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The effects of financial education in the workplace: evidence from a survey of households

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Abstract

We use a novel household survey to investigate the effects of employer-based financial education on personal saving. We explore cross-sectional relations between the availability of employer-based financial education and various measures of asset accumulation, and we interpret these patterns in light of various potentially confounding factors. Our findings favor the hypothesis that employer-based financial education stimulates saving, both in general and for retirement.

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1. Introduction

During the 1980s, a small but significant minority of employers instituted educational programs to provide employees with information about financial decisions and retirement planning. Spurred in part by the increasing popularity of employee-directed pension plans such as 401(k)s (see e.g. Employee Benefit Research Institute, 1995), the rate of adoption accelerated considerably in the 1990s. As of 1994, 88% of large employers offered some form of financial

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education, and more than two-thirds had added these programs after 1990.¹ More recent evidence indicates that financial education in the workplace continued to spread at a rapid pace throughout the late 1990s.² If poor financial decisions result with sufficient frequency from failures to appreciate financial vulnerabilities or from misunderstandings of intertemporal tradeoffs (see Bernheim, 1994, 1995a), then education of this form may influence a wide range of behaviors, including plan participation, voluntary contributions, portfolio mix, and the individual's overall rate of saving.

The potential effects of financial education are interesting and important from a policy perspective. There is a widespread perception that the rates of national and personal saving are too low, and the efficacy of Individual Retirement Accounts (IRAs) and other tax policies is controversial.³ Moreover, some observers speculate that the post-War increase in saving by Japanese households may have been at least partially attributable to an extensive educational and promotional campaign.⁴ The growth of employer-based financial education has therefore attracted attention within policy circles. Indeed, in 1995, the Department of Labor announced its intention to launch 'a national pension education program aimed at drawing the attention of American workers to the importance of taking personal responsibility for their retirement security' (Berg, 1995, p. 2).

In this paper, we use a novel cross-sectional survey of US households to investigate the efficacy of employer-based financial education. Our primary focus concerns the effects of these programs on saving, both in general and for the purposes of retirement.⁵ Holding fixed a wide range of observable characteristics including pension status, we find that virtually all measures of retirement accumulation (both stocks and flows) are significantly higher on average and at the 25th and 50th percentiles when the respondent's employer offers financial education. We also find that rates of participation in 401(k) plans are significantly higher, both for the respondent and for his or her spouse, when financial education is available. For measures of total accumulation, the evidence is mixed. We find a significant relationship on average and at the 25th and 50th percentiles for the rate of saving (a flow variable), but essentially no relationship for total wealth (a stock variable). For the 75th percentile, none of the estimated coefficients are statistically significant.

We interpret these findings in light of several potential confounding considera-

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

² Overall, 86% of 401(k) plan sponsors indicated that they provided financial education to employees in 1999, compared with 59% in 1997 (Hewitt Associates, 2000).

³ See Bernheim (1997, 1999) for reviews of the literature on taxation and saving.

⁴ Naturally, there are other explanations for the Japanese experience. See Bernheim (1991) and Central Council for Savings Promotion (1981).

⁵ Due to data limitations, we are unable to study the effects of employer-based financial education on portfolio allocation. Weisbenner (1999) provides some indirect evidence concerning this issue.

tions: that the availability of financial education in the workplace may be systematically correlated with the underlying predisposition to save, that our estimates may confound the effects of unobserved plan characteristics, and that education may effect reporting, rather than behavior. Though we are cognizant of the limits of cross-sectional analysis, we believe that our results favor the hypothesis that financial education significantly stimulates retirement saving among low and moderate savers. Indeed, because employers typically institute financial educational programs for remedial purposes (that is, when employees are predisposed *against* saving), cross-sectional estimates may understate the effects of these programs. Though the pertinent evidence is somewhat less direct, further analysis supports the view that the associated increase in retirement saving represents a net contribution to total saving rather than asset shifting.

This study complements a small collection of roughly contemporaneous papers that use data gathered from employers to examine the effects of employer-based financial education on 401(k) participation and plan balances (Bayer et al., 1996; Bernheim, 1998; Clark and Schieber, 1998). An important limitation of employer data is that it does not permit one to examine assets held outside of retirement plans. Even if education has a sizable impact on voluntary pension contributions, its effect on total saving (or even total saving for retirement) may be small. For example, education may simply induce households to reshuffle their assets between pension accounts and other instruments for saving. To investigate these critical issues, one requires household survey data. The current study makes a unique contribution to the literature by providing the only available evidence concerning the relation between financial education in the workplace and total household saving (including saving outside of pension plans).

Existing evidence on the effects of retirement education in the workplace also includes qualitative surveys and non-academic case studies. In one survey (Employee Benefit Research Institute, 1994), 92% of 401(k) participants said that they read materials provided by their employers; of those, 44% said that they allocated their funds differently, and 33% said that they contributed more to their plans. A more recent survey (Employee Benefit Research Institute, 2001) found that workers who took advantage of opportunities for financial education in the workplace were more likely to undertake a retirement needs calculation (53 vs. 32%), to alter financial decisions after making such a calculation (66 vs. 37%), and to save for retirement (82 vs. 50%). Unfortunately, if attitudes toward saving are systematically related to factors that determine the likelihood of using educational materials, then these statistics confound behavioral responses with selection effects. It is also possible that individuals are simply reluctant to report that they ignore education after receiving it. Finally, neither survey attempted to measure the magnitude of the treatment effect. Employers who enhanced their educational efforts also tend to report increases in plan participation (A. Foster Higgins & Co., Inc., 1994), but the available evidence does not establish whether these increases are out of the ordinary. Case studies frequently cite dramatic

changes in participation (see e.g. Employee Benefit Research Institute, 1995, or Borleis and Wedell, 1994), but the link to education is usually speculative, and often confounded by other factors. For example, one company views its communications program as the ‘most important factor’ behind its 92% 401(k) participation rate, but the factual basis for this inference is unclear (Geisel, 1995). Notably, all of these studies focus exclusively on decisions pertaining to pension plans; none of them examine the impact of financial education on broad measures of saving.

The current study is also related to work by Bernheim et al. (2001), which examines the long-term effects of state-wide high school financial curriculum mandates. Exploiting the variation in requirements both across states and over time, these authors find that mandates significantly raise both exposure to financial curricula and subsequent asset accumulation once exposed students reach adulthood. There is also a more distant relation to various papers that document correlations between an individual’s general level of educational attainment and his or her rate of saving (documented by Bernheim and Scholz, 1993, and by Hubbard et al., 1995). Naturally, these correlations may be attributable to other related factors, such as permanent income and rates of time preference.

The remainder of this paper is organized as follows. Section 2 provides some general background information concerning financial education in the workplace. Section 3 describes the data used in our analysis. Section 4 presents cross-sectional estimates of the relation between the availability of employer-based financial education and various measures of asset accumulation. Section 5 interprets the cross-sectional patterns in light of the potentially confounding factors mentioned earlier. It also examines the hypothesis that financial education stimulates retirement saving by inducing workers to shift assets without increasing overall saving. Section 6 concludes.

2. Background on financial education in the workplace

The characteristics of financial education in the workplace vary widely from employer to employer. Programs differ along three primary dimensions: content, media, and frequency.

Educational content falls into several categories. For our purposes, the most important category concerns topics related to the level of saving. Specific subjects include retirement income sources and needs (including ‘retirement gap’ calculations), the establishment of goals, the importance of pension plan participation, the impact of preretirement withdrawals on retirement income, the advantages of early and regular saving (including the benefits of compounding), budgeting, and debt reduction. While emphasis varies, sizable majorities cover retirement income needs (73%) and general retirement strategies (88%) (Employee Benefit Research

Institute, 1995). Topics related to asset allocation, including the concepts of risk, risk tolerance, diversification, and the characteristics of various assets, comprise a second category. Virtually all employer-based financial education programs include some coverage of these subjects (Employee Benefit Research Institute, 1995). Other common topics include basic investment terminology, the effects of inflation, the benefits of dollar cost averaging, the role of the investor's time horizon, tax issues, and details of the employer's pension plan.

Employers provide educational materials to workers through a variety of media. Written information is particularly widespread. According to one recent survey (Employee Benefit Research Institute, 2001), of those workers whose employers offer some form of financial education, 89% receive benefit statements, 85% receive brochures, 59% receive either newsletters or magazines, and 54% have access to workbooks and worksheets. It is also quite common for employers to offer information through media that involve personal contact. Among employees of firms with educational programs, 57% have access to a financial planner, 57% can obtain investment advice, and 54% are eligible to attend seminars. The use of electronic media is growing at an explosive pace. In 2001, on-line educational materials were available to 47% of employees at firms with educational programs, up from only 4% in 1998. Smaller fractions of these employees have access to computer software (15%) and informational videos (20%).

Practitioners generally agree that the success of an employer-based financial education program hinges on regular reinforcement of a clear and consistent message. Some programs provide information only when the employee is hired, upon enrollment, or in the context of a temporary campaign. Others publish regular newsletters, maintain ongoing seminar series, distribute periodic benefit statements, and engage in other high-frequency activities. Among employers with 401(k) plans and educational programs in 1999, six of ten maintained ongoing communications campaigns (Hewitt Associates, 2000).

