

NBER WORKING PAPER SERIES

THE EFFECTS OF FINANCIAL EDUCATION
IN THE WORKPLACE: EVIDENCE FROM
A SURVEY OF EMPLOYERS

Patrick J. Bayer
B. Douglas Bernheim
John Karl Scholz

Working Paper 5655

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 1996

We are grateful to the National Science Foundation (Grant Number SBR94-09043 and Grant Number SBR95-11321), as well as to Merrill Lynch, Inc. for financial support. We would also like to thank KPMG Peat Marwick LLP, and in particular Martha Priddy Patterson, for making available the data used to conduct this study. This paper is part of NBER's research programs in Aging and Public Economics. Any opinions expressed are those of the authors and not those of the National Bureau of Economic Research.

© 1996 by Patrick J. Bayer, B. Douglas Bernheim and John Karl Scholz. All rights reserved. Short sections of text, not to exceed two paragraphs, may be quoted without explicit permission provided that full credit, including © notice, is given to the source.

THE EFFECTS OF FINANCIAL EDUCATION
IN THE WORKPLACE: EVIDENCE FROM
A SURVEY OF EMPLOYERS

ABSTRACT

We examine the effects of education on financial decision-making skills by identifying an interesting source of variation in pertinent training. During the 1990s, an increasing number of individuals were exposed to programs of financial education provided by their employers. If, as some have argued, low saving frequently results from a failure to appreciate economic vulnerabilities, then education of this form could prove to have a powerful effect on rates of behavior. The current paper undertakes an analysis of these programs using a previously unexploited survey of employers. We find that both participation in and contributions to voluntary savings plans are significantly higher when employers offer retirement seminars. The effect is typically much stronger for non-highly compensated employees than for highly compensated employees. The frequency of seminars emerges as a particularly important correlate of behavior. We are unable to detect any effects of written materials, such as newsletters and summary plan descriptions, regardless of frequency. We also present evidence on other determinants of plan activity.

Patrick J. Bayer
Department of Economics
Stanford University
Stanford, CA 94305-6072

B. Douglas Bernheim
Department of Economics
Stanford University
Stanford, CA 94305-6072
and NBER

John Karl Scholz
Department of Economics
University of Wisconsin-Madison
1180 Observatory Drive
Madison, WI 53706
and NBER

1. Introduction

Since the early work of Becker (1967), economists studying the returns to education have traditionally focused on the relation between education and wages. From the perspective of the associated literature, education creates value by conferring skills that are of use to employers. Clearly, however, this is not the sole economic objective of education. In addition to labor market skills, education may also confer *decision making* skills. Apart from any affect on labor market performance, these decision making skills may improve an individual's ability to weigh alternatives, exploit opportunities, and achieve personal objectives.

Some of the most complex decisions undertaken by ordinary individuals concern financial issues, such as the determination of retirement income needs, or the allocation of resources among alternative investments. Most individuals make these decisions on the basis of their own judgement, rather than with the help of experts, in large part because the market for financial expertise is imperfect (see Bernheim 1994a, 1996b). It is therefore conceivable that appropriate forms of education may improve the quality of personal financial decision-making.

Existing evidence concerning the relation between education and financial choices is quite limited. Correlations between an individual's general level of educational attainment and his or her rate of saving have been documented by Bernheim and Scholz (1993) and Hubbard, Skinner, and Zeldes (1995). However, as in the literature on returns to education in labor markets, these correlations may be attributable to other related factors. For example, individuals with greater patience presumably tend to remain in school longer, and to save at higher rates. As noted by those studying the relation between wage and schooling (see e.g. Card, 1995), causal inferences about the effects of education are potentially misleading unless they are derived from sources of variation in education that are plausibly exogenous.

One particularly pertinent source of variation in education concerns the availability of financial education in the workplace. According to one recent survey, as of 1994, 88 percent of large employers

offered some form of financial education, and more than two-thirds had added these programs after 1990.¹ Typically, employers provide information and guidance on a range of topics related to retirement planning. While nearly all such programs cover principles of asset allocation, sizable majorities treat retirement income needs (73 percent) and retirement strategies (88 percent).² If, as argued by Bernheim (1994a, 1995a), low saving frequently results from a failure to appreciate economic vulnerabilities, then education of this form could prove to have a powerful effect on rates of saving.

It is doubtful that the availability of employer-based retirement education is entirely unrelated to workers' underlying predispositions to save. However, there are a variety of reasons (discussed below) to believe that employers adopt these programs as remedial measures in instances where employees are disinclined to save. If this is the case, then cross-sectional estimates of the relation between saving and education may provide lower bounds on the causal effects of education. In addition, since many of these programs have been adopted quite recently, it may be possible to control for an unobserved predisposition to save by contrasting the behavior of the same individuals before and after educational interventions.

In this paper, we study the behavioral effects of financial education in the workplace using survey data collected from employers who sponsor pension plans. Our analysis is based in part on estimates of the cross-sectional relations between various forms of education and plan activity. Since the data contain repeated observations on many firms, they also permit us to evaluate the direction of the probable bias in cross-sectional estimates by testing the hypothesis that educational is remedial (through an examination of the circumstances under which programs are adopted or expanded). Moreover, the longitudinal data allow us to control explicitly for unobserved (firm-level) fixed effects.

Despite the growing importance of employer-based retirement education, existing evidence on this

¹“Employees getting more: Investment education, planning help on the increase,” *Pensions & Investments*, January 23, 1995, p. 74.

²See Employee Benefit Research Institute (1995, p. 15).

topic is largely confined to qualitative surveys and case studies (see e.g. Employee Benefit Research Institute, 1994, 1995, A. Foster Higgins & Co., Inc., 1994; Borleis and Wedell, 1994; or Geisel, 1995). One exception is Bernheim and Garrett (1996), who use a novel household survey to study the effects of these programs. Their analysis is complementary to the current paper; we discuss the relations between these studies in greater depth below.

The remainder of this paper is organized as follows. After describing our data (section 2), we provide an analysis of the circumstances under which employers offer retirement education (section 3). While certain kinds of education are more common at organizations that offer self-directed pension plans (such as 401(k)s and 403(b)s), even employers that offer defined benefit plans (and nothing else) frequently provide some form of financial education. For 401(k) plans in particular, the data indicate that low participation among non-highly compensated employees is a strong predictor of the adoption and/or enhancement of educational offerings. At least in the context of 401(k) plans, education therefore appears to be remedial, in the sense that it is made available to those who are least inclined to save. In part, this may be a consequence of non-discrimination requirements, which limit contributions of highly compensated employees as a function of contributions by non-highly compensated employees. Based on this finding, one would expect cross-sectional estimates of the relation between participation (contributions) and education to be biased against the conclusion that education enhances participation and contributions to self-directed plans.

In section 4, we examine factors correlated with participation in and contributions to 401(k) plans. We find that both measures of activity are significantly higher when employers offer retirement seminars. The effect is much stronger for non-highly compensated employees than for highly compensated employees. The frequency of seminars emerges as a particularly important correlate of behavior. We are unable to detect any effects of written materials, such as newsletters and summary plan descriptions, regardless of frequency. We obtain similar results based on longitudinal patterns, as well as for an

assortment of estimation methods. In light of the likely bias mentioned in the previous paragraph and discussed in more detail in section 3, these findings are strongly consistent with the efficacy of retirement seminars, and they do not rule out the possibility that other forms of education are also effective.

In studying the relation between 401(k) activity and education, we control for a variety of plan features. The effects of these features are, of course, of independent interest, and have been the subject of several prior analyses (see Poterba, Venti, and Wise, 1994, Papke, Petersen, and Poterba, 1993, Papke, 1995, Andrews, 1992, Kusko, Poterba, and Wilcox, 1993, and Scott, 1994). Generally, we find that the existence of an employee match is strongly related to 401(k) contributions, and especially to participation, in cross-sections. However, this effect is not readily apparent in longitudinal data. There is relatively little indication that any measure of 401(k) activity is significantly related to loan provisions. Investment options have no detectable effect on participation, but contributions tend to be a bit higher when greater flexibility is offered.

The paper closes with a brief conclusion.

2. Data

The data for our analysis come from the 1993 and 1994 versions of the *KPMG Peat Marwick Retirement Benefits Survey*. In 1993, KPMG Peat Marwick selected approximately 1100 employers at random from a list of all the private and public employers in the United States with at least 200 employees. If they were willing to participate again, these same employers were retained for the 1994 survey. Any employers who declined to participate in 1994 were replaced with a randomly selected employer from the same industry, region, and employer-size category.

