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Temporal Reframing and Participation in a Savings Program: A Field Experiment

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Abstract. A growing number of American workers are now freelancers and thus, responsible for their own retirement savings, yet they face psychological hurdles that hamper them from saving enough money for the long term. Although prior theory-derived interventions have been successful in addressing some of these obstacles, encouraging participation in saving programs is a challenging endeavor for policy makers and consumers alike. In a field setting, we test whether framing savings in more or less granular formats (for example, saving daily versus monthly) can encourage continued saving behavior through increasing the take up of a recurring deposit program. Among thousands of new users of a financial technology app, we find that framing deposits in daily amounts as opposed to monthly amounts quadruples the number of consumers who enroll. Furthermore, framing deposits in more granular terms reduced the participation gap between lower- and higher-income consumers: three times as many consumers in the highest rather than lowest income bracket participated in the program when it was framed as a \$150 monthly deposit, but this difference in participation was eliminated when deposits were framed as \$5 per day.

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Keywords: choice architecture • behavioral economics • saving • field experiment • financial technology

1. Introduction

People often have difficulty saving money, and marketers face problems convincing them to do so, a challenge that exists regardless of whether goals and time horizons are short or long term. For example, consumers have trouble saving for long-term goals, like retirement (Benartzi and Thaler 2013) and college education (Madrian et al. 2017). However, people are also challenged by the prospect of saving for emergencies that may arise in the short term: in a recent government report, nearly one-half of adults said that they either could not handle an emergency expense of a few hundred dollars or would have to cover the emergency through selling something or borrowing money (Lusardi et al. 2011, Board of Governors of the Federal Reserve System 2016).

Prior behavioral economic interventions have been successful in addressing psychological obstacles that hamper people from choosing to save. Automatically enrolling eligible employees into employer-sponsored saving plans (i.e., defined contribution plans) results in a dramatically greater percentage of employees actively saving (Madrian and Shea 2001), although some plans still set default savings rates too low relative to

what would be more effective (Beshears et al. 2009). The Save More Tomorrow program, for example, directly addresses psychological obstacles to saving, such as myopia, inertia, and loss aversion (Thaler and Benartzi 2004), by introducing precommitment and automatic savings rate escalators that are synchronized with future salary increases. Such programs have helped millions of Americans be more actively prepared for retirement (Benartzi and Thaler 2013). In similar fashion, global policy efforts have been introduced to help increase participation in saving programs. In the United Kingdom, for example, the Pensions Act 2008 mandates that employers autoenroll certain employees into retirement savings plans (Parliament of the United Kingdom 2016). Similarly, in the United States, rulemaking at the federal level has outlined guidance and provided safe harbors that have ultimately facilitated state-level efforts to both overcome roadblocks and start to permit the benefits of autoenrollment to be expanded to nonemployer savings arrangements, namely individual retirement accounts (U.S. Department of Labor, Employee Benefits Security Administration 2016). Despite the success of these and similar programs, consumers and policy

makers still face major hurdles when it comes to encouraging participation in saving programs.

One of these hurdles, as typified in saving for retirement, is that existing solutions have largely focused on employees with access to a retirement savings plan (e.g., 401k plan). Furthermore, the solutions were designed for an era where employees were predominantly employed full time and tended to receive paychecks on a regular but relatively infrequent basis, such as biweekly or monthly. These traditional employment arrangements are increasingly obsolete, because more workers are part of the so-called gig economy, which consists of more self-employed, part-time, and on-demand workers. Indeed, the U.S. Government Accountability Office estimated that “contingent workers” (i.e., on-call, part-time, and self-employed workers) make up more than one-third of the total employment workforce (GAO 2015), and companies considered part of the on-demand economy (e.g., Uber, Lyft, and Amazon Mechanical Turk) comprise around 21 million workers internationally (De Stefano 2020). One assessment even suggests that alternative employment arrangements accounted for nearly 85% of employment growth between 2005 and 2013 (Friedman 2014). This distinction between traditional employment arrangements and alternative arrangements is important, because gig economy workers may be paid on more granular time intervals than traditional workers. For example, Uber drivers work when they want and get paid weekly (Cramer and Krueger 2016). Amazon Mechanical Turk workers may complete tasks, have them approved by different task requesters in minutes, request payment distributions, and have them paid daily (Paolacci and Chandler 2014).

Given this shift toward more granular payment structures, we test whether framing savings in more or less granular formats (e.g., saving daily vs. monthly) can encourage continued saving behavior through increasing the take up of a recurring deposit program. Because people may create separate mental accounts for small compared with large losses of money (Thaler 1985), our specific research objective is to test whether people are less sensitive to present-day losses (which will turn into future gains) when such losses are framed in a smaller, more granular format (e.g., \$5 a day) compared with a larger, less granular format (e.g., \$150 a month). We draw on three related literatures to generate this hypothesis.

First, financially equivalent sums of money can be presented in formats with different psychological associations. For example, when workers near retirement, they have the option to cash out their savings in a lump sum (e.g., \$100,000) or purchase an annuity and receive an equivalent amount spread out monthly for life (e.g., \$500 per month from age 68 onward). Yet, consumers are more sensitive to changes in wealth when income

is expressed in a monthly framing compared with a lump sum framing (Goda et al. 2014, Goldstein et al. 2016). This leads to an “illusion of wealth,” whereby lump sums seem more adequate than an equivalent monthly income at lower wealth levels (when consumers can adequately perceive just how *little* a monthly amount would afford), with a reversal of this pattern at higher levels of wealth (when consumers can adequately perceive just how *much* a monthly amount would afford). That is, at lower wealth levels, a lump sum may seem subjectively larger than its equivalent monthly amount, thus affording a perception of greater adequacy.

In this investigation, we examine whether this same psychological phenomenon can be used to help people regularly contribute to a savings account in a field setting with consequential outcomes. If consumers perceive that lump sums afford greater spending power than equivalent amounts framed in more granular ways, then it stands to reason that parting with such lump sums should be more psychologically painful than giving up an equivalent amount of money spread out over time in a smaller, more granular format (i.e., a “pennies-a-day” framing) (Gourville 1998). Concretely, when consumers enroll in some saving plans, they are given the opportunity to set up a recurring deposit and regularly contribute a given amount of money to their account. These contributions are often framed in terms of a monthly contribution (e.g., \$150 a month), likely reflecting traditional paycheck and banking norms where money is only transferred from one account to another on a monthly basis. However, these same monthly contributions could be instead represented by weekly (e.g., \$35 a week) or even daily (e.g., \$5 a day) amounts. Goldstein et al. (2016) found that a lump sum of \$100,000 felt subjectively larger than its equivalent annuity of \$500 per month. Likewise, larger monthly amounts of money (e.g., \$150) may be more psychologically painful to give up than equivalent smaller weekly (e.g., \$35) or daily (\$5) amounts of money. As a result, we predict that consumers will be more likely to enroll in a recurring deposit program when deposits are framed in a more granular way (i.e., when parting with the recurring deposit seems less psychologically painful) than when deposits are framed in a less granular way.

Second, in research from the pennies-a-day literature, temporally reframing the cost of a product into more granular amounts increased purchase intent in laboratory settings, in part because doing so reduced the perceived cost of the deal (Nagle and Holden 1995; Gourville 1998, 1999). This general preference for less aggregate framing over more aggregate framing extended from days to larger units, such as weeks and months (paying \$1 per day is preferred to paying \$365 per year), but this finding reverses with larger monetary

amounts (paying \$4,200 per year is preferred to paying \$11.50 per day) (Gourville 2003). Although much of the literature on temporal reframing has focused on cost perceptions in purchasing domains, we view these as relevant to saving decisions as well: when deciding whether to save or spend money now, one factor that consumers must consider is how painful it will be to give up (i.e., “pay”) a certain amount of money now for larger gains later. Indeed, people at least seem to think that such framing can be helpful in the savings domain: Colby and Chapman (2013), for example, found that consumers thought that they would be more likely to forgo small expenditures in order to put money toward a savings goal but only when such goals were framed in a more granular format. Notably, the literature to date has not investigated the effectiveness of such temporal framing in a field setting with consequential financial outcomes.

