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Abstract

This paper further extends our efforts to understand how household decision-making works and the relation of decisions made within the household to incentives from Social Security and pensions. A structural model of family retirement decision making is estimated using U.S. data from the Health and Retirement Study (HRS), which includes comparable labor market histories for husbands and wives.

Compared to our earlier results, the coefficient on the age variables are substantially lower when parameter estimates are based on the HRS data. This is particularly important because the responsiveness of retirement to the incentives created by pensions and other policies is greater the lower the coefficient on the age measure.

Our findings also provide some further insight as to the source of the interdependence in the retirement behavior of husbands and wives. Our earlier results suggested that the appearance of the spouse's retirement measure in the utility function of each individual was responsible for much of the coordination in retirement that we observe between spouses. Here we find that a measure of how much each spouse values being able to spend time in retirement with the other accounts for a good portion of that apparent interdependence. When we include this measure, the simulations almost double the frequency of predicted joint retirements. Moreover, the entire effect of the wife's interdependence is due to the difference between those who value spending time in retirement with their spouse and those who do not. It also remains true that husbands are more influenced by whether their spouse is retired, with half of this effect reflecting their response to whether they enjoy the idea of spending time in retirement with their spouse.

With regard to the effects of policy alternatives that would privatize social security, or divide benefits between spouses, the policies seem to have only a limited effect on retirement outcomes. Because social security is roughly actuarially fair, and the different schemes for dividing benefits have only a modest effect on the rewards, it would not be reasonable to expect large effects. At some ages, such as 65, there may be as much as a 6 percent increase in the old age work force under privatized accounts that effectively raise the reward to work at older ages compared to the current program.

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I. Introduction

There are a number of reasons why economists are interested in the process of retirement decision making within the family. Most fundamentally, it is not possible to understand the retirement decision of one spouse without considering the behavior of the other. Aspects of consumption are joint, and so is family wealth. The valuation of one's own leisure may depend on the amount of the spouse's leisure. Finally, the reward to work for one spouse may depend on the labor market activities and work history of the other.[1]

Accordingly, it is reasonable to expect that the retirement decisions of each spouse may be influenced by the actions of the other. More generally, analysis of joint retirement decisions may further our understanding of other dimensions of behavior within and by the family unit. Yet much of the research on retirement behavior has focused on the individual.[2] To the extent that important interactions between spouses have been ignored, the retirement decision will be misunderstood, and so will the roles played by public policies and private retirement programs.

One reason analysts have focused on the behavior of the individual rather than the family is that estimation of many models of family behavior may be clouded by a lack of identifying

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[1]For example, the increase in the value of the social security benefits that accrues to the family from the work of one spouse depends on the work history and employment of the other spouse (Gustman and Steinmeier, 2001c). We analyze the effects of interactions within the social security system and some alternative structures in Section VIII.

[2]See, for example, Burtless and Moffitt (1984), Fields and Mitchell (1984), Gustman and Steinmeier (1986a and b), Stock and Wise (1987), Berkovec and Stern (1991) and Lumsdaine, Stock and Wise (1990, 1992, 1994, 1996). For an analogous structural model of retirement fit to data for married women, see Pozzebon and Mitchell (1989). There are fewer studies examining the retirement decisions of both spouses together. Most are reduced form. For a survey, see Lundberg (1999). Recent examples using the HRS include Coile (1999) and Johnson and Favreault (2001)

instruments. Fortunately, however, in the case of the retirement decision, the reward structure is shaped not only by the wage, but by the accrual rate in the value of pensions and social security. These programs may create sharp differences in the incentives facing each spouse, and among couples, promoting more precise identification as each spouse responds to a sharp incentive that differs from the incentive facing their spouse. Thus the interactions between husbands and wives in the course of deciding on joint retirement behavior may be easier to estimate than are the interactions underlying other decisions reached within the family. In turn, more precise identification of the decisions reached by each spouse will not only promote increased understanding of the retirement decision, but what is learned about spouse interactions in the course of retiring may also increase understanding of other household decisions, such as bargaining between spouses, saving and even the formulation of the household.

Pension plan provisions are helpful in identifying the determinants of the behavior of each spouse for a number of reasons. These provisions create sharp spikes in the benefit accrual profile for the plan.[3] The locations of these spikes depend idiosyncratically on the date of hire

[3]Typically, a defined benefit pension is a plan that provides a benefit based on the length of tenure on the job, annual earnings in the last few or highest few years of work, and the chosen age of retirement. At normal retirement age, a plan might provide a benefit equal to say 1.5 percent of the average of last three years of earnings times years of service. Most often, such plans allow individuals to retire early, but only if they have met tenure and age requirements. Moreover, these plans often reduce benefits for those retiring at the early retirement age, but not on an actuarially fair basis. The effect of such reductions is to create a spike in the pension accrual profile at the early retirement age. Many such plans also provide other incentives to retire early, further enhancing the size of the spike. In contrast, a defined contribution plan provides benefits based on contributions to an account, by the employer and perhaps also by the employee. The reward structure is much smoother. Although some DC plans offer special early retirement enhancements, most DC plans do not, and thus do not generate a spike in the benefit accrual profile. (See Gustman and Steinmeier, 1989, for a discussion of the relevant literature and an extensive analysis of the factors determining the shape of the benefit accrual profile in the case of covered workers surveyed by the Survey of Consumer Finances.)

and age at hire, and vary among pension plans, and thus differs between spouses. In addition, the sizes of the spikes vary widely among plans and among individuals, again depending on their work histories. The spikes in pension accrual profiles for defined benefit plans may be very large, equaling or exceeding the wage for working another year. In contrast to wages and other benefits that are closely related to the wage, which accrue relatively smoothly over time, the sharp spikes in pension accruals break the close relationship between the substitution and wealth effect, and hence facilitate identification of these effects. If a person responds strongly to economic rewards, he or she is unlikely to retire in the few years before becoming eligible for early retirement benefits, at least in the absence of a strong outside influence such as a bout of ill health.

