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Evidence from a Large-Scale Field Experiment

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Disclaimer

Statistical compilations disclosed in this document relate directly to the bona fide research of, and public policy discussions concerning savings behavior as it relates to tax compliance. Compilations are anonymous and do not disclose information containing data from fewer than 10 tax returns or reflect taxpayer-level data with the prior explicit consent from taxpayers. Compilations follow Intuit's protocols to help ensure the privacy and confidentiality of customer tax data.

The Role of Choice Architecture in Promoting Saving at Tax Time: Evidence from a Large-Scale Field Experiment

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Abstract

A large-scale field experiment (N = 646,116) from the Refund to Savings Initiative tested a choice architecture and persuasive messaging intervention that increased saving among low-moderate income (LMI) consumers by approximately 50% during tax refund time. Two follow-up experiments parsed components of the intervention. The first follow-up experiment (N = 569) tested the messaging and choice architecture interventions separately, finding that each can increase savings. A final follow-up experiment (N = 554) tested individual elements of the choice architecture intervention, demonstrating that mere mention of savings within choice options was not sufficient to increase saving, however, heavy emphasis of savings and making saving "frictionless" within choice options both effectively increased saving intentions. The final experiment also demonstrated that the choice architecture effect operates similarly for both LMI and non-LMI consumers.

Keywords: Choice Architecture, Decision Making, Savings, Persuasion, Financial Decision Making

American households, including low- and moderate-income (LMI) households in particular, do not have enough savings to cover unforeseen expenses. Nationally representative data from the Pew Charitable Trusts[1] show that 41% of households do not have liquid savings to cover a $2,000 expense in the case of an emergency; for low-income families that rate increases to 78%. Yet, financial emergencies are frequent: 60% of American households report a financial shock within the past year.[2]

Tax refunds offer potential relief to LMI households. A substantial percentage of LMI households are eligible for tax refunds,[3] and these refunds constitute a sizeable portion of annual income for LMI consumers (often equating an entire month of pay).[4] Tax refund time has been identified as a "savable moment" for LMI consumers[5] and may be the only time of the year when LMI consumers reasonably can afford to set aside money as savings.[6,7] In this research, we test the influence of a

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persuasive messaging and choice architecture intervention on LMI consumers' real and simulated decisions to put money into savings accounts at tax refund time.

The use of persuasive messaging to influence behavior is ubiquitous in both commercial marketing and public policy campaigns, often with substantial influence.[8,9] Choice architecture, another approach to influencing decisions, involves the organization of decision contexts to influence choices, typically in ways that do not change the actual options that are available.[10] Choice architecture has been shown to influence decisions as consequential as environmental efficiency,[11] retirement savings,[12] and organ donation.[13]

Although there are numerous instances where both persuasive messaging and choice architecture effectively alter decisions, there also are numerous instances where each fails to do so.[14,15,16] Interventions that effectively encourage savings decisions among LMI consumers may be particularly difficult to construct because LMI consumers have strong and pre-planned preferences regarding refund allocation, leaving little opportunity to influence saving decisions.[17,18] In a previous iteration of the R2S project, for example, it was found that varying a suggested impetus for saving (general goals, retirement, or emergencies) had no influence on savings deposit behavior.[19]

In this research, we develop an intervention relying on persuasive messaging and choice architecture to increase savings as part of the Refund to Savings Initiative, a large and ongoing project aimed at increasing savings allocations at tax refund time among low- and moderate-income (LMI) filers. We report findings from three experiments. Experiment 1 (N = 646,116) tests the effect of a messaging and choice architecture intervention on real savings accounts deposits at tax refund time. Experiment 2 (N = 569), a follow-up online experiment, separates the messaging and choice architecture interventions to gauge the unique influence of each. Finally, Experiment 3 (N = 554), also conducted online, isolates individual components of the choice architecture manipulation to determine which features are essential for increasing savings.

Experiment 1: Tax Refund Field Experiment

In experiment 1, we rely on a large-scale field experiment to test whether messaging and choice architecture interventions increase the amount of refund money allocated to savings accounts by LMI consumers at tax time. The experiment is part of the R2S initiative, an ongoing collaboration between researchers at Washington University, Duke University, and Intuit, Inc. The experiment was embedded inside the TurboTax Freedom Edition (TTFE) tax preparation software offered free to qualified LMI tax filers as a part of the IRS Free File Program.[20] During the 2015 tax season, filers qualified for the TTFE if they had an adjusted gross income (AGI) of under $31,000, if they qualified for the Earned Income Tax Credit, or if a member of the household was on active military duty and had an AGI of under $60,000. The experiment ran from January 16th through June 7th 2015. Intuit shared anonymous, aggregated tax data with the researchers in accordance with 26 U.S. Code § 7216.

