NBER WORKING PAPER SERIES

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Working Paper 17345
http://www.nber.org/papers/w17345

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
August 2011

We thank Aon Hewitt and our corporate partner for conducting the field experiment and providing the data. We are particularly grateful to Pam Hess, Mary Ann Armatys, Diane Dove, Barb Hogg, Diana Jacobson, Larry King, Bill Lawless, Shane Nickerson, and Yan Xu, some of our many contacts at Aon Hewitt. We thank Sherry Li and seminar participants at Berkeley, Cornell, Stanford, Wharton, the NBER Summer Institute, the Harvard Business School / Federal Reserve Bank of Boston Consumer Finance Workshop, and the Behavioral Decision Research in Management Conference for their insightful feedback. Michael Buckley, Yeguang Chi, Christina Jenq, John Klopfer, Henning Krohnstad, and Eric Zwick provided excellent research assistance. Beshears acknowledges financial support from a National Science Foundation Graduate Research Fellowship. Beshears, Choi, Laibson, and Madrian acknowledge individual and collective financial support from the National Institute on Aging (grants R01-AG-021650, P01-AG-005842, and T32-AG-000186). This research was also supported by the U.S. Social Security Administration through grant #19-F-10002-9-01 to RAND as part of the SSA Financial Literacy Research Consortium. The findings and conclusions expressed are solely those of the authors and do not represent the views of SSA, any agency of the Federal Government, or RAND. See the authors' websites for lists of their outside activities. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

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NBER Working Paper No. 17345
August 2011
JEL No. D03,D14,D83,D91

ABSTRACT

We measure how receiving information about coworkers' savings behavior affects recipients' savings choices. Employees of a large company who were not participating in or contributing little to the company's retirement savings plan were sent a simplified enrollment or contribution rate increase form. A randomized subset of forms included information on the fraction of coworkers either participating in or contributing at least 6% of pay to the plan. We find that peer information increased savings of non-unionized recipients but decreased savings of unionized recipients. Our results highlight the possibilities and limitations of peer information interventions.

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> Social norms marketing is the science of persuading people to go along with the crowd. The technique works because people are allelomimetic—that is, like cows and other herd animals, our behavior is influenced by the behavior of those around us.
>
> —"The Year in Ideas," *The New York Times Magazine*, December 9, 2001

Social norms marketing disseminates information about what a target population's peers typically do. The hope is that when people learn that a certain behavior is more (or less) common than they had previously believed, they will engage in the behavior more (or less) themselves. In this paper, we use a field experiment to investigate the effect of social norms marketing on retirement savings choices.

Models of informational cascades and social learning predict that individuals will mimic their peers because peer behavior reflects private information that is relevant to an individual's own payoffs (Banerjee, 1992; Bikhchandani, Hirshleifer, and Welch, 1992; Ellison and Fudenberg, 1993). Observations of peers may also inform individuals about social norms from which deviations are costly due to a taste for conformity, social sanction, identity considerations, or strategic complementarities (Asch, 1951; Festinger, 1954; Akerlof, 1980; Bernheim, 1994; Akerlof and Kranton, 2000; Glaeser and Scheinkman, 2003; Benjamin, Choi, and Strickland, 2010; Benjamin, Choi, and Fisher, 2010).

Non-experimental empirical work has found that individuals imitate their peers in a variety of domains, including retirement savings, retirement timing, stock market participation, health plan choice, technology adoption, criminal activity, education, welfare usage, automobile purchases, contraception, and littering.[1] Field experiments have shown that social norms marketing, which tries to exploit this tendency to imitate peers, moves behavior towards the peer norm in domains where the marginal cost of conforming is small: entrée selections in a

[1] See Cialdini, Reno, and Kallgren (1990), Case and Katz (1991), Besley and Case (1994), Hershey et al. (1994), Foster and Rosenzweig (1995), Glaeser, Sacerdote, and Scheinkman (1996), Bertrand, Luttmer, and Mullainathan (2000), Kallgren, Reno, and Cialdini (2000), Sacerdote (2001), Duflo and Saez (2002, 2003), Hong, Kubik, and Stein (2004), Munshi (2004), Munshi and Myaux (2006), Sorensen (2006), Chalmers, Johnson, and Reuter (2008), Grinblatt, Keloharju, and Ikäheimo (2008), and Narayanan and Nair (2011). Manski (2000) provides an overview of issues in the social interaction literature.

restaurant, contributions of movie ratings to an online community, small charitable donations, music downloads, towel re-use in hotels, taking petrified wood from a national park, stated intentions to vote, and residential electricity usage (Cai, Chen, and Fang, 2009; Chen et al., forthcoming; Frey and Meier, 2004; Salganik, Dodds, and Watts, 2006; Goldstein, Cialdini, and Griskevicius, 2008; Cialdini et al., 2006; Gerber and Rogers, 2009; Schultz et al., 2007; Ayres, Raseman, and Shih, 2009; Allcott, 2010). However, Costa and Kahn (2010) find that social norms marketing about electricity consumption has the unintended effect of *increasing* the electricity usage of households with conservative political views. Perverse effects have also been observed in other settings. For example, Fellner, Sausgruber, and Traxler (forthcoming) document that peer information regarding tax compliance can have positive or negative effects on compliance depending on the subpopulation studied. Carrell, Sacerdote, and West (2011) find negative and significant peer effects in an intervention that attempted to use peer effects to improve the academic performance of the lowest ability students. Finally, the evidence is mixed on the efficacy of perhaps the largest-scale implementation of social norms marketing: the publicizing by U.S. colleges and universities of campus alcohol consumption statistics in order to reduce drinking.[2] Overall, there is little evidence on how social norms marketing influences choices in domains such as saving,[3] where conformance can have high personal costs in the short run.

We conducted our field experiment in partnership with a large manufacturing firm and its retirement savings plan administrator. Employees who had never participated in the firm's 401(k) plan were mailed Quick Enrollment (QE) letters, which allowed them to start contributing 6% of their pay to the plan at a pre-selected asset allocation by returning a simple reply form. Employees who had previously enrolled but had a low contribution rate received Easy Escalation (EE) letters, which included a nearly identical reply form that could be returned to increase their contribution rate to 6% of pay. Previous work has shown that these simplified enrollment and contribution escalation mechanisms significantly increase savings plan contributions (Choi, Laibson, and Madrian, 2009; Beshears et al., 2010).

We randomly assigned the QE and EE recipients to one of three groups. The mailing for the first group included information about the savings behavior of coworkers in their five-year

[2] See Werch et al. (2000) and Wechsler et al. (2003) for critiques of this literature.
[3] Duflo and Saez (2002) estimate the impact of peer behavior on retirement saving outcomes. Our paper differs from theirs in that we do not examine peer effects per se, but the impact of providing information about peer behavior.

age bracket (e.g., all employees at the firm between the ages of 25 and 29). The second group received similar information about coworkers in their ten-year age bracket (e.g., all employees at the firm between the ages of 20 and 29). The remaining recipients, whose mailing included no peer information, served as a control group. The two peer information QE mailings stated the fraction of employees in the relevant age bracket who were already enrolled in the savings plan. The two peer information EE mailings stated the fraction of savings plan participants in the relevant age bracket contributing at least 6% of their pay on a before-tax basis to the plan. The peer information values ranged from 72% to 93%.

Employees in our study naturally fall into four subpopulations distinguished along two dimensions: (1) unionized non-participants, (2) non-unionized non-participants, (3) unionized plan participants with low contribution rates, and (4) non-unionized plan participants with low contribution rates. We draw the distinction between non-participants and low savers because the QE and EE mailings make different requests of recipients: initial enrollment in the case of QE, and contribution rate increases in the case of EE. We analyze union employees separately from non-union employees because the latter were automatically enrolled in the retirement savings plan at a 6% contribution rate unless they opted out, while union employees were not subject to automatic enrollment. Non-union employees who remained at their 6% contribution rate default did not receive QE or EE letters, whereas union employees who remained at their non-participation default received QE letters, creating differential selection into the target sample by union status. Prior research has shown that automatic enrollment has a large impact on 401(k) plan participation, contribution rates, and asset allocations because employees often passively accept the defaults (Madrian and Shea, 2001; Choi et al., 2002 and 2004; Beshears et al., 2008), so the extent of differential selection was likely to be substantial.[4] Among the four subpopulations who received a mailing, only unionized non-participants had never made an active 401(k) savings decision; the other three subpopulations had actively chosen their low savings rates.

Further justification for analyzing union employees separately comes from the fact that all non-union employees faced a 6% employer match threshold (the minimum percent of pay they must contribute to earn their maximum possible employer matching contribution to the

[4] Prior to the mailing, the plan participation rate was 70% for union employees and 96% for non-union employees. The latter figure does not include non-union employees within 90 days of their hire date, since they are likely to have had automatic enrollment pending.

plan). In contrast, union employees faced several different matching formulas, and the match threshold for 77% of the union employees included in the mailing was different from 6%. Due to technological constraints in the processing of QE and EE forms, everybody who returned a QE or EE reply form would have their contribution rate raised to 6%. The correspondence between this 6% contribution rate and the non-union employees' match threshold may have made the mailings more compelling for non-union employees; for union employees with a different match threshold, the 6% contribution rate could have been less focal.[5] In addition, union employees have different kinds of jobs than non-union employees, and union employees' relationship with the firm is mediated by a collective bargaining entity.

In the taxonomy of Harrison and List (2004), our study is a "natural field experiment," since subjects never learned that they were part of an experiment. We use administrative plan data to track contribution rate changes during the month following our mailing. We measure the average effect of the *presence* of peer information by comparing how much more the peer information treatment groups increased their contribution rates than the control group. We also estimate the effect of the *magnitude* of the peer information number that employees saw. To do this, we exploit two sources of variation in the peer information number. First, two employees of the same age were exposed to different peer information numbers if one was randomly assigned to see information about coworkers in her five-year age bracket and the other to see information about coworkers in her ten-year age bracket. Second, two employees who are similar in age but on opposite sides of a boundary separating adjacent five-year or adjacent ten-year age brackets would see different peer information numbers.

