Imperfect Knowledge, Retirement and Saving

Alan L. Gustman
Dartmouth College and NBER
and
Thomas L. Steinmeier
Texas Tech University

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Abstract

Using data from the Health and Retirement Study, this paper measures 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 or lack of information about retirement benefits is the norm. Those who are most dependent on social security are the least well informed, while the opposite is true for pensions. Women and minorities are also less well informed about their retirement benefits. Those who engage in planning activities 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 over estimate their benefits are likely to retire sooner than they planned, but the measured effects are again relatively modest.

Alan L. Gustman
Department of Economics
Dartmouth College
Hanover, N.H. 03755
and NBER
alan.l.gustman@dartmouth.edu

Thomas L. Steinmeier
Department of Economics
Texas Tech University
Lubbock, TX 79409
Thomas.Steinmeier@TTU.edu

I. Introduction

This paper focuses on the imperfect knowledge individuals have about the value of their pension and social security benefits. It begins by creating a series of measures of each individual's knowledge about their social security and pension benefits and documents the extent of imperfect knowledge and its distribution in the population.[1] Next the paper documents the relation of these measures to activities undertaken to plan for retirement. It then explores how these knowledge measures and measures of planning activities affect 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.[2]

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.

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[1]This work builds on an earlier study (Gustman and Steinmeier, forthcoming). There we use data from the Health and Retirement Study to show that there are wide discrepancies between what people tell us about their social security and pensions, including their expected benefits, and what their covered earnings histories obtained from the Social Security Administration, and descriptions of their pensions obtained from their employers, suggest they will actually receive. A brief exploratory analysis in our earlier paper also suggested that it may be fruitful to investigate the relation of knowledge to planned and realized retirement and to saving.

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

Central to our analysis are measures of the extent of imperfect knowledge about 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. By relating measures of knowledge of social security and pension benefits to respondent reports of planning activities, we can judge the relation of engaging in retirement planning activities to the quality of information individuals have about their retirement benefits. Further, by relating miscalculations of social security and pension benefits to planned retirement, actual retirement, and wealth accumulation, we can judge the consequences of imperfect knowledge for retirement and saving behavior.

To the extent that imperfect information about pensions and social security influences retirement and saving behavior, one must understand the role of imperfect information if one is to determine the effects of various retirement policies.[3] In particular, without an understanding of how knowledge of social security and pensions shapes retirement and saving, it is not possible to determine how various policies that are designed to improve knowledge of retirement programs will affect preparations for retirement, and wealth upon retirement.

Public officials have become increasingly concerned with the adequacy of information about retirement saving, and would like to remedy a situation where many people are poorly informed about their pensions and social security. A number of actions have recently been undertaken by the Social Security Administration and by the Labor Department to increase information available to the public. For example, Bernheim

[3]A number of studies explore the implications of imperfect foresight and planning, or the inability to fully maximize. For example, Bernheim (1989) examines the reasons for divergence between retirement expectations and realizations. Bernheim (1988) and Clark and Schieber (1998) indicate that workers may be imperfectly informed about their pensions and social security. Thaler (1994) argues that the behavior determining saving outcomes diverges from that postulated for fully informed maximizing agents. Lusardi (1999) explores heterogeneity in planning activities, and how planning affects saving outcomes.

(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 now mails earnings records to covered individuals. They also have made available a retirement planner on their web site.

Similarly, the U.S. Department of Labor has begun 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. Following on the 1997 SAVER (Savings Are Vital to Everyone's Retirement) Act (PL 105-92), in 1998 there was a National Summit on Retirement Savings which emphasized the need for public education through media and other campaigns. Last year there was a five year anniversary event hosted by The Department of Labor for its Retirement Savings Education Campaign. The Employee Benefit Research Institute has been conducting a yearly Retirement Confidence Survey, focusing on retirement confidence and the saving of those with different levels of confidence, the level of knowledge about pensions, IRAs, educational materials provided by employers offering pensions and related issues.

These efforts involve basic outreach, providing the public with general information. There is little systematic evidence on the efficacy of these programs. Neither the efforts of the Social Security Administration nor those of the Department of Labor lend themselves to a ready evaluation.

Ultimately, if we are to determine the contributions of these programs, and more generally understand the role of information and misinformation about the retirement process, it will be necessary to understand retirement decision making and saving at a more fundamental level, incorporating the role of information and planning into our models. Although our analysis is exploratory, we hope it provides a basis for measuring the extent of misunderstanding of retirement plans, and adequately documents the relationship between misinformation and retirement and saving outcomes. We also hope this paper brings us a step closer to understanding how to better formulate policies to improve the information available for planning retirement.

