bottom two income quintiles had liquid savings that could cover only 9 and 15 days of regular living expenses, respectively (Pew Charitable Trusts, 2015b). Thus, many LMI households may be ill-equipped to respond to economic instability without experiencing hardship.

Tax refunds are irregular windfalls (Epley and Gneezy, 2007), more likely to be used to increase savings than usual income (Mammen and Lawrence, 2006; Romich and Weisner, 2000). The opportunity to build emergency savings is especially ripe for households which receive the EITC, a refundable tax credit that offers a substantial financial benefit for qualifying households. For the 2015 tax year, the average credit was \$3,186 for families with children, though the average credit is considerably lower for single filers (\$293) (Center on Budget and Policy Priorities, 2016).

Despite the opportunity to build emergency savings at tax filing, there are several barriers to promoting refund savings. First, LMI households often use tax refunds for other reasons besides saving—overdue bills, debt reduction, home improvements and repairs, car repairs, and large purchases (Halpern-Meeke et al., 2015; Mendenhall et al., 2012; Shaefer, Song, and

Shanks, 2013; Smeeding, Phillips, and O'Connor, 2000; Sykes et al., 2015; Tach and Greene, 2014). Second, even if LMI tax filers do intend to save part or all their refund, a gap exists between intention to save refunds and actual refund saving behavior. Mendenhall et al. (2012) found that 57 percent of a sample of 194 EITC recipients followed over a six-month period intended to save their refunds, but only 39 percent could meet their savings goals. Similarly, Spader, Ratcliffe, and Stegman (2005) found that 55 percent of low-income tax filers in North Carolina who planned to save their refund did not save any portion of it.

III. TAX-TIME SAVINGS INTERVENTIONS AND EVIDENCE

Though there have been relatively few rigorous studies of interventions intended to promote tax refund savings, the evidence from these interventions demonstrates positive savings outcomes for LMI tax filers. The Extra Credit Savings program in Chicago gave LMI tax filers free tax preparation services, an opportunity to open a savings account with a 2.5 percent interest rate, direct deposit of refunds into these accounts, and a 10 percent bonus for amounts still saved after one year. The program was successful in increasing account ownership, but not in helping filers accumulate liquid assets (Beverly et al., 2004). The Refund to Assets program offered low-income tax filers in Tulsa, Oklahoma an opportunity to open savings accounts and/or split their refunds into existing savings accounts. Beverly et al. (2006) found a take-up rate of 20 percent and that participants saved an average of \$606, or almost half of their refunds. However, four months later, most saved refund amounts were spent.

More recent interventions have incorporated incentives to encourage tax filers to retain saved refunds. Most (70 percent) SaveNYC participants responded to and received a 50 percent match for allocating and retaining a portion of their refund to savings (Tucker et al., 2014). Savers were less likely than non-savers to experience financial difficulty in the year following

tax filing (Key et al., 2015). Modeled after the New York City program, SaveUSA offered 50 percent matches on amounts of refunds low-income tax filers allocated and retained in savings for one year. Results based on a 42-month follow-up indicate an 8-percentage point increase in the proportion of filers with any non-retirement savings and \$522 more in savings among treatment compared to control group participants (Azurdia and Freedman, 2016).

The studies reviewed above suggest that opportunities, encouragement, and incentives can increase the refund saving take-up rate and retained refund savings among LMI tax filers. However, these studies were conducted with small samples and were not conducted exclusively with EITC recipients, who are more likely than other low-income tax filers to be single parents with children who have greater financial challenges to navigate. In addition, savings incentives delivered in community-based settings may be too costly to implement at scale (Grinstein-Weiss et al., 2015).

IV. CURRENT STUDY

The (name of initiative) is an ongoing collaboration among (names of collaborating institutions and organizations), with the goal of encouraging LMI households to save refunds at tax time. (Initiative) collaborators test interventions informed by behavioral economics and delivered through (name of software) tax filing software to encourage filers to deposit a portion of their federal tax refunds into a savings vehicle. (Name of software) is a free version of (name of software) available to LMI tax filers. Randomized controlled trials testing these interventions have been conducted every year since 2012.

A. Prior Evidence from (name of initiative)

Prior evidence from (name of initiative) experiments conducted in 2012, 2013, and 2015 indicated that LMI tax filers who received motivational messages (e.g., encouraging filers to

save for emergencies or for retirement) and choice architecture manipulations (i.e., making saving all of one's refund the first choice on the refund allocation screen) were more likely to allocate all or a portion of their refund to a savings account and had higher average refund saving amounts compared to filers in control groups who received the standard tax filing experience in (name of software). In comparing different types of behavioral interventions, higher anchors (i.e., suggestions to save a certain proportion or amount of one's refund) and choice architecture manipulations had a greater impact on savings outcomes than motivational messages (Grinstein-Weiss et al., 2017a, 2017b; Roll et al., 2018). Several studies from (name of initiative) also investigated the impact of these interventions on downstream household outcomes, finding that tax filers who randomly received the savings interventions held more of their refund in savings than the control group six months after tax filing (Roll et al., 2018, 2019), and that refund savings deposits were associated with lower reported rates of material hardship six months post-filing (Grinstein-Weiss et al., 2016).

B. Testing Interventions Among EITC Recipients

We build on evidence from our prior studies by examining savings outcomes among EITC recipients and comparing these outcomes with non-EITC recipients for the 2015 and 2016 experiments. In our prior studies, we found that EITC recipients differ from other LMI tax filers with respect to filing status, age, number of dependents, adjusted gross income, and federal tax refund amounts. Given these differences in socioeconomic characteristics, it is important to determine whether EITC recipients' responses to interventions aimed at encouraging tax refund saving are different than among other LMI tax filers.