We find some evidence that the peer information intervention worked as expected among non-unionized non-participants. Receiving peer information increased this group's likelihood of subsequently enrolling in the plan by 1.9 percentage points, from 0.7% to 2.7%, although this difference is not statistically significant. Among those who received peer information, a one percentage point increase in the reported fraction of coworkers already enrolled in the plan increased the enrollment rate by 1.1 percentage points and the average before-tax contribution rate change by 0.06% of income, effects that are significant at the 10% level.

[5] We have analyzed union employees with a match threshold other than 6% separately from union employees with a match threshold of 6%. The peer information treatment effect estimates are similar across these subsamples, although the standard errors of the estimates for the 6% threshold group are large because of the small sample size.

However, receiving peer information significantly *reduced* the likelihood of unionized non-participants subsequently enrolling in the plan by 3.6 percentage points, from 9.9% to 6.3%. Schultz et al. (2007) argue that social norms marketing can backfire if individuals learn that the promoted behavior is less common than they previously believed. But this mechanism is unlikely to be driving our union employees' response because enrollment was also *decreasing* in the magnitude of the peer information number communicated to an employee. A one percentage point increase in the reported fraction of coworkers already enrolled in the plan significantly reduced the enrollment rate by 1.8 percentage points and the average before-tax contribution rate change by 0.11% of income.

We do not find statistically significant effects among unionized participants who received EE letters. These null effects may be due to the fact that, compared to non-participants, union employees who have actively chosen a positive contribution rate have stronger convictions about their optimal contribution rate and are thus less likely to be swayed by peer information. On the other hand, we do find a positive effect (significant at the 10% level) of the peer information number's magnitude on non-union participants' before-tax contribution rate changes; a one percentage point increase in the reported fraction of participants contributing at least 6% of their pay to the plan increases non-union participants' before-tax contribution rate changes by 0.07% of income.

Our results highlight the possibilities and limitations of interventions based on peer information. The robust negative relationship between peer information and enrollment among unionized non-participants suggests that "boomerang effects" (Clee and Wicklund, 1980; Ringold, 2002) from even subtle social norms marketing campaigns such as the one we tested are a potentially important pitfall.

The paper proceeds as follows. Section I provides background information on the firm we study. Section II describes our experimental design, and Section III describes our data. Section IV presents our empirical results and discusses possible explanations for our findings. Section V concludes.

I. Company Background

The company that ran our field experiment is a manufacturing firm with approximately 15,000 U.S. employees. About a fifth of the employees are represented by one of five unions. In

general, unionized workers are employed on the manufacturing shop floor, although not all shop floor workers are unionized. The firm offers both defined benefit and defined contribution retirement plans to its employees. The details of the defined benefit plans vary according to an employee's union membership, but a typical employee receives an annual credit of four to six percent of her salary in a cash balance plan, as well as interest credit on accumulated balances. Upon retirement, the employee receives an annuity based on the notional balance accrued in the plan.

The details of the defined contribution plan, which is the focus of our study, also depend on an employee's union membership. In general, employees do not need to meet a minimum service requirement before becoming eligible for the plan. Participants can contribute up to 50% of their eligible pay to the plan on a before-tax basis, subject to IRS limits.[6] For most employees, the firm makes a matching contribution proportional to the employee's own contribution up to a threshold. These matching contributions vest immediately. Several hundred employees who receive a special pension benefit in lieu of an employer match were excluded from the study. Table 1 describes the matching formulas that apply to different employee groups. After-tax contributions to the plan are also allowed but do not garner an employer match. All employees can allocate plan balances among 21 mutual funds, eleven of which are target date retirement funds. Employer stock is not an investment option.

On January 1, 2008, all non-union employees not already contributing to the 401(k) plan were automatically enrolled at a before-tax contribution rate of 6% of pay unless they opted out or elected another contribution rate.[7] The default investment for automatically enrolled employees was the target date retirement fund whose target retirement date was closest to the employee's anticipated retirement date. Non-union employees hired after January 1, 2008 were also subject to automatic enrollment 60 days after hire unless they actively opted out. Automatic enrollment was not implemented for unionized employees until January 1, 2009 because the collective bargaining negotiations necessary to effect the change could not take place until the fall of 2008.

[6] In 2008, the year of the experiment, the annual contribution limit was $15,500 for workers younger than 50 and $20,500 for workers older than 50.
[7] Employees were informed in advance that they would be automatically enrolled unless they opted out.

II. Experimental Design

The peer information intervention targeted non-participating and low-saving U.S. employees who were at least 20 years old and at most 69 years old as of July 31, 2008.[8] Non-participants were defined as employees who were eligible for but had never enrolled in the 401(k) plan as of July 14, 2008. Two groups of non-participants were excluded from the intervention. The first group is employees who receive a special pension benefit in lieu of an employer match.[9] The second group is non-unionized employees who were within the first 60 days of their employment at the company on July 14, 2008 and had not opted out of automatic enrollment; these employees were likely to be automatically enrolled soon after the intervention date, so the intervention would serve little purpose for them. Low savers were defined as employees who were enrolled in the 401(k) plan but whose before-tax contribution rate was less than both their employer match threshold and 6% as of July 14, 2008.[10] The match threshold varies by union status and can be less than, equal to, or greater than 6% (see Table 1).[11] The majority of employees in our experiment (72%) have a match threshold of 6%.

We used a stratified randomization scheme to allocate intervention-eligible employees to three equally sized treatment groups. We first sorted employees into bins based on age as of July 31, 2008, plan participation status (enrolled or not enrolled), geographic location of workplace, and employer match structure (and therefore union status). Within each of these bins, employees were randomly assigned to receive no peer information, information about the savings behavior of peers in their five-year age bracket, or information about the savings behavior of peers in their ten-year age bracket.

On July 30, 2008, Quick Enrollment and Easy Escalation mailings were sent to target employees, and we surmise that employees received these mailings at some point between

[8] Employees younger than 20 or older than 69 years of age were excluded from the intervention because there are so few employees in these categories that reporting peer information about these age groups could potentially divulge the savings decisions of individual employees.

[9] Only 52 employees receive this special pension benefit but otherwise met the criteria for inclusion in the intervention.

[10] We did not consider after-tax contribution rates when classifying low savers. Approximately 9% of plan participants make after-tax contributions, and approximately 9% of the employees we classified as low savers were making after-tax contributions at the time of the experiment. If we had limited the intervention to employees whose *combined* before-tax and after-tax contribution rates were less than both their employer match threshold and 6%, approximately 7% of the low savers would have been excluded.

[11] One match formula limits employer matching contributions to a maximum of $325 per year. We did not observe the dollar amount of matching contributions as of July 14, 2008, so the definition of low savers did not exclude employees who had reached the maximum. The results of our analysis do not change meaningfully if all low savers who faced this match formula are dropped from the sample.

August 1 and August 4, 2008. Both the QE and EE mailings gave a deadline of August 22, 2008 for returning the forms, but this deadline was not enforced. Appendix A shows sample QE and EE letters.

Non-participants received a QE mailing, which described the benefits of enrollment in the 401(k) plan, especially highlighting the employer matching contribution.[12] By checking a box on the form, signing it, and returning it in the provided pre-addressed postage-paid envelope, employees could begin contributing to the plan at a 6% before-tax rate invested in an age-appropriate target date retirement fund. Employees were reminded that they could change their contribution rate and asset allocation at any time by calling their benefits center or visiting their benefits website. The mailing sent to employees in the peer information treatments additionally displayed the following text: "Join the *A*% of *B*-*C* year old employees at [company] who are already enrolled in the [plan]." Letters sent to employees in the *no* peer information control condition simply omitted this sentence. The number *A* was calculated using data on all savings-plan-eligible employees in the five-year or ten-year age bracket applicable to the recipient. These participation rates, reported in Table 2, ranged from 77% to 93%. The numbers *B* and *C* are the boundaries of the relevant five-year or ten-year age bracket.

Low savers received EE mailings, which also emphasized that employees were foregoing employer matching contributions.[13] A low-saving employee could increase her before-tax contribution rate to 6%, invested according to her current asset allocation, by completing the form and returning it in the provided pre-addressed postage-paid envelope. Like the QE mailings, the EE mailings reminded recipients that they could change their contribution rate or asset allocation through their benefits call center or website. The EE peer information text, which did not appear to employees in the no peer information control condition, read: "Join the *D*% of *B*-*C* year old [plan] participants at [company] who are already contributing at least 6% to the [plan]." Data on all plan participants in the relevant five-year or ten-year age bracket were used to calculate *D*, which ranged from 72% to 81% (see Table 2).

[12] Information on employer contributions varied according to the match structure facing the individual employee.
[13] Again, information about employer contributions was personalized.

III. Data

Our data were provided by Aon Hewitt, a large U.S. benefits administration and consulting firm. The data include a cross-sectional snapshot of all employees in our experiment on July 14, 2008, just prior to our intervention. This snapshot contains individual-level data on each employee's plan participation status, contribution rate, birth date, geographic location of workplace, employer match structure, and union membership. A second cross-section contains the new enrollments and contribution rate changes of employees between August 4, 2008 and September 8, 2008—right after the mailing was sent. The final cross-section contains employees' gender, hire date, and 2008 salary, which we annualize for employees who left the firm before the end of 2008.

IV. Effect of Providing Peer Information

We divide the discussion of our main empirical results into five parts. First, we discuss the characteristics of the employees who received mailings. Second, we analyze the effect of providing peer information in the QE mailing by comparing the savings choices of peer information QE treatment groups to those of the control group that received the QE mailing with no peer information. Third, we restrict our attention to the peer information QE treatment groups and examine the response of participant behavior to the magnitude of the peer information number that the participant received in the mailing. Fourth, we examine the impact of the peer information given in the EE mailings. And finally, we discuss possible explanations for the different peer information effects observed in the union and non-union subpopulations.