II. Framework for Analysis

Some individuals may be poorly informed because, for them, gaining information is too costly. Others may be poorly informed because some are not capable of solving the complex problems associated with rational retirement and saving behavior.[4] There is no behavioral mechanism forcing individuals to be well informed about the need for retirement saving. The survivor principle provides a strong justification for expecting firms in competitive industries to behave as rational profit maximizers. The idea is that adoption of nonmaximizing behavior will eventually cause bankruptcy or take-over, so that those who continue in business, the survivors, are selected to be those who adopt an efficient paradigm. The same is not true for individuals. Unlike firms, individuals are not subject to the survivor principle. A person who does not plan well for retirement does not face exit from the market. Rather, he or she will have fewer resources to support consumption in retirement, and may perhaps work longer than contemporaries who do a better job of planning.

We model the role of information, planning activities, retirement and saving in the context of five reduced form equations. First, there is an equation that links knowledge about social security and pensions (K_o) to planning activities (P_o) and other variables. The zero subscript signifies that the measures of knowledge and planning that we have will be at the beginning of the period of observation, and are not variables that change within the panel.

$$K_o = \alpha_o + \alpha_1 P_o + \alpha_2 X_1 + \varepsilon_1 \tag{1}$$

In this equation knowledge is specified as a function of planning activities (P_o) and other factors (X_1), but it is possible for causality to run in both directions. It also may be that the error term ε_1 includes some unmeasured characteristics of respondents related to their time preference or other characteristics that the proxy measures we employ in X_1 do not accurately measure.[5]

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[4]See the collection of articles in Aaron (1999).

[5]The equations in this section are written as linear equations, although in estimation if the dependent variable is binary, the analogous probit equation will be estimated.

The next equation is for the date of planned retirement as of the base period (R_o^p), which is a function of knowledge about social security and pensions (K_o), planning activities (P_o), other exogenous factors (X_2) and an error term, which once again may contain some unobservable influence in addition to random error.[6]

$$(2) \qquad R_o^p = \beta_o + \beta_1 K_o + \beta_2 P_o + \beta_3 X_2 + \varepsilon_2$$

Equation 3 is for the date of actual retirement (R_t), which again is a function of knowledge, planning activities and an error term that may include a systematic component that is unobservable.

$$(3) \qquad R_t = \gamma_o + \gamma_1 K_o + \gamma_2 P_o + \gamma_3 X_3 + \varepsilon_3$$

In addition to estimating versions of equations 2 and 3, we will be estimating equations that pertain to the difference between planned and actual retirement.

$$(4) \qquad R_t - R_o^p = \gamma_o - \beta_o + (\gamma_1 - \beta_1)K_o + (\gamma_2 - \beta_2)P_o + \gamma_3 X_3 - \beta_3 X_2 + \varepsilon_3 - \varepsilon_2$$

The last estimating equation relates nonpension, non-social security wealth (W_o) over lifetime earnings (E_o^L) as of the base period, to knowledge, planning activities and a set of other explanatory variables (X_4).

$$(5) \qquad \frac{W_o}{E_o^L} = \delta_o + \delta_1 K_o + \delta_2 P_o + \delta_3 X_4 + \varepsilon_4$$

Note that to the extent that planning activities are a perfect predictor of retirement, β_2 should be equal to γ_2, and the coefficient of P_o should be zero in equation 4. Note also that if knowledge were produced only by planning activities, there would be a severe

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[6]Chan and Stevens (2001) analyze the relationship between retirement expectations and incentives in the context of a fixed effect model. Their work on retirement expectations differs from ours in four ways. First, they analyze the changes in retirement expectations over the first three waves of the HRS in response to changing incentives. In contrast we focus on the level of expectations in the HRS base period. Second, they focus on the adjustment of retirement expectations to unforeseen changes in incentives over a relatively short period. Our interest is in the relationship between retirement and incentives over the longer term, where saving behavior can be readily molded to accommodate retirement plans. Third, in addition to the relationship between retirement incentives and expectations, we also are interested in the relationship between retirement expectations and retirement realizations. Lastly, our main interest is in the role of knowledge variables on each of these retirement outcomes, as well as on saving behavior.

collinearity problem in each equation and a very high R^2 in equation 1. Finally, it is also possible that knowledge is the perfect summary statistic for planning. In that case, the there will be a high degree of correlation between the knowledge and planning variables in equations 2 through 5, and the coefficients should have a hard time achieving significance. We further examine the relationships among these variables below.

Lusardi (2001) argues that planning is endogenous in wealth equations, in that those with higher wealth are more likely to engage in planning activities. She finds that when planning measures are instrumented in a wealth regression by variables such as the age difference with older siblings and the characteristics of the older siblings, there is a very large increase in the coefficient, which remains significant.[7] She suggests that planning is partly a function of exogenous planning costs. In the absence of an important omitted measure such as cost of planning, even if planning were a determinant of retirement and wealth outcomes, one could estimate retirement and wealth equations of the standard form, omitting any measure of planning. By substituting out for the planning measure, the retirement equation thus specified is a reduced form of a jointly determined system with a planning equation and a retirement equation with retirement as a function of planning. To determine the effects of omitting planning measures from the standard specification of the retirement and wealth equations, we also estimate the reduced form versions of these equations. These estimates will be biased if there are important exogenous determinants of planning that do not appear in the retirement equation, such as planning costs. Nevertheless, it is useful to ask whether omission of planning and knowledge variables have important effects on the coefficients for independent variables measuring the value and accrual of social security and pension benefits. We will examine this issue in section VII.