Further aiding identification, there is reason to believe the incentives created by pensions and social security are truly exogenous to the individual decision maker. Those with pensions have only limited turnover from their jobs (Gustman and Steinmeier, 1993, 1995). Accordingly, by the time they retire, pension covered workers typically have a long tenure. There have been many large changes in pensions during the course of the work lives of those pension covered workers in the U.S. who are now approaching retirement.[4] Thus for those who are now within a decade of retirement age, the incentives from pensions in place at the time of retirement are very

[4]Consider some of the major changes in pensions that have occurred over the work life of those cohorts now approaching retirement. Plan type has shifted from defined benefit to defined contribution (Gustman and Steinmeier, 1992, 2000b). The size of the spike associated with early retirement has increased. In addition, there has been a sharp decline in the age of eligibility for early retirement, falling eight years between the late 1960s and the early 1980s (Anderson, Gustman and Steinmeier, 1999). Today, three fourths of HRS respondents with a defined benefit plan are eligible for an early retirement benefit by age 55 (Gustman and Steinmeier, 2000c). There also have been analogous changes in the normal retirement age.

different from what they were when they first accepted their jobs. Having made their decisions to join their firms decades earlier, these strong trends mean they could not foresee what their pensions would look like at the time they were hired. The implication is that causality does not run from leisure preference to the opportunity set, but from the pension to retirement choice[5]. Analogously, the incentives from social security are largely exogenous to the decision making of the family.

In an earlier study (Gustman and Steinmeier, 2000a), we used respondent self reports describing their pension plans to estimate a structural model in which the decisions of the two spouses were combined in a possibly non-cooperative bargaining model of retirement. There is an important concern about this earlier work. At the time we wrote that paper, there was no longitudinal survey that combined information on work history and current work effort with information from respondents' employers describing the pension plans that they offered. For those covered by defined benefit plans, we had to rely on the respondent description as to the location and size of the early retirement spike and to impute benefits and the accrual spike using a generic formula and information on average actuarial adjustments. Available evidence now establishes that respondents do a poor job of reporting the key pieces of information necessary to locate and determine the size of spikes in their pension accrual profile (Gustman and Steinmeier, 2001a, 2001b). Indeed, respondents even report plan type with considerable error (Mitchell, 1988; Gustman and Steinmeier, 1989).[6]

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[5]For a contrasting view arguing that selection into pension plans is related to the propensity to save and to leisure preference, see Ippolito (1998).

[6]This is also a major problem because reported plan type is used to determine whether the respondent is asked questions about the characteristics of a defined benefit, or a defined

Data have recently become available that facilitate the estimation of joint retirement models. Pension plan descriptions have been obtained from the employers of respondents answering longitudinal surveys. These data provide a precise picture of the location and size of the spikes in the accrual profiles of defined benefit pensions, while allowing retirement behavior to be recorded in a timely fashion in the relevant wave following retirement.

The present paper takes advantage of new longitudinal surveys that link employer provided pension plan descriptions and earnings histories obtained from the Social Security Administration with panel data following the household through the retirement decision. We rely primarily on the Health and Retirement Study (HRS). However, later in the analysis we also use data from the National Longitudinal Survey of Mature Women (NLS-MW), which now include employer provided pension plan descriptions. Despite the availability of employer provided pension data, certain features of the NLS-MW make it less satisfactory for estimating a model of joint retirement behavior than the data from the HRS[7]. However, the estimates based

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contribution plan.

[7]There are two basic problems with the NLS-MW. One is incomplete reporting of the spouse's labor market activities. The respondent to the NLS-MW is the woman in the household. There is an excellent earnings history, based on interviews from 1967 to the last survey, available for the woman. She also reports, but only incompletely, and for much of the period retrospectively, on the labor market activities and earnings of her spouse. Although below we update the NLS-MW results to incorporate employer provided plan descriptions, we cannot improve the husbands' earnings histories in the NLS-MW. Another problem is that pension plan descriptions were matched in the NLS-MW with a three period lag that clouds matching process. In contrast, the Health and Retirement Study interviews each spouse separately, asking individually about their own labor market activities, including current and previous work. Moreover, the match process is more contemporaneous, and the HRS provides earnings records from the Social Security Administration that allow exact measurement of the joint earnings histories of both spouses. These differences improve the identification of parameters for each spouse within the structural model when the HRS data are used.

on the NLS-MW help to build a bridge to the findings from our earlier study.

Once estimated, the model is used to investigates three potential channels which might generate the elevated level of instances in which the spouses retire at around the same time. The estimation also is extended to incorporate information on the preferences of each spouse regarding the value of time spent together. In a final section, we also simulate the effects of adopting individual social security accounts and benefit splitting, policies that would change the distribution of social security benefits within the household.

II. Overview of the Model[8]

We specify a joint retirement model that mixes noncooperation with some elements of cooperation, and selfish utility maximization with joint utility maximization. The two spouses share household consumption. They do not consume goods according to own income. For each spouse, utility is a function of own leisure, which in part may be determined by spouse's leisure, and household consumption. Although each spouse acts to maximize own utility, at a given level of own utility, each would choose any feasible alternative that improves their spouse's utility.

The utility functions for the two spouses are specified symmetrically. The subscript or superscript h signifies a variable that pertains to the husband; w signifies a variable pertaining to the wife.

For the husband we have:

[8]This model is developed in Gustman and Steinmeier (2000a). A more complete description can be found there.

$$U_h = \sum_{t=0}^{T} \left[\frac{1}{\alpha} C_t^{\alpha} + e^{X_t^h \beta_h + \gamma_h L_t^w + \epsilon_h} L_t^h \right]$$

For the wife, the utility function is:

$$U_w = \sum_{t=0}^{T} \left[\frac{1}{\alpha} C_t^{\alpha} + e^{X_t^w \beta_w + \gamma_w L_t^h + \epsilon_w} L_t^w \right]$$

C_t is family consumption, and L_t^h and L_t^w are the leisure of the husband and wife. L_t is a dichotomous variable taking on a value of 0 if the individual is working and 1 if retired at time t.[9] Each individual lives T years, and t is time since household formation. The terms $e^{X_t^h \beta_h + \gamma_h L_t^w + \epsilon_h}$ and $e^{X_t^w \beta_w + \gamma_w L_t^h + \epsilon_w}$ determine the relative values of retirement to the husband and wife. X_t is a vector of variables that includes a constant term, age, and health. ϵ is an individual fixed effect, where higher values of ϵ indicate higher values of retirement to the individual. As age increases, so does the value of leisure. When the value of retirement outweighs the value of the wages from working, the individual retires.