A. Employee Characteristics

Table 3 presents summary statistics for the sample that received mailings, broken out by initial participation status, union status, and the type of peer information received. The majority of the sample is male, although this fraction varies considerably across the different subpopulations: 66% among unionized non-participants, 76% among non-union non-participants, 55% among unionized low savers, and 68% among non-union low savers. The average age is 41 years, and average tenure is high—9 years among unionized non-participants, 7 years among non-union non-participants, and 11 years in both low saver subpopulations. Mean annual salary is in the $35,000 to $50,000 range for all subpopulations except the non-union low savers, for

whom mean annual salary is above $57,000. Among the two low saver subpopulations, average initial before-tax contribution rates are about 2%.

B. Effect of Providing Peer Information in Quick Enrollment

To estimate the effect of providing peer information in the QE mailing, we compare the savings choices of peer information QE treatment groups to those of the control group that received no peer information. The first two columns of Table 4 list, by union status, the fraction of employees in each QE treatment group who enrolled in the savings plan between August 4, 2008 and September 8, 2008. The last two columns report the average before-tax contribution rate changes as a percent of income for each QE treatment group, again broken out by union status.[14] For the purposes of statistically testing the effect of providing peer information, we pool the five-year age bracket and ten-year age bracket peer information treatments (row 4 of Table 4).

We first look at the unionized non-participants. Among this group, 6.3% of employees who were given peer information enrolled in the plan, while 9.9% of those whose mailings did not include peer information enrolled in the plan, a statistically significant difference of 3.6 percentage points. This indicates that peer information provision *reduces* savings plan enrollment. The difference in enrollment rates corresponds to a 20 basis point reduction in the average before-tax contribution rate change as a percent of income, a difference that is significant at the 10% level.

In contrast, there is some evidence that providing peer information has a small positive effect on non-union non-participants' savings plan enrollment and average before-tax contribution rate changes: a 2.7% enrollment rate and a 15 basis point before-tax contribution rate increase within the pooled peer information treatments versus only a 0.7% enrollment rate and a 4 basis point before-tax contribution rate increase within the control group without peer information. However, neither of these differences is statistically significant.

Table 5 analyzes the average effect of providing peer information in the QE mailings within an ordinary least-squares regression framework. The sample is non-participants who received QE mailings. In the first two columns, the dependent variable is a binary variable taking

[14] Individuals who ceased employment at the firm between August 4, 2008 and September 8, 2008 are treated as if their participation status and contribution rate on their departure date continued unchanged until September 8, 2008.

a value of one if the employee initiated savings plan participation between August 4, 2008 and September 8, 2008;[15] in the next two columns, the dependent variable is the change in the employee's before-tax contribution rate during the same time period. The regressions control for gender, tenure, salary, and a linear spline in age with knot points every five years starting at age 22½.[16,17] The regression-adjusted impact of providing peer information is qualitatively and quantitatively similar to the effect measured from comparing means in Table 4. Including peer information decreases enrollment by 4.0 percentage points and before-tax contribution rate changes by 22 basis points for unionized non-participants, while it has a positive but insignificant effect on non-unionized non-participants.

C. Effect of the Peer Information Number's Magnitude in Quick Enrollment

To examine how the magnitude of the peer information number received by employees affected responsiveness to the QE mailing, we limit our attention to the employees who were in the two peer information QE treatments. An important confound our analysis must address is the "reflection problem" (Manski, 1993). Because our experiment provided employees with peer information related to their five-year or ten-year age brackets, the peer information number embeds not only information about the peer group but also information about the age-related characteristics of the QE or EE mailing recipient. Throughout our analysis, we therefore study the relationship between responsiveness to the mailing and the magnitude of the peer information number while controlling for a flexible function of age—specifically, an age spline with knot points every five years starting at age 22½.

Our empirical strategy identifies the effect of the peer information number's magnitude using two sources of variation. First, two employees of the same age may see different peer information numbers if one is randomly assigned to receive information about her five-year age

[15] We report the estimates from linear probability regressions for the binary dependent variables instead of probit or logit regressions because of problems with perfect predictability. Our flexible age controls sometimes perfectly predict failure, requiring us to drop observations from probit or logit regressions. Adjusting the sample for each regression specification would make it difficult to compare results across specifications, and using a minimal sample for all specifications could potentially give a misleading picture of the results. Thus, we report the results of linear probability regressions, which allow us to maintain a consistent sample and include all observations. In Appendix Table B.1, we present probit regressions using our baseline set of controls, and the results are qualitatively similar to the linear probability regression results.

[16] As noted in Table 3, salary information is missing for a small number of employees. We exclude these employees from regression samples throughout the paper.

[17] We use a linear spline in age instead of age group dummy variables in Table 5 to be consistent with Table 6.

bracket and the other is randomly assigned to receive information about her ten-year age bracket. Second, two employees who are nearly identical in age may see different peer information numbers if their ages are on opposite sides of a boundary separating two adjacent five-year or ten-year age brackets.

Table 6 presents results from our baseline regression specification for analyzing the impact of the peer information number's magnitude. The coefficient estimates are from ordinary least-squares regressions for the sample of non-participants who received QE mailings with peer information. The outcomes of interest are the same as in Table 5—enrollment in the savings plan[18] or the change in the employee's before-tax contribution rate between August 4, 2008 and September 8, 2008—as are the other regression controls.

For union non-participants, a one percentage point increase in the reported fraction of coworkers participating in the plan results in a statistically significant 1.8 percentage point decrease in the probability that the QE letter recipient enrolled in the plan and a statistically significant 11 basis point lower change in the before-tax contribution rate. To put these estimates in perspective, the peer information values received by non-participants range from 77% to 93%, a difference of 16 percentage points (Table 2). This implies an enrollment rate and before-tax contribution rate change that differ by 28 percentage points and 1.7% of income, respectively, between employees who receive the lowest and the highest peer information values—a very large difference relative to the 9.9% enrollment response and 0.6% before-tax contribution rate change of unionized QE recipients who received no peer information (Table 4).

In contrast, among non-union non-participants, a one percentage point increase in the peer information number results in a marginally significant 1.1 percentage point *increase* in the enrollment rate and a marginally significant 6 basis point higher increase in the contribution rate. Note the complementarity of the results in Tables 5 and 6. For unionized non-participants, receiving peer information reduces the response rate to the QE mailings on average (Table 5), and a higher peer information magnitude further reduces the QE response rate (Table 6). For non-union non-participants, receiving peer information leads to a small (but insignificant)

[18] Appendix Table B.2 reports results from the probit version of the first two columns of Table 6. The results are similar in direction and statistical significance. The peer information value coefficient's magnitude is similar for the unionized non-participants. The magnitudes differ for the non-union non-participants, but the probit marginal effect estimates for this subpopulation seem to be unreliable.

increase in the QE response rate on average (Table 5), and the response rate is increasing in the magnitude of the peer information number (Table 6).

Table 7 shows the importance of the two sources of variation in the peer information number used to generate the results in Table 6. To facilitate comparison, the first column reproduces the peer information value coefficient estimates from Table 6. The coefficients in the second column of Table 7 are estimated by adding to the baseline regression specification a set of five-year age bracket dummies that correspond to the age brackets in the five-year age bracket peer information treatment. With the inclusion of these dummies, the effect of the peer information value is no longer identified using discontinuities across age bracket boundaries; rather, identification comes entirely from differences between employees in the five-year versus ten-year age bracket peer information treatments. The peer information coefficients in this specification are slightly larger than in the baseline specification and retain the same qualitative level of statistical significance.

The regression specification presented in the last column of Table 7 excludes the five-year age group dummies used in the second column and instead estimates different linear splines in age for employees in the five-year versus ten-year age bracket peer information treatments. Here, identification comes only from comparing employees on opposite sides of an age bracket boundary at which the peer information value jumps discontinuously. Under this specification, the peer information value coefficients do not change sign, but they are smaller in magnitude and lose their statistical significance. Hence, the effects estimated in the baseline specification from Table 6 are largely driven by the differences in peer information values between the five-year and ten-year age bracket peer information treatments.

In Table 8, we investigate the robustness of our peer information value results to the manner in which we control for age in our regressions. The first row presents the peer information value coefficients from our baseline specifications in Table 6 to facilitate comparison. In the second row, we replace the original linear spline (knot points every five years) with a linear spline featuring knot points every 2½ years, starting at age 22½. This spline is more flexible and hence gives a sense of whether the structure imposed by the original spline produces misleading results. The coefficients on the peer information value do not change meaningfully with the more flexible spline, and the effects' statistical significance strengthens for non-union employees.

One additional element that varied across the QE mailings was the fund in which employee contributions would be invested absent any other election by the employee. (This was not a factor in the EE mailings, since all employees currently contributing to the plan had a preexisting asset allocation.) This default fund was a target date retirement fund (e.g., Fund 2020) chosen according to the recipient's anticipated retirement age and thus varying systematically with age. Although we think it is unlikely that employees would respond to the mailings differentially depending on the target date retirement fund offered, we nonetheless try to account for this possibility by including dummy variables in the regressions for the exact target date retirement fund mentioned in the mailings. As shown in the third row of Table 8, incorporating these controls does not change our main results.

The specifications in the last two rows of Table 8 are designed to address another set of issues. The two sources of identifying variation in the peer information value are associated with an employee's position within an age bracket. To be more precise, two employees of the same age who are randomly assigned to the five-year versus ten-year age bracket peer information treatments differ not only in the peer information values they see, but also in the set of peers for whom those values are defined, with one group (the five-year group) more narrowly defined than the other. Similarly, two employees on opposite sides of a boundary separating adjacent five-year or ten-year age brackets are exposed to different peer information values but are also in different situations relative to their peer groups, with one older than most of her peer group and the other younger. To partially control for these factors, we add to our regressions variables capturing an individual's position relative to her peer information comparison group. The regressions reported in the fourth row of Table 8 include linear and squared terms for the difference in years between the employee's age and the mean age in her peer group; the regressions reported in the fifth row of Table 8 include linear and squared terms for the employee's percentile rank in age within her peer group. All coefficient estimates for the union QE recipients are qualitatively similar to the baseline coefficient estimates. For the non-union QE recipients, the coefficients remain similar in magnitude but lose significance when we control for the difference between the employee's age and her peer group's mean age.

