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# IMPERFECT KNOWLEDGE, RETIREMENT AND SAVING

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## ABSTRACT

Using data from the Health and Retirement Study, this paper creates variables measuring knowledge about future social security and pension benefits by comparing respondent reports of their expected benefits with benefits calculated from social security earnings records and employer provided descriptions of pension plans. The knowledge measures suggest that misinformation, imprecision and lack of information about retirement benefits is the norm. Those who are most dependent on social security are the least well informed about their social security benefits, while those who are most dependent on pensions are best informed about their pension benefits. Women and minorities are less well informed about both types of retirement benefits.

Having documented the extent of misinformation, we turn to questions about the production of information, and the consequences of misinformation for real outcomes. Relating measures of information to planning activities, we find that those who plan are somewhat better informed than those who do not, but with the exception of having requested a social security earnings record, the effects of planning activities on knowledge are modest.

In descriptive and reduced form equations for planned and actual retirement and saving, there is at best a modest relation of knowledge measures to planned and actual retirement and to nonpension, nonsocial security wealth as a share of lifetime earnings. Individuals who overestimate their benefits are likely to retire sooner than they planned, but the measured effects are relatively modest. Coefficients of measures of the increase in reward from postponed retirement are barely affected by the addition of measures of respondent knowledge of their retirement benefits to standard reduced form retirement and wealth equations.



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## I. Introduction

Ever since it became possible to compare data from the Social Security Administration with self reported data, it has been apparent that many of those approaching retirement are far from perfectly informed about their social security benefits (Bernheim, 1988). Similar conclusions emerge about pensions when respondent descriptions of plan characteristics or plan values are compared with detailed plan descriptions collected from employers (Mitchell, 1988, Gustman and Steinmeier, 1989). Respondents also seem to be poorly informed about the kind of details of their retirement plans that play central roles in retirement models, e.g., ages of eligibility for early and normal benefits, and the effects of postponing retirement on the value of these benefits (Gustman and Steinmeier, 2000b).

Many have argued that there is a need to modify the standard life cycle model to accommodate imperfect information and other complexities. Some argue that saving and related behavior diverge from what would be observed under strict maximization, perhaps because the problem to be solved is too complex, or the channels of information are very imperfect, or for other behavioral reasons.[1] Essentially, it is argued that successful planning and the discipline required to plan and execute life cycle saving is beyond many in our population. Certainly social security and pension plans have been found to be sufficiently complex to cause confusion among covered individuals.[2] A number of studies discuss one or another implication of imperfect foresight, imperfect planning or failure to plan, or the inability to fully maximize. Although the implications of various imperfections have been explored, there is no complete model of retirement and saving that allows for the effects of imperfect information and other than maximizing behavior.

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[1]Thaler (1994) argues that the behavior determining saving outcomes diverges from that postulated for fully informed maximizing agents and discusses reasons why.

[2]For example, Blinder, Gordon and Wise (1980) find a disconnect between the actual incentives created by social security and what they perceive as the popular understanding of the rules.

If people are imperfectly informed, misunderstand incentives or are otherwise incapable of engaging in fully maximizing behavior, retirement expectations may diverge from realizations, even if all contingent outcomes result in expected realizations.[3] In addition, any relations estimated between measured incentives created by social security or pension rules, and outcomes of interest, such as retirement or saving, may not represent the relation to that conventional theory visualizes.

Researchers who believe these issues are important may, and often do, modify the approach they take to analyzing saving and retirement. One area of research relates measures of engagement in planning activities to outcomes such as saving.[4] Policy makers who hold similar views worry that it is those with lowest incomes who are least well informed, and thus most poorly prepared for retirement. Consequently, they may encourage the spread of programs designed to increase the information available to those covered by social security and pensions, and to foster increased availability of tools for planning retirement.[5] At least at the level of the firm, such tools seem to be effective in increasing plan participation (Clark and Schieber, 1998).[6] Policy makers with greatest concern about imperfections in markets related to retirement programs may also advocate mandatory participation by all workers.

An alternative view is that respondents have only a limited idea of the value of

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[3]Bernheim (1989) examines the reasons for divergence between retirement expectations and realizations. See also Disney and Tanner (1999).

[4]Lusardi (1999) explores heterogeneity in planning activities and discusses whether unmeasured costs of planning may affect saving outcomes.

[5]Bernheim (1994), when discussing public policies to raise economic literacy and information so as to encourage saving, noted the importance of having the Social Security Administration mail financial statements to covered individuals. Such a program has since been adopted. The Social Security Administration has also made available a retirement planner on their web site. Similarly, the U.S. Department of Labor is engaged in a number of efforts to understand the extent of the information problem, and to increase participant information about pensions and about the need for retirement saving.

[6]There is little systematic evidence on the efficacy of these and related programs instituted by the Social Security Administration and by the Department of Labor.

their benefits because many of them have little need to obtain a precise answer, especially if they expect their social security benefits, or social security and pensions together, to provide an adequate retirement income replacement rate. They choose not to plan because they know their benefits will be adequate. Around retirement time, they respond to whatever incentives are relevant. Some who want higher replacement rates are free to save, but many need not consider their replacement rates in detail. In support of this view, data from the Health and Retirement Study suggest that many of those approaching retirement can expect an adequate replacement rate as judged by standard rules of thumb for an acceptable ratio of post- to pre- retirement income (Gustman and Steinmeier, 1999a).[7] Moreover, because social security covers a larger share of the income of those in the lower part of the distribution, it is not only high, but low income families that might rationally choose to forego planning activities, expecting their replacement rates from social security will be adequate.

So the question is whether we find many of those approaching retirement to be imperfectly informed because of some type of market failure, or whether those approaching retirement have gathered an appropriate amount of information, which may be very limited for those who will be well covered in retirement. To shed further light on these issues, we try to find evidence of the kind of changes in behavior one would observe if misunderstandings are likely to be corrected as one approaches retirement age. We also try to find more about the nature of the misinformation by examining its relation to planning activities. Lastly, if misinformation is distributed throughout the population, but is systematically related to the rewards from pensions and social security, there is a danger that omitting measures of misinformation from models of retirement and wealth

[7]What is an adequate replacement rate remains a disputed issue, partly because there are different definitions of adequacy. For example, Moore and Mitchell (2000) find that to replace 100 percent of preretirement consumption, a number of HRS families on the verge of retirement would have to engage in very high rates of saving. However, the closer one is to retirement age, the harder it is going to be to make up any gap, even one that would have required only a modest increment saving from a young age. Moreover, some would argue that 100 percent replacement rate is too high, especially with children out of the home. Consequently, adequacy is in part in the eye of the beholder.

may cause bias. We also examine this contingency.

More specifically, the paper begins by creating a series of measures of each individual's knowledge about their social security and pension benefits. These include indicators of whether or not the respondent knows what their social security and pension benefits will be, and what types of pension they have. For those who tell us about their expected benefits, knowledge is measured by the difference between the social security benefit or pension benefit the respondent expects, and our own estimate of what their benefit will be, calculated from social security earnings histories or from detailed pension plan descriptions obtained from employers. The paper then documents the distribution of imperfect knowledge in the population. Next the paper relates measures of knowledge of social security and pensions to activities undertaken to plan for retirement. It then explores how these knowledge measures and measures of planning activities are related to the planned retirement date. Following that, the paper relates imperfect knowledge about the level of pension and social security benefits to realized retirement, the difference between planned and realized retirement, and the wealth accumulated at the time of retirement. Lastly, the paper incorporates measures of imperfect knowledge into reduced form retirement and saving equations to determine the effects of imperfect knowledge on the coefficients of variables measuring social security and pension accrual, and the significance of knowledge variables in these conventionally specified reduced form equations.

Our empirical analysis is based on data from the first four waves of the Health and Retirement Study, as well as (restricted) covered earnings histories obtained from the Social Security Administration and matched pension plan descriptions obtained from employers. The Health and Retirement Study is a rich data source that provides the opportunity to explore these issues in a unified empirical framework -- allowing joint consideration of retirement, saving, imperfect knowledge of pensions and social security, and participation in planning activities.

## II. The Data

The Health and Retirement Study (HRS) is a longitudinal, nationally representative survey of older Americans.[8] The survey began in 1992 with an initial cohort of 12,652 individuals from 7,702 households, with at least one household member born from 1931 to 1941. Earnings records from the Social Security Administration were matched for three fourths of the sample. Detailed descriptions of the pension plans covering respondents were obtained for two thirds of respondents with a pension on their current job, for two thirds of those with no current job who had a pension on their last job, and for just over a third of the pensions from jobs held before the current or last job.[9]

From the social security earnings histories and the detailed employer provided pension plan descriptions, we compute expected benefits in retirement.[10] From the respondent surveys, we obtain qualitative indicators of knowledge of social security and pensions.[11] We also compute measures of social security value and pension value from

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[8]The Health and Retirement Study is supported principally by a grant from the National Institute on Aging to the Institute for Social Research at the University of Michigan. Additional support is provided by the Social Security Administration and other Federal agencies.

[9]Gustman and Steinmeier (2001b) find that an extensive set of covariates provides only a weak explanation for the probability of matching a social security earnings record. The probit examining the correlates of whether a matched employer provided pension plan description is available for a worker who reports coverage by a pension plan does not fit the data very well. However, there are a number of significant determinants of whether an employer provided plan description is available. Firm size is an important determinant of the probability of matching an employer provided pension plan description. Other significant determinants of a match include indicators of race, schooling, home ownership, planning horizon, job tenure, manufacturing employment, assets, earnings, job type and plan type.

[10]The pension values calculated from the plan descriptions also use the self reported earnings on the job and the self reported dates that the job began and (if applicable) ended.

[11]For the self reported social security benefits, question N46 asks: Do you expect to receive social security benefits in the future? At what age? How much will the benefits be in today's dollars? The expected social security benefit questions were only

the respondent data reporting expected benefits.[12] Comparisons of the social security benefit values calculated from the attached earnings records with self reports of expected social security benefits, and the pension values calculated from pension plan descriptions with self reports of expected benefits, yield quantitative indicators of knowledge of social security and pension benefits.[13]

Appendix Table 1 reports on the sample sizes found in the various tables derived in this paper.

## III. Knowledge of Social Security and Pensions

*What Do People Know About Their Social Security*

Table 1 compares the distribution of the social security benefit amounts respondents report they expect to receive with the distribution of the amounts they will actually receive based on their matched social security earnings records. Both the self reported benefits and the benefits calculated from the records are sorted into cells that are $1,500 wide on an annual basis. The entry in each cell is the (unweighted) number of individuals in the cell. For the cells in the main northwest-southeast diagonal, the benefits that the respondents expect roughly match the amounts that are calculated from the records. Respondents in the lower left part of the table are overestimating their

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asked of the spouse who was most financially knowledgeable. For the self-reported pension benefits, the HRS asks about plan type, the expected age of receipt, and the expected amount of the benefit or the percent of final pay that the benefit would be (for defined benefit plans) or the amount in the account (for defined contribution plans). Note that knowledge variables are measured as of the initial date of the survey, which is not necessarily occurring at the same age for all respondents.

[12]The form of the question is such that the respondent can report benefits received weekly, biweekly, monthly or yearly. In fact, 96 percent of those who answer the question about expected social security benefits do so in terms monthly income, the same period over which social security benefits are paid.

[13]Details of the individual calculations, as well as comparisons at the individual level between reports obtained from respondents and plan features and amounts obtained from the social security and pension records, are available in Gustman and Steinmeier (2001b).

benefits, while respondents in the upper right are underestimating their benefits.[14]

Misinformation or lack of information about expected social security benefits is the norm. As seen from the last column, bottom three rows of Table 1, only half of the respondents who expect social security benefits have indicated an expected benefit amount.[15] When benefit amounts are reported, the discrepancies between self reported social security values and computed values based on earnings histories are substantial. Among the half of the sample that would hazard a guess as to the expected social security benefits, more than 40 percent were more than one cell away from the main diagonal, which translates into an estimation error of more than $1,500 per year. Including those who could not provide an estimate of the benefits, less than 30 percent of respondents were able to estimate their future benefits to within about $1,500 per year.

Some of the differences between the benefits reported by respondents and those calculated from the social security earnings records for respondents are to be expected because of the varying criteria underlying the respondent reports.[16] Nevertheless, the

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[14]When we recalculate Table 1 omitting those cases where the respondent's own benefit is less than half the spouse benefit, the main effect is to throw out a number of observations in the upper left hand corner of the table. The dispersion around the diagonal remains unaffected.

[15]The fraction of respondents indicating the do not know their expected social security and pension benefits would undoubtedly be reduced if the benefit amounts were solicited with unfolding brackets, as is the practice when asking about wealth and income measures in the HRS (Gustman and Juster, 1996). More generally, some fraction of those who say they do not know their expected social security (and pension) benefits are saying they don't know the amounts precisely, although the would be willing to report approximate benefits if allowed to do so. In the 2002 wave of the HRS, the question about expected social security benefits will include unfolding brackets.