Practitioners also typically recommend that employers tailor the content, media, and frequency of financial education programs to the characteristics and needs of their employees. Employers are advised to select educational messages that pertain to employees' concerns, to pitch these messages at an understandable level, and to select media that are most conducive to presentations that effectively attract and maintain attention. Whether employers actually follow this advice is an open question. In practice, relatively little is known about the manner in which educational programs vary with employee characteristics. Bayer et al. (1996) find that, controlling for other factors, the use of seminars, summary plan descriptions, newsletters, and periodicals among 401(k) plan sponsors is not significantly related to whether the plan covers union employees. Since unionized and non-unionized workers differ with respect to a variety of factors (including average income and education), this finding suggests that the features of educational programs may vary relatively little with employee characteristics.

3. The data

Unfortunately, none of the standard sources of information on household finances (such as the Survey of Consumer Finances, the Survey of Income and Program Participation, and the Panel Study on Income Dynamics) contain information on employer-based retirement education. To address the nexus of issues discussed in Section 1, it was necessary to collect new data.

The first author of this paper has directed an ongoing project to monitor the adequacy of personal saving through annual household surveys (see Bernheim, 1995b). For the Fall of 1994, the survey instrument was expanded to cover a number of new topics, including employer-based financial education. Data were collected during the month of November from a national sample of respondents between the ages of 30 and 48. A total of 2055 surveys were completed.⁶

The survey gathered standard economic and demographic information, including household assets and liabilities, rates of saving, earnings, income, pension coverage, employment status, gender, marital status, age, ethnic group, education, and household composition. It also covered less standard topics, such as retirement education in the workplace, economic and financial knowledge, sources of information and advice on retirement planning, and childhood experiences of possible relevance to later financial decisions.

One potential concern is that the survey was administered by telephone. While telephone interviews are usually regarded as less reliable than face-to-face interviews, the survey was designed to achieve a high level of compliance and to assure accuracy. Questions were sequenced according to their degree of invasiveness. This permitted interviewers to establish credibility, to place respondents at ease, and to engage them in the interview process. Interviewers first asked respondents to assess their own levels of financial knowledge, and then moved on to childhood experiences (whether the respondent received an allowance, held a regular job, and so forth), sources of information and advice about retirement (including financial education in the workplace), and questions designed to test economic and financial knowledge. Invasive questions concerning assets and earnings were deferred until later in the survey, and the most innocuous of these (for example, the household's rate of saving) were placed before the most problematic ones (primarily those designed to elicit asset holdings). As a result, rates of refusal to individual questions were surprisingly low among those

⁶The survey was designed in cooperation with the first author of this paper and fielded for Merrill Lynch by Survey Communications, Inc., using a proprietary CATI (Computer Assisted Telephone Interviewing) system. Sampling was based on automated generation and execution of random phone numbers, using an algorithm designed to ensure representativeness. Direct electronic data entry permitted automated control of skip patterns and eliminated the possibility of transcription errors. Respondents who terminated their interviews before completion of the survey were deleted from the final sample. Information on the frequency of disconnects is not available.

completing the survey: 79.1% of respondents provided quantitative answers to all questions concerning components of wealth, and 90.4% provided quantitative answers to all questions concerning earnings. While high response rates are encouraging, it is important to judge the reliability of the data by making appropriate comparisons with known benchmarks (see below).

3.1. Measures of financial education in the workplace

The survey contains two questions concerning retirement education in the workplace. The first asks whether the respondent's employer offers seminars, professional assistance, or informative materials to assist with retirement planning. The second question asks whether the respondent has taken advantage of these offerings. Nearly all respondents (2036 of 2055) provided usable answers ('yes' or 'no' rather than 'don't know' or 'refused') to both of these questions. Obviously, these are coarse measures of exposure to the wide variety of employer-based retirement education programs discussed in Section 2. Unfortunately, detailed descriptions of program structure and content are not available. Because we lump all programs together, our analysis probably understates the effects of the best programs. However, because individuals are presumably more likely to recall (and report) more effective educational efforts, our results may overstate the effects of the average program.

Just over one-half (53.6%) of working respondents report that their employers offer some form of retirement education. The availability of education is highly correlated with pension eligibility. Of employed respondents without pensions, only 26.6% say that educational programs are available. In contrast, 68.9% of those covered only by 401(k)s, 58.2% of those covered only by other pension plans, and 76.4% of those covered by both types of plans report the existence of educational options.⁷ Since these options have become common even in the absence of 401(k)s, the growth of self-directed plans does not appear to be the sole factor motivating the growth of retirement education in the workplace.⁸

Overall, slightly more than three-quarters (76.9%) of respondents with access to retirement education in the workplace report that they make use of these opportunities. This is lower than the 92% figure (which refers to the fraction of workers who read written materials provided by their employers) reported by

⁷ A relatively small number of those who describe themselves as 'not working' nevertheless report that their employers offer some form of retirement education. These respondents may have in mind educational programs offered by past employers, their spouse's employer, or a school that they attend.

⁸ Conceivably, 'other pensions' may include some self-directed plans. However, our '401(k)' category is intended to include 'other tax-deferred salary reduction plans,' which subsumes many other common self-directed plans, such as 403(b)s. Of course, some respondents may have misclassified their pensions, but misclassification would have to be extremely common to explain the observed differences between those with and without other pensions. Notably, Bayer et al. (1996) corroborate our findings using employer survey data.

EBRI (1994). The usage rate is higher for workers covered only by 401(k)s (79.9%) than for workers without pensions (69.1%). However, those covered exclusively by pensions other than 401(k)s are only marginally more likely to participate in educational programs than those who have no pension coverage (69.2 vs. 69.1%), and those with both 401(k)s and some other plan are only slightly more likely to participate than those covered by 401(k)s alone (80.2 vs. 79.9%). Thus, the existence of a pension plan does not appear to affect significantly the likelihood of worker participation in retirement education offerings unless the plan has self-directed features that require active participant decision-making.

When financial education is available in the workplace, 27.0% of respondents report that their employers are the most important sources of advice and information concerning retirement planning, compared to only 7.4% of employees in instances where education is not offered. Reliance on financial professionals differs little between these two groups (23.3 and 24.3%, respectively), but reliance on parents, friends and relatives is lower in the presence of educational offerings (19.2 vs. 24.6%), as is reliance on the individual's own judgement (9.3 vs. 14.5%). These patterns are consistent with (but certainly do not prove) the hypotheses that many employees rely heavily on financial education in the workplace, and that this education most commonly displaces non-authoritative sources of assistance. Thus, there is considerable scope for employer-based education to affect financial choices.

3.2. Measures of asset accumulation

Data collected in this survey allow us to study the relations between employer-based financial education and six distinct measures of asset accumulation. We use three definitions of wealth, differentiated by breadth. In order of increasing inclusiveness, we consider asset accumulation within 401(k)s, total accumulation for retirement, and total accumulation for all purposes. Here and throughout the remainder of this paper, we use the term '401(k)' to refer to any employer-sponsored, participant-directed, tax-deferred, salary-reduction retirement plan, even though many of these plans technically fall under other sections of the tax code (such as 403(b)s). For each definition of wealth, we study a measure of flows and a measure of stocks.

Since employer-based financial education is most common among firms offering 401(k)s, it is appropriate to study the effects on accumulation within these plans. Survey respondents were asked whether they were eligible to participate in 'a 401(k) or some other tax-deferred salary reduction plan' sponsored by their employers, and whether they actually participated. Irrespective of their answers to these questions, they were asked to report accumulated balances in tax-deferred salary reduction plans sponsored by past or present employers. They were also asked to provide similar information concerning their spouses. From these

questions, we obtained a measure of flows into 401(k) plans (current participation), as well as a measure of stocks (total plan balances).

Since individuals can shift retirement saving between employer-sponsored plans and other accounts (such as IRAs), it is also important to examine the impact of financial education on total accumulation for retirement. Survey respondents were asked to report the percentage of household earnings (not including income received from assets and investments) currently saved for retirement (our flow measure), as well as the total amount of money accumulated to date specifically for retirement (our stock measure).

Since individuals can also shift saving between retirement accounts and other assets, it is important to examine the impact of financial education on overall accumulation. Survey respondents reported the percentage of household earnings currently saved in all forms (our flow measure), as well as various components of assets and liabilities, from which we construct net wealth (our stock measure).⁹

Several important issues arise with respect to our measures of asset accumulation. First, self-reported rates of saving are suspect because they do not necessarily reflect the consistent application of appropriate economic concepts. For example, some individuals may report the fractions of their paychecks that they put away, while others may (despite the wording of the questions) count some portion of reinvested capital income (e.g. realizations) as both income and saving.¹⁰ This disadvantage is at least partially offset by the fact that questions about rates are less invasive than questions about asset values; as a result, we may obtain more honest answers. It is also obvious from the results discussed later in Section 4 that reported rates of saving contain more than random noise. They are highly correlated with total net wealth (presumably reflecting serial correlation in rates of saving), and they exhibit the expected correlations with variables such as 401(k) eligibility and education, even controlling for wealth. Absent either a true panel or a detailed log of household spending, self-reported rates of saving are the only available measures of flow saving. While they are admittedly imperfect, they do

⁹Net wealth is defined as the total value of homes, businesses, other real property, and financial assets (including cash, bank accounts, retirement accounts, and other investments such as stocks, bonds, and mutual funds), minus debt. This measure of net wealth only encompasses assets that are subject to the household's discretion. Note that it excludes the value of future income derived from defined benefit pension plans and Social Security. In our view, it is not possible to construct reasonable estimates of defined benefit pension wealth and Social Security wealth using the available data. For our empirical analysis, we therefore attempt to explain discretionary net wealth, controlling where possible for non-discretionary accumulations (e.g. through the inclusion of binary variable summarizing defined benefit pension eligibility).