Third, a growing body of research has suggested that one barrier to future-oriented behavior is the tension that consumers feel between what they may want to do in the present and what they think that they should do for the future (Bazerman et al. 1998). In an effort to help consumers with such intertemporal dilemmas, researchers have attempted to enhance the sense of emotional connection that is felt between current and future selves: when the future self is made to feel emotionally closer to the current self, consumers are more likely to delay financial rewards (Bartels and Urminsky 2011) and increase their retirement contributions (Bryan and Hershfield 2012). However, increasing this sense of connection between selves can be costly and difficult to execute. As a result, another type of intervention may be effective: rather than trying to directly influence the relationship between current and future selves, it may be useful to frame the sacrifices made by the current self as less onerous in nature (Hershfield 2018). Along these lines, framing savings contributions in less “painful” ways (i.e., in more temporally granular ways) may increase the likelihood that a consumer would be willing to make a present-day sacrifice for future gains.

Given the importance of investigating whether these effects extend to real-world settings and the growing interest from policy makers in encouraging participation in saving programs, we set out to conduct a field study with a financial technology company (Acorns) that provides a mobile phone app allowing people to save and invest in small (e.g., spare change) and large amounts (e.g., thousands of dollars). In the course of our research, new users were given the opportunity to set up a recurring deposit program in an effort to get them to save regularly. Critically, when users were invited to join the recurring deposit program, they were offered deposits in terms of daily, weekly, or monthly amounts. Drawing

on the various literature streams reviewed above, we hypothesized that users would be more likely to enroll in the recurring deposits program when deposits were framed as more granular and less psychologically painful. That is, the probability of enrolling will be greater for daily over weekly over monthly framing of the same total amounts.

2. Method

Participants in the field study were new users to the Acorns app. We aimed to have approximately 2,000 users in each of five conditions or run the sign-up period of the field study for approximately 4 weeks, whichever came first. The sign-up period ran from January 4 to January 31, 2017, and we concluded with 8,931 total participants.

2.1. Sample Characteristics

The average age of participants was 32.81 years old (standard deviation = 10.19 years old). In terms of household income, 25.4% had less than \$25,000 a year, 37.8% had between \$25,000 and \$49,999, 29.5% had between \$50,000 and \$99,999, 6.9% had between \$100,000 and \$249,999, and 0.6% had above \$250,000. Users were not required to report their sex, and only 1,737 or 19% of the sample did; of those, 551 were women, and 1,186 were men.

To sign up for an Acorns account, a user has to download the Acorns app to his or her smartphone. From there, users must provide an email address for logging in, affirm they are a U.S. resident who is 18 years of age or older, agree to an Acorns program agreement, connect a bank account using their bank credentials, and provide some personal information (e.g., name, home address, phone number, and Social Security identification) to open an investment account. Users are also asked to furnish information about their income, net worth, and investment goals to help Acorns recommend a predesigned investment portfolio, which reflects a mix of exchange traded funds (often representing an asset class or index, like the Standard and Poor’s 500) in one of five configurations: conservative, moderately conservative, moderate, moderately aggressive, or aggressive. Fees for an Acorns account are \$1 per month for an account less than \$5,000 and 0.25% per year for an account greater than or equal to \$5,000.

2.2. Procedure

After signing up for an account with Acorns, users were asked if they wanted to make an initial one-time deposit to their accounts, and they were presented with five options for that initial deposit (one of which was a free response, and the other four options were based on the user’s income level) (Table A.1 in the online appendix has a full set of options). If a given

user decided to make an initial deposit,¹ he or she was then randomly assigned to receive one of five different treatments, which asked whether he or she would like to set up a recurring deposit that varied the dollar amount and temporal frame. (We discuss implications of this design in Section 4.) This message represents the central component of the field study that we conducted. Because randomization was conducted using a truly random allocation procedure, the number of users who were assigned to each condition was not equal across conditions. In three of the conditions, users would deposit a total of approximately \$150 a month, but deposits were framed in daily, weekly, or monthly amounts: (1) \$5 a day (1,772 users), (2) \$35 a week (1,826 users), or (3) \$150 a month (1,744 users); in two additional conditions, users would deposit a total of approximately \$30 a month framed in weekly or monthly amounts: (4) \$7 a week (1,817 users) or (5) \$30 a month (1,772 users).² To check the validity of the random assignment, we compared the distribution of those variables that were reported by all participants and found that random assignment was in fact valid, because there were no differences across condition in terms of age ($F(4, 8,926) = 0.95, p = 0.43$), initial deposit³ ($F(4, 8,910) = 0.93, p = 0.44$), or the categorical income variable ($\chi^2(16, n = 8,931) = 15.26, p = 0.51$). Table 1 has descriptive statistics by condition.

Users could elect to either enroll in the recurring deposit program or do so at a later time. Note that, when users elect to participate in the recurring deposit program, money is pulled on a daily, weekly, or monthly basis based on their assigned condition, provided that any weekend day pulls are postponed until the following Monday.

After users had made their decision regarding recurring deposits, they were free to use the app as they wished. Figure 1 has a flowchart of the sign-up process, including the critical recurring deposit intervention. After this initial sign-up, we continued to monitor users for three months at approximately 5-, 7-, 8-, 10-, and 12-week intervals, during which we were able to assess whether users had left the recurring deposit feature on or turned it off (allowing us to assess retention as a function of condition). During this period of time, we also monitored total account balance.⁴

3. Results

Our interest in conducting this field study concerned whether framing monetary contributions in a more granular manner would increase participation in a recurring deposit program. Thus, we treated the first three conditions (\$5 a day, \$35 a week, and \$150 a month) as our primary conditions of interest and the last two conditions (\$7 a week and \$30 a month) as a robustness check that was conducted simultaneously. Below, we separately report analyses for these two groupings of conditions.

Because of a nondisclosure agreement, the full data set for this project cannot be posted. Files can be obtained from the authors directly on request, and full analysis code and output can be found at OSF.IO/BSGHX.

3.1. \$5 per Day, \$35 per Week, and \$150 per Month Conditions

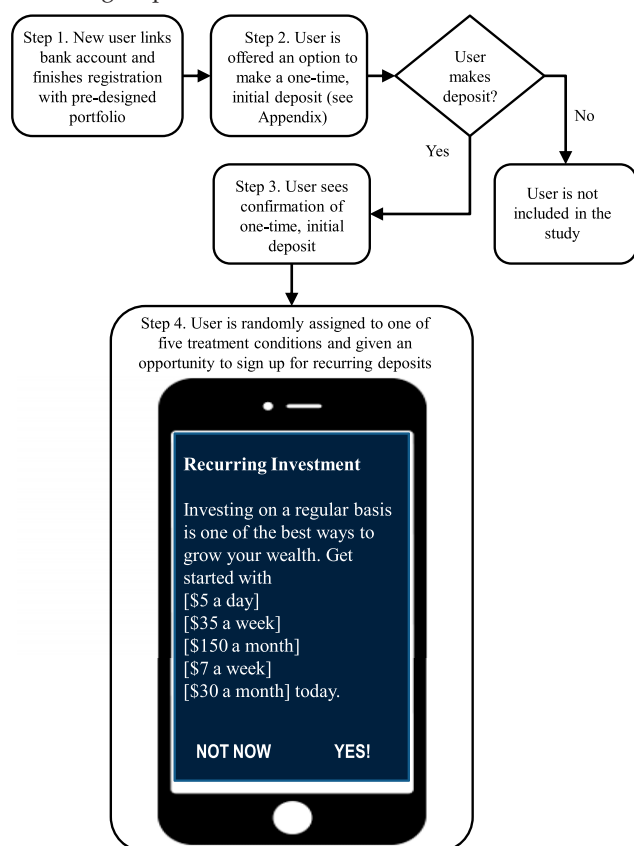
3.1.1. Sign-Ups. To examine whether sign-up rates for the recurring deposit program differed as a function of condition, we conducted a logistic regression