Participants

Participants (n = 646,116, M_{Age} = 35) were individuals who used TTFE and received a federal tax refund when filing in 2015. Mean gross income was just over $15,000 (see Table 1 for sample characteristics).

Table 1. Experiment 1 (Field Experiment) Sample Description (*n* = 646,116)

Group assignment	*N*
Precautionary saving ("Be Prepared")	161,011
Interactive goal	161,936
Interactive retirement	161,217
Control	161,952
Demographics	% or Mean (SD)
Age[1]	35.25 (15.47)
Filing Status	
Single	66.84%
Head of Household	22.85%
Married, filing jointly, widow(er)	9.39%
Married, filing separately	0.92%
Any dependents	31.37%
Number of dependents (excluding none)	1.71 (0.89)
Gross annual income	15,055 (9,941)
Amount of federal tax refund	2,030 (2,379)

Note: Means are weighted across groups.

[1] Calculated based on the difference between the weighted means of birthdate at tax filing and filing date.

Procedure

Participants were randomly assigned to a control group or one of three intervention groups. Random assignment occurred within the TTFE software after participants completed their federal income tax returns and learned they would receive a federal tax refund. Participants randomly assigned to the control group received the standard TTFE screen on which they were prompted to indicate how they wished to receive their refund (see Appendix A for screenshots of all experimental conditions). These control group participants were asked whether they wished to receive their refund via direct deposit into a bank account, via paper check, or split into multiple accounts or a US Series I Savings Bond. If participants chose to receive their refund via direct deposit, on a subsequent screen they were prompted to enter a bank account routing number, which could be either for a checking account or a savings account. The refund amount allocated to savings accounts served as our primary outcome of interest.

Participants in all 3 intervention groups, by contrast, viewed a savings-emphasis "choice architecture" screen in which the option to deposit their refund into a savings account was explicitly included in the top two options, the third option included direct deposit of the entire refund into a checking or other bank account, and a final option included receipt of a paper check (see Appendix A for screenshots of all experimental conditions).

In addition, participants in the three intervention groups were randomly assigned to receive 1) a message about emergency savings,[21,22,23,24] 2) a message about saving for one's future that included an optional interactive component encouraging participants to select specific future financial goals, or 3) a message about retirement savings that also included an optional interactive component

encouraging participants to select specific retirement savings goals (see Appendix A for exact messaging).

Results

We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study[25] (please also see supplemental materials).

Sample balance

Sample balance was assessed across the four experimental groups for the following participant demographic characteristics: age, 2014 gross income, filing status, number of dependents, health insurance status, military status, and refund amount. In addition, we assessed sample balance based on several additional variables that served as proxies for the financial characteristics and circumstances of participants. These included any income from the following sources: dividends or distributions, bank account interest, certain government payments (e.g., unemployment benefits), retirement plan distributions, and/or social security benefits. Additionally, sample balance was assessed for child, student loan, and/or higher education expense-related (i.e., American Opportunity and Lifetime Learning) tax credits, for mortgage interest, real estate tax, medical expenses, self-employed health insurance, and moving expenses deductions, and for tax filing date. All aggregate data bivariate tests for these covariates were statistically non-significant, indicating that randomization was effective and that the four groups did not differ in any systematic way regarding participant characteristics that might explain variation in savings outcomes.

Main results

The refund amount allocated to savings accounts served as our primary outcome of interest. Though a savings bond purchase was an option in all conditions, we excluded this as a dependent variable on a substantive basis. We are most interested in low- and moderate-income households having access to liquid financial assets in savings accounts to meet household needs. Furthermore, the overall rate of savings bond purchases was extremely low (< .1% in each condition); incorporating savings bond uptake into the outcome measure does not meaningfully influence results.

Participants in each of the three intervention groups were significantly more likely to deposit to savings accounts than were participants in the control group. For example, 13% of participants who received the emergency savings intervention allocated all or a portion of their refunds to a savings account compared to 8% of control group participants $\chi^2(1, n = 358{,}097) = 1600, p < .001$ (see Table 2 for full results).

Table 2. Treatment Effects (n = 646,116).