[7]Note that a simple analysis in which wealth was a positive function of planning, and planning a positive function of wealth, one would expect instrumenting to reduce the coefficient on the planning variable in a wealth equation. Correlation in the error terms must also be playing a role to explain a downward bias in the coefficient of the planning variable when it is not instrumented in a wealth equation.

III. The Data

Our analysis is based on data from the Health and Retirement Study (HRS), a longitudinal, nationally representative survey of older Americans. The survey began in 1992 with an initial cohort of 12,652 individuals from 7,607 households, with at least one household member born from 1931 to 1941. Permission to obtain earnings records from the Social Security Administration was granted by three fourths of respondents, and records were matched for 95 percent of this group. 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.

From the social security earnings histories and the pension records we compute expected benefits in retirement. Knowledge of social security and pensions is obtained by comparing 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.[8] 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 (forthcoming).

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

IV. Knowledge of Social Security and Pensions

This section addresses the relationship between measures of knowledge and measures of planning activity, corresponding to equation 1 in the analytical framework. Imperfect information is measured by a discrepancy between what the respondent tells us about their pensions or social security and what the record tells us. We then relate the measures of imperfect information to characteristics of the respondent, as well as to

[8]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.

various measures of planning[9]. The measures we use of imperfect information pertain to the amount of benefits of social security and pensions and to the type of pension plan.[10]

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

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. When benefit amounts are reported, the discrepancies between self reported social security values and computed values 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

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[9]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 asked: 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 asked: Have you asked SSA to calculate benefits for you?

[10]For the self reported social security benefits, question N46 asked: 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 asked of the financial respondent, which for a married couple was intended to be 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 planning and knowledge variables are measured as of the initial date of the survey, which is not necessarily occurring at the same age for all respondents.

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

Correlates of Knowledge About Social Security

Table 2 describes the correlates of knowledge about social security benefits. The first three columns refer 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, the first four columns 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

[11]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.

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 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. For example, 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 don't 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

Next, without implying causality, we ask how knowledge of social security benefits is related to retirement planning activities. From Table 3 we see that those who have planned for retirement are more knowledgeable about their likely social security benefits. Those who have thought some or a lot about retirement, have discussed it some or a lot with their spouse, or with friends, have attended retirement meetings, and typically plan over a long horizon, are less likely to report they do not know their social security benefits, and are more likely to estimate their benefits within 25 percent of the amount we estimate from their earnings history that they will receive. From the bottom row in Table 3, the most effective planning activity is to have requested a benefit

calculation from the Social Security Administration. The quarter of those in the sample who indicate they did request such a calculation are much less likely to say they do not know their benefits, and in half the cases estimate their benefits within 25 percent of the actual amount they will receive. Lastly, although planning is associated with knowledge about social security benefits, word recall is not.

Table 4 presents 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. The first column measures 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 calculated from the social security record. 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 first row, the insignificant coefficient of -25 in the third 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 -660 in the fourth column means that respondents with pensions are considerably more accurate in their estimates than is true for 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.

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.[12] Row 1 of Table 4 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. 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). Although those with pensions have higher actual benefits as calculated from the social security earnings records, in columns 3 and 5 there is only weak evidence that they systematically underestimate their benefits relative to other respondents. In columns 4 and 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.[13] 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

[12]Other covariates beside those discussed below are listed in a footnote to Table 4. Note that in the multivariate equations in Table 4 and those that follow, we do not include the wealth decile as a right hand side variable. We do, however, include the decile indicator for the ratio of pension wealth to total wealth.

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

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. Having asked the Social Security Administration for a benefit calculation reduces the probability of reporting one does not know the benefit by almost 40 percentage points. Since the percentage of respondents who can not estimate the 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 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 and 2 of Table 4, but not in columns 3 through 6. Thus the planning variables are significant in explaining whether the respondent knows the social security benefit and the level of the benefit calculated from the earnings record, but not in explaining the errors in the value of social security benefits.[14]

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 to 4. The first column of Table 5 indicates the fraction of respondents with matched employer provided pension plan descriptions who correctly report whether they have a defined benefit pension or a defined contribution pension. 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 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 and the values calculated when the benefit

[14]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.

formula reported by the firm 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.[15] 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. The situation is particularly bad for defined contribution plans with voluntary contributions, since in this case the contribution rate must also be taken from self reports, but the history of contribution rates is not reported.

In previous work (Gustman and Steinmeier, forthcoming), 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

[15]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.

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 5, 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 14 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 only 12 percent of those with a low relative value of pensions correctly indicate the value of their pensions.

