

Can Simple Informational Nudges Increase Employee Participation in a 401(k) Plan?

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Abstract:

We report results from a field experiment in which a randomized subset of newly hired workers at a large financial institution received a flyer containing information about the employer's 401(k) plan and the value of contributions compounding over a career. Younger workers who received the flyer were significantly more likely to begin contributing to the plan relative to their peers in the control group. Many workers do not participate in their employers' supplemental retirement savings programs, even though these programs offer substantial tax advantages and immediate returns due to matching contributions. From a survey of new hires we find that many workers choose not to contribute to the plan because they have other financial priorities. However, some non-participants lack the financial literacy to appreciate the benefit. These findings indicate that simple informational interventions can nudge workers to participate in retirement saving plans and enhance individual well-being and retirement income security.

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CAN SIMPLE INFORMATIONAL NUDGES INCREASE EMPLOYEE PARTICIPATION IN 401(k) PLANS?

The importance of saving for retirement is widely acknowledged, yet employers often find workers fail to enroll in the optional retirement saving plans they offer. If employees choose not to participate in their employer's 401(k) plan because they have other financial priorities or for other reasons perceive that greater retirement saving is not in their own best interest at the present time, it may be difficult to increase participation and increasing retirement saving might actually lower lifetime utility for some employees. However, if the relatively low rate of participation for employees is attributed to inertia or lack of knowledge, a low cost intervention may be an effective tool to increase participation and improve employee wellbeing. To explore these issues empirically, we partnered with a large financial institution, hereafter referred to as LFI.

Our discussion begins with background information on employer-provided retirement savings plans and employees' choice of whether to participate. We then describe LFI, its retirement benefits, and the characteristics of its employees. Using detailed administrative data, we describe the patterns of participation in the company's 401(k) plan. To understand better the choices that workers are making, we investigate reasons for non-participation through a unique survey of all newly hired workers at LFI over a six month period. Respondents report a variety of reasons for non- and limited participation in the 401(k) plan, including paying off credit card debt and not having enough room in one's budget to save money for retirement. Using a set of financial knowledge questions, we find many survey respondents that are not currently participating in the 401(k) plan are unaware of the full range of benefits associated with saving through a tax qualified retirement saving plan. The survey indicates an important role for

financial literacy and knowledge regarding retirement savings in the decision to contribute to such plans.

For our main analysis, we report results from a field experiment. We designed a low-cost intervention whereby LFI distributed a flyer to a randomly selected subset of 401(k) plan non-participants who were hired in 2008 through 2010. The flyers contained a message encouraging employees to take advantage of the employer match using the common catchphrase, “Don’t Leave Money on the Table.” In addition, the flyers highlighted the long term value of small but continuous contributions to the savings plan that were matched by the employer. We find young employees who received the nudge had a statistically significantly larger increase in participation rates compared to workers of a similar age that did not receive the flyer. However, for workers over age 45, the percent initiating participation among the treatment group was statistically significantly lower than the control. These findings highlight the potential effectiveness of informational “nudges” for non-participants. They also suggest that the materials employers distribute to newly hired workers should be tailored to the particular needs and concerns of specific groups.

II. Influencing Employees’ Choices to Participate in a 401(k) Plan

Although many large corporations still provide their employees with defined benefit pension plans, these types of plans are becoming less common as firms move towards voluntary defined contribution plans. As of 2007, 63 percent of all workers had a defined contribution 401(k) plan as their only form of employer sponsored retirement savings (Munnell, Kopcke, Golub-Sass, and Muldoon, 2009). The benefits of participation in an employer sponsored 401(k) plan include the employer match, investment growth, and the tax advantages of retirement saving. Despite the advantages of contributing to the supplemental retirement saving plan, many

newly hired workers decline to participate in company-provided 401(k) plans. Lack of participation may stem from inadequate information about the characteristics of the plan or inadequate financial literacy to understand the value of the plan. On the other hand, employees might have other financial considerations that lead them not to participate, such as the need to pay off other debts or saving for other priorities such as a house or their children's education. In addition, an employee might decline to participate because they perceive that they are already accumulating sufficient assets for retirement through prior employment, their company's defined benefit plan, a spouse's employer-sponsored retirement savings plan, and/or expected Social Security benefits.

In large firms, newly hired employees are usually required to participate in a formal orientation program and are given considerable information concerning their employee benefits. In most cases, workers have to actively enroll in defined contribution plans and decide what percent of their salary they wish contribute to the plan each pay period. Since the passage of the Pension Protection Act in 2006, many companies have begun automatically enrolling new hires in their 401(k) plans at a default level of contribution. Automatic enrollment plans are effective at increasing participation but come at a cost to both employers and to employees that might not benefit from contributing. While automatic enrollment plans have been shown to be extremely effective at achieving a net increase in participation rates (see, e.g., Madrian and Shea, 2001; Choi, Laibson, and Madrian, 2004; Choi, Laibson, Madrian, and Metrick, 2002 and 2004; Clark, Morrill, and Maki, 2011), employers do have other options to help employees take full advantage of retirement benefits. If non-participation is due to inadequate information or a lack of financial literacy, employers might provide financial education to their employees. Clark and Schieber (1998) and, more recently, Nyce (2005) provide overviews of this literature and demonstrate,

using administrative records, that financial communications can have beneficial effects on employee's financial decisions. In our study, we show that a simple informational intervention can increase participation rates, at least among some groups. In distributing a flyer, employees that feel they would benefit from participation may be induced to enroll simply from receiving timely information and a "nudge" from their employer.

A. Factors Affecting the Choice to Participate in a 401(k) Plan

There are several factors that might influence a worker's decision to participate in an employer-sponsored 401(k) plan. First, workers need to know and understand both the tax advantage of contributing to a 401(k) and the size of any employer match in order to correctly assess the tradeoff of lower consumption today in return for higher consumption in retirement. If the employee does not fully appreciate these benefits, then he or she may place less value on contributions to the 401(k) plan simply because his or her calculation of the future return to these contributions is too low. In this case, providing information about the benefit of retirement savings might lead to higher participation rates. On the other hand, if an individual is saving according to a "rule of thumb" strategy that overvalues retirement savings, then providing additional information may cause the individual to revise downward the value of saving.¹ Of course, beyond participation, one must also consider the intensive margin of the level of savings.²

¹ Benartzi and Thaler (2007) discuss the rule of thumb savings heuristics often used by individuals to determine savings behavior.

² To determine the optimal level of saving, Scholz, Seshardi, and Khitatrakun (2006) presents a life cycle model for households to determine the optimal level of wealth accumulation. They account for uncertainties in longevity, earnings, medical expenses, as well as taxation and government transfers. They then compare the calculated optimal targets with actual wealth accumulation and find, surprisingly,

While financial literacy plays a strong role in retirement saving, the levels of financial literacy in the population vary across demographic groups. Gale, Harris, and Levine (2012) note that a large proportion of American adults with lower income, low levels of education, and on either end of the age spectrum (the very young and the very old) lack a basic understanding of financial concepts. Using the Planning and Financial Literacy Module of the 2004 wave of the Health and Retirement Survey, Lusardi and Mitchell (2011) find that financial literacy varies by race and gender.³

Besides knowledge and understanding of the benefits of participating in a 401(k) plan, financially literate individuals might be more likely to make the effort to enroll in a plan. Signing up for a 401(k) plan is costly in the sense that it requires the individual to allocate sufficient time to decide on a retirement plan, complete the appropriate allocation forms, and work with the company HR office and the plan provider. Workers may suffer from inertia and choose not to actively enroll in the plan simply to avoid the cognitive burden of figuring out how to enroll or calculating the benefits. For example, Sethi-Iyengar, Huberman, and Jiang (2004) find that employers with fewer plan options, and hence a simplified investment choice, saw higher 401(k) participation rates. If inertia is a component of an employee's choice not to

that over 80 percent of households in their sample have accumulated sufficient wealth to reach their optimal level of saving. However, their primary data was collected during 1992-1993, a period of strong stock market performance which can affect wealth accumulation.