Outcome	Control	Emergency Savings	Interactive Goals	Interactive Retirement
Percent who saved	8.44%	13.34%***	12.60%***	12.40%***
Percent who saved entire refund	7.92%	12.54%***	11.83%***	11.63%***
Mean amount saved (SD)	$160.25 ($856.15)	$243.76*** ($1032.69)	$229.52*** ($1004.87)	$228.26*** ($1001.43)

Note: *** $p < .001$.

In addition, within treatment groups, participants who received the emergency savings intervention were significantly more likely to deposit to savings accounts than were participants who received the future savings interactive message $\chi^2(1, n = 364{,}815) = 30.14$, $p < .001$ and retirement savings interactive message, $\chi^2(1, n = 363{,}689) = 48.56$, $p < .001$. There was no statistically significant difference in the rate of depositing to savings when comparing the interactive future goal and interactive retirement goal messages $\chi^2(1, n = 323{,}153) = 2.85$, $p = .09$. In total, the treatment conditions led to an additional 20,916 tax filers depositing into savings vehicles.

Examining average amount saved reveals similar patterns. Participants in each intervention group deposited significantly more money to savings than did participants in the control group (see Table 2). For example, participants who received the interactive retirement intervention deposited an average of $68 more to savings accounts than control group participants $t(315{,}104) = 20.74$, Cohen's $d = 0.07$, $p < .001$. In total, the net increase in the refund saved due to treatments was $35,625,127.

Some statistically significant differences in savings deposits were observed between intervention groups as well. Participants who received the emergency savings intervention on average deposited $14 and $16 more to savings respectively than participants who received the interactive future goal $t(322{,}593) = 3.97$, Cohen's $d = 0.01$, $p < .001$ and interactive retirement $t(321{,}896) = 4.33$, Cohen's $d = 0.02$, $p < .001$ interventions. There was no statistically significant difference in average savings deposits when comparing the interactive future goal and interactive retirement goal messages $t(323{,}151) = 0.36$, $p = .72$.

Sub-group outcomes

Treatment effects for both savings deposit rates and average amount deposited to savings were very stable across differences in both filing status and age (see Table 3). For example, intervention group participants who filed as Single deposited $43 more to savings than their control group counterparts ($p < .001$), while intervention group participants who filed as Head of Household deposited $138 more to savings than their control group counterparts ($p < .001$). The higher net difference observed among Head of Household filers in the intervention group was due to a larger average refund ($n = 110{,}559$ $M_{Refund} = \$4{,}796.15$) compared to Single filers in the intervention group ($n = 323{,}679$ $M_{Refund} = \$860.08$).

Table 3. Treatment Effects by Subgroup

	Savings Rate		Amount Saved	
	Control %	Intervention %	Control Mean (SD)	Intervention Mean (SD)
Filing Status				
Single ($n = 431{,}879$)	8.26	12.93***	65.61 (338.85)	108.81 (448.65)***
Head of Household ($n = 147{,}646$)	7.47	9.88***	390.84 (1448.35)	529.08 (1670.77)***
Age				
15 to 24 ($n = 211{,}605$)	10.37	15.24***	81.19 (462.23)	119.13 (543.55)***
25 to 34 ($n = 180{,}352$)	6.52	11.41***	179.79 (930.89)	284.46 (1134.25)***
35 to 44 ($n = 90{,}747$)	6.90	9.67***	286.36 (1259.17)	402.80 (1481.16)***
45 to 54 ($n = 69{,}544$)	6.99	9.61***	226.31 (1055.81)	300.03 (1193.77)***
55 to 64 ($n = 57{,}833$)	6.79	9.83***	153.80 (809.61)	214.53 (931.48)***
65+ ($n = 36{,}035$)	6.77	9.78***	89.99 (500.67)	132.99 (622.13)***

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.

Discussion

Experiment 1 documents a significant and substantial effect of choice architecture and messaging on LMI consumers' real choices to allocate tax refund money to savings accounts. Although one particular message (emergency savings) appears somewhat more successful than the other messages, the most substantial effect was that all versions of the treatment (choice architecture + messaging) considerably increased savings allocations compared to the control condition. In Experiment 2, we attempt to isolate and compare the choice architecture and messaging components of the treatment manipulation to determine the effectiveness of each intervention.

Experiment 2: Choice Architecture vs. Messaging

Experiment 2 tested the Choice Architecture and Messaging manipulations separately in an online simulation, gauging the unique influence of each intervention.