¹⁰It is worth noting that no respondent reports negative saving, despite the fact that some households undoubtedly dissave. This probably reflects the fact that most individuals do not think about saving and dissaving symmetrically. For those who dissave, it is probably more natural to report that they save nothing (a saving rate of zero) than to report a negative rate of saving.

appear to provide meaningful information on flow saving, and are therefore worthwhile subjects of analysis.

Second, the distinction between total wealth and retirement wealth, and the analogous distinction between the overall rate of saving and the rate of saving for retirement, may be imprecise and subjective. Some individuals may earmark funds for particular purposes, while others may regard their resources as fungible. While these distinctions are sharper when individuals use targeted retirement savings vehicle (e.g. IRAs, 401(k)s, variable annuities, and life insurance products), some individuals may save for retirement through other vehicles, or save for other objectives (such as college education) through a retirement account. Nevertheless, high response rates indicate that most individuals do earmark some portion of their wealth psychologically, if not physically, for retirement.

3.3. Comparisons with benchmarks

To evaluate the reliability of these data, we undertake comparisons with other recognized data sources. In particular, for both the March 1995 Current Population Survey (CPS) and the 1995 Survey of Consumer Finances (SCF), we construct comparison samples by mimicking the selection criteria for the Merrill Lynch household survey sample. We include all single individuals between the ages of 30 and 48. For each married couple, we randomly designate either the husband or the wife as a ‘pseudo-respondent,’ and include the household if the pseudo-respondent’s age is between 30 and 48. We compute benchmark statistics for demographics and earnings based on the CPS sample; for assets, we use the SCF sample. In all cases, we apply appropriate population weights. Results appear in Table 1.

The first section of the table provides statistics on demographic characteristics.¹¹ It is evident that there are disproportionate numbers of homeowners and highly educated individuals in the Merrill Lynch survey. Married individuals and whites are over-represented to a lesser degree. High frequencies of homeowners and married individuals should not be surprising, as there is a greater likelihood of contacting at least one member of such a household.

Selectivity based on demographics is not particularly troubling. Of greater concern is the accuracy of information on potentially sensitive financial topics, such as earnings and assets. The second section of Table 1 provides statistics on earnings. To remove the effects of differences in demographic composition, we confine attention to full-time white employees, and tabulate median earnings

¹¹For couples, ethnicity and education pertain to the respondent in the Merrill Lynch sample, and to the pseudo-respondent in the CPS sample.

Table 1
Summary statistics and comparisons with benchmarks

Variable and subgroup	Sample ^a	Benchmark ^b
Percent married	73.0	66.9
Percent single male	13.1	16.4
Percent single female	13.8	16.7
Percent white	87.2	84.3
Percent non-white	12.8	15.7
Percent no degree	3.6	10.3
Percent high school degree only	56.2	60.9
Percent college degree	40.2	28.9
Percent homeowners	79.1	57.6
Median earnings (white, full time employees)		
Men, no high school degree	25,000 ^c	21,000
Men, high school degree only	35,000	32,000
Men, college degree	50,000	50,000
Women, no high school degree	15,000 ^d	12,000
Women, high school degree only	21,000	21,000
Women, college degree	33,000	35,000
Median 401(k) & thrift balances (full sample)		
Earnings < \$25,000	5000	3500
\$25,000 ≤ Earnings < \$50,000	9000	9000
\$50,000 ≤ Earnings < \$75,000	16,000	17,000
\$75,000 ≤ Earnings < \$100,000	25,000	31,300
\$100,000 ≤ Earnings	50,000	51,140
Median net wealth (full sample)		
Earnings < \$25,000	14,000	11,343
\$25,000 ≤ Earnings < \$50,000	50,000	45,028
\$50,000 ≤ Earnings < \$75,000	119,000	88,773
\$75,000 ≤ Earnings < \$100,000	175,000	130,264
\$100,000 ≤ Earnings	315,000	320,769

^a For demographic variables and wealth, we use the entire sample. For earnings, we pool information on respondents and spouses, and select subsamples of males and females between the ages of 30 and 48. For net wealth and 401(k) balances, we weight the observations to produce the same composition of homeowners and non-homeowners within each earnings category as in the benchmark sample.

^b For demographic variables, we establish benchmarks by drawing a comparable sample of households from the March 1995 Current Population Survey (CPS). Specifically, we include single individuals between the ages of 30 and 48. For each married couple, we randomly select either the husband or the wife, and include the household if the selected individual's age is between 30 and 48. For earnings, we also use the March 1995 CPS, restricting attention either to all males between the ages of 30 and 48, or all females between these ages. For wealth, we draw a comparable sample of households from the 1995 Survey of Consumer Finances (SCF) following the same procedure as for the CPS.

^c Fifty or fewer observations.

^d Twenty or fewer observations.

(through employment or self-employment) separately for men and women with three different levels of educational attainment. These figures represent all respondents (or pseudo-respondents) and spouses between the ages of 30 and 48 in the samples mentioned above. Generally, the figures are quite close. The largest discrepancies for both men and women appear among those without high school degrees; notably, for the Merrill Lynch sample, both of these groups contain relatively few observations.

The last two sections of Table 1 contain household medians for 401(k) and thrift balances (among those with positive balances) and net wealth for the full sample. To control for differences in education and earnings between the two samples, we report figures separately for five earnings categories. Since homeowners are significantly over-represented in the Merrill Lynch sample, and since they are known to have significantly more wealth than non-homeowners, we weight the observations within each earnings category to achieve the same distribution across homeowners and non-homeowners as in the benchmark sample.¹² Note that median 401(k) and thrift account balances for the Merrill Lynch survey sample are quite close to the benchmarks. Median net wealth in the Merrill Lynch sample consistently exceeds the benchmarks, but by relatively small margins for households with earnings below \$50,000 and above \$100,000. The discrepancies are larger for households with earnings between \$50,000 and \$100,000. However, given the noisiness of most wealth measures, the Merrill Lynch survey figures for net wealth appear reasonable, and they exhibit the correct relation to earnings even within the most problematic range.

Overall, 49% of the respondents in our sample indicate that they are eligible for 401(k)s, and 78% of these report that they participate. The rate of eligibility increases with income, from 25% among households with total earnings between \$10,000 and \$20,000, to 62% for households with total earnings over \$75,000. Similarly, rates of participation for eligible respondents increase from 58% among those with total earnings between \$10,000 and \$20,000, to 85% among those with total earnings over \$75,000. According to Poterba et al. (1995), data drawn from the 1991 Survey of Income and Program Participation (SIPP) exhibit similar patterns, but imply somewhat lower overall rates of eligibility and participation for the corresponding age group. The discrepancies are potentially attributable to the increasing popularity of 401(k)s between 1991 and 1995, and to the fact that the Merrill Lynch survey oversampled homeowners.¹³

¹²Weighting makes relatively little difference for 401(k) balances, but is important for net wealth.

¹³Notably, employer survey results summarized in Hewitt Associates (2000) place the 401(k) participation rate at 79% in 1997, which is nearly identical to the self-reported participation rate for our sample.

4. Cross-sectional patterns

4.1. Estimation issues

One natural approach to the issues at hand would be to estimate ‘treatment effects’ by studying the relations between our measures of asset accumulation and the *use* of financial education. Unfortunately, the potential endogeneity of treatment selection would confound the interpretation of the estimated coefficients. Similar issues arise in other contexts such as the literature on the returns to schooling: if years of schooling rise with ability, and if wages rise with ability fixing years of schooling, then the cross-sectional relation between schooling and wages tends to overstate the impact of incremental schooling. Likewise, in the current context, if frugal individuals are more likely to participate in financial education programs, and if these individuals save more fixing the level of financial education, then the cross-sectional relation between saving and financial education tends to overstate the impact of the intervention. One common statistical remedy for this problem is to use family and environmental attributes as instrumental variables.¹⁴ Naturally, the validity of this approach depends on the properties of the chosen instrument.

In this paper, concerns about the endogeneity of treatment selection lead us to study the relation between asset accumulation and the *availability* of financial education. While the individual employee determines whether he or she *uses* a financial education offering, the employer determines the *availability* of this offering.¹⁵ Thus, different considerations govern the selection process for use and availability. If availability is exogenous with respect to household saving decisions, then availability is a valid instrument for usage. Rather than estimate the relation between asset accumulation and the use of financial education through an instrumental variables procedure, we simply substitute availability for use.¹⁶ This is acceptable in the current context because the coefficient of availability has a natural interpretation: it measures the impact of an intervention on saving without conditioning on use. Obviously, the validity of our approach depends on the nature

¹⁴Examples include Angrist and Krueger (1991) and Card (1993), among many others.

¹⁵As discussed in Section 5, an employee may influence the availability of financial education indirectly, for example through the choice of a job.

¹⁶Poterba et al. (1995) adopt a similar approach to measure the effects of 401(k) plans on saving. Since the availability of a 401(k) plan is probably positively correlated with the underlying predisposition to save, their estimates presumably tend to overstate the impact of these plans. In contrast, since the availability of financial education appears to be *negatively* correlated with the underlying predisposition to save conditional on 401(k) eligibility, our approach tends to understate the impact of financial education. See Section 5 for further discussion of these issues.

of the selection process governing availability. In Section 5, we carefully examine evidence pertaining to this process, and we interpret our cross-sectional estimates in light of this evidence.