³ A majority of Hispanic respondents were unable to correctly answer questions pertaining to interest compounding and inflation. Both Blacks and Hispanics were also least likely to be able to correctly answer the question regarding investment diversification. Women were less likely than men to correctly answer questions regarding risk diversification, and overall, display lower levels of financial literacy (Lusardi and Mitchell, 2011).

participate, then providing a flyer might both provide information and a “nudge” to encourage the employee to undergo the initiation process.

A second factor that determines the relative value of saving for retirement is employer matching contributions. Most prior research finds that workers are sensitive to match rates and higher employer matching contributions are associated with higher participation rates among employees (Papke, 1995; Papke and Poterba, 1995). In contrast, Mitchell, Utkus, and Yang (2007) compare benefits across firms and find that the existence of a match provides only a small incentive to participate. However, it may be that workers in firms that offer a match but also have a tenure requirement to be eligible for the match delay participation to coincide with when they become eligible for the employer match. Such a finding would imply that workers would have contributed to the plan sooner if the match was effective at the time of hire. Since all of the individuals in our study are employed by LFI, they all face the same plan characteristics and the terms of the employer match do not vary across workers; however, time since being hired should influence the decision to enroll as the employer match goes from 0 to 100 percent at the moment the tenure requirement is fulfilled. We find strong evidence of the importance of match eligibility in the choice to participate in the 401(k) plan.

Of course, many other factors outside of an employer’s control contribute to an individual’s decision to participate in a 401(k) plan. Previous literature modeling the choice to participate in a defined contribution plan has found that participation rates are higher among higher earners, older workers, workers with longer tenures, workers with higher levels of education, men, and white (when compared to black and Hispanic) workers (see, e.g., Bassett, Fleming, and Rodriguez, 1998; Munnell, Sunden, and Taylor, 2002; Madrian and Shea, 2001). The level of participation also varies depending on employee and company characteristics.

Many of the factors that influence participation are also correlated with higher contribution amounts (Holden and VanDerhei, 2001). While it is difficult to isolate the direct causal links, several factors that affect the relative weighting of current consumption to the future value of a benefit in retirement are associated with these demographic characteristics.

First, the magnitude of the tax advantage is dependent on the worker's annual salary. Thus, we may see those with higher salaries contributing at higher levels both because they have more disposable income and because they see a higher benefit to savings through tax advantaged retirement savings plans. Similarly, an individual has a personal discount rate which is used to value future consumption relative to today's consumption. Personal discount rates may also affect investments that individuals make in human capital and may change as individuals get closer in age to retirement. The market returns to savings will also determine the value of contributing to a plan.

It is common in this literature to find lower participation rates for women (see, e.g., Carroll, Choi, Laibson, Madrian, and Metrick, 2009). It might be that women earn less, so see less benefit from participating. It might also be that women are less informed about the benefits. If the latter is true, then we would expect women to initiate participation at higher rates if more information is provided. However, if women are less likely to incorporate new information into their evaluation of the benefit of participating, then an intervention might be less effective for women than men.

There are several reasons why we might expect participation rates to vary by age. Employees have other opportunities to save that will compete for any dollars that the worker might consider saving. These opportunities include saving for other factors besides retirement (home, car, etc) and also debt reduction through paying down credit card debt and paying off

student loans. Thus, the existence of these debts would be expected to lower the probability of newly hired workers enrolling in the 401(k) plan. These factors are likely to be correlated with age and salary. Further, the age of the individual is an indicator of how far away retirement is for the worker. Older workers might have a clearer picture of the future or more recognition of the current lack of sufficient resources to fund an adequate retirement. If younger workers are less informed because retirement is a far-off and abstract concern, then these individuals will not participate at higher levels even though their actual benefit might be larger due to compounding and tax advantages. Providing information to younger workers might produce a larger change in the probability of participating relative to older workers, if younger workers are indeed less informed about the benefits of participating and the power of having many years of compounding returns.

Recent research suggests that the behavior of peers might also influence an individual's choice to participate in a company 401(k) plan. Duflo and Saez (2002) find that the choice to enroll in an employer sponsored retirement savings account is affected by the enrollment status of other employees within the same department. Beshears, Choi, Laibson, Madrian, and Milkman (2011) evaluate the effect of social norms marketing (providing information about peer behavior) on retirement plan enrollment. They find that for unionized employees, the likelihood of enrollment was negatively correlated with the magnitude of communicated peer information.⁴

⁴ Peer participation was provided by age range, and some age ranges had higher levels of plan participation than others. Among those individuals who received the intervention, those in subgroups with higher peer participation rates were less likely to initiate participate relative to those in subgroups with lower peer participation rates.

B. Plan Design versus Employer-Provided Financial Education

To make optimal retirement saving decisions, workers must have sufficient knowledge about the plan and its benefits and the financial literacy that would enable them to correctly assess the payoff of saving through the 401(k) relative to other forms of saving and debt reduction. Typically, at employee orientation or shortly after an employee is hired the employer provides detailed information about the plan including specifics of the employer matching contributions, various investment options, maximum allowable contributions, and the procedure for enrolling. Having received this information, workers must then decide whether to enroll in the retirement saving plan at that time and, if so, how much they would like to contribute. Workers that do not begin participating immediately can always choose to begin participating at any future time period.

Choi, Laibson, and Madrian (2004) describe several features of plan designs that encourage participation including employer match rates, the menu of funds, options for taking loans from the plan, the presence of a defined benefit plan, and automatic enrollment. Several studies of individual employers have found automatic enrollment to be successful at increasing participation rates in 401(k) plans (e.g., Madrian and Shea, 2001; Munnell, et al., 2009). Clark, Maki, and Morrill (2011) find that the adoption of automatic enrollment in a medium size firm increased participation in the company 401(k) plan from 60 percent in the year before its adoption to over 90 percent in subsequent years. As discussed in O'Neill (2007), although these types of plans are effective in increasing participation, they are costly for employers and may lead to individuals being defaulted into plans that are not optimal for their personal circumstances (see also Brown, Farrell, and Weisbenner, 2011). Carroll, et al. (2009) describe

how “active decisions” can be an appealing alternative to defaults if the population of employees is sufficiently financially literate.

Employers interested in increasing participation in a 401(k) plan might consider providing an informational nudge to their employees to address concerns of lack of knowledge and inertia, as described at the beginning of Section IIA. Employers that do not want to implement an automatic enrollment policy, but do want to encourage higher participation rates, might find that providing targeted and timely information to workers is an effective alternative. Low cost informational interventions have been found to be successful in other contexts. For example, Liebman and Luttmer (2011) conducted a field experiment that provided information about social security provisions and found significant effects on female labor force participation. In a randomized experiment conducted at a large university, Duflo and Saez (2003) found people who were exposed to employees that received more information about their 401(k) plan were more likely to participate.

In related work, Choi, Haisley, Kurkoski, and Massey (2012) show the effectiveness of a similar field experiment where email messages were sent to employees to encourage 401(k) plan participation and higher contribution rates. They find that anchoring, goal setting, and savings-threshold salience influenced the subsequent savings behavior of the employees. Karlan, McConnell, Mullainathan, and Zinman (2010) provide theoretical support for the effectiveness of reminders and demonstrate in a series of field experiments that savings in consumer bank accounts can be increased through timely reminders. Goda, Manchester, and Sojourner (2012) perform a large scale field experiment to test for bias in the way individuals think about compounding. Using a low cost intervention, they inform recipients about how current saving translates into future retirement income using a variety of different frameworks. They find that

the information was effective in increasing contribution levels. Their results highlight the effects of behavioral influences in the decision making process.