Participants

Six-hundred participants were recruited from Amazon Mechanical Turk and received $0.50 for participating. For both Experiments 2 and 3, conducted online via Mechanical Turk, we analyzed data only from those participants who passed an instructional manipulation check designed to identify inattentive participants.[21,26] Recruitment sample size and the exclusion criterion were set *ex ante*. For Experiment 2, this procedure resulted in a total of 569 analyzed responses (M_{Age} = 34, 55% female, 45% male).

Procedure

All participants were asked to imagine they had just filed their federal income tax returns and expected to receive a $1,000 refund. In a 2 (Control, Choice Architecture) x 2 (No Message,

Figure 1: Experiment 2 amount saved based on choice architecture and messaging interventions. *Note:* * $p < .05$; *** $p < .001$.

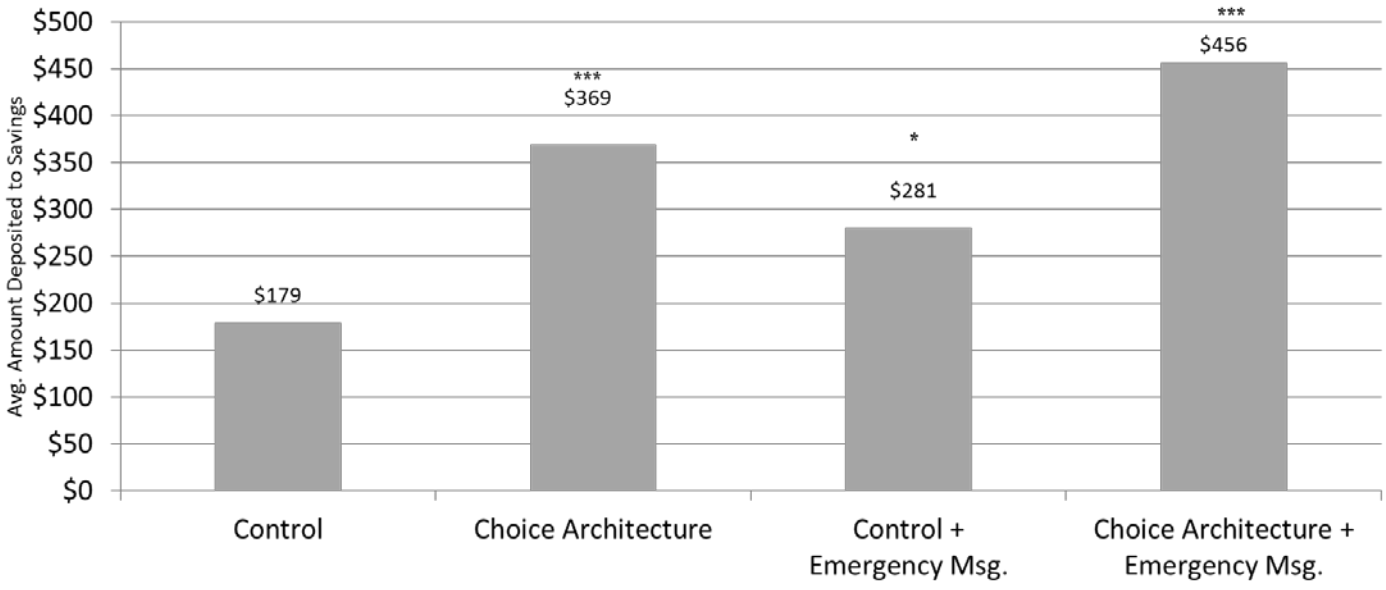

Table 4. Experiment 2 Savings Outcomes Based on Choice Architecture and Messaging Interventions

	Amount Saved (Mean)	Percent Who Saved	Percent Who Saved Entire Refund
Control (choice options), No Message	$178.57	18%	18%
Choice Architecture, No Message	$369.39***	41%***	31%*
Control (choice options), Emergency Savings Message	$280.64*	30%*	27%†
Choice Architecture, Emergency Savings Message	$456.07***	56%***	37%***

Note: †$p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$ compared to Control/No Message.

Emergency Savings Message) between subjects experimental design, participants were randomly assigned either to view refund allocation options like those from the Control condition or from the Choice Architecture conditions in the field experiment; participants also were randomly assigned to view either no additional savings messaging, or to view the Emergency Savings message from the field experiment (the emergency saving message was found to be the most effective message in Experiment 1). After making initial allocation decisions on the experimental screens (See Appendix B), subsequent screens guided participants through follow-up aspects of their choice including, for example, exactly how much money they wished to allocate to savings versus checking accounts.