Table 1. Summary of Conditions, Descriptive Statistics, and Sign-Up Rate

Condition	\$150/Month conditions ($n = 5,342$)			\$30/Month conditions ($n = 3,589$)	
	\$5/Day ($n = 1,772$)	\$35/Week ($n = 1,826$)	\$150/Month ($n = 1,744$)	\$7/Week ($n = 1,817$)	\$30/Month ($n = 1,772$)
Mean age	32.84 (10.41)	32.70 (10.47)	32.80 (10.23)	32.30 (9.69)	32.86 (10.16)
<\$25,000, %	25.2 ($n = 446$)	25.4 ($n = 463$)	26.4 ($n = 460$)	25.9 ($n = 470$)	23.8 ($n = 422$)
\$25,000–\$49,999, %	37.9 ($n = 672$)	38.4 ($n = 702$)	37.8 ($n = 659$)	37.0 ($n = 672$)	38.5 ($n = 683$)
\$50,000–\$99,999, %	29.9 ($n = 529$)	28.5 ($n = 521$)	29.0 ($n = 506$)	29.6 ($n = 537$)	30.5 ($n = 541$)
\$100,000–\$249,999, %	6.9 ($n = 122$)	7.2 ($n = 132$)	6.5 ($n = 114$)	7.0 ($n = 127$)	6.9 ($n = 122$)
\$250,000+, %	0.2 ($n = 3$)	0.4 ($n = 8$)	0.3 ($n = 5$)	0.6 ($n = 11$)	0.2 ($n = 4$)
Sign-up rate	29.9	10.3	7.1	39.9	21.8

Notes. Standard deviation of age is listed in parentheses. Percentages of condition at each income bracket may not total 100% because of rounding.

Figure 1. (Color online) Acorns Sign-Up Process and Recurring Deposit Intervention



analysis with dummy-coded condition variables. The omnibus effect of condition was significant: Wald $\chi^2(2) = 361.07$, $p < 0.001$. In line with our hypothesis, the more granular the framing, the more users signed up, with 29.9% signing up under the daily framing, 10.3% signing up under the weekly framing, and 7.1% signing up under the monthly framing. Follow-up contrast tests indicated that significantly more users signed up under daily framing compared with weekly framing ($B = 1.31$, Wald $\chi^2(1) = 199.13$, $p < 0.001$) and that significantly more users signed up under daily framing compared with monthly framing ($B = 1.72$, Wald $\chi^2(1) = 258.71$, $p < 0.001$). Finally, more users signed up under weekly framing compared with monthly framing ($B = 0.41$, Wald $\chi^2(1) = 11.23$, $p < 0.001$) (Model 1 of Table 2). The omnibus effect of condition remained significant when we controlled for income and age (Wald $\chi^2(2) = 362.19$, $p < 0.001$), and all contrast tests also remained significant ($B > 0.40$, $p < 0.001$) (Model 2 of Table 2).

3.1.2. Retention. We examined retention over three separate time points: approximately one month after registration, two months after registration, and three months after registration (Figure 2 has a graphical depiction of results, and Table A.2 in the online appendix has full logistic regression results).

3.1.2.1. Retention at One Month. To examine whether retention differed as a function of condition at one month, we conducted a logistic regression analysis with retention as the dependent variable (1 = still enrolled in recurring deposits; 0 = no longer enrolled in recurring deposits) and condition as a dummy-coded variable. The omnibus effect of condition was significant: Wald $\chi^2(2) = 12.46$, $p < 0.001$. Fewer people remaining enrolled after one month in the daily framing (75%) than in the weekly framing (85%) or monthly framing (86%) conditions. Follow-up contrast tests indicated that significantly more users remained in the weekly framing than the daily framing ($B = 0.63$, Wald $\chi^2(1) = 7.66$, $p < 0.01$) and that more users remained in the monthly framing than the daily framing ($B = 0.73$, Wald $\chi^2(1) = 6.77$, $p < 0.01$), but there was no difference in retention rates after one month between the weekly and monthly conditions ($B = -0.10$, Wald $\chi^2(1) = 0.09$, $p = 0.77$) (Model 1 of Table A.2 in the online appendix). The omnibus effect of condition remained significant when we controlled for income and age (Wald $\chi^2(2) = 8.39$, $p = 0.02$), and the significant contrast tests also remained significant ($B > 0.53$, $p < 0.05$) (Model 2 of Table A.2 in the online appendix). Importantly, we note that, even despite lower retention rates in the daily versus weekly and monthly conditions after one month, overall participation in the program was still higher in the daily condition (22%) compared with the weekly (9%) and monthly (6%) conditions ($\chi^2(2, n = 5,342) = 249.52$, $p < 0.001$).

3.1.2.2. Retention at Two Months. To assess retention from one to two months, we again conducted a logistic regression and found no difference in retention between conditions (Wald $\chi^2(2) = 1.04$, $p = 0.54$), with roughly the same percentage of users remaining enrolled in the recurring deposit program from one to two months (daily framing: 89%; weekly framing: 89%; monthly framing: 93%) (Model 3 of Table A.2 in the online appendix). Results held when we controlled for income and age (Wald $\chi^2(2) = 1.05$, $p = 0.59$) (Model 4 of Table A.2 in the online appendix).

3.1.2.3. Retention at Three Months. Finally, we conducted a logistic regression assessing retention from two to three months. Again, there were no differences in retention between conditions (Wald $\chi^2(2) = 3.31$, $p = 0.19$), with roughly the same percentage of users remaining enrolled in the recurring deposit program from two to three months (daily framing: 94%; weekly framing: 92%; monthly framing: 90%) (Model 5 of Table A.2 in the online appendix). Results held when we controlled for income and age (Wald $\chi^2(2) = 4.29$, $p = 0.12$) (Model 6 of Table A.2 in the online appendix).