In addition, we use a survey experiment to examine EITC recipients' hypothetical probabilities of deferring refunds based on varying incentive levels, thus allowing us to directly

inform recent deferred refund saving policy proposals. Our study is unique in that we use direct observations of savings behavior among a large sample of EITC recipients and we examine the intersection of an existing refundable tax credit aimed at supplementing wages with an inducement to build emergency savings.

C. Intervention Overview

In each study year, participants were randomly assigned to one of three interventions or a control group which received no intervention. Figure 1 summarizes the interventions.

<Insert Figure 1 here>

1. 2015 Interventions

In the 2015 experiments, three unique message-based interventions were delivered after participants had entered all their information into (name of software) and determined that they would be receiving a refund. A common heading was used for these three interventions: "Choose how you'd like your federal refund".

First, in the "emergency savings" condition, the message read "No one knows what life has in store. In fact, 2 out of 3 people will have an unexpected financial emergency in 6 months or less. It pays to save!" This message was followed by a sidebar next to the savings deposit allocation choice that read "Be prepared. Don't let life catch you by surprise. Save something today and have cash on hand when it's needed down the road".

Second, in the "interactive goal" condition, the message read "Saving some or all of your refund is an excellent way to set aside money to achieve your goals", followed by a sidebar that read "Imagine a brighter future today. Then select which goals you'd like to save for most" Participants then were presented with icons for car/vehicle, house, education, retirement, emergencies, and other.

Third, in the "interactive retirement" condition, the message read "Your refund can go a long way towards saving money for retirement" followed by a sidebar that read "Imagine yourself at retirement. Then select what you'd like to be doing and start saving for it today!" Participants were then presented with icons for family time, traveling, volunteering, RVing, fishing, and relaxing. Nothing occurred when participants clicked on any icons on the interactive goal and interactive retirement screens.

In all three interventions, participants also received a choice architecture manipulation embedded in refund allocation options. The first option presented was to deposit the entire refund into a savings account, followed by options to split the refund among multiple bank accounts or toward a savings bond, deposit the entire refund into a checking account, or receive a paper check in the mail.

2. 2016 Interventions

In 2016, three interventions were delivered – also after participants learned they would receive a federal tax refund under a common heading "Choose how you'd like your refund". First, a choice architecture-only intervention used the same manipulation as in 2015, wherein the first option was to save their entire refund, followed by options to split the refund, deposit into a checking account, or receive a paper check. However, no persuasive messaging around saving was included.

In the second treatment condition, an emergency savings message was added to the choice architecture of the first treatment condition. This message read "Don't let life catch you by surprise. Save something today and have the cash on hand when you need it down the road", followed by a sidebar that read "Save for life's unexpected emergencies and be ready for: getting

a car fixed, making up for lost income, paying medical bills, covering legal expenses, repairing your home." This message had no interactive component.

In the third treatment condition the emergency savings messaging incorporated an interactive element. Participants were first shown a screen that read "Saving doesn't have to be that hard...your refund could be just the secret weapon you need to be ready for whatever life has in store". This was followed by an invitation to "Select one or more expenses below that might affect you and we'll help you get ahead by using your refund to save" with icons for car repairs, job loss, medical bills, legal fees, home repairs, and other. After participants made their selection(s), they continued to another screen with the choice architecture manipulation with a sidebar that read "Don't let these expenses put your life on hold", displaying their selections from the previous screen.

In both 2015 and 2016, participants in the control group were asked whether they wished to receive their refund by direct deposit into a bank account, paper check, or split into multiple accounts or toward a savings bond, which is the standard (name of software) experience. No message-based or choice architecture interventions were delivered. To allocate all or part of refunds to a savings account, participants needed to have an existing savings account.

D. Role of Economic Theory and Behavioral Science in Intervention Design

Content of the emergency and retirement savings messages was informed by economic theory that emphasizes the role of liquid assets in mitigating hardship (Deaton, 1991) and the impact of adverse events such as job loss (Lusardi, 1998). Savings messages were also informed by prior evidence indicating that individuals over-value immediate consumption compared to saving (Benhabib, Bisin, and Schotter, 2010; Frederick, Loewenstein, and O'Donoghue, 2002; Thaler, 1981) and underestimate future adversity (Bryan and Hershey, 2012). Also, individuals

devote limited attention to making financial and other decisions (Johnson et al., 2012), will use reference points to make decisions when they are available (Simmons, LeBoeuf, and Nelson, 2010), and can be influenced by persuasive messaging aimed at behavior change (Banks et al., 1995; Fishbein et al. 2002).

The choice architecture manipulations in 2015 and 2016 were informed by prior research indicating individuals' tendency to accept default options (Choi et al., 2003; Thaler, Sunstein, and Balz, 2014). Altering choice architecture by limiting the options to ones that are financially beneficial was found effective in facilitating Medicare Part D plan decisions (Congdon et al., 2011), while making retirement saving the default option boosted take-up rates in retirement plans (Benartzi and Thaler, 2007; Beshears et al., 2009; Choi et al., 2003).