Results

A 2 x 2 ANOVA predicting amount deposited to savings revealed a significant main effect of the choice architecture manipulation ($F(1, 565) = 24.72$, $p < .001$), a significant main effect of emergency savings messaging ($F(1, 565) = 6.57$, $p = .011$), and no interaction between the two manipulations, $p > 0.25$. A binary logistic regression predicting whether or not participants directed any refund to savings showed similar patterns: a significant main effect of the choice architecture manipulation, ($Exp(B) = 3.17$, $p < .001$), a significant main effect of emergency savings messaging ($Exp(B) = 1.93$, $p = .022$), and no interaction between the two manipulations, $p > 0.25$.

Discussion

Experiment 2 tested the messaging and choice architecture manipulations separately. Both manipulations from the field experiment increased savings intentions when tested individually, within a new context, and with a new sample.

Experiment 3: Effective Choice Architecture Components

The final experiment, Experiment 3, tests which elements of the Choice Architecture manipulation are essential to increase savings.

Participants

Six-hundred participants were recruited from Amazon Mechanical Turk and received $0.50 for participation. Following procedures from Experiment 2, we analyzed data only from those participants who passed an instructional manipulation check designed to identify inattentive participants, resulting in a total of 554 analyzed responses ($M_{Age} = 35$, 56% female, 44% male).

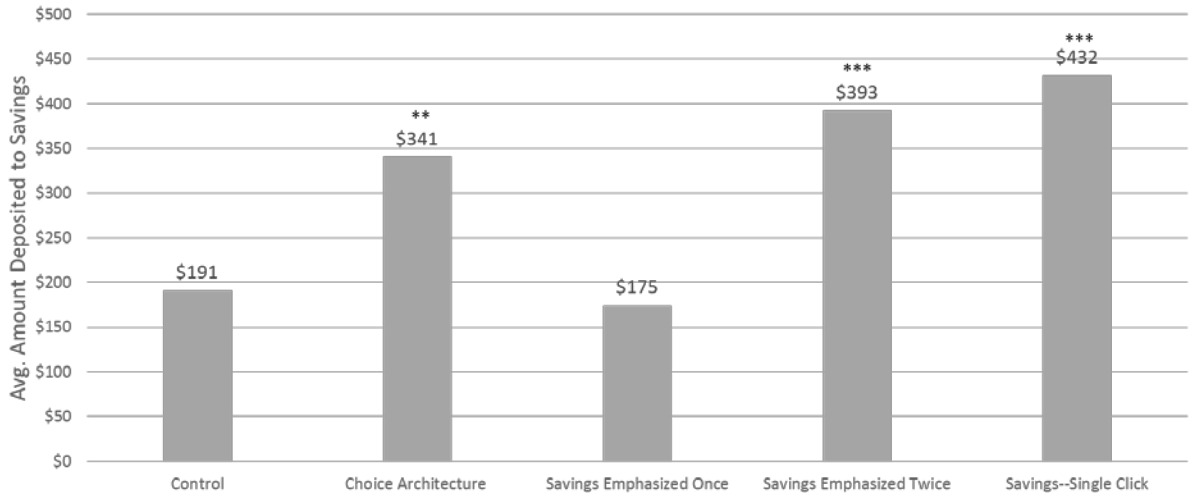

Figure 2: Experiment 3 amount saved based on Choice Architecture components. *Note:* **p* < .05; ***p* < .01; ****p* < .001, compared to Control.

Procedure

Participants imagined that they had just filed their federal income tax returns and expected to receive a $1,000 refund. Participants were randomly assigned to one of 5 experimental conditions that varied choice option descriptions. The first two conditions ("Control" and "Choice Architecture") replicated the two conditions from Experiment 2 without messaging, simulating the choice architecture intervention from Experiment 1.

The remaining three conditions separately tested the functional pieces of the choice architecture intervention. The choice architecture intervention was functionally different from the control condition in three main ways: 1) savings was explicitly emphasized within the choice options, tested in a "Savings Emphasized" condition, 2) savings explicitly was mentioned *twice* among the choice options, tested in a "Savings Emphasized Twice" condition, and 3) one option included a simple one-click single-decision option that allowed participants to make one click to allocate their entire refund into savings, tested in a "Savings--Single Click" condition. After making the initial allocation decision on the experimental screens (See Appendix C), subsequent screens guided participants through detailed aspects of their choice (e.g., exactly how much money they wished to allocate to savings versus checking).

