THE ROLE OF INFORMATION ON RETIREMENT PLANNING: EVIDENCE FROM A FIELD STUDY

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Many households neglect the pivotal task of planning for retirement. Proposals to stimulate employees to save for retirement in the workplace include tax subsidies, which are costly, and using automatic defaults, which may not complement the heterogeneous preferences of savers. This randomized field study shows that an information-based intervention increases reported retirement plan participation, emergency savings, and using a budget. Employees offered access to education increased actual retirement deferrals by $26 per month. These results suggest that retirement education programs may be an effective strategy to increase retirement planning and saving behavior. (JEL J26, D14, D91)

I. INTRODUCTION

Modern financial planning is dominated by discussions of one topic: retirement savings. Retirement planning behaviors are widely studied, yet, population data show perplexing patterns of savings, especially among households who reasonably should expect to live long and healthy lives after separating from the workforce. Savings choices are increasingly focused on the decisions of individuals, rather than on public plans or employer-mandated pensions (Poterba 2014). However, policymakers' attempts to stimulate more individual-level savings have not shown strong effects (Duflo et al. 2007). One problem appears to be related to people failing to fully plan ahead for retirement and neglecting longer-run financial management in general (Ameriks, Caplin, and Leahy 2003).

According to the Employee Benefit Research Institute (2015), more than one in four workers have less than $1,000 in retirement savings. Fewer employees today have access to defined benefit pensions than they did in the past, and instead rely on employer-based 401(k) savings accounts and nonemployer-based individual retirement accounts (IRAs) (Munnell 2006). However, participation rates remain low; 43% of private sector workers of age 25–64 take part in retirement savings programs (Calabrese 2011). Even among active savers, there are concerns about how well people are able to manage their retirement accounts in ways that reflect optimal planning horizons.

Several policies have been designed to increase participation in retirement plans. First, firm-level programs requiring employees to opt-out (vs. opt in) to a 401(k) plan have increased participation in retirement savings plans (Madrian and Shea 2001). However, as Choi, Laibson, and Madrian (2011) highlight, because individuals have heterogeneous savings preferences, these default options may be costly to individuals as some might save more in the absence of the default, and others might prefer to save less. Second, government-designed tax breaks for individuals investing in retirement accounts and increases in maximum income deferral limits for these accounts could increase retirement savings. However, income tax deductions and credits can be costly tax expenditures, and individuals, especially lower- and middle-income savers, may not respond to these incentives (Engen, Gale, and Scholz 1996). Third, firms can try to help people better

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ABBREVIATIONS

IRAs: Individual Retirement Accounts
OLS: Ordinary Least Squares
SEPs: Self-Employment Pensions

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understand their savings options and make plans for retirement, effectively lowering the costs of information with workshops and/or counseling. Retirement planning requires information in order to form expectations about lifetime income, years of work, expected investment returns (adjusted for risk), and consumption levels in retirement. People who lack information about these issues may fail to make a plan, or proceed to design a plan based on incomplete information. Educational programs targeted to workers hold promise to help people recalibrate their expectations and shift their savings behavior. Well-targeted financial education might facilitate people to pursue their individual retirement saving preferences in ways that default rules or incentives alone cannot.

This article studies the effect of financial education on retirement savings offered to employees in an online format. Online information offers several advantages over traditional seminars. For example, online courses can be delivered to a large audience and at a lower cost per participant than classroom delivery. It also poses relatively low marginal costs to the employee because of the flexibility and convenience of the mode of delivery; it may serve employees who would not attend in-person sessions. While participants in online education do not benefit from group interactions, online delivery provides participants privacy to explore financial issues that they might shy away from in more public settings.

Several studies document that employer-based education is associated with improvements in employees' financial knowledge (Clark and d'Ambrosio 2002; Holland, Goodman, and Stich 2008; Skimmyhorn forthcoming). However, which employees attend educational programs is an important caution. Meier and Sprenger (2008) show evidence of selection such that individuals who participate in voluntary financial education tend to be more motivated and future oriented than nonparticipants. Our study addresses this problem by randomly assigning employers to the education program.

This study follows employees at 45 credit unions where access to a 10-unit online financial education course was randomly assigned at the credit union level. Employees completed a survey concerning their self-assessed financial knowledge and self-reported behavior before the offer of education. This study also includes actual employer-based retirement account contributions for a sub-sample of employees. The random assignment of the timing of credit unions into the education allows us to causally estimate the effect of financial education on financial knowledge and behaviors.

Employees demonstrated high cooperation rates, with more than 90% of those offered education completing the online education modules. We find that employees offered the online education increase their level of self-reported financial knowledge, as expected. We then show that exposure to the education is associated with greater self-reports of individual retirement plan participation. We also show with administrative data a 40% increase in employer retirement contribution amounts. Comparing this to the average monthly employer-based retirement contribution, this effect size translates into a monthly increase of $26 per employee at credit unions where the education was offered. At the same time, we find no self-reported declines in education savings or increases in paying late fees on bills, suggesting that individuals are not substituting retirement savings with other uses.

The remainder of this article provides a brief background on the literature on retirement planning decisions, followed by an overview of the field study and methods used to estimate the effects of the education program. After reviewing these estimates, we conclude with a discussion of financial education in the workplace and its role as a complement to other retirement savings strategies.