E. Study Purpose

The purpose of the current study was to assess savings outcomes among a sub-sample of 2015 and 2016 (name of initiative) participants who received the EITC and to compare these outcomes to other LMI tax filers who did not receive the EITC. Prior studies have not examined savings outcomes solely among EITC recipients, many of whom are single parents with children who face elevated risk for economic instability and insecurity, nor have savings outcomes among EITC recipients been compared to non-recipients with similar incomes. We also conducted a survey experiment to assess the probability that EITC recipients would defer a portion of their refund to receive a savings match. Findings from our study can inform current policy proposals aimed at promoting economic security among EITC recipients (Bellisle and Marzahl, 2015; Edin et al., 2014; Holt, 2015).

V. METHODS

A. Sample and Experimental Design

Samples for the current study were comprised of 2015 ($n = 270,891$) and 2016 ($n = 112,562$) (name of initiative) participants who received the EITC. In addition, a sample of 3,979 EITC recipients who completed a household financial survey in 2016 was drawn to assess refund deferral preferences based on randomly assigned hypothetical savings match conditions. Study samples are drawn from the larger 2015 ($n = 646,116$) and 2016 ($n = 284,125$) (name of initiative) participant samples of LMI tax filers who filed their federal income taxes using (name of software), expected to receive a refund, and were randomly assigned to an intervention group described above or to a control group (see Figure 1). Assignment took place within the (name of software), after participants completed their federal income tax returns and learned they would receive a refund. (Name of software) users who were not due a refund were not part of the study.

1. Survey Experiment Regarding Deferral Preferences

To assess EITC recipients' refund deferral and savings match preferences, we randomly assigned survey respondents to see one of three different hypothetical questions in the 2016 household financial survey. Each of these questions asked about their willingness to save (defer) 20 percent of their refund for six months, but the three groups of respondents were randomized to see this question with either no deferred refund saving match, or a 25 or 50 percent match. In the no match condition, participants were asked: "Many people get a financial boost from tax refunds but find themselves short on funds later in the year. Imagine a program that allows you to put off a portion of your refund and receive it 6 months later. You just completed your taxes and expect a \$(amount) refund. If you had the following options today, which would you choose to do?"¹ The amount was populated with their self-reported federal tax refund amount. Response

¹ While this question populates a refund amount based on the respondents' self-reported federal tax refund amount, we take the refund measure used in this analysis from administrative tax data. The use of administrative data for refund amount allows us to avoid issues of nonresponse to the survey question on refund amount and is a more accurate measure of what respondents actually received as a refund. In practice, this distinction makes very little

choices included to receive their full refund at tax time or to receive 80 percent of their expected refund at tax time and the remaining 20 percent six months later.

In the 25 and 50 percent match conditions, participants were asked: "Many people get a financial boost from tax refunds but find themselves short on funds later in the year. Imagine a program that offers one bonus dollar for every two/four dollars of your refund if you wait 6 months to receive it. Your total tax refund would be larger, but you would have to wait 6 months to receive some of it. You just completed your taxes and expect a \$(amount) refund. If you had the following options today, which would you choose to do?" Response choices included to receive their full refund at tax time or to receive 80 percent of their expected refund at tax time and the remaining 20 percent six months later plus either a 25 or 50 percent match.

Because participants were re-sampled based on EITC recipient status for the savings interventions and survey experiments, we conducted group balance checks using normalized difference scores using the following formula:

$$\Delta_x = \frac{|\bar{X}_1 - \bar{X}_0|}{\sqrt{S_0^2 + S_1^2}},$$

where the numerator is the absolute difference in treatment and control group means and the denominator is the square root of the sum of treatment and control group sample variances. Scores greater than .25 are considered to indicate sample imbalance (Imbens and Wooldridge, 2009). We assessed imbalance for age, gross income, filing status, number of dependents, filing date, refund amount, income from wages, unemployment benefits, retirement benefits, interest, and dividends. Normalized treatment-control group differences for the 2015 and 2016

difference to our analysis. Models incorporating self-reported refund amount are almost identical to models that use administrative tax data, and the correlation between the self-reported refund amount and the administrative refund amount is 0.95.

intervention and survey experiment samples were no higher than 0.031, far below the standard of .25 (Imbens and Wooldridge, 2009), indicating that randomization was kept intact after re-sampling on EITC receipt status.

B. Data and Analysis

Study data concerning savings outcomes are from administrative tax data collected on federal income tax returns completed in 2015 and 2016 for tax years 2014 and 2015, respectively. These data were available in aggregate form, with sub-group aggregation by EITC status and treatment and control group assignment. Data regarding participants' preferences for deferring a portion of their refunds were derived from a household financial survey that was completed by 3,979 EITC recipients in 2016 who agreed to complete the survey after they filed their taxes.

We used two dependent variables to estimate average treatment effects for refund savings outcomes: (1) the refund saving take-up rate, measured by the proportion of participants who allocated all or a part of their refund to a savings account; and (2), the amount of refund allocated to a savings account. Whereas y denotes each savings outcome and w group assignment (1 = treatment; 0 = control), average treatment effects (ATE) for interventions are estimated:

$$E(y / w = 1) - E(y / w = 0) = E(y_1) - E(y_0) = ATE$$

To assess outcomes, we estimated the ATE using chi square tests of independence (χ^2) and independent samples t-tests for refund saving take-up and refund savings amounts, respectively, comparing intervention and control group participants. In addition, to detect effect size heterogeneity, we examined both savings outcomes across five refund quantiles for the 2015

sample.² That is, treatment-control group differences were examined to determine whether treatment effects varied based on the size of the refund.

For refund saving take-up rates, we calculated effect size using a binomial effect size display, the resulting percentage of which was transformed into Cohen's *d* (Lenhard and Lenhard, 2016; Rosenthal and Rubin, 1982). For refund savings amount, we calculated Cohen's *d* using standardized mean differences between the intervention and control group.