Results

Replicating the pattern observed in Experiments 1 and 2, planned contrasts revealed that participants allocated significantly more money to savings accounts in the Choice Architecture condition compared to the Control condition ($M_{\text{Choice Architecture}}$ = $340.68, M_{Control} = $190.91 , $t(549)$ = 2.63, Cohen's d = .22, p = 0.009).

Participants did not, however, allocate more to savings in the Savings Emphasized condition ($M_{\text{SavingEmphasized}}$ = $174.75 compared to the Control condition p > .25, suggesting that merely emphasizing savings one time is not sufficient to influence refund allocations. Participants did allocate more to savings in both the Savings Emphasized Twice condition M = $392.73 $t(549)$ =

Table 5: Experiment 3 Savings Outcomes Based on Choice Architecture Components

	Amount Saved (Mean)	Percent Who Saved	Percent Who Saved Entire Refund
Control	$190.91	19%	19%
Choice Architecture	$340.68**	39%***	30%*
Savings Emphasized	$174.76	21%	14%
Savings Emphasized Twice	$392.73***	44%***	35%**
Savings--Single Click	$431.86***	54%***	34%**

Note: * $p < .05$; ** $p < .01$; *** $p < .001$, compared to Control.

3.45, Cohen's $d = 0.29$, $p < 0.001$; and Savings—Single Click condition M = $431.86, M = $392.73 $t(549) = 4.26$, Cohen's $d = 0.36$, $p < 0.001$ compared to the Control condition, suggesting that the heavy emphasis of savings and/or the increased ease of depositing to savings contribute to the Choice Architecture finding (see Figure 2 and Table 4).

We also analyzed categorical income information from participants' responses to final demographics questions. We find that the savings allocation patterns held for both LMI consumers (defined as having annual household incomes at or below $35,000) and non-LMI consumers. We conducted a binary logistic regression predicting whether or not participants deposited to savings, including categorical predictors for each experimental condition (except Control) and interaction terms combining each experimental condition and LMI status. Results mirrored the findings in Table 2 and further showed no interaction with LMI status: the coefficients for Choice Architecture ($p < 0.002$), Savings Emphasized three times ($p = 0.001$) and Savings-One Click ($p < 0.001$) were each statistically significant whereas Savings Emphasized was not ($p > 0.25$); none of the interaction terms with LMI status was significant (p's > 0.25).

Discussion

Experiment 3 tested individual components of the choice architecture manipulation, demonstrating that although heavily emphasizing saving or making saving a simple one-click decision both increased savings, simply making saving explicit among choice options via choice architecture was not sufficient to increase savings deposits. The result that merely making saving explicit among choice options does not increase savings ("Savings emphasized" condition), suggests that the patterns from Experiment 1 and 2 are not simply due to reminding consumers that allocating to a savings account is an option. In addition, there were no significant differences by income, suggesting that the choice architecture intervention may be effective across income groups.

General Discussion

Although previous research has struggled to find interventions that effectively increase savings among low-moderate income (LMI) consumers,[17] the current research documents a robust choice architecture and messaging intervention that results in substantially higher savings within this financially vulnerable group. Further, this intervention represents a program that could be implemented on a large scale because it is both low-touch and low-cost.

Experiment 1, a large-scale field experiment (N = 646,116) and part of the R2S initiative, documents a choice architecture and messaging intervention that increases real deposits to saving accounts during tax refund time by LMI consumers by approximately 50%. Experiment 2, an online follow-up experiment, experimentally separated the choice architecture and messaging components, finding that both appear to increase savings deposits. Experiment 3, a final follow-up experiment, tested individual features of the choice architecture intervention, finding that heavy emphasis of savings and making saving "frictionless" via choice architecture both increase allocations to savings accounts, however, explicitly mentioning savings once within choice options does not.