Each spouse's utility may be linked to the other's through three possible channels. Most directly, consumption is family consumption, financed by a joint budget constraint which is described below. In addition, the spouse's utility appears in the exponential expression affecting the value of one's own leisure. Lastly, the fixed effects in their respective utility functions may be correlated for husbands and wives.

Both the husband and wife maximize their respective utility functions subject to the constraint that lifetime family consumption cannot exceed family income:

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[9]Primarily to keep the model simple enough to estimate, part-time work is ignored and retirement is considered to be an absorbing state; once retired, one cannot return to work.

$$\sum_{t=0}^{T} d^t C_t \leq Y = \sum_{t=0}^{T} d^t (1 - L_t^w) W_t^w + \sum_{t=0}^{T} d^t (1 - L_t^h) W_t^h$$

In this budget constraint, both consumption and wages are expressed in real terms, and d is the real interest rate. W_t^h and W_t^w are the husband's and wife's compensation amounts when employed. In addition to wages, compensation includes annual accruals to the present values of pensions and social security, due both to own and spouse and survivor benefits.

The sequence of decisions is straightforward. Because there is a common consumption parameter α, both spouses can agree on how to spend a given amount of lifetime family income. Each spouse then chooses own labor supply to maximize his or her own utility function. In choosing own labor supply, we assume that each spouse knows the leisure preferences of the other, and so bases their choice of own labor supply on the labor supply that the other spouse will choose as a result. With each spouse's labor supply entering the utility function of the other spouse, there is the possibility of two or more Nash equilibria. Should there be more than one Nash equilibrium, the one that is advantageous to both spouses will be chosen. When the spouses prefer different Nash equilibria, we assume that the spouse who retires first chooses the retirement date which is advantageous to that spouse, taking into account the retirement date that the second spouse will subsequently choose. There is no uncertainty in the model. Since both spouses know each others' preferences from the start, consumption and labor supply decisions are planned at the beginning of the life cycle with perfect foresight.

Details to the solution of the model are presented in our earlier paper. For family i, let $S_i(\alpha, \beta_h, \beta_w, \gamma_h, \gamma_w)$ be the set of values of ϵ_h and ϵ_w in the utility maximization problem which are consistent with retirement between the observed dates. If the retirement age for either

spouse is not observed within the survey period (1992-2000), the set will not be bounded; this effectively is how the estimation procedure accommodates cases where a respondent has already retired before the survey starts or is still has not retired when last observed. Note that the boundaries of the set depend on the values of the utility function parameters. Further suppose that the values of ϵ_h and ϵ_w come from a bivariate normal distribution with density $f(\epsilon_h, \epsilon_w | \sigma_h^2, \sigma_w^2, \rho)$, where σ_h^2 and σ_w^2 are the variances of ϵ_w and ϵ_h, and ρ is the correlation. Using this notation, the log-likelihood function is

$$\ln \mathcal{L} = \sum_{i=1}^{i=N} \ln \left[\int_{S_i(\alpha,\beta_h,\beta_w,\gamma_h,\gamma_w)} f(\epsilon_h, \epsilon_w | \sigma_h^2, \sigma_w^2, \rho)\, d\epsilon_h\, d\epsilon_w \right]$$

The integrals in the log-likelihood function are evaluated with a standard routine for cumulative joint probabilities of bivariate normal distributions. The likelihood function is maximized using a standard maximization routine, and standard errors for the estimates are calculated by the Berndt-Hall-Hall-Hausman method.

III. The Data

Our central focus is on results using the Health and Retirement Study (HRS).[10] These results pertain to couples with a long term marriage, where each spouse also has a long term commitment to the labor market. 5,390 respondents meet these initial criteria out of the original HRS sample of 12,652. Table 1 describes the derivation of the sample. Of the 9896 respondents

[10]The HRS is funded primarily by the National Institute on Aging, with additional support from the Social Security Administration and others.

who were married in the initial survey, 1921 of them had changed spouses, either through divorce or widowhood, after age 35. After allowing for some duplications among families, this means that approximately 17% of the couples are deleted because a lifetime planning model is probably not appropriate. More importantly, over 60% of the couples were dropped because one spouse was not a career worker. Specifically, 2585 respondents out of 7975 (representing about 4000 couples) did not meet the criteria for a career worker.[11]

Next we face a trade-off between bias due to missing data and bias due to instrumentation. In a nonlinear model like ours, the choice is fairly clear: include only observations for which the required data are available. To illustrate, in our nonlinear model, certain types of incorrect information, such as the wrong date for the location of the spike in the pension accrual profile due to early retirement provisions, will create a severe bias. Suppose that the detailed description of a defined benefit pension plan is missing, and we impute a value for the date of eligibility for early retirement benefits that is after the actual date of eligibility.

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[11]We use fairly liberal criterion in defining who is a career worker. Career workers are those who have worked full-time (30 hours or more) more than 50% of the time between age 40 (or 1982, whichever came earlier) and the last year of observed full-time work, as determined by the jobs in the job history and the full-time work answers in wave 3. The last year of full-time work must be no earlier than age 50, or if the worker was not 50 in 1992, he or she must have been working full-time in 1992. This was cross-checked with the social security records if those were available; a worker would not be considered to be a career worker if he or she had zero social security earnings in more than 50% of the years in the above-mentioned interval, unless the individual indicated that there were either government jobs or non-social security jobs. Also, an individual would always be considered to be a career worker if the social security earnings record indicated that he/she earned at least 60% of the real wages earned in the final full-time job for more than 50% of the years in the interval, even if the job history did not indicate enough years. This should catch instances of a series of short jobs which would be missed in the job history. Since it is improbable that there are many duplications of non-career workers within individual families, this means that around 60% of the families (2585 ÷ 4000)were dropped because one spouse was not a career worker.

Although the person may have retired at the time he became eligible under his actual plan, the model will find the respondent leaving just before becoming eligible for the (imputed) early retirement eligibility date. Consequently, the estimation will indicate that the person is not at all sensitive to economic incentives, since the foregone benefit accrual might have amounted to a year's pay or more from working for an additional few weeks or months. However, the error is not symmetric: if the imputed early retirement date is too low and the respondent retires at a later date, we would not necessarily conclude that the respondent is highly sensitive to economic incentives. By confining the estimation to those observations where a full set of information is available, we avoid this very strong bias that may result from imputation. That is why we have decided to omit observations for which we do not have an exact description of the pension, and to extend this choice to estimate findings only for the portion of the sample for which a complete data set is available.