Knowledge of Pensions and Planning Activities

Next in Table 6 we ask how knowledge of pension benefits is related to retirement planning activities. Those who planned more for retirement by thinking about it, discussing it with spouses or friends, and attending retirement seminars are more likely to identify plan type correctly, are less likely to say they don't know what their pensions will be worth, and are more likely to estimate their pension benefits correctly. Planning horizon and word recall are not strongly related to knowledge about the pension. Those who requested a social security calculation from SSA are only slightly more knowledgeable about their pensions than are those who have not.

Table 7 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 4 have been included in the equations. The first column of Table 7 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 pension value on the explanatory variables. For this purpose, 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 four columns of the table are analogous to the last four columns of Table 4 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 last 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.

Row 1 of Table 7 indicates that on some dimensions, knowledge of one's pension benefit increases with the value of the pension.[16] An additional $10,000 in pension value

[16]We do not include pension value in any regressions in which a measure of deviations in pension value appears as a dependent variable, except when we wish to standardize for employer reported value in a regression in which the value of the self reported pension is the dependent variable.

is associated with a 6 percent greater likelihood of a respondent reporting their pension plan type correctly, and 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 less accurate in reporting their pension values, and 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, 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 relation to the various measures of pension knowledge. The pseudo R^2s 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^2s of 0.19, 0.38, 0.14 and 0.09 in the last four regressions for the difference between the respondent and firm reports of pensions, their absolute value, the relative difference in reported pension, and in its absolute value respectively. As a group, the planning variables are significant in equations 4 and 5, but not in the other equations. Thus planning is significantly related to the total value of the pension as reported by the

respondent, and to the error in a simple OLS equation.

V. Relation of Knowledge of Social Security and Pensions to Retirement Outcomes

Next we consider the relationships specified in equations 2 through 4 of the analytical framework, linking planned date and actual retirement, on the one hand, and knowledge about social security, and engagement in activities pertaining to planning for retirement, on the other. Table 8 presents some simple descriptive statistics on these issues. 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.

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.[17] 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. In comparing the first and third groups for both social security and pensions, however, there does appear to be some evidence that those who underestimate benefits expect to retire in the next six years less often than those who overestimate their benefits. This appears to be especially true for the social security benefits.

The second column looks at actual retirement among those who expect in 1992 to retire in the next six years. The naive expectation is in this case the percentages should be declining as expected benefits rise relative to actual benefits. If respondents expect to retire early but find that the true benefits will in fact be less than the benefits they are

[17]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.

expecting, some of them may decide to a retire a little later than they had planned. This pattern holds for pensions, but for social security it is decidedly mixed. Those who overestimate their social security benefits do in fact postpone retirement to some degree, but those who underestimate benefits postpone retirement by about as much despite the fact they have more benefits than they would have anticipated.

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. The results for social security go the wrong way, but the differences in the percentages in this group are relative small as compared to some of the other cases. For pensions, the pattern is correct for those who underestimate their pensions relative to those who are more accurate, but not for those who overestimate relative to those who are more accurate. In comparing those who underestimate to those who overestimate, the overall trend is in the right direction but relatively weak.

These results are more or less confirmed in the multivariate analyses reported in Tables 9 and 10. Table 9 includes just the social security knowledge variables, while Table 10 includes both the social security and pension knowledge variables. The drawback to using both is one of sample size; requiring valid pension plan documents to compute the pension knowledge variables cuts down the sample size by over 60 percent.

The first three columns of these tables are probit equations that roughly correspond to the first three columns of Table 8. The fourth column looks at 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 gave an expected retirement age in 1992 but had not retired by 1998 are treated as right censored, while respondents who said they would never retire but retired before the last survey are treated as left censored.

The first column of these tables relates to whether the respondent intended to retire before 1998. One would expect that the higher are the expected pension and social security benefits relative to the actual values, the more likely it would be that the individual would expect to retire earlier rather than later. This translates to positive expected coefficients on the estimation error variables.[18] 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 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 certainly 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

[18] 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.

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.

The second columns of the tables are probits for whether respondents who expected to retire before 1998 actually did so, and the third columns are probits for whether respondents who expected to retire after 1998 actually did so.[19] 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. The results for the estimation errors for pensions are very weak and insignificant.[20] 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 planned to retire early, the coefficient is positive and close to significance, particularly in Table 10. That is, among those who understated their expected benefits, but nevertheless expected

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[19]In these and remaining columns of Tables 9 and 10, 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. Nor are there indicators of a layoff over the six year period. Changes in health over time and layoffs are reflected in the covariates in Table 13 below, where the retirement equation analyzes outcomes over a two year period.

[20]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.

to retire early, the more one understated expected benefits, the more likely one is to revise plans and in fact retire later than planned.[21]

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. Overestimating benefits is less likely to lead to a situation where the respondent revises the anticipated retirement date and retires before 1998. 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.

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 of Table 10. 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 significance. The exception is the variable for having thought a lot about retirement; it's coefficient is significantly positive in Table 9 for the group intending to retire before 1998, but almost significantly negative in Table 10 for the group intending to retire after 1998.