In short, although retention rates differed as a function of condition after one month, for the remainder of

Table 2. Logistic Regression Predicting Sign-Up Decision: \$5 per Day, \$35 per Week, and \$150 per Month Conditions ($N = 5,342$)

							95% CI for Exp(B)	
	<i>B</i>	SE	Wald	Df	Sig.	Exp(B)	Lower	Upper
Model 1								
Condition			361.067	2	0.000			
\$5/Day vs. \$150/month	1.716	0.107	258.714	1	0.000	5.560	4.511	6.853
\$5/Day vs. \$35/week	1.310	0.093	199.130	1	0.000	3.708	3.091	4.448
\$35/Week vs. \$150/month	0.405	0.121	11.232	1	0.001	1.499	1.183	1.900
Constant	−2.570	0.093	760.716	1	0.000	0.077		
Model 2								
Condition			362.185	2	0.000			
\$5/Day vs. \$150/month	1.720	0.107	259.236	1	0.000	5.584	4.529	6.884
\$5/Day vs. \$35/week	1.318	0.093	200.498	1	0.000	3.736	3.113	4.484
\$35/Week vs. \$150/month	0.402	0.121	11.023	1	0.001	1.494	1.179	1.894
Age	0.002	0.004	0.358	1	0.549	1.002	0.994	1.010
Income			12.036	3	0.007			
Constant	−2.214	0.227	95.095	1	0.000	0.109		

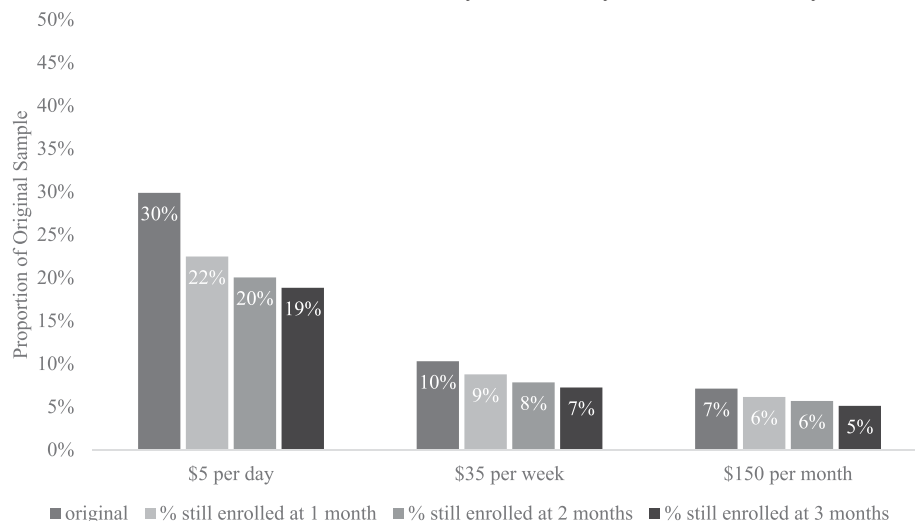
Notes. Income is coded on a categorical scale in which 1 = less than \$25,000, 2 = \$25,000–\$49,999, 3 = \$50,000–\$99,999, and 4 = \$100,000+; original logistic regression models specified contrasts between daily and monthly conditions and between weekly and monthly conditions. An additional logistic regression model was conducted to specify the daily vs. weekly contrast. 95% CI, 95% confidence interval; *Exp(B)*, exponentiated *B*; *SE*, standard error; *Df*, degrees of freedom; *Sig.*, significance.

the longitudinal study, they remained consistent across conditions.

3.1.3. Income. We had hypothesized that one reason why a more granular framing would be effective for encouraging enrollment was because giving up small amounts of money on a daily basis might seem less psychologically painful and more feasible than giving up a large amount of money on a monthly (or weekly) basis. The field study context of this study, however, did not allow us to directly investigate perceptions of psychological pain. Nonetheless, if larger, less granular amounts seem more psychological painful

and less feasible, then framing recurring deposits in such terms (i.e., in weekly or monthly amounts) should be primarily appealing to users who have greater financial resources: namely, users who have higher incomes. Thus, we examined whether there were any differences in the decision to enroll in the recurring deposit program as a function of both condition and household income. Figure 3 has a graphical depiction of results, and Table A.3 in the online appendix has full regression table results.

To do so, we conducted a factorial logistic regression with condition and income bracket as dummy-coded categorical between-subjects factors, decision to enroll

Figure 2. Retention at One, Two, and Three Months: \$5 Daily, \$35 Weekly, and \$150 Monthly Conditions

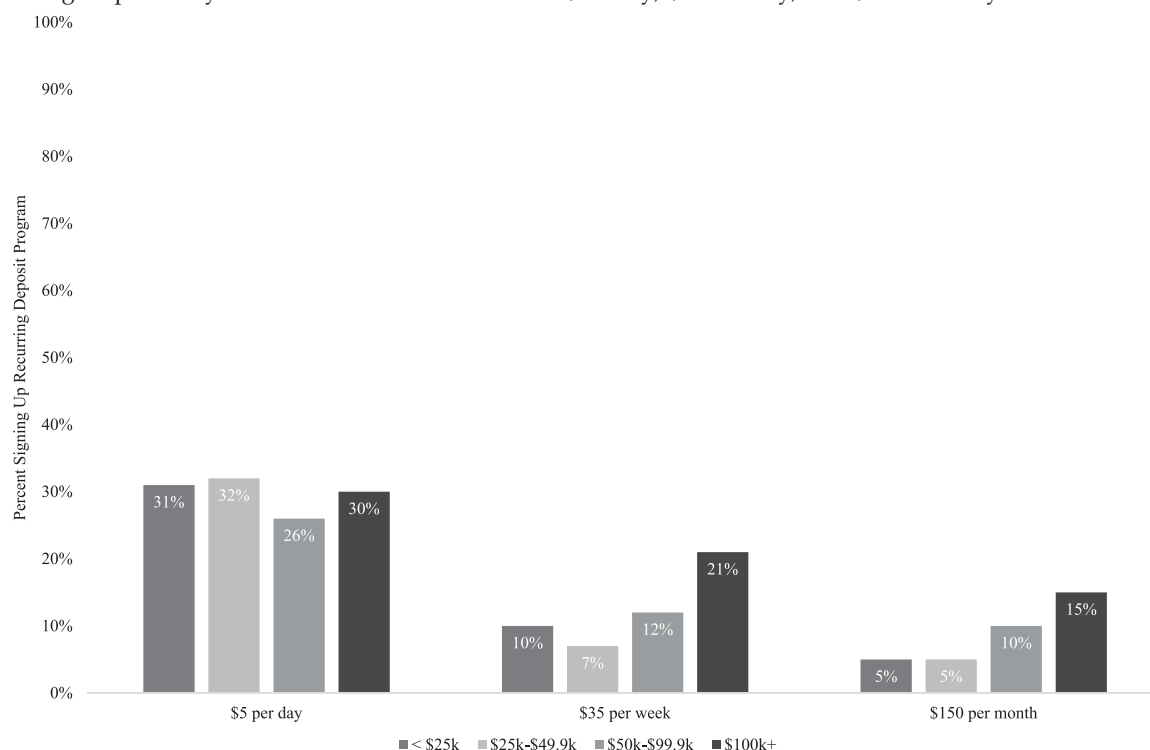
as the dependent variable, and contrasts capturing differences in sign-ups for pairs of income brackets and pairs of conditions. Household income was bracketed in five bins (1 = less than \$25,000; 2 = \$25,000–\$49,999; 3 = \$50,000–\$99,999; 4 = \$100,000–\$250,000; 5 = more than \$250,000). Because there were so few consumers in the highest income bracket (i.e., \$250,000+; $n = 16$), we combined this income bracket with the next highest one (i.e., \$100,000–\$249,999) for this analysis. Doing so, we obtained an overall interaction between condition and income: Wald $\chi^2(6) = 33.09$, $p < 0.001$. Before offering a detailed reporting of this interaction below, we first wish to highlight the main takeaway that arises from this interaction. As shown in Figure 3, consumers in lower income brackets were less likely to sign up for the automatic savings program when it was framed in a less granular way (i.e., as \$150 per month or \$35 per week). However, when the automatic savings program was framed in the most granular form—that is, as \$5 per day—then there were no differences in sign-up rates across income brackets.