D. Effect of Providing Peer Information in Easy Escalation

We now turn our attention to the impact of providing peer information to the low savers who received the EE mailings. The first two columns of Table 9 list the fraction of low savers, separately by union status, who increased their contribution rate between August 4, 2008 and September 8, 2008. The last two columns of Table 9 report the average before-tax contribution rate change during the same time period. The last row in Table 9 shows that the differences between the groups who did and did not receive peer information are close to zero and insignificant for both union and non-union participants.

Table 10 reports the OLS-adjusted average impact of providing peer information in EE. In the first two columns, the dependent variable is a binary variable taking a value of one if the employee increased her before-tax contribution rate between August 4, 2008 and September 8, 2008;[19] in the next two columns, the dependent variable is the change in the employee's before-tax contribution rate during the same time period. In addition to the controls used in Table 5 for the QE recipients, the regressions for the EE recipients include a full set of dummies for each employee's before-tax contribution rate on July 14, 2008—two weeks prior to the mailing. The results in Table 10 are qualitatively similar to the raw differences reported in Table 9: receiving peer information has a negligible effect on savings responses on average.

Table 11 presents regressions that identify the impact of the peer information value's magnitude in the EE mailings. The dependent variables are the same as in Table 10.[20] Like we did in the corresponding analysis for QE, we restrict the regression sample to EE recipients who were given peer information. We find that, for both union and non-union participants, the peer information value's magnitude has a positive but insignificant effect on the probability of increasing one's before-tax contribution rate. The value's magnitude also has a positive effect on the before-tax contribution rate change that is insignificant for union recipients and marginally significant for non-union recipients. The non-union coefficient indicates that a one percentage point increase in the reported fraction of participants contributing at least 6% of their income to the plan results in a 7 basis point higher before-tax contribution rate change, which is material relative to the 26 basis point average before-tax contribution rate increase of the non-union EE recipients who did not receive peer information (Table 9).

[19] Appendix Table B.1 reports the probit version of these regressions. The results are qualitatively similar.
[20] Appendix Table B.2 reports the probit version of Table 11's binary regressions. The results are qualitatively similar.

E. Discussion of Results

The negative response of unionized non-participants to the peer information in the QE mailings is somewhat surprising, although it accords with Costa and Kahn's (2010) finding that certain Republican households respond to peer energy use information by increasing energy consumption. The contrary reaction of unionized non-participants in our experiment is probably not due to their learning that their coworkers had a lower plan participation rate than expected, since the enrollment rate and contribution rate changes of unionized non-participants varied *inversely* with the magnitude of the peer information value they received. We discuss three possible explanations for these findings.

First, unionized non-participants may have perceived their optimal savings behavior to be negatively correlated with that of the coworkers used to construct the peer information number. Because unionized workers constitute only one-fifth of the firm's workforce, company-wide 401(k) participation rates largely reflect the choices of non-union workers. If unionized employees identify themselves in opposition to non-union employees, they may prefer savings choices that are atypical by company standards.[21] The difficulty with this hypothesis is that it does not parsimoniously explain why unionized participants, who received EE, did not exhibit similar contrary behavior. One would need to additionally assume that unionized participants' oppositional identity is weaker than that of unionized non-participants.

Second, unionized non-participants may have believed, due to an antagonistic collective bargaining relationship with the firm, that savings messages sent to them by the company were likely to be counter to their own best interests. A related explanation, in line with psychological reactance theory (Brehm, 1966), is that mistrust caused unionized non-participants to perceive the peer information as coercive, leading them to act contrary to the peer information in an effort to assert their independent agency. This set of hypotheses also suffers from the inability to parsimoniously explain the results we obtain for unionized EE recipients. Furthermore, it is not clear why the inclusion of peer information would produce greater mistrust than the control letter, which also strongly encouraged 401(k) participation, nor why mistrust would be increasing in the magnitude of the peer information value.

[21] We have tried to examine this hypothesis empirically by testing whether the magnitudes of the peer information effects vary with the fraction of the peer reference group that is unionized. The results do not support the hypothesis.

Finally, unionized non-participants may have been discouraged and demotivated by the size of the gap between their own savings behavior and their peers' savings behavior. This mechanism would lead to negative effects from both the presence and the magnitude of the peer information value. The weakness of this hypothesis is that it does not parsimoniously explain the positive reaction of unionized EE recipients and non-unionized QE and EE recipients. One must additionally assume that these three subpopulations are less susceptible to such discouragement.

V. Conclusion

The results of our field experiment offer insight into the possible benefits and limitations of social norms marketing interventions. Consistent with theory and evidence arguing that exposure to information about the actions of peers often generates conformity, savings plan enrollment rates and contribution rate changes among non-unionized non-participants in our study were positively affected by the magnitude of the peer information number shown in Quick Enrollment mailings, and contribution rate changes among non-unionized participants were positively affected by the magnitude of the peer information number shown in Easy Escalation mailings. However, unionized non-participants reacted negatively to both the presence and the magnitude of the peer information number in Quick Enrollment, and unionized participants were unaffected by peer information in Easy Escalation.

Overall, our results suggest that social norms marketing may have limited power and can even produce an effect opposite of that intended in important settings. It is possible that peer information is demotivating when it highlights seemingly unattainable model behavior in one's peers. An important issue for future research is to develop a better understanding of how and when social norms campaigns will work as expected and when they are likely to backfire.

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Table 1. Employer Match Formulas

This table describes the employer match formulas that applied to different groups of employees at the firm.

		Number of employees included in the mailing with this match	
	Match formula	Union	Non-union
Match A	100% on the first 1% of pay contributed 50% on the next 5% of pay contributed	0	3,158
Match B	The minimum of $325 or 50% on the first 2% of pay contributed	126	0
Match C	100% on the first 2% of pay contributed 50% on the next 2% of pay contributed 25% on the next 4% of pay contributed	1,114	0
Match D	100% on the first 2% of pay contributed 50% on the next 2% of pay contributed 25% on the next 2% of pay contributed	261	0
Match E	50% on the first 4% of pay contributed	135	0
Match F	50% on the first 6% of pay contributed	149	0
Match G†	None	0	0

† This group was not included in the intervention.

Table 2. Peer Information Values

This table lists the peer information values in the mailings sent to employees in the peer information treatments. Employees not participating in the savings plan were sent the participation rate of employees in either their 5-year or 10-year age bracket (first column). Participating employees with before-tax contribution rates below the minimum of their match threshold and 6% were sent the fraction of participants in either their 5-year or 10-year age bracket whose before-tax contribution rate is at least 6% (third column).

	Savings plan participation rate	# of employees sent participation rate	Fraction of participants contributing ≥ 6% of pay	# of employees sent ≥ 6% contributor fraction
5-year age brackets				
20 – 24	77%	61	79%	57
25 – 29	87%	72	74%	155
30 – 34	90%	45	72%	161
35 – 39	90%	61	72%	162
40 – 44	92%	55	73%	166
45 – 49	93%	41	75%	172
50 – 54	91%	56	77%	142
55 – 59	90%	44	78%	102
60 – 64	88%	35	79%	47
65 – 69	87%	7	81%	7
10-year age brackets				
20 – 29	83%	135	76%	202
30 – 39	90%	104	72%	331
40 – 49	92%	97	74%	339
50 – 59	91%	109	78%	240
60 – 69	88%	38	79%	55

Table 3. Sample Characteristics

This table summarizes the characteristics of Quick Enrollment recipients (Panel A) and Easy Escalation recipients (Panel B). Employees are grouped by their union status and the type of peer information they received in their mailing. Salary data are missing for some employees in the sample. These employees are excluded from the regression analyses in subsequent tables.

Panel A: Quick Enrollment recipients (non-participants in the savings plan)						
	Union			Non-union		
	No peer information	5-yr. age bracket peer information	10-yr. age bracket peer information	No peer information	5-yr. age bracket peer information	10-yr. age bracket peer information
Percent male	69.1	66.0	61.6	77.2	75.4	75.4
Age						
Mean	41.0	40.7	41.0	40.4	41.2	41.3
(Std. dev.)	(13.4)	(13.4)	(13.4)	(11.4)	(11.6)	(12.2)
Tenure (years)						
Mean	9.4	9.5	9.0	7.2	7.5	7.8
(Std. dev.)	(12.0)	(12.1)	(12.1)	(9.3)	(9.5)	(8.4)
Annual salary ($1000s)						
Mean	38.3	38.1	39.0	46.3	46.2	45.1
(Std. dev.)	(16.7)	(15.1)	(18.9)	(22.3)	(23.9)	(21.5)
Sample size	$N = 343$	$N = 347$	$N = 349$	$N = 136$	$N = 130$	$N = 134$
# missing salary data	6	2	7	1	0	0

Panel B: Easy Escalation recipients
(plan participants with initial before-tax contribution rate < min{match threshold, 6%})

	Union			Non-union		
	No peer information	5-yr. age bracket peer information	10-yr. age bracket peer information	No peer information	5-yr. age bracket peer information	10-yr. age bracket peer information
Percent male	61.3	51.8	52.0	67.7	67.6	69.5
Age						
Mean	39.9	40.8	41.1	41.8	42.0	42.0
(Std. dev.)	(11.7)	(11.8)	(11.9)	(10.6)	(10.7)	(10.5)
Tenure (years)						
Mean	11.4	10.6	10.5	10.7	10.5	11.1
(Std. dev.)	(10.1)	(9.8)	(10.6)	(10.2)	(9.6)	(9.9)
Annual salary ($1000s)						
Mean	43.8	42.0	41.1	57.4	56.1	58.3
(Std. dev.)	(16.2)	(13.3)	(14.2)	(30.3)	(24.8)	(28.3)
Before-tax contrib. rate						
Mean	2.5	2.5	2.6	1.9	1.8	1.8
(Std. dev.)	(1.8)	(1.8)	(1.8)	(1.7)	(1.8)	(1.8)
Sample size	$N = 235$	$N = 255$	$N = 256$	$N = 931$	$N = 916$	$N = 911$
# missing salary data	0	0	0	0	2	3