[16]The expected benefit amounts reported by respondents presumably include future work effort. To make the amounts calculated from the social security records (which only include earnings through 1991) comparable, we project earnings until each respondent's expected year of retirement by sampling randomly from the last five years of observed social security earnings and then calculate the social security benefits in 1992 dollars.

errors appear to be symmetric in the table, not the result of systematic bias.[17]

*Correlates of Knowledge About Social Security*

Table 2 describes the simple relation between knowledge of social security benefits and various demographic variables, and measures of income and wealth. The first three columns refer, respectively, to respondents who underestimate benefits by at least 25 percent, respondents whose estimates are within 25 percent of their calculated benefits, and respondents who overestimate benefits by at least 25 percent. The three categories roughly correspond to individuals who are in the upper right part of Table 1, respondents who are close to the main diagonal in Table 1, and respondents who are in the lower left part of Table 1. For any row of Table 2, these three columns, together with column 4, which reports the respondents who answer they don't know their expected social security benefits, sum to 100 percent (except for rounding errors). Overall, only about half of the respondents say they know what their benefits will be, and from column 2, only a little over a quarter of the sample (27 percent) estimates a value of their yearly social security benefits within 25 percent of the benefits they will receive as calculated from the social security records. Of the respondents who venture an estimate that is outside this range, 14 percent are too pessimistic and underestimate their benefits, while 10 percent are too optimistic and overestimate theirs.

Women do a poorer job than men of estimating their benefits. Women are 11 percent more likely to say they don't know their benefits, and 10 percent fewer women estimate their benefits within 25 percent than men. Among the other categories, those in the oldest cohort do better in estimating their benefits than their younger counterparts, whites have a better idea of their benefits than blacks or Hispanics, married people are better informed as, in general, are those with more schooling. Those in the lowest lifetime income decile are almost 20 percent more likely to say they don't know benefits than are those in the highest lifetime income decile, and 25 percent more of those in the

[17]If dual beneficiaries were including spouse benefits in addition to own benefits, we would expect the observations in the left hand columns of Table 1 to fall below the diagonal, instead of appearing to be symmetrically distributed.

highest decile estimate their benefits within 25 percent than do those in the lowest lifetime income decile. Similar differences are observed between those in the top versus the bottom wealth deciles.

These findings imply that those who are most dependent on their social security benefits know the least about them. Thus as seen in the final set of results in Table 2, 58 percent of those whose social security wealth accounts for 60 percent or more of their total wealth indicate they don't know what their social security benefits will be, while 42 percent of those for whom social security wealth represents a fifth or less of their total wealth do not know what their social security benefits will be.

Although one might argue that finding those who rely the most on social security know the least about it narrows the target population for information policies, it may be telling us something else. Many of those who rely most heavily on social security may be receiving a satisfactory replacement rate, and so may have less need for more precise information about their benefits.

*Knowledge of Social Security and Planning Activities*

Without implying causality, we now ask how knowledge of social security benefits is related to retirement planning activities. Table 3 presents partial results from multivariate equations exploring the relation between a set of dependent variables measuring various aspects of the respondent's knowledge of social security outcomes and a set of independent variables measuring planning activities, holding various demographic and income related measures constant.[18] The first column measures

[18]Direct questions about retirement planning in wave 1 include: How much have you thought about retirement? Have you talked to your spouse about retirement? Have you discussed retirement with friends or relatives? Have you attended retirement meetings organized by your or your spouse's employer? For those not yet retired, these are questions K16 to K19 in the survey. For those who have already retired, these are questions K5 to K8 and refer to the period before retirement. Question L15 asks: In planning how much of the family income to spend or save, how long a planning period do you use? (The answers range from a few months to longer than ten years.) Question N45c asks: Have you asked SSA to calculate benefits for you?

whether or not the individual is able to make any kind of estimate of the benefit, and the second column refers to the benefit as level as reported by the respondent. The remaining columns deal with the expectation error, which is the difference between the benefits the respondents estimate they will receive and the benefits that they actually will receive, based on the social security earnings record. The dependent variable in the third column is the value of the estimation error, and hence the coefficients measure the systematic effects of the explanatory variables on the expected benefits minus the actual benefits. The fourth column uses the absolute value of the estimation error, and the coefficients of this regression measure the effects of the explanatory variables on the accuracy of the expectations. For instance, in the second row, the insignificant coefficient of -26 in the second column means that having a pension does not cause respondents to systematically overestimate or underestimate benefits much more so than other respondents, but the significant coefficient of -958 in the third column means that respondents with pensions have smaller errors than do others in the overall population.

The fifth and sixth columns of the table look at the relative expectation errors, which are the expectation errors divided either by the expected benefit or the actual benefit, whichever is higher. Since both benefits are nonnegative, the relative error lies between -1 and +1. A value near -1 indicates that the respondent has very substantially underestimated the value of the social security benefits, while a value near +1 indicates that the respondent is wildly over optimistic about the benefits he or she will receive. Column 5 uses the value of this relative estimation error and thus measures the systematic effects of the explanatory variables, while column 6 uses the absolute value of the relative error and hence examines the accuracy of the expectations. Column 7 focuses on whether the error was positive.

As with all probits in this paper, the coefficients reported indicate the change in the probability of the indicated outcome with a unit change in the independent variable.[19]

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[19]Other covariates beside those discussed below are listed in a footnote to Table 3. Note that in the multivariate equations in Table 3 and those that follow, we do not include the wealth decile as a right hand side variable. We do, however, include the decile

Row 2 of Table 3 considers the relation of pension coverage to knowledge of one's social security benefits. These results suggest that those with pensions are better informed about their social security benefits.[20] Those with pensions are 2 percent less likely to indicate that they don't know what their social security benefits are worth (not a significant effect). In columns 3 and 5 there is evidence that those with pensions exhibit a significantly lower error than those without pensions. In column 6, the evidence is much stronger that the absolute deviations are significantly lower for those with pensions, indicating less reporting error on their part.

Union members are less likely to report they do not know what their social security is worth, but in fact do no better than nonunion members in reporting their benefit amounts. Those with a short planning horizon are more likely to misreport their social security benefits, and the amounts they report are characterized by more error than those with a medium planning horizon.[21] In contrast, those with a long planning horizon report they do not know less often than those with a medium planning horizon, but the amounts they report are not characterized by smaller errors. Having thought about retirement a lot lowers the chance of reporting one doesn't know about social security benefits, but does not reduce the reporting error. Discussing retirement benefits with a spouse or a friend has no effect on knowledge. However, having attended a meeting is associated with a 7 percent lower chance of saying one doesn't know what the social security benefit will be, but again there is no effect on the size of the reporting error. Word recall is not significant in these regressions. Having asked the Social Security Administration for a benefit calculation reduces the probability of reporting one does not

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indicator for the ratio of pension wealth to total wealth.

[20]Row 1 of Table 3 reports the coefficient on the social security benefit calculated from the respondent's earnings record. The coefficient of .31 in column 2 suggests that each dollar of additional benefits is associated with a 31 cent increase in reported benefits. Other measures of earnings are also included in the table, which is why the estimated coefficient is so far below 1.0.

[21]Planning horizon may be considered to be a measure of planning activity, or of preferences.

know the benefit by almost 40 percentage points. Since the percentage of respondents who cannot estimate their benefits is roughly 50 percent, this is not only a significant effect but a large effect. Having requested a benefit calculation also significantly reduces the absolute deviations, and absolute value of the relative error in the amounts reported.

One may argue that in these and in later regressions, planning variables, and later knowledge variables when they appear on the right hand side, should be considered as a group. Individually each explanatory variable is competing with others in the same category. As a group the planning variables are significant in the regressions in columns 1, 2, 3 and 7 of Table 3, but not in columns 4 through 6. Thus the planning variables are significant in equations for whether the respondent knows the social security benefit, the level of the benefit reported by the respondent in the equations for the error, and whether the error is positive, but not in the equations for the relative error, or the absolute size of the error.[22]

*What Do People Know About Their Pensions?*

Next we consider statistics for measures of pension knowledge that are similar to those presented for social security knowledge in Tables 2 and 3. The first column of Table 4 indicates the fraction of respondents with matched employer provided pension plan descriptions whose report of whether they have a defined benefit pension or a defined contribution pension is the same as in the employer provided plan description.[23] Just over three fourths (77 percent) of the full sample correctly identify whether the respondent has a pension which is at least partly a defined benefit plan. The fifth column

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[22]As a group planning variables include thinking about retirement, talking about it with spouses and friends, attending retirement meetings, and the corresponding "not available" categories.

[23]There is a possibility that even with employer name and address, the employer provided plan description may be imperfectly matched to a respondent, especially if the firm offers many different plans. The employers were requested to provide all plan descriptions, and the exact match between a respondent and a plan is based on staff judgement, using the respondent provided answers as to occupation and other information.

indicates the share of the population that does not report a pension value. Forty one percent of respondents say they don't know what their pensions are worth.

The second through fourth columns of the table report the relation between the pension values reported by the respondents (transformed into present value of pension wealth) and the values calculated when the benefit formula reported by the firm (also transformed into present value of pension wealth) is applied to the earnings history reported by the respondent. Before examining these results, we should note that the measurement of pension values is to some degree inherently less precise than the measurement of social security benefits. For social security, the true benefit amount can be fairly accurately estimated from the social security earnings record in conjunction with the social security benefit calculation rules. For pension amounts, the pension plan documents contain the necessary rules to calculate benefits, but the HRS did not ask the firms for any information about the respondents, including the respondents' wage histories at the firm, the exact dates of employment, and, for defined contribution plans, the amounts of any accumulations.[24] To calculate defined benefit amounts, it is necessary to use either the wages self reported by the respondent or the earnings from the social security record, which may contain other income or may be truncated by the social security earnings limit. For defined contribution plans, it is necessary to use the earnings amounts and dates of employment in order to figure contributions, and in addition it is necessary to assume some rate of return on the invested amounts.[25] The situation is particularly bad for defined contribution plans with voluntary contributions, since in this

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[24]This was done to avoid identifying to firms that particular individuals were in the HRS, which might compromise the confidentiality that the respondents were promised.

[25]The pension calculator program uses the contributions specified in the plan. If the amounts are in dollars, the dollar amounts are assumed to grow over time by the growth rate of average earnings that the user specifies. If the plan allows voluntary contributions, the program uses the contribution rates which the user specifies. Both are allowed to grow over time according to the interest rate assumptions specified by the user.

case the contribution rate must also be taken from self reports, but the history of contribution rates is not reported.

In Gustman and Steinmeier (2001b), we found little evidence of systematic overall biases in the respondents' estimates of defined benefit amounts and in the balances of defined contribution plans which do not allow for voluntary contributions. For defined contribution plans which do allow for voluntary contributions, however, we found that the amounts calculated from the pension plan descriptions appeared to be higher overall than the amounts reported from the respondents, with the magnitude of the discrepancy higher for higher value pensions. One possible cause of this is that respondents could be increasing their voluntary contribution rate over time, leading the calculations which assume a constant contribution rate to overstate the balance. Other explanations are possible, however, and the net implication is that there is somewhat less certainty that the amounts calculated from the pension plan documents should be treated as the "true" amounts than was the case for the social security comparisons. In particular, there appears to be some likelihood that the amounts calculated for defined contribution plans with voluntary contributions may be too high.

Turning back to the table, only 16 percent of respondents estimate their pension benefits to within 25 percent of the amount computed from employer provided plan descriptions. A quarter of all respondents understate their likely benefits, while 17 percent are too optimistic. To the degree that the calculations from the pension plan documents are too high for defined contribution plans with voluntary contributions, the numbers of individuals understating and overstating their benefits may be more nearly equal.

*Correlates of Knowledge About Pensions*

According to the data in Table 4, once again it appears that women have a poorer understanding of their pensions than men. Women are 7 percent less likely to correctly identify plan type and are 15 percent more likely to say they don't know their benefits. Four percent fewer women estimate their benefits within 25 percent of the value predicted from the employer provided pension formula than men. Moreover, women are much

more pessimistic about the value of the pension they will receive than men, with twice as many women underestimating their benefits as overestimating their benefits. Unlike what we found with social security benefits, those in the oldest cohort perform better on some dimensions of pension knowledge but do worse on others. Those from older cohorts are less likely to correctly identify plan type, but are also less likely to say they don't know what their pension benefits will be. Plan values are not consistently better identified by those in any cohort. Once again, whites have a better idea of their plan type and of their benefits than blacks or Hispanics, and as we found with social security benefits, married people are better informed, as are those with more schooling. Those in the lowest household lifetime income deciles are less likely to correctly identify plan type than are those in the highest lifetime income deciles, are more likely to say they don't know what their benefits are, but are not much less likely than those in the highest decile to estimate their benefits within 25 percent of the value computed from the employer provided plan descriptions. Those in the top decile of the population arrayed by total household wealth are thirteen percent more likely to have correctly estimated their pension values.