In each year, these employers were questioned by telephone about the administration, features, and employee utilization of their retirement plans. Some basic employer data, such as total employees, sales, and industry, are available for all respondents. In addition, those employers who have a retirement plan (910 in

1993 and 861 in 1994) provide some general information about their plan, including the number of employees covered by the plan, the types of plans offered, and the extent to which financial education and guidance is provided by the employer to help employees invest for retirement. Furthermore, for each type of retirement plan that a firm offers, the survey contains detailed questions about its features, eligibility requirements, and employee activity.

Those employers who offer 401(k) plans (596 in 1993 and 566 in 1994) report the features of their plan, including the availability of an employer match, the matching rate provided, whether hardship withdrawals and loans are permitted, and the number and type of investment options available to a participant in the plan. The survey also allows us to determine which employee groups, such as union, salaried, or part-time employees, are eligible to participate in the plan. In addition, participation and contribution rates are provided for the employees eligible for the 401(k) plan. Thus, for a large sample of over 500 firms each year, the survey provides a rich set of plan characteristics and utilization rates. The variables that we focus on in this study fall into three categories: basic firm characteristics (where the firm is the unit of analysis for the study); general plan characteristics, encompassing all retirement plans offered by the firm; and 401(k) plan characteristics.

With respect to the first category, we experimented with a number of basic firm characteristics (including sales and dummy variables for industry and region), but generally found that they had very little effect on our results. For most of the results presented in this paper, we have retained only one general firm characteristic: the total number of employees.³

The second group of variables includes general features of the firm's retirement programs. The most important of these describe the extent to which the firm provides financial education to its employees. Specifically, the survey asks each respondent how often the firm provides summary plan descriptions, employee newsletters or other periodic publications, investment seminars for all employees, seminars for

³Since the data were provided to us without firm identifiers, we were limited to information collected by the survey.

employees over age 50, and seminars for employees within a year or two of retirement. Each respondent was asked whether the firm used these devices often, sometimes, rarely, or never. To incorporate the qualitative nature of these responses into our analysis, we use these responses to create three dummy variables for each educational device. The first indicates whether the device is used often, the second indicates whether it is used sometimes or rarely, and the third indicates it is never used. We combine the responses “sometimes” and “rarely” because the data have limited ability to identify educational parameters, and since the subjective distinctions between these responses seem the most likely to differ across respondents.⁴

Other pertinent characteristics of an employer’s overall retirement program covered by the survey include information on the composition of retirement plans (e.g. 401(k)s, defined benefit, profit sharing, and so forth), and the fraction of employees who are covered by a retirement plan. Unfortunately, the survey collects coverage information on a firm-wide basis, rather than plan-by-plan.

The final category of variables includes characteristics of 401(k) plans. These include dummy variables for whether loans are permitted and whether an employer match is provided. We also calculate a measure of the number of different kinds of investment options (employer stock, guaranteed income contracts, equity mutual funds, corporate bond funds, government funds, and other funds) available to plan participants. Other survey questions allow us to determine if certain employee groups, such as union, part-time, or salaried employees, are eligible for the plan.⁵

For 401(k) plans, we construct participation and contribution rates for eligible employees. The survey

⁴The results in this paper do not change qualitatively when we use other groupings of the responses to these questions. In order to verify the robustness of our results and to reduce still further the number of parameters, we also occasionally define a single variable measuring the intensity of the educational offering. The variable is set equal to 3 if the device is used often, 2 if it is sometimes used, 1 if it is rarely used, and 0 if it is never used.

⁵The survey also provides information about other potentially useful plan features, such as hardship withdrawals and the actual matching rate provided by the firm. Unfortunately the usefulness of these variables is diminished by data limitations and we therefore do not include them in our specifications. For example, in each year of the survey over 94 percent of employers allow hardship withdrawals, so there is not enough variation in the data to examine their effect on plan activity. Also, fewer than 40 percent of the employers who offer an employer match report the actual matching rate. Therefore, incorporating the actual rate into our specifications would severely limit the sample size available for estimation.

provides measures of 401(k) plan activity for three categories of employees: all, highly compensated (HC), and non-highly compensated (NHC). All eligible employees are classified as either HC or NHC according to specific rules set forth in the applicable non-discrimination provisions. These rules were instituted to ensure an equitable distribution of benefits from pension plans. In the context of 401(k)s, they operate by limiting the amounts that highly compensated employees can contribute as a function of contributions by non-highly compensated employees. An individual is classified as highly compensated if he or she meets any of a number of specific criteria (e.g. earnings of roughly \$100,000 or more, ownership of more than 5 percent of the company, or earnings of roughly \$65,000 or more if this amount is in the top quintile of the firm's salary distribution). In addition to participation rates, the survey also provides contribution rates as a percentage of salary for plan participants.⁶ Once again, these figures are provided separately for all employees, HC employees, and NHC employees. Taking the product of participation rates and average contribution rates conditional on participation, we obtain average contribution rates conditional on eligibility.

Summary statistics for 401(k) participation and contribution rates are provided in Table 1. Mean participation rates are slightly less than 60 percent for NHC employees, roughly 80 percent for HC employees, and just over 60 percent overall in both 1993 and 1994. The distribution of participation rates for HC employees is highly skewed (with outliers on the lower tail), causing the median participation rates to be about 10 percentage points higher than the mean rates. Participating employees generally contribute between 5 and 7 percent of their salaries, with HC employees contributing approximately one percentage point more than NHC employees. In both years, contribution rates for eligible employees averaged just under three percent for NHC employees, over five percent for HC employees, and between three and four percent overall.

⁶While the survey asks for the average contribution as a percentage of compensation, it is not completely clear from the wording whether it means the average over contributors, or the average over eligibles. The designers of the survey suggest the former is the natural interpretation. Given the data, this interpretation appears to be correct. We calculated the average contribution for companies that reported participation rates from 0 to 25 percent, 25 to 50 percent, 50 to 75 percent, and 75 to 100 percent. There was no evidence of systematic variation in contributions over these categories. If companies were reporting the average over eligibles, then the average would (as a purely mechanical matter) have to rise steeply across these categories.

3. The Availability of Retirement Education

As a first step in our analysis, we provide descriptive information concerning the availability of different kinds of retirement education in the workplace. Overall, in 1993 nearly 74 percent of pension plan sponsors provided summary plan descriptions, roughly 65 percent distributed newsletters, and just over 44 percent offered retirement seminars to all employees. When firms are weighted by total employment, summary plan descriptions and newsletters appear to be somewhat more common (roughly 80 percent in each case), but the frequency of seminars is essentially unchanged (44 percent). The fraction of firms providing summary plan description was somewhat lower in 1994 than in 1993, but the fractions providing newsletters and seminars rose slightly.

Since our ultimate objective is to evaluate the relation between education and behavior, it is important to develop an understanding of the sources of variation in educational offerings across firms. Plan sponsors are presumably more likely to provide information when participants are required to make decisions. It is therefore natural to speculate that the growth of educational offerings results in large part from the rising popularity of self-directed plans such as 401(k)s and 403(b)s (see EBRI, 1995, or the extended discussion in section 3 of Bernheim and Garrett, 1996). Yet the KPMG Peat Marwick survey data reveal that seminars, newsletters, and summary plan descriptions are nearly as common among firms with defined benefit plans (43.8 percent, 68.9 percent, and 73.1 percent, respectively for 1993) as among firm with 401(k)s (44.4 percent, 71.2 percent, and 80.1 percent, respectively for 1993).

The preceding finding raises the possibility that many employers provide retirement education to address general concerns about employees' preparation for retirement, rather than to equip them with plan-specific decision-making skills. One need not construe this as necessarily altruistic. Education may help employees to appreciate the values of their pension plans. By promoting adequate preparation for retirement, an employer may also hope to avoid subsequent conflicts (e.g. over demands for more generous pension benefits) with older, poorly prepared workers. Assistance with financial planning may also enhance employee

loyalty, improve labor relations, and boost morale.

Of course, comparisons based on raw frequencies, such as those described above, may be misleading. For example, it is common for employers to offer both a defined benefit plan and a supplemental 401(k). It is therefore possible that the frequency of educational offerings at organizations with defined benefit plans in part reflects the presence of secondary 401(k) plans. Also, it is conceivable that educational offerings may differ systematically by company characteristics that are related to the presence of defined benefit plan.