II.   THE ROLE OF INFORMATION

Prior studies show a positive correlation between financial literacy, retirement planning, and savings behavior (Hastings and Mitchell 2011; Lusardi and Mitchell 2007; Mandell and Klein 2009). Employees use information they learn through education in order to calibrate expectations about their own retirement timing and to determine the amount and method to save. This requires ongoing decisions about current and future consumption, as people attempt to smooth spending over their expected earnings lifecycle.

Table 1 summarizes the role of information in various contexts related to retirement planning. In each case, information may result in employees reconsidering the tradeoffs between consumption in the present and saving for the future. Earlier in their work career, employees will set initial retirement planning goals and then revise them as their income profiles change. Even in the context of stable income expectations, new information

TABLE 1

Potential Roles of Information to Increase
Deferrals into Retirement Savings

Information	Realization
Retirement date	Earlier ages require more savings
Expected returns	Real returns tend to be modest
Lifespan post-retirement	Greater longevity requires more savings
Replacement rates	Higher consumption levels require more savings
Value of tax benefits	Reduced current income tax burden

can trigger people to revise consumption and saving choices. For example, employees will revise their expectations of savings levels based on their understanding that retirement earlier in life (at a younger vs. older age) or retirement with higher levels of income replacement (vs. lower consumption in retirement) would both require higher levels of current savings. After revising these expectations, if either retiring early or maintaining a higher standard of living in retirement becomes a driving goal, then savings levels should increase.

Employees have the opportunity to take advantage of employer-based benefits, including non-retirement benefits like life insurance and health insurance coverage, as they form their financial plans. Looking beyond employer-based options, other employees might also open a nonemployer-based account such as an IRA. These accounts offer additional flexibility and tax benefits, and represent individual efforts to save over and above any employer provided pension or defined contribution account.

Generally, all employees are calibrating expectations about saving over their working years, but some may respond more strongly to new information. People with lower initial levels of financial education, people with lower levels of general education and people at younger ages may be most responsive to retirement education programs. Work by Lusardi, Michaud, and Mitchell (2014) shows that the acquisition of financial literacy is likely to have heterogeneous effects on behavior, which is also reflected in other studies (Fernandes, Lynch, and Netemeyer 2014; Hastings, Madrian, and Skimmyhorn 2013). The implication of this growing literature is that some people are likely to receive more value from financial education than others; those with stronger income and wealth expectations,

for example, may invest more in acquiring financial education earlier in life. Other people may not be provided information about finances through school or from their families, increasing the costs of later acquiring financial knowledge. Within any employee population offered financial education, some groups will respond differently from others.

People may also fail to engage in financial planning for retirement because of a number of biases including inertia, perceived transaction costs of dealing with paper work, procrastination, and inattention. Employer-based educational interventions could serve to overcome these biases, as well as provide a perceived endorsement of savings options (Bernheim, Fradkin, and Popov 2015). Brown and Weisbenner (2014) find that people often make decisions based on incorrect information about their retirement plan. Clark, Morrill, and Vanderweide (2014) show that not understanding benefits is more prevalent among employees with shorter tenures, who also appear less likely to fully use retirement savings programs at work. This evidence is consistent with the idea that, in the absence of information, people may fail to optimally form financial plans, including utilizing appropriate employer-based retirement and related benefits. The need for information is not just isolated to newly hired employees, however. Long-time employees may benefit by learning about information that influences their financial plans such that they decide to change their contribution levels or expected retirement target date (Chalmers, Johnson, and Reuter 2014).

Studies of financial education provided in the workplace support the potentially positive role of information for decisions and behavior in a variety of savings. For example, Clark, Morrill, and Allen (2012) provide evidence of the effect of financial education for newly hired employees, as well as longer-term employees closer to retirement age. Further, Bayer, Bernheim, and Scholz (2009) find that offering frequent retirement seminars to employees is associated with higher participation in, and contributions to, voluntary employer-based savings plans, especially among employees at lower compensation levels. Other studies suggest one role of information is through the effects of peers (Chalmers, Johnson, and Reuter 2014; Duflo and Saez 2003). Studies of workplace-based seminars are difficult to interpret, however, in large part because firms often simultaneously promote retirement planning seminars while

changing other aspects of retirement savings programs. The limitation of many prior studies is the lack of an experimental or other robust causal inference approach; studies present compelling associations but not clear evidence of impacts.

Of course there are a range of other factors that may also influence retirement planning behavior. Educational interventions might be better viewed in the context of other approaches commonly used in the workplace, such as automatic enrollment in retirement programs and default savings levels. Benartzi and Thaler (2007) suggest that automatic enrollment and default contribution levels are a powerful strategy to increase employee retirement savings. The tradeoff of these programs is that employees may fail to develop their own financial planning skills and capabilities. It remains to be seen whether people who were "defaulted into" savings plans will effectively maintain them over time, or manage them as well as more actively engaged savers post-retirement when crucial decisions about asset allocation and distributions will need to be made (Mitchell et al. 2009). More active decision making may provide for better outcomes especially when there is a heterogeneity in preferred savings rates and risk preferences (Carroll 2009; Curcuru et al. 2009). The advantage of an education-based approach is the potential to enhance decision-making capability useful over the life course.