Table 4. Effect of Receiving Peer Information in Quick Enrollment: Mean Comparisons
This table shows the average responses of employees who received Quick Enrollment mailings, reported separately by union status and treatment condition, and the differences in these average responses across treatment conditions. The responses of interest are enrollment in the plan between August 4, 2008 and September 8, 2008 and the before-tax contribution rate change as a percent of income during the same time period. Quick Enrollment recipients in the peer information treatments were shown the participation rate of employees in their five-year or ten-year age bracket. Standard errors appear in parentheses. *, **, and *** in the last row indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Fraction who enrolled in savings plan		Average before-tax contribution rate change	
	Union	Non-Union	Union	Non-Union
(1) No peer info	9.9%	0.7%	0.58%	0.04%
	(1.6)	(0.7)	(0.10)	(0.04)
(2) 5-year age bracket info	6.6%	2.3%	0.40%	0.14%
	(1.3)	(1.3)	(0.08)	(0.08)
(3) 10-year age bracket info	6.0%	3.0%	0.36%	0.16%
	(1.3)	(1.5)	(0.08)	(0.08)
(4) Combined 5-year and 10-year	6.3%	2.7%	0.38%	0.15%
	(0.9)	(1.0)	(0.06)	(0.06)
Difference: (4) – (1)	-3.6%**	1.9%	-0.20%*	0.10%
	(1.9)	(1.2)	(0.10)	(0.08)

Table 5. Effect of Receiving Peer Information in Quick Enrollment: Regression Analysis
This table reports the results of ordinary least-squares regressions where the dependent variable is either a dummy for enrolling in the plan between August 4, 2008 and September 8, 2008 or the before-tax contribution rate change during the same time period. The sample is Quick Enrollment recipients. The linear spline in recipient age has knot points at 22.5, 27.5, 32.5, …, and 67.5. All regressions include a constant. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Enrolled in savings plan		Dependent variable: Before-tax contribution rate change	
	Union	Non-union	Union	Non-union
Received peer info dummy	-0.040**	0.019	-0.221**	0.099
	(0.019)	(0.014)	(0.112)	(0.078)
Male dummy	-0.013	-0.031	-0.044	-0.154
	(0.020)	(0.021)	(0.116)	(0.113)
log(Tenure)	-0.025***	-0.010	-0.146***	-0.054
	(0.008)	(0.006)	(0.047)	(0.035)
log(Salary)	0.007	0.038*	0.021	0.252*
	(0.021)	(0.024)	(0.129)	(0.136)
Age spline	Yes	Yes	Yes	Yes
R^2	0.033	0.048	0.029	0.052
Sample size	N = 1,024	N = 399	N = 1,024	N = 399

Table 6. Effect of the Peer Information Value Received in Quick Enrollment

This table reports the results of ordinary least-squares regressions where the dependent variable is either a dummy for enrolling in the plan between August 4, 2008 and September 8, 2008 or the before-tax contribution rate change during the same time period. The sample is Quick Enrollment recipients who were given peer information. The peer information value was the participation rate of coworkers in the recipient's five-year or ten-year age bracket. The linear spline in recipient age has knot points at 22.5, 27.5, 32.5, …, and 67.5. All regressions include a constant. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Enrolled in savings plan		Dependent variable: Before-tax contribution rate change	
	Union	Non-union	Union	Non-union
Peer info value	-1.760**	1.083*	-10.663**	5.558*
	(0.731)	(0.559)	(4.613)	(2.935)
Male dummy	0.011	-0.057*	0.088	-0.293*
	(0.022)	(0.031)	(0.134)	(0.166)
log(Tenure)	-0.010	-0.016**	-0.061	-0.087**
	(0.009)	(0.008)	(0.053)	(0.044)
log(Salary)	-0.022	0.062*	-0.138	0.398**
	(0.027)	(0.034)	(0.170)	(0.199)
Age spline	Yes	Yes	Yes	Yes
R^2	0.034	0.085	0.033	0.091
Sample size	$N = 687$	$N = 264$	$N = 687$	$N = 264$

Table 7. Effect of the Peer Information Value Received in Quick Enrollment: Sources of Identification

This table reports the peer information value coefficients from ordinary least-squares regressions analyzing employee responses to Quick Enrollment mailings. The coefficients in each cell come from separate regressions. The sample in all specifications is recipients of Quick Enrollment mailings that included a peer information value equal to the participation rate of coworkers in either the recipient's five-year or ten-year age bracket. The dependent variable is either a dummy for enrolling in the plan between August 4, 2008 and September 8, 2008 or the before-tax contribution rate change during the same time period. The column headings indicate the source of variation used to identify the peer information value coefficient. All regressions include controls for gender, log tenure, log salary, and a constant, as in Table 6, as well as a linear spline in recipient age with knot points at 22.5, 27.5, 32.5, …, and 67.5. Additional controls for age are included as indicated in the bottom rows. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Source of identification for the effect of the peer information value		
	Baseline (from Table 6)	Differences in 5-year vs. 10-year peer information values	Discontinuities around age bracket boundaries
Dependent variable:			
Enrolled in savings plan			
Union (N = 687)	-1.760**	-1.970**	-0.736
	(0.731)	(0.816)	(1.224)
Non-union (N = 264)	1.083*	1.490*	0.994
	(0.559)	(0.881)	(1.025)
Dependent variable:			
Before-tax contribution rate change			
Union (N = 687)	-10.663**	-11.784**	-5.237
	(4.613)	(5.073)	(7.611)
Non-union (N = 264)	5.558*	9.038*	3.180
	(2.935)	(5.261)	(3.860)
Age controls			
Age spline	Yes	Yes	Yes
5-yr. age group dummies	No	Yes	No
Rec'd 10-year age group info dummy	No	No	Yes
Age spline × rec'd 10-year age group info	No	No	Yes

Table 8. Effect of the Peer Information Value Received in Quick Enrollment: Robustness to Different Age Controls

This table reports the peer information value coefficients from ordinary least-squares regressions analyzing employee responses to Quick Enrollment mailings. The estimated coefficients in each cell come from separate regressions. The sample in all specifications is recipients of Quick Enrollment mailings that included a peer information value equal to the participation rate of coworkers in either the recipient's five-year or ten-year age bracket. The dependent variable is either a dummy for enrolling in the plan between August 4, 2008 and September 8, 2008 or the before-tax contribution rate change during the same time period. All regressions include controls for gender, log tenure, log salary, and a constant, as in Table 6. The regressions vary in how they control for recipient age: (1) a linear spline in age with knot points at 22.5, 27.5, 32.5, …, and 67.5 (every five years), which is the baseline; (2) a linear spline in age with knot points at 22.5, 25, 27.5, …, and 67.5 (every 2.5 years); (3) a linear spline in age with knot points every 5 years and dummies for the target date retirement fund offered, which is dependent on age; (4) a linear spline in age with knot points every five years and controls for the number of years the recipient is from the age group mean (linear and squared terms); or (5) a linear spline in age with knot points every five years and controls for the recipient's percentile rank in the age group (linear and squared terms). Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Enrolled in savings plan		Dependent variable: Before-tax contribution rate change	
Parameterization of age controls	Union	Non-union	Union	Non-union
Age spline with knot points every 5 years (Baseline from Table 6)	-1.760** (0.731)	1.083* (0.559)	-10.663** (4.613)	5.558* (2.935)
Age spline with knot points every 2.5 years	-1.736** (0.734)	1.342** (0.662)	-10.520** (4.636)	6.760** (3.285)
Dummies for target date retirement fund offered	-1.931*** (0.723)	0.990* (0.574)	-11.665** (4.558)	5.797* (3.396)
Controls for years from age group mean (linear and squared)	-2.041** (0.797)	0.890 (0.596)	-12.220** (4.994)	5.111 (3.517)
Controls for percentile within age group (linear and squared)	-1.757** (0.748)	1.180* (0.657)	-10.438** (4.673)	6.519* (3.798)
Sample size	$N = 687$	$N = 264$	$N = 687$	$N = 264$

Table 9. Effect of Receiving Peer Information in Easy Escalation: Mean Comparisons
This table shows the average responses of employees who received Easy Escalation mailings, reported separately by union status and treatment condition, and the differences in these average responses across treatment conditions. The responses of interest are increasing one's before-tax contribution rate between August 4, 2008 and September 8, 2008 and the before-tax contribution rate change during the same time period. Easy Escalation recipients in the peer information treatments were shown the fraction of participants in their five-year or ten-year age bracket with before-tax contribution rates of at least 6%. Standard errors appear in parentheses. *, **, and *** in the last row indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Fraction who increased before-tax contribution rate		Average before-tax contribution rate change	
	Union	Non-Union	Union	Non-Union
(1) No peer info	10.6%	8.2%	0.33%	0.26%
	(2.0)	(0.9)	(0.08)	(0.04)
(2) 5-year age bracket info	9.8%	7.8%	0.30%	0.29%
	(1.9)	(0.9)	(0.07)	(0.05)
(3) 10-year age bracket info	11.3%	8.8%	0.38%	0.40%
	(2.0)	(0.9)	(0.09)	(0.07)
(4) Combined 5-year and 10-year	10.6%	8.3%	0.34%	0.35%
	(1.4)	(0.6)	(0.06)	(0.05)
Difference: (4) – (1)	0.0%	0.1%	0.01%	0.08%
	(2.4)	(1.1)	(0.10)	(0.07)