To analyze responses to the survey experiment concerning hypothetical refund saving matches, we used linear probability modeling to examine deferral preferences as binary outcomes (Hellevik, 2009), assigning a value of '1' to defer 20 percent of the expected refund, and '0' to receive the entire refund at tax time. We estimate three models in this analysis: An unadjusted model examining the relationship between match rate and deferral preferences; a model in which we control for refund quantile, age, income, filing status, number of dependents, race/ethnicity, gender, home, credit card, and bank account ownership, taxes withheld, budgeting habits, ability to come up with \$2,000 in an emergency, material hardship and financial shocks in the prior six months, and health insurance status; and a model that explores the interaction between refund quantile and match rate, controlling for the above demographic and financial characteristics.

VI. RESULTS

A. Sample Characteristics

Characteristics of the 2015 and 2016 study samples are presented in Table 1, including comparisons of EITC recipients and non-recipients. Differences in characteristics between the 2015 and 2016 samples and between the treatment and control groups in each year were

² Data limitations prevent us from conducting this same analysis for the 2016 sample.

negligible. Annual income was low – averaging around \$16,000, slightly higher than the estimated median adjusted gross income (\$14,686³) of all EITC filers in the U.S. (Brookings Institution, 2018).

<Insert Table 1 Here>

Average refunds were substantial, representing almost a quarter of income. About half of the samples in each year claimed head of household tax filing status – the same as for all U.S. EITC filers (Brookings Institution, 2018), which typically denotes a household headed by a single adult parent with one or more children or other dependents. Compared to U.S. EITC filers (Brookings Institution, 2018), the samples were comprised of a larger proportion of single filers (33 to 34 percent vs. 26 percent) and a smaller proportion of married filing jointly filers (14 to 16 percent vs. 24 percent).

In both 2015 and 2016, tax filers in the studies differed significantly based on EITC status. Compared to non-recipients, EITC recipients were older, less likely to have single filing status, and more likely to have head of household or married filing jointly filing status. Recipients also had more dependents, higher incomes, and higher tax refunds.

Saving Outcomes

In this section, we present results of randomly assigned interventions in 2015 and 2016 to encourage EITC recipients to save their tax refunds. Savings rates among participants who received an intervention were higher than the control group in both years by about 3 to 4 percentage points ($p < .001$). Savings rates among the three intervention groups in both years were similar, with effect sizes ranging from .10 to .14 in 2015, and .09 to .11 in 2016. Similarly, average amounts saved among participants who received an intervention were higher than the

³ Authors' calculation of the weighted average median adjusted gross income for all 50 states and the District of Columbia.

control group by close to or more than \$100 in both years ($p < .001$), with effect sizes ranging from .08 to .10 in 2015, and .06 to .08 in 2016 (see Tables 2 and 3).

<Insert Tables 2 and 3 here>

Savings Outcomes by Refund Amounts: 2015 Sample

To examine whether savings outcomes vary based on the size of one's tax refund, we present treatment-control group differences in refund savings take-up rates by refund quantiles in Table 4. Statistically significant average treatment effects were found for all quantiles, and the rate of refund savings increases with the quantile of the refund. However, the intervention appears to be somewhat less effective at motivating savings deposits for those with larger refunds, as indicated by slightly smaller effect sizes for those in the third quantile and above. Take-up rates increased modestly for both groups as refund amounts increased.

<Insert Table 4 here>

EITC and non-EITC Recipient Savings Rates

We also compare whether refund savings rates differ based on whether tax filers received the EITC. In 2015, the refund savings rate among non-EITC recipients was 9.87, 14.79, 14.91, and 14.16 percent among the control, emergency saving, interactive goal, and interactive retirement groups, respectively. Each of these savings rates was significantly higher than the rate among EITC recipients ($p < .001$). Overall, the refund savings rate was 10.52 and 12.53 percent among EITC and non-EITC recipients, respectively.

In 2016, the refund savings rate among non-EITC recipients was 8.87, 14.35, 13.64, and 13.31 percent among the control, emergency saving, interactive goal, and interactive retirement groups, respectively. Each of these savings rates was significantly higher than the rate among

EITC recipients ($p < .001$). Overall, the refund savings rate was 12.35 and 15.52 percent among EITC and non-EITC recipients, respectively.

Survey Experiment: Refund Deferral Preferences and Savings Match Rates

In this section, we present the results of a survey-based experiment assessing the relationship between potential EITC match rates and participants' willingness to defer 20 percent of their refund for six months. Table 5 presents the unadjusted results of this experiment.

Overall, 21 percent of 2016 EITC recipients in the survey said they would defer 20 percent of their refund for six months without the offer of a match. With a 25 and 50 percent match, these hypothetical deferral take-up rates rose to 70 and 80 percent, respectively. Hypothetical deferral take-up rates increased across all three match conditions with refund size. The percentage point difference between the 25 percent and no match conditions increased with refund size, yet decreased for the difference between the 25 and 50 percent match conditions.