Informational strategies may also be valuable when combined with savings incentives. Prior studies show that people do respond to economic incentives with respect to retirement savings decisions, although take-up is uneven and informational barriers may remain (Duflo et al. 2006, 2007; Saez 2009). Education may help people to understand and optimally respond to tax and other economic incentives.

III. THE FIELD STUDY

In the fall of 2009, the Wisconsin Credit Union League sponsored the REAL Progress & Pathways to Prosperity (RP3) program, an online financial education program developed by Precision Information, LLC. The 10-module program included the following topics: (1) Basics of Finance, (2) Basics of Investing, (3) Basics of Financial Planning, (4) Basics of Retirement, (5) Saving Strategies, (6) Mutual Funds, (7) Saving for College, (8) Understanding Investment Risks, (9) Working with Financial Advisers, and (10) Getting Started. The majority of the content

focused on saving for retirement, retirement planning, and understanding the tradeoffs of starting later versus earlier with respect to retirement saving. For the employees, this was a low-cost intervention, as employees were permitted to take the course during work hours on paid time.[1] The program has since been replicated in 13 states with the support of the Investor Protection Trust.

Forty-five credit unions agreed to participate in the program.[2] The average credit union had 6 branches and 48 full-time employees (a median of 20 employees). Participating credit unions were randomly assigned to offer the course to their employees either in the fall of 2009[3] or in the spring of 2010.[4] Employees at the credit unions that offered the program in the fall constitute the "treatment" group. In turn, employees at the credit unions that offered the program in the spring constitute the "control" group, based on the assumption that individual financial behaviors are not correlated with a credit union's assignment into the fall or spring cohort. This design allows for the estimation of causal effects.

Employees in both groups completed a mandatory 48-question survey concerning their self-assessed financial knowledge and self-reported behavior in September 2009 and January 2010. All the participants completed the same surveys at the same point in time, regardless of whether their employer offered the education program in the fall or spring. Table 1 provides a timeline of the study, including when data on retirement account contributions were collected beginning in January 2009 and continuing through February 2010.[5] All the employees at all the participating credit unions received the same treatment. The information was not customized by employee or specific employer location.

After assigning each employee a confidential code, the data for this analysis were provided

1. The mean time to complete the education was 8.75 hours, with a median of 4.4 hours based on online login records.

2. While we have no reason to believe that the credit unions that agreed to participate are different from those that did not, we acknowledge that the 45 credit unions choosing to participate may not represent all 160 credit unions in Wisconsin.

3. The first employee in the fall cohort began the course September 29th, 2009 and the last completed the course December 28th.

4. The first employee in the spring cohort began the course January 28th, 2010.

5. Although the recession was dated from December 2007 to June 2009, unemployment peaked in Wisconsin in December 2009 at 9.2%, slightly below national averages at the time.

TABLE 2

Gender and Age Self-Reported Total Financial Assets: Survey Data Versus Survey of Consumer Finances

	18–35	36–45	46–55	56–64
Survey data				
Female	18,419 (21,834)	41,214 (26,049)	53,075 (21,005)	54,347 (19,879)
Male	22,432 (24,088)	50,230 (22,303)	60,757 (13,624)	60,172 (14,546)
2013 Survey of Consumer Finances				
Female	14,060 (66,841)	27,398 (112,233)	91,615 (514,689)	155,855 (768,128)
Male	43,703 (235,303)	169,923 (1,164,266)	278,820 (2,215,722)	483,588 (210,4249)

Means (*SE*); RP3 Survey; Survey of Consumer Finances.

by the online financial education company Precision Information, LLC. The sample includes 1,001 employees who completed both survey waves, including 700 in the control group and 301 in the treatment group. In addition, data on monthly retirement account use were obtained from 10 credit unions, including 5 from each group, covering about 220 employees making regular contributions or moving existing funds between investment options. This provides a means to externally validate the self-reported survey data on retirement behavior. The inclusion of both self-reported data and actual retirement contributions is valuable, as individuals' self-reports could suffer from social-desirability bias after exposure to the education (Gustman, Steinmeier, and Tabatabai 2012). Notably, all of the credit unions in these data used the same benefits provider and generally offered the same investment plan and benefits options, including features such as savings matches and automatic enrollment.

Table 2 shows the distribution of financial assets by the gender of employees in the study overall. The mean of the self-reported level of financial assets is displayed in the first panel, and similar means from the Survey of Consumer Finances by the Federal Reserve Board in the lower panel. Employees in the field experiment generally have lower asset levels than the means in the Survey of Consumer Finances, especially at younger ages. Most of the employees (80%) are women, and two-thirds are under age 45.[6] The employee base in these credit unions is skewed toward populations with lower asset levels in general.

6. The U.S. Department of Labor reports that 75% of individuals employed at savings institutions, including credit unions, are female (U.S. Department of Labor, Bureau of Labor Statistics 2009).

IV. METHODS

Assignment to the financial education occurred at the level of the firm. Table 3 shows the means for employees at the baseline in each cohort, with standard errors clustered by credit union (the firm level). The sample appears balanced, with the exception that the treatment group have lower incomes. These differences also are not large in magnitude.