In contrast to our findings about social security, our examination of knowledge about pension benefits indicates that those who are most dependent on their pension benefits know the most about them. Thus 93 percent of those whose pension wealth accounts for 60 percent or more of their total wealth correctly identify plan type, compared to 68 percent who correctly identify plan type among those with pension wealth accounting for less than twenty percent of total wealth. Forty five percent of those with the lowest pension-wealth ratios indicate they don't know what their benefits will be, while 29 percent of those for whom pension wealth represents three-fifths or more of their total wealth don't know what their social security benefits will be. Lastly, 18 percent of those with a high ratio of pension wealth to total wealth correctly identify the level of their benefits within 25 percent, but 12 percent of those with a low relative value of pensions correctly indicate the value of their pensions.

*Knowledge of Pensions and Planning Activities*

Table 5 presents multivariate equations exploring the relation between a set of dependent indicators of knowledge of pension outcomes and independent variables measuring planning activities. In addition to the covariates reported in the table, other covariates corresponding to those included in the analogous regressions in Table 3 have been included in the equations. The first column of Table 5 relates to plan type, whether or not the respondent can answer a question as to whether the pension is defined benefit, defined contribution, or both. The second column checks for agreement between the respondent and the pension plan documents as to whether the plan has a defined benefit component; the presence of a defined benefit component is perhaps the most significant and visible characteristic of a pension plan. The third column asks whether the respondent was unable to give a value of the benefit amount for a defined benefit plan, or the amount in the account for a defined contribution plan.

For those who could give an amount, the fourth column is a regression of the respondent report of pension value on the explanatory variables. For this purpose, for those with more than one plan, the present value of defined benefit amounts are added to the defined contribution balances. A problem here is that the defined contribution balances reflect only work to date, while the expected defined benefit amounts presumably reflect work until retirement. To make these amounts comparable, defined benefit amounts are prorated based on the ratio of the current tenure on the job to the total tenure that the respondent will have on the job at retirement.

The last five columns of the table are analogous to the last five columns of Table 3 for social security. The defined benefit and defined contribution amounts calculated from the pension plan documents are combined in exactly the same way as for the self reported amounts. The fifth and sixth columns use the dollar values of the difference between self reported amounts less the amounts calculated from the documents, while the next two columns scale the differences to be between -1 and +1. Columns 5 and 7 look at whether the differences are systematically positive or negative, while the absolute value variables in columns 6 and 8 focus on the accuracy of the estimates. The last column examines the probability of reporting a positive error.

Row 1 of Table 5 indicates that on some dimensions, knowledge of one's pension benefit increases with the value of the pension.[26] For example, from column 2 we see that an additional $10,000 in pension value is associated with a 6 percent greater likelihood of a respondent reporting their pension plan type correctly, and from column 3 that the extra $10,000 in pension value is associated with a 3 percent lower likelihood of responding they don't know the value of their pension.

Union members are three tenths of a percent less likely to report they do not know what type of pension they have, are 9 percent more likely to report their plan type correctly than nonunion members, and although on average, they over report the value of their pension relative to the value the employer reports, union members exhibit lower dispersion in their reporting error than nonunion members, with absolute deviations $10,000, or 7 percentage points, lower for union members. Those with a planning horizon of five or more years are 6 percent less likely to agree on plan type with their employers than are those with a planning horizon of 1 to 5 years (the omitted group). Having thought about retirement, discussed retirement with a spouse or friend modestly reduces the chance of reporting one doesn't know the value of the pension, but these activities have little effects on the accuracy of reported pension amounts. Those who have attended a meeting about retirement are likely to report a higher pension value, are less accurate in reporting their pension values, and are more likely to report a positive error in pension value. Word recall is unrelated to knowledge about pensions. When we added a measure of whether the respondent had requested information on social security benefits from the Social Security Administration (not included in the regressions in Table 5), the coefficients for this variable were not close to significant in any equation.

Altogether the combination of informal sources of information from the union and indicators of planning activity and the measure of pension value have a noticeable

[26]We do not include pension value in any regressions in which a measure of deviations in pension value appears as a dependent variable. In column 4, we do standardize for employer reported value in a regression in which the value of the self reported pension is the dependent variable.

relation to the various measures of pension knowledge. The pseudo $R^2$s in regressions for knowledge of plan type, respondent and employer agree on plan type, and respondent doesn't know pension value are 0.27, 0.10 and 0.06 respectively. These regressors are associated with $R^2$s of 0.19, 0.38, 0.14 and 0.09 in the last four regressions for the size of the reporting discrepancy. As a group, the planning variables are significant in equations 4 5 and 9, but not in the other equations. Thus planning is significantly related to the total value of the pension as reported by the respondent, to the error in a simple OLS equation, and to the probability of overestimating one's benefit.

## IV. Relation of Knowledge of Social Security and Pensions to Retirement Outcomes

Next in Table 6 we consider the relationships linking dependent variables related to planned retirement date and actual retirement, with independent variables reflecting knowledge about social security and pensions, and engagement in activities pertaining to planning for retirement.[27] Because, for the early years of the survey, the sample is, for the most part, below the average retirement age, and because the number of respondents retiring in any particular year is relative low, we choose to focus on whether or not individuals retire before the last survey that we observe them, which is usually 1998. Recall that the HRS began in 1992, so this covers retirement over a six year period.[28]

The first three columns are probit equations regarding whether the respondent expected to retire before the last survey, and conditional on planning to retire before the last survey, whether the respondent in fact retired as planned. The fourth column looks at

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[27]Appendix Table 2 reports analogous results only for social security. These results are consistent with the findings for the social security variables in Table 6. The sample is larger since the data in Table 6 are confined to those who have a pension, and for whom the employer provided description of the pension is available. Requiring pension coverage and a valid pension plan document to compute the pension knowledge variables cuts down the sample size by over 60 percent.

[28]In this discussion, we will write 1998, although it is understood that this may mean an earlier year if the individual dropped out of the sample before the fourth wave in 1998.

respondents who report they don't know when they are asked at what age they expect to retire. The fifth and sixth columns are regression equations for the planned retirement age and the actual retirement age. Both of these regressions require censored regression techniques. For the planned retirement age, a small but nontrivial number of respondents said that they expected never to retire. These respondents are treated as right censored. Their expected retirement date is considered to be sometime after 1998, which effectively means that the amount of information they contribute to the regression is small. For the regression for actual retirement age, over half of the individuals are still working in the last available interview, usually 1998. They are also treated as right censored and their actual retirement date is considered to be some unspecified year after 1998. The last column is the difference between the actual retirement age less the planned retirement age. This regression is also estimated with censored regression techniques. Respondents who said they would never retire but retired before the last survey are treated as left censored.

The first column pertains to the percentage of respondents who are not retired in 1992 but report at that time that they intend to retire before 1998. The naive pattern we would expect is that the ratios would rise as the benefits expected by the respondents, relative to the actual benefits, rise. Higher expected benefits should have a wealth effect encouraging earlier retirement, and the higher expected benefits should also ease any expected liquidity problems upon retirement. For both social security and pensions, this pattern seems to hold for those who underestimate their benefits, but it does not appear to hold for those who overestimate their benefits. This translates to positive expected coefficients on the estimation error variables.[29] The coefficients for the negative estimation error variable certainly bears this out, being uniformly positive and either above or close to significance. The positive estimation error variable fluctuates in sign

[29] The variable labeled "positive values" has a value if the estimation error is positive and zero if it is negative. The variable labeled "negative values" has a negative value if the estimation error is negative and zero if it is positive. If the coefficients of these two variables are the same, the two variables can be collapsed into a single estimation error variable.

but is nowhere close to statistical significance in any case. Regarding whether or not the respondent had an estimate of the pension and social security values, it would seem reasonable that those who responded that they didn't know the values were ignorant of the information because at least some of them did not intend to retire anytime soon. The estimates bear this out, since the coefficients of the "don't know" variables are uniformly negative and are among the most significant in the equation. One would also think that respondents who had thought about retirement a lot, discussed it with spouses and/or friends, and attended retirement meetings would be more likely to retire relatively quickly, and the regressions give strong support to this hypothesis, especially for thinking about retirement and going to retirement meetings. We should note again, however, that although the correlation between these planning variables and the expected retirement is strong, the causality is not necessarily clear. Finally, union membership has a fairly strong influence on the probability of expecting to retire relatively early, and mental acuity as measured by the number or words the respondent can recall after a few minutes of intervening interview material has a mildly negative impact on whether the respondent expected to retire before 1998.

For column two, the expectation would be that among those who expect to retire relatively soon, the more optimistic respondents are about the values of their pension and social security benefits relative to the true amounts, the more likely they are to be unpleasantly surprised and the less likely they are to fulfill plans to retire before 1998.[30]

[30]In these and remaining columns, we are analyzing retirement over a six year period. Accordingly, we use the same set of covariates used to explain retirement expectations. Thus the retirement regressions do not include measures revising health status over this six year period from the base period value. When we rerun the equations to include a measure of changes in health, that measure is significant in equations for correctly anticipating retirement after the last survey, for actual retirement age, and for the difference between planned and actual retirement age. But in no case is there a noticeable change in any coefficient on a measure of knowledge of social security or of pension benefits.

The results for the estimation errors for pensions are very weak and insignificant.[31] Although also insignificant for those with positive errors in their predicted social security benefits, the coefficients are negative and close to significance, and thus are consistent with a prior that suggests a person who is overly optimistic about their benefits, and therefore plans to retire early, will be more likely to revise those plans and delay retirement once it is discovered that benefits in retirement will be lower than anticipated.

For negative values of the social security estimation error among those who planned to retire early, the coefficient is positive and close to significance. That is, among those who understated their expected benefits, but nevertheless expected to retire early, the more one understated expected benefits, the more likely one is to revise plans and in fact retire later than planned.[32]

The third column looks at the degree to which respondents who expect in 1992 to retire more than six years later actually do so. In this column, the naive expectation is for an upward progression as expected benefits rise relative to actual benefits. Those who underestimate their benefits in 1992 may, upon finding out that their actual benefits will be higher than they had anticipated, think that they can afford to retire earlier than they had expected. Thus for the probit in column three pertaining to those who expected to retire after the last survey, the expected signs of the coefficients for the estimation error variables are positive. For pensions, the results include one positive coefficient at almost significant levels and one clearly insignificant coefficient. For social security, the results are mostly insignificant and mixed in sign.

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[31]The coefficients on the social security and pension knowledge variables are not sensitive if we drop from the sample those with defined contribution plans that have voluntary contributions, i.e., those plans whose values we have difficulty in measuring using employer provided plan descriptions.

[32]If we exclude anyone who has a pension, the largest changes in coefficients are for those reported in column 2. Omitting pension-covered individuals, the coefficient for the "doesn't know ss benefit" variable in the second column is -0.309, and the two coefficients for the social security estimation errors are -0.793 and 0.682. These coefficients are considerably larger than the corresponding coefficients of Table 6 and have t-statistics of 2.4, 2.7 and 2.9 respectively, but they pertain to only 185 observations.

One would expect that individuals who did not know the value of their social security and pensions would probably be less accurate in their retirement expectations, and the probit equations are mildly supportive of this. Most of the coefficients of these variables fluctuate in sign and are insignificant, but the coefficient of the social security "don't know" variable approaches significance in the second column. Similarly, a higher degree of planning activity, as measured by thinking about retirement, talking to spouses and/or friends, and attending retirement meetings, might be expected to result in more accurate expectations of retirement. Again, the evidence on this is mixed, with most of the coefficients far from significant.

The fourth column refers to responses of "don't know" when asked about the age of expected retirement. Individuals who respond that they don't know pension and social security amounts are more likely to respond "don't know" to a question about expected retirement. One might think that individuals who have done more retirement planning activities (thought about retirement, talked with spouses and/or friends, and attended retirement meetings) would be less likely to respond "don't know" to an expected retirement age question, but this hypothesis appears to be confirmed only for the coefficient of the variable indicating that the respondent had thought about retirement a lot.

Column 5 is a regression equation for planned retirement age, which is looking at another aspect of the behavior examined in column 1. Since higher planned retirement ages in column 5 would lead to a lower probability of relatively early retirement in column 1, the expected signs of the coefficients in column 5 should be reversed from those discussed for column 1. The results bear this out; if a coefficient was significant in one equation, it is generally either significant with the opposite sign or not significant in the other equation. The coefficients of three retirement planning variables are significant or nearly so. Of the four coefficients of the estimation errors, two are significant with the expected signs and two are not significant, or are significant with the wrong sign.