To investigate this possibility, we estimate probit models explaining the availability of seminars for all employees, seminars for employees over 50 years of age, seminars for employees nearing retirement, summary plan descriptions, and newsletters or periodicals. Results are contained in table 2. Explanatory variables include variables measuring the types and variety of plans (where the omitted category is “only a defined benefit plan”), employment, plan coverage, and year. The data are pooled across years, and the standard errors are corrected to account for potential correlation across observations from the same organization.

Focusing attention on organizations with a single plan, it is evident that seminars of all kinds are most common among non-profit institutions with 403(b)s. Companies with 401(k)s are more likely to offer seminars to all employees than companies with defined benefit or other kinds of plans, but less likely to offer seminars specifically for older employees. Written materials of all kinds are most commonly used among companies with 401(k)s, but there are no significant differences between the likelihoods that sponsors of other kinds of plans provide such materials. Thus, while the rising popularity of self-directed plans may have promoted the growth of certain educational offerings, the impetus for this growth appears to be much more general. This is consistent with the findings of Bernheim and Garrett (1996).

Table 2 also indicates that educational offerings are significantly more common among organization with multiple plans. Employment and coverage are positively correlated with seminar offerings, but not with the availability of written materials. This may reflect the presence of economies of scale in the provision of

seminars. Generally, the frequencies of educational offerings did not change appreciably between 1993 and 1994.

When analyzing the relation between education and behavior, we must necessarily restrict attention to organizations with plans that permit employees to make choices. We therefore focus our attention on 401(k)s. Since the determinants of education offerings relate to the selection process determining the incidence of “treatment,” it is important to reexamine the determinants of these offerings specifically in the context of 401(k)s. If, for example, education tends to be offered in response to a demand for information by employees who are naturally inclined to save at high rates, then positive cross-sectional correlations between education and 401(k) activity could reflect selection, rather than the influence of employer-based education on employee behavior. If, on the other hand, companies tend to provide education as a remedial measure to employees who are otherwise disinclined to save, then the nature of selection could obscure an underlying relation between education and behavior.

Analogously to table 2, table 3 provides estimates of probit models explaining the availability of various educational offerings in the pooled 1993/94 sample. In this instance, however, we have confined attention to companies with 401(k)s. We have also added several new explanatory variables, including the number of categories of investment options (e.g. employer stock, guaranteed income contracts, bond funds, equity mutual funds, and so forth) available to participants, and dummy variables indicating whether the plan covers union employees,⁷ whether it provides for an employer match, and whether loans are permitted.

As in table 2, seminars for older workers are more likely when companies offer plans other than 401(k)s, and the likelihood of seminar offerings generally tends to rise with employment. Notably, education does not appear to be more common among plans that cover union employees. Since employees presumably have greater leverage when they are unionized, this casts doubt on the hypothesis that education is provided

⁷Unfortunately, this variable is not available for defined benefit plans, and therefore could not be included in the regressions of table 2.

in response to employee demand. It is also notable that the correlation between seminars and employer matching provisions is negative (though not significant at conventional levels). This is consistent with the view that education and matching are substitutable methods of encouraging participation in situations where employees show insufficient interest in the plan. Not surprisingly, education of all forms is significantly more likely when employers offer participants more investment options. There is also some indication that seminars and loan provisions are positively correlated.

Thus far, we have not exploited the longitudinal features of our data. Doing so permits us to examine the circumstances under which employers establish or expand educational offerings. Specifically, we regress the change in seminar offerings between 1993 and 1994 on a variety of “initial” (1993) company and pension plan characteristics. For the purpose of this analysis, we measure the change in seminar offerings as the difference between the “intensity” of seminars (measured on a scale of 0 to 3) in 1993 and 1994 (see footnote 4).

Results appear in table 4. Separate results are presented for each of our five educational categories. The most striking feature of this table is the pattern of negative coefficients for the initial participation rate of NHC employees in the specifications explaining changes in seminar offerings. In the case of seminars for all employees, the coefficient is highly significant; it is marginally significant (i.e. with slightly less than 95% confidence) for the other two seminar variables. This implies that low participation among NHC employees is strongly associated with subsequent increases in employer-sponsored seminars. This result does not, however, carry over to written materials. No other variable consistently passes tests for statistical significance at conventional levels. The coefficients of the initial HC participation rate are also negative for the seminar variables, but their magnitudes and levels of significance are smaller. With low confidence, the estimates indicate that educational improvements were more likely among firms with pensions plans that covered larger fractions of employees. Improvements in age-specific seminars were also less common among larger firms and among unionized firms. There is little if any relation between initial pension plan

characteristics and subsequent changes in educational offerings.

The pattern documented in table 4 supports the hypothesis that, in the context of 401(k)s, retirement seminars are remedial. These offerings appear to be motivated by low participation among NHC employees. This is consistent with the view that non-discrimination requirements provide a powerful impetus for the provision of retirement education among 401(k) sponsors. However, it is doubtful that this is the only motivation. If it were, then high initial HC participation would also correlate with subsequent increases in education, which is not the case. The small negative effect of initial HC participation probably reflects the offsetting effects of two separate considerations: first, that employers are inclined to offer education as a remedial measure when 401(k) activity is low (regardless of HC or NHC status), and second, that employers also use education to address binding non-discrimination constraints (which tend to arise when HC participation is high). These findings are consistent with the indirect evidence on selection offered by Bernheim and Garrett (1995).

4. Evidence on Participation in and Contributions to 401(k) Plans

In this section we use the KPMG Peat Marwick plan-level data to examine factors associated with participation in and contributions to 401(k) plans. We use cross-sectional data on all the firms in our sample and also examine changes for the same firm over 1993 and 1994. While we focus on the role employer-based education plays in these decisions, we examine several other plan and firm characteristics that may be related to participation and contributions.

A. Factors affecting participation in self-directed plans

The first step in our analysis of 401(k) activity is to examine cross-sectional OLS regressions of plan-level participation rates. Since there are strong similarities between the data for 1993 and 1994, and since we are not interested in investigating any specific hypotheses about the differences between these years, we pool the two surveys. We include a year dummy to account for any systematic factors that might influence

participation or contributions differently through time. As in the previous section, pooling the data raises one important empirical issue: since many of the same firms were surveyed in both years, it is doubtful that the error terms are independent across all observations. While OLS estimates are still consistent under these conditions, the conventional method of computing standard errors is inapplicable. In our reported estimates, we again correct our standard errors to reflect clustered sampling.

Since nondiscrimination rules are binding for many employers (Garrett, 1996), education programs may be designed to encourage participation by NHC employees. Moreover, since HC and NHC households start out with different levels of financial sophistication, we would expect financial education to affect their behavior differently. For both reasons, we estimate separate regressions for these groups as well as for the combined sample.

Results are contained in the first panel of table 5. The dependent variables for these regressions – the plan participation rates – vary from 1 to 100 percent. The estimated effects of the key explanatory variables are described below.

i. The role of seminars

For our base-case estimates, we use dummy variables to measure the intensity (frequency) of educational offerings. In this way, we avoid imposing assumptions on the functional relation between participation and an arbitrarily scaled measure of education (as discussed in section 2, we do, however, use the same dummy variable to represent the responses “sometimes” and “rarely”). In subsection D, we also present results based on a single scalar measure of educational intensity. We also focus exclusively on seminars for all employees, rather than on seminars targeted at employees over 50 or employees near retirement. In practice, the seminar variables are highly colinear, and it is difficult to identify their separate effects with precision.

Reading across the first two rows of the first panel of Table 5, it is apparent that frequent seminars have a consistently positive and significant effect on participation in self-directed plans. For non-highly

compensated employees, frequent seminars are associated with participation rates that are 11.5 percentage points higher than plans with no seminars. The corresponding figure for highly compensated employees is 6.4 percentage points. These are economically large estimates given mean participation rates – 60 to 80 percent – in the sample. The occasional seminar indicator variable is, however, insignificant in each specification.

The results in table 5 may obscure the relation between education and participation among HC employees. Although censoring at the plan level (at either 0 percent or 100 percent) is relatively rare for “all” employees and for NHC employees, it is much more common for HC employees. Specifically, for 32 percent of the sample, the HC participation rate is 100 percent. Obviously, increases in seminars and changes in other plan characteristics cannot be associated with higher participation rates for companies that achieve 100 percent HC participation. We investigate the effects of censoring in section D, below, where we estimate Tobit specifications.