In examining the relation between saving behavior and education, one must also be cognizant of the fact that the response to education may vary systematically across the population. While most Americans probably save too little (relative to financial planners' recommendations), some save adequately, and a few probably put away significantly more than is necessary. Education may promote thrift among low savers without affecting high savers. Alternatively, if education nudges each household toward an appropriate mode of behavior, even the direction of its effect may change as one moves from those who save too little to those who save excessively. For this reason, it is important to study the relation between financial education and the entire *distribution* of asset accumulation. To this end, we employ a combination of regression procedures, including OLS, quantile regression, and (where appropriate) probit models.

In practice, survey data on wealth and self-reported rates of saving typically have skewed distributions with extreme outliers in thick upper tails.¹⁷ We prefer to use estimation strategies that moderate the influence of these outliers, for two reasons. First, extreme outliers may result from measurement error processes with non-standard properties (e.g. an incorrect number of zeros, or a whimsical answer). Second, the relationship between the dependent and independent variables may be systematically different for households with extreme values of the dependent variable. For example, the effect of financial education on saving may be negligible for households that inherit large estates from relatives, even if it is substantial for ordinary households. Quantile regression techniques are reasonably robust with respect to the presence of such outliers, but OLS is not. To minimize the influence of outliers, we convert the dependent variables to population percentiles (equivalently, population ranks) before fitting OLS regressions. The coefficients in the resulting equations are easily interpreted: they describe the effects of changes in the independent variables on the respondent's position in the distribution of the dependent variable. For the reasons mentioned above, we do not report OLS regression results for specifications in which the untransformed values of wealth and saving rates are used as dependent variables. In practice, this approach also yields qualitatively similar results, but in a number of cases the estimates are simply too imprecise to support reliable inferences.

4.2. Results

Before discussing the regression results, it is useful to summarize the key patterns in the raw data. We refer the reader to Table 2, which reports statistics on

¹⁷For example, six respondents reported total wealth in excess of \$5 million, and three indicated that they saved 100% of income.

Table 2

Measures of asset accumulation, by availability of financial education in the workplace

	Frequency	25th percentile	Median	75th percentile
401(k) participation				
Education available	0.827			
Education not available	0.673			
401(k) balances				
Education available		1400	9150	25,000
Education not available		0	5000	18,500
401(k) participation, spouse				
Education available	0.844			
Education not available	0.730			
401(k) balances, spouse				
Education available		1000	6000	15,000
Education not available		0	5000	20,000
Saving rate—retirement				
Education available		3%	6%	10%
Education not available		0%	5%	10%
Retirement wealth				
Education available		5000	20,000	40,000
Education not available		0	9000	30,000
Saving rate—total				
Education available		5%	10%	15%
Education not available		2%	8%	15%
Total wealth				
Education available		24,000	90,000	198,000
Education not available		16,800	90,000	212,000

asset accumulation conditional upon the availability of financial education at the respondent's workplace. The statistics on 401(k)s are derived from subsamples for which the respondent (or spouse) was eligible for a 401(k).

Several patterns in Table 2 merit emphasis. Rates of participation in 401(k) plans are significantly higher when the respondent's employer offers financial education, both for the respondent (a 15.4 percentage point difference) and for the respondent's spouse (an 11.4 percentage point difference). This raises the possibility that education has a positive spillover effect on a spouse's pension plan activity. Notice, however, that the gap between plan balances for those with and without educational offerings at the respondent's workplace is larger for the respondent than for the respondent's spouse. At the 25th percentile, all measures of asset accumulation are higher when the respondent's employer offers financial education. The same statement holds at the median, with the exception of total wealth, for which there is no difference. At the 75th percentile, the pattern is mixed: measures of asset accumulation are higher when the respondent's employer

offers financial education in two cases (401(k) balances and retirement wealth), the same in two cases (rates of saving for retirement and overall), and lower in two cases (spouse's 401(k) balances and total wealth). These differences across percentiles reinforce the importance of studying the distribution of asset accumulation, rather than a single summary statistic such as the mean.

It is natural to wonder whether the differences in Table 2 are statistically significant, and whether they hold up when one controls for other household characteristics. We therefore estimate probit regressions for 401(k) participation, as well as both OLS and quantile regressions for 401(k) balances, saving rates, retirement wealth, and total wealth. In addition to an indicator variable summarizing the availability of financial education at the respondent's workplace, explanatory variables include: earnings,¹⁸ respondent's age and education, spouse's age and education, dummy variables indicating whether the respondent and spouse are eligible for 401(k) plans, dummy variables indicating whether the respondent and spouse are eligible for other pension plans, dummy variables indicating whether the respondent is married, black, or non-white other than black, and dummy variables indicating whether the respondent and spouse are self-employed.¹⁹ We also include a variable that measures the respondent's recollection of his or her parents' inclination to save, which we construe as a proxy for preferences (an interpretation that is consistent with the pattern of estimated coefficients).²⁰ Finally, for specifications explaining rates of saving, we include a measure of total wealth.²¹ This is justified by the usual life cycle considerations, which imply that the associated coefficient should be negative (since higher wealth should increase consumption). However, if preferences towards saving are reasonably stable over time, wealth may function primarily as another taste proxy, in which case one would expect to obtain a positive coefficient. Recall that the survey solicits *current* rates of saving, rather than rates of saving for the preceding

¹⁸We use the log of earnings to reduce the influence of outliers in the upper tail of the distribution of observed earnings. This functional assumption is natural for most of our measures of asset accumulation. Since contribution to 401(k) balances and other retirement saving accounts are capped, the marginal effect of earnings must decline with earnings. Similarly, though rates of saving may rise with earnings, it seems likely that they level off when earnings are sufficiently high. To avoid taking the log of zero for non-earners, we first add one dollar to earnings. For 401(k)s, we differentiate between respondent's earnings and spouse's earnings, on the grounds that the earnings of the eligible individual may be more closely related to plan activity. For all other measures of asset accumulation (which pertain to the entire household), we use total household earnings.

¹⁹We include self-employment indicators because self-employed individuals have different saving opportunities, and may conceive of wealth and saving differently from others.

²⁰Our results are not particularly sensitive to the inclusion or exclusion of this variable.

²¹As in specifications for which wealth is the dependent variable, we use the percentile rank of total wealth. Due to the presence of extreme outliers, this variable explains variation in saving rates far better than the level of wealth. When the latter variable is used, the associated coefficient is typically small and statistically insignificant.

year. It is therefore appropriate to regard current wealth as a predetermined (though not necessarily exogenous) variable.

We present complete estimates for our various specifications, along with associated sample sizes, in Tables 3–6. All probit coefficients are scaled to reflect incremental effects on probability evaluated at sample means. Our primary interest is in the coefficients for the dummy variable indicating whether the respondent's employer offers financial education.²²

According to the results in Tables 3 and 4, rates of participation in 401(k) plans are significantly higher when the respondent's employer offers financial education, both for the respondent (a 12.1 percentage point difference) and for the respondent's spouse (a 9.2 percentage point difference). For respondent's 401(k) balances (Table 3), the financial education coefficient is positive and statistically significant in the OLS regression and at the 25th and 50th percentiles.²³ At the 75th percentile, one cannot reject the possibility that the coefficient is zero at conventional levels of confidence. Note also that, as a percentage of balances (recall Table 2), the estimated effect declines sharply as one moves to higher percentiles. In this sense, the effect is strongest at the lower end of the saving distribution. The relation between the availability of financial education at the respondent's workplace and spouse's 401(k) balances is much weaker. For the OLS regression, one can reject the hypothesis that the key coefficient is zero with only 92% confidence. For the 25th percentile, one can reject this hypothesis with only 85% confidence; at the median and 75th percentiles, the corresponding

²²In the text, we focus exclusively on the coefficients of this key financial education variable. For the most part, other coefficient estimates are sensible, though in some cases they require careful interpretation. Several examples deserve emphasis. In various specifications for rates of saving, the coefficient of respondent's age is negative. This does not, however, mean that rates of saving decline with age. The equations also control for earnings and wealth, both of which rise with age, and both of which are associated with higher saving. The equation merely indicates that a younger individual with given levels of earnings and wealth tends to save at a higher rate than an older individual with the same levels of earnings and wealth. This is hardly surprising: the younger individual accumulated the same wealth more quickly, and therefore is presumably more predisposed to save. Similarly, one must exercise care when interpreting the coefficients of spouse's age. As a household ages, this variable moves in lockstep with respondent's age. Thus, spouse's age functions much like an interaction between marital status and age. When interpreting the coefficients of education (some of which are negative), one should keep in mind that the specifications control for income. It is not clear whether one should expect an unsuccessful highly educated person to save more or less than a successful person with less education. Finally, since all variables pertaining to the spouse are set equal to zero for single individuals, the coefficients of the marital status indicator do not measure the typical differences between married and single respondents.

²³These estimates make no allowance the fact that the distribution of 401(k) balances is bounded below by zero. This is potentially important, since slightly more than 20% of eligible individuals have no 401(k) balances. We have investigated the importance of this issue by estimating a tobit regression for respondent's balances. The estimated coefficient of the key education variable was 11,515; the associated *t*-statistic was 3.23.