Column 6 is a regression equation for the actual retirement age. The naive expectation would be that those who had engaged in retirement planning activities before

1992 are more likely to retire earlier, and those who had not bothered to gather enough information to have some idea of their pension and social security benefits are more likely to retire later. Most of the coefficients of these variables are not significant, but to the extent that they are significant, they have the expected sign. One might expect overly optimistic expectations about benefits to delay actual retirement as respondents adjusted to the lower actual benefits at least in part by delaying retirement. On the other hand, we have seen that those with overly optimistic expectations plan for an earlier retirement. Overall, none of the coefficients of the estimation error variables is significant with expected sign in this equation.

Column 7 is a regression of the difference between the actual retirement age less the planned retirement age. The main coefficients of interest in this equation are probably for the estimation error variables; one would expect that overestimating benefits should lead to later retirement relative to the planned retirement date, and that the coefficients should be positive. Of the four coefficients of these variables, one is significantly positive (for negative values of the pension estimation errors) and another is nearly significantly positive (for positive values of the social security estimation errors). The remaining coefficients are negative but not significant.

The planning variables as a group are significant in most equations. They are not significant in equations 2 and 7. Thus the planning variables cannot explain the differences between actual and planned retirement age, but otherwise are related to the measures of planned and actual retirement in these tables.

The knowledge variables as a group include don't know social security amounts, social security errors (both positive and negative), don't know pension plan type, pension type doesn't agree, don't know pension value, and pension value errors (both positive and negative). As a group they are significant in equations 1, 4, 5 and 7. Thus the knowledge variables are significantly related to anticipated retirement, respondent knows when will retire, to planned retirement age, and to the difference between the planned and actual retirement age.

The overall impression is that the data are mildly supportive of the naive

expectations that individuals who have participated in retirement planning are likely to retire earlier, and that individuals who over estimate their social security and pension benefits are likely to retire later than they planned. The evidence is weak because so many of the coefficients in these tables fail to achieve statistical significance. Among the coefficients that are significant, most of them have the signs that would be expected. The main exception to this possibly occurs for respondents who plan to retire early (before 1998) and who underestimate their social security benefits; the results suggest they retire later relative to their planned retirement age than do respondents who are more accurate in their estimates of social security benefits. However, the statistical significance of this effect is modest at best.[33]

## V. How is Knowledge of Social Security and Pensions Related to Non-Social Security, Nonpension Wealth?

In this section we examine the relationship between wealth and the knowledge of pension and social security benefits. A major question is whether individuals who overestimate their pensions and/or social security save less wealth in other forms, since they think that their retirement needs will be provided by their pension and social security benefits. This question is unresolved because previous investigations of this hypothesis, called the "offset" hypothesis, have produced mixed results at best. In Gustman and Steinmeier (1999a) our findings suggest little substitution of pensions for other wealth despite having included in the equations for wealth outcomes a number of variables that Gale (1998) suggests are required for proper testing of the offset hypothesis. In other previous work (Gustman and Steinmeier, 2001a), which looked at the relation between wealth and retirement, but not in the context of respondent misinformation, we found little evidence of the hypothesis.

Table 7 reports on regressions with the ratio of non-social security, nonpension

[33]The t-statistics for the effect in question is 1.9. However, in Appendix Table 2, which examines knowledge related to social security for a larger sample, the comparable t-statistic is only 1.3.

wealth (including housing) to lifetime earnings of the household as the dependent variable.[34] There are two groups of regressions, one including only the measures of social security knowledge, and the other including both the measures of social security knowledge and pension knowledge. Each group is estimated with OLS, and then in an effort to reduce the influence of outliers, the group is reestimated with median and robust regressions. In addition to the independent variables listed below Table 6 and the measures of knowledge of social security and pensions, as seen from Table 7, these regressions include total household lifetime earnings and its square, total household social security wealth over lifetime earnings and its square, total pension wealth over lifetime earnings and its square, and measures related to retirement planning activities. These regressions are meant to tell us whether the knowledge variables bear any relationship to wealth over and above social security and pensions.

Even though they include measures of household earnings and the relative importance of social security and pensions in total wealth, none of the regressions does a very good job of explaining the ratio of wealth to lifetime earnings. This is consistent with Venti and Wise (1999), who emphasize the significance of the very wide variation in wealth within each lifetime earnings decile.

In these six regressions, the only measure of pension knowledge that is consistently related to wealth is whether the respondent can correctly identify whether the pension plan contains a defined benefit component. Those who can identify the plan type correctly have a ratio of ordinary wealth to lifetime earnings that is a little over one percentage point less than others. The coefficient of the variable indicating whether the respondent answered "don't know" when asked about the type of pension plan is significant in the median regression, but the significance evaporates in the robust regression. As a group, the knowledge variables are significant only in equation 5, the median regression relating the ratio of non social security -- non pension wealth to

[34] These equations exclude single individuals, individuals with nontrivial (greater than $10,000) inheritances, and individuals whose wealth exceeds their household lifetime earnings.

lifetime earnings, to knowledge of social security and pensions.

Among the variables measuring the retirement planning activities (thought about retirement, talked about it with spouses and/or friends, and attended retirement meetings), only the variable which indicates that the respondent discussed retirement with their spouse has a consistently significant coefficient. Respondents who have discussed retirement with their spouses appear to have a one to two percent higher wealth to lifetime earnings ratio. Altogether, planning variables are significant in equations 2 and 3, and 5 and 6. That is, although not significant in OLS, they are significant in median and robust regressions. This is consistent with Lusardi (2001), who finds a strong effect of planning on wealth. She finds an even stronger effect when she instruments. This is despite the fact that if the errors of the planning and saving equations were uncorrelated, the bias from simple endogeneity would be toward finding a weaker relation between planning and wealth using instruments.

## VI. Sensitivity of Findings

Planning variables have been included in our regressions to at least partially control for the possible endogeneity of the knowledge variables. Accordingly, we are interested in determining how sensitive the coefficients on the knowledge variables are to inclusion of the planning measures. To ascertain this, we reestimate Tables 6 and 7 excluding the retirement planning variables: whether the respondent thought about retirement, talked with spouses and/or friends, or attended retirement meetings. For the retirement equations analogous to those in Table 6, the coefficients of the knowledge variables in the new estimates are not outside the confidence ranges of the old estimates. The coefficients do change moderately when the retirement planning variables are omitted, but they do not appear to be consistently higher or lower, or larger in absolute value. With regard to the wealth equations in Table 7, the coefficients of the social security and pension knowledge variables do not change appreciably whether or not the retirement planning variables are included in the regressions. To avoid clutter, we do not present the results of the equations omitting the retirement planning variables here.

## VII. Knowledge Variables and Measures of Benefit Accrual

Reduced form retirement and wealth equations often include measures of benefit accrual.[35] In this section we ask whether the coefficients of the knowledge variables change very much when measures of the retirement incentives generated by pensions and social security are added to the equations, and vice versa. The incentives to retire over a given period of time relate to the path of earnings both during the period and in the future, and there is no unique way to completely summarize these incentives in two or three variables. It is clear that accruals, which are the amounts by which the present values of social security and/or pension benefit payments change in response to another year of work, are important, and yet a single accrual measure may not do the job. The clearest indication of this is that defined contribution plans raise accruals at all ages, and yet the general impression is that the effect of the defined contribution accruals on retirement is relatively small. Perhaps it is better to include two accruals in the equation, one at the beginning of the period and one at the end of the period. If the accrual rate drops sharply during the period, the incentives to continue work are reduced and the individual has strong incentives to retire. In addition to accruals, recent work suggests that some measure of whether or not there are rewards to staying to a later age should also be included. Stock and Wise (1990a and b) devise the option value as an implementation of this concept, and Coile and Gruber (2000) develop a similar but simpler measure they call the peak value.

In implementing these incentive measures, the retirement probit equations in the second and third columns of Table 6 are perhaps less useful than they could be because the time period is six years. This makes effects of the change in accruals less evident than they would be in a shorter period. In previous work (Gustman and Steinmeier, 2001a), we measure retirement over the two year period between successive interviews in the HRS. Accruals are measured at the beginning and end of the two year period, and a

[35]Studies have shown that retirement outcomes are influenced importantly by benefit accrual both from work in the current period and from future work. See Lumsdaine and Mitchell (1999) for a survey of the retirement literature.

measure we call premium value, which is a close cousin of peak value but remedies some of its shortcomings, is included to measure the potential vlaue of accruals in future periods. To those equations we now add measures of the respondents' knowledge of social security, and tabulate the results of the accrual variables and knowledge variables in Table 8 for both retirement and wealth. Retirement is full retirement within a two year period between surveys, and wealth is the ratio of non-social security, nonpension wealth to household lifetime earnings.[36]

For both retirement and wealth, we examine three equations. The middle equation includes both the incentive variables (accruals and premiums) and the knowledge variables for social security.[37] The first equation includes only the incentive variables and excludes the knowledge variables, while the third equation includes only the knowledge variables while excluding the incentive variables. A cursory examination of this table suggests that the coefficients of the accrual variables are not much affected by whether or not the knowledge variables are included. This is good news not only for our previous work but also for the host of other studies that have used the incentive variables without examining the degree to which the individuals in the samples are aware of the incentives. The converse proposition also seems to be true, although to a lessor extent: the coefficients of the knowledge variables are not overly sensitive to whether the incentive variables are present.

## VIII. Conclusions

Measures of the degree to which knowledge about pensions and social security is imperfect suggest that many people are misinformed or lack information about expected

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[36]Retirement status is determined from information on self reported retirement status and on usual hours worked. See Gustman and Steinmeier (2001a) for further details.

[37]Equations using knowledge variables for both social security and pension values yield roughly the same result, although the sample sizes are smaller and the results less precise.

social security and pension benefits and other features of these plans. Those with less education, income and wealth, women and minorities are less well informed about their retirement benefits. In the case of social security, those who are most dependent on the program are least well informed. In contrast, those who are most dependent on pensions are most well informed.

Various aspects of planning for retirement are associated with greater knowledge of social security and pensions. But the relationship is not overly strong. Nor are all planning activities associated with increased knowledge. The strongest relationship, between knowledge of social security benefits and an indicator that the respondent has asked the Social Security Administration for a benefit calculation, is obviously subject to strong selection effects. Those who have requested such a calculation are 40 percentage points less likely to report they do not know their benefits, and have a smaller relative error in reported benefits. Although one might think that those who have requested an earnings history from the Social Security Administration are more engaged in retirement planning in general, those who have requested an earnings record from SSA are not better informed about the value of their pensions. Informal sources of information, such as unions, also are associated with more knowledge. Those with pensions are better informed about their social security benefits. In addition, there are other indicators associated with greater knowledge of pensions and social security. Those with a short planning horizon exhibit greater errors in their reports about social security, while those with longer planning horizons do a better job in reporting about their pensions.

Knowledge measures are also related to planned retirement outcomes, to realized retirement outcomes and, more weakly, to the difference between planned and realized outcomes. Those who underestimate their benefits, especially their social security, are less likely to expect to retire early (over a specified six year horizon, from 1992 to 1998) than are those who overstate their benefits. Individuals who over estimate their social security and pension benefits are likely to retire later than they initially planned, but these results fall below statistical significance.

Individuals who expect to retire later accumulate less wealth. As a group,

variables measuring knowledge of social security and pensions are jointly significant in a median regression for non pension, non social security wealth as a share of lifetime earnings. However, there is no systematic relationship between whether one systematically overestimates or underestimates the value of expected benefits and the value of assets accumulated for retirement. In sum, there is substantial evidence of wide heterogeneity in saving behavior, but measures of benefit knowledge do not contribute much to our understanding of that heterogeneity. Measures of planning activity are more significant.

Lastly, we examined how imperfect information affects the parameters estimated in reduced form retirement and wealth equations, particularly their impact on coefficients of forward looking measures of the effect of continued work on the value of retirement benefits. There is only a small effect of the knowledge variables on the parameters estimated for variables measuring benefit accrual from current and future work; nor are the coefficients of the knowledge variables very sensitive to the presence of the accrual measures

Many puzzles remain to be solved about the relationship between knowledge, wealth accumulation and retirement. Available findings suggest how difficult it is to isolate the effect of an individual's income on wealth accumulation for retirement. In previous work Venti and Wise (1999) suggest that much of the huge differences among individuals in wealth accumulation, even among individuals with similar lifetime earnings potentials, is the result of differences in savings behavior (taste for saving), and not necessarily the result of differences in investment portfolios or differences in luck in the returns on those portfolios. This suggests that different individuals are willing to go into retirement with large differences in their financial ability to support themselves at their pre-retirement standards of living.