These results are consistent with the hypothesis that seminars stimulate 401(k) participation generally, and especially among NHC employees. This implies that retirement seminars may be an effective response to non-discrimination rules. However, there is no indication in the pooled results that seminars matter unless they are conducted frequently.

ii: Other forms of education and information dissemination

We include several additional education variables (newsletters and summary plan descriptions) to examine whether all educational and informational efforts are equally effective. Summary plan descriptions typically amount to disclosure of plan characteristics, and contain very little (if any) recognizable education. While it is perhaps conceivable that employees would be unwilling to trust (and therefore to participate in) their pension plans without disclosure, we would nevertheless be surprised if the use of these materials had a measurable effects on plan activity. In contrast, newsletters often serve the same function as seminars, but provide information through printed, rather than audio-visual media. According to a survey by the Employee

Benefit Research Institute, 92 percent of 401(k) participants say that they read these materials, and 33 percent say that they contribute more to their plans as a result. One might therefore expect newsletters to have an effect on behavior similar to that of seminars. Alternatively, individuals may exaggerate their responses to newsletters in response to survey questions, particularly if they perceive this to be the “appropriate response.”

Notably, in the regressions of table 5, aside from seminars, no other medium of providing information and education to employees – either through newsletters or summary plan descriptions – has any significant association with participation rates. This is consistent with the hypothesis that these media have no effect on participation. In principle, selection bias could mask a behavioral response. However, in contrast to seminars, there is little indication in the results of section 3 that the provision of written materials is motivated by low participation.

iii. Plan characteristics

There is mixed evidence in the literature on the effect of matching rates on participation in self-directed plans, despite the fact that matching is very common. According to a 1990 Hewitt and Associates survey, 79 percent of 944 major U.S. corporations matched employee contributions. Papke (1995) finds a strong, positive relationship between match rates and participation in cross-sectional regressions using data from Form 5500.⁸ The effect disappears in her preferred, fixed effects specification. Andrews (1992) uses data from the Current Population Survey and finds a positive relationship between the presence of a match and participation rates. Kusko, Poterba, and Wilcox (1994) examine data from a single firm over several years, where the match rate varied from 0 to 139 percent of employee contributions (up to six percent of salary). They found little variation in participation rates across years, which lead them to conclude that their results suggest “a relatively small elasticity of participation with respect to the match rate, and cast substantial doubt

⁸Form 5500 is filed annually with the IRS by all sponsors of pension plans with more than 100 participants. The data include plan eligibility, participation, employment, administrative cost, distributions, and contributions.

on the view that employer matching is a key factor in explaining the rapid expansion of 401(k) plans." However, the 401(k) sponsored by the firm examined by Kusko, Poterba, and Wilcox was part of a profit-sharing plan, and hence had unusually volatile match rates. It is not clear that one can generalize from participation responses in profit-sharing plans to more common plan types, where match rates change much less frequently. In principal, we expect matching rates to exert a positive effect on participation since they provide a pure substitution effect at the extensive margin.

In all the cross-sectional regressions we have examined, there is a positive and significant correlation between the existence of a match and participation.⁹ The regression results in table 5 imply that plans with matches have participation rates that are 14.6 to 16.9 percentage points higher than plans without matches.

Loan provisions allow families to borrow against contributions made to the self-directed plan. Conventional reasoning suggests that eligible workers will be more likely to participate in plans with loan provisions since they will have access to funds in the event they need to borrow. An alternative view holds that loan provisions will be negatively correlated with participation because they exacerbate "self-control" problems with saving (see e.g. Sheffrin and Thaler, 1988). We find that the correlation between the existence of loan provisions and participation are positive but insignificant in the regressions for all employees, and negative but insignificant in the separate regressions for HC or NHC employees.

Having a broad range of investment options presumably increases the attractiveness of participation. The number of options in these plans is not particularly large, with a mean of 2.8 in 1993 and a mean of 3.7 in 1994. A single investment option can be narrow (say stock in the employee's company, or a guaranteed life insurance contracts), or broad, like the Fidelity family of mutual funds. Although we expect investment options to be positively correlated with participation, this effect is not significant in any specification. Conceivably, this finding may be attributable to the coarseness of our measure for the number of options

⁹Recall from section 2, that data on the level of match is missing for a large number of observations so we use only an indicator variable for whether the firm offers a match.

(e.g., the vast family of Fidelity equity mutual funds would be considered one option).

iv. Firm characteristics

An obvious concern with cross-sectional estimates of the kind considered here is that the variables of interest may be correlated with unobserved firm-specific characteristic. In that case, the correlations that we attribute to seminars may in fact reflect other factors. In addition to the plan characteristics already mentioned, we therefore include a set of firm-specific variables to try to account for other pertinent factors.

The existence of other pension plans should matter for two distinct reasons. First, other pension plans may be positively correlated with participation in a self-directed plan. There is extensive evidence that the existence of a 401(k) is positively correlated with employees' tastes for saving (Engen, Gale, and Scholz, 1995; and Bernheim 1996a). It is likely that the same is true for other pensions. Thus, the presence of pensions may be positively correlated with participation in self-directed plans. Second, other pension plans may reduce the likelihood of participation in a self-directed plan because the pension may provide households with sufficient retirement saving.

As would be expected if pensions and self-directed plans are initiated in response to employees' wishes, participation rates are higher in self-directed plans when the sponsoring firms offers at least one other pension plan. The effect for all employees is significant at conventional levels.

There may be systematic differences in self-directed plan offerings depending on the size of the firm, and on the number of employees covered by the plan. These differences might, for example, arise from economies of scale in plan administration, or from correlations between size and other variables, such as plan age, unobserved dimensions of plan generosity, or the nature of peer group effects. We include the number of employees in the firm to capture variations in participation that may be associated with firm size, and the fraction of employees covered to capture variations in participation that may be related to plan size. We find that firm size is negatively associated with participation, but that participation rises significantly with the fraction of employees covered.

The unionization indicator variable is consistently insignificant across specifications.

v. Summary

In pooled cross-sectional regressions, there are a number of factors that are significantly associated with participation, including match rates and certain characteristics of the company. The effect of frequent seminars is economically large, positive, statistically significant. No other educational variable significantly affects participation. In light of the selection issue documented in section 3, there is reason to believe that these estimates understate the behavioral impact of retirement seminars, but may accurately reflect the impact of written materials.

B. Factors related to contributions in self-directed plans

As indicated in table 1, the survey collects information on average contribution rates for plan participants. Multiplying the average contribution rate times the participation rate gives the average contribution rate across all eligibles. We use this as our dependent variable to examine contributions. Because the data are aggregated across plans, there is no obvious way to use information on the fraction of nonparticipants and the conditional mean among participants separately without making strong ad hoc assumptions on the data. Since the conditional mean among participants is of limited intrinsic interest, we therefore use the transformed contribution variable.

Obviously, our contributions variable may inherit some of the properties of our participation variable. Even so, there is no compelling reason to expect, a priori, that contributions will vary with education in the same way as participation. To see why, consider the following example. Suppose a firm's employees differ in their taste for saving. Those with a high taste will participate in self-directed plans when available and, due to the tax subsidy (and possibly employer match), devote a relatively high fraction of salary to these plans. Employees with low tastes for saving will choose not to contribute. Now suppose frequent seminars induce employees with low tastes for saving to contribute. If they contribute at low levels, the mean contribution, conditional on participation, may actually fall, unless education also encourages high savers to

save even more. It is conceivable, however, that education might actually reduce saving among those who would otherwise put away “too much” relative to standard rules of thumb. Thus, even the unconditional mean of the contribution rate might fall with education.

As is clear from the second panel of Table 5, the frequent seminar variable is positively and significantly associated with contributions for the regressions involving all employees and non-highly compensated employees. The effect is quite large. Mean (unconditional) contribution rates are around 3.4 percent of salary, so the estimates imply that contributions are nearly 20 percent larger in firms offering frequent seminars. This result is consistent with the hypothesis that retirement education – and frequent seminars in particular – positively affect the size of contributions to self-directed plans.

In the specification for all employees, both match rates and loan provisions are positively and significantly associated with contribution rates. Larger firms have lower contribution rates (the effect is significant for highly-compensated employees). The larger the fraction of employees covered by a self-directed plan, the higher are contribution rates (the effect is significant for non-highly compensated employees and the all employees specification).

C. Longitudinal evidence on participation and contributions

The specifications displayed in table 5 use pooled data from 1993 and 1994. To control for spurious factors that might generate an apparent cross-sectional relationship between seminars and participation or contributions, we included a number of plan- and firm-specific variables. Nevertheless, a skeptical reader might question these results on the grounds that seminars are correlated with other firm-specific characteristics, such as the degree of interest management takes in their employees, and that these other characteristics are responsible for the observed correlation with behavior (perhaps through plan generosity, which is only imperfectly accounted for in our specification).