Table 10. Effect of Receiving Peer Information in Easy Escalation: Regression Analysis
This table reports the results of ordinary least-squares regressions where the dependent variable is either a dummy for increasing one's before-tax contribution rate between August 4, 2008 and September 8, 2008 or the before-tax contribution rate change during the same time period. The sample is Easy Escalation recipients. The linear spline in age has knot points at 22.5, 27.5, 32.5, …, and 67.5. Before-tax contribution rates as of July 14, 2008 are controlled for using a full set of contribution rate dummies. All regressions include a constant. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

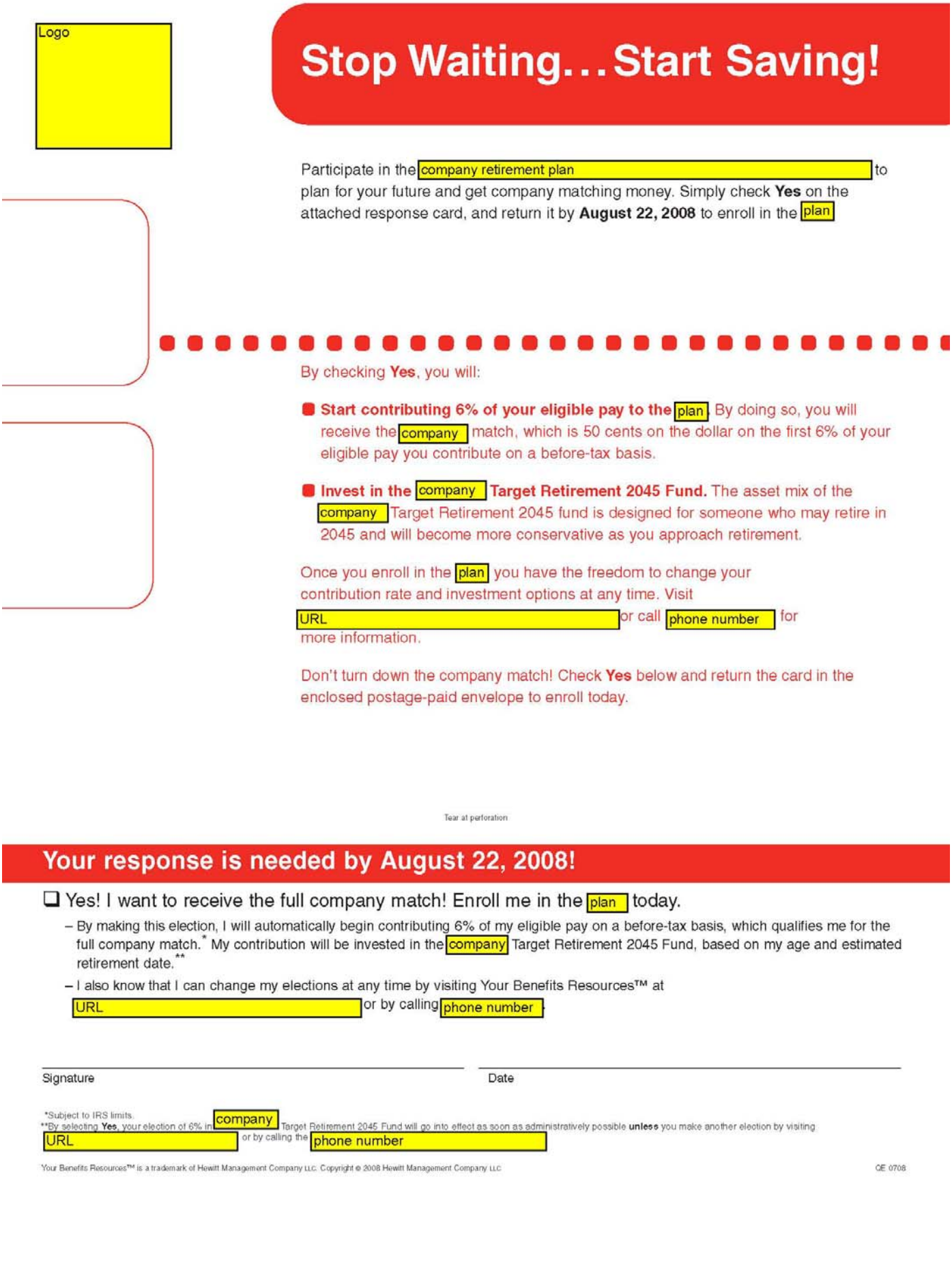
	Dependent variable: Increased before-tax contribution rate		Dependent variable: Before-tax contribution rate change	
	Union	Non-union	Union	Non-union
Received peer info dummy	-0.004 (0.025)	0.001 (0.011)	-0.008 (0.101)	0.072 (0.057)
Male dummy	-0.052** (0.026)	0.002 (0.011)	-0.147 (0.105)	0.024 (0.047)
log(Tenure)	-0.003 (0.014)	0.002 (0.005)	-0.047 (0.056)	0.030 (0.023)
log(Salary)	0.064* (0.038)	0.056*** (0.014)	0.308** (0.147)	0.406*** (0.115)
Age spline	Yes	Yes	Yes	Yes
Contribution rate dummies	Yes	Yes	Yes	Yes
R^2	0.029	0.024	0.041	0.018
Sample size	$N = 746$	$N = 2{,}753$	$N = 746$	$N = 2{,}753$

Table 11. Effect of the Peer Information Value Received in Easy Escalation

This table reports the results of ordinary least-squares regressions where the dependent variable is either a dummy for increasing one's before-tax contribution rate between August 4, 2008 and September 8, 2008 or the before-tax contribution rate change during the same time period. The sample is Easy Escalation recipients who were given peer information. The peer information value was the fraction of participants in the recipient's five-year or ten-year age bracket with before-tax contribution rates of at least 6%. The linear spline in age has knot points at 22.5, 27.5, 32.5, …, and 67.5. Before-tax contribution rates as of July 14, 2008 are controlled for using a full set of contribution rate dummies. All regressions include a constant. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Dependent variable: Increased before-tax contribution rate		Dependent variable: Before-tax contribution rate change	
	Union	Non-union	Union	Non-union
Peer info value	2.309	0.494	11.108	7.414*
	(1.901)	(0.813)	(7.085)	(4.179)
Male dummy	-0.035	-0.002	-0.050	0.014
	(0.031)	(0.014)	(0.124)	(0.062)
log(Tenure)	0.000	-0.002	-0.063	0.019
	(0.017)	(0.006)	(0.069)	(0.032)
log(Salary)	0.069	0.056***	0.371*	0.487***
	(0.055)	(0.017)	(0.215)	(0.166)
Age spline	Yes	Yes	Yes	Yes
Contribution rate dummies	Yes	Yes	Yes	Yes
R^2	0.041	0.020	0.064	0.021
Sample size	N = 511	N = 1,822	N = 511	N = 1,822

Appendix A.1: Sample Quick Enrollment Letter with No Peer Information



Logo

Stop Waiting…Start Saving!

Participate in the company retirement plan to plan for your future and get company matching money. Simply check **Yes** on the attached response card, and return it by **August 22, 2008** to enroll in the plan.

By checking **Yes**, you will:

- **Start contributing 6% of your eligible pay to the** plan. By doing so, you will receive the company match, which is 50 cents on the dollar on the first 6% of your eligible pay you contribute on a before-tax basis.
- **Invest in the** company **Target Retirement 2045 Fund.** The asset mix of the company Target Retirement 2045 fund is designed for someone who may retire in 2045 and will become more conservative as you approach retirement.

Once you enroll in the plan you have the freedom to change your contribution rate and investment options at any time. Visit URL or call phone number for more information.

Don't turn down the company match! Check **Yes** below and return the card in the enclosed postage-paid envelope to enroll today.

Tear at perforation

Your response is needed by August 22, 2008!

❑ Yes! I want to receive the full company match! Enroll me in the plan today.

– By making this election, I will automatically begin contributing 6% of my eligible pay on a before-tax basis, which qualifies me for the full company match.* My contribution will be invested in the company Target Retirement 2045 Fund, based on my age and estimated retirement date.**

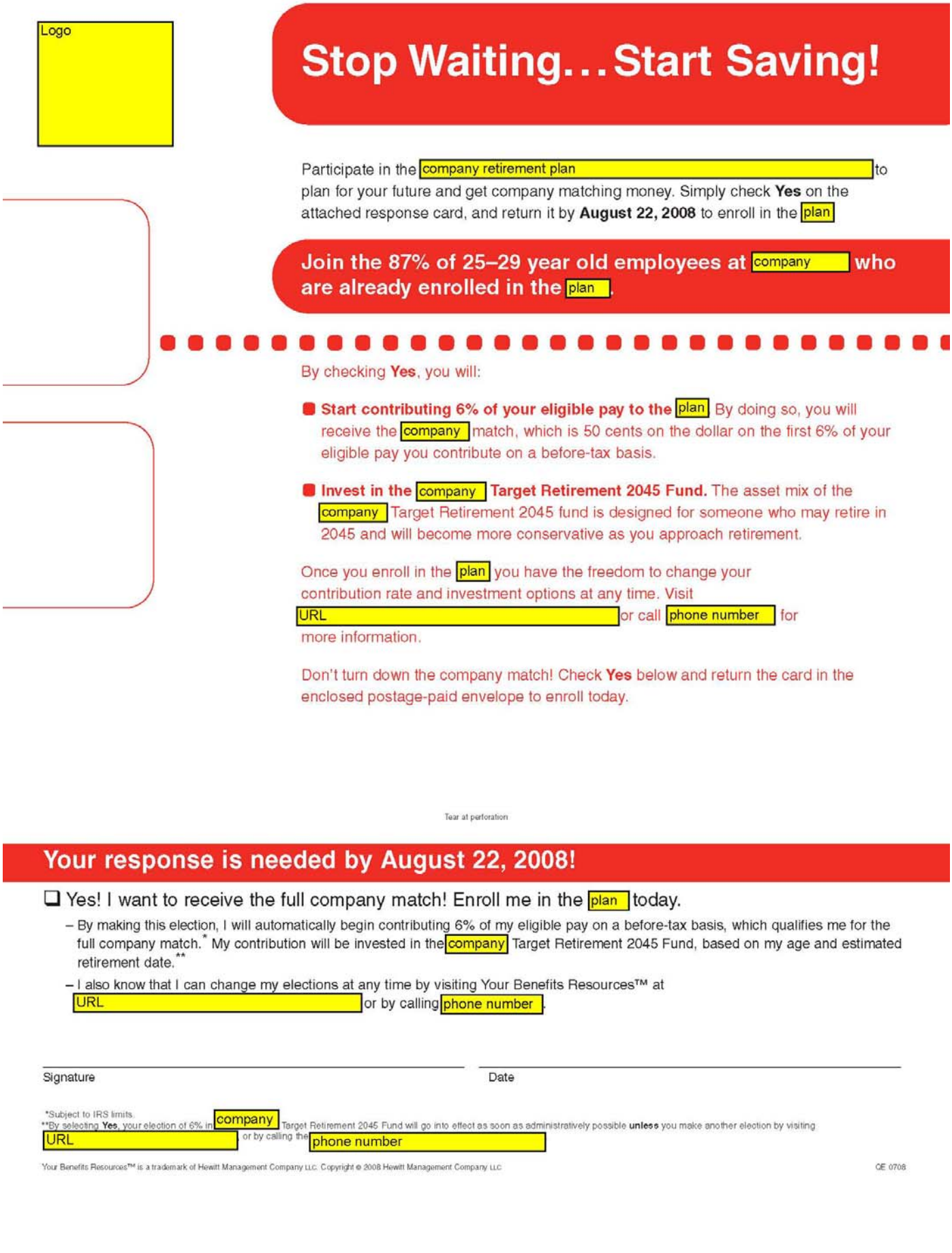
– I also know that I can change my elections at any time by visiting Your Benefits Resources™ at URL or by calling phone number.