The fourth column of the tables 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. Union members and respondents with pensions are more likely to have an expected retirement age (less likely to say don't know when will

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[21]If we exclude anyone who has a pension from Table 9, 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 9 and have t-statistics of 2.4, 2.7 and 2.9 respectively, but they pertain to only 185 observations.

retire) in Table 9, although the coefficient for union membership is not confirmed to be significant in Table 10. 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 the four retirement planning variables are all significant with the expected negative sign in Table 9, and three are significant or nearly so in Table 10. Of the six coefficients of the estimation errors in the two tables, two are significant with the expected negative sign, and four are not significant, with mixed signs. The coefficient for respondents who don't know their pension values remains significant with the expected positive sign, but the coefficient for respondents who don't know their social security benefit, which is significant in column 1, becomes not significant in column 5.

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 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 six coefficients of these variables in the two tables, 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 in Table 10). The remaining coefficients are negative but not significant.

In Tables 9 and 10 the planning variables as a group are significant in most equations. They are not significant in equation 7 of Table 9, and are not significant in equations 2 and 7 in Table 10. 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 and 4 of Table 9. However, they are significant in equations 1, 4, 5 and 7 of Table 10. Thus the knowledge variables are significantly related to anticipated retirement, respondent knows when will retire, and also in Table 10 to planned retirement age, and to the difference between the planned and actual retirement age.

The overall impression from Tables 8 through 10 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 (under) estimate their social security and pension benefits are likely to retire later (sooner) 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; both the coefficients in the second columns of Tables 9 and 10 and the pattern in the second column of Table 8 indicate that 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.[22]

VI. 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, 2001), 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 11 presents the ratio of non-social security, nonpension wealth to household lifetime earnings, for individuals classified according to whether they plan to retire before or after the last survey, and according to the ratio of their expected to actual social security and pension benefits. There are two types of patterns that are of interest in the table. First, one would expect that individuals who plan to retire after 1998 would have

[22]The t-statistics for the effect in question is 1.9 in Table 10 and only 1.3 in Table 9. The corresponding information in Table 8, the 57.9% figure, is based on only about 115 observations (23.9% times 481), and the standard deviation of this figure is about 4.6 percentage points, which means that the 57.9% figure is probably not statistically significantly lower than the 64.9% figure immediately below it.

less wealth, both because they have more time to accumulate additional wealth and because the number of years they have to support themselves in retirement will be less. This hypothesis is largely supported by the table; of the six comparisons between the numbers in the first and second columns, in only one instance is the number in the second column greater, and even there it is only 1 percentage point greater.

According to the offset hypothesis there should also be a second set of relations. Specifically, within in each group of three numbers down the columns, the ratio of wealth to lifetime earnings should decline as expected social security or pension benefits increase relative to actual benefits. Individuals who have an over optimistic view of their future benefits would be expected to be saving less. However, in none of the four groups is this universally true. Indeed, in three of four cases, those who are overly optimistic about their benefits from social security or pensions also have higher wealth in other forms.

Table 12 reports on regressions with the ratio of non-social security, nonpension wealth to lifetime earnings of the household as the dependent variable.[23] There are two groups of regressions, one including only the measures of social security knowledge (corresponding roughly to the equations in Table 9), and the other including both the measures of social security knowledge and pension knowledge (corresponding roughly to the equations in Table 10). 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 10 and the measures of knowledge of social security and pensions, 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.

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

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 equations 5, the median regression relating the ratio of non social security -- non pension wealth to 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.

VII. 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 9, 10, and 12 excluding the retirement planning variables: whether the respondent thought about retirement, talked with spouses and/or friends, or attended retirement meetings. For the retirement equation analogues to Tables 9 and 10, in only a couple of cases are the coefficients of the knowledge variables in the new estimates outside the confidence ranges of the old estimates, and vice versa. These coefficients are both in the first column of Table 9, which is the equation for whether the respondent plans to retire before 1998, but these differences do not hold up once the pension variables are added as in Table 10. 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 12, 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.

VIII. Knowledge Variables and Measures of Benefit Accrual

Reduced form retirement and wealth equations often include measures of benefit accrual. 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 Tables 9 and 10 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, 2001), 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 measure we call premium value, which is a close cousin of peak value but remedies some of its shortcomings, is also included. 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 13 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.[24]

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.[25] 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

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

[25]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.

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.

IX. Conclusions

This paper has developed measures of the degree to which knowledge about future pension and social security benefits is imperfect, and has examined the distribution of these measures of imperfect information in the population. It has linked these measures to planning activities, and explored the relation of these measures to retirement plans, realized retirement dates and to accumulated wealth.

To measure the extent of imperfect knowledge, we compared respondent expectations of their social security and pension benefits with benefits calculated from social security earnings records, reported employment and earnings histories, and administrative descriptions of pensions. The knowledge measures suggest that misinformation or lack of information about expected social security benefits is the norm.