Follow-up interaction tests indicated that there was a difference between sign-ups for the daily versus monthly conditions when comparing the <\$25,000 income bracket with the \$100,000+ income bracket ($B = -1.27$, Wald $\chi^2(1) = 10.00$, $p < 0.01$). As shown in the rightmost part of Figure 3, under the \$150 per month condition, three times as many consumers in the highest rather than lowest income bracket participated in the program when it was framed as a

\$150 monthly deposit ($B = 1.21$, Wald $\chi^2(1) = 13.27$, $p < 0.001$), but this difference in participation was eliminated when deposits were framed as \$5 per day (the leftmost part of Figure 3) ($B = 0.05$, Wald $\chi^2(1) = 0.05$, $p = 0.82$). Likewise, there was a difference in sign-ups for the daily versus monthly conditions when comparing the \$25,000–\$49,999 income bracket with the \$100,000+ income bracket ($B = -1.23$, Wald $\chi^2(1) = 10.72$, $p < 0.001$). Again, approximately three times as many consumers in the \$100,000+ rather than the \$25,000–\$49,999 income bracket participated in the program when it was framed as a \$150 monthly deposit ($B = 1.14$, Wald $\chi^2(1) = 13.67$, $p < 0.001$), but this difference in participation was eliminated when deposits were framed as \$5 per day ($B = 0.09$, Wald $\chi^2(1) = 0.17$, $p = 0.68$). There was not, however, a difference in sign-ups between daily and monthly conditions when comparing the two top income brackets with each other ($B = -0.32$, Wald $\chi^2(1) = 0.75$, $p = 0.39$).

Similar interactions arose when comparing daily with weekly conditions. Namely, there was a difference between sign-ups for the daily versus weekly conditions when comparing the <\$25,000 income bracket with the \$100,000+ income bracket ($B = -0.93$, Wald $\chi^2(1) = 7.40$, $p < 0.01$): approximately two times as many consumers in the highest rather than lowest income bracket participated in the program when it was framed as a \$35 weekly deposit ($B = 0.88$, Wald $\chi^2(1) = 11.39$, $p < 0.001$), but as noted earlier, this

Figure 3. Sign-Up Rate by Condition and Income Bracket: \$5 Daily, \$35 Weekly, and \$150 Monthly Conditions



difference in participation was eliminated when deposits were framed as \$5 per day ($B = 0.05$, Wald $\chi^2(1) = 0.05$, $p = 0.82$). Likewise, there was a difference in sign-ups for the daily versus weekly conditions when comparing the \$25,000–\$49,999 income bracket with the \$100,000+ income bracket ($B = -1.26$, Wald $\chi^2(1) = 14.51$, $p < 0.001$). Here, approximately three times as many consumers in the \$100,000+ rather than the \$25,000–\$49,999 income bracket participated in the program when it was framed as a \$35 weekly deposit ($B = 1.18$, Wald $\chi^2(1) = 21.49$, $p < 0.001$), but this difference in participation was eliminated when deposits were framed as \$5 per day ($B = 0.09$, Wald $\chi^2(1) = 0.17$, $p = 0.68$). There was not a difference in sign-ups between daily and weekly conditions when comparing the two top income brackets with each other ($B = -0.45$, Wald $\chi^2(1) = 1.82$, $p = 0.18$).

No differences emerged for the weekly versus monthly conditions when comparing the lower income brackets with the highest income bracket ($B < 0.33$, $p > 0.43$).

Framing deposits in the most granular terms (i.e., in terms of daily amounts) seems to reduce the participation gap between lower- and higher-income individuals in this recurring deposit program.

3.2. \$7 per Week and \$30 per Month Conditions

3.2.1. Sign-Ups. We again conducted a logistic regression analysis with a dummy-coded independent variable representing condition. In line with our hypothesis, more people signed up under the weekly framing (39.9%) than the monthly framing (21.8%; $B = 0.87$, Wald $\chi^2(1) = 133.86$, $p < 0.001$). Results held when we controlled for income and age ($B = 0.91$, Wald $\chi^2(1) = 141.79$, $p < 0.001$). (Table 3 has full logistic regression results.)

3.2.2. Retention. As in the analyses for the \$150 conditions, to examine whether retention differed as a function of condition, we conducted a logistic regression analysis with retention as the dependent variable (1 = still enrolled in recurring deposits; 0 = no longer enrolled in recurring deposits) and condition as a dummy-coded independent variable at one, two, and three months into the program. Figure 4 has a graphical depiction of results, and Table A.4 in the online appendix has full logistic regression results.

3.2.2.1. Retention at One Month. Of the participants who signed up for recurring deposits on registration, retention rates at one month did not differ as a function of condition ($B = 0.17$, Wald $\chi^2(1) = 0.79$, $p = 0.37$), with roughly the same proportion of people remaining enrolled after one month in the weekly framing (87%) and the monthly framing (89%) conditions. Results held when we controlled for income and age ($B = 0.10$, Wald $\chi^2(1) = 0.24$, $p = 0.62$).

3.2.2.2. Retention at Two Months. A similar pattern was obtained for retention from one to two months ($B = 0.03$, Wald $\chi^2(1) = 0.01$, $p = 0.91$), with 94% being retained in both conditions. Results held when we controlled for income and age ($B = -0.02$, Wald $\chi^2(1) = 0.003$, $p = 0.95$).

3.2.2.3. Retention at Three Months. Finally, a similar pattern was obtained for retention from two to three months, with 94% being retained in the monthly condition and 95% being retained in the weekly condition ($B = -0.29$, Wald $\chi^2(1) = 0.90$, $p = 0.34$). Results held when we controlled for income and age ($B = -0.33$, Wald $\chi^2(1) = 1.20$, $p = 0.27$).

3.2.3. Income. As in the \$150 conditions, we examined whether there were any differences in the decision to enroll in the recurring deposit program as a function of condition and income bracket. Figure 5 has a graphical depiction of these results, and Table A.5 in the online appendix has full regression table results. Although there was an overall significant interaction between condition and income bracket (Wald $\chi^2(3) = 10.49$, $p = 0.02$), follow-up tests indicated that no significant interactions emerged for the weekly versus monthly conditions when comparing the lower income brackets with the highest income bracket ($B < 0.28$, $p > 0.27$), results that were also found when comparing weekly with monthly framings in the \$150 per month conditions. The significant overall interaction arises from an unpredicted (and theoretically less interesting) comparison: there was a difference in sign-ups for the weekly versus monthly conditions when comparing the \$25,000–\$49,999 income bracket with the \$50,000–\$99,999 income bracket ($B = -0.59$, Wald $\chi^2(1) = 10.43$, $p < 0.001$). Here, almost two times more consumers in the \$50,000–\$99,999 income bracket compared with the \$25,000–\$49,999 income bracket participated in the program when it was framed as a \$30 monthly deposit ($B = 0.80$, Wald $\chi^2(1) = 33.19$, $p < 0.001$), but there was only a trend-level difference between these income brackets within the \$7 weekly deposit condition ($B = 0.21$, Wald $\chi^2(1) = 3.23$, $p = 0.07$).