<Insert Table 5 here>

Table 6 presents regression estimates of the relationship between match rates and refund deferral preferences among EITC recipients. Model 1 estimates this relationship without the use of any controls, Model 2 includes controls for the quantile of the refund amount as well as an array of other demographic and financial controls, and Model 3 incorporates an interaction between the refund quantile and the match rate. In Model 1, the unadjusted relationship between match rate and refund deferral preferences is identical to that seen in Table 5—the inclusion of a 25 or 50 percent match increases the reported probability of deferral by 48 and 59 percentage points, respectively ($p < .001$).⁴ Model 2 demonstrates that the inclusion of controls does not affect these estimates, and that respondents with higher refunds have significantly higher

⁴ F-tests show that the reported deferral response to the 50 percent match rate is significantly higher than the 25 percent match rate in all models ($p < .001$).

reported deferral rates. Compared to participants in the first quantile for refund amount, participants in the third, fourth, and fifth quantiles had 8, 16, and 18 percent greater probabilities of deferring their refund ($p < .001$).

The incorporation of interaction terms between refund quantile and the deferral match rate in Model 3 assesses the degree to which refund size moderates respondents' response to match rates, controlling for other factors. Except for the coefficient on the interaction between a 25 percent match and the fifth refund quantile ($p < .05$), the interaction between match rate and refund size is not statistically significant, indicating that the response to different refund match rates is not sensitive to the size of the refund.

<Insert Table 6 here>

Figure 2 incorporates the Model 3 estimates to illustrate the predicted probability of refund deferral as a function of deferral match rate and refund quantile. The patterns in predicted probabilities reinforce the patterns observed in the regressions: Reported deferral rates increase as both match rate and refund size increase. This figure also indicates that, directionally speaking, a 50 percent match rate may be more effective at incentivizing deferral among those with lower refunds and that those with higher refunds are less responsive to the shift from a 25 percent match to a 50 percent match.

<Insert Figure 2 here>

DISCUSSION

In this paper, we investigate impacts on tax refund saving of behavioral interventions delivered through an electronic tax preparation platform among two samples of EITC recipients representing nearly 400,000 households. We discover statistically significant main treatment effects on refund saving take-up and amounts across all interventions delivered in both sample years. Participants who received a behavioral intervention saved \$7.3 million and \$8.1 million

more than participants in the control group in 2015 and 2016, respectively. Effect sizes ranged from .06 to .14 and are based on direct observations of savings behavior impacted by a low-touch and low-cost intervention with the potential for scale to reach hundreds of thousands of other EITC recipients. While the effect sizes are modest, they are observed in the context of a relatively inexpensive and large-scale intervention. Though a cost estimate for including savings messages and a modified choice architecture in online tax filing software is not available, the fact that these interventions do not substantially alter the online tax filing experience indicates that the marginal cost of implementing these changes is minimal. This suggests that low-touch message-based and choice architecture interventions could be a cost effective strategy for promoting tax-time savings.

In comparing interventions, some instructive differences in impact emerge. In 2015, the emergency saving intervention performs slightly better than the interactive goal and interactive retirement interventions. This finding suggests that EITC recipients may be more responsive to messages encouraging preparation for near term, unexpected events versus longer range financial goals. Corroborating this finding, the emergency saving messages (both interactive and non-interactive) delivered in 2016 performed better than the choice architecture-only intervention. However, these differences were modest.

Overall, (name of initiative) interventions resulted in three to four percentage point increases in refund savings take-up and modest refund savings increases of around \$100 among EITC recipients. From the 2015 sample, we see that these results are stable across refund quantiles, suggesting that EITC recipients can be encouraged to save regardless of the size of their expected tax refund. The impact on savings we find suggests some preference for liquidity and prior research indicates that making savings deposits (Grinstein-Weiss et al., 2016) and

having savings Brobeck, 2008; Gjertson, 2016; Tach et al., 2018) – even if held for short periods – reduces risk for material hardship. While saved refunds may provide EITC recipients with resources to help cope with economic instability, they may also view EITC refunds as precautionary savings built up throughout the year to address deferred repairs, purchases, expenses, and bills (Jones, 2012).

Despite the impacts we observe, the overall refund saving take-up rate is low and even lower among EITC recipients compared to other LMI filers, likely a result of EITC recipients' competing priorities for allocating tax refunds (see, for example, Halpern-Meekin et al., 2015). Indeed, some households may wish to pay down unsecured debt first (Shaefer et al., 2013), having used credit cards to smooth consumption throughout the year (Jones and Michelmore, 2016). Compared to non-recipients, EITC recipients in our study are more heavily comprised of unmarried parents with dependent children who may face greater barriers to saving tax refunds.

Also, the average treatment effect of around \$100 in increased refund savings we found is less than a month's rent for most LMI households. Though this amount could provide food during a spell of joblessness or help pay for a minor car repair, our finding suggests the need for additional incentives to make refund saving economically meaningful.

To examine the role of incentives, we assess probabilities that EITC recipients would defer (and hence, save) their refund if offered a savings match. We find a very strong proclivity to save refunds if offered a 25 or 50 percent match. The proportion of EITC recipients who say they would defer 20 percent of their refund for six months jumps 49 percentage points from the offer of no match to an offer of a 25 percent match. The jump from the 25 to 50 percent match conditions is a relatively modest 10 percentage points.

Our findings concerning refund deferral preferences lend support to policy proposals aimed at encouraging EITC recipients and other LMI tax filers to save their refunds. Both the Refund to Rainy Day Savings Act (S.1018) and the Financial Security Credit Act include a 50 percent match on refunds saved or deferred for six months (Halpern-Meekin et al., 2018). We find a high level of interest in both a 25 and 50 percent match among EITC recipients.

Though refund deferral preferences in response to hypothetical savings matches rise with refund amount up to the fourth quantile, our tests for moderation indicate that these preferences are largely insensitive to refund size. This suggests that, despite the phase-in/out structure of the EITC relative to earnings, responses to savings incentives may be fairly stable by refund size.