Another thread of evidence shedding light on this topic comes from the different studies trying to find whether there is full or incomplete offset of social security wealth and pension wealth on other forms of wealth, particularly non-qualified financial wealth. While Gale (1998) does find a substantial offset, other studies in this area, including our

own, have found only a very limited offset, if indeed any at all (Gustman and Steinmeier, 1998). In our earlier work, we suggest that pension wealth may not be offset against other wealth due to the effects of knowledge. If those with pensions are educated by their employers about the need for retirement saving, they will have a stronger preference for saving. Consistent with this view is our finding that the dispersion of the difference between respondent reports of expected social security benefits and those calculated from SSA provided earnings histories are smaller for those with pensions. If a person is covered by a pension, they are more aware of the value of their social security benefits. Moreover, the higher the value of the pension, the more likely the respondent and employer are to agree on plan type, and the less likely a respondent is to say they do not know the value of the pension. Pension coverage and pension value also have the expected sign in equations for other measures of knowledge of social security and pensions, but the effects are not statistically significant.

Despite the fact that those with pensions are more knowledgeable about their benefits, once we control for knowledge measures, we still do not find significant substitution between pension wealth and other wealth. In light of this finding, it is perhaps not surprising that we are largely unsuccessful in finding much of a relationship between errors in estimating the levels of pension and social security benefits and the levels of respondents' other wealth. It would appear that if there is an offset, it would logically be between the nonsocial security, nonpension wealth and the amount of pension and social security wealth that individuals think that they have. By itself, the fact that half of the respondents with pensions and social security have no idea of the worth of their pensions and social security benefits does not bode well for the offset hypothesis. But even among those who can provide the amount of pension and social security benefits they expect to receive, there is little evidence that the amount of the errors has much of an impact on wealth outside of pensions and social security.

With regard to retirement, the hypothesized effect of misperceptions of pension and social security benefits on retirement works through wealth. For instance, the argument goes that overestimating social security benefits causes people to retire later

than they intend because they will not have accumulated enough wealth to support themselves at their intended standard of living in retirement. However, in view of the previous results that the misperceptions do not have much of an influence on accumulated wealth, this chain of reasoning breaks down. Hence it is not unexpected that we have difficulties finding a substantial impact of misperceptions on whether respondents retire before or after the date that they originally intend.

Past studies have emphasized the importance of current and future period benefit accrual in shaping retirement flows. Defined benefit pensions, in particular, have features which strongly affect the rewards to continued work at various ages, and these do seem to have an impact on retirement. For instance, many plans contain what amounts to a large bonus for working up to the early retirement age, and in such plans there is a clump of individuals who retire soon after they become eligible for early retirement. But these retirements are the result of work incentives, not the effects of the sufficiency or insufficiency of accumulated wealth. Levels of benefits have played a less important role in shaping retirement behavior. Thus the weak effects we find of measures of imperfect information on retirement may result because these measures pertain to the level of social security and pension wealth, and not to nonlinearities in the benefit accrual profile.[38]

Thus we do find relationships of imperfect knowledge to real outcomes, but the relationships are weak. Based on this evidence, someone who believed that those who are poorly informed simply do not require full information to behave in their own interest might be surprised by the extent of misinformation, but may be unwilling to change their prior. Those who feel that people are poorly informed, and incapable of fully efficient planning may find support for their view in the extent of misinformation. Neither group can feel comfortable with the evidence that there is only a weak relationship between the extent of imperfect information and real outcomes.

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[38]Errors in perception or understanding of benefit accrual are not as readily available for the HRS sample and have not been analyzed here. See Gustman and Steinmeier (2001b) for relevant descriptive data on the distribution of misinformation about the location of the pension spike in defined benefit plans.

*Caveats and Future Work*

There are a number of important caveats to this work. The analysis is exploratory in its approach, relying on descriptive data and relatively imprecisely specified reduced form retirement and saving equations. The questions about expected social security and pension benefits are imprecise, and may cause additional error. And there is likely to be some error in the firm reported plan values through improper matching of plans with respondents, especially in firms offering more than one pension. In addition, missing information on the course of contributions under DC pensions creates systematic errors in the value of DC plans estimated with employer provided formulas.

We have focused only on knowledge of pensions and social security, retirement plans and wealth accumulated as of the baseline for the HRS. The only *changes* we analyze are in the divergence of retirement outcomes from retirement plans, relating those to lack of information or levels of misperception in social security or pension values as of 1992.

There are no instruments for the knowledge (and planning) variables that are convincingly exogenous to the saving or retirement decision. Without proper instruments, we have been able to examine only indirectly some aspects of the endogeneity of knowledge variables.

A number of refinements are required to make further progress in analyzing the role of knowledge in determining retirement and wealth outcomes. Analysis would benefit from more complete information on timing. In addition, we have not analyzed the effects on any marginal corrections in saving between 1992 and the time of retirement. The effect of a misperception will depend on the respondent's age when the error is discovered and how long until the respondent expects to retire, which together also determine the length of the expected retirement period. The earlier a mistake is realized, the longer one has to work to correct the error. For a given age of discovery of an error in expected benefits, the earlier a person expects to retire, the less time there is to adjust benefits. An earlier expected retirement date is associated with a longer period of retirement, requiring more saving to overcome the effects of a given shortfall in yearly

benefits. If a pension allows retirement before age 62, there will be a shorter time to adjust for a shortfall in pension benefits than to adjust for a shortfall in social security. Moreover, the nature of the adjustment will be very different for those who are liquidity constrained than for those who are not.

Precise analysis of the effects of imperfect knowledge will likely require a more structural approach that both allows for differentiation of the various cases and the corners that some people will find themselves in, as well a direct role for unmeasured taste parameters, in particular, preference for leisure and time preference. It will not be possible to unravel the determination of retirement from the determination of wealth unless the explicit role of unmeasured taste is modeled.[39]

It is interesting to think about the role imperfect knowledge may play in the context of a structural model. Imperfect knowledge may be manifested in greater imprecision in the specification of the budget constraint. Those with access to more precise information, e.g., union members or those with employer provided pensions, may have a clearer picture of what the budget constraint looks like. Alternatively, imperfect knowledge may result from an inability to process the required information, a characteristic of the individual which may be associated with lower productivity and may also be reflected in the wage. Or imperfect knowledge may reflect a high rate of time preference which defers any activities that affect future income, and thus may be associated with reduced saving activity. Moreover, where one can attain knowledge through search or by hiring expertise, the extent of knowledge may be endogenously determined as a product of planning related activities. But the planning activities themselves should be fully modeled.

With regard to the wealth equations, our discussion refers at times to the life cycle motive for saving, but does not incorporate measures relevant to either the precautionary motive or to the bequest motive. Nor is wealth adjusted for the effects of shocks that occurred in the past. Although a number of studies have considered each of these effects

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[39]See Gustman and Steinmeier (2001a) for a further discussion of the dependence of retirement and wealth on the relation between leisure and time preference.

in isolation, a great deal of work remains before we have an integrated analytical framework that is suitable for fully analyzing retirement and saving behavior.[40]

*Implications for Public Policy*

From a policy perspective, these results establish that there is a great deal of misinformation about social security and pensions, and that the public is so poorly informed that increasing the amount of information can fill an important gap. In addition, the relationships between planning activities and the level of knowledge about social security and pensions may suggest some preliminary routes for providing knowledge. Most importantly, the strong relationship we found between having requested a report from SSA and knowledge of one's social security benefits suggest that provision of information on request is a helpful policy, although the selective nature of the population asking for their earnings history does not allow us to say much about the effects of current policy, whereby earnings records and projected benefits are made available to a broad population.

However, without further progress in modeling and estimating the role of imperfect information as a determinant of retirement and saving, it will not be possible to generate any precise measures of the effects of current or new policies. In the face of the conflicting evidence developed here, we cannot reject the hypothesis that many are poorly informed about their pension benefits because they are irrelevant. The evidence cited in the previous paragraph raises doubts about an extreme view of this hypothesis, that those who are poorly informed about pensions and social security are in such a strong financial position as they approach retirement that the benefits are irrelevant to them. In this case, we probably would not have found that those who have the lowest pension benefits are least well informed about them.

To overcome the hurdle created by a lack of plausibly exogenous excluded instruments, identification may be achieved through implementation of reasonable

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[40]For a discussion of the inconsistencies between current empirical studies of retirement and saving, see Gustman and Juster (1996).

assumptions about structure, or through experiments, natural or planned.[41] It may be feasible to specify and estimate a structural model that incorporates the major influences of imperfect information on retirement and saving decisions. Structural modeling is a difficult route, but the experimental route may be no easier.

[41]Quasi-experimental and natural experiments have been useful in uncovering the likely effects of programs to enhance information about 401(k) plans and the extent of program participation. See, for example, Bayer, Bernheim and Scholz (1996), Bernheim and Garrett (1996) and Clark and Schieber (1998), who all find that programs that inform workers about retirement needs and retirement benefits increase participation in pension plans.

Table 1
Distribution of Social Security Benefits Reported by Respondents and Calculated From Earnings Records
(Tabulations Are for Age-Eligible Respondents in Wave 1 Who Have Not Yet Received Benefits)

| | Annual Benefits Calculated From SSA Earnings Records (1,000's of 1992 Dollars) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0-1.5 | 1.5-3 | 3-4.5 | 4.5-6 | 6-7.5 | 7.5-9 | 9-10.5 | 10.5-12 | 12-13.5 | 13.5-15 | 15+ | Sum |
| Self Reported Benefits | | | | | | | | | | | | |
| 0-1.5 | 161 | 56 | 41 | 24 | 37 | 20 | 19 | 15 | 11 | 9 | 38 | 431 |
| 1.5-3 | 24 | 22 | 25 | 11 | 6 | 1 | 3 | 4 | 0 | 1 | 0 | 97 |
| 3-4.5 | 33 | 20 | 36 | 23 | 14 | 7 | 10 | 4 | 2 | 2 | 4 | 155 |
| 4.5-6 | 41 | 29 | 54 | 72 | 59 | 30 | 34 | 11 | 8 | 2 | 1 | 341 |
| 6-7.5 | 6 | 2 | 16 | 23 | 39 | 40 | 30 | 8 | 12 | 1 | 1 | 178 |
| 7.5-9 | 0 | 2 | 13 | 22 | 37 | 62 | 62 | 24 | 6 | 9 | 5 | 242 |
| 9-10.5 | 0 | 2 | 4 | 19 | 29 | 30 | 137 | 56 | 28 | 16 | 2 | 323 |
| 10.5-12 | 2 | 2 | 3 | 8 | 10 | 33 | 72 | 61 | 33 | 23 | 7 | 254 |
| 12-13.5 | 0 | 0 | 0 | 0 | 1 | 2 | 5 | 8 | 3 | 5 | 0 | 24 |
| 13.5-15 | 0 | 0 | 0 | 0 | 1 | 7 | 13 | 14 | 10 | 18 | 8 | 71 |
| 15+ | 2 | 1 | 1 | 1 | 3 | 6 | 12 | 16 | 12 | 15 | 2 | 71 |
| Total with a Value | 269 | 136 | 193 | 203 | 236 | 238 | 397 | 221 | 125 | 101 | 68 | 2187 |
| Don't Know (DK) | 267 | 192 | 276 | 301 | 271 | 266 | 240 | 191 | 119 | 78 | 34 | 2235 |
| Total Including DK's | 536 | 328 | 469 | 504 | 507 | 504 | 637 | 412 | 244 | 179 | 102 | 4422 |
| Fraction with a Value | 0.50 | 0.41 | 0.41 | 0.40 | 0.47 | 0.47 | 0.62 | 0.54 | 0.51 | 0.56 | 0.67 | 0.49 |