Although the present research identifies an effective intervention to increase savings deposits at tax refund time, some may question whether one-time savings deposits are a meaningful measure of "saving" or whether saving is even the most beneficial use of tax refunds. Some recent research[27] finds that low-income tax filers often use refunds to reduce high-interest unsecured debt—an important financial priority that we do not capture in the current investigation. Further, some additional research finds that when consumers allocate money to savings, they may be unwilling to subsequently use those funds to cover non-discretionary expenses,[28] potentially prompting the future adoption of expensive debt to make ends meet.[29] Nevertheless, when consumers do not have emergency savings, they may be more likely to use high-cost financial services such as payday loans in the future.[30] Further, there is some evidence to suggest that saving at tax time has lasting effects: in a previous iteration of R2S, households that chose to deposit into savings vehicles at tax time were less likely to report material hardships six months after filing their taxes than were households who did not deposit to savings at tax time (even after adjusting for observable differences between groups).[19] Future research exploring long-term financial and psychological health outcomes based on these and related interventions would help to direct development of interventions that yield the largest possible benefit to consumers' financial well-being. In sum, this research documents a robust choice architecture and messaging intervention that increases real savings accounts deposits among financially vulnerable consumers at tax time.

End Notes

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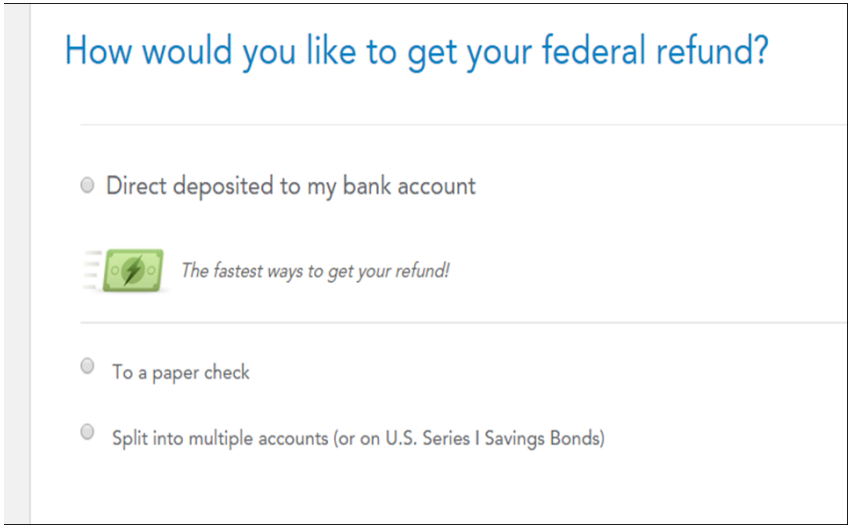
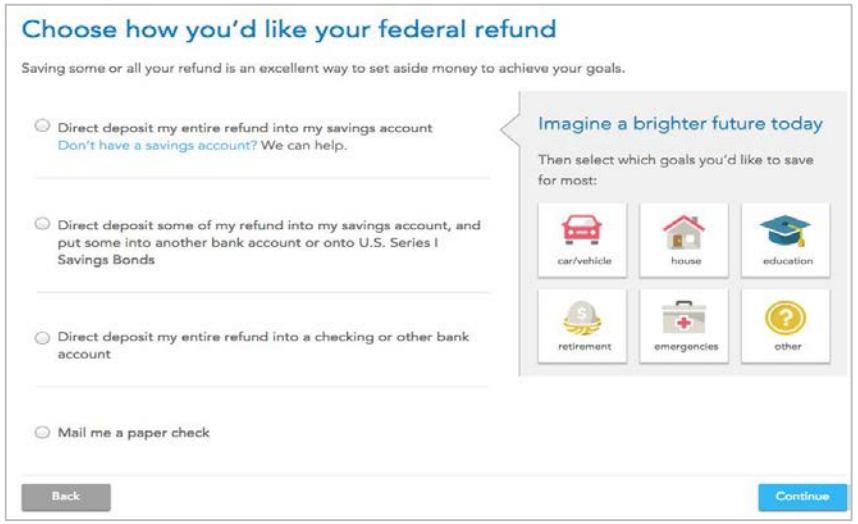
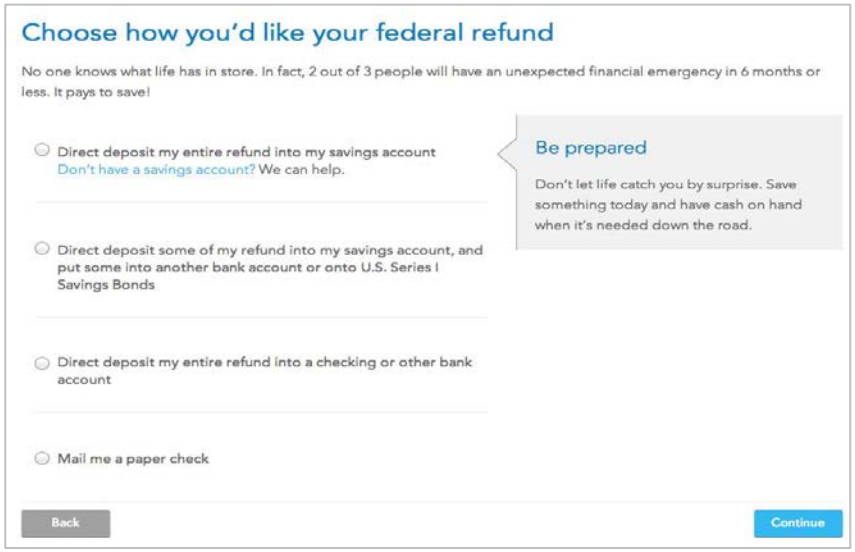
Appendix A Supplemental Figure A1. Materials*