III. The Large Financial Institution Descriptive Statistics⁵

The large financial institution (LFI) with whom we partnered is a publically traded banking, insurance, and investments company and is among the top ten largest financial service corporations in the United States. LFI has over 30,000 active workers located in 13 states. At LFI, all newly hired employees participate in a company orientation program. The orientation occurs during the first two weeks of employment and includes discussion of the defined benefit and 401(k) plans. LFI provides employees with access to Pro Nvest, a company that has partnered with LFI to provide retirement planning services and education. The 401(k) participant guide, discussed during the orientation, provides the employee with information about investing. The guide includes formulas for calculating how much is needed for retirement, explanations of the importance of considering inflation when planning for retirement, and illustrations of compounding power. There is an extensive discussion of the tax advantages of the company sponsored retirement plan and examples demonstrating the advantage of pre-tax retirement savings. The information distributed in our “nudge” is adapted from these materials, so should be familiar to all employees. Employees are also encouraged to participate in the 401(k) plans during annual reviews.⁶

LFI offers a traditional final average pay defined benefit plan to its full-time employees.

⁵ For a comprehensive discussion of the employer examined in this paper, please see Clark and Morrill (2010) and Clark, Morrill, and Maki (2011).

⁶ Annual reviews for officers occur in February; for non-officers all reviews occur at the employee’s one year anniversary.

In addition, employees are offered the option of participating in the company's 401(k) plan. Employees can make contributions to the plan starting the first day of the calendar month following employment. To be eligible for the matching contributions, the employee must be at least 21 years of age and must complete 1,000 hours of service within the 12 months following his or her hire date. LFI offers a 100 percent match on the first 6 percent of compensation contributed to the plan.⁷ LFI allows employees to contribute to up to 50 percent of their pay to the plan. Employees may enroll in the plan by using LFI's PlanTrac website or may enroll over the phone. Changes can be made on a daily basis and contribution rates can be changed at any time. Participants may invest in the plan's core funds or in a self-directed brokerage account (available through TD Ameritrade). The plan allows for both loans and hardship withdraws.

LFI provided us with detailed, de-identified administrative data on all employees hired between January 1, 2008 and December 31, 2010. For our analysis we restrict the sample to those who were actively employed on June 20, 2011. The data include annual compensation, gender, date of birth, date of hire, match eligibility status, date of first contribution to the 401(k) plan, and contribution amount (as a percent of salary).⁸ Table 1 provides summary statistics of the over 7,000 newly hired employees in our sample. Of workers hired during this period, 49

⁷ The match on the first 4 percent is referred to as the basic match contribution while the remaining 2 percent is called the supplemental match. The supplemental match is subject to vesting requirements which state that it may be forfeited if the employee engages in misconduct including embezzlement, theft, or larceny or engages in direct competition with the firm, unless the employee has three years of continuous employment with the firm or has reached age 65.

⁸ Because signing and year-end bonuses make measuring the annual compensation for recent hires somewhat complicated, we make adjustments to the annual compensation reported in the data. We define salary as the total 2010 compensation reported in February of 2011 for those hired in 2008 and 2009. For those hired in 2010, we adjust the year-to-date compensation reported in June 2011 to be an annual salary.

percent are participating in the voluntary 401(k) retirement savings plan as of February 28, 2011, with an average contribution rate of 6.6 percent of salary among those contributing.⁹ As expected, participation rates are higher among men, older workers, and those earning the highest salaries. Note that the majority of low salary workers are part-time employees (such as bank tellers), but are still eligible to participate in the 401(k) plan. Plan participation and average contribution rates move in the same direction; those groups with higher participation rates also have higher average contributions conditional on participating. This indicates that not only are men, older workers, and higher earning workers participating more, but they are also saving a higher fraction of their salaries.

[Table 1]

By comparing participation rates by year of hire at the bottom of Table 1, we see that participation rates are positively correlated with tenure.¹⁰ Note that the employer match does not begin until 12 months after hire date, so that workers hired in March through December of 2010 were not yet eligible to receive matching employer contributions.¹¹ We see a large difference in

⁹ Note that we have 144 observations with a valid date of first contribution but a missing value for the percent contributing. It is likely that these workers began participating but either suspended their contributions or took a loan from their account. For the purposes of our analysis, we have chosen to define “participating” as those that have ever contributed to the plan since these individuals have an account and an account balance. Although these workers are classified as participating, they are excluded from calculations using contribution rates.

¹⁰ To some extent, the difference in participation rate by hire year also reflects the pattern that those who enrolled in the 401(k) plan are less likely to leave the company (or those that are more likely to leave the company do not enroll in the 401(k) plan). It may also be the case that cohort participation rates rise over time as a result of higher salaries, learning, or aging closer to retirement.

¹¹ Match eligibility is a function of both hours of service and tenure and is determined by a classification provider by the employer as of February 28, 2011.

participation rates by match eligibility status. Only 34.5 percent of workers that are not yet match-eligible participate, which is substantially lower than the participation rate for those hired in 2008 (63.7 percent), 2009 (52.9 percent), and the first two months of 2010 (54.5 percent).

Figure 1 illustrates the contribution rate for new hires enrolled in the 401(k) plan as of February 28, 2011. Of the 3,534 workers that actively contribute to a 401(k) plan, 43.4 percent contribute at the 6 percent level, exactly the amount needed to receive the full employer match. Over 26 percent of those enrolled contribute amounts above the six percent level.¹² Thus, two thirds of all newly hired employees who participate in the retirement saving plan are contributing at levels that enable them to receive the full employer match.

[Figure 1]

Next, we estimate a multivariate regression of the choice to participating in the 401(k) plan for the sample of all 7,218 workers hired between 2008 and 2010. The estimated average marginal effects from a logit model are presented in Column 1 of Table 2. First, workers hired in 2008 and 2009 have higher participation rates relative to the more recent hires. Consistent with the differences in means presented in Table 1, the estimates reported in Table 2 indicate that among the workers hired in 2010, those that are match-eligible have a significantly higher participation rate than those who were hired in 2010 and are not yet match eligible. The average marginal effect is 15.7 percentage points, which is approximately 32 percent of the mean

¹² Many workers who do participate in the 401(k) plan do so quickly. Of the 2,398 employees hired in 2008, approximately 36 percent of the 1,527 contributing had enrolled within the first three months of their employment. In results not shown, the participation rate increases steadily at about one to two percent per month, with a small increase in the rate once employees become eligible for the employer match.

participation rate.¹³ Female employees of LFI are significantly less likely to be participating in the 401(k) plan, but the difference is small in magnitude. Higher salary is associated with an increase in the participation rate. These findings are consistent with the literature described in Section II.

[Table 2]

Column 2 of Table 2 presents estimates from an OLS regression on the percent of salary contributed by employees hired between 2008 and 2010, limited to plan participants only. Here we see no statistically significant difference in the contribution rate conditional on participation by the year of hire or match eligibility, although the estimates are imprecise. Women contribute significantly less to the saving plan than men, while workers age 45 and above contribute approximately 2 percent more of salary relative to workers age 25 to 34. And, finally, employees with greater annual incomes contribute a larger percentage of their salary to the 401(k) plan.¹⁴ The results indicate a relationship between participation and contribution rates. We see that not only are older workers and higher salaried workers more likely to participate, but they are also contributing at higher levels conditional on participation.

¹³ Because participation in the 401(k) plan is supposed to be discussed by managers during annual reviews, the group that is match eligible may also have a higher participation rate due to this reminder from their managers.

¹⁴ While we find that income and contribution percentage are positively correlated. Holden and VanDerhei (2001) find in their analysis of the 1999 contribution behavior of 1.7 million 401(k) participants that salary and deferral percentage are positively correlated up to an annual earning amount of \$80,000 after which point the correlation become negative. They note that many of the plans included in their analysis allow for a maximum contribution of \$10,000, which may be driving this result. LFI, on the other hand, allows employees to contribute up to 50 percent of salary so we do not expect to see a similar trend here.

In the final column of Table 2 we instead consider a binary indicator for whether the individual is contributing 6 percent or more of salary (i.e., taking full advantage of the employer matching contributions). Estimated average marginal effects from a logit model are reported. In general the patterns are very similar to those found looking at contribution rates, except here we see a positive and statistically significant effect of tenure. We find that match eligibility is associated with an approximately 5 percentage points higher probability of electing a contribution amount of 6 percent or higher, conditional on participating.