Column (1) of Table 4 shows that individual-level characteristics do not predict treatment in the baseline period using an ordinary least squares (OLS) regression, again clustered at the credit union level. The only statistically significant difference across the treatment and control groups is whether or not the employee has children. Columns (2)–(5) in Table 4 show that treatment is uncorrelated with baseline IRA savings, forming a budget, having 3 months of savings, and being enrolled in benefits, all potential dependent variables we would predict would shift at follow-up for those employees who have access to financial education.

We begin by estimating the effects of online financial education on retirement outcomes by comparing treatment and control groups in the post-treatment period as a cross section. Specifically, we estimate Equation (1), where T_i is equal to one if the individual was in the treatment group and zero otherwise. α_1 is therefore the primary coefficient of interest. By including $Y_{i,t-1}$, the dependent variable in the baseline period, this can be interpreted as the change relative to baseline. X_i is a vector of individual-level controls including income, assets, age, sex, minority, college, home ownership, score on a "financial challenge" 25-question test, and a dummy for whether or not the individual has at least one child. $\varepsilon_{i,t}$ is the error term. We cluster our standard errors at the credit union level (the level of treatment), as there may

TABLE 3
Covariate Balance Check

	Control	Treatment	Total
Married	0.736 (0.0249)	0.684 (0.0356)	0.720 (0.0207)
Kids	0.703 (0.0535)	0.788 (0.0341)	0.728 (0.0406)
Own	0.819 (0.0338)	0.801 (0.0360)	0.814 (0.0258)
College	0.324 (0.0580)	0.236 (0.0654)	0.297 (0.0471)
Minority	0.175 (0.0495)	0.209 (0.0669)	0.185 (0.0411)
Female	0.803 (0.0389)	0.832 (0.0311)	0.812 (0.0290)
Age 18–35	0.404 (0.0554)	0.343 (0.0390)	0.386 (0.0417)
Age 36–45	0.230 (0.0155)	0.246 (0.0248)	0.235 (0.0132)
Age 46–55	0.226 (0.0332)	0.253 (0.0264)	0.234 (0.0252)
Age 56–64	0.125 (0.0219)	0.131 (0.0178)	0.127 (0.0162)
Income cat	5.259** (0.116)	4.795 (0.191)	5.119 (0.106)
IRA	0.537 (0.0322)	0.466 (0.0451)	0.515 (0.0268)
Budget	0.410 (0.0364)	0.422 (0.0264)	0.414 (0.0269)
Benefits	0.798 (0.0130)	0.739 (0.0371)	0.780 (0.0154)
Months saving	0.501 (0.0142)	0.441 (0.0347)	0.483 (0.0156)
Observations	700	301	1001

Notes: Standard errors clustered at the credit union level in parentheses. There are 45 credit unions. Kids = 1 if at least one dependent under the age of 18. Income is on an 8-point scale, where the mean for the control group is $51,100 and $45,540 for the treatment group.

Differences in means reported at the *$p < .10$, **$p < .05$, ***$p < .01$ level.

Source: RP3 Surveys.

TABLE 4
Differences in Treatment and Controls at Baseline

	(1) Treatment	(2) IRA	(3) Budget	(4) 3 Months' Saving	(5) Benefits
Treatment		−0.0547 (0.0414)	0.0199 (0.0375)	−0.0534 (0.0325)	−0.0427 (0.0284)
Married	−0.0669 (0.0469)	−0.0144 (0.0474)	−0.0278 (0.0531)	0.0595* (0.0321)	0.0332 (0.0346)
Kids	0.124** (0.0517)	−0.0179 (0.0455)	0.0508 (0.0362)	−0.0665 (0.0407)	−0.113*** (0.0219)
Owns home	0.00548 (0.0586)	0.00823 (0.0397)	−0.0912* (0.0521)	−0.138*** (0.0410)	−0.109* (0.0562)
College	−0.0548 (0.0725)	0.0775* (0.0404)	0.0799*** (0.0277)	0.0469* (0.0248)	0.0596** (0.0268)
Minority	0.00483 (0.0300)	−0.0279 (0.0180)	0.0128 (0.0224)	0.00550 (0.0170)	0.0144 (0.0199)
Female	−0.0171 (0.0443)	−0.000594 (0.0295)	0.0420 (0.0297)	−0.0455* (0.0243)	−0.0334 (0.0321)
Age 18–35	−0.162 (0.135)	−0.170 (0.119)	0.0219 (0.1000)	0.0293 (0.109)	−0.236** (0.100)
Age 36–45	−0.0950 (0.134)	−0.0591 (0.129)	−0.0582 (0.101)	0.0593 (0.113)	−0.227** (0.0895)
Age 46–55	−0.0823 (0.128)	−0.0634 (0.120)	−0.102 (0.106)	0.0682 (0.108)	−0.0921 (0.0964)
Age 56–64	−0.100 (0.130)	0.0551 (0.115)	−0.0389 (0.104)	0.141 (0.106)	−0.0225 (0.107)
Income $24–$48 k	−0.0807 (0.0807)	0.0618 (0.0393)	0.131*** (0.0459)	0.134*** (0.0444)	−0.0184 (0.0492)
Income $48–$72 k	−0.0894 (0.0870)	0.0102 (0.0515)	0.193*** (0.0433)	0.161*** (0.0480)	−0.0319 (0.0449)
Income >$72 k	−0.123 (0.106)	0.0424 (0.0517)	0.221*** (0.0606)	0.189*** (0.0408)	0.0243 (0.0495)
Observations	983	975	981	983	983
F-statistic	1.88	29.73	7.66	16.62	45.63
p Value	0.035	0.00	0.00	0.00	0.00

Notes: Robust standard errors clustered at the credit union level in parentheses. There are 45 credit unions. OLS regressions. Column (1) controls for levels of assets categorically, where no group is statistically different from another.