Table 3
Regression results for respondent's 401(k) activity

Variable	Probit for participation	Balances			
		OLS, % Rank	25th percentile	50th percentile	75th percentile
Availability of financial education at workplace	0.121 (3.58)	0.0670 (3.69)	1381 (2.09)	2789 (2.86)	2814 (0.87)
Eligibility for other pension, respondent	−0.0430 (−1.27)	−0.0149 (−0.82)	−293 (−0.45)	−813 (−0.84)	−2830 (−0.85)
Eligibility for 401(k), spouse	−0.0332 (−0.83)	0.0096 (0.46)	631 (0.80)	−1205 (−1.07)	1590 (0.43)
Eligibility for other pension, spouse	0.0227 (0.51)	0.0043 (0.17)	232 (0.27)	861 (0.65)	−248 (−0.06)
Marital status	−0.0059 (−0.09)	0.0359 (0.95)	678 (0.49)	3451 (1.70)	12,459 (1.82)
Black	−0.0923 (−1.67)	−0.0615 (−2.02)	−1478 (−1.32)	−2563 (−1.57)	−4000 (−0.74)
Other non-white	0.0067 (0.10)	0.0155 (0.43)	1019 (0.81)	2966 (1.55)	889 (0.14)
Education, respondent	−0.0001 (−0.01)	0.0091 (1.41)	258 (1.04)	689 (2.01)	1387 (1.28)
Education, spouse	0.0004 (0.03)	−0.0077 (−1.10)	−67.0 (−0.25)	−727 (−1.92)	227 (0.18)
Age, respondent	−0.00414 (−1.21)	0.0002 (0.10)	7.60 (0.11)	327 (3.23)	795 (2.29)
Age, spouse	0.00269 (0.76)	0.0022 (1.15)	46.9 (0.66)	−61.1 (−0.59)	356 (1.02)
Log earnings, respondent	0.103 (3.90)	0.153 (9.64)	3390 (6.16)	10,015 (11.8)	20,981 (5.99)
Log earnings, spouse	0.00838 (1.48)	0.0007 (0.22)	−8.15 (−0.08)	51.3 (0.31)	−967 (−1.74)
Self-employed, spouse	−0.115 (−1.72)	−0.0442 (−1.36)	−895 (−0.73)	−2963 (−1.69)	−3754 (−0.66)
Parent's saving	0.0021 (0.24)	0.0015 (0.30)	19.9 (0.11)	122 (0.46)	1019 (1.13)
Constant		−1.09 (−6.35)	−36,808 (−6.24)	−109,861 (−11.98)	−250,257 (−6.45)
Observations	795	722	722	722	722

Notes: *t*-statistics in parentheses. Probit coefficients are scaled to reflect incremental effects on probability evaluated at sample means. Samples consist of all respondents who are eligible for 401(k)s, and for whom the required data are available.

Table 4
Regression results for spouse's 401(k) activity

Variable	Probit for participation	Balances			
		OLS, % Rank	25th percentile	50th percentile	75th percentile
Availability of financial education at workplace	0.0916 (2.28)	0.0452 (1.76)	1030 (1.46)	– 30.5 (–0.02)	3.16 (0.00)
Eligibility for 401(k), respondent	0.0498 (1.22)	– 0.0029 (–0.11)	– 215 (–0.31)	1595 (1.21)	640 (0.16)
Eligibility for other pension, respondent	– 0.0383 (0.84)	– 0.0156 (–0.54)	– 414 (–0.53)	580 (0.41)	– 2271 (–0.51)
Eligibility for other pension, spouse	– 0.0220 (–0.53)	– 0.0656 (–2.40)	– 1321 (1.79)	– 3232 (–2.37)	– 3055 (–0.73)
Black	– 0.0278 (–0.34)	– 0.0963 (–1.75)	– 841 (–0.57)	– 3372 (–1.25)	– 6764 (–0.92)
Other non-white	0.720 (0.91)	0.0353 (0.66)	843 (0.60)	3671 (1.42)	5869 (0.76)
Education, respondent	– 0.0136 (–0.94)	0.0017 (0.18)	– 8.20 (–0.03)	835 (1.80)	1485 (1.11)
Education, spouse	0.0336 (2.37)	0.0178 (2.02)	206 (0.83)	341 (0.77)	2344 (1.84)
Age, respondent	0.0015 (0.29)	– 0.0020 (–0.61)	– 7.81 (–0.09)	– 136 (–0.82)	83.3 (0.17)
Age, spouse	– 0.0001 (–0.01)	0.0038 (1.39)	12.8 (0.19)	290 (2.10)	615 (1.52)
Log earnings, respondent	0.0083 (1.43)	0.0050 (1.25)	114 (1.14)	– 35.2 (–0.18)	– 193 (–0.32)
Log earnings, spouse	0.0690 (3.18)	0.0624 (4.13)	1590 (4.81)	4233 (5.57)	6086 (1.85)
Self-employed, respondent	– 0.0083 (–0.15)	– 0.0029 (–0.11)	– 572 (–0.57)	– 460 (–0.25)	– 967 (–0.18)
Parent's saving	– 0.0022 (–0.21)	– 0.0015 (–0.21)	– 23.6 (–0.12)	1998 (0.57)	545 (0.53)
Constant		– 0.118 (–0.67)	– 16,756 (–4.27)	– 47,534 (–5.41)	– 85,575 (–2.40)
Observations	529	397	397	397	397

Notes: *t*-statistics in parentheses. Probit coefficients are scaled to reflect incremental effects on probability evaluated at sample means. Samples consist of all observations for which the spouse is eligible for a 401(k), and for whom the necessary data is available.

Table 5
Regression results for retirement accumulation

Variable	Saving rate				Wealth			
	OLS % Rank	25th percentile	50th percentile	75th percentile	OLS % Rank	25th percentile	50th percentile	75th percentile
Availability of financial education at workplace	0.0457 (3.20)	0.698 (3.31)	1.10 (3.91)	0.832 (1.20)	0.0362 (2.62)	1047 (2.19)	2200 (2.37)	746 (0.35)
Eligibility for 401(k), respondent	0.0837 (5.82)	1.46 (6.91)	2.04 (7.22)	2.10 (2.96)	0.102 (7.34)	3146 (6.46)	7092 (7.59)	12,727 (5.85)
Eligibility for other pension, respondent	0.0269 (1.68)	0.362 (1.58)	0.395 (1.25)	0.161 (0.21)	0.0659 (4.25)	3587 (6.68)	6714 (6.43)	7419 (3.02)
Eligibility for 401(k), spouse	0.0331 (2.10)	0.374 (1.63)	0.915 (2.94)	1.61 (2.10)	0.0489 (3.23)	1643 (3.08)	2075 (2.04)	3325 (1.41)
Eligibility for other pension, spouse	0.0182 (0.92)	0.444 (1.58)	0.558 (1.44)	0.050 (0.05)	0.0227 (1.21)	1737 (2.70)	2765 (2.21)	6614 (2.25)
Marital status	0.0179 (0.71)	0.082 (0.23)	0.334 (0.67)	0.082 (0.07)	− 0.0189 (− 0.78)	− 1413 (− 1.69)	− 2775 (− 1.71)	− 7510 (− 2.04)
Black	− 0.0115 (− 0.44)	− 0.439 (− 1.19)	− 0.290 (− 0.57)	− 0.006 (− 0.01)	− 0.0721 (− 2.81)	− 1923 (− 2.16)	− 2422 (− 1.42)	− 3994 (− 1.02)
Other non-white	− 0.0165 (− 0.64)	− 0.382 (− 1.04)	− 0.547 (− 1.08)	0.267 (0.21)	− 0.0118 (− 0.48)	− 499 (− 0.70)	2190 (1.33)	2.303 (0.62)
Education, respondent	0.0112 (2.30)	0.170 (2.42)	0.211 (2.18)	0.539 (2.22)	0.0258 (5.56)	575 (3.49)	1620 (5.21)	3308 (4.71)
Education, spouse	− 0.0027 (− 0.48)	0.061 (0.76)	− 0.035 (− 0.32)	− 0.087 (− 0.32)	0.0169 (3.21)	666 (3.49)	1738 (4.92)	6004 (7.50)
Age, respondent	− 0.0037 (− 2.42)	− 0.037 (− 1.69)	− 0.071 (− 2.35)	− 0.125 (− 1.64)	0.0070 (4.89)	124 (2.41)	631 (6.56)	1103 (4.91)
Age, spouse	0.0039 (2.63)	0.049 (2.32)	0.074 (2.50)	0.138 (1.82)	0.0033 (2.32)	142 (2.89)	243 (2.56)	693 (3.15)
Log household earnings	0.0270 (4.79)	0.227 (3.50)	0.226 (2.07)	0.367 (1.11)	0.043 (8.23)	1394 (10.78)	2926 (8.30)	2404 (2.14)
Self-employed, respondent	− 0.0237 (− 1.25)	− 0.421 (− 1.55)	− 0.676 (− 1.80)	0.030 (0.03)	0.0148 (0.86)	− 212 (− 0.36)	− 49.3 (− 0.04)	5471 (2.03)
Self-employed, spouse	− 0.0416 (− 1.77)	− 0.746 (− 2.20)	− 0.334 (− 0.72)	− 0.237 (− 0.21)	− 0.0137 (− 0.64)	− 265 (− 0.36)	− 991 (− 0.69)	− 1640 (− 0.49)
Parent's saving	− 0.0105 (2.65)	0.103 (1.80)	0.158 (2.02)	0.231 (1.20)	0.0097 (2.59)	339 (2.64)	448 (1.78)	1168 (1.98)
Wealth, % rank	0.248 (9.87)	2.93 (8.10)	5.47 (11.00)	8.25 (6.67)				
Constant	− 0.0992 (− 1.27)	− 4.23 (− 4.21)	− 3.47 (− 2.29)	− 4.34 (− 1.02)	− 0.600 (− 8.31)	− 26,920 (− 12.32)	− 65,152 (− 13.40)	− 94,851 (− 6.90)
Observations	1494	1494	1494	1494	1616	1616	1616	1616

Note: *t*-statistics in parentheses.