As discussed earlier, we have observations in both years for nearly 300 firms. Thus, it is possible to repeat our analysis, differencing the data for our short (2-year) panel. While differencing removes time-

invariant plan-specific characteristics, it also exacerbates any measurement error problems that might be present, making it more difficult to estimate correlations that arise from behavioral relationships.

The first panel of table 6 examines participation, repeating the same specification as shown in table 5, but using the first-differenced data. Although the statistical significance of the results is not quite as striking, this is probably to be expected because the sample size is considerably smaller and because of the problems arising from differencing short panels. Nevertheless, we find that instituting seminars on a frequent basis is associated with a 7.7 percentage point increase in participation rates, and the effect is significant at the 11 percent level for the all-employee sample. For non-highly compensated employees, the effect is 12.1 percentage points, and it is significant at the 7 percent level. It is worth noting that the estimated effects of occasional seminars appear stronger in the differenced estimates. Indeed, the effects of frequent and occasional seminars now appear to be roughly proportional.

We view this as further support for the hypothesis that retirement education – and frequent seminars in particular – influence the saving behavior of employees. Naturally, we cannot resolve the question of causality with only two years of data: it is, for example, conceivable that employees might agitate for seminars once they start participating (though it is doubtful that their employer would respond over such a short time frame).

Our results on match rates follow the pattern observed in the literature. Although we find that match rates appear to have a strong, positive correlation with participation and contributions in cross-sectional data, the effect disappears when one follows the same firms over time. Because actual changes in match rates are infrequent, it is possible that “observed” changes are dominated by measurement errors, in which case the panel estimates of the matching effect may be highly misleading. Satisfactory resolution of the role played by matching on participation in self-directed plans requires better data. In general, very few other variables are significant in the participation rate specifications (and none are significant in the highly-compensated

group).¹⁰

The second panel of Table 6 examines contributions, repeating the same specification as shown in Table 5, but using the first-differenced data. The frequent seminar variable is again significant for the non-highly compensated group, and it is marginally significant in the specification for all employees. The only other significant coefficients (at conventional levels) are the occasional seminar variable (for HC employees) and the unionization variable (for all employees and HC employees).

D. Robustness

The results presented in the previous sections depict a strong correlation between frequent seminars and 401(k) activity, especially among NHC employees. In order to verify the robustness of these results we examine the sensitivity of our results to a different method for measuring the intensity of education. We also employ several alternate estimation techniques: median, robust, and Tobit regression.

In the previous section, there were certain cases (most notably differenced specifications for participation) where the effects of frequent seminars were only marginally significant. This may occur, at least in part, because we are asking the data to identify too many parameters. In these same cases, the point estimates for the effects of occasional seminars are roughly half of the corresponding point estimates for the effects of frequent seminars (see table 6). It is therefore natural to consider an alternate specification based on a scalar measure of educational intensity that allows us to summarize the effects of education through a single parameter. Instead of constructing dummy variables based on the frequency of educational offerings, we simply measure frequency on a scale of zero to three, depending on whether education is offered never, rarely, sometimes, or often. This specification forces the effects of an increase in the frequency of education to be the same when moving from each qualitative response to the next. That is, it assumes that an increase

¹⁰In table 6, the occasional provision of summary plan descriptions appears to have a positive and significant effect on participation. However, this result is apparently driven by outliers; it vanishes when more robust estimation techniques are applied (as in the next section).

from never to rarely has the same effect on participation and contribution rates as an increase from rarely to sometimes or sometimes to often. While restrictive, it is more parsimonious than our original procedure, and is generally not rejected by the data.

We estimate median and robust regression models to reduce the potential influence of outlying observations.¹¹ The standard errors reported for the median and robust regressions (as well as for the Tobit estimates) using the pooled data are not adjusted for the fact that the same firm may appear in the pooled sample twice. As the standard errors were similar with and without this correction in the OLS specifications shown in Table 5, we do not view this as a major shortcoming.

We use Tobit regressions to account for right and left censoring of participation rates at 0 and 100 percent. While censoring occurs in the data for all three employee categories, it is particularly prevalent for HC employees. In the pooled data, the participation rate equals 100 percent for all employees in 29 of 1027 observations and for NHC employees in 27 observations out of 805. For HC employees this number jumps to 267 of 824 observations, or approximately 30 percent of the sample. Left-censored observation (i.e., those for which the participation rate is 0 percent) are not nearly as prevalent. There are no such observations for all employees and NHC employees, and only 12 cases for HC employees. We estimate Tobit models only for participation rates using pooled cross-sectional data. While censoring is also present in the differenced versions of these models, as well as in models for contribution rates (both because of the censoring of participation and because of limits on contributions), the Tobit model is inappropriate in these contexts.

We report the coefficients of the seminar variables for these alternate specifications in Table 7 and Table 8. We omit the coefficients of other explanatory variables to conserve space. Each of these specifications employs the same additional covariates as the earlier OLS regressions; results for these other covariates are similar to those reported in previous subsections and are available on request.

¹¹Median regression accomplishes this by minimizing the sum of the absolute values of the residuals rather than the sum of squared residuals. Robust regression first eliminates gross outliers and then performs Huber iterations followed by biweight iterations in order to weight observations more evenly in the loss function.

i. An alternative measure of seminar intensity

For every specification contained in tables 5, 6, 7, and 8, we present results based on an analogous specification in which we use a single scalar measure of educational intensity, as described at the outset of this section. The resulting coefficients for seminars are presented in tables 7 and 8 under columns labeled “intensity.”

Generally speaking, for specifications involving pooled (as opposed to differenced) data, the magnitudes and statistical precision of educational effects are similar to the results obtained using separate dummies for frequent and occasional seminars. However, the use of the seminar intensity variable sharpens the estimates considerably for the differenced data. For example, in the first column of table 6 (which concerns participation rates), the coefficient on frequent seminars for NHC employees is only significant at the 7 percent level. However, its magnitude is also roughly twice that of the occasional seminar variable, which suggests that use of the intensity variable may be appropriate. Indeed, as indicated in the first column of table 7, the estimated coefficient for the intensity variable in an analogous specification is statistically significant at the 1 percent level. A similar observation applies to differenced estimates of participation rates for all employees. In general, with differenced data, the effects of seminars on participation (table 7) and contributions (table 8) are found to be significant at a higher level of confidence when a single measure of educational intensity is used.

ii. Median and robust regression: robustness of participation results

We present median and robust regression results for participation in the middle sections of Table 7. In many respects, these results are qualitatively similar to the OLS estimates. In the pooled data, the coefficient on frequent seminars for NHC employees drops from 11.5 in the OLS specification to 9.9 in the median and 11.2 in the robust regression. However, both of these coefficients remain significant at the 1 percent level. The coefficients of occasional seminars for NHC employees rise relative to OLS, but still fail to achieve statistical significance at conventional levels. There is no indication that seminars – even frequent ones –

have a significant impact on the participation rates of HC employees. It is therefore possible that the effects of frequent seminars on HC employees measured in OLS regressions (as well as in the Tobit regressions reported later) reflect the influence of outliers. For HC employees, the unexpected negative coefficient (from OLS) on occasional seminars is reduced to a number much closer to zero in both the median and robust regressions. Finally, the effect of frequent seminars on participation rates for all employees is a bit weaker in median regression and robust regressions than for OLS; however, the effect of occasional seminars, though still smaller than the effect of frequent seminars, now achieves conventional levels of statistical significance.