Table 2
Correlates of Knowledge About Expected Social Security Benefits

| | Expected SS Benefits Relative to Actual Benefits | | | | |
|---|---|---|---|---|---|
| | <75% | 75-125% | >125% | DK | Number of Observations |
| All Respondents | 14.3 | 27.0 | 9.8 | 48.9 | 3441 |
| Gender | | | | | |
| Males | 16.2 | 31.6 | 7.9 | 44.3 | 1954 |
| Females | 11.6 | 20.5 | 12.5 | 55.4 | 1487 |
| Cohort | | | | | |
| 1931-33 | 11.2 | 36.3 | 9.1 | 43.4 | 769 |
| 1934-38 | 14.1 | 24.9 | 10.5 | 50.5 | 1560 |
| 1939-41 | 16.7 | 23.1 | 9.4 | 50.8 | 1112 |
| Race | | | | | |
| White | 14.6 | 28.6 | 9.7 | 47.1 | 2622 |
| Black | 12.8 | 17.7 | 12.2 | 57.3 | 559 |
| Hispanic | 11.9 | 14.6 | 7.5 | 66.0 | 260 |
| Marital Status | | | | | |
| Married | 14.6 | 30.4 | 9.6 | 45.3 | 2233 |
| Not Married | 13.6 | 20.8 | 10.2 | 55.4 | 1208 |
| Education | | | | | |
| < High School | 10.2 | 19.6 | 9.5 | 60.6 | 774 |
| High School Grad | 13.3 | 28.2 | 10.9 | 47.6 | 1185 |
| Some College | 12.0 | 27.3 | 9.8 | 51.0 | 694 |
| College Graduate | 18.5 | 34.5 | 9.0 | 38.0 | 338 |
| Graduate Degree | 22.1 | 27.2 | 8.5 | 42.2 | 450 |
| HH Lifetime Income Decile | | | | | |
| First | 14.6 | 11.2 | 17.0 | 57.2 | 293 |
| Second | 10.9 | 16.3 | 11.8 | 61.0 | 467 |
| Third | 14.6 | 20.1 | 9.0 | 56.3 | 406 |
| Fourth | 14.6 | 23.6 | 6.9 | 54.9 | 398 |
| Fifth | 13.2 | 29.0 | 10.6 | 47.2 | 357 |
| Sixth | 13.1 | 33.3 | 9.4 | 44.2 | 361 |
| Seventh | 14.5 | 31.2 | 11.1 | 43.2 | 329 |
| Eighth | 16.0 | 31.6 | 7.8 | 44.5 | 310 |
| Ninth | 13.7 | 39.8 | 9.8 | 36.7 | 287 |
| Tenth | 19.6 | 36.9 | 5.5 | 38.0 | 233 |
| Total HH Wealth Decile | | | | | |
| First | 13.6 | 9.7 | 12.1 | 64.7 | 331 |
| Second | 12.8 | 18.0 | 9.7 | 59.5 | 450 |
| Third | 13.6 | 22.4 | 10.8 | 53.2 | 439 |

| | | | | | |
|---|---|---|---|---|---|
| Fourth | 12.4 | 23.3 | 9.7 | 54.6 | 363 |
| Fifth | 14.8 | 28.4 | 8.2 | 48.6 | 369 |
| Sixth | 13.4 | 30.3 | 8.6 | 47.7 | 345 |
| Seventh | 15.2 | 33.7 | 8.4 | 42.7 | 311 |
| Eighth | 12.5 | 33.3 | 13.5 | 40.7 | 298 |
| Ninth | 15.8 | 37.0 | 7.7 | 39.6 | 265 |
| Tenth | 19.7 | 36.1 | 10.2 | 34.1 | 270 |
| SS Wealth / Total Wealth | | | | | |
| 0-20% | 19.8 | 26.2 | 12.4 | 41.6 | 770 |
| 20-40% | 12.8 | 31.0 | 9.5 | 46.7 | 1005 |
| 40-60% | 11.1 | 30.0 | 8.2 | 50.7 | 819 |
| >60% | 13.5 | 19.0 | 9.3 | 58.2 | 847 |

All tabulations are for age-eligible respondents working in wave 1 only. Social security tabulations are for financial respondents with social security records.

Table 3
Multivariate Analysis of Relation of Planning Activities to Measures of Knowledge of Social Security

| | Dependent Variable | | | | | | |
|---|---|---|---|---|---|---|---|
| | Respondent Doesn't Know SS Benefit | Total Respondent Reported SS Benefit | Social Security Estimation Errors | | | | |
| | | | Amount of Error [a] | Absolute Value of Error | Relative Error [b] | Absolute Value of Relative Error | Positive Error |
| Method of Estimation | Probit | Regression | Regression | Regression | Regression | Regression | Probit |
| SS Amount From SSA | -0.000 [1.2] | .31 [10.1] | | | | | |
| Pension | -0.023 [0.9] | -26 [0.1] | -958 [2.9] | 1.87 [0.0] | -0.108 [4.3] | -0.092 [4.4] | -0.154 [3.6] |
| Union | -0.043 [2.0] | -215 [0.9] | 95 [0.4] | -276 [1.1] | 0.010 [0.5] | -0.022 [1.3] | -0.041 [1.3] |
| Planning Horizon | | | | | | | |
| Next Year or Less | 0.035 [1.8] | 573 [2.6] | 554 [2.3] | 585 [2.6] | 0.028 [1.6] | 0.017 [1.1] | 0.015 [0.4] |
| More than 5 Years | -0.044 [1.4] | -16 [0.1] | -348 [1.0] | 304 [1.0] | -0.019 [0.7] | 0.025 [1.2] | 0.010 [0.2] |
| Not Available | 0.121 [2.1] | 4.49 [0.0] | -429 [0.6] | 363 [0.5] | -0.034 [0.6] | -0.022 [0.5] | 0.057 [0.5] |
| Thought About Retirement | | | | | | | |
| A Lot | -0.066 [2.7] | -209 [0.8] | -43 [0.1] | -376 [1.4] | 0.007 [0.0] | 0.002 [0.1] | 0.017 [0.5] |
| Not Available | 0.147 [0.7] | 1350 [0.6] | -383 [0.1] | -444 [0.2] | -0.114 [0.6] | -0.065 [0.4] | 0.739 [8.0] |
| Talked to Spouse About Retirement | | | | | | | |
| A Lot | 0.002 [0.1] | 304 [1.0] | 435 [1.3] | -90 [0.3] | 0.005 [0.2] | -0.023 [1.1] | 0.058 [1.4] |
| Not Available | 0.041 [1.0] | 23 [0.0] | -288 [0.5] | 468 [1.0] | -0.029 [0.7] | 0.014 [0.4] | -0.117 [1.7] |
| Talked with Friends About Retirement | | | | | | | |
| A Lot | -0.012 [0.4] | 43 [0.1] | 118 [0.3] | .59 [0.0] | 0.004 [0.2] | -0.026 [1.2] | -0.057 [1.4] |
| Not Available | 0.334 [1.7] | -261 [0.1] | -168 [0.1] | 119 [0.1] | -0.084 [-0.5] | -0.064 [0.4] | -0.753 [---] |
| Attended Retirement Meetings | | | | | | | |
| Yes | -0.073 [3.0] | -106 [0.4] | -102 [0.4] | -140 [0.6] | 0.007 [0.4] | 0.006 [0.3] | -0.056 [1.7] |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Not Available | -0.435 [2.2] | -2001 [1.1] | -568 [0.3] | 292 [0.2] | 0.150 [1.0] | 0.146 [1.1] | 0.083 [0.3] |
| Words Recalled | | | | | | | |
| Number (0-20) | 0.004 [1.2] | 18 [1.5] | 3.50 [0.1] | 15 [0.4] | 0.001 [0.3] | -0.003 [1.2] | -0.008 [-1.6] |
| Missing | 0.134 [2.1] | -406 [0.5] | -1281 [1.5] | 1214 [1.6] | -0.080 [1.3] | 0.045 [0.9] | 0.011 [0.1] |
| Requested SS Benefit Calculation | | | | | | | |
| Yes | -0.375 [19.1] | 268 [1.3] | 228 [1.0] | -668 [3.1] | -0.014 [0.8] | -0.085 [5.8] | 0.0133 [0.5] |
| Not Available | -0.526 [20.1] | -7023 [25.9] | -6572 [21.8] | 2810 [10.3] | -0.919 [40.7] | 0.365 [19.3] | --- |
| | | | | | | | |
| Adjusted or Pseudo $R^2$ | 0.1882 | 0.4449 | 0.2532 | 0.1060 | 0.4846 | 0.2808 | 0.0902 |
| Number Observations | 4422 | 2187 | 2187 | 2187 | 2187 | 2187 | 2187 |

For the probit equations, the reported values are marginal effects, which are the changes in the probability of the indicated outcome with a unit change in the independent variables. Absolute values of t or z-statistics are superscripted to the right of the coefficients. These equations include as additional independent variables, not shown in the table, demographic measures including gender, marital status, education, race, current and last job holding and earnings on those jobs, self employment and full time status, employment in management, manufacturing and government, decile measures of lifetime household earnings, decile measures of household pension wealth to household total wealth, and health status. Note that the questionnaire skips those who indicate they plan never to retire around the retirement planning questions. Thus the not available's for those questions mainly include those who were not asked about their plans because they indicated they never expect to retire. As a group the planning variables are significant in equations 1, 2, 3 and 7, and not in equations 4 through 6.

[a] Respondent's estimate of annual benefit minus the benefit from the social security earnings records.

[b] The estimation error divided by the larger of the respondent's estimate or the benefits calculated from the earnings record.

Table 4
Correlates of Respondent Knowledge About Their Pensions
(for Respondents with Pension Records)

| | Correctly Identified DB Plan | Expected Pension Benefits Relative to Actual Benefits | | | | Number of Observations |
|---|---|---|---|---|---|---|
| | | <75% | 75-125% | >125% | DK | |
| All Respondents | 77.1 | 25.6 | 15.9 | 17.1 | 41.3 | 2262 |
| Gender | | | | | | |
| Males | 80.4 | 26.6 | 17.8 | 21.0 | 34.6 | 1208 |
| Females | 73.2 | 24.4 | 13.6 | 12.3 | 49.6 | 1054 |
| Cohort | | | | | | |
| 1931-33 | 74.8 | 25.8 | 18.3 | 18.2 | 37.7 | 458 |
| 1934-38 | 77.3 | 26.3 | 14.0 | 16.7 | 43.0 | 1034 |
| 1939-41 | 78.4 | 24.5 | 17.0 | 17.0 | 41.5 | 770 |
| Race | | | | | | |
| White | 77.9 | 26.2 | 16.8 | 17.6 | 39.5 | 1762 |
| Black | 74.9 | 21.8 | 10.3 | 15.0 | 52.8 | 384 |
| Hispanic | 63.5 | 21.0 | 10.4 | 11.7 | 56.9 | 116 |
| Marital Status | | | | | | |
| Married | 78.0 | 26.3 | 16.7 | 18.0 | 39.0 | 1697 |
| Not Married | 74.8 | 23.6 | 13.7 | 14.7 | 48.1 | 565 |
| Education | | | | | | |
| < High School | 70.1 | 24.2 | 10.4 | 14.9 | 50.5 | 360 |
| High School Grad | 73.8 | 24.7 | 15.5 | 15.6 | 44.3 | 789 |
| Some College | 75.2 | 28.5 | 15.6 | 17.0 | 38.9 | 461 |
| College Graduate | 82.9 | 31.5 | 17.8 | 13.0 | 37.7 | 256 |
| Graduate Degree | 86.7 | 21.6 | 19.9 | 24.1 | 34.3 | 396 |
| Household Lifetime Income Decile | | | | | | |
| First | 81.8 | 23.2 | 15.2 | 17.5 | 44.1 | 103 |
| Second | 62.8 | 24.0 | 8.7 | 10.8 | 56.5 | 163 |
| Third | 67.0 | 23.8 | 15.9 | 13.4 | 46.9 | 188 |
| Fourth | 77.4 | 22.8 | 12.1 | 15.9 | 49.1 | 248 |
| Fifth | 77.8 | 25.9 | 12.4 | 14.3 | 47.4 | 244 |
| Sixth | 78.8 | 21.9 | 16.4 | 19.7 | 42.1 | 271 |
| Seventh | 74.8 | 27.1 | 21.0 | 18.4 | 33.6 | 286 |
| Eighth | 79.1 | 31.2 | 19.2 | 12.6 | 37.0 | 269 |
| Ninth | 81.0 | 23.7 | 18.1 | 23.2 | 35.0 | 267 |
| Tenth | 84.8 | 29.2 | 15.4 | 21.6 | 33.9 | 223 |
| Total Household Wealth Decile | | | | | | |
| First | 70.3 | 25.8 | 3.9 | 11.2 | 59.1 | 70 |
| Second | 66.0 | 25.2 | 7.2 | 13.1 | 54.5 | 156 |
| Third | 68.5 | 17.5 | 18.0 | 14.8 | 49.7 | 235 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Fourth | 72.3 | 20.5 | 11.8 | 18.4 | 49.3 | 250 |
| Fifth | 73.3 | 23.9 | 15.5 | 17.5 | 43.1 | 258 |
| Sixth | 78.8 | 21.8 | 18.5 | 19.7 | 40.0 | 280 |
| Seventh | 77.2 | 27.1 | 17.2 | 20.1 | 35.7 | 272 |
| Eighth | 82.5 | 26.8 | 19.6 | 19.3 | 34.3 | 265 |
| Ninth | 84.5 | 28.2 | 16.8 | 17.8 | 37.2 | 278 |
| Tenth | 84.7 | 38.1 | 17.2 | 11.2 | 33.5 | 198 |
| Pension Wealth / Total Wealth | | | | | | |
| 0-20% | 68.3 | 20.7 | 12.1 | 22.3 | 44.9 | 833 |
| 20-40% | 77.0 | 22.7 | 15.9 | 18.4 | 43.0 | 704 |
| 40-60% | 84.6 | 29.0 | 21.3 | 10.7 | 39.1 | 479 |
| >60% | 92.8 | 43.9 | 18.4 | 8.7 | 29.1 | 246 |