Signature _____ Date _____

*Subject to IRS limits.
By selecting **Yes, your election of 6% in company Target Retirement 2045 Fund will go into effect as soon as administratively possible **unless** you make another election by visiting URL or by calling the phone number.

QE 0708

Appendix A.2: Sample Quick Enrollment Letter with Peer Information



Logo

Stop Waiting…Start Saving!

Participate in the company retirement plan to plan for your future and get company matching money. Simply check **Yes** on the attached response card, and return it by **August 22, 2008** to enroll in the plan.

Join the 87% of 25–29 year old employees at company who are already enrolled in the plan.

By checking **Yes**, you will:

- **Start contributing 6% of your eligible pay to the plan.** By doing so, you will receive the company match, which is 50 cents on the dollar on the first 6% of your eligible pay you contribute on a before-tax basis.
- **Invest in the company Target Retirement 2045 Fund.** The asset mix of the company Target Retirement 2045 fund is designed for someone who may retire in 2045 and will become more conservative as you approach retirement.

Once you enroll in the plan you have the freedom to change your contribution rate and investment options at any time. Visit URL or call phone number for more information.

Don't turn down the company match! Check **Yes** below and return the card in the enclosed postage-paid envelope to enroll today.

Tear at perforation

Your response is needed by August 22, 2008!

❑ Yes! I want to receive the full company match! Enroll me in the plan today.

– By making this election, I will automatically begin contributing 6% of my eligible pay on a before-tax basis, which qualifies me for the full company match.* My contribution will be invested in the company Target Retirement 2045 Fund, based on my age and estimated retirement date.**

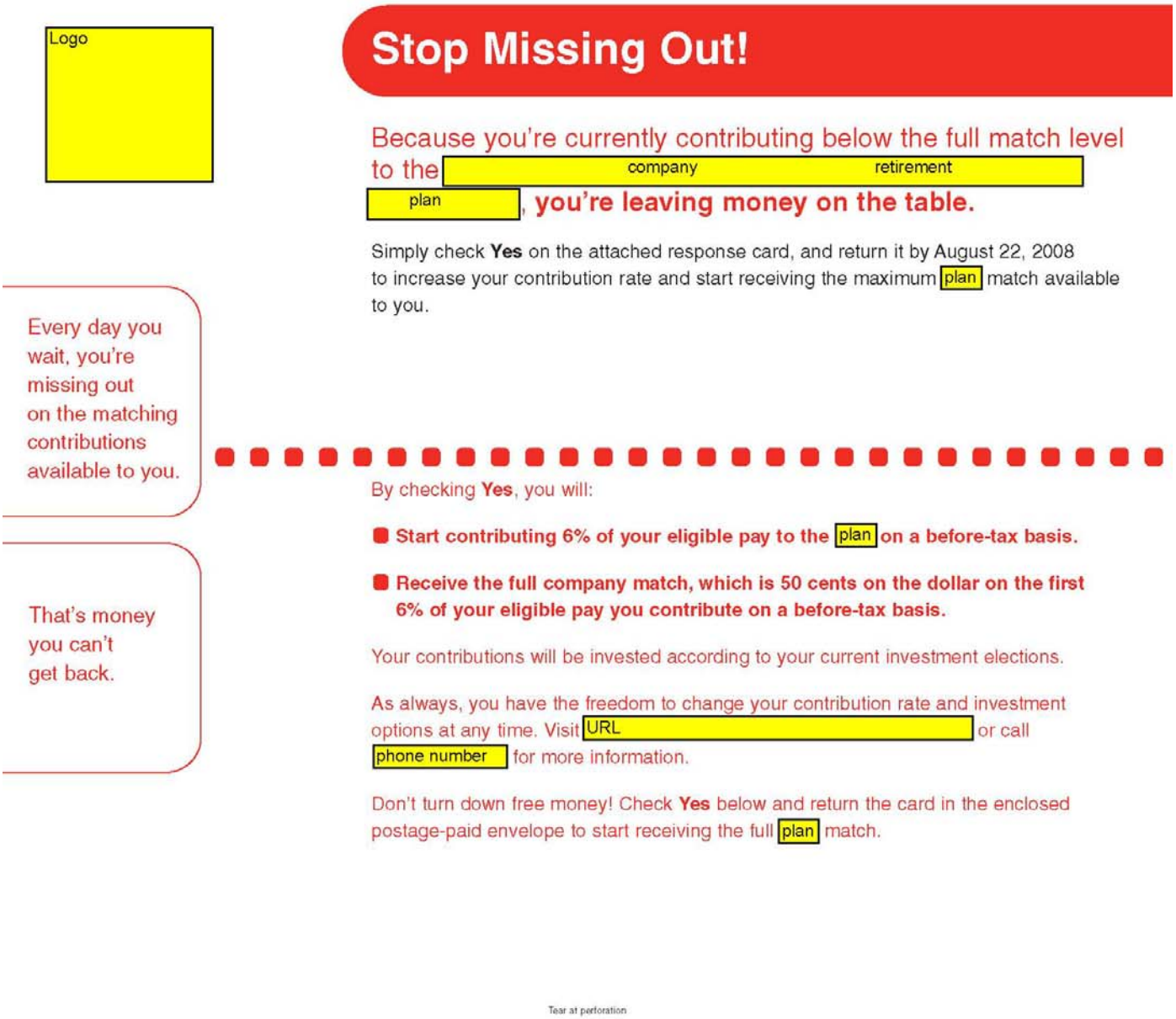
– I also know that I can change my elections at any time by visiting Your Benefits Resources™ at URL or by calling phone number.

Signature _____ Date _____

*Subject to IRS limits.
By selecting **Yes, your election of 6% in company Target Retirement 2045 Fund will go into effect as soon as administratively possible **unless** you make another election by visiting URL or by calling the phone number.

QE 0708

Appendix A.3: Sample Easy Escalation Letter with No Peer Information



Logo

Stop Missing Out!

Because you're currently contributing below the full match level to the company retirement plan, **you're leaving money on the table.**

Simply check **Yes** on the attached response card, and return it by August 22, 2008 to increase your contribution rate and start receiving the maximum plan match available to you.

Every day you wait, you're missing out on the matching contributions available to you.

That's money you can't get back.

By checking **Yes**, you will:

- **Start contributing 6% of your eligible pay to the plan on a before-tax basis.**
- **Receive the full company match, which is 50 cents on the dollar on the first 6% of your eligible pay you contribute on a before-tax basis.**

Your contributions will be invested according to your current investment elections.

As always, you have the freedom to change your contribution rate and investment options at any time. Visit URL or call phone number for more information.

Don't turn down free money! Check **Yes** below and return the card in the enclosed postage-paid envelope to start receiving the full plan match.

Tear at perforation

Your response is needed by August 22, 2008!

❑ Yes! I want to receive the full company match. Increase my contribution rate today.