4. General Discussion

The fields of marketing and behavioral economics have implemented a variety of solutions to help consumers overcome the many obstacles that they face in pursuit of saving for the long term. We add to this growing literature by examining the effectiveness of an intervention meant to encourage the take up of a recurring deposit program. Namely, we asked new users of a financial tech app whether they wished to sign up for a recurring deposit program, but we framed those recurring deposits in more or less granular terms. In a departure from the existing literature on temporal

Table 3. Logistic Regression Predicting Sign-Up Decision: \$7 per Week and \$30 per Month Conditions ($N = 3,589$)

							95% CI for Exp(B)	
	B	SE	Wald	Df	Sig.	Exp(B)	Lower	Upper
Model 1								
\$7/Week vs. \$30/month	0.866	0.075	133.861	1	0.000	2.378	2.054	2.754
Constant	−1.278	0.058	493.378	1	0.000	0.278		
Model 2								
\$7/Week vs. \$30/month	0.911	0.076	141.867	1	0.000	2.487	2.141	2.889
Age	0.012	0.004	9.035	1	0.003	1.012	1.004	1.020
Income			72.87	3	0.000	1.477	1.350	1.615
Constant	−2.590	0.152	288.816	1	0.000	0.075		

Notes. Income is coded on a categorical scale in which 1 = less than \$25,000, 2 = \$25,000–\$49,999, 3 = \$50,000–\$99,999, and 4 = \$100,000+. 95% CI, 95% confidence interval; $Exp(B)$, exponentiated B ; SE , standard error; Df , degrees of freedom; Sig., significance.

framing of financial outcomes, here we examined consequential decisions in a field setting. In what follows, we first review how enrollment behavior and retention differ as a function of temporal framing. We then discuss whether reframing a recurring deposit saving program in more granular terms may seem psychologically less painful before closing with a discussion of limitations and future directions.

4.1. Enrollment Behavior

In the three central conditions, we found that take up was approximately four times higher when deposits were framed in daily terms (i.e., \$5 per day) compared with monthly terms (i.e., \$150 per month) and approximately three times higher compared with a weekly framing (i.e., \$35 per week). Furthermore, take up of the recurring deposit program was almost 1.5 times higher when framed in weekly versus monthly terms. We had a consistent basic finding that

more granular framing led to higher take up with two additional robustness check conditions that framed deposits in lower overall amounts: take up was approximately twice as high when deposits were framed as \$7 per week compared with \$30 per month. Taken together, temporally reframing a recurring deposit in a more granular manner led to increased take up of the program.

It is important to acknowledge that the users who were randomly assigned to the different temporal framing conditions were users who had already decided to make an initial deposit with Acorns. As a result, the overall baseline participation rates in this study may be inflated relative to what we might observe from a sample of users who had not decided to make an initial deposit. We have no reason to suspect, however, that differences between conditions would be different if we were to have offered the recurring deposit saving program to all users regardless of whether they

Figure 4. Retention at One, Two, and Three Months: \$7 Weekly and \$30 Monthly Conditions

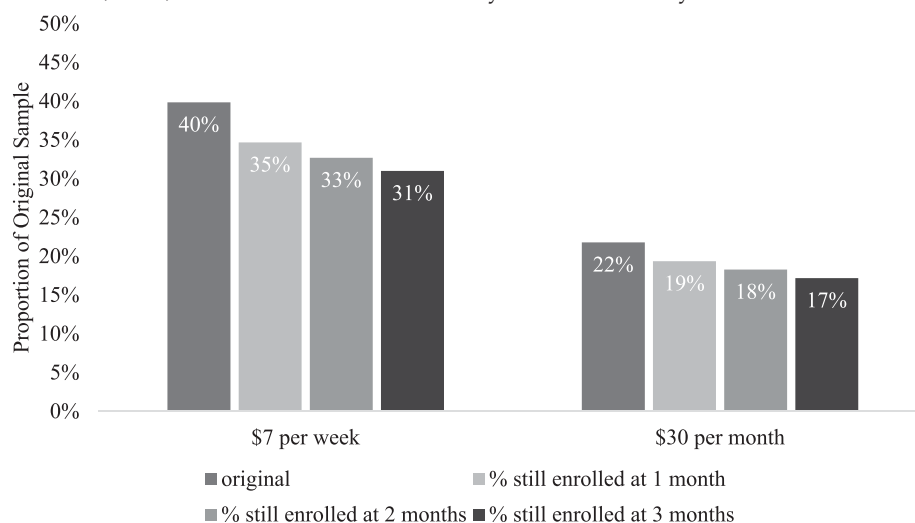
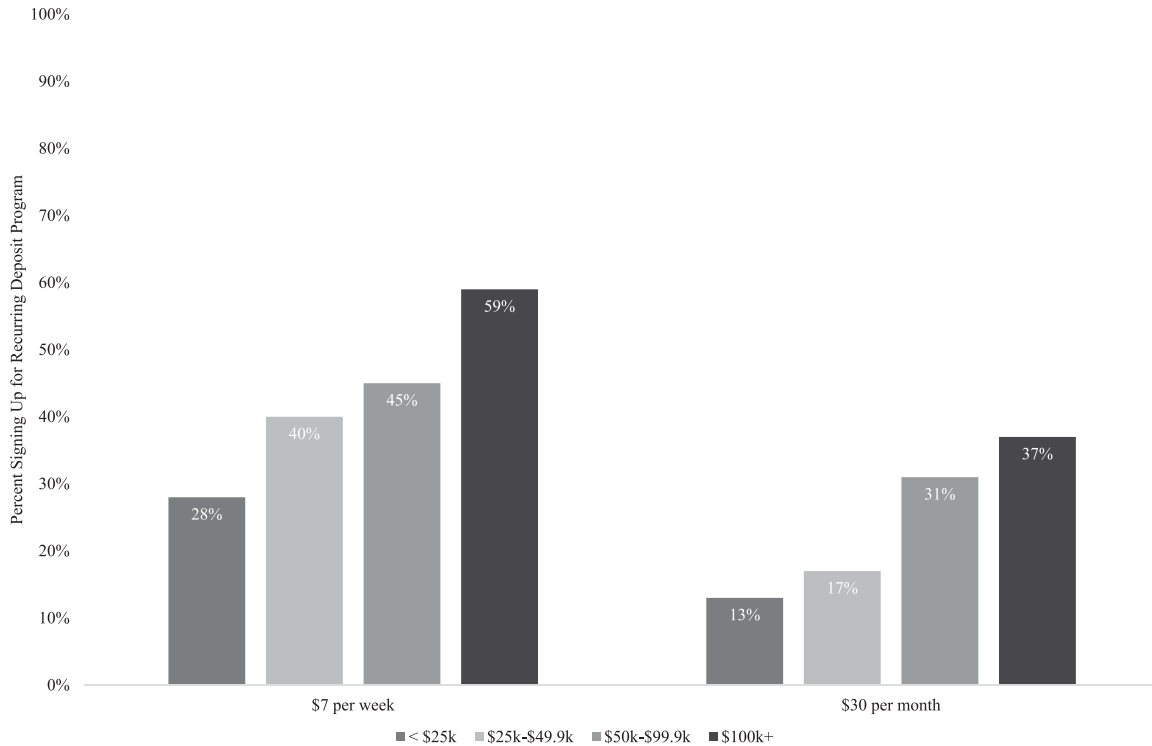


Figure 5. Sign-Up Rate by Condition and Income Bracket: \$7 Weekly and \$30 Monthly Conditions

made an initial deposit. Just the same, future research should implement an experimental design in which all users are offered a recurring deposit program.

4.2. Retention

Because of the longitudinal nature of this study, we were also able to investigate the extent to which the initial framing of recurring deposits prompted continued enrollment in the program. Results indicated that, after one month, there was a higher dropout rate in the daily framing condition compared with in the weekly or monthly conditions. Whereas approximately one-quarter of the consumers who enrolled in the daily condition ended up dropping out after one month, only approximately 15% dropped out in the weekly and monthly conditions. However, as noted above, because of a large difference in enrollment between conditions, even with this higher dropout rate in the daily amount condition, there were still more consumers from the daily conditions enrolled in the recurring deposits program after one month (and also, for the rest of the program) than for the weekly and monthly conditions. At subsequent periods of two and three months, retention remained the same across conditions. It may be the case then that a higher proportion of consumers who sign up for a recurring deposit program when it is framed in a granular way regret doing so after a short period of time (i.e., a month). After this time period, however, enrollment remained stable regardless of initial condition.