Of the 5390 who are career workers in families, data problems with the respondent reduce the survey by one third (269 + 53 + 365 + 8 + 1094 = 1789; 1789/5390 = 0.33). Of this decline in the sample, about 61 percent of the loss is due to missing pension data (1094/1789).[12] From the perspective of the entire sample, about two thirds of these older workers have pensions, and the provider profile is missing for about a third of them, meaning that over a fifth of these workers are dropped because of a missing pension. Again assuming relatively little duplication of missing pensions within a family, this means that almost 40% of two-worker families would

[12]The pension plan descriptions are missing disproportionately for employees in small firms, college grads, those with more than $100,000 in assets, long tenure workers, those in manufacturing and management, those earning more than $100,000 per year, those with defined contribution plans only, those with DB plans paying low benefits, and those with $25,000 to $100,000 in DC plans. Regressions are reported in Gustman and Steinmeier (2001a).

be dropped for this reason. In addition, forty percent of the original 5390 observations (2171/5390) were lost because the respondent met all of these criteria, but the spouse did not. As seen in Table 1, in the end the sample used in the estimation is a special subgroup, one representing roughly 27 percent (1430/5390) of the original observations of respondents with career jobs and a long term marriage, amounting to 715 couples.[13]

We are going to compare the findings from the HRS with results from two studies that we undertook with data from the NLS Mature Women's Survey (NLS-MW). The first, Gustman and Steinmeier (2000a), used data through the 1989 wave. The women in the NLS-MW were born between 1923 and 1937 and thus were 52 to 66 years old in 1989. Pension incentives were measured only crudely. The basic problem was that pension characteristics used in that analysis were self reported. We know from other work (e.g., Gustman and Steinmeier, 1989, 2000a) that there are substantial errors in pension self reports. Without a detailed description, we had to adopt a crude approximation of the pension incentives.[14] After all of these exclusions, there were

[13]There are three other more minor yet not completely non-trivial deletions. The first is instances where the number of full-time years is ambiguous. These are primarily cases where the social security record is missing and either the respondent was not interviewed at wave 3 or the wave 3 information about full-time years is missing. The second reason is instances where the age in one survey was greater than or equal to the age reported in a subsequent survey. This calls into question which age is correct and throws into doubt whether we have the correct age for the timing of retirement. The third reason is that the 9896 married individuals in 1992 do not translate exactly into 4948 couples, since there were some instances where one spouse was interviewed but the other refused. This brings down the number of married couples interviewed in 1992 somewhat; in Table 1 this is reflected in the "Spouse observation not good" line.

[14]Thus the pension is assumed to be a simple DB plan, where the benefit is the product of a generosity coefficient times years of service times final salary. The generosity coefficient (the term in the benefit formula determining the replacement rate) is calculated from the report of expected pension benefits, or if expected pension benefits are not reported, a figure of 1.6 percent is used, which is the median for those plans for which we did have information. We assumed that all pensions reduce benefits from the age of normal retirement by 4.9 percent per

564 couples in the NLS-MW sample using self reported pension incentives.

Bridging the gap between our earlier study and the present one, we had an updated version of our earlier study. These results are based on the NLS-MW data through a later year (1992) and include information on pensions from employer provided pension plan descriptions.[15] The pension summary plan descriptions were collected from employers after the 1989 survey, but these were not released until the release of the 1992 respondent data.

Nevertheless, there also are some problems with the later study. Because the NLS-MW was a study of women, there was very limited information available for the husband. Although it was possible to match the employer provided pension plan descriptions, they were available for only one fifth of the husbands with a pension. In contrast, pension plan descriptions from current or last jobs are available for roughly two thirds of HRS respondents who report pensions on those jobs. Moreover, a full work history is available for about 70 percent of the respondents to the HRS in the form of the social security earnings history. In contrast, although the NLS-MW data provides an extensive work history for wives, the work history for husbands is badly incomplete, and in the end relies on retrospective data rather than panel data recorded contemporaneously, or administrative data. Indeed, in the NLS-MW, the self reported pension information on which we rely for matching an employer provided pension plan description for the husband was collected from the wife.

Because of these severe problems undermining our ability to match employer provided

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year, a figure found in earlier work by Hatch et al. (1981).

[15]These findings are based on a study we conducted for the U.S. Department of Labor, Bureau of Labor Statistics (Gustman and Steinmeier, 1998).

plan descriptions in the NLS-MW, we used a different procedure than we follow with the HRS. For the NLS-MW sample, in cases of missing pension descriptions, we used the early and normal retirement dates reported on the respondent survey (by the wife for her own and for her husband's pension). From this we constructed the pension accrual profiles using the generosity and early retirement reduction factors calculated as the means of employer provided pensions in the same industry, occupation, and earnings category. The idea was to use as many observations as possible in the smaller NLS-MW sample by anchoring the pensions on the self-reported early and normal retirement ages and imputing the generosity and reduction factors as the averages for pensions in similar jobs. However, the fact that we employed imputation procedures for the pensions in the NLS-MW means that estimates of the responsiveness to economic incentives are probably understated in these results.

The NLS-MW contains 2,084 women who were married at the beginning of the survey and who participated in each of the surveys through 1992.[16] Of these, in our second study using NLS-MW data there are 499 couples in the sample.[17]

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[16]Since the initial age of respondents was 30 to 44 in 1967, women who dropped out in the early years of the survey did so before reaching retirement age, and hence these women would not shed much light on a retirement analysis in any case.

[17]Career workers refer to those with substantial full-time work experience (at least three consecutive surveys of work after age 40 and at least one-half of the surveys before the last survey with full-time work for women, or at least two-thirds of the surveys before the last survey with full-time work for men), and at least one survey of full-time work after age 50. Full-time work means at least 25 hours of work per week for women or at least 1250 hours per year for men, for whom usual weekly hours are not always available. Using a 35 hour per week or 1500 hour per year definition results in slightly higher joint retirement, but at a cost of about 20 percent of the sample.

IV. Descriptive Analysis

Tables 2 and 3 provide some idea as to the timing of retirement of husbands and wives within the HRS sample. By comparing the two parts of each table, we can determine the similarity between the sample used in our later analysis, and the full sample including observations with missing data. Part A of each table is based on the sample of those for whom we have information on retirement, but not information on the budget constraint, while part B of each table includes only those for whom we have all required information, both on retirement and on the budget constraint. It is the sample in part B of each table that is estimated and analyzed in later in the paper.