*$p < .10$, **$p < .05$, ***$p < .01$.

Source: RP3 Surveys

be unobserved differences in the treatment across groups (Pepper 2002)[7]

$$(1) \quad Y_{i,t} = \alpha_0 + \alpha_1 (T_i) + \alpha_2 Y_{i,t-1} + \gamma X_i + \varepsilon_{i,t}.$$

The estimates for α_1 in Equation (1) will be of interest, as these represent the causal effect of

assignment to the course on financial knowledge and financial behaviors.[8] We consider this to be an intent to treat measure because there may be selection into who actually completes the course. However, take-up of the education was extremely

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7. We also tested bootstrapped standard errors and wild cluster bootstrapped standard errors (Cameron, Gelbach, and Miller 2008), as well as clustering by both credit union and time period, with similar results.

8. Using a difference-in-differences model allows us to fully use the data as a panel and allows us to include time varying factors. These results remain consistent with the simple treatment and control comparison, and we choose to omit them from the main analysis.

high, nearly 90% at most credit unions.[9] For our estimates to be valid, we assume that there are no spillover effects that would contaminate the treatment. For example, this might occur if employees in credit unions that were offered the education talked to those at the credit unions without education. However, a violation of this assumption would bias us against finding significant effects of the education.

The dependent variables related to knowledge of credit scores, interest rates, stocks and bonds, and investing were measured using 5-point scales, where $1 = $ low and $5 = $ high self-reported knowledge. For the analysis, these measures have been rescaled to be between 0 and 1.[10] The dependent variables related to behavior are generally dichotomous variables (0 or 1, where 1 is "yes") and are estimated in a similar fashion using a linear probability model.[11] The means of these behaviors are shown in Table 3. At the initial period of observation across treatment and control groups, an average of 51.5% of employees owned an IRA account. Just under 42% of employees reported having a budget or spending plan. Most (78%) of the employees reported fully using employer-sponsored health or life insurance and other benefits. Meanwhile, just under half (48.3%) of employees reported having 3 months of expenses saved for an emergency. When compared to the FINRA Investor Education Foundation's National Financial Capability Study (2009), these rates are comparable, where 55% of individuals contribute to retirement accounts, 40% have a budget, 81% use employer-provided benefits, and 37% have emergency savings.

We obtain a smaller set of data on 220 employees across 10 credit unions with actual monthly contributions to an employer-sponsored retirement account. Here, the data are grouped into five credit unions in the earlier cohort with an offer of online financial education and then, employees at the five credit unions offering the same education in the spring of the following year. We also provide results from Equation (1) in this setup. However, we now control for the average mean of the dependent variable in the pre-period since we have monthly data for 1 year prior to the education. These results will produce an estimate

for α_1. We log monthly contributions as they are non-normally distributed. Log-transforming this variable also facilitates interpretation as a percent change in contributions for treated employees.

V. RESULTS

We begin with the traditional treatment control setup from Equation (1), where we report α_1. Recall that in these specifications, we only include the post-treatment period and compare the individuals who received access to the education to those who did not, where we also control for individual-level characteristics and the pre-period dependent variable. All specifications cluster standard errors at the credit union level, where there are 45 credit unions in the sample.[12] Table 5 presents the first of this series of estimates. As these dependent variables are on a $0-1$ scale, they can be interpreted as a percentage point change. The self-assessed score for credit score knowledge, interest rate knowledge, stock and bond knowledge, and investing knowledge all show increases that are statistically different from zero at standard levels. These effects are between 5% and 26% marginal increase from the overall mean, and all effects are statistically different from zero at the 5% level.

Table 6 shows self-reported behaviors. Here, the results are from linear probability models and can be interpreted as percentage point changes relative to baseline in the coefficients. The results again report the difference across treatment and control groups in the post-period. Column (1) shows that the offer of online education increases IRA participation by 6 percentage points. When compared with mean participation of about 52%, this is approximately an 11% marginal effect from the mean participation rate. Column (2) of Table 6 shows that education increased the rate of creating a budget by almost 6 percentage points, which is a 12% marginal increase over the baseline mean budgeting rate. Both of these effects are statistically different from zero at the 5% level. In Columns (3) and (4), access to the education increases the probability that individuals enroll in benefits and have 3 months' savings by between 3.7 and 3.8 percentage points. However, none of these effects are statistically different from zero at the 10% level.

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9. There are no measurable differences in take-up rates across credit unions.

10. See the Appendix for question wording.

11. Although not shown, marginal effects from probit models provide similar estimates.

12. Central limit theorem properties hold for these clusters: of the 45 credit unions, 27 have at least 30 observations, and the remainders have between 10 and 30. The sample is not composed of a few firms holding the majority of observations.