Table 6
Regression results for total accumulation

Variable	Saving rate				Wealth			
	OLS % Rank	25th percentile	50th percentile	75th percentile	OLS % Rank	25th percentile	50th percentile	75th percentile
Availability of financial education at workplace	0.0448 (3.08)	1.39 (4.51)	1.59 (2.96)	1.15 (1.57)	− 0.0057 (− 0.39)	− 2214 (− 0.54)	− 1742 (− 0.24)	3332 (0.26)
Eligibility for 401(k), respondent	0.0441 (3.03)	2.01 (6.44)	1.23 (2.29)	0.909 (1.22)	0.0616 (4.23)	13,516 (3.38)	21,962 (3.08)	22,369 (1.71)
Eligibility for other pension, respondent	0.0253 (1.54)	0.403 (1.18)	0.588 (0.97)	0.516 (0.63)	− 0.0129 (− 0.78)	− 629 (− 0.14)	200 (0.03)	− 17,368 (− 1.17)
Eligibility for 401(k), spouse	0.0397 (2.48)	0.712 (2.13)	1.27 (2.14)	1.75 (2.22)	0.0411 (2.56)	8464 (1.88)	13,617 (1.73)	16,472 (1.14)
Eligibility for other pension, spouse	0.0146 (0.73)	0.888 (2.13)	0.266 (0.36)	− 0.411 (− 0.417)	0.0049 (0.24)	3310 (0.60)	− 1310 (− 0.13)	− 11,924 (− 0.66)
Marital status	0.0211 (0.82)	0.749 (1.37)	1.18 (1.24)	0.385 (0.29)	0.0224 (0.87)	− 4335 (− 0.62)	− 472 (− 0.04)	− 7893 (− 0.34)
Black	0.0370 (1.38)	0.031 (0.06)	0.236 (0.24)	0.896 (0.67)	− 0.0631 (− 2.36)	− 9946 (− 1.35)	− 23,836 (− 1.84)	− 32,817 (− 1.38)
Other non-white	− 0.0337 (− 1.29)	− 1.24 (− 2.31)	− 1.03 (− 1.06)	0.339 (0.26)	0.0730 (2.75)	18,437 (2.55)	27,264 (2.10)	40,610 (1.71)
Education, respondent	0.0080 (1.62)	0.366 (3.52)	0.439 (2.39)	0.073 (0.29)	0.0150 (3.02)	− 737 (− 0.53)	5984 (2.47)	16,021 (3.63)
Education, spouse	− 0.0142 (− 2.50)	− 0.311 (− 2.56)	− 0.445 (− 2.12)	− 0.489 (− 1.73)	0.0149 (2.62)	5600 (3.52)	11,962 (4.30)	18,529 (3.59)
Age, respondent	− 0.0062 (− 4.00)	− 0.094 (− 2.93)	− 0.196 (− 3.41)	− 0.281 (− 3.65)	0.0100 (6.54)	1684 (3.93)	4011 (5.35)	9020 (6.36)
Age, spouse	0.0023 (1.52)	0.037 (1.23)	0.054 (0.97)	0.117 (1.55)	0.0029 (1.90)	1575 (3.62)	1543 (2.07)	2432 (1.75)
Log household earnings	0.0329 (5.55)	0.382 (4.39)	0.522 (2.44)	0.789 (2.25)	0.0454 (7.97)	20,885 (19.5)	16,167 (5.78)	17,619 (2.59)
Self-employed, respondent	− 0.0199 (− 1.04)	− 0.359 (− 0.90)	0.003 (0.00)	− 0.017 (− 0.02)	0.112 (5.86)	19,174 (3.57)	58,618 (6.27)	215,556 (12.57)
Self-employed, spouse	− 0.0315 (− 1.322)	− 1.09 (− 2.20)	− 0.985 (− 1.12)	− 0.729 (− 0.61)	0.0952 (3.97)	24,351 (3.62)	46,474 (3.96)	113,531 (5.31)
Parent's saving	0.0069 (1.73)	0.068 (0.81)	0.094 (0.64)	0.363 (1.79)	0.0203 (5.07)	4078 (3.69)	8554 (4.39)	12,625 (3.48)
Wealth, % rank	0.311 (12.1)	5.91 (11.10)	9.50 (10.0)	14.4 (10.86)				
Constant	0.039 (0.48)	− 3.36 (− 2.36)	0.329 (0.11)	3.10 (0.73)	− 0.714 (− 9.15)	− 341,807 (− 19.10)	− 388,106 (− 10.16)	− 599,295 (− 6.97)
Observations	1501	1501	1501	1501	1524	1524	1524	1524

Note: *t*-statistics in parentheses

coefficients are essentially zero. Since baseline 401(k) participation rates exceed 75%, this weak evidence of an effect in the lower tail of the distribution is consistent with the significant increase in participation noted above. The loss of statistical precision is no doubt attributable in part to the fact that fewer observations are available for spouse's 401(k) activity than for respondent's 401(k) activity.

According to the results in Tables 5 and 6, self-reported rates of saving, both for retirement and overall, are significantly higher on average (OLS) and at the 25th and 50th percentiles (at the 99.5% confidence level in all cases) when the respondent's employer offers financial education. However, these effects are insignificant at the 75th percentile. The coefficients are expressed in terms of percentage points. Thus, the median rate of saving for retirement is 1.10 percentage points higher when financial education is available. This represents a 22% increase over the baseline median retirement saving rate of 5%. Likewise, the median rate of overall saving is 1.59 percentage points higher when financial education is available—a 20% increase over the baseline median rate of 8%. Note that, expressed as a proportion of baseline saving rates, the magnitude of the point estimates decreases sharply as one moves to higher percentiles.

Retirement wealth is significantly higher on average (OLS) and at the 25th and 50th percentiles when the respondent's employer offers financial education (see Table 5). Once again, this effect is insignificant at the 75th percentile. The magnitudes of these effects are reasonably close to those estimated for the respondent's 401(k) balances.

Finally, there is little evidence that total wealth is higher on average or at any percentile when the respondent's employer offers financial education (Table 6). The estimated coefficients are negative for the OLS regression and at the 25th and 50th percentiles, and positive at the 75th percentile. In all cases, the associated standard errors are large.

In summary, we find the following patterns. Holding fixed all other characteristics (including whether or not the respondent's employer offers a 401(k)), all measures of asset accumulation except total wealth tend to be significantly higher on average and in the lower tail of the population distribution when the respondent's employer offers financial education. Strong effects are also evident at the median for all measures of wealth accumulation except for total wealth and spouse's 401(k) balances. For the 75th percentile, none of the estimated coefficients are statistically significant at conventional levels of confidence.

The disappearance of significant effects at the 75th percentile is not surprising. It is consistent with the view that education encourages saving among those who save too little, but not among those who already save enough. Though one cannot rule out the hypothesis that financial education is associated with substantially higher levels of total wealth at any percentile (due to large standard errors), the absence of any clear evidence along these lines—despite evidence of strong associations with other measures of asset accumulation—is a puzzle that requires

resolution before one can confidently interpret our findings. A natural explanation for this pattern emerges from the considerations discussed at the end of the following section.

5. Interpreting the cross-sectional patterns

In this section, we discuss four issues pertaining to the proper interpretation of our cross-sectional estimates: (1) the nature and implications of the selection process governing the availability of financial education in the workplace, (2) potential biases resulting from the omission of controls for various pension plan features, (3) the possibility that education may affect the reporting of behavior, rather than behavior itself, and (4) the possibility that education may induce asset shifting rather than greater total saving.

5.1. The availability of financial education

Motives for the adoption of employer-based retirement education fall into four categories. First, an employer may hope to avoid liabilities that potentially arise in the context of self-directed pension plans, such as 401(k)s (Dike, 1994). Second, an employer may wish to encourage participation among non-highly compensated employees, thereby addressing non-discrimination requirements that create binding constraints on pension participation among highly compensated employees (Garrett, 1995). Third, an employer may believe that financial education improves employee motivation, loyalty, and morale by demonstrating concern for employee welfare, by averting conflicts with older, poorly prepared workers, and by communicating the substantial value of pension benefits, including 401(k) options (Scott, 1994). Fourth, employees may request assistance with financial planning.

Each of these motives has implications for the correlation between education and the predisposition to save, and hence for selectivity bias. Provided that the analysis is conditioned on the existence or non-existence of a 401(k), no obvious bias arises in the context of the first motive. For the second and third motives, education is *remedial*, and (again conditional on the existence of a 401(k)) tends to be offered more frequently in situations where employees are predisposed *against* saving. For our specifications, this creates a bias against the finding that education stimulates saving. The opposite bias may emerge for the fourth motive, since high-saving employees may be more likely to demand investment education as a fringe benefit.