More planning activities are associated with increased information about social security benefits and about pensions. But the relationship is not overly strong. Although some planning activities improve knowledge of retirement benefits, particular planning activities do not have consistent effects on knowledge of social security and pensions. Having asked the Social Security Administration for a benefit calculation reduces the probability of reporting one does not know their benefit by almost 40 percentage points, and lowers the error measured by the absolute value of the relative benefits reported by almost 8 percentage points, but does not affect knowledge of pensions. Informal sources of information, such as unions, also play a role in determining knowledge. Those with pensions are better informed about their social security benefits. 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.

Retirement planning, retirement outcomes and their differences are also systematically related to knowledge measures. Individuals who over (under) estimate their social security and pension benefits are likely to retire later (sooner) than they planned. Those who underestimate their benefits, especially their social security, expect to retire over a six year horizon (1992 to 1998) less often than do those who overstate their benefits. When examining actual retirement conditional on planned retirement, the results are only close to statistically significant. They suggest that those who overstate their social security benefits are less likely to go ahead and retire early if they planned to do so. Overstating pension benefits does not have a similar effect. As a group, the variables measuring knowledge of pensions and social security are significantly related to planned retirement and actual retirement age. Among the coefficients that are significant, most, but not all of them, have the signs that would be expected.

Measures of planning activities as a group are more strongly related to retirement outcomes.

Having established the extent of knowledge and its relation to planned and actual retirement, we then turned to the relation between knowledge and saving outcomes. We find that individuals who expect to retire later have accumulated less wealth. However, we find that systematically overestimating or underestimating the value of expected benefits does not affect the level of assets accumulated for retirement. As a group, variables measuring knowledge of social security and pensions are jointly significant in a median regression for nonpension, non social security wealth as a share of lifetime earnings. 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. Once again, the 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 measure the effect of offset that social security wealth and pension wealth have 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). Such a result would seem to imply that individuals do not actively do much to adjust their savings rates (net of pensions and social security) to offset savings in pensions and social security. It would also appear to imply that savings rates are largely determined by forces other than the desire to maintain a set standard of living in retirement.

In light of this previous work, 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 that individuals save for 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 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.[26]

Caveats and Future Work

There are a number of important caveats to this work. The analysis is exploratory

[26]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 (forthcoming) for relevant descriptive data on the distribution of misinformation about the location of the pension spike in defined benefit plans.

in its approach, relying on descriptive data and relatively imprecisely specified reduced form retirement and saving equations. So our findings should be taken as suggestive, but not conclusive. 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, for those with different levels of misperception in 1992. In addition, a full set of instruments for the knowledge (and planning) variables is not available. Without them 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. 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 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.[27]

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. 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. 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. And as reflected in our model, 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, we have focused on the life cycle motive for saving, but have not incorporated 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 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.[28]

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

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

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

security and pensions may suggest some preliminary routes for providing knowledge. In addition, 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, making the records available to a broader population.

From a policy perspective, it is also important that we have uncovered linkages between measures of knowledge and retirement outcomes. Imperfect information does make a difference. But 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. Where a complete set of instruments is not available, identification may be achieved through implementation of reasonable assumptions about structure, or through experiments, natural or planned.[29] It may be feasible to specify and estimate a structural model that incorporates the major influences of imperfect information on retirement and saving decisions. Such a model may be our best hope for determining the likely effects of expanded policies designed to improve information about social security, pensions and benefit planning. Structural modeling is a difficult route, but the experimental route may be no easier. There have been major changes in the labor market affecting those approaching retirement, including changes in pensions and in the labor force history and participation of younger generations of women. These and other changes will hamper analysis of any "natural experiments".

Our findings, including our documentation of the extent and distribution of misinformation about social security and pension benefits, and the effects of the misinformation on retirement, albeit through limited channels, suggest that efforts to isolate the effects of knowledge of social security and pension benefits on retirement and

[29]Among others, Bayer, Bernheim and Scholz (1996), Bernheim and Garrett (1996) and Clark and Schieber (1998) find that programs adopted by firms to inform workers about their pensions increase their participation in their pensions.

saving are a fruitful line of future research. Without additional research building on these results, it is going to be very difficult to determine the likely effects of policies to increase information about retirement benefits and to evaluate programs to enhance retirement planning.

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
Relation of Knowledge About Expected
Social Security Benefits to Planning Activities

	Expected Social Security Benefits Relative to Actual Benefits				
	<75%	75-125%	>125%	DK	Number of Observations
All Respondents	14.3	27.0	9.8	48.9	3441
Thought About Retirement?					
Some or a Lot	13.6	33.0	10.8	42.6	1695
A Little or Less	12.6	20.4	9.8	57.1	1281
Discussed w/ Spouse					
Some or a Lot	14.7	35.5	11.3	38.6	1096
A Little or Less	12.1	25.0	9.0	54.0	899
Discussed w/ Friends					
Some or a Lot	13.2	33.5	11.1	42.2	1061
A Little or Less	13.2	24.6	10.0	52.2	1911
Attended Retirement Meetings					
Some or a Lot	16.3	39.0	10.8	34.1	578
A Little or Less	12.4	25.0	10.3	52.3	2399
Planning Horizon					
< 1 Year	13.9	21.5	10.3	54.4	864
1-5 Years	11.9	28.4	10.5	49.2	1163
5-10 Years	16.1	29.4	8.5	46.0	1078
10+ Years	17.9	30.2	11.7	40.1	275
Word Recall (Second Time)					
0-5 Words	15.0	25.7	10.2	49.0	1837
6+ Words	13.5	28.2	9.5	48.8	1604
Requested SS Calculations?					
Yes	12.5	50.7	14.5	22.3	810
No	8.6	19.3	9.1	63.0	2385