For the differenced data, both the median and robust regressions reduce the size of the coefficients for frequent seminars, but also increase the precision with which they are measured. The coefficient on frequent seminars for NHC employees drops from 12.1 in the OLS specification to 7.4 in the median and 8.6 in the robust regression. However, while the OLS coefficient was only significant at the 7 percent level, the median regression coefficient is significant at the 2 percent level and the robust regression at the 5 percent level. Notably, while the effect of occasional seminars on NHC participation was not significant in OLS estimates with differenced data, it is significant (and substantial) in both median and robust regression estimates. Median and robust regressions also yield more precise coefficients for HC employees. For the median regression in particular, the effect is statistically significant, even though its magnitude is small. We suspect that this result is attributable to the nature of the distribution of the differenced HC participation rates. Many of the participation rates for HC employees are at or near 100 percent for both 1993 and 1994; consequently, more than 30 percent of the firms in the sample experience no change in the measured participation rate of HC employees between 1993 and 1994. Since the median change is zero, and since there are so many zeros, it is not surprising that our explanatory variables are found to have very little effect on the median, or that this finding is precise. The effect of frequent seminars on participation rates disappears in the median and robust regression estimates of the differenced specification for all employees; however, the impact of occasional seminars emerges as significant. Finally, as noted earlier the use of the intensity variable also enhances the

statistical significance of the educational effect on NHC participation rates in both the median and robust regression estimates that make use of differenced data.

iii. Median and robust regression: robustness of the contribution results

The median and robust regression results for contribution rates appear in Table 8. The top panel contains results for regressions with pooled data. The results for the robust regressions are qualitatively similar to the earlier OLS estimation, with a slight drop in the coefficients on frequent seminars. For example, in the specification for NHC employees, this coefficient drops from 0.81 to 0.69. The statistical significance of the estimates is comparable to that of the OLS coefficients, with the coefficient on frequent seminars for NHC employees remaining significant at the 1 percent significance level. The effect of occasional seminars is also statistically significant in the specification for all employees. In contrast, the median regression results for contribution rates are weaker than the OLS and robust regression results. While the signs of the coefficients are the same, magnitudes are generally lower, and no single seminar dummy achieves statistical significance at conventional levels. However, the seminar intensity variables approaches statistical significance at the 95 percent confidence level in the specifications for NHC and all employees.

The bottom panel of table 8 presents median and robust regression results for contribution rates using differenced data. The effect of frequent seminars on NHC contribution rates is still reasonably strong, and similar to that obtained using OLS. None of the other seminar dummies depicted in this lower panel achieves statistical significance. The estimated effect of frequent seminars on the HC contribution rate is actually negative and fairly large in magnitude, but not very precise. However, as with the previous specifications, when the seminar intensity variable is used, median and robust regression estimates of the seminar effect for NHC employees are similar in magnitude to the OLS results and statistically significant at the usual levels of confidence.

iv. Tobit regression results

Tobit results for rates of participation appear in the last section of Table 7. The coefficients for both

frequent and occasional seminars increase in size (relative to OLS) for all three employee groups. The most dramatic change occurs in the coefficient for frequent seminars for HC employees, which increases from 6.4 to 10.5. This result is not surprising given the fact that more than 30 percent of the HC observations are right-censored. Although precision is somewhat lower for the Tobit estimates than for OLS, the coefficient of frequent seminars for NHC employees remains significant at the 1 percent level, and the coefficient for HC employees remains significant at the 5 percent level. These results suggest that censoring causes a downward bias in the OLS coefficients, and that HC and NHC employees respond to education more similarly than the OLS results appear to indicate. Again, using the seminar intensity variable results in more precisely estimated effects.

5. Conclusions

In this paper, we have examined the effects of employer-based retirement education on 401(k) activity using firm-level data. Our results indicate that retirement seminars are generally associated with significantly higher rates of participation and contributions, at least when the frequency of these offerings is high. The effect appears to be particularly strong for non-highly compensated employees. Our findings reflect both cross-sectional and longitudinal patterns in the data, and they are robust with respect to a variety of estimation techniques.

The current paper is complementary to Bernheim and Garrett (1996) who use household survey data to investigate the effects of education on total saving, both inside and outside of pension plans. However, since their data are cross-sectional, they are forced to make indirect inferences concerning the probable direction of biases that might result from the inevitable failure to control for unobserved individual effects. With household survey data, it is also difficult to distinguish between the effects of education on behavior, and the effects of education on the way that individuals report behavior. In contrast, the employer survey data used here allow us to examine both cross-sectional and longitudinal patterns; moreover, there is relatively little risk

that the education of employees would affect the way that employers report rates of participation and contributions. The tradeoff, of course, is that employer survey data provide no information on assets held outside of pension plans, and therefore do not permit us to investigate whether increased participation and contributions reflect new saving, rather than asset reshuffling.

Taken together, the current paper and that of Bernheim and Garrett (1996) suggest that financial education in the workplace can exert a strong influence on personal financial decisions. More generally, these studies raise the possibility that the enhancement of decision-making skills (as opposed to labor market skills) may constitute a significant economic return to education.

References

- A. Foster Higgins & Co., Inc. *Survey of Employee Savings Plans, 1994, Report 2: Plan Participation and Discrimination Testing*. Princeton, NJ: A. Foster Higgins & Co., Inc., 1994.
- Andrews, Emily S., "The Growth and Distribution of 401(k) Plans," in J. Turner and D. Beller, eds., *Trends in Pensions 1992*, Washington, D. C., U.S. Department of Labor, 1992.
- Becker, Gary S., *Human Capital and the Personal Distribution of Income*, Ann Arbor: University of Michigan Press: 1967.
- Berg, Olena, "DOL to Launch Savings and Pension Education Campaign," *EBRI Notes*, June 1995, p. 2.
- Bernheim, B. Douglas, *The Vanishing Nest Egg: Reflections on Saving in America*, New York: Priority Press, 1991.
- Bernheim, B. Douglas, "Personal Saving, Information, and Economic Literacy: New Directions for Public Policy," in *Tax Policy for Economic Growth in the 1990s*, Washington, DC: American Council for Capital Formation, 1994a, 53-78.
- Bernheim, B. Douglas, "Comments and Discussion," *Brookings Papers on Economic Activity* (1), 1994b, 152-166.
- Bernheim, B. Douglas, "Do Households Appreciate Their Financial Vulnerabilities? An Analysis of Actions, Perceptions, and Public Policy," *Tax Policy and Economic Growth*, Washington, DC: American Council for Capital Formation, 1995a, pp. 1-30.
- Bernheim, B. Douglas, "The Merrill Lynch Baby Boom Retirement Index: Update '95," mimeo, 1995b.
- Bernheim, B. Douglas, "Rethinking Saving Incentives," in Alan Auerbach (ed.), *Fiscal Policy: Lessons from Economic Research*, Cambridge, MA: MIT Press, 1996a, forthcoming.
- Bernheim, B. Douglas, "Financial Illiteracy, Education, and Retirement Saving," in *Living with Defined Contribution Plans*, Pension Research Council, the Wharton School, University of Pennsylvania, 1996b, forthcoming.
- Bernheim, B. Douglas and Daniel Garrett, "The Determinants and Consequences of Financial Education in the Workplace: Evidence from a Survey of Households," mimeo, Stanford University, March 1996.
- Bernheim, B. Douglas and John Karl Scholz, "Private Saving and Public Policy," *Tax Policy and the Economy* 7, 1993, 73-110.
- Borleis, Melvin W. and Kimberly K. Wedell, "How to spark employee interest with employer matching contributions," *Profit Sharing*, January 1994, pp. 7-16.
- Card, David, "Earnings, Schooling, and Ability Revisited," *Research in Labor Economics* 14, 1995, pp. 23-48.

Central Council for Savings Promotion, *Savings and Savings Promotion Movement in Japan*, Tokyo: Bank of Japan, 1981.

Congressional Budget Office, *Baby Boomers in Retirement: An Early Perspective*, September 1993.

Employee Benefit Research Institute, *Retirement Confidence in America: Getting Ready for Tomorrow*, EBRI Special Report SR-27, Issue Brief Number 156, December 1994.

Employee Benefit Research Institute, "Can We Save Enough to Retire? Participant Education in Defined Contribution Plans," *EBRI Issue Brief*, no. 160, April 1995.

Engen, Eric M., William G. Gale, and John Karl Scholz, "Do Saving Incentives Work?" *Brookings Papers on Economic Activity* (1), 1994, 85-151.

Garrett, Daniel M., "The Effects of Nondiscrimination Rules on 401(k) Contributions," mimeo, Stanford University, 1995.

Geisel, Jerry, "Communication yields success for XTRA 401(k)," *Business Insurance*, April 10, 1995, p. 3.

Hubbard, R. Glenn, Jonathan Skinner, and Stephen P. Zeldes, "Precautionary Saving and Social Insurance," *Journal of Political Economy*, 103(2), April 1995, 360-399.

Kusko, Andrea, James M. Poterba, and David W. Wilcox, "Employee Decisions With Respect to 401(k) Plans: Evidence from Individual Level Data," Working Paper No. 4635, National Bureau of Economic Research, 1994.

Papke, Leslie E., "Participation in and Contributions to 401(k) Plans: Evidence from Plan Data," *Journal of Human Resources* 30(2). Spring 1995.

Papke, Leslie, Mitchell Petersen, and James M. Poterba, "Did 401(k) Plans Replace Other Employer Provided Pensions?" Working Paper No. 4501, National Bureau of Economic Research, October 1993.