We also wish to note here that our robustness check conditions that involved much lower amounts of money (\$7 per week and \$30 per month) showed no differences in retention at any of the time periods. Although this higher retention rate is promising, these consumers are clearly depositing much lower amounts of money into their accounts than those in the \$5 per day, \$35 per week, and \$150 per month conditions.

4.3. Possible Psychological Mechanisms

4.3.1. Psychological Pain. Drawing on prior work regarding temporal reframing (Gourville 1999) as well as how consumers view lump sums versus annuitized streams of money (Goldstein et al. 2016), we suggested that one reason why a more granular framing would be effective for encouraging enrollment was because giving up small amounts of money on a daily basis might seem less psychologically painful and more feasible than giving up a large amount of money on a monthly (or weekly) basis. Although the field study context of this study did not allow us to directly probe this psychological mechanism, an analysis of average initial deposit as well as enrollment differences as a function of income provided some compelling indirect evidence for this proposition. Namely, if smaller, more granular amounts do in fact seem less psychologically painful and more feasible than larger, less granular amounts, then framing recurring deposits in terms of smaller daily deposits should be appealing to consumers across the income spectrum. Likewise, if larger,

less granular amounts seem more psychologically painful and less feasible, then framing recurring deposits in such terms should be primarily appealing to a segment with higher income (i.e., a segment that could feasibly make such large deposits). Put differently, signing up for the recurring deposit program when framed in weekly or monthly terms may seem like a more burdensome responsibility, leading to take up only among consumers who already felt like they had sufficient resources to participate. Indeed, the consumers who participated in the recurring deposit program when it was framed in weekly or monthly terms made higher initial deposits than those who participated when it was framed in daily terms.

More to the point, the recurring deposit program seemed to appeal to a wide set of customers independent of income, but the weekly and monthly framing only appealed to a segment of higher-income customers: as noted above, a significant interaction arose such that, when the program was framed as \$150 per month, significantly more users signed up from the highest income bracket compared with the lowest income brackets. However, when the program was framed as \$5 per day, there were no differences between income brackets. Similarly, a significant interaction arose such that, when the program was framed as \$35 per week, significantly more users signed up from the highest income bracket compared with the lowest income brackets. We note, however, that these interactions with income bracket did not arise when making comparisons between the weekly and monthly conditions both for the \$35 per week condition compared with the \$150 per month condition and for the \$7 per week compared with \$30 per month condition. It may simply be the case that the daily framing is the most powerful form of granular framing when it comes to reducing the income gap in participation in savings programs.

A major issue that faces policy makers concerns how best to encourage engagement in saving programs across the income spectrum. The results of this work suggest that one way to reduce the income gap in saving behavior is by framing recurring savings programs in a granular, daily format: not only did this framing encourage more people to save, it may have encouraged those who tend to struggle the most to start saving.

4.3.2. Poor Financial Forecasting. In addition to differences in perceived psychological pain, the more granular framing of saving amounts could have led to higher take up of the automatic savings program because of poor financial forecasting. It is possible, for example, that consumers made errors when calculating how much \$5 per day really amounted to over time and thus, underestimated how much they would actually be saving. Notably, we did observe a

difference in retention rates between the daily condition and the weekly and monthly conditions at one month into the intervention, suggesting that there was some portion of new users who made a forecasting error when estimating how much they could afford to save (and then corrected this error by dropping out of the program after one month). We note, however, that, even after this correction took place, there were still significantly more users enrolled in the automatic deposit program who had initially seen the daily (rather than weekly and monthly) framing.

4.3.3. Different Considerations of Opportunity Costs.

Furthermore, temporally reframing monetary amounts may call to mind different sets of opportunity costs for consumers (Spiller 2011). For example, when considering saving \$5 a day, there may be dozens of expenditures that consumers could consider that cost \$5 a day (e.g., a nice coffee, a sandwich, some candy, etc.), but when considering \$150 per month, there may be relatively few expenditures that cost this much (e.g., one nice dinner out at a restaurant). As a result, a more granular temporal reframing could suggest to consumers that, even though they may have to give up an expenditure or two, there are still plenty of other items that fall under the umbrella of \$5 per day that could still be purchased. However, when considering what would need to be given up to make a \$150 per month contribution to a saving account, there could be fewer comparisons, leading to an overall sense that a contribution of this magnitude would be more restrictive.

4.4. Limitations and Future Directions

Despite the promise of temporal reframing on encouraging user take up of recurring deposit programs, we nonetheless acknowledge the limitations of this research. The research was conducted on a self-selected group of users who were already interested in signing up for a financial technology application. We question whether take-up rates would be quite so high in a sample of users who were not already interested in better organizing their finances. However, even though overall take-up rates may be lower in a broader sample, we suspect that the between-group differences in take up would remain. Future research should thus examine whether more granular framing is similarly effective for a broader, more representative sample.

Along similar lines, we acknowledge here one possible limitation with our experimental design: as noted above, because the initial deposit amounts that were offered to users were a function of their income, we would expect that those with higher income would make a higher initial deposit. Although we do

not have any reason to suspect that this initial difference in the deposit amounts would influence the interaction between income bracket and condition on sign-up behavior, future research could use an experimental design in which all users are offered the same options for their initial deposit.

Notably, in the robustness check conditions (i.e., \$7 per week vs. \$30 per month), even though sign-up rates differed, initial deposit amount did not differ as a function of condition and the decision to enroll in the recurring deposit program. We can only speculate as to why we observed such differences in the \$150 per month conditions and not in the \$30 per month conditions. Again, we treated differences in initial deposits as proxies for differences in how burdensome the recurring deposit saving programs seemed: the more burdensome the program, the more likely it would be that consumers with higher resources would sign up. Even though it may be the case that \$7 per week seemed more manageable than \$30 per month (as indicated by the higher sign-up rate in the former compared with the latter condition), the overall amount (i.e., \$30 per month) may not have been all that burdensome to begin with. The burden imposed by \$30 per month compared with \$7 per week may have been large enough to result in different sign-up rates in other words but may not necessarily have been large enough to then manifest in terms of differences in initial deposits or income bracket. It would thus be prudent for future research to investigate a variety of different recurring deposit amounts to better gauge the boundaries to the effects that were observed in the \$150 per month conditions.

Given that more consumers dropped out of the program after one month in the \$5 per day condition but not in the \$7 per week condition, future research should also attempt to identify an optimal recurring deposit amount that maximizes overall sign-ups but minimizes dropouts. Additionally, although we were able to track users for a period of three months, it is possible that retention rates could change over a longer period of time or one that includes the holiday season or other periods of time when consumers may wish to spend more of their earnings. Future work may thus want to track users over a longer time interval (e.g., a year or longer).

Furthermore, as may be the case with much of the nudging literature, we cannot at this point observe whether the temporal reframing intervention has universally positive effects for all consumers. Although participation in the saving program increased across income brackets as a result of the temporal reframing intervention, doing so may have had unintended consequences: consumers in the lowest income bracket, for example, could have chosen to save money at the

expense of paying off high interest. Given that we did not have access to users' other accounts, we cannot address such unintended consequences in this data set, but future research should attempt to examine the holistic effects of temporal reframing interventions.