TABLE 5
Knowledge Changes after Online Education

	Self-Assessed Knowledge Type (Scaled between 0 and 1)			
	Credit Score	**Interest Rate**	**Stock and Bond**	**Investment**
Treat	0.0291** (0.0143)	0.0283** (0.0118)	0.156*** (0.0162)	0.104*** (0.0171)
Observations	989	989	989	989
Mean	0.635	0.652	0.655	0.657

Notes: Robust standard errors clustered at the credit union level in parentheses. There are 45 credit unions. Treatment versus control models estimate Equation (1), reporting α_1 estimates. Controls include treatment, post, income, assets, age, sex, minority, college, home ownership, test score, children, and pre-period dependent variables.
*$p < .10$, **$p < .05$, ***$p < .01$.
Source: RP3 Surveys.

TABLE 6
Behavior Changes after Online Education

	IRA	**Budget**	**Enrolled in Benefits**	**3 Months Saving**
Treat	0.0622*** (0.0220)	0.0582** (0.0230)	0.0371 (0.0252)	0.0381 (0.0291)
Observations	973	977	989	989
Mean	0.516	0.416	0.479	0.779

Notes: Robust standard errors clustered at the credit union level in parentheses. There are 45 credit unions. Treatment versus control models estimate Equation (1), reporting α_1 estimates. Controls include treatment, post, income, assets, age, sex, minority, college, home ownership, test score, children, and pre-period dependent variables.
*$p < .10$, **$p < .05$, ***$p < .01$.
Source: RP3 Surveys.

Next, we turn to the monthly retirement contributions data to see if we can reaffirm the survey data with administrative data. Table 7 shows the results of the offer of education on actual contributions (excluding transfers) to employer-sponsored accounts. The post-period is after December 2009, when the treatment cohort completed the education. Column (1) suggests that the causal effect of education on contributions results in an increase in contributions of 40.4%, when estimating the cross-sectional difference in means. When comparing this estimate to mean contributions, roughly $65 per month, this suggests an increase of approximately $26 per month or $312 annually per person. This is slightly smaller than the findings in Helman et al. (2015), where 69% of workers state that they could save $25 per week more than they currently are for retirement. These results are consistent with a shift in savings behavior, with employees offered the education being more likely to save in employer-sponsored accounts after the education is completed.

Column (2) in Table 7 further explores the underlying mechanisms shown in Column (1) in terms of contributions to employer-based retirement accounts. The credit unions involved

all offered eligible employees a match of up to 3% of annual gross income, such that employees would maximize their match when contributing 6% of their annual income, including receiving a full 3% employer match. We only observe the total deferral amount, including the match, but can provide a lower bound on when an employee increases her contribution to obtain a larger match from the employer.[13] The lowest full-time equivalent employee in our data earns approximately $25,000 per year. A 6% deferral rate (adding in the match) would produce a monthly contribution of $125. Any employee contributing less than $125 per month would not be maximizing his matching benefit—this is admittedly a low threshold because some employees earn two to three times this annual income. Nevertheless, shifting from contributing less than $125 to deferring more than $125 would be a signal of attempting to obtain a larger employer match. Column (2) shows that the employees in the treatment group show this very pattern—an

13. Credit unions use a common intermediary for pooled benefits, CUNA Mutual. This results in a high degree of standardization. Also, all of the credit unions in the study were based in Wisconsin and tended to offer similar benefits packages.

TABLE 7

Retirement Account Contributions Increase after Online Education

	Log(Amt)	Deferral >$125	Log(Amt)	Deferral >$125
Treat	0.404** (0.0549)	0.0907* (0.0295)		
Treat in T-4 to T-1			0.218 (0.234)	0.0296 (0.0546)
Observations	420	420	767	767
Mean amount	64.97			
Median amount	45.49			

Notes: Robust standard errors clustered at the credit union level in parentheses. Two-hundred and twenty accounts at 10 credit unions (5 control) from January 2009 to April 2010 (16 months). Treatment versus control models estimate Equation (1), where we report α_1. Models also control for the log of initial contribution amounts in Columns (1) and (3) and the initial match choice in Columns (2) and (4). These monthly data cannot be matched to the survey data. In Columns (2) and (4), $125 would maximize match for lowest paid full-time employee (per month). Columns (3) and (4) compare the treatment and control groups across the four periods leading up to the intervention (T-1 through T-4).

*$p < .10$, **$p < .05$, ***$p < .01$.

Source: CUNA mutual administrative data.

increase in the rate of savers meeting the match threshold of about 10%.

In Columns (3) and (4) of Table 7, we show that falsely placing the treatment in the 4 months prior to the education yields no effect. Specifically, we restrict the sample to stop just before the intervention and falsely place the treatment in the four periods leading up to the education. None of these results are statistically different from zero with p values near .5 in both specifications. In addition to the statistical significance, these results are nearly half the magnitude of the effects found in Columns (1) and (2).

We also include estimates for self-reported behaviors to make sure employees are not increasing savings for retirement at the same time as they substitute away from other savings or are missing payments on bills. Table 8 shows self-reports of savings for education, paying late fees on bills, and using automated deposits for savings. Not only are the magnitudes for each of these coefficients close to zero but also none are statistically significant at the 10% level.