IV. Attitudes and Knowledge of Newly Hired Workers

In order to better understand why workers are making key retirement saving choices, we developed a short survey. LFI distributed the surveys between March 2011 and August 2011 to all employees hired between December 2010 and May 2011 approximately 60 to 90 days after hire. This lag was chosen to ensure that all survey recipients would have had sufficient time to enroll in the 401(k) plan prior to responding. The surveys were available online to employees at the first of every month, and the link to the survey remained open for the duration of that month. New links were sent each month, for a total of six months. Surveys were sent to 1,947 new hires, and 356 individuals completed and returned the surveys for a response rate of 18.3 percent. Note that the surveys cover workers hired between December 2010 and May 2011. We do not have administrative data on workers hired in 2011, and we are not able to link surveys to the administrative records for the December 2010 new hires. Appendix A discusses how representative the survey respondents are compared to the administrative data from the 2008-2010 new hires. Survey respondents are much more likely to be participating in the 401(k) plan, are slightly older, earn more, and are more likely to be male relative to the full group of 2008-2010 new hires.

The first objective of the survey was to learn more about employee attitudes regarding the information they were provided concerning the 401(k) plan. We present responses disaggregated both by age group and by participation status in the 401(k) plan. Note that all of the survey respondents were eligible to participate in the plan, but none had earned sufficient tenure to qualify for employer matching contributions as of the survey date. Table 3 presents responses to select questions regarding the employee's perception of the value of information he or she received and on the sources of information the employee relied upon when making his or her participation decision. Although the most common rating of the information LFI provided was that it was "very comprehensive," participants gave higher ratings than non-participants. Approximately one-third of younger workers who were already participating in the plan reported that they would have benefitted from more information. Interestingly, the older workers were over twice as likely relative to younger workers to not have read the information that their employer provided about the 401(k) plan. Further, in response to a question about how the information influenced their participation decision, we find that over half of all workers said the information did not influence their participation decision. Nearly 80 percent of older workers not yet participating in the plan stated that the information they received did not influence their participation decision, compared to about 60 percent of younger non-participating workers.

[Table 3]

The bottom row of Table 3 shows large differences by age group in the sources of information that respondents report as influencing their decision to participate. Younger workers are far more reliant on family, relatives, colleagues, friends, and the internet than are older workers. The employer resources, including the plan website and benefit office, were reported to be useful sources of information by both age groups and both participants and non-participants.

The reliance on employer resources highlights the potential impact of the human resource/benefits department on employee retirement saving behavior and decision making. Interestingly, participants reported being influenced by a financial advisor, newspapers, books, and magazines more frequently than non-participants. Taken together, the responses reported in Table 3 indicate that younger workers may be more responsive than older workers to receiving additional information from their employer. We find younger workers are more likely to seek out information from their employer and that that information influences their participation decision.

The second goal of the survey was to learn more about the financial constraints that affected the participation and contribution rates of new hires. If new hires are not participating because they have other financial obligations, such as paying down high interest loans, then an employer intervention aimed at increasing participation may not be effective. To understand the reasons for limited or non-participation, we included parallel questions for participants and non-participants. For those that were currently participating in the 401(k) plan, the question asked what factors limit the amount the respondent is currently contributing. For non-participants, the question asks what factors are inhibiting the choice to contribute. Both questions listed a series of possible reasons where the respondent could select all that applied. Responses to these questions are reported in Table 4, listed separately for the two age groups.

[Table 4]

The employer match emerges as a key factor in the decision to participate in 401(k) plan and the level of contributions among participants. Recall that none of the survey participants were currently eligible for the matching contributions, which begin after 12 months of employment. Among those who were not yet contributing to the 401(k) plan, over 50 percent

indicate that they plan to start contributing when they met the eligibility conditions for the employer match. The second most common response is that “my salary covers my monthly living expenses with no extra room for retirement savings.” This reason is more common for the younger workers than older workers. Also more common for younger workers is the need to pay off debt including credit card debt, student loans, mortgages, or other debts. Furthermore, younger workers are also significantly more likely to be saving for a large purchase such as a car or home. Older workers participating in the plan are significantly more likely than younger workers to report that taking into account Social Security, pensions, and spouse’s retirement, “I expect that I will have sufficient retirement income with the amount I am currently contributing.”

The responses reported in Table 4 suggest that not all employees would benefit from being automatically enrolled in a 401(k) plan. Rather, for some employees their non-participation results from an evaluation of their own financial portfolio. However, one should be cautious in drawing too broad a conclusion from these results since the survey response rate was less than 20 percent and the sample of respondents is not necessarily representative of the full population of newly hired workers.

Next, we explore how important financial literacy is to the choice to participate in the plan. The survey included five questions designed to measure the basic financial literacy of the newly hired employees. The questions, shown in Appendix B, focus on the individual’s knowledge concerning the importance of compounding interest rates, the effect of inflation on real income, the importance of investment diversification, tax advantages associated with investing in the 401(k) plan, and the value of the employer match. The instructions state that if the respondent does not know the correct answer, he or she should provide his or her best guess. We limit the sample to those that left no more than two questions blank. If the respondent left

the question blank or selected “don’t know” it is recorded as an incorrect response. Table 5 shows the proportion of new hires by enrollment status who answered these questions correctly.

[Table 5]

First, on aggregate, we see the knowledge score is highest for participants relative to non-participants and for older relative to younger workers. The largest differences between participants and non-participants are in knowledge of inflation, investment diversification, and the 401(k) tax advantage. The inflation and investment questions are measuring general financial literacy, while the 401(k) tax advantage question specifically addresses the value of participating in the plan. In general, we find that the tax advantages of 401(k) plan participation are not well understood by any group, with fewer than half of all respondents able to correctly identify the net effect of a 401(k) contribution on after-tax take home pay (see Appendix B, Question 4). Because we find participants have higher financial literacy than non-participants, efforts to improve financial knowledge could lead to an increase in 401(k) plan participation for both older and younger workers.

The results of our survey indicate that an employer intervention aimed at both educating and encouraging employee participation in the 401(k) plan could be effective. Workers, particularly those under age 45, report looking to their employer for information about saving for retirement. Although many workers report having too little extra money to save for retirement after paying down debts and saving for a large purchase, many also do not exhibit a full appreciation for the tax advantage of contributing to a 401(k) plan. These results indicate that providing information could increase worker well-being if the employee does not fully recognize the long-term benefits of participating in the 401(k) plan. However, if workers are fully

informed and financially literate, then providing additional information could still affect participation through “nudging” them to sign up.

V. Nudging Non-participants: A Randomized, Controlled Experiment

We designed a field experiment to test whether additional employer-provided financial education could be effective in increasing 401(k) plan participation. All employees hired during 2008 through 2010 who were not participating in the plan as of February 28, 2011 were randomly assigned to treatment and control groups. Appendix C describes the randomization and presents means verifying the success of the randomization.¹⁵ The treatment group received a flyer that included a brief example of investment growth over time and instructions on how to sign up for the company’s 401(k) retirement savings plan. The control group did not receive any additional information, but both groups still received packets at orientation and follow-up encouragements during annual reviews. A copy of the flyer is included in Appendix E. The information contained in the flyer is adapted from information that was already presented to all workers in their benefits package. The intervention highlights the benefits of saving, and, in particular, the value of compounding and potential for investment growth over time. The flyer was not altered for any specific group and illustrated the wealth accumulation that would occur with 40 years of savings.¹⁶ The flyer itself was adapted from material that LFI already provides to newly hired workers during orientation, with some small modifications including the addition

¹⁵ The treatment group was broken into two sub-groups. The first was given a version of the flyer had an additional statement on the savings behavior of all employees in the company to test for peer effects. Ultimately, no difference was found between the two treatment groups. Full results broken down by treatment group status are included in Appendix D.