While the expressed intentions to save refunds based on the hypothetical incentives we test in our study are encouraging, participants may have been inclined to self-report affirmatively because they were primed with respect to saving as a normative behavior (Nolan et al., 2008). Moreover, prior research has found a gap between intended and actual refund saving among LMI households (Mendenhall et al., 2012; Spader et al., 2005). Many LMI tax filers who may wish or intend to save 20% of their refunds may find it difficult to follow through when confronted with competing needs at tax time.

Our study offers important insights into interventions and policies aimed at improving the economic security of EITC recipient households. Prior research demonstrates that behavioral interventions can induce positive behavior changes such as retirement savings (Thaler and Benartzi, 2004), college enrollment (Castleman and Page, 2015) and financial aid applications renewals (Castleman and Page, 2016). We extend evidence concerning the promise of behavioral interventions via social welfare programs (Congdon and Shankar, 2015; Richburg-Hayes et al., 2014) by demonstrating positive impacts among EITC recipients concerning refund saving.

Nonetheless, there are important limitations of our study to note with respect to refund saving policy proposals. The data available for our study allowed us to examine treatment effect heterogeneity by refund size for the 2015, but not 2016 sample. Also, our findings do not generalize to the EITC recipient population. (Name of initiative) participants are slightly younger, less likely to be African American or Latino, have slightly fewer children, and have greater educational attainment (Grinstein-Weiss et al., 2015), compared to EITC recipients in other studies (Azurdia and Freeman, 2016; Jones and Mahajan, 2015; Meyer, 2008; Nichols and Rothstein, 2016). Moreover, EITC recipients file their taxes in other ways. EITC recipients who file their taxes online may differ based on unobserved characteristics from EITC recipients who complete paper returns, or use paid or volunteer preparers.

In addition, (name of tax filing software) requires filers to already have a savings account to save all or a portion of their expected tax refund. Under the Financial Security Credit Act, in addition to incentives, tax filers would have the opportunity to open a savings account when they file their federal income tax returns. This is an important policy feature, as the results we observe in our study might have been different if tax filers without savings accounts had the opportunity to open an account as they made their refund allocation decisions.

An additional study limitation is that we do not observe whether participants' refund savings might have been offset by reductions in other savings accounts or increased borrowing, nor do we observe whether participants retained their refunds in savings or dissaved in the months following tax filing. However, we find in prior studies that tax filers who were randomly assigned to receive an intervention had retained a greater proportion of their refund in savings six months after tax filing compared to the control group (Roll et al., 2018, 2019). While these findings do not dismiss the possibility of asset shifting or debt accumulation offsets, we also find

that tax-time savings deposits are associated with lower likelihood of experiencing material hardship six months after filing taxes (Grinstein-Weiss et al., 2016). Thus, our prior studies suggest that the refund saving outcomes we observe among EITC recipients in this study may have a positive impact on household finances in the months following tax season.

Making savings deposits are not the only ways that households set aside money for future use. For example, individuals construct mental accounts to consider certain portions of their liquid assets as saved for different purposes (Thaler, 1990). Still, once made, savings deposits tend to remain (Sikkel and van Meer, 2015). This makes it more likely EITC recipient households who save their refunds will have resources to draw upon when they experience a setback such as an expensive car repair or lost wages due to a family illness.

Still, saving refunds may not be possible among acutely constrained households, and may even be ill-advised among households carrying heavy unsecured debt to finance consumption (Seefeldt, 2015). Thus, an alternative proposal to deferred savings matches is periodic payment, where EITC-eligible tax filers would receive a half of their expected refundable credit in quarterly payments during the year (Holt, 2015). Periodic payment – as well as extending the EITC to non-custodial parents (Wheaton and Sorenson, 2010)–has the advantage of boosting household income to smooth consumption during the year, which may help reduce demand for unsecured debt. However, prior research suggests that EITC recipients prefer receiving lump sum refunds at tax time as a form of forced saving (Jones, 2010; Jones, 2012; Romich and Weisner, 2000; Tach and Halpern-Meehin, 2014). Furthermore, take-up for the periodic EITC was very low, which led to its repeal in 2010, though Holt (2015) argues that periodic payment can be structured differently to lower the administrative burden on employers, one of the main factors behind the low take-up of this program.

CONCLUSION

In this study, we assess savings outcomes for a set of behavioral interventions delivered through an electronic tax filing platform with EITC recipients using a randomized control trial design. Interventions in the 2015 and 2016 experiments positively impacted both savings rates and amounts, though savings rates were lower among EITC recipients compared to other LMI tax filers. EITC recipients also showed strong interest in deferring a portion of their refunds if offered savings matches. Our findings lend support for policy proposals aimed at offering encouragement, facilitation, and incentives for EITC recipients to save part of their refunds, which may help EITC households cope with economic instability and reduce risk for material hardship. At the same time, the relatively modest levels of savings observed suggest that EITC recipient households are balancing an array of consumption priorities amid low earnings, and therefore generally have limited capacity to enact large changes to savings behavior. Ultimately, the EITC can serve as an important buffer for families that can set aside part or all their refund as savings, and financial incentives could be required to encourage LMI households to forgo current consumption in favor of savings. To the degree that current-period needs are being met within households, such improved savings behavior could improve overall well-being.

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Statistical compilations disclosed in this document relate directly to the bona fide research of, and public policy discussions concerning, financial security of individuals and households as it relates to the tax filing process and more generally. Compilations follow Intuit's protocols to help ensure the privacy and confidentiality of customer tax data. The views and opinions expressed in this report are those of the authors and do not necessarily reflect the views and opinions of the funders.