Next, we see if the average treatment effects estimated above might include better (or worse) outcomes for some observable subgroups of employees. The response to the offer of the online education might reasonably also differ by demographic characteristics. To test for heterogeneous treatment effects, we restrict the sample to specific subgroups, including education level, gender, and the degree to which respondents report learning about personal finances from their parents. Table 9 summarizes each of the four outcomes. Here, the primary analysis compares coefficients across column pairs (1 vs. 2; 3 vs. 4; 5 vs. 6). While splitting the sample

TABLE 8

Treatment Effects for Non-Retirement Outcomes

	Education Saving	Late Fee	Auto Saving
Treat	0.00361	0.0276	0.00605
	(0.0185)	(0.0270)	(0.0322)
Observations	969	978	975

Notes: Robust standard errors clustered at the credit union level in parentheses. There are 45 credit unions. Treatment versus control models estimate Equation (1), reporting α_1 estimates. Controls include treatment, post, income, assets, age, sex, minority, college, home ownership, test score, children, and pre-period dependent variables.

*$p < .10$, **$p < .05$, ***$p < 0.01$.

Source: RP3 Surveys.

weakens statistical power, it offers useful insights into the mechanisms of financial education for this population.

The first two columns compare employees with no college to those with a college education. To the extent no college is a signal for lower levels of investment in financial literacy earlier in life, this comparison might show if employees with less education are more strongly influenced by the workplace-based education, which is consistent with Lusardi, Michaud, and Mitchell (2014). Both groups show similar coefficients related to IRA participation. However, the lower education group shows larger, and statistically significant differences in formulating a budget or having 3 months' savings—the lowest education levels respond with a larger magnitude than the highest education group. The effects for benefits enrollment are the opposite. Our interpretation is the margin for behavior change among

TABLE 9
Heterogeneous Effects

	(1) No College	(2) Low College	(3) Female	(4) Male	(5) Low Parent	(6) High Parent
Have IRA						
Treat	0.0691**	0.0641**	0.0597**	0.0959**	0.0868***	0.0377
	(0.0291)	(0.0256)	(0.0229)	(0.0399)	(0.0257)	(0.0340)
Use budget						
Treat	0.0589*	0.0134	0.0575*	0.00339	0.0571*	0.0240
	(0.0326)	(0.0438)	(0.0288)	(0.0727)	(0.0298)	(0.0405)
Three months' savings						
Treat	0.0606*	0.00229	0.0463	0.0640	0.0483	0.0607
	(0.0308)	(0.0496)	(0.0323)	(0.0632)	(0.0386)	(0.0409)
Enrolled in benefits						
Treat	0.0402	0.0653*	0.0276	0.0867*	0.0432*	0.0311
	(0.0283)	(0.0331)	(0.0283)	(0.0439)	(0.0245)	(0.0441)

Notes: Robust standard errors cluster at the credit union level in parentheses. Models estimate Equation (1), where we report α_1 estimates. All models include the following controls: treatment, post, income, minority status, home ownership status, a child indicator, and initial values of the dependent variables. High parent denotes that at least some of an individual's financial knowledge came from his/her parents, and low parent denotes that little or no information came from parents.

*$p < .10$, **$p < .05$, ***$p < .01$.

Source: RP3 Surveys.

the less-informed employees was strongest for budgeting and emergency savings. Benefits use may reflect underlying differences across these populations in terms of expected future income and expectations about household formation and fertility.

The second pair of columns ((3) and (4)) in Table 9 also shows a general tendency for a stronger response to the workplace education program among females in terms of using a budget, which again maybe the clearest and simplest behavioral response an employee could report having changed. Male employees appear to have somewhat stronger responses to education in terms of having an IRA or enrolling in benefits, although again this maybe based on differential expectations.

Finally, the last two columns show employees who reported that their parents never or seldom taught them about personal finance. Here, the results mirror a mix of the prior comparisons. The employees reporting lower levels of parent socialization related to personal finances have stronger responses to opening an IRA and enrolling in benefits. This group also shows a stronger response to using a budget, but not saving for an emergency. Given the smaller sub-samples, self-reports and unobserved differences between employees, these comparisons are hardly definitive. However, these general patterns paint a picture of an educational intervention having effects among those employees

with characteristics that might proxy for lower initial levels of financial capability.

VI. CONCLUSION

Self-assessed financial knowledge, self-reported financial planning, and self-reported savings behaviors appear to be positively affected by online education for employees of credit unions. Intention-to-treat estimates of effects include changes in behavior such as the increased use of IRAs, such as the 6 percentage point increase in IRA use. Moreover, the actual average monthly contributions to employer-sponsored savings plans increased by an estimated $26 per month. This is a significant increase per employee from a relatively modest intervention.

These results appear broadly consistent with previous results from Bayer et al. (2009), who estimated the association between education and savings at about a 12% higher rate of participation in retirement plans by non-highly compensated employees. By using longitudinal data, administrative records, and random assignment, our study has several methodological advantages to produce results that enhance the conclusions of prior work.