Table 5
Multivariate Analysis of Relation of Planning Activities to Measures of Knowledge of Pensions

| | Dependent Variable | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Pension Value Estimation Error [a] | | | | |
| | Respondent Doesn't Know Plan Type | Employer, Respondent Agree Plan Is DB | Respondent Doesn't Know Pension Value | Respondent Reported Pension Value | Amount of Error | Absolute Value of Error | Relative Error [b] | Absolute Value of Relative Error | Positive Error |
| Method of Estimation | Probit | Probit | Probit | OLS | OLS | OLS | OLS | OLS | Probit |
| Pension Value from Provider Survey | -1.40e-08 [0.9] | 5.85e-07 [5.1] | -2.73e-07 [2.4] | .4419 [24.6] | | | | | |
| Union | -.0027 [1.9] | .090 [4.9] | -.009 [0.4] | 6,716 [1.2] | 4,426 [0.6] | -10,158 [1.9] | .053 [1.8] | -.069 [4.2] | 0.0337[1.1] |
| Planning Horizon | | | | | | | | | |
| Next Year or Less | -.0004 [0.3] | -.020 [0.9] | .010 [0.4] | -6,028 [0.9] | -6,520 [0.7] | 787 [0.1] | .010 [0.3] | -.028 [1.4] | -0.019[0.5] |
| More than 5 Years | .0023 [0.9] | -.061 [1.8] | .059 [1.5] | 3,179 [0.3] | 9,144 [0.7] | -14,002 [1.5] | -.061 [1.2] | -.027 [0.9] | -0.054[1.0] |
| Not Available | .0088 [1.4] | -.055 [0.8] | .213 [2.4] | -36,104 [1.4] | -70,350 [2.0] | 59,651 [2.3] | .015 [0.1] | -.035 [0.4] | -0.007[0.1] |
| Thought About Retirement | | | | | | | | | |
| A Lot | -.0009 [0.5] | -.015 [0.6] | -.047 [1.6] | 7,184 [1.0] | 5,401 [0.6] | -1,589 [0.2] | .041 [1.1] | -.010 [0.5] | 0.017[0.4] |
| Not Available | -.0015 [0.4] | -.042 [0.7] | .024 [0.4] | 3,538 [0.2] | -488 [0.2] | -6,094 [0.3] | -.086 [0.9] | -.042 [0.8] | --- |
| Talked About Retirement with Spouse | | | | | | | | | |
| A Lot | -.0020 [1.1] | .030 [1.1] | -.025 [0.7] | -3,083 [0.4] | -2,960 [0.3] | 1,446 [0.2] | -.002 [0.0] | -.007 [0.3] | 0.029[0.7] |
| Not Available | .0081 [1.0] | .002 [0.0] | -.034 [0.5] | -1,643 [0.1] | 11,473 [0.5] | 3,548 [0.2] | .027 [0.3] | .033 [0.6] | 0.146[1.5] |
| Talked About Retirement With Friends A Lot | .0038 [1.3] | -.013 [0.4] | -.078 [2.3] | 13,253 [1.7] | 10,688 [1.0] | 2,319 [0.3] | .015 [0.3] | .031 [1.3] | -0.007[0.2] |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Attended Retirement Meetings | .0005 [0.3] | .010 [0.4] | -.030 [1.1] | 12,322 [2.0] | 104 [0.0] | 10,364 [1.7] | .079 [2.4] | -.019 [1.0] | 0.092 [2.7] |
| Words Recalled Number (0-20) | -.0001 [0.3] | -.002 [0.5] | -.002 [0.4] | -1,096 [1.1] | -447 [0.3] | -1,400 [1.4] | .004 [0.8] | -.003 [1.1] | -0.001 [0.1] |
| Not Available | .0179 [2.0] | .001 [0.0] | .002 [0.0] | -32,432 [1.7] | -32,363 [1.3] | -17,741 [0.9] | .001 [0.0] | .000 [0.0] | -0.025 [0.2] |
| Adjusted/ Pseudo $R^2$ | .2744 | .1015 | .0634 | .6504 | .1857 | .3756 | .1410 | .0901 | 0.0918 |
| Number Observations | 2262 | 2262 | 2262 | 1303 | 1303 | 1303 | 1303 | 1303 | 1303 |

For probit equations, the reported values are marginal effects, which are the changes in the probability of the indicated outcomes with a unit change in the independent variables. t or z-statistics are superscripted to the right of the coefficients. The regressions also hold constant gender, marital status, education, race, current earnings, self employment, full time status, employment in management, manufacturing and government, health status, decile of lifetime household earnings, and decile of pensions as a share of total household wealth. As a group, the planning variables are significantly related to the dependent variable in columns 3, 4 and 9, but not in the other equations. In column 8, the coefficient on a variable indicating that the answer to discussed retirement with friends is missing is -0.118, with a t-statistic of -1.22. When a measure indicating that the respondent requested a social security benefit calculation from SSA is added to these equations, it is not statistically significant in any of them.

[a] Difference between respondent's estimate of pension value and the value calculated from the pension plan description.
[b] The estimation error divided by either the respondent's estimate of pension value or by the value calculated from the pension plan description, whichever is greater.

Table 6
Relation Between Measures of Knowledge of Social Security and Pension Variables and Measures of Retirement

| | Anticipated Retirement Before Last Survey | Correctly Anticipated Retirement Among Those Anticipating Retirement | | Did Not Know When Would Retire | Planned Retirement Age | Actual Retirement Age | Actual Less Planned Retirement Age |
|---|---|---|---|---|---|---|---|
| | | Before Last Survey | After Last Survey | | | | |
| Method of Estimation | Probit | Probit | Probit | Probit | Regression | Regression | Regression |
| Mean of Dependent Variable | .391 | .615 | .804 | .063 | 62.7 | 59.7 | -3.0 |
| Doesn't Know SS Benefit | -.116 [2.9] | -.105 [1.8] | .012 [0.3] | .036 [2.1] | -.233 [0.9] | -.048 [0.1] | .190 [0.5] |
| Social Security Estimation Errors [a] | | | | | | | |
| Positive Values | .106 [0.8] | -.257 [1.5] | .131 [0.8] | -.057 [0.8] | -2.109 [2.5] | -.075 [0.1] | 2.609 [1.8] |
| Negative Values | .145 [1.9] | .228 [1.9] | .002 [0.0] | .020 [0.5] | .781 [1.5] | -.176 [0.2] | -1.100 [1.2] |
| Doesn't Know Pension Plan Type [b] | .082 [0.6] | .190 [0.8] | .015 [0.4] | .212 [2.9] | -.092 [0.1] | .857 [0.5] | 1.744 [0.9] |
| Incorrect Knowledge of Plan Type [b] | .052 [1.3] | .103 [1.5] | .019 [0.4] | .020 [1.4] | -.524 [2.0] | -.903 [1.9] | -.420 [0.9] |
| Doesn't Know Pension Value | -.127 [2.6] | .054 [0.7] | | .038 [1.8] | .743 [2.4] | .223 [0.4] | -.625 [1.2] |
| Pension Value Estimation Errors [a] | | | | | | | |
| Positive Values | -.045 [0.5] | -.063 [0.5] | -.038 [0.5] | .035 [1.0] | .231 [0.4] | -.561 [0.6] | -.596 [0.6] |
| Negative Values | .110 [1.4] | -.101 [0.8] | .137 [1.7] | -.030 [0.9] | -1.482 [2.9] | 1.052 [1.2] | 2.636 [3.1] |
| Union | .046 [1.4] | .028 [0.6] | -.004 [0.1] | -.000 [0.0] | -.737 [3.5] | -.544 [1.5] | .322 [0.9] |
| Planning Horizon | | | | | | | |
| Next Year or Less | .019 [0.5] | -.007 [0.1] | .017 [0.6] | .009 [0.6] | .126 [0.5] | .610 [1.3] | .473 [1.1] |
| Over 5 Years | .018 [0.3] | .074 [0.8] | -.073 [1.5] | -.006 [0.3] | .625 [1.7] | .797 [1.2] | -.399 [0.6] |
| Not Available | .208 [1.7] | .059 [0.4] | -.096 [0.7] | | .428 [0.6] | -.151 [0.1] | -.447 [0.4] |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Thought About Retirement | | | | | | | |
| A Lot | .195 [4.9] | .066 [1.1] | -.083 [1.8] | -.041 [2.6] | -1.647 [6.4] | -1.163 [2.6] | .252 [0.6] |
| Not Available | | | -.119 [1.5] | | | | |
| Discussed Retirement with Spouse | | | | | | | |
| A Lot | .048 [1.0] | .069 [1.0] | -.062 [1.0] | -.010 [0.5] | .137 [0.4] | -.724 [1.4] | -.876 [1.7] |
| Not Available | .116 [0.9] | .286 [1.2] | -.138 [1.7] | -.052 [2.1] | -1.013 [1.3] | -3.408 [1.9] | -2.883 [1.8] |
| Discussed Retirement with | | | | | | | |
| Friends a Lot | .033 [0.7] | .001 [0.0] | .018 [0.4] | -.006 [0.3] | -.692 [2.4] | -.591 [1.2] | -.003 [0.0] |
| Attended Retirement | | | | | | | |
| Meetings | .101 [2.7] | -.045 [0.9] | .008 [0.2] | -.002 [0.2] | -.449 [1.9] | -.031 [0.1] | .056 [0.9] |
| Words Recalled | | | | | | | |
| Number (0-20) | -.007 [1.2] | -.011 [1.2] | .000 [0.0] | -.000 [0.1] | -.016 [0.4] | .007 [1.0] | -.014 [0.2] |
| Not Available | -.290 [2.4] | .008 [0.0] | .107 [1.0] | .118 [1.8] | -.302 [0.3] | 1.070 [0.6] | 1.079 [0.6] |
| | | | | | | | |
| Adjusted or Pseudo $R^2$ | .1098 | .0642 | .0841 | .1357 | .1479 | .0273 | .0468 |
| Number of Observations | 1164 | 455 | 709 | 1242 | 1084 | 1084 | 1084 |

For probits, the reported values are marginal effects, which are the changes in the probability of the indicated outcomes with a unit change in the independent variables. Regressions are adjusted for the censoring that occurs when respondents say that they will never retire or when they retire after the last survey; see text for further details. t or z-statistics are superscripted to the right of the coefficients. Other variables held constant in these regressions include gender, marital status, education, race, current earnings, whether held a recent job and earnings on that job, self employment, full time status, employment in management, manufacturing or government work, and self reported health status. As a group, planning variables are significant in equations 1, 3, 4, 5 and 6. Knowledge variables are significant as a group in equations 1, 4, 5 and 7.

[a] The social security or pension benefit anticipated by the respondent minus the benefit calculated from the earnings record or the plan documents, divided by the maximum of the two; for further discussion see the text.

[b] Plan type is whether or not the plan has a defined benefit component.

Table 7: Relation of the Ratio of Nonsocial Security, Nonpension Wealth to Lifetime Earnings to Measures of Knowledge of Social Security and Pensions