¹⁶ Although tax advantages are also important, they were not addressed in the intervention in the interest of simplicity.

of an emphasis on employer matching contributions.¹⁷ The orientation materials are not targeted to certain age groups or planning horizons and also include a 40 year investment horizon.

The intervention was designed to isolate the effect of information on retirement saving behavior as measured by the proportion of workers who are active participants in the 401(k) plan. Nearly 4,000 workers participated in the experiment, allowing for the exploration of heterogeneity in responses by demographic characteristics. The recipients were unaware that their behavior was being observed, and because the researchers observe the outcome of interest in administrative data, there is no reporting bias. Therefore, any difference in the rate of initiating participation in the 401(k) plan that is observed between the treatment and control group can be attributed to the receipt of the low-cost flyer.¹⁸

The flyers were distributed to employees at LFI in mid-April 2011. Most of the flyers were distributed by email, but employees that did not have regular access to a computer at work were sent a black and white print-out of the flyer through interoffice mail. Appendix Table C illustrates that the delivery method was not randomized, although in Appendix Table D we see that the impacts were similar. We measure participation initiation as of June 20, 2011, which allowed employees approximately two months to respond to the information they received.

¹⁷ The examples showing the savings from reduced consumption on certain items and the impact of investing these funds in the 401(k) plan were taken from the retirement plan's handbook. For consistency, the flyer made the same assumptions concerning the investment period and rate of return as used by the plan provider in the information given to newly hired employees.

¹⁸ We chose to focus only on the choice to participate and not on the level of contribution. In results available upon request, the intervention had no effect on the level of contribution among those that initiated participation.

Employees who terminated employment during the study period were excluded from the analysis.¹⁹

Table 6 presents statistics on the percent participating as of June 20, 2011. Because the sample includes only those that were not participating as of February 28, 2011, the percent participating in June is an indication of the percent of workers that initiated participation during our study period. Although the average participation rate of employees in the treatment group is 1.0 percentage points (17 percent) higher than the control group, the difference is not statistically significant. However, when the sample is disaggregated by demographic characteristics, we see that the intervention did significantly affect the retirement saving behavior of some groups of employees.

[Table 6]

The largest effect of the intervention can be seen when comparing employees in different age groups. Results indicate that younger employees, those 18 – 24 years old, were 4.5 percentage points more likely to join the 401(k) plan if receiving an intervention relative to the control. For this group, those receiving the intervention were over twice as likely to initiate participation in the plan relative to the control group. A similarly large and statistically significant difference was observed for workers ages 35-44. On the other hand, for the age group 45 years and older, those receiving the intervention were a statistically significant 4.4 percentage points *less* likely to initiate participation relative to the control group. As the intervention highlighted the importance of saving early by demonstrating investment growth over time, it is

¹⁹ Termination was not correlated with receipt of intervention material, results available upon request.

possible that this older group of workers were actually discouraged from participating in their employer 401(k) plan.²⁰

Table 7 presents the estimated average marginal effects from a logit regression on the individuals' choice to initiate participation over the study period. The first column presents estimates for the full sample, while columns (2) and (3) include estimates for those ages 18-44 and 45 and older, respectively. The intervention significantly increased participation for workers ages 18-44, while it significantly decreased the likelihood to initiate participation among those workers ages 45 and older. The regressions also include controls for salary, gender, year of hire, and match eligibility.²¹ Workers hired January through May of 2010 were significantly more likely to initiate participation relative to workers hired in June through December of 2010, which we interpret as the effect of recently becoming match-eligible along with any effect from reminders during the annual review. It is interesting to note that the results indicate little differences in the probability to initiate participation by salary or gender.

[Table 7]

Next, we explore heterogeneity in the effect of the intervention by salary, gender, and match eligibility. If there are particular groups that are more responsive to the intervention, then those may be targeted in the future to increase participation rates. Because the effects of the intervention are so different between the older and younger age groups, we present all analysis for the two groups separately. In the top half of Table 8, we see that the positive effect of the

²⁰ In Table 6 we see that a similar positive and negative pattern appears by salary level, but in results not shown, when we control for age in a regression framework we find this difference is due to age rather than income-level.

²¹ Match eligibility is a function of both hours of service and tenure and is determined by a classification provider by the employer as of June 20, 2011.

intervention for younger workers is concentrated among men, whose participation rate was increased by 4.4 percentage points over the control group. We also see that among younger workers the intervention was most effective for those that were not yet match-eligible. On the other hand, in the bottom half of Table 8, we see that for those ages 45 and above, the negative effect on participation due to intervention is stronger for higher salaried workers, males, and those not yet match-eligible.

[Table 8]

VI. Discussion and Conclusions

Although these results do show that a low cost intervention can be effective in increasing 401(k) participation among some groups, we find the effectiveness varied by employee characteristics. Women were far less responsive to the intervention than men, and only the most recently hired workers behaved significantly differently than the control. Most importantly, we find that older workers were actually less likely to participate if they received the flyer relative to the control group. We find that among workers ages 18-44 that were initially not participating in the 401(k) plan, those that were sent a flyer were 2.5 percentage points (roughly 40 percent of the mean of 6.6 percent) more likely to initiate participation in the 401(k) plan relative to the control group. However for the workers ages 45 and older, receiving the intervention actually led to a lower initiation rate.

Our intervention was designed based on materials already distributed to workers at orientation. The flyer emphasized the value of compounding using a standard 40 year time horizon. Older workers in our sample may have been put off by the framing of this information, an unintended consequence of the design of our flyer. Older workers in the control group had a sign-up rate that was over twice as large as younger workers in the control group, suggesting that

older workers already had an appreciation of the value of participating and that the framing of the flyer may have been discouraging to those in the treatment group. Prior literature has highlighted an important role for anchoring and framing in retirement savings (e.g., Choi, et al., 2012). Future work should further explore whether materials currently distributed to employees could be improved by better highlighting the benefits to the particular demographic group of interest. At a minimum, our results suggest that information distributed to workers might be more effective if it is tailored to the circumstances of the group. Perhaps current differences in participation rates by broad demographic category are a reflection of framing and the design of employer-provided educational materials.

One important caveat to these results is that the design of the study allowed only two months between the intervention date and the outcome evaluation. It is possible that some groups respond more slowly and a follow-up study allowing for more time to enroll would find different patterns or larger effects. It is also important to note that the sample used included only individuals who had not already enrolled in the plan, perhaps due to inertia or a lack of understanding of the employer match and compounding. Viewed in this light, the increases in participation from the nudge are even more impressive. In addition, we should emphasize that the nudge was extremely low cost. It was developed using information already provided by the plan provider and sent through company e-mail or interoffice mail. Thus, even modest increases in participation rates are impressive from a cost-benefit perspective.

There are several potential reasons why workers might fail to participate in an employer-sponsored 401(k) plan. On one hand, employees might not fully appreciate the value of participation or might suffer from inertia. On the other hand, it might be that employees are choosing not to participate in order to spend money on paying down debt or to save for a large

purchase. In order to understand the importance of these factors, we present results from a short survey of newly hired workers. Results confirm the importance of the employer match in participation and contribution decisions. We find an important role of financial education in retirement savings, since not all benefits of participating in an employer sponsored 401(k) plan are well understood.

Employers seeking to raise participation rates in a 401(k) plan may choose to modify plan design through manipulation of such features as employer matching contributions, defaults and automatic enrollment, or eligibility and vesting periods. However, if workers either suffer from inertia or fail to fully appreciate the value of participating, a simple informational nudge might be an attractive alternative.