These results also are useful in the context of prior studies, such as Duflo et al. (2007). These authors found that offering economically meaningful financial incentives did not cause individuals to save more in IRA plans. However, one

barrier to the effectiveness of financial incentives could be a lack of information. Individuals may fail to respond to incentives for saving because they do not understand the terms of the savings plan, matches, or how these programs relate to their own personal financial plan (Ameriks et al. 2003). Employer incentives to save might generally benefit from being paired with financial planning and education, if the costs of delivery for employers and the opportunity costs of attending education for employees can remain relatively modest. Online-based education may provide one mechanism to provide such a low-cost delivery mode to targeted information.

Employees exposed to the educational modules were also more likely to engage in broader financial management activities. For example, the results show an increase in budgeting. The use of a spending plan helps individuals to better manage consumption and facilitate savings. Likewise, designating liquid savings for an emergency might help people smooth consumption, avoid short-term debt, and preserve their long-run savings for goals like retirement. These skills may prove especially valuable as employees separate from their employer and have to manage their retirement assets independently from their employer.

The marginal effect of the offer of the online education program on opening an IRA is about 11% relative to the mean—slightly less than the effects of those found in studies of opt-out or default-option policies—but still quite large. Education-based approaches might complement default or opt-out strategies given the heterogeneous preferences of individuals enrolled in automatic savings programs. With more information, employees may select different savings levels and products. By enhancing people's financial planning skills, employees with more education may better be able to manage their assets throughout their life, including upon retirement.

The costs of this intervention include the direct cost of fees for the online module, provided by a private firm, which is approximately $10 per employee. At an equivalent hourly wage of $20, if all employees spent 10 hours on the course, the total cost was about $210 per employee in terms of lost wages for the employer (not including any worker dis-utility from the training). The increased savings estimated above is an average of about $312 per year per employee offered the education. Assuming employees maintain that savings pattern for 10 years as their salaries increase, and earn a

3% real return on savings, that would result in about $4,200 in additional savings for impacted employees. This is all before considering additional savings in newly opened IRAs, emergency savings, or more general improvements in financial management behaviors. Whether this is a welfare-enhancing goal for firms or for society as a whole could be debated, but this study at least shows modest interventions can result in measurable behavioral changes.

According to the 2013 Survey of Consumer Finances by the Federal Reserve Board, those households between age 50 and 65 have an average of $59,736 in savings in IRAs, self-employment pensions (SEPs), Keoghs, or other nonemployer-based accounts. These accounts offer added flexibility and tax benefits, and are often a supplement to employer-based accounts. If online financial education can facilitate the use of employer and nonemployer-based retirement accounts, or can be used in conjunction with employer-based automated savings, then similar interventions may have potential to move people toward savings levels that are better calibrated with their personal consumption preferences in retirement.

These estimates arguably could be a lower bound on the effect of workplace financial education in other contexts. The sample in this study constitutes credit union employees, who may have a higher baseline of knowledge and a lower opportunity cost of obtaining financial education compared with the general population. However, it could also be the case that a certain baseline level of financial knowledge must exist prior to engaging in workplace financial education, which might suggest that these estimates are on the higher end. Because retail financial services at credit unions typically does not involve working with customers on issues of retirement planning, benefits, and investing, the topics in this education may not have had much direct application for employees in their work tasks.

The emergence of online and technologically enhanced education should trigger a closer look at the role of employee education in retirement policies. To the extent employers or policymakers seek to increase the rate at which employees are saving in employer-sponsored retirement plans, other sponsored benefits, or even IRAs, then, the offer of relatively modest online financial education programs has the potential to influence financial behaviors at a relatively low cost. For example, one potential policy would be to provide subsidies to firms who provide online education

at the workplace as an enhancement of tax incentives or changes in deferral limits. The launch of the U.S. Department of Treasury's low-cost myRA individual retirement account may offer another opportunity to connect employees to education as part of a savings strategy.

APPENDIX

FIGURE A1

Timeline
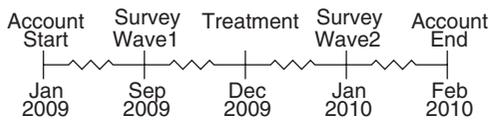
Notes: Account Start and Account End signify the timeframe for which we have information on individuals' credit union accounts. The survey waves describe the time at which individuals filled out the financial surveys, where it was necessary for the individual to complete the survey before obtaining the online education. Treatment describes the group that received the education offer.

SURVEY QUESTIONS

Financial knowledge[14]:

1. How much do you know about credit scores and credit files?
2. How much do you know about investing for retirement?
3. How much do you know about interest rates and loans?
4. How much do you know about stocks and bonds?

Financial behaviors:

1. Do you have an IRA retirement savings/investment account?
2. Do you have a weekly or monthly spending plan or budget?
3. I am taking advantage of all my retirement and insurance benefits at work. (1–5 agreement scale; rescaled disagree = 0, agree = 1)
4. I have at least three 3 months' expenses set aside in a readily accessible account (e.g., money market mutual fund). (1–5 agreement scale; rescaled disagree = 0, agree = 1)

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14. Five-point scales, where 1 = low and 5 = high self-reported knowledge; re-scaled to be between 0 and 1. Note that Allgood and Walstad (2016) show use of self-assessments is a reasonably valid measure compared with objective quiz questions in surveys.

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