– By making this election, I will automatically begin contributing 6% of my eligible pay on a before-tax basis, which qualifies me for the full company match.* My after-tax contribution (if any) will remain the same. My contributions will be invested according to my current investment election.**

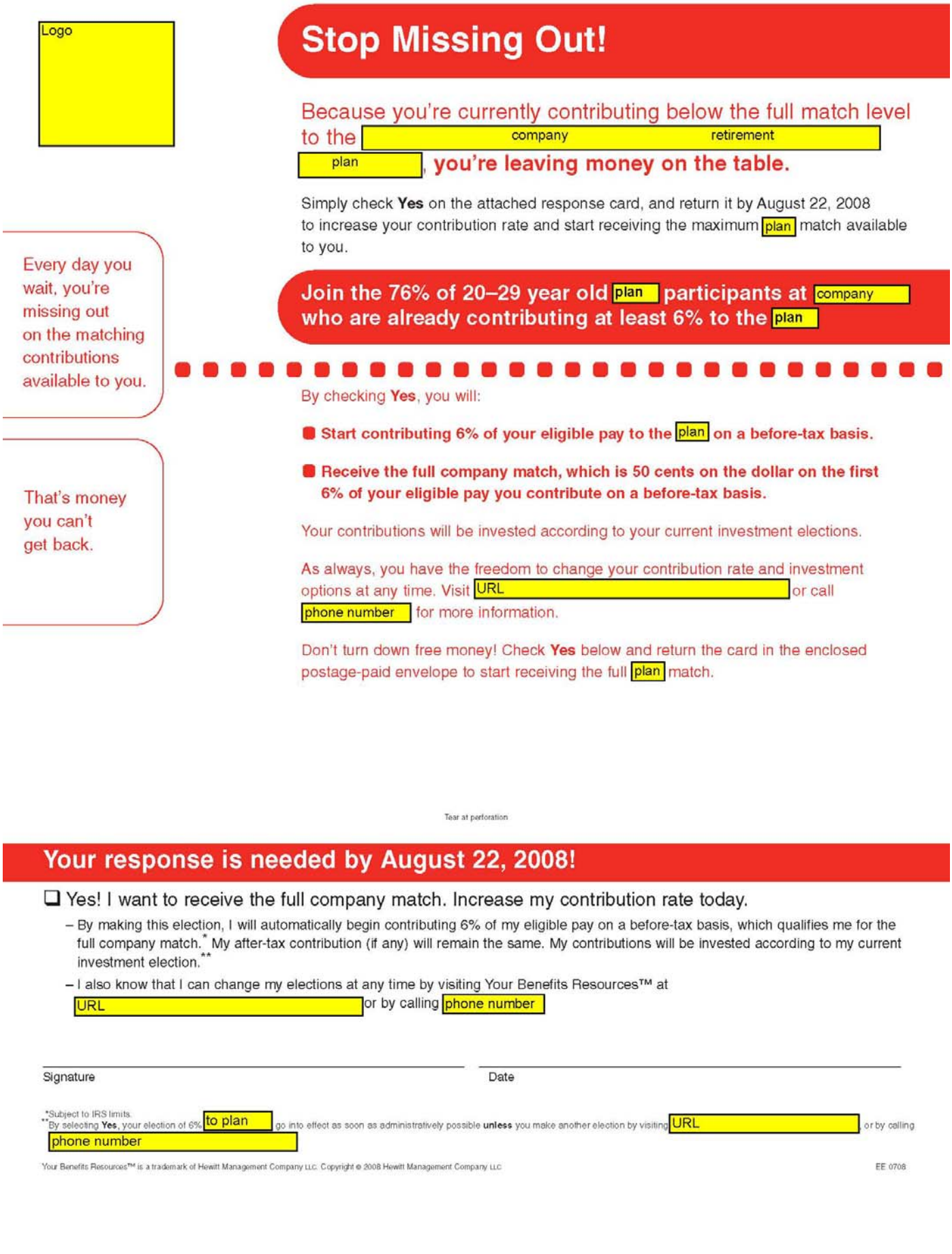
– I also know that I can change my elections at any time by visiting Your Benefits Resources™ at URL or by calling phone number.

Signature _____ Date _____

*Subject to IRS limits.
By selecting **Yes, your election of 6% to plan go into effect as soon as administratively possible **unless** you make another election by visiting URL or by calling phone number.

EE 0708

Appendix A.4: Sample Easy Escalation Letter with Peer Information



Logo

Stop Missing Out!

Because you're currently contributing below the full match level to the company retirement plan, **you're leaving money on the table.**

Simply check **Yes** on the attached response card, and return it by August 22, 2008 to increase your contribution rate and start receiving the maximum plan match available to you.

Join the 76% of 20–29 year old plan participants at company who are already contributing at least 6% to the plan

Every day you wait, you're missing out on the matching contributions available to you.

That's money you can't get back.

By checking **Yes**, you will:

- **Start contributing 6% of your eligible pay to the plan on a before-tax basis.**
- **Receive the full company match, which is 50 cents on the dollar on the first 6% of your eligible pay you contribute on a before-tax basis.**

Your contributions will be invested according to your current investment elections.

As always, you have the freedom to change your contribution rate and investment options at any time. Visit URL or call phone number for more information.

Don't turn down free money! Check **Yes** below and return the card in the enclosed postage-paid envelope to start receiving the full plan match.

Tear at perforation

Your response is needed by August 22, 2008!

❑ Yes! I want to receive the full company match. Increase my contribution rate today.

– By making this election, I will automatically begin contributing 6% of my eligible pay on a before-tax basis, which qualifies me for the full company match.* My after-tax contribution (if any) will remain the same. My contributions will be invested according to my current investment election.**

– I also know that I can change my elections at any time by visiting Your Benefits Resources™ at URL or by calling phone number

Signature _____ Date _____

*Subject to IRS limits.
By selecting **Yes, your election of 6% to plan go into effect as soon as administratively possible **unless** you make another election by visiting URL, or by calling phone number

EE 0708

Appendix Table B.1. Effect of Receiving Peer Information on Intervention Response: Probit Regressions

This table reports the results of probit regressions modeling employee responses to the Quick Enrollment and Easy Escalation mailings. The sample in the first two columns is Quick Enrollment recipients; the dependent outcome for this group is enrollment in the plan between August 4, 2008 and September 8, 2008. The sample in the second two columns is Easy Escalation recipients; the dependent outcome for this group is making a before-tax contribution rate increase between August 4, 2008 and September 8, 2008. The table reports marginal effects holding all variables fixed at their means (in particular, age is fixed at its mean, as opposed to holding the variables that make up the linear spline in age each fixed at their individual means). In the case of binary variables, the marginal effects are reported for a change from zero to one. Because of the problem of perfect predictability, all four regressions exclude employees over the age of 67.5. Perfect predictability also forces us to drop employees under the age of 22.5 and between the ages of 52.5 and 62.5 from regression (A2). Thus, the linear spline in age has knot points at 22.5, 27.5, 32.5, …, and 62.5 for regressions (A1), (A3), and (A4). The linear spline in age for regression (A2) has knot points at 27.5, 32.5, 37.5, 42.5, and 47.5, as well as an independent slope and intercept for the age range 62.5-67.5. These adjustments reduce the number of observations for regressions (A1), (A2), (A3), and (A4) by 5, 79, 4, and 2, respectively. All regressions include a constant. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance of the underlying probit coefficient at the 10%, 5%, and 1% levels, respectively.

	Quick Enrollment recipients		Easy Escalation recipients	
	Dependent variable: Enrolled in savings plan		Dependent variable: Increased before-tax contribution rate	
	Union (A1)	Non-union (A2)	Union (A3)	Non-union (A4)
Received peer info dummy	-0.031**	0.002	-0.003	0.002
	(0.017)	(0.004)	(0.015)	(0.010)
Male dummy	-0.010	-0.011**	-0.032**	0.001
	(0.016)	(0.021)	(0.017)	(0.010)
log(Tenure)	-0.019***	-0.001*	-0.003	0.002
	(0.007)	(0.003)	(0.008)	(0.004)
log(Salary)	0.000	0.004*	0.039*	0.050***
	(0.020)	(0.008)	(0.024)	(0.013)
Age spline	Yes	Yes	Yes	Yes
Contribution rate dummies	No	No	Yes	Yes
Pseudo-R^2	0.061	0.241	0.042	0.041
Sample size	N = 1,019	N = 320	N = 742	N = 2,751

Appendix Table B.2. Effect of Peer Information Value Received on Intervention Response: Probit Regressions

This table reports the results of probit regressions modeling employee responses to the Quick Enrollment and Easy Escalation mailings. The sample in the first two columns is Quick Enrollment recipients; the dependent outcome for this group is enrollment in the plan between August 4, 2008 and September 8, 2008. The sample in the second two columns is Easy Escalation recipients; the dependent outcome for this group is making a before-tax contribution rate increase between August 4, 2008 and September 8, 2008. Both samples are further restricted to employees who received a mailing with a peer information value. For Quick Enrollment recipients, the peer information value was the participation rate of employees in their five-year or ten-year age bracket. For Easy Escalation recipients, the peer information value was the fraction of participants in their five-year or ten-year age bracket with a before-tax contribution rate of at least 6%. The table reports marginal effects holding all variables fixed at their means (in particular, age is fixed at its mean, as opposed to holding the variables that make up the linear spline in age each fixed at their individual means). In the case of binary variables, the marginal effects are reported for a change from zero to one. Because of the problem of perfect predictability, all four regressions drop employees over the age of 67.5. Perfect predictability also forces us to drop employees under the age of 22.5 and between the ages of 52.5 and 62.5 from regression (A6). Thus, the linear spline in age has knot points at 22.5, 27.5, 32.5, …, and 62.5 for regressions (A5), (A7), and (A8). The linear spline in age for regression (A6) has knot points at 27.5, 32.5, 37.5, 42.5, and 47.5, as well as an independent slope and intercept for the age range 62.5-67.5. These adjustments reduce the number of observations for regressions (A5), (A6), (A7), and (A8) by 3, 52, 2, and 1, respectively. All regressions include a constant. Robust standard errors are in parentheses. *, **, and *** indicate statistical significance of the underlying probit coefficient at the 10%, 5%, and 1% levels, respectively.

	Quick Enrollment		Easy Escalation	
	Dependent variable: Enrolled in savings plan		Dependent variable: Increased before-tax contribution rate	
	Union (A5)	Non-union (A6)	Union (A7)	Non-union (A8)
Peer info value	-2.249***	0.008**	1.665	0.590
	(1.306)	(0.025)	(1.939)	(0.898)
Male dummy	0.020	-0.008***	-0.028	-0.004
	(0.034)	(0.020)	(0.026)	(0.014)
log(Tenure)	-0.018	-0.000***	-0.000	-0.001
	(0.014)	(0.000)	(0.013)	(0.006)
log(Salary)	-0.044	0.000***	0.051	0.055***
	(0.045)	(0.001)	(0.046)	(0.019)
Age spline	Yes	Yes	Yes	Yes
Contribution rate dummies	No	No	Yes	Yes
Pseudo-R^2	0.066	0.435	0.060	0.036
Sample size	$N = 684$	$N = 212$	$N = 509$	$N = 1{,}821$