Finally, we opened this paper by noting that more workers today are paid in a granular format (i.e., instead of the traditional monthly paycheck, workers are paid weekly or even daily). Our reason for highlighting the so-called gig economy was to acknowledge that payments and deposits from the financial system do not need to be thought of solely in monthly terms as they once were. However, an open question not addressed by this research is whether more granular framing of a recurring deposit program would have differential effectiveness for workers who are paid in more versus less granular ways. It could be the case, for example, that workers who are paid on a daily basis would actually be less likely to sign up for a recurring deposit saving program when it was framed in daily terms: \$5 per day may feel like a larger amount to workers paid daily rather than those paid monthly simply because people paid daily may have smaller reference points than those paid monthly. Additionally, it could be the case that workers who are paid in a more granular way also have a better sense of their (limited) budget, and such a perception could affect willingness to participate in the automatic savings program. This conjecture suggests a possible interesting question for future research: could the timing of the temporal reframing intervention itself affect take-up likelihood? If the program is advertised immediately after workers receive their paychecks, for example, they may perceive more slack in their future budget (Lynch et al. 2015), leading to a greater willingness to participate across temporal reframing conditions; if the program is advertised toward the end of a pay cycle (i.e., when limited budgets are more salient), then the more granular reframing could be more effective. Future research should examine the link between temporal framing of recurring deposit saving programs, payment frequency, and the timing of such interventions.

4.5. Conclusion

In summary, this field experiment demonstrates the power of temporal reframing to boost participation in a recurring deposit saving program. Among new users of a savings app who had already agreed to make an initial deposit to their saving accounts, we quadrupled the number of recurring savers by framing a recurring deposit program in daily amounts as opposed to monthly amounts. We also increased the number of low-income savers and showed that daily framing could eliminate the income gap in saving behavior. Although automatic enrollment in 401(k)s has been shown to reduce the income gap in saving behavior (Madrian and

Shea 2001), this temporal reframing intervention can reduce savings disparities among workers without access to an employer-provided retirement plan. These results are especially relevant given current trends in the labor market, because a growing number of workers are now freelancers and responsible for their own retirement savings. By better understanding the information and choice architectures that influence financial decision making, we can improve the design of websites and apps that will play an increasingly important role in shaping the financial future of American workers.

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Endnotes

¹ Approximately 45% of users opted to make an initial deposit. Although it would have been desirable to compare those who made an initial deposit with those who did not, we were not given access to data from the users who did not make an initial deposit. Furthermore, it may have been desirable to have an experimental design in which all new users were given access to the recurring deposit program and not just the users who elected to make an initial deposit. For business reasons, however, it did not make sense to ask users who had declined an initial deposit to then sign up for a recurring deposit program, because doing so may have caused them to exit from the sign-up process.

² Note that we were unable to implement \$1 per day owing to technical limitations identified by Acorns.

³ Initial deposit data were missing for 16 participants.

⁴ Acorns also monitored weekly logins, number of weekly withdrawals, and average weekly withdrawal amount, though these variables fell outside the scope of this research project.

References

- Bartels DM, Urminsky O (2011) On intertemporal selfishness: How the perceived instability of identity underlies impatient consumption. *J. Consumer Res.* 38(1):182–198.
- Bazerman MH, Tenbrunsel AE, Wade-Benzoni K (1998) Negotiating with yourself and losing: Making decisions with competing internal preferences. *Acad. Management Rev.* 23(2):225–241.
- Benartzi S, Thaler R (2013) Behavioral economics and the retirement savings crisis. *Science* 339(6124):1152–1153.
- Beshears J, Choi JJ, Laibson D, Madrian BC (2009) The importance of default options for retirement saving outcomes: Evidence from the United States. Kay SJ, Sinha T, eds. *Social Security Policy in a Changing Environment* (University of Chicago Press, Chicago), 167–195.
- Board of Governors of the Federal Reserve System (2016) Report on the economic well-being of U.S. households in 2015. Retrieved July 3, 2019, <https://www.federalreserve.gov/2015-report-economic-well-being-us-households-201605.pdf>.
- Bryan CJ, Hershfield HE (2012) You owe it to yourself: Boosting retirement saving with a responsibility-based appeal. *J. Experiment. Psych. General* 141(3):429–432.
- Colby H, Chapman GB (2013) Savings, subgoals, and reference points. *Judgment Decision Making* 8(2):16–24.
- Cramer J, Krueger AB (2016) Disruptive change in the taxi business: The case of Uber. *Amer. Econom. Rev.* 106(5):177–182.
- De Stefano V (2020) The rise of the ‘just-in-time workforce’: On-demand work, crowd work and labour protection in the ‘gig-economy’. *Comparative Labor Law Policy J.* Forthcoming.
- Friedman G (2014) Workers without employers: Shadow corporations and the rise of the gig economy. *Rev. Keynesian Econom.* 2(2):171–188.
- GAO (2015) Contingent workforce: Size, characteristics, earnings, and benefits. Report GAO-15-168R, GAO, Washington, DC.
- Goda GS, Mandhester CF, Sojourner AJ (2014) What will my account really be worth? Experimental evidence on how retirement income projections affect saving. *J. Public Econom.* 119(November):80–92.
- Goldstein DG, Hershfield HE, Benartzi S (2016) The illusion of wealth and its reversal. *J. Marketing Res.* 53(5):804–813.
- Gourville JT (1998) Pennies-a-day: The effect of temporal reframing on transaction evaluation. *J. Consumer Res.* 24(4):395–408.
- Gourville JT (1999) The effect of implicit vs. explicit comparisons on temporal pricing claims. *Marketing Lett.* 10(2):113–124.
- Gourville JT (2003) The effects of monetary magnitude and level of aggregation on the temporal framing of price. *Marketing Lett.* 14(2):125–135.
- Hershfield HE (2018) The self over time. *Current Opinion Psych.* 26(April):72–75.
- Lusardi A, Schneider D, Tufano P (2011) Financially fragile households: Evidence and implications. *Brookings Papers Econom. Activity* 2011(1):83–134.
- Lynch J, Spiller S, Zauberman G (2015) Resource slack: A theory of perceived supply and demand. Diehl K, Yoon C, eds. *NA—Advances in Consumer Research*, vol. 43. (Association for Consumer Research, Duluth, MN), 74–79.
- Madrian BC, Shea DF (2001) The power of suggestion: Inertia in 401(k) participation and savings behavior. *Quart. J. Econom.* 116(4):1149–1187.
- Madrian BC, Hershfield HE, Sussman AB, Bhargava S, Burke J, Huettel SA, Jamison J, et al. (2017) Behaviorally informed policies for household financial decision making. *Behav. Sci. Policy* 3(1):27–40.
- Nagle TT, Holden RK (1995) *The Strategy and Tactics of Pricing: A Guide to Profitable Decision Making* (Prentice Hall, Englewood Cliffs, NJ).
- Paolacci G, Chandler J (2014) Inside the Turk: Understanding Mechanical Turk as a participant pool. *Current Directions Psych. Sci.* 23(3):184–188.
- Parliament of the United Kingdom (2016) Pensions Act 2008 (c.30). Retrieved July 3, 2019, https://www.legislation.gov.uk/ukpga/2008/30/pdfs/ukpga_20080030_310516_en.pdf.
- Spiller S (2011) Opportunity cost consideration. *J. Consumer Res.* 38(4):595–610.
- Thaler RH (1985) Mental accounting and consumer choice. *Marketing Sci.* 4(3):199–214.
- Thaler RH, Benartzi S (2004) Save more tomorrow™: Using behavioral economics to increase employee saving. *J. Political Econom.* 112(S1):S164–S187.
- U.S. Department of Labor, Employee Benefits Security Administration (2016) Final rule: Savings arrangements established by states for non-governmental employees. Retrieved July 3, 2019, <https://www.dol.gov/sites/dolgov/files/legacy-files/ebsa/temporary-postings/savings-arrangements-final-rule.pdf>.