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

Table 4
Multivariate Analysis of Relation of Planning Activities to Measures of Knowledge of Social Security

	Dependent Variable					
			Social Security Estimation Errors [a]			
	Respondent Doesn't Know SS Benefit	SS Benefit Calculated from Record	Amount of Error	Absolute Value of Error	Relative Error [b]	Absolute Value of Relative Error
Method of Estimation	Probit	Regression	Regression	Regression	Regression	Regression
Pension	-0.023 [0.9]	1289 [6.2]	-25 [0.1]	-660 [2.3]	-0.039 [1.7]	-0.100 [4.8]
Union	-0.043 [2.0]	-395 [2.4]	-215 [0.9]	56 [0.2]	-0.013 [0.7]	-0.019 [1.1]
Planning Horizon						
Next Year or Less	0.035 [1.8]	-59 [0.4]	573 [2.6]	571 [2.8]	0.030 [1.8]	0.017 [1.1]
More than 5 Years	-0.044 [1.4]	459 [2.1]	-16 [0.1]	69 [0.2]	0.005 [0.2]	0.022 [1.0]
Not Available	0.121 [2.1]	597 [1.3]	4 [0.0]	55 [0.1]	-0.002 [0.0]	-0.026 [0.6]
Thought About Retirement						
A Lot	-0.066 [2.7]	-199 [1.1]	-209 [0.8]	-257 [1.0]	-0.006 [0.3]	0.001 [0.0]
Not Available	0.147 [0.7]	2189 [1.4]	1350 [0.6]	-787 [0.4]	0.015 [0.1]	-0.081 [0.5]
Talked About Retirement with Spouse						
A Lot	0.002 [0.1]	-227 [1.1]	304 [1.0]	3 [0.0]	-0.005 [0.2]	-0.022 [1.0]
Not Available	0.041 [1.0]	425 [1.3]	23 [0.0]	247 [0.5]	-0.006 [0.2]	0.011 [0.3]
Talked About Retirement with Friends						
A Lot	-0.012 [0.4]	-110 [0.5]	42 [0.1]	54 [0.2]	-0.001 [0.1]	-0.025 [1.2]
Not Available	0.334 [1.7]	-90 [0.1]	-261 [0.1]	185 [0.1]	-0.091 [0.5]	-0.063 [0.4]
Attended Retirement Meetings						
Yes	-0.073 [3.0]	10 [0.1]	-106 [0.4]	-137 [0.6]	0.007 [0.4]	0.001 [0.4]

Not Available	-0.435 [2.2]	-1678 [1.3]	-2001 [1.1]	727 [0.4]	0.043 [0.3]	0.159 [1.2]
Words Recalled						
Number (0-20)	0.004 [1.2]	18 [0.7]	18 [0.5]	4 [0.1]	0.002 [0.7]	-0.003 [1.3]
Missing	0.134 [2.1]	1267 [2.4]	-406 [0.5]	593 [0.8]	-0.015 [0.3]	0.037 [0.7]
Requested SS Benefit Calculation						
Yes	-0.375 [19.1]	16 [0.1]	268 [1.3]	-697 [3.5]	-0.011 [0.7]	-0.085 [5.8]
Not Available	-0.526 [20.1]	429 [2.0]	-7023 [25.9]	3130 [12.2]	-0.953 [46.8]	0.369 [19.5]
Adjusted or Pseudo R^2	0.1882	0.5692	0.3845	0.2132	0.5842	0.2835
Number Observations	4422	2187	2187	2187	2187	2187

For the probit equation, 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. t or z-statistics are superscripted to the right of the coefficients. These equations include as additional independent variables, not shown in the table, the amount of social security benefit reported by the respondent, 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 and 2, and not in equations 3 through 6.

[a] Difference between the respondents' estimates of annual social security benefits minus the benefits calculated from the social security earnings records.

[b] The estimation error divided by either the respondents' estimates of benefits or by the benefits calculated from the earnings record, whichever is greater.