Among those in Table 2A who meet the definition of couples with a lifetime commitment to the labor market, 514 wives and 476 husbands retire after the last wave of the survey. In addition, 235 wives and 284 husbands retired before the first wave of the survey. With 2,934 total wives and husbands in the sample in Table 2A (1,467 couples), that leaves 1,425 individuals, or 48.6% of the original sample of career workers married only to their current spouses, who retired in waves 2, 3, 4, or 5 of the survey.

In Table 2B there are 715 couples. Thus approximately half of the couples in Table 2A will be lost for not having economic information available (715/1,467). Among the sample with all the information required for estimation of our structural model available, 662 out of 1,430, or 46.3 percent, retired in waves 2, 3, 4 or 5 of the survey.

Table 3 examines the patterns of retirement among HRS couples, according to their age differences. Among the 435 couples in Table 3A, which includes observations whether budget constraint variables are available or not, the wife is older than the husband in only 49 of them, or

in 11.3% of the cases. Similarly, among the 192 couples in Table 3B, which excludes observations with budget constraint variables missing, the wife is older than the husband in 24 of them, or in 12.5% of the cases. In an additional 36 households in Table 3A, the wife and husband are the same age. So in more than three quarters of the households in both samples, the husband is older than the wife. Nevertheless, the median difference in time of retirement is zero, with 205 couples (47 percent of couples) with spouses who retire within the same year. Similarly, the median difference in Table 3B is zero, with 86 couples (45 percent of couples) with spouses who retire in the same year. Moreover, the distributions of differences in retirement age are symmetric around zero in the two tables. This evidence suggests the two samples, those with complete data and the full sample which also includes observations with missing data, are similar. These findings are also strong evidence of coordination of retirement among the two career couples in the HRS who have already retired.

The data in Table 3 do not describe the patterns of retirement that will ultimately be observed, however, since the couples in Table 3 are selected to include those who retired by the fifth wave of the survey, and thus who have a stronger preference for retirement. As indicated in Section II, the estimation procedure does not censor the sample if either spouse has yet to retire, and thus the analysis below will focus on explaining the distribution of retirements that will ultimately be observed for this cohort.

V. Estimates of the Structural Model

Columns 1 and 2 of Table 4 report the maximum likelihood estimates for the parameters of the joint utility function and the associated t statistics using data from the Health and

Retirement Study. Following the methodology reported above, the equations for the status of each spouse are jointly determined, allowing for the underlying interaction of the decisions of each spouse in a noncooperative bargaining model. The estimation searches for the coefficients of each of the parameters appearing in the utility function(s) and the range of fixed effects that are most likely to be associated with the retirement outcomes observed for the couple, conditional on the constraints formed by the wage offer, any pension and social security. The dependent variable in the equation for each spouse is an indicator of the work-retirement decision in each wave of the survey for which the respondent was observed.

We estimate a parsimonious specification of the utility function, with only a few right hand side variables included in evaluating the utility for each spouse. First there is α, the exponent on the measure of joint consumption. The remaining measures affect the utility of retirement and are different for each of the spouses. For each spouse, the measure of age is continuous, so that no special effects are built into the outcomes through a dummy variable corresponding to whatever age the retirement hazard happens to spike at. Spouse's retirement status is a qualitative binary variable defined as whether the spouse is contemporaneously retired. Health status is an indicator equal to one if the respondent has reported in two successive surveys that health status is fair or poor, or if self reported health status is fair or poor for the last observed survey. An indicator of vintage (year of birth) is also included.

The estimated coefficients are similar to those we found in our earlier study (Gustman and Steinmeier, 2000a), which are reported in column 3 of Table 4, with the associated t statistics in column 4. Column 5 reports the coefficients obtained from the expanded sample from the NLS-MW which also included employer provided pension plan descriptions, or

matched descriptions that involved defined benefit plans with comparable early and normal retirement dates.

The easiest way to interpret the findings is to begin with the coefficient on the age measure. This parameter indicates that roughly speaking, utility of retirement is increasing for the husband by about 60 percent per year with each year of age ($e^{.47}$ -1), and by about 52 percent per year for the wife ($e^{.42}$ -1). The coefficients on the age variable are lower in the HRS than in the NLS-MW.[18] That suggests that policies will be found to be more effective when they are evaluated using utility function parameters from the HRS. As suggested earlier, the smaller effects of age in the HRS may be due more precise estimation of the pension accrual profile in the HRS, where pension plan descriptions were exactly matched, in contrast to reliance on crude pension formulas and self reported plan descriptions as in column 3, or a mix between imputed and matched plan descriptions, as in column 5.

For the husband, in the results using HRS data, having a retired wife is equivalent to the effect of being about a year older. This is similar to our published findings based on the NLS-MW seen in column 3, and a bit smaller than the NLS-MW results based on employer plan descriptions, which suggests that having a retired wife is equivalent to about another 1.8 years of age. For the wife, having a retired husband is equivalent to about another three quarters of a year of age, whereas there was almost no effect of having a retired husband in the NLS-MW sample. Because the effect of each year of age is greater for the husband, having a retired spouse continues to have a larger effect for men than for women, but the difference is narrower than we

[18]The age coefficients in column 3 translate into percentage effects of 85 percent for each year of age for men, and 70 percent for women; while the coefficients in column 5 translate into percentage effects of 96 and 108 percent for each year of age for men and women respectively.

found in our earlier work.

In the HRS findings, for the husband the effect of ill health is equivalent to about an additional 1.5 years of age. This is considerably less than we found using the NLS-MW self reported data seen in columns 3 and 4, where poor health is equivalent to about three years of aging. For the wife, ill health has the same effect as about another 2.7 years of age, which is greater than the NLS-MW results, where ill health is equivalent to about another 1.6 years of age.

Vintage is also significant, as is the standard deviation of the fixed effects. The former result suggests that those in widely different vintages will have considerable differences in taste. However, we should note that both the NLS and HRS are focused on a fairly narrow range of vintages, and extrapolating very far outside this range may be unsound. As for unobserved differences in retirement preferences (the fixed effects), it is clear from the magnitude of the standard deviation of these preferences that variations in taste create a considerable difference in retirement behavior.