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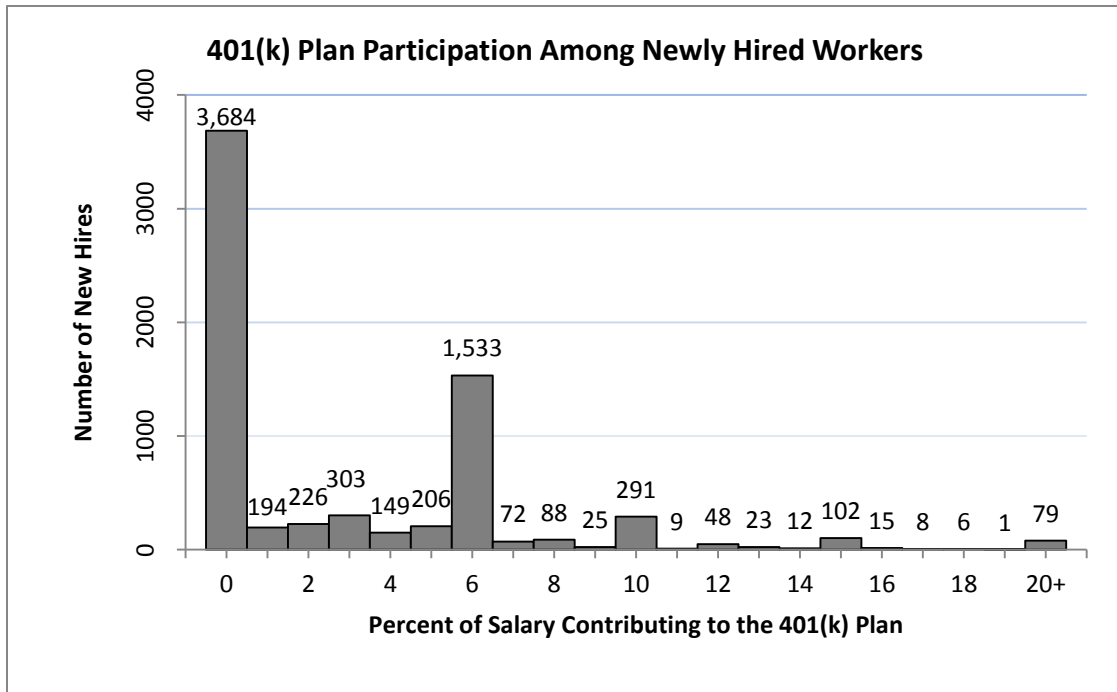
Figure 1: Contribution Rates of Workers Hired in 2008-2010 as of February 2011

Table 1: Participation Rates Prior to Intervention for Employees Hired in 2008-2010

		Percent of Sample	Percent Participating in 401(k) Plan	Average Contribution Rate among Participants
		(1)	(2)	(3)
Total		100%	49.0%	6.6%
Gender	Female	65.8	43.2	5.8
	Male	34.2	60.0	7.6
Age	<25	25.5	39.2	5.4
	25-34	32.0	49.8	5.8
	35-44	21.1	50.9	6.5
	45+	21.5	57.4	8.5
Salary	<29,999	42.7	29.2	5.0
	30,000-59,999	34.2	55.4	5.8
	60,000+	23.1	75.9	8.5
Hire Date	in 2008	33.2	63.7	6.5
	in 2009	20.0	52.9	6.4
	in Jan - Feb 2010, Match-Eligible	5.4	54.5	6.5
	in Mar – Dec 2010, Not Yet Match-Eligible	41.4	34.5	6.9

Notes: The sample is 7,218 workers who were hired between 2008 and 2010 and were still actively employed as of June 20, 2011. Participation, contribution rates, and age are measured as of February 28, 2011. Column (3) is the average contribution rate among those participating in the 401(k) plan, expressed as a percent of annual salary.

Table 2: Regression Analysis of Participation Choice and Contribution Rate

	Participation	Contribution Rate (Participants Only)	Deferral of 6% or More (Participants Only)
	(1)	(2)	(3)
Hired 2008	0.265 ^{***} (0.012)	-0.129 (0.194)	0.048 ^{**} (0.018)
Hired 2009	0.169 ^{***} (0.013)	-0.263 (0.228)	0.050 [*] (0.021)
Match-eligible 2010 hire	0.157 ^{***} (0.023)	-0.629 (0.369)	0.059 (0.033)
Female	-0.030 [*] (0.013)	-0.780 ^{***} (0.177)	-0.096 ^{***} (0.017)
Age 18-24	-0.037 ^{**} (0.014)	0.126 (0.229)	0.060 ^{**} (0.019)
Age 35-44	-0.044 ^{**} (0.015)	0.323 (0.225)	0.007 (0.021)
Age 45 and above	-0.006 (0.015)	1.965 ^{***} (0.220)	0.140 ^{***} (0.019)
Salary (in Thousands)	0.004 ^{***} (0.000)	0.022 ^{***} (0.002)	0.002 ^{***} (0.000)
Observations	7,218	3,390	3,390

Notes: See Table 1 for a description of the sample and the relevant means. Column (1) presents average marginal effects derived from a logit model where the dependent variable is the choice to participate. Column (2) presents coefficients from an OLS regression on the contribution rate for participants. Column (3) presents average marginal effects derived from a logit model where the dependent variable is the choice to contribute 6% or more of salary. The 69.5 percent of participants contribute at this level. Participation, contribution rates, and age are measured as of February 28, 2011. The omitted categories are hired in 2010 but not yet match-eligible and age 25-34 and salary \$30,000 - \$59,999. A constant is also included in each specification. Standard errors are in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3: Plan Participants' Evaluation of Employer-Provided Financial Education

	Participants		Non-Participants	
	Ages 18-44	Ages 45+	Ages 18-44	Ages 45+
	(1)	(2)	(3)	(4)
Q: How would you rate the info you received?				
The information I received was very comprehensive.	66.3%	75.0%	62.7%	52.2%
I would have benefited from more information.	32.0%	19.1%	24.2%	26.1%
I received information regarding my employer's 401(k) plan but did not read it.	2.0%	4.4%	6.3%	13.0%
I did not receive any information regarding my employer's 401(k) plan.	2.6%	1.5%	3.2%	4.3%
Blank	0.7%	0.0%	0.0%	4.3%
Q: Did the information you received influence your participation decision?				
Yes, the information I received influenced my decision to participate.	44.0%	41.2%	33.7%	17.4%
Yes, the information I received influenced my decision to NOT participate.	0.6%	0.0%	7.4%	4.3%
No, the information did not influence my participation decision.	55.3%	58.8%	57.9%	78.3%
Blank	0.0%	0.0%	0.1%	0.0%
Q: What sources of information influenced your participation decision? (Respondents could select all that apply)				
Family and relatives	61.3%	27.9%	63.2%	47.8%
Colleagues and friends	30.0%	10.3%	21.1%	4.3%
Benefit office, website, other employer resources	40.7%	32.4%	31.6%	30.4%
Internet	12.0%	4.4%	7.4%	0.0%
Newspapers, books, magazines	18.7%	25.0%	10.5%	0.0%
Financial advisor	21.3%	25.0%	16.8%	13.0%
Number of Respondents	150	68	95	23

Notes: Sample is survey respondents hired between December 2010 and May 2011. Age is approximated from year of birth.