Table 5
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 6
Relation of Respondent Knowledge about Pensions to Planning Activities
(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
Thought About Retirement?						
Some or a Lot	79.3	25.9	17.4	19.6	37.0	1376
A Little or Less	74.1	25.2	13.0	13.0	48.8	741
Discussed w/ Spouse						
Some or a Lot	79.6	26.9	18.5	19.6	35.0	1007
A Little or Less	75.8	24.5	13.3	15.7	46.5	619
Discussed w/ Friends						
Some or a Lot	80.6	26.7	18.2	20.6	34.5	925
A Little or Less	75.0	24.8	14.2	14.7	46.3	1192
Attended Retirement Meetings						
Some or a Lot	82.6	24.1	19.7	21.0	35.2	555
A Little or Less	75.7	26.2	14.6	16.1	43.1	1562
Planning Horizon						
< 1 Year	73.5	23.4	17.9	14.3	44.5	469
1-5 Years	79.4	26.9	16.7	17.8	38.6	816
5-10 Years	78.0	25.4	14.4	18.4	41.8	753
10+ Years	74.0	26.6	15.3	17.7	40.5	185
Word Recall (Second Time)						
0-5 Words	76.3	26.0	15.0	17.2	41.9	1061
6+ Words	77.7	25.2	16.8	17.2	40.8	1152
Requested SS Calculations?						
Yes	79.3	27.9	16.0	22.0	34.1	421
No	76.8	24.1	15.5	17.4	43.0	1036

Table 7
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	Respondent and Employer Agree Whether Plan Has DB Component	Respondent Doesn't Know Pension Value	Total Respondent Reported Pension Value	Amount of Error	Absolute Value of Error	Relative Error [b]	Absolute Value of Relative Error
Method of Estimation	Probit	Probit	Probit	OLS	OLS	OLS	OLS	OLS
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]
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]
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]
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]
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]
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]
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]
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]

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]
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]
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]
Adjusted/ Pseudo R^2	.2744	.1015	.0634	.6625	.1857	.3756	.1410	.0901
Number Observations	2262	2262	2262	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 inequations 4 and 5, but not in the other equations

[a] Difference between respondents' estimates of pension value minus the values calculated from the pension plan descriptions.
[b] The estimation error divided by either the respondents' estimates of pension value or by the value calculated from the pension plan descriptions, whichever is greater.

Table 8
Relation Between Measures of Knowledge of Social Security
and Pensions and Measures of Retirement

	Percentage Expecting to Retire Before Last Survey[a]	Percentage of Group Retiring According to Expectations		Number of Observations
		Among Those Expecting to Retire Before Last Survey	Among Those Expecting to Retire After Last Survey[b]	
Expected Social Security Benefits				
< 75% of Actual Benefits	23.9%	57.9%	81.6%	481
75-125% of Actual Benefits	42.2	64.9	78.4	874
> 125% of Actual Benefits	38.5	57.2	77.5	346
Expected Pension Benefits				
< 75% of Actual Benefits	41.5	66.8	79.4	567
75-125% of Actual Benefits	48.8	62.8	86.6	341
> 125% of Actual Benefits	45.1	59.6	82.0	383
All Respondents	32.4	62.7	76.8	6,539

[a] Excludes "don't know" responses.
[b] Includes "never retire" responses.

Table 9
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.

Table 10
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 11
Relation of Wealth (Excluding Social Security and Pensions)
to Measures of Knowledge of Social Security and Pensions

	Ratio of Wealth to Lifetime Earnings		
	Planned Retirement Before Last Survey	Planned Retirement After Last Survey[a]	Number of Observations
Expected Social Security Benefits			
< 75% of Actual Benefits	0.17	0.13	482
75-125% of Actual Benefits	0.15	0.13	874
> 125% of Actual Benefits	0.17	0.17	346
Expected Pension Benefits			
< 75% of Actual Benefits	0.19	0.13	567
75-125% of Actual Benefits	0.13	0.14	341
> 125% of Actual Benefits	0.18	0.14	383

[a] Includes "never retire" responses

Table 12
Relation of the Ratio of Non Social Security, Non Pension 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 13
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 & 4)	4,422
8	Eliminate Not Currently Working (Tables 2, 3, & 9)	3,441
9	Eliminate Don't Know Social Security Benefits (Tables 8 & 11)	1,701
10	Begin with Line 8	3,441
11	Eliminate Not Married	2,233
12	Eliminate Nontrivial Inheritances (> $10,000)	2,052
13	Eliminate Households with Wealth > Lifetime Earnings	1,908
	Eliminate if Spouse Is Missing Lifetime Earnings (Table 12)	1,903
14	Begin with Line 8	3,441
15	Eliminate Pension Provider Missing or Invalid (Table 10)	1,242
16	Eliminate Not Married	827
17	Eliminate Nontrivial Inheritances (> $10,000)	761
18	Eliminate Households with Wealth > Lifetime Earnings	719
	Eliminate if Spouse Is Missing Lifetime Earnings (Table 12)	718
19	Begin with Line 3	9,348
20	Eliminate Not Currently Working	6,539
21	Eliminate Pension Provider Value Missing or Invalid (Tables 5-7)	2,262
22	Eliminate Don't Know Pension Benefits (Tables 8 & 11)	1,291

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 13 is detailed in Gustman and Steinmeier (2001), 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 was not asked.

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