| | Relation to Social Security Knowledge Variables | | | Relation to Social Security and Pension Knowledge Variables | | |
|---|---|---|---|---|---|---|
| Method of Estimation | OLS | Median | Robust | OLS | Median | Robust |
| Log of Household Lifetime Earnings | | | | | | |
| Linear Term | .129 [1.1] | .140 [2.0] | .111 [1.8] | -.158 [0.9] | -.393 [7.4] | -.290 [2.9] |
| Squared Term | -.005 [1.1] | -.005 [1.8] | -.003 [1.5] | .006 [0.9] | .014 [7.0] | .011 [2.9] |
| Household Social Security / Lifetime Earnings | | | | | | |
| Linear Term | .193 [0.7] | .390 [2.5] | .257 [1.8] | .604 [1.6] | .629 [3.6] | .551 [2.5] |
| Squared Term | .247 [0.3] | -.327 [0.6] | .065 [0.1] | -1.994 [1.2] | -2.304 [2.8] | -2.148 [2.1] |
| Household Pension / Lifetime Earnings | | | | | | |
| Linear Term | -.142 [1.7] | -.015 [0.3] | .067 [1.5] | .070 [0.7] | .054 [1.1] | .087 [1.4] |
| Squared Term | .269 [1.2] | .185 [1.4] | -.028 [0.2] | .025 [0.1] | -.026 [0.3] | .016 [0.1] |
| Doesn't Know Social Security Benefit | -.008 [1.0] | -.007 [1.5] | -.006 [1.4] | -.006 [0.6] | -.009 [1.9] | -.014 [2.5] |
| Social Security Estimation Error [a] | | | | | | |
| Positive Values | .013 [0.5] | .011 [0.7] | .004 [0.3] | .032 [0.9] | .010 [0.6] | -.020 [0.3] |
| Negative Values | .019 [1.3] | .015 [1.8] | .008 [0.9] | -.014 [0.7] | -.007 [0.7] | .013 [1.2] |
| Doesn't Know Pension Plan Type [b] | na | na | na | .042 [1.0] | .075 [3.9] | .019 [0.8] |
| Correct Knowledge of Plan Type [b] | na | na | na | -.014 [1.3] | -.013 [2.6] | -.010 [1.6] |
| Doesn't Know Pension Value | na | na | na | .012 [1.0] | .007 [1.2] | .004 [0.6] |
| Pension Value Estimation Error [a] | | | | | | |
| Positive Values | na | na | na | .039 [2.0] | .004 [0.4] | -.001 [0.6] |
| Negative Values | na | na | na | -.014 [0.7] | .000 [0.0] | -.006 [0.5] |
| Pension | -.025 [2.8] | -.012 [2.4] | -.010 [2.1] | na | na | na |
| Union | -.002 [0.3] | -.003 [0.6] | .002 [0.4] | .004 [0.5] | .002 [0.4] | -.000 [0.1] |
| Planning Horizon | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Next Year or Less | -.012 [1.6] | -.008 [1.8] | -.010 [2.3] | -.015 [1.4] | -.012 [2.4] | -.010 [1.6] |
| Over 5 Years | .007 [0.6] | .018 [2.7] | .015 [2.4] | .009 [0.6] | .015 [2.2] | .003 [0.3] |
| Not Applicable | .035 [1.4] | .001 [0.1] | -.018 [1.4] | -.007 [0.3] | -.017 [1.2] | -.023 [1.3] |
| Thought About Retirement | | | | | | |
| A Lot | -.005 [0.5] | .001 [0.1] | .002 [0.5] | -.002 [0.1] | .008 [1.5] | .007 [1.1] |
| Not Available | .206 [1.6] | .221 [3.9] | .142 [2.0] | .092 [0.9] | .053 [5.0] | .056 [0.9] |
| Discussed Retirement with Spouse | | | | | | |
| A Lot | .022 [2.1] | .012 [2.0] | .011 [2.0] | .018 [1.5] | .018 [3.2] | .018 [2.6] |
| Not Available | -.168 [1.8] | -.211 [5.3] | -.135 [2.7] | -.095 [0.9] | -.049 [6.0] | -.049 [0.8] |
| Discussed Retirement with Friends | | | | | | |
| A Lot | .000 [0.0] | .005 [0.8] | .003 [0.5] | -.005 [0.4] | .003 [0.6] | .000 [0.0] |
| Not Available | -.026 [0.3] | -.039 [0.1] | -.003 [0.1] | | | |
| Attended Retirement | | | | | | |
| Meetings | .012 [1.4] | .009 [1.8] | .010 [2.2] | -.004 [0.5] | .003 [0.7] | .006 [1.0] |
| Words Recalled | | | | | | |
| Number (0-20) | -.000 [0.4] | .000 [0.3] | .000 [0.2] | .001 [0.4] | .001 [1.3] | .000 [0.5] |
| Not Available | -.024 [0.9] | .000 [0.0] | .002 [0.1] | .009 [0.3] | .000 [0.0] | .007 [0.4] |
| Adjusted or Pseudo $R^2$ | .1365 | .0844 | | .0797 | .0923 | |
| Number of Observations | 1903 | 1903 | 1903 | 718 | 718 | 718 |

t statistics are superscripted to the right of the coefficients. Other variables held constant in these regressions include gender, marital status, education, race, current earnings, whether held a recent job and earnings on that job, self employment, full time status, employment in management, manufacturing or government work, and self reported health status.

[a] The social security or pension benefit anticipated by the respondent minus the benefit calculated from the earnings record or the plan documents, divided by the maximum of the two; for further discussion see the text.

[b] Plan type is whether or not the plan has a defined benefit component.

Table 8
Sensitivity of Measures of Benefit Accrual to the Presence of Knowledge Variables in Retirement Probits

| | Retirement Equations | | | Wealth Equations | | |
|---|---|---|---|---|---|---|
| | Accrual Measures Without Knowledge Variables | Accrual Measures With Knowledge Variables | Knowledge Variables Without Accrual Measures | Accrual Measures Without Knowledge Variables | Accrual Measures With Knowledge Variables | Knowledge Variables Without Accrual Measures |
| Incentive Variables | | | | | | |
| Initial Accrual / Annual Earnings | .0167 [1.1] | .0164 [1.1] | | .0135 [1.5] | .0141 [1.6] | |
| Final Accrual / Annual Earnings | -.0492 [2.4] | -.0495 [2.5] | | .0103 [1.2] | .0094 [1.1] | |
| Premium Value / Annual Earnings | -.0283 [2.8] | -.0284 [2.8] | | .0009 [0.2] | .0005 [0.1] | |
| Knowledge Variables | | | | | | |
| Doesn't Know Social Security Benefit | | –.0055 [0.6] | -.0060 [0.6] | | -.0051 [1.1] | -.0049 [2.1] |
| Social Security Estimation Error | | | | | | |
| Positive Values | | .0137 [0.4] | .0152 [0.5] | | -.0092 [0.5] | -.0079 [1.5] |
| Negative Values | | .0235 [1.0] | .0216 [1.0] | | .0409 [3.5] | .0276 [3.6] |
| R2 or pseudo R2 | .1090 | .1093 | .1064 | .1446 | .1467 | .1455 |
| Number of Observations | 6406 | 6406 | 6406 | 4005 | 4005 | 4005 |

1. Source: authors' calculations.

Appendix Table 1
Sample Sizes by Table and Reasons for Deletions

| | Causes of Deletion from Main Sample | Number Remaining in Sample |
|---|---|---|
| 1 | Number of Total HRS Respondents in Wave 1. | 12,652 |
| 2 | Eliminate Not Age Eligibles | 9,824 |
| 3 | Eliminate Proxy Respondents | 9,348 |
| 4 | Eliminate Not Financial Respondent | 6,254 |
| 5 | Eliminate No Social Security Record | 4,779 |
| 6 | Eliminate Currently Receiving Benefits | 4,490 |
| 7 | Eliminate Received Benefits in the Past (Tables 1 & 3) | 4,422 |
| 8 | Eliminate Not Currently Working (Tables 2 and Appendix Table 2) | 3,441 |
| 9 | Eliminate Not Married | 2,233 |
| 10 | Eliminate Nontrivial Inheritances (> $10,000) | 2,052 |
| 11 | Eliminate Households with Wealth > Lifetime Earnings | 1,908 |
| | Eliminate if Spouse Is Missing Lifetime Earnings (Table 7) | 1,903 |
| 12 | Begin with Line 8 | 3,441 |
| 13 | Eliminate Pension Provider Missing or Invalid (Table 6) | 1,242 |
| 14 | Eliminate Not Married | 827 |
| 15 | Eliminate Nontrivial Inheritances (> $10,000) | 761 |
| 16 | Eliminate Households with Wealth > Lifetime Earnings | 719 |
| | Eliminate if Spouse Is Missing Lifetime Earnings (Table 7) | 718 |
| 17 | Begin with Line 3 | 9,348 |
| 18 | Eliminate Not Currently Working | 6,539 |
| 19 | Eliminate Pension Provider Value Missing or Invalid (Tables 4 and 5) | 2,262 |

Source: Authors' calculations.

Note: For tables with multiple columns, these figures give the number of observations for the column with the maximum number of observations. Further reductions in other columns are due to the nature of the dependent variable in those columns. The sample size of Table 8 is detailed in Gustman and Steinmeier (2001a), reduced by cases in which the social security earnings record is not present or in which the respondent was not the primary respondent, in which case the questions about expected social security benefits were not asked.

Appendix Table 2
Relation Between Measures of Knowledge of Social Security Variables and Measures of Retirement

| | Anticipated Retirement Before Last Survey | Correctly Anticipated Retirement Among Those Anticipating Retirement | | Did Not Know When Would Retire | Planned Retirement Age | Actual Retirement Age | Actual Less Planned Retirement Age |
|---|---|---|---|---|---|---|---|
| | | Before Last Survey | After Last Survey | | | | |
| Method of Estimation | Probit | Probit | Probit | Probit | Regression | Regression | Regression |
| Mean of Dependent Variable | .314 | .607 | .772 | .113 | 63.4 | 59.8 | -3.6 |
| Doesn't Know SS Benefit | -.087 [4.3] | -.047 [1.1] | -.013 [0.5] | .059 [3.7] | -.064 [0.3] | -.333 [1.1] | -.151 [0.4] |
| Social Security Estimation Errors [a] | | | | | | | |
| Positive Values | -.057 [0.9] | -.188 [1.6] | -.113 [1.5] | .010 [0.2] | -.067 [1.2] | -1.459 [1.6] | -.812 [0.8] |
| Negative Values | .127 [3.3] | .098 [1.3] | -.003 [0.1] | -.030 [1.0] | -.055 [0.2] | .301 [0.5] | -.082 [0.1] |
| Pension | -.008 [0.4] | .067 [1.4] | .010 [0.4] | -.067 [4.4] | -.396 [2.0] | .152 [0.4] | .507 [1.3] |
| Union | .070 [3.6] | .034 [0.9] | -.019 [0.8] | -.054 [3.8] | -1.093 [6.5] | -.879 [3.1] | .151 [0.5] |
| Planning Horizon | | | | | | | |
| Next Year or Less | .058 [2.9] | -.030 [0.8] | .028 [1.3] | .016 [1.2] | -.023 [0.1] | .594 [2.0] | .776 [2.3] |
| Over 5 Years | .028 [0.9] | .083 [1.4] | .080 [2.4] | .008 [0.4] | .228 [0.9] | -.118 [0.3] | .334 [0.6] |
| Not Available | .152 [2.2] | .045 [0.4] | -.065 [0.9] | -.018 [0.4] | -.765 [1.3] | -1.018 [1.1] | -.260 [0.3] |
| Thought About Retirement | | | | | | | |
| A Lot | .130 [6.0] | .102 [2.5] | -.044 [1.4] | -.091 [5.8] | -1.321 [6.9] | -1.050 [3.3] | .046 [0.1] |
| Not Available | .950 [7.2] | | .252 | .085 [0.3] | -6.969 [2.3] | 4.655 [1.1] | 2.975 [0.6] |
| Discussed Retirement with Spouse | | | | | | | |
| A Lot | .097 [3.6] | .048 [1.0] | -.049 [1.2] | .020 [0.8] | -.582 [2.5] | -.702 [1.8] | -.330 [0.8] |
| Not Available | .042 [0.7] | .038 [0.3] | -.034 [0.9] | -.047 [1.4] | -.168 [0.3] | -.816 [0.9] | -1.459 [1.3] |
| Discussed Retirement with Friends | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A Lot | .007 [0.3] | -.040 [0.9] | -.021 [0.6] | -.015 [0.7] | -.524 [2.3] | -.513 [1.4] | -.035 [0.1] |
| Not Available | .252 [1.0] | | -.664 | .161 [1.1] | -3.600 [1.8] | .885 [0.3] | 3.063 [0.9] |
| Attended Retirement Meetings | | | | | | | |
| Yes | .081 [3.7] | .016 [0.4] | .018 [0.6] | .020 [1.2] | -.432 [2.3] | -.087 [0.3] | .384 [1.0] |
| Not Available | -.726 | | -.991 [58.2] | | -.348 [0.1] | -5.930 [1.4] | -6.843 [1.5] |
| Words Recalled | | | | | | | |
| Number (0-20) | -.007 [2.4] | -.006 [0.9] | -.001 [0.2] | .000 [0.2] | .005 [0.9] | -.074 [1.6] | -.064 [1.2] |
| Not Available | -.127 [2.3] | .026 [0.2] | .060 [0.9] | .080 [1.6] | .233 [0.4] | .139 [0.1] | .239 [0.2] |
| | | | | | | | |
| Adjusted or Pseudo $R^2$ | .1743 | .0486 | .0549 | .1091 | .1206 | .0243 | .0109 |
| Number of Observations | 3052 | 958 | 2094 | 3441 | 2555 | 2255 | 2255 |

For probit equations, the reported values are marginal effects, which are the changes in the probability of the indicated outcomes with a unit change in the independent variables. Regressions are adjusted for the censoring that occurs when respondents say that they will never retire or when they retire after the last survey; see text for further details. t or z-statistics are superscripted to the right of the coefficients. Other variables held constant in these regressions include gender, marital status, education, race, current earnings, whether held a recent job and earnings on that job, self employment, full time status, employment in management, manufacturing or government work, and self reported health status. As a group, planning variables are significant in all equations but equation 7. As a group, knowledge variables are significant in equations 1 and 4.

[a] The social security benefit anticipated by the respondent minus the benefit calculated from the earnings record, divided by the maximum of the two; for further discussion see the text.

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