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Figure 1

2015 and 2016 Interventions

Intervention Condition	2015 Experiment	2016 Experiment
1	Control	Control
2	Emergency saving + Choice architecture	Choice architecture
3	Interactive goal + Choice architecture	Emergency saving + Choice architecture
4	Interactive retirement + Choice architecture	Interactive emergency + Choice architecture

Table 1**Sample Description: 2015 and 2016 Experiments**

<i>Panel A. 2015 Experiment</i>					
<i>Covariates</i>	EITC Status				<i>p</i>
	Treatment % or mean (SD)	Control % or mean (SD)	Recipient % or mean (SD)	Non-Recipient % or mean (SD)	
Age	39.28 (11.91)	39.19 (11.87)	39.25 (11.90)	32.34 (16.99)	***
Filing Status ¹					
Single	33.68	33.60	33.66	90.80	***
Head of Household	50.63	50.77	50.66	2.77	***
Married, filing jointly	15.62	15.57	15.61	4.84	***
Widow(er)	<1	<1	<1	<1	***
Number of dependents	1.18 (1.08)	1.18 (1.08)	1.18 (1.09)	0.07 (0.40)	***
Gross annual income	16,589 (10,402)	16,597 (10,409)	16,591 (10,404)	13,946 (9,438)	***
Federal tax refund	3,751 (2,725)	3,756 (2,710)	3,752 (2,722)	787 (842)	***
N	202,866	68,025	270,891	357,065	
<i>Panel B. 2016 Experiment</i>					
<i>Covariates</i>	EITC Status				
	Treatment % or mean (SD)	Control % or mean (SD)	Recipient % or mean (SD)	Non-Recipient % or mean (SD)	
Age	39.91 (12.19)	39.83 (12.18)	39.89 (12.19)	32.18 (17.66)	***
Filing Status ¹					
Single	33.35	33.22	33.32	91.76	***
Head of Household	52.04	52.30	52.11	2.52	***
Married, filing jointly	14.53	14.38	14.49	4.37	***
Widow(er)	<1	<1	<1	<1	***
Number of dependents	1.16 (1.07)	1.17 (1.08)	1.16 (1.07)	0.06 (0.37)	***
Gross annual income	16,660 (10,332)	16,691 (10,325)	16,668 (10,330)	13,222 (9,452)	***
Federal tax refund	3,805 (2,758)	3,822 (2,747)	3,810 (2,756)	738 (790)	***
N	88,484	28,078	112,562	171,563	

Note: ¹ There were no cases of married filing separately as this filing status is a disqualification for the EITC.

Table 2

Average Treatment Effects: 2015 Interventions

Intervention	<i>n</i>	Savings rate				Savings amount ¹			
		%	χ^2	<i>p</i>	<i>d</i>	<i>M</i>	<i>SD</i>	<i>p</i>	<i>d</i>
Control	68,025	7.84				292.50	1259.49		
Emergency saving + CA	67,655	11.94	639.96	***	.14	429.01	1497.56	***	.10
Interactive goal + CA	67,761	11.15	431.98	***	.12	406.65	1467.31	***	.08
Interactive retirement + CA	67,450	11.14	429.24	***	.10	405.69	1461.88	***	.08

Note: **p* < .05; ***p* < .01; *** *p* < .001. ¹ Includes allocations to savings deposits, excludes US Series I Savings Bond purchases. *d* = Cohen's *d* effect size estimation. CA = choice architecture.

Table 3

Average Treatment Effects: 2016 Interventions

Intervention	<i>n</i>	%	Savings Rate			Savings Amount ¹			
			χ^2	<i>p</i>	<i>d</i>	<i>M</i>	<i>SD</i>	<i>p</i>	<i>d</i>
Control	28,078	7.98				303.49	1293.03		
Choice architecture	28,085	10.75	127.75	***	.10	386.49	1432.76	***	.06
Emergency saving + CA	28,221	11.12	160.83	***	.11	402.83	1464.03	***	.07
Interactive emergency + CA	28,178	10.95	145.50	***	.09	409.25	1489.82	***	.08

Note: **p* < .05; ***p* < .01; *** *p* < .001. ¹ Includes allocations to savings deposits, excludes US Series I Savings Bond purchases. *d* = Cohen's *d* effect size estimation. CA = choice architecture.

Table 4

Refund Saving Take-up, by Refund Quantile: 2015 Interventions

Refund Quantile	<i>n</i>	Treatment	Control	χ^2	<i>p</i>	d
		%	%			
1 st (\$1 - \$329)	54,205	10.03	6.07	193.84	***	0.07
2 nd (\$330 - \$1,300)	54,168	10.78	6.95	168.33	***	0.07
3 rd (\$1,301 - \$2,990)	54,164	11.89	8.37	129.32	***	0.06
4 th (\$2,991 - \$3,865)	54,182	11.99	8.92	96.55	***	0.05
5 th (\$3,866 and over)	54,172	12.76	9.35	113.17	***	0.06

Note: *** *p* < .001. d = Cohen's d effect size estimation.