Using panel data for a sample of employers, Bayer et al. (1996) find that, conditional upon pension plan characteristics, low rates of participation, particularly among non-highly compensated employees, are strongly associated with the subsequent introduction of employer-based financial education. In fact, no other variable compares in importance as a predictor of subsequent educational

activity. This evidence suggests that financial education is adopted as a remedial measure at the instigation of employers in instances where employees are disinclined to save. Direct survey evidence corroborates this finding. According to Bernheim (1998), the most important reasons given for offering financial education are: ‘employees were not thinking enough about retirement,’ and ‘to increase participation generally.’

In principle, the availability of financial education in the workplace could also be correlated with the typical employee’s underlying predisposition to save (conditional on pension plan characteristics) if workers sort themselves into jobs based in part on employers’ educational offerings.²⁴ We discount this possibility for three reasons. First, since comparable services (retirement seminars, financial planning assistance, etc.) are widely available outside of the workplace, it is difficult to rationalize non-trivial sorting based on their availability in the workplace. Second, educational programs spread rapidly in the early 1990s. With normal labor force turnover, worker self-selection could not have had much of an impact on employee composition by 1994. Third, workers probably have little awareness of financial education offerings prior to accepting jobs. Since employee demand is rarely the impetus for adoption, employers do not tend to regard financial education as a strong drawing card, and do little to enhance the visibility of these programs among potential employees.

Further data analysis yields additional corroboration for the view that our central findings are not attributable to spurious conditional correlations between the availability of financial education in the workplace and the respondent’s underlying predisposition to save. Four patterns merit discussion.

5.1.1. The effects of deleting a proxy for ‘tastes’

If the availability of financial education is negatively (positively) correlated with the predisposition to save conditional upon pension status and other characteristics, then the estimated effects of education should be biased downward (upward). Typically, one expects the inclusion of taste proxies to reduce this bias, and thus to increase (decrease) the estimated coefficient. Thus, we can shed some light on the sign of the bias by omitting or adding taste proxies, and examining the resulting changes in the key coefficients.

In the saving rate regressions of Tables 5 and 6, wealth apparently functions primarily as a proxy for the proclivity to save. Indeed, it is arguably the best available proxy for this inclination. When we exclude wealth from the median regression for retirement saving, the key education coefficient falls from 1.10 to 0.69; for total saving, it falls from 1.58 to 1.34. We observe this qualitative pattern for seven out of the eight saving rate regressions in Tables 5 and 6 (the lone

²⁴Sorting based on job characteristics that are correlated with educational offerings, such as the existence of a pension plan or the type of plan(s) offered, is presumably not problematic provided that we control for these other characteristics.

exception is the equation for rates of retirement saving at the 75th percentile). This is consistent with the view that the availability of financial education is negatively correlated with the predisposition to save conditional on other characteristics, and that the estimated effects of education in Tables 3–6 are therefore biased downwards.²⁵

As an additional check on the validity of our reasoning, we also examine the effects of excluding the wealth variable on the coefficients of 401(k) eligibility. Since high-saving workers tend to seek out jobs that provide access to 401(k)s and to agitate for the creation of such plans when none exist, eligibility is probably positively correlated with underlying predispositions to save (see Bernheim, 1997, 1999). We would therefore expect the associated coefficients to increase when we omit wealth. This occurs in 13 of 16 cases. The coefficient of respondent's 401(k) eligibility rises in six of eight cases (the exceptions being the 25th quantile regression for the retirement saving rate and the 75th quantile regression for the overall saving rate), while the coefficient of spouse's 401(k) eligibility rises in seven of eight cases (the exception being the 75th quantile regression for the retirement saving rate).²⁶

5.1.2. Correlations with economic knowledge

Next we examine cross-sectional patterns involving a variable measuring a blend of financial and macroeconomic knowledge (henceforth referred to as 'economic knowledge').²⁷ The variable is constructed from answers to a battery of

²⁵This reasoning abstracts from the possibility that wealth may also depend on education. This complicates, but does not fundamentally alter the logic of the exercise. Assume that education increases saving. Consider two individuals, one of whom has received retirement education, and one of whom has not. Suppose that all other observable characteristics are identical. Since they have the same wealth, the one without retirement education presumably must have a greater innate predisposition to save. Thus, controlling for wealth induces a negative partial correlation between education and the taste for saving, thereby biasing the coefficient of education downward. The omission of wealth eliminates this bias, but increases the bias associated with conditional correlations between education and the components of unobserved tastes for which wealth serves as a proxy. If education is positively correlated with tastes for saving, the two effects work in the same direction, and the omission of wealth should increase the coefficient of education, contrary to our findings. If education is negatively correlated with tastes for saving, then the two effects work in opposite directions, and the omission of wealth can in principle move the coefficient of education in either direction.

²⁶To illustrate, median regression results are affected as follows. In the specification for the rate of retirement saving, the coefficient of respondent's 401(k) eligibility rises from 2.04 to 2.53, and the coefficient of spouse's 401(k) eligibility rises from 0.92 to 1.78. In the specification for the rate of total saving, the coefficient of respondent's 401(k) eligibility rises from 1.23 to 1.46, and the coefficient of spouse's 401(k) eligibility rises from 1.27 to 1.70.

²⁷The regression equations in Tables 3–6 omit economic knowledge even though this variable may be directly related to behavior. Since our object is to measure the reduced-form effects of financial education in the workplace on behavior, this omission is appropriate. If education affects knowledge and knowledge affects saving, it would be misleading to control for knowledge when attempting to measure the total effects of education.

factual and conceptual questions.²⁸ For each questions, we assigned a ‘relative knowledge score,’ defined as the fraction of the population who gave answers that were at least as far in absolute value as the respondent’s answer from the true answer.²⁹ This procedure normalizes the scores for each question to reflect difficulty, so that no question (or group of questions) dominates the variation in total scores. For questions that require continuous, quantitative responses, relative knowledge scores are also less arbitrary than coding answers as ‘right’ or ‘wrong.’ We average the relative knowledge score over the respondent’s answers to obtain an overall measure of relative knowledge scaled from 0 to 1.

Economic knowledge may be positively correlated with the inclination to save because knowledge creates the impetus to save, because high savers have greater incentives to acquire knowledge, or because tastes for saving and tastes for financial knowledge are correlated. For our purposes, the existence of a correlation is important, but the source is not. Ranking respondents based on test scores, median wealth is, respectively, \$66,000, \$75,000, \$86,000, and \$132,500 for those in the first, second, third, and fourth quartiles. This pattern is not entirely attributable to common correlations with other variables, such as earnings. When economic knowledge is added to the long list of explanatory variables in the OLS wealth regression of Table 6, its coefficient is 0.133, with a *t*-statistic of 2.44. See Bernheim (1998) for further evidence on the relation between economic knowledge and wealth.

If, as we have just argued, economic knowledge is positively correlated (conditional on other covariates) with underlying predispositions to save, then the relation between this variable and the availability of financial education in the workplace sheds further light on selectivity bias. As it turns out, average test scores are slightly higher for respondents whose employers offer financial education (0.619 vs. 0.605). However, this is entirely attributable to correlations between economic knowledge and eligibility for 401(k) plans.³⁰ In a probit regression explaining the availability of financial education as a function of a range of demographic and economic characteristics, the probability-scaled coefficient of the test score variable is -0.259 , with an associated *t*-statistic of -2.18 .

In evaluating this evidence, one must of course be cognizant of the fact that financial education may affect test scores directly. It is reasonable to assume that

²⁸Factual questions concerned rates of unemployment, inflation, taxation (in the lowest federal income tax bracket), and interest (on 30 year mortgages), and levels of the minimum wage, the federal deficit, federal debt per household, and Dow Jones average. Conceptual questions probed the respondent’s understanding of real vs. nominal investment returns and risk–return tradeoffs.

²⁹Suppose, for example, that we ask four individuals (A, B, C, and D) the same question. Suppose that the true answer is ‘5,’ that A answers ‘6,’ B and C answer ‘8,’ and D answers ‘0.’ Then A would receive a score of 100, B and C would receive scores of 75, and D would receive a score of 25.

³⁰Conditional on the availability of education, test scores are positively correlated with 401(k) eligibility, but conditional on 401(k) eligibility, test scores are negatively correlated with the availability of financial education.

education does not depress test scores. Consequently, were one to remove the causal effects of education on knowledge, one would presumably find an even larger negative correlation between test scores and the availability of education, conditional upon other observed characteristics (including pension status). Thus, the patterns described in the previous paragraphs corroborate the view that the conditional correlation between the availability of financial education in the workplace and the respondent's underlying predisposition to save is negative.

Portions of the preceding discussion suggest that economic knowledge may be a reasonable proxy for the underlying predisposition to save. If so, and if the availability of education is negatively correlated with this predisposition (conditional on other observable characteristics), one might expect the relationships between education and thrift noted in Tables 3–6 to be stronger when economic knowledge is added to the list of explanatory variables (just as it is weaker in the saving regressions of Tables 5 and 6 when wealth is removed). There is, however, an important offsetting effect: if education stimulates saving at least partly because it improves knowledge, then controlling for knowledge artificially removes part of the effect we are trying to measure, thereby biasing the measured impact of education downward.³¹ The net effect is ambiguous. In practice, adding this variable to the specifications makes little difference.³²

5.1.3. Comparisons between low, medium, and high savers

In Section 4, we documented a strong positive conditional correlation between the availability of financial education and most measures of asset accumulation at the 25th and 50th percentiles, but not at the 75th percentile. As we have already mentioned, this is consistent with the view that education encourages thrift among people who save too little, but not among those who save enough or too much. It is difficult to identify a plausible source of spurious correlation that would contaminate our results for the 25th and 50th percentiles, but not for the 75th percentile. Indeed, if high savers are more likely to agitate aggressively for educational programs, or if they are more likely to select into firms that offer

³¹Controlling for economic knowledge does not remove the entire effect of education on saving unless (1) our knowledge variable is perfect, and (2) education does not affect saving through other channels (e.g. by focusing attention on financial planning or increasing comfort with financial decision-making).