Lastly, the correlation of the fixed effect retirement preferences using the HRS data is almost identical to the value found in our earlier published data. This correlation is considerably weaker in the NLS results with employer provided pension data.

VI. Sources of Joint Retirement

In this model, it is difficult to compare directly the coefficients for the spouse retirement variables with the correlation coefficient for the unobserved part of preferences. Both the correlation coefficient and the coefficient of the wife retired variable in the husband's

preferences are significant, and the coefficient of the husband retired variable in the wife's preference is close to significant. By themselves, the sizes or even the significance of these measures do not establish which is more important as a determinant of joint retirement. To determine the relative importance of each effect, we conduct simulations of retirement behavior which include and exclude these effects.

To do the simulations, the procedure is as follows. The simulations are performed for the same couples who were used in the estimation, using the same values for the compensation streams and for the variables in the X vector as were used in the estimation. A random draw is made from the bivariate normal distribution of ϵ_w and ϵ_h, allowing for the standard errors of the two ϵ's and their correlation. This gives the retirement ages of the wife and husband corresponding to these values of the ϵ's. This process is repeated 10,000 times for each couple in the sample.

Table 5 reports on the main results of these simulations for the HRS sample and for each of the NLS-MW samples. The fractions of households retiring together in each survey are reported in row 1 of the table. A great deal of caution is required in interpreting the results in row 1. Specifically, statistics on the baseline level of joint retirements should not be compared across surveys nor should they necessarily be compared to the simulation results. According to row 1 in Table 5, the proportion retiring together is much higher in the HRS than in the NLS-MW. But this may be due to two factors which make the numbers in this row to some degree non-comparable. First, these figures consider couples to retire together if they retire between the same two waves. But the waves are separated by different amounts of time in the two surveys. HRS waves are always two years apart. However, the NLS-MW waves are in some cases only

one year apart. The longer period between survey waves will make the HRS figures on coincidence of retirement higher. Secondly, the percentages in row 1 of Table 5 use in the denominator only those couples for whom both retirements were observed. In the HRS, these cover only four periods between the five waves, while in the NLS-MW they cover a considerably larger number of waves. A perhaps more useful comparison across the surveys is that in the HRS, about three times as many couples retire together as at adjacent cells (see Table 3 above), and this is about the same proportion as in Figure 3 in our previous work (Gustman and Steinmeier, 2000a).

The simulations in the second row of Table 5 are for the full model, and in subsequent rows for the model with one or another source of interdependence in preferences eliminated. To clarify the measure of simultaneous retirement reported in the sample, if the simulation resulted in the husband retiring in 1994 at age 62 and the wife retiring in 1997 at age 58, the value of this variable would be -3. A value of 0 indicates that both spouses retired in the same year.

In contrast to the results in Row 1 of Table 5, which present the fraction retiring at the same time in the raw data, consisting only of those who had retired by the time the survey was taken, the simulations in the other rows of Table 5 report the retirement dates for all couples in the sample. Thus the results in rows 2 through 5 adjust for selectivity to incorporate the retirement dates for those who were not observed to retire by the last year of the survey.

Row 2 of Table 5 gives the results using the full model, including the spouse retirement variables and the correlation between unobserved preferences. In the HRS data, 9% of couples are simulated to retire in exactly the same year. Figure 1 shows the simulated distribution of relative retirement ages. The spike in the middle of the figure indicates the joint retirement. The

part of the figure to the right refers to cases where the husband retires first, and the part to the left refers to cases where the wife retires first. The figure indicates that the incidence of joint retirement appears to be almost twice as great as as the incidence of retirement one or two years apart.

Row 5 of Table 5 shows the results of simulations setting to zero the correlation in unobserved preferences and omitting the spouse retirement variables from the utility functions of the two spouses.[19] These results lower the spike at joint retirement to the same level as the adjacent values in Figure 1 and thus exhibit no evidence of joint retirement. Note that this simulation eliminates any preferences for joint retirement, but does not eliminate incentives for joint retirement that operate through the opportunity set. For instance, if couples tended to choose jobs that had the same early retirement date in their pensions, the pensions might still induce a tendency toward joint retirement even if the couples otherwise had no particular preferences towards retiring at about the same time. This simulation, however, effectively rules out the possibility that a significant proportion of joint retirement arises because of coordinated retirement incentives in the compensation profiles.

The other two simulations reported in Table 5 examine separately the omissions of the spouse retirement variables and setting the correlation of the unobserved preferences to zero. Row 3 omits the spouse retirement variables but keeps the correlation at the value found in the last row of Table 4. The correlation parameter has almost no effect on joint retirement. In

[19]In this simulation, the constant in the linear form $X\beta$ is increased to compensate for the omission of the spouse retirement variable. Otherwise, the omission of the spouse retirement variable would reduce the coefficient of leisure in the utility function and lead to an increase in retirement ages generally.

contrast, when in row 4 we include the spouse retirement variables but omit the correlation, the spouse retirement variables alone accounts for almost all of the spike in joint retirement that is evident in the full model.

VII. Including A Direct Measure of Spouse Preferences for Joint Retirement

To further explore the role of preferences for joint retirement, we include a direct measure of the desire of each spouse to retire with the other. The Health and Retirement Study asked each respondent how much being with the other spouse is a positive point of retirement (questions K11d and K21d). This variable is defined to have a value of 1 if the respondent said that being with the spouse was a "very important" benefit of retirement. About half the respondents gave this response to the question. In the expanded model, the new variable is entered in the linear form βX as $... + \beta_e$ (spouse retired) (enjoy time with spouse) + ... This has the effect of splitting the old coefficient of spouse retired into a part dependent on the new enjoy spouse variable and a remaining effect.

The model estimates with the new variable are presented in Table 6. This new variable picks up almost all of the effect of the original spouse retirement variable for wives, and around half for husbands. The wife's parameter is significant at the 92% confidence level, and both variables are jointly significant that the 98% confidence level. Figure 2 indicates the relative retirement distributions implied by these results. Compared to Figure 1, this indicator of preference for joint retirement leads to a substantial increase in the share of joint retirements, from about 9 percent to almost 16 percent. Moreover, joint retirement now is about three times more common than retirement at adjacent values, which more closely approximates the

retirement observed in Table 3B.