Poterba, James M., Steven F. Venti, and David A. Wise, "401(k) Plans and Tax-Deferred Saving," in David A. Wise, ed., *Studies in the Economics of Aging*, Chicago: University of Chicago Press, 1994.

Scott, Jason, "The Compensation Value of 401(k) Pension Plans," mimeo, Stanford University, 1994.

Sheffrin, Hersh M., and Richard H. Thaler. "The Behavioral Life-Cycle Hypothesis," *Economic Inquiry* 26(4), 1988, 609-43.

Table 1: Mean and Median 401(k) Participation and Contribution Rates

		Observations	Median	Mean	Employment-Weighted Mean
<u>1993:</u>					
Participation Rates	NHC	415	60.9	59.44	59.66
	HC	422	92.5	82.59	82.34
	All	530	70.0	63.08	64.32
Conditional Contribution Rates	NHC	395	5.0	4.96	4.72
	HC	398	6.0	6.75	6.09
	All	457	5.0	5.15	5.14
Unconditional Contribution Rates	NHC	349	2.8	3.06	2.91
	HC	352	5.7	5.79	5.16
	All	437	3.4	3.39	3.46
<hr/>					
<u>1994:</u>					
Participation Rates	NHC	392	60.0	57.68	55.18
	HC	404	92.0	78.56	82.69
	All	500	70.0	61.23	60.77
Conditional Contribution Rates	NHC	357	5.0	4.86	4.84
	HC	359	6.0	6.66	6.05
	All	412	5.0	5.34	5.32
Unconditional Contribution Rates	NHC	311	2.6	2.94	2.79
	HC	317	5.4	5.44	5.07
	All	393	3.3	3.41	3.55

Source: Derived from KPMG Peat Marwick's *Retirement Benefits in the 1990s: 1993 and 1994 Survey Data*.

Table 2: The Effect of Retirement Plan Type on Education - All Companies

	Dependent Variable				
	Seminars for All Employees	Seminars for Employees Over 50	Seminars for Employees Near Retirement	Summary Plan Descriptions	Newsletters or Periodicals
Only 401(k) Plan	0.251 (.129)	-0.221 (.141)	-0.343 (.143)	0.727 (.134)	0.464 (.129)
Only 403(b) Plan	0.759 (.204)	0.503 (.205)	0.325 (.207)	0.185 (.202)	0.104 (.200)
Only Another Plan	0.107 (.151)	-0.177 (.165)	-0.092 (.162)	0.059 (.148)	-0.210 (.148)
Two or More Plans	0.326 (.113)	0.34 (.119)	0.274 (.119)	0.554 (.112)	0.484 (.111)
Total Employment*	0.255 (.181)	0.352 (.141)	0.322 (.141)	-0.174 (.169)	0.204 (.147)
Fraction of Employees Covered by Plans	0.0032 (.0012)	0.0047 (.0012)	0.0041 (.0012)	-0.0033 (.0013)	0.0001 (.0012)
1994 Dummy	0.093 (.060)	-0.050 (.063)	0.003 (.064)	-0.134 (.065)	0.077 (.063)
Intercept	-0.647 (.142)	-0.999 (.151)	-0.951 (.151)	0.431 (.145)	0.016 (.141)
N	1778	1773	1773	1771	1778

*Coefficients for Total Employment are multiplied by 10^5 .

Excluded Variable is Only Defined Benefits Plan.

Standard errors are in parentheses.

Source: Derived from KPMG Peat Marwick's *Retirement Benefits in the 1990s: 1993 and 1994 Survey Data*.

Table 3: The Effect of Retirement Plan Type on Education - Companies with 401(k) Plans

	Dependent Variable				
	Seminars for All Employees	Seminars for Employees Over 50	Seminars for Employees Near Retirement	Summary Plan Descriptions	Newsletters or Periodicals
Defined Benefits Plan	0.065 (.106)	0.627 (.115)	0.652 (.118)	-0.090 (.116)	0.072 (.111)
Other Retirement Plan No DB Plan	-0.009 (.109)	0.258 (.120)	0.343 (.121)	-0.020 (.118)	0.082 (.113)
Total Employment*	0.491 (.264)	0.754 (.292)	0.702 (.285)	-0.389 (.267)	0.397 (.332)
Fraction of Employees Covered by Plans	0.0019 (.0016)	0.0034 (.0017)	-0.0029 (.0017)	-0.0049 (.0017)	-0.0017 (.0016)
Union Eligibility	-0.038 (.093)	0.016 (.095)	0.034 (.096)	0.056 (.095)	0.140 (.096)
Employer Match	-0.165 (.111)	-0.042 (.111)	-0.123 (.110)	0.203 (.119)	0.054 (.111)
Number of Options	0.166 (.036)	0.179 (.039)	0.186 (.040)	0.132 (.041)	0.179 (.038)
Loans Permitted	0.213 (.090)	0.147 (.095)	0.120 (.093)	0.013 (.095)	-0.034 (.091)
1994 Dummy	-0.015 (.072)	-0.216 (.080)	-0.203 (.080)	-0.229 (.084)	-0.026 (.081)
Intercept	-0.773 (.173)	-1.729 (.188)	-1.724 (.190)	0.737 (.188)	0.044 (.176)
N	1170	1169	1170	1162	1169

*Coefficients for Total Employment are multiplied by 10^5 ; coefficients for 1994 Dummy are multiplied by 10^4 .

Excluded Variable is Only 401(k) Plan.

Standard errors are in parentheses.

Source: Derived from KPMG Peat Marwick's *Retirement Benefits in the 1990s: 1993 and 1994 Survey Data*.

Table 4: Predictors of Changes in Education

	Dependent Variable				
	Seminars for All Employees	Seminars for Employees Over 50	Seminars for Employees Near Retirement	Summary Plan Descriptions	Newsletters or Periodicals
NHC Participation 1993	-0.0084 (.0038)	-0.0058 (.0031)	-0.0059 (.0032)	-0.0013 (.0047)	0.0020 (.0046)
HC Participation 1993	-0.0018 (.0035)	-0.0045 (.0028)	-0.0001 (.0029)	-0.0043 (.0044)	-0.0057 (.0046)
Fraction of Employees Covered by Plan	0.0044 (.0030)	0.0031 (.0024)	0.0012 (.0025)	0.0041 (.0038)	0.0004 (.0037)
Total Employment* 1993	0.091 (0.504)	-0.959 (0.406)	-0.448 (0.420)	-0.338 (0.621)	0.165 (.609)
Union Eligibility 1993	-0.083 (.182)	-0.282 (.148)	-0.196 (.152)	-0.501 (.224)	-0.057 (.220)
Employer Match 1993	0.207 (.227)	-0.058 (.182)	-0.030 (.189)	0.251 (.280)	0.412 (.274)
Defined Benefits Plan - 1993	-0.339 (.197)	-0.082 (.159)	-0.069 (.164)	-0.183 (.243)	-0.285 (.238)
Other Pension Plan No DB Plan - 1993	-0.094 (.208)	-0.184 (.167)	-0.069 (.173)	0.107 (.256)	-0.180 (.251)
Loans Permitted 1993	0.059 (.169)	-0.144 (.136)	-0.005 (.141)	-0.015 (.209)	-0.045 (.204)
Investment Options 1993	0.058 (.070)	0.071 (.057)	0.027 (.059)	0.003 (.087)	0.079 (.085)
Intercept	0.168 (.416)	0.579 (.344)	0.201 (.346)	-0.049 (.519)	-0.013 (.502)
N	244	243	244	243	244

*Coefficients for Total Employment are multiplied by 10^5 .

All dependent variables are first differenced.

Standard errors are in parentheses.

Source: Derived from KPMG Peat Marwick's *Retirement Benefits in the 1990s: 1993 and 1994 Survey Data*.