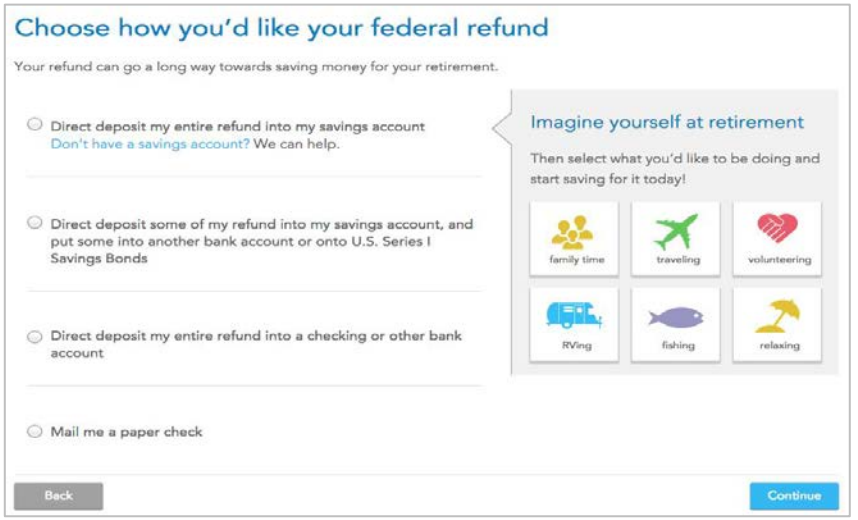
Control



Future Message + Interaction + Choice Architecture



Emergency Savings Message + Choice Architecture



Retirement Message + Interaction + Choice Architecture

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Appendix B
Experiment 2: Experiment Materials and Conditions

Messaging Manipulation

NO MESSAGE

(NONE)

EMERGENCY SAVINGS MESSAGE

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!

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.

Choice Architecture Manipulation

CONTROL

How would you like to get your federal refund?

- o Direct deposit to my bank account
- o Mail me a paper check
- o Split into multiple accounts

CHOICE ARCHITECTURE

How would you like to get your federal refund?

- o Direct deposit my entire refund into a savings account
- o Direct deposit some of my refund into a savings account, and put some into another bank account
- o Direct deposit my entire refund into a checking account
- o Mail me a paper check

Appendix C

Experiment 3: Experiment Materials and Conditions

CONTROL

How would you like to get your federal refund?

- o Direct deposit to my bank account
- o Mail me a paper check
- o Split into multiple accounts

CHOICE ARCHITECTURE

How would you like to get your federal refund?

- o Direct deposit my entire refund into a savings account
- o Direct deposit some of my refund into a savings account, and put some into another bank account
- o Direct deposit my entire refund into a checking account
- o Mail me a paper check

Savings Emphasized Once

How would you like to get your federal refund?

- o Direct deposit my entire refund or some of my refund into a savings account
- o Direct deposit my entire refund into a checking account
- o Mail me a paper check

Savings Emphasized Twice

How would you like to get your federal refund?

- o Direct deposit my entire refund into one or more savings accounts
- o Direct deposit some of my refund into a savings account, and put some into another bank account
- o Direct deposit my entire refund into a checking account
- o Mail me a paper check

Single-click Savings

How would you like to get your federal refund?

- o Direct deposit my entire refund into a savings account
- o Direct deposit my entire refund or some of my refund into a checking account
- o Mail me a paper check

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