Table 7 reports the effects of the decomposition as to the reason for joint retirement when the "enjoy spouse in retirement" measure is included with the preference variables. Once again, virtually all of the explanation for joint retirements resides with the spouse retirement coefficient rather than with the correlation in preferences.

VIII. Simulating the Effects of Alternative Rules for Sharing Benefits Within the Household

Policy makers are concerned with the rules governing the sharing of social security benefits between spouses. Under current provisions, when both spouses are alive each spouse is entitled to an amount equal to half the benefits earned by the other, or to benefits based on own earnings, whichever is larger. When one dies, the other will receive either the survivor benefit (equal to the benefit the deceased was entitled to with some adjustment for early claiming), or the benefit based on their own earnings, whichever is larger. It can be shown that, because of the progressivity of the social security benefit formula, a lower earning spouse will have all benefits received while their spouse is alive based on own earnings if, very roughly, the AIME from own earnings is one third or more of the AIME of the high earning spouse. That is, one third of the AIME results in half of the higher earning spouse's PIA. The incentive to continue to work depends in part on the marginal reward to continued work. Thus the incentive for a household member with the lower AIME to continue to work after reaching age 62 depends in part on the increase in social security benefits associated with each additional year of work, which in turn depends on the earnings of each spouse. In addition, in most cases, the increase in benefit from

own work for the lower earning spouse will be relevant only as long as the higher earning spouse remains alive. On the other hand, to the extent that both spouses are alive and each is collecting benefits based on own earnings, the value of additional work to the high earnings spouse will be reduced when the spouse does not benefit from spouse benefits.

The model we have estimated permits analysis of the effects of alternative policies governing the crediting of benefits within the household. Some schemes for sharing benefits among spouses, including schemes that would simply divide credit for total earnings in a household evenly between the two spouses, will change the incentives for continued work for each spouse. The model we have estimated is structural and as a result allows us to isolate the effects both of current law and of proposed policy changes.

Table 8 presents cumulative retirement probabilities by age from retirement simulations under three different programs. The first two columns present results under the current program. In the next two columns, the results are simulated for a program where the accruals are simply equal to the contributions. This corresponds roughly to a situation where the entire amount is placed in a private account and allowed to grow at the interest rate. Note that whether or not it is annuitized at retirement is irrelevant in this model, since the only thing that matters in the model is the expected present value of the accrual. This also means that any liquidity effects are not accounted for. Thus these findings are not the same as those that would be observed were liquidity constraints included in the model. With regard to this scheme, note that the accruals are relatively flat, rather than as in the current social security scheme, where the lifetime accruals start high for the first decade or two of work and then drop considerably by the time the individuals reach their fifties and sixties. The flatter accruals mean that the rewards for working

later are relatively higher than the rewards to working in the early years, and this should delay retirement.

In the last two columns, the results pertain to a program where there is simple earnings splitting. That is, credited earnings are divided equally between the husband and wife each year. Most of the story here will be distributional between families where both spouses work and earn on a comparable basis, and the other where one spouse is the primary earner. Consider two couples, one with a single $40k worker and one with two $20k workers. This plan would leave unchanged the situation of the two $20k workers but would transform the $40k family to look like the two $20k workers. This has two effects. The progressivity of the benefit formula would make the own benefits higher, since twice the benefits of a $20k worker are more than the own benefits of a $40k worker. This would be offset because separate spouse and survivor benefits would be lost. The loss in spouse and survivor benefits is more important, so the family with a single $40k worker would be made worse off. Also note that splitting the earnings does not mean that the family with a single $40k worker is not better off that one with two $20k workers, since the financial calculations do not value the leisure of the stay at home spouse.

Table 8B presents simulations based on the model in which each respondent indicates how much they value being with their spouse in retirement, whereas Table 8A runs the same simulations where the indicator of spouse retirement status influences each spouses valuation of retirement, but the variable indicating the valuation of spending time with one's spouse in retirement is missing.

As seen in Tables 8A, these alternative programs reduce the ranks of the retired by one to two percentage points. At age 55 men are about eight tenths of a percentage point less likely to

have retired under a privatized system or one where credit for working is evenly split between spouses than under the current system. Wives are almost two percentage points less likely to have retired by age 55 under the alternative systems. By age 60 and 62, men are about 1.5 percentage points less likely to be retired under the alternative systems. Wives are two to three percentage points less likely to have retired under the alternative system. Smaller differences are found at age 65. With half the male labor force retired by age 62 and more than two thirds of the female labor force retired, these one to two percentage point differences in the share of the population retired translate into more than a two to four percent increase in the labor force around age 62. By age 65, given the lower base in number working, an almost two percentage point difference in the proportion retired translates into roughly a six percent increase in the size of the male labor force, and a 1.5 percentage point difference in the proportion retired translates into almost a 14 percent increase in the number of women working. Even when account is taken of the preference for having the spouse jointly retired, the implications of these two alternative programs are roughly the same as before, as is indicated in Table 8B.

IX. Conclusions

At the outset of this paper we emphasized the potential importance of using employer provided pension plan descriptions to measure the incentives facing husbands and wives who have a pension. Broadly speaking, our findings are comparable across surveys. Nevertheless, there are important advantages from having incorporated the employer provided plan descriptions rather than using imputed the pension incentives, and having labor supply histories for both spouses. Compared to our earlier results, the coefficient on the age variables are

substantially lower when parameter estimates are based on the HRS data. This is particularly important because the responsiveness of retirement to the incentives created by pensions and other policies is greater the lower the coefficient on the age measure.

Our findings also provide some further insight as to the source of the interdependence in the retirement behavior of husbands and wives. Our earlier results suggested that the appearance of the spouse's retirement measure in the utility function of each individual was responsible for much of the coordination in retirement that we observe between spouses. Here we find that a measure of how much each spouse values being able to spend time in retirement with the other accounts for a good portion of the apparent interdependence. When we include this measure, the simulations double the frequency of predicted joint retirements. Moreover, the entire effect of the wife's interdependence is due to the difference between those who value spending time in retirement with their spouse and those who do not. It also remains true that husbands are more influenced by whether their spouse is retired, with half of this effect reflecting their response to whether they enjoy the idea of spending time in retirement with their spouse.