³²To conserve space, we report results only for the OLS specifications. When a control for economic knowledge is added, the coefficients for our education variable (with *t*-statistics in parentheses) are 0.686 (3.80) for respondent's 401(k) balances, 0.451 (1.75) for spouse's 401(k) balances, 0.454 (3.19) for the retirement saving rate, 0.0391 (2.84) for retirement wealth, 0.450 (3.09) for the total rate of saving, and -0.0040 (-0.27) for total wealth. The corresponding coefficients of the economic knowledge variables (with *t*-statistics in parentheses) are 0.184 (2.65) for respondent's 401(k) balances, -0.051 (-0.51) for spouse's 401(k) balances, -0.025 (-0.46) for the retirement saving rate, 0.249 (4.93) for retirement wealth, 0.0119 (0.217) for the total rate of saving, and 0.133 (2.437) for total wealth. When we include economic knowledge as an explanatory variable in all other specifications, the changes in the coefficients of our education variable are of the same small order of magnitude.

educational programs, the availability of these programs should be most closely related to the preferences of those who are most inclined to save. One would then expect to observe a stronger ‘effect’ for the 75th percentile than for the 25th percentile or the median.

5.1.4. Comparisons across different measures of wealth accumulation

As we mentioned at the end of Section 4, the absence of a clear relation between education and total wealth, coupled with evidence of strong associations with other measures of asset accumulation, is a puzzle that requires resolution before one can confidently interpret our findings. If education has no effect on saving, it is difficult to explain this puzzle by positing a positive conditional correlation between the availability of financial education and the underlying predisposition to save. The hypothesized correlation should generate a spurious ‘effect’ for total wealth, just as it is assumed to do for other measures of asset accumulation.

5.2. The omission of pension plan features

Data limitations preclude us from controlling for various pension plan features such as the rate at which an employer matches contributions. We doubt that these omissions explain our findings for four reasons. First, the correlation between matching and educational efforts across employers is slightly negative and statistically insignificant, while the correlations between education and other plan features (number of investment options, loan provisions, etc.) are generally small (see Bayer et al., 1996). Second, existing studies have not identified large quantitative relations between plan activity and plan features. The available evidence on the effects of matching provisions is somewhat mixed (see Papke, 1995; Andrews, 1992; Papke et al., 1996; Scott, 1994). Other features do not appear to have dramatic effects on participation or contributions (Bayer et al., 1996). Third, participants may alter behavior outside of pension plans to offset the effects of provisions that induce greater saving within these plans. Consequently, the omission of controls for plan features is a particularly suspect explanation for the observed relation between the availability of financial education and the overall rate of saving. Finally, improvements in respondent’s 401(k) plans should *reduce* participation in spouses’ pension plans as households shift retirement saving to the more attractive plan.

5.3. The possibility that education affects reporting

It is difficult to distinguish effects of education on behavior from effects on reporting. Nevertheless, reporting effects poorly account for certain aspects of our results. We consider two specific concerns. First, individuals may tend to report falsely that they actually behave as they are taught to behave. It is, however, unlikely that education would induce individuals to exaggerate retirement wealth,

rates of saving for retirement and overall, and respondent's 401(k) balances, but not total wealth or spouse's 401(k) balances. Second, education may affect the way an individual defines a variable. However, this problem is presumably not a concern for 401(k) balances and participation. Indeed, if educational programs increase awareness of 401(k) plans without raising participation, then measured rates of participation should be lower—not higher—when education is available.

5.4. *New saving versus asset shifting?*

Controlling for other observable characteristics, all measures of retirement saving are significantly higher on average and among low and moderate savers when the respondent's employer provides financial education. In contrast, evidence concerning the effect of financial education on total accumulation is mixed. Overall rates of saving are higher on average and among low and moderate savers when the respondent's employer offers financial education, but net wealth is not. The appropriate interpretation of our results hinges on the resolution of this puzzle.

One possible explanation for this puzzle proceeds from the joint hypothesis that financial education stimulates overall saving, and that its availability is negatively correlated with underlying predispositions to save. Most retirement education programs were relatively new as of 1994. The effect of education on flows should be proportionately larger, and more easily detectable, than the effect on stocks of wealth because stocks reflect all past choices, including those made prior to the availability of education. If financial education is negatively correlated with the predisposition to save (conditional on other characteristics), then, in cases where educational programs are sufficiently recent, stocks of wealth may actually be *lower* for those who have access to employer-based education, even if education stimulates rates of saving. These considerations are less problematic for retirement wealth than for total wealth since stocks of retirement wealth are typically very low to begin with (a given change in rate of flow should manifest itself more quickly in the stock when the range of initial stocks is small).

There are, however, other possible explanations for the puzzle. If financial education induces individuals to finance greater retirement saving through borrowing, and if these individuals fail to count borrowing as negative saving, one would observe a positive relationship between education and the self-reported rate of saving (even though households are merely shifting assets), but no relationship between education and net wealth. This possibility exemplifies a more general issue: respondents may define self-reported rates of saving too narrowly in the sense that they either ignore dissaving or omit important components of asset accumulation. Notably, 8.8% of respondents indicated that their rates of saving for retirement exceeded their overall rates of saving. This indicates a proclivity to net out some forms of dissaving when contemplating total rates of accumulation. However, no respondent reported a negative rate of saving. This corroborates the view that individuals do not think of borrowing as negative saving.

Fortunately, the asset-shifting hypothesis has additional testable implications concerning the relation between financial education and specific components of total wealth. It is, for example, difficult to imagine that the self-reported rate of overall saving excludes changes in gross financial assets. Consequently, if the availability of financial education is associated with a higher self-reported rate of overall saving simply because this rate excludes the components of net wealth from which assets are shifted, financial education should also be associated with higher levels of gross financial assets. The offsetting decline would, of necessity, show up in some other asset/liability category, such as debt.

To investigate the validity of the aforementioned prediction, we estimated OLS (percentage rank) and quantile regressions for gross financial wealth, net housing wealth (market value minus mortgage balance), miscellaneous debt, and other wealth (including business and property net of associated mortgages). We omit the detailed results to conserve space. The coefficients of the key education variable are slightly negative and statistically insignificant in the specifications for financial wealth and other wealth, positive and in some instances statistically significant for net housing wealth, and positive and in some instances marginally statistically significant for miscellaneous debt. By themselves, the results for miscellaneous debt appear consistent with the view that education induces individuals to finance retirement contributions, at least in part, through borrowing, and that these individuals neglect the resulting increase in debt when reporting overall rates of saving. In contrast, the regressions for net housing wealth and other wealth provide little or no support for the view that individuals finance retirement contributions by borrowing against homes or other real property, or by accumulating less property.³³ Most importantly, the results for financial wealth undermine the asset shifting hypothesis by contradicting the specific prediction mentioned in the preceding paragraph. In contrast, these findings are easily reconciled with the joint hypothesis that education increases total saving, and that its availability is negatively correlated with the underlying predisposition to save.

6. Conclusions

We have used a novel household survey to investigate the efficacy of employer-based financial education. Our primary focus has concerned the effects of these programs on saving, both in general and for the purposes of retirement. While a small number of previous papers have examined related issues, all have focused exclusively on decisions pertaining to pension plans; none examine the impact of financial education on broad measures of saving. The current study makes a unique

³³While the estimated relationship between the availability of financial education and other wealth is negative, it is far too small to explain the increase in retirement assets or in self-reported rates of saving.

contribution to the literature by providing the only available evidence concerning the relation between financial education in the workplace and reasonably broad measures of household saving (including saving outside of pension plans).

Holding fixed a wide range of observable characteristics including pension status, virtually all measures of retirement accumulation (both stocks and flows) are significantly higher on average and at the 25th and 50th percentiles when the respondent's employer offers financial education. Rates of participation in 401(k) plans are also significantly higher, both for the respondent and for his or her spouse, when financial education is available. For measures of total accumulation, the evidence is mixed. There is a significant relationship on average and at the 25th and 50th percentiles for the rate of saving (a flow variable), but essentially no relationship for total wealth (a stock variable). For the 75th percentile, none of the estimated coefficients are statistically significant at conventional levels of confidence.

We have interpreted these findings in light of several potential confounding considerations: that the availability of financial education in the workplace may be systematically correlated with the underlying predisposition to save, that our estimates may confound the effects of unobserved plan characteristics, and that education may affect reporting, rather than behavior. Though we are cognizant of the limitations of cross-sectional analysis, we believe that our results favor the hypothesis that financial education significantly stimulates retirement saving among low and moderate savers. Further analysis supports the view that this effect represents a net contribution to total saving rather than asset shifting.

Our analysis has potentially important implications concerning the efficacy of strategies to stimulate saving by US households. Most obviously, it raises the prospect that a serious national campaign to promote saving through education and information could have a meaningful impact on behavior, particularly among those who save the least.

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