Table 4: Reasons for Non- or Limited Participation in 401(k) Plans, By Age Group

Panel 1: Participants			
What factors limit the amount you contribute to the 401(k) plan?	Ages 18-44	Ages 45+	Difference
I plan to increase my contribution amount once I am eligible for the employer 401(k) match.	29.3%	19.1%	10.2*
I am concerned about the volatility of the stock market.	6.0%	5.9%	0.1
Taking into account SS, pensions, and spouse's retirement, I expect that I will have sufficient retirement income with the amount I am currently contributing.	6.0%	14.7%	-8.7*
Instead of saving more for retirement, I am paying off credit card debt.	16.0%	7.4%	8.6**
Instead of saving more for retirement, I am paying of student loans, mortgages, or other debt.	22.7%	10.3%	12.4**
I am primarily concerned with saving for a large purchase such as a car or a home.	13.3%	1.5%	11.8***
I plan to start saving more in the future when I am closer to retirement.	7.3%	7.4%	0.1
My salary covers my monthly living expenses with little extra room for retirement savings.	32.0%	13.2%	18.8***
Other (write-in)	12.0%	26.4%	-14.4
Number of Respondents	150	68	
Panel 2: Non-Participants			
Why are you not currently contributing to the plan?	Ages 18-44	Ages 45+	Difference
I was not aware my employer provided this saving option.	1.0%	0.0	1.0
I plan to start once I am eligible for the employer 401(k) match.	54.7%	52.2%	2.5
I am concerned about the volatility of the stock market.	4.2%	0.0%	4.2
Taking into account social security, employer pensions and spouse's retirement benefits, I expect that I will have sufficient retirement income.	0.0%	4.3%	-4.3
Instead of saving for retirement, I am paying off credit card debt.	11.6%	8.7%	2.9
Instead of saving more for retirement, I am paying of student loans, mortgages, or other debt.	16.8%	4.4%	12.4**
I am primarily concerned with saving for a large purchase such as a car or a home.	10.5%	0.0%	10.5***
I plan to start saving more in the future when I am closer to retirement.	2.1%	0.0%	2.1
My salary covers my monthly living expenses with no extra room for retirement savings.	27.4%	17.4%	10.0
I am unsure of whom to contact with questions or how to learn more about the 401(k).	5.3%	0.0%	5.3**
The enrollment procedures were unclear or cumbersome.	5.3%	8.7%	-3.4
Other (write-in)	13.7%	13.0%	0.7
Number of Respondents	95	23	

Notes: See Table 3 for a description of the sample. Respondents could select more than one response for each question.

Table 5: Financial Knowledge by Participation Status, Ages 18-44

	Participants		Non-Participants	
	Ages 18-44	Ages 45+	Ages 18-44	Ages 45+
	(1)	(2)	(3)	(4)
Financial Literacy Questions				
Interest Rates	83.3%	89.7%	84.2%	73.9%
Inflation	75.3%	89.7%	60.0%	73.9%
Investment	81.3%	89.7%	69.5%	82.6%
401(k) Tax Advantage	40.7%	52.9%	33.7%	34.8%
401(k) Employer Match	59.3%	63.2%	62.1%	60.9%
Knowledge Score out of 5	3.4	3.9	3.1	3.3
Number of Respondents	150	68	95	23

Notes: See Table 3 for a description of the sample. The percentages in each column show the percent correctly answering each type of question, with missing or blank responses classified as “incorrect”. The knowledge score is calculated for only those respondents that left no more than 2 of the knowledge questions blank. See Appendix B for specific wording for each of the knowledge questions.

Table 6: Percent Initiating Participation during the Study Period

Category	Sample Size	Received Intervention	Control Group	Difference in Percent Initiating Participation
All New Hires	3684	6.9%	5.9%	1.0
Females	2698	6.3%	5.5%	0.8
Males	986	8.6%	7.1%	1.5
Match-eligible	2238	7.6%	6.9%	0.7
Not Match-eligible	1446	5.9%	4.4%	1.5
Age:				
Age 18-24	852	7.8%	3.3%	4.5***
Age 25-34	1295	7.8%	7.4%	0.4
Age 35-44	794	6.4%	3.4%	3.0*
Age 45 and over	743	5.0%	9.4%	-4.4*
Salary (in thousands):				
Less than \$29,999	2181	5.4%	5.4%	0.0
\$30,000-59,999	1101	9.1%	4.7%	4.4***
\$60+	402	8.7%	12.6%	-3.9

Notes: The sample includes all workers hired in 2008, 2009, and 2010 who were not participating in the 401(k) plan as of February 28, 2011 and excludes employees terminated during intervention period and 45 treated employees for which the delivery method is unknown. The mean values for the treatment and control group were tested to determine if they are statistically significantly different, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Age refers to worker's age as of April 2011, the date of the intervention.

Table 7: Choice to Initiate Participation between February and June 2011

	Full Sample	Ages 18-44	Ages 45+
	(1)	(2)	(3)
Intervention	0.012 (0.008)	0.025** (0.009)	-0.045* (0.021)
Salary (in Thousands)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Female	-0.012 (0.010)	-0.015 (0.011)	-0.010 (0.023)
Match-eligible 2010 hire	0.062*** (0.015)	0.066*** (0.017)	0.056 (0.032)
Hired 2008	-0.015 (0.011)	-0.016 (0.012)	-0.011 (0.024)
Hired 2009	0.011 (0.013)	0.011 (0.015)	0.007 (0.029)
Age when Hired:			
Age 18-24	-0.009 (0.010)		
Age 35-44	-0.022* (0.010)		
Age 45 and Above	-0.013 (0.010)		
N	3684	2941	743
Mean participation	0.066	0.066	0.065

Notes: See Table 6 for a description of the sample. Coefficients are average marginal effects derived from a logit model of participation initiation. Omitted categories are hired in 2010 but not yet match-eligible and age 25-34. Standard errors are in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 8: Heterogeneity in the Effect of Treatment on the Probability of Initiating Participation between February and June 2011

Ages 18-44				
Group	Sub-Group	N	Percent Initiating Participation	Average Marginal Effect of Treatment
Full Sample		2941	6.63%	0.025 (0.009)***
Salary	Salary <\$60K	2696	6.31%	0.026 (0.009)***
	Salary \$60K+	245	9.8%	0.013 (0.039)
Gender	Females	2149	6.05%	0.018 (0.010)*
	Males	792	8.21%	0.044 (0.019)**
Match Eligibility	Match-eligible-A	1197	5.26%	0.017 (0.013)
	Match-eligible-B	574	12.0%	0.027 (0.027)
	Not Match-eligible	1170	5.38%	0.032 (0.013)**
Ages 45 and Older				
Group	Sub-Group	N	Percent Initiating Participation	Average Marginal Effect of Treatment
Full Sample		743	6.46%	-0.045 (0.021)**
Salary	Salary <\$60K	586	5.46%	-0.027 (0.021)
	Salary \$60K+	157	10.2%	-0.101 (0.058)*
Gender	Females	549	6.01%	-0.027 (0.022)
	Males	194	7.73%	-0.099 (0.050)**
Match Eligibility	Match-eligible-A	325	5.23%	-0.018 (0.028)
	Match-eligible-B	142	11.27%	-0.068 (0.062)
	Not Match-eligible	276	5.43%	-0.068 (0.034) **

Notes: See Table 6 for a description of the sample. Match-eligible-A refers to those workers hired in 2008 and 2009, all of which were match-eligible as of June 2011. Match-eligible-B refers to those 2010 hires that were hired in January through May of 2010 and had achieved the requirements for match eligibility by June 2011. All other 2010 hires were not match-eligible. Specification is identical to that in Table 7. Coefficients presented are average marginal effects from a logit model, with standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Appendix Table A: Representativeness of Survey Respondents

Appendix Table A demonstrates that the survey is not necessarily representative of all newly hired workers. Respondents are significantly more likely to be participating in the 401(k) plan, are more likely to be male, are slightly older, and tend to have higher salaries. Note that the employees given the survey are not the same as those represented in the administrative data with the exception of the workers hired in December 2010. Therefore, a direct comparison is not possible.

	Survey Respondents	Administrative Data on all New Hires	Administrative Data on New Hires within 60 Days
Date of Hire	Dec 2010 – May 2011	Jan 2008 – Dec 2010	Nov 2010 – Dec 2010
Participant	64.9%	49.0%	28.4%
Female	58.3%	65.8%	67.2%
Age	36.5	34.7	34.2
Salary:			
Less than \$25,000	21.0%	28.1%	45.1%
\$25,000-49,999	38.9%	42.8%	33.4%
\$50,000-74,999	14.6%	12.7%	10.1%
\$75,000-99,999	12.6%	7.5%	4.8%
\$100,000+	12.9%	8.9%	6.6%
Observations	336	7,218	557

Notes: The first column presents the means and sample percentages for those responding to the survey. The second column presents statistics from administrative on all new hires from 2008-2010. The third column presents statistics from administrative data for those that were hired within the last 60 days of 2010.