Table 5: OLS Results for Participation and Contribution Rates

	Dependent Variable					
	Participation Rates			Contribution Rates		
	NHC	HC	All	NHC	HC	All
Seminars Often	11.52 (3.00)	6.37 (2.94)	8.17 (2.46)	0.809 (.291)	0.342 (.417)	0.677 (.240)
Seminars Sometimes or Rarely	1.74 (2.07)	-2.98 (2.37)	1.43 (1.75)	0.252 (.171)	0.077 (.261)	0.232 (.142)
Newsletters Often	-0.58 (2.72)	1.09 (3.00)	-2.30 (2.23)	0.183 (.211)	0.149 (.380)	-0.120 (.186)
Newsletters Sometimes or Rarely	-0.91 (2.63)	0.01 (2.81)	-0.83 (2.12)	-0.088 (.210)	-0.353 (.350)	-0.248 (.183)
Plan Descriptions Often	0.35 (2.79)	-1.66 (3.16)	2.17 (2.24)	-0.084 (.196)	0.024 (.366)	-0.137 (.182)
Plan Descriptions Sometimes or Rarely	2.16 (2.83)	-1.00 (3.07)	1.98 (2.32)	0.282 (.220)	-0.274 (.347)	0.007 (.197)
Employer Match	14.59 (2.55)	16.94 (3.17)	17.27 (2.04)	0.389 (.238)	0.732 (.413)	0.566 (.205)
Loans Permitted	-1.42 (2.09)	-2.34 (2.20)	1.78 (1.74)	0.076 (.159)	0.003 (.258)	0.313 (.149)
Investment Options	-0.158 (.819)	-0.237 (.873)	0.712 (.720)	0.105 (.066)	0.156 (.107)	0.099 (.062)
Other Pension Plan	4.41 (2.36)	3.39 (2.53)	5.02 (2.06)	-0.203 (.198)	-0.306 (.293)	-0.035 (.171)
Total Employment*	-1.78 (0.64)	-0.29 (0.66)	-1.07 (0.53)	-0.91 (0.56)	-1.71 (0.59)	-0.45 (0.46)
Fraction of Employees Covered by Plan	0.188 (.039)	0.049 (.042)	0.236 (.034)	0.0141 (.0032)	0.0020 (.0047)	0.0153 (.0029)
Union Eligibility	1.49 (2.09)	1.56 (2.19)	3.56 (1.72)	-0.045 (.166)	0.320 (.273)	0.171 (.149)
1994 Dummy	-2.30 (1.82)	-4.41 (2.10)	-3.24 (1.48)	-0.184 (.145)	-0.410 (.239)	-0.102 (.124)
Intercept	30.90 (4.47)	65.87 (5.09)	23.16 (3.64)	1.313 (.341)	4.870 (.705)	1.386 (.344)
N	805	824	1027	658	667	827

*Coefficients for Total Employment are multiplied by 10^4 in the participation specifications, and 10^5 in the contribution specifications.

Huber standard errors are in parentheses.

Source: Derived from KPMG Peat Marwick's *Retirement Benefits in the 1990s: 1993 and 1994 Survey Data*.

Table 6: OLS Results for Changes in Participation and Contribution Rates

	Dependent Variable					
	Participation Rates			Contribution Rates		
	NHC	HC	All	NHC	HC	All
Seminars Often	12.14 (6.58)	6.60 (8.49)	7.65 (4.72)	1.106 (.513)	-0.141 (.772)	0.408 (.348)
Seminars Sometimes or Rarely	6.87 (4.53)	1.59 (5.97)	4.75 (3.19)	0.533 (.344)	1.044 (.540)	0.214 (.235)
Newsletters Often	-7.02 (5.35)	-5.80 (7.01)	-2.87 (3.93)	-0.119 (.410)	-0.912 (.624)	-0.360 (.292)
Newsletters Sometimes or Rarely	-1.41 (4.85)	-3.33 (6.30)	-1.49 (3.65)	-0.078 (.384)	-0.557 (.572)	-0.081 (.279)
Plan Descriptions Often	6.32 (5.30)	6.62 (6.69)	3.18 (3.76)	0.240 (.411)	0.021 (.597)	-0.224 (.272)
Plan Descriptions Sometimes or Rarely	11.34 (5.49)	11.60 (6.97)	6.29 (3.80)	0.711 (.424)	0.695 (.624)	0.217 (.278)
Employer Match	-1.56 (5.66)	0.77 (7.61)	-0.22 (4.36)	-0.072 (.457)	0.270 (.695)	-0.016 (.325)
Loans Permitted	1.31 (7.63)	1.30 (10.52)	2.54 (5.93)	-0.683 (.617)	-0.715 (1.02)	-0.603 (.433)
Investment Options	2.44 (1.89)	2.76 (2.50)	0.18 (1.43)	0.300 (.153)	0.102 (.226)	0.132 (.107)
Other Pension Plan	9.44 (5.25)	5.02 (6.97)	3.51 (4.11)	-0.002 (.419)	0.408 (.629)	0.037 (.295)
Total Employment*	0.43 (3.51)	2.25 (4.60)	1.54 (2.34)	0.083 (.261)	-0.011 (.389)	0.030 (.168)
Fraction of Employees Covered by Plan	0.135 (.089)	0.098 (.115)	0.078 (.067)	0.0045 (.0070)	0.0131 (.0108)	-0.0041 (.0049)
Union Eligibility	-1.95 (4.92)	6.10 (6.28)	9.00 (3.82)	0.055 (.402)	1.465 (.586)	0.786 (.272)
Intercept	-7.81 (2.88)	-8.55 (3.89)	-4.38 (2.10)	-0.360 (.239)	-0.557 (.359)	-0.213 (.165)
N	188	196	291	148	147	213

*Coefficients for Total Employment are multiplied by 10⁴.

All variables, both dependent and independent, are first differenced.

Standard errors are in parentheses.

Source: Derived from KPMG Peat Marwick's *Retirement Benefits in the 1990s: 1993 and 1994 Survey Data*.

Table 7: Robustness of Participation Results

	OLS			Median Regression			Robust Regression			Tobit Estimation		
	Intensity	Often	S/R	Intensity	Often	S/R	Intensity	Often	S/R	Intensity	Often	S/R
<u>Pooled:</u>												
NHC	2.69 (0.91)	9.85 (3.16)	2.89 (1.92)	2.65 (0.97)	11.15 (3.33)	3.05 (2.00)	2.99 (0.91)	12.95 (3.40)	1.90 (2.02)	2.97 (0.92)		
HC	0.32 (0.99)	1.74 (2.87)	-0.29 (1.76)	0.41 (0.67)	1.63 (1.31)	0.26 (0.79)	0.36 (0.35)	10.54 (5.37)	-2.55 (3.15)	1.06 (1.45)		
All	1.99 (0.75)	5.37 (2.86)	3.58 (1.75)	1.62 (0.93)	6.65 (2.50)	3.66 (1.53)	2.11 (0.69)	9.13 (2.80)	1.44 (1.70)	2.18 (0.77)		
<u>Panel:</u>												
NHC	5.32 (1.94)	7.42 (3.20)	4.41 (2.19)	3.12 (0.54)	8.64 (4.30)	7.06 (2.96)	3.45 (1.33)					
HC	2.91 (2.54)	0.87 (0.19)	0.22 (0.13)	0.170 (0.06)	2.03 (1.88)	-0.18 (1.30)	0.59 (0.55)					
All	3.47 (1.40)	0.72 (1.90)	2.43 (1.31)	0.59 (0.39)	-0.91 (2.12)	3.60 (1.43)	0.42 (.63)					

Each entry is the coefficient on Seminars for that specification of the model

The abbreviation S/R indicates the Sometimes-Rarely Seminar variable.

Standard errors are in parentheses.

Source: Derived from KPMG Peat Marwick's Retirement Benefits in the 1990s: 1993 and 1994 Survey Data.

Table 8: Robustness of Contribution Results

	OLS	Median Regression			Robust Regression		
	Intensity	Often	S/R	Intensity	Often	S/R	Intensity
<u>Pooled:</u>							
NHC	0.211 (.080)	0.475 (.363)	0.186 (.219)	0.155 (.084)	0.690 (.254)	0.192 (.153)	0.169 (.070)
HC	0.115 (.119)	0.119 (.405)	0.118 (.247)	0.068 (.075)	0.316 (.389)	0.225 (.231)	0.121 (.106)
All	0.198 (.066)	0.484 (.319)	0.249 (.192)	0.124 (.063)	0.487 (.224)	0.261 (.135)	0.163 (.061)
<u>Panel</u>							
NHC	0.407 (.153)	0.929 (.506)	0.206 (.338)	0.201 (.084)	0.824 (.426)	0.242 (.285)	0.263 (.123)
HC	0.219 (.242)	-0.837 (.490)	0.011 (.338)	-0.084 (.110)	-0.518 (.684)	0.663 (.478)	-0.090 (.202)
All	0.194 (.104)	0.248 (.268)	0.038 (.181)	0.105 (.105)	0.265 (.303)	0.113 (.204)	0.113 (.091)

Each entry is the coefficient on Seminars for that specification of the model

The abbreviation S/R indicates the Sometimes-Rarely Seminar variable.

Standard errors are in parentheses

Source: Derived from KPMG Peat Marwick's *Retirement Benefits in the 1990s: 1993 and 1994 Survey Data*.