Table 5

Refund Deferral Preferences, by Refund Quintiles: 2016 Survey Experiment

Refund Quintile	<i>n</i>	% Choosing to defer 20% of refund for six mos.		
		No match	25% match	50% match
1 st (\$1 - \$561)	672	13.1	54.3***	73.3 ^{†††}
2 nd (\$562 - \$1,133)	835	15.0	64.7***	75.1 ^{††}
3 rd (\$1,134 - \$2,982)	808	18.6	68.5***	79.6 ^{††}
4 th (\$2,982 - \$5,372)	793	29.9	76.1***	84.1 [†]
5 th (Over \$5,372)	871	28.0	80.3***	86.0
Total	3,979	21.3	69.6***	79.8 ^{†††}

Note: *** $p < .001$; compared to no match. [†] $p < .05$; ^{††} $p < .01$; ^{†††} $p < .001$; compared to 25% match.

Table 6**Refund Deferral Preferences: Marginal Effects**

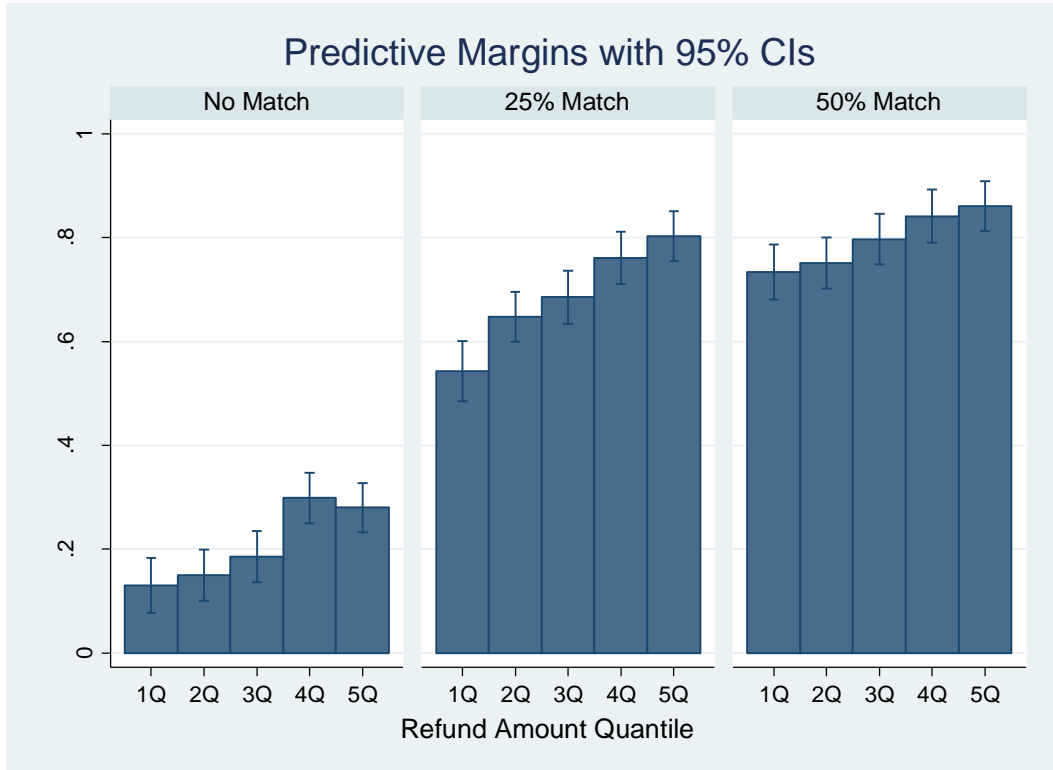
Outcome Model	Would Defer 20% of Refund		
	1	2	3
Refund Deferral Match (Ref. = No Match)			
25% Match	0.483*** (0.016)	0.482*** (0.016)	0.418*** (0.040)
50% Match	0.585*** (0.016)	0.587*** (0.016)	0.606*** (0.038)
Refund Quantile (Ref. = 1st Quantile)			
2 nd (\$562 - \$1,133)		0.040 (0.022)	0.019 (0.037)
3 rd (\$1,134 - \$2,981)		0.078*** (0.023)	0.053 (0.038)
4 th (\$2,982 - \$5,372)		0.163*** (0.028)	0.171*** (0.041)
5 th (Over \$5,372)		0.177*** (0.032)	0.158*** (0.043)
Refund Deferral Match*Refund Quantile			
25% Match*2 nd Quantile			0.073 (0.053)
25% Match*3 rd Quantile			0.083 (0.054)
25% Match*4 th Quantile			0.043 (0.054)
25% Match*5 th Quantile			0.104* (0.053)
50% Match*2 nd Quantile			0.000 (0.000)
50% Match*3 rd Quantile			-0.001 (0.052)
50% Match*4 th Quantile			0.003 (0.052)
50% Match*5 th Quantile			-0.059 (0.053)
Constant	0.213*** (0.012)	0.051 (0.049)	0.068 (0.053)
Demographic/Financial Controls			
R-squared	No	Yes	Yes
Observations	0.269	0.306	0.308
	3,979	3,979	3,979

Note: * $p < .05$; *** $p < .001$. Standard errors in parentheses. Coefficients represent the change in the probability of deferring 20% of one's refund compared to the reference group for that independent variable based on linear

probability models. Models 2 and 3 control for refund quantiles and covariates including income, filing status, number of dependents, race/ethnicity, gender, home, credit card, and bank account ownership, taxes withheld, budgeting habits, ability to come up with \$2,000 in an emergency, material hardship and financial shocks in the prior six months, and health insurance status.

Figure 2

Predicted Probabilities of Refund Deferrals by Match Condition and Refund Quantile



Note: These predicted probabilities are derived from the regression estimate in Model 3 in Table 6. This model includes an array of demographic and financial controls, as well as an interaction between refund match rates and refund quantile. N=3,979.