Appendix B: Knowledge Questions

Below is a list of the knowledge questions and potential answers, with the correct answer in bold.¹

Interest Rate: If you have savings in the amount of \$100 in the bank and the interest rate is 2%, how much will you have in your savings account after 5 years?

Answers: (a) **More than \$102** (b) \$102 (c) Less than \$102 (d) Do not know

Inflation: If the current interest rate on your bank deposit is 1% per year and the inflation rate is 2% per year, how much do you think you will be able to buy with your money a year from now?

Answers: (a) A larger amount than you can buy now (b) Exactly the same as you can buy now
(c) **A smaller amount than you can buy now** (d) Do not know

Investment: Do you think the following statement is true or false? “Buying a single company stock usually provides a safer return than a diversified portfolio.”

Answers: (a) True (b) **False** (c) Do not know

Tax Advantage: Assume you are in the 25 percent tax bracket (you pay \$0.25 in tax for each dollar earned) and you contribute \$100 pretax to the 401(k) plan. Your take home pay (what is in your pay check after all taxes and other payments are taken out) will:

Answers: (a) Decline by \$100 (b) **Decline by \$75** (c) Decline by \$50 (d) Remain the same (e) Do not know

401(k) Employer Match: Assume that your employer matches your contribution one dollar for each dollar you contribute to the 401(k) plan. If you contribute \$100 to the 401(k) plan, your account balance in the plan, including your contribution, will:

Answers: (a) Increase by \$50 (b) Increase by \$100 (c) **Increase by \$200** (d) Remain the same (e) Do not know

¹ The first three questions were developed by Lusardi and Mitchell (2011).

Appendix C: Randomization in Intervention Group Assignments

Employees that were hired during 2008- 2010 that were not participating in the 401(k) plan as of February 28, 2011 were randomly assigned to three groups:

- (1) Intervention Version 1 (flyer including peer participation statement)
- (2) Intervention Version 2 (basic flyer, no peer information)
- (3) Control (group 3).

To verify that the randomization was done properly, the group means for age, gender, year of hire, and salary are evaluated to ensure that each group is representative of the entire sample of non-participants. Due to limited access to computers at work, a small subset of workers in the “intervention” samples were sent the flyer via interoffice mail instead of via email. The delivery method was not randomized, since it was only those without regular access to computers for work that received the hard copy version.

Appendix Table C shows the means are nearly identical across the randomized treatment and control groups, as intended by study design. We also see that those terminated during the sample period were more likely to be lower paid employees and those that were more recently hired. Appendix Table D demonstrates that there was little difference between the effects of the two versions of the flyer. Therefore, we do not find any evidence of a differential “peer effect” from providing information about peer behavior.

Appendix Table C:

Randomization (Full Data)			
	Group 1 (Intervention)	Group 2 (Intervention)	Group 3 (Control Group)
Age	34.7	34.7	34.5
Age 18-44	80.0%	80.5%	80.7%
Age 45+	20.0%	19.5%	19.3%
Female	72.3%	72.9%	75.1%
Hired in 2010	56.9%	57.5%	59.2%
Hired in 2009	19.5%	18.6%	18.1%
Hired in 2008	23.6%	23.9%	22.7%
Salary	\$34,556	\$34,149	\$33,941
Observations	1370	1371	1370
Randomization (Final Sample)			
	Group 1 (Intervention)	Group 2 (Intervention)	Group 3 (Control Group)
Age	35.1	34.9	34.6
Age 18-44	79.2%	80.0%	80.3%
Age 45+	20.8%	20.0%	19.7%
Female	71.6%	72.8%	75.3%
Hired in 2010	57.4%	57.1%	59.3%
Hired in 2009	18.3%	18.7%	18.2%
Hired in 2008	24.3%	24.2%	22.5%
Salary	\$36,048	\$35,567	\$34,837
Observations	1216	1223	1245
Delivery Method (not randomized)			
	Email	Interoffice Mail	
Age	36.1	32.0	
Age 18-44	77.4%	85.7%	
Age 45+	22.6%	14.3%	
Female	67.7%	84.6%	
Hired in 2010	55.2%	62.9%	
Hired in 2009	18.2%	19.5%	
Hired in 2008	26.6%	17.6%	
Salary	\$42,971	\$21,594	
Observations‡	1789	650	

Notes: The full data includes all employees hired in 2008-2010 that were not participating in the 401(k) plan as of February 2011. The “final sample” excludes those that left employment and individuals in the treatment group for which the delivery method is unknown. Age refers to age at April 2011, the date of intervention. Forty-five observations had missing information on delivery method, so were excluded.

Appendix Table D: LFI Intervention Effects by Version of Flyer

	Full Sample	Ages 18- 44	Ages 45+	Full Sample	Ages 18- 44	Ages 45+
	(1)	(2)	(3)	(4)	(5)	(6)
Intervention Version 1	0.013 (0.011)	0.030* (0.013)	-0.040* (0.019)			
Intervention Version 2	0.012 (0.011)	0.028* (0.013)	-0.036 (0.019)			
Intervention Email				0.012 (0.009)	0.028* (0.011)	-0.045* (0.020)
Intervention Interoffice Mail				0.012 (0.014)	0.027 (0.017)	-0.027 (0.022)
Salary (1K)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Female	-0.012 (0.010)	-0.015 (0.011)	-0.010 (0.023)	-0.012 (0.010)	-0.014 (0.011)	-0.011 (0.023)
Match-eligible 2010 hire†	0.062*** (0.015)	0.065*** (0.017)	0.056 (0.032)	0.062*** (0.015)	0.065*** (0.017)	0.056 (0.032)
Hired 2008	-0.015 (0.011)	-0.016 (0.012)	-0.011 (0.024)	-0.015 (0.011)	-0.016 (0.012)	-0.010 (0.024)
Hired 2009	0.011 (0.013)	0.011 (0.015)	0.007 (0.029)	0.011 (0.013)	0.011 (0.015)	0.007 (0.029)
Age 18-24	-0.009 (0.010)			-0.009 (0.010)		
Age 35-44	-0.022* (0.010)			-0.022* (0.010)		
Age 45 and Above	-0.013 (0.010)			-0.013 (0.010)		
Observations	3684	2941	743	3684	2941	743

Notes: Specification and sample is identical to that presented in Table 7. In columns (1) - (3) we include two variables indicating the type of intervention sent. In columns (4) - (6) we include two variables indicating the delivery method of the intervention. Standard errors are in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Appendix E: Flyer Sent to LFI Non-Participants

Are you leaving money on the table?

Join the 68% of LFI employees who are already contributing to their 401(k) plan

A LITTLE MONEY SAVED TODAY GOES A LONG WAY IN RETIREMENT

LFI offers a 100% match on the first 6% of income saved in your 401(k) account, plus you get all the tax savings!¹ Even a simple change – such as bringing a bagged lunch to work a few times a month – can make a big difference.

The following examples show how small sacrifices today can have a big impact on your retirement income.

	Unit Price	Per Year	Amount per year <u>plus</u> 100% Employer Match ²	Total If Invested in Plan for 40 Years ³
1 specialty coffee per day	\$2.50	\$912.50	\$1,825.00	\$863,158
1 movie per week	\$8.50	\$443.25	\$886.50	\$419,248
1 candy bar per day	\$0.55	\$200.75	\$401.50	\$189,895

To Enroll: The Learning Center at **eBenefitsNow.com** contains the LFI 401(k) Savings Plan Participant Guide. The LFI 401(k) Savings Plan Participant Guide provides Plan Highlights, Investment Information, and Enrollment Instructions. You can also enroll by accessing the Plan's website directly at: <http://www.-.com/plantrac>.

¹ Employees are eligible for the employer match after 1 year of service. Contributions to 401(k) plans come from pre-tax income and the interest on 401(k) balances is exempt from taxes.

² Assumes 100% employer match.

³ Assumes 4% annual price inflation, deposits to plan at the end of each month and 8% average annual returns, no taxes apply.