With regard to the effects of policy alternatives that would privatize social security, or divide benefits between spouses, the policies seem to have only a limited effect on retirement outcomes. Because social security is roughly actuarially fair, and the different schemes for dividing benefits have only a modest effect on the rewards, it would not be reasonable to expect large effects. At some ages, such as 65, there may be as much as a 6 percent increase in the old age work force under privatized accounts that effectively raise the reward to work at older ages compared to the current program.

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Table 1
Reasons for deletions of observations from the HRS Sample

	Observations Deleted	Observations Remaining
Original observations		12652
Not married in 1992	2756	9896
Changed spouses after age 35	1921	7975
Not a career worker	2585	5390
Age not consistent among surveys	269	5121
SS record missing and no good earnings	0	5121
Social security status ambiguous	53	5068
Number of full-time years ambiguous	365	4703
Earnings unclear from SS record alone	8	4695
No Pension Provider record in last job	1094	3601
Spouse observation not good	2171	1430
Second respondent in family	715	715
Number of couple observations	715	

Table 2
Retirement Tabulations From the HRS by Year

A. Including Observations With Missing Budget Constraint Data

	Retirement of Wife						
	Before 1992	1992-1994	1994-1996	1996-1998	1998-2000	After 2000	Sum of Husbands
Retirement of Husband							
Before 1992	107	43	37	25	27	45	284
1992-1994	26	59	15	19	15	29	163
1994-1996	24	21	46	21	21	40	173
1996-1998	22	17	27	53	24	36	179
1998-2000	26	8	17	25	47	69	192
After 2000	30	28	34	40	49	295	476
Sum of Wives	235	176	176	183	183	514	1467

B. Excluding Observations With Missing Budget Constrain Data

	Retirement of Wife						
	Before 1992	1992-1994	1994-1996	1996-1998	1998-2000	After 2000	Sum of Husbands
Retirement of Husband							
Before 1992	48	19	19	12	11	29	138
1992-1994	13	24	8	12	9	14	80
1994-1996	10	4	14	8	11	26	73
1996-1998	10	7	13	25	10	14	79
1998-2000	10	3	9	12	23	39	96
After 2000	12	16	18	24	23	156	249
Sum of Wives	103	73	81	93	87	278	715

Table 3
Retirement Differences Between Husbands and Wives In The HRS Among Couples Who Have Already Retired, By Age Difference Between Husband and Wife

A. Including Observations With Missing Budget Constraint Data

	Difference in Retirement Surveys (Husband - Wife)							
Age Difference Husband - Wife	-3	-2	-1	0	1	2	3	Sum
-10	0	0	0	1	0	0	0	1
-9	0	0	0	0	0	0	0	0
-8	0	0	0	0	0	0	0	0
-7	0	0	0	1	0	0	0	1
-6	0	0	0	1	0	0	0	1
-5	0	0	1	1	0	0	0	2
-4	0	0	0	2	0	0	0	2
-3	0	0	0	4	1	0	0	5
-2	1	0	1	6	2	1	0	11
-1	1	2	3	12	5	3	0	26
0	1	2	3	17	9	4	0	36
1	1	1	8	26	8	3	1	48
2	3	6	1	24	12	5	2	53
3	0	7	11	21	8	6	1	54
4	2	6	11	25	8	2	1	55
5	1	8	3	13	4	3	1	33
6	2	0	7	10	5	0	1	25
7	0	1	5	14	4	5	0	29
8	1	0	0	11	2	1	0	15
9	1	4	2	5	3	0	0	15
10	1	3	4	11	2	1	1	23
Sum	15	40	60	205	73	34	8	435

Table 3
Retirement Differences Between Husbands and Wives In The HRS Among Couples Who Have Already Retired, By Age Difference Between Husband and Wife

B. Excluding Observations With Missing Budget Constraint Data

	Difference in Retirement Surveys (Husband - Wife)							
Age Difference Husband - Wife	-3	-2	-1	0	1	2	3	Sum
-10	0	0	0	0	0	0	0	0
-9	0	0	0	0	0	0	0	0
-8	0	0	0	0	0	0	0	0
-7	0	0	0	1	0	0	0	1
-6	0	0	0	0	0	0	0	0
-5	0	0	1	0	0	0	0	1
-4	0	0	0	1	0	0	0	1
-3	0	0	0	2	0	0	0	2
-2	0	0	1	5	2	1	0	9
-1	0	1	0	7	1	1	0	10
0	1	1	0	7	5	2	0	16
1	1	1	6	11	3	1	0	23
2	2	3	1	8	6	3	1	24
3	0	4	7	8	3	4	1	27
4	1	5	6	15	3	1	0	31
5	0	3	2	4	1	2	0	12
6	1	0	1	1	0	0	1	4
7	0	0	1	5	1	1	0	8
8	1	0	0	5	1	0	0	7
9	1	2	0	1	2	0	0	6
10	1	3	0	5	1	0	0	10
Sum	9	23	26	86	29	16	3	192

Table 4
Parameter Estimates for a Structural Model

	HRS		NLS-MW Self Reported Pensions		NLS-MW Firm Reported Pensions	
	coefficient	t-statistic	coefficient	t-statistic	coefficient	t-statistic
Joint consumption exponent	-0.59	-2.7	-1.53	-4.0	-1.21	-3.4
Husband's parameters						
Constant	-10.18	-12.0	-20.03	-15.7	-18.34	13.9
Age[b]	0.47	4.8	0.61	4.1	0.68	4.4
Wife's Retirement	0.50	2.2	0.58	1.1	1.19	2.9
Health	0.72	2.3	2.05	3.7	1.88	3.7
Vintage[c]	0.11	2.7	0.11	2.3	0.12	2.6
Std. dev. of fixed effects	2.75	5.5	3.41	3.4	3.51	5.0
Wife's parameters						
Constant	-9.23	-17.0	-18.62	-26.8	-17.28	-16.6
Age[b]	0.42	5.3	0.53	5.2	0.73	4.3
Husband's Retirement	0.31	1.7	0.10	0.3	0.00	---[a]
Health	1.12	3.4	0.98	3.1	1.05	2.5
Vintage[c]	0.12	3.5	0.08	2.0	0.11	2.4
Std. dev. of fixed effects	2.35	5.8	2.71	5.8	3.56	4.7
Correlation of fixed effects	0.24	4.2	0.24	4.1	0.09	1.5
Number of Observations	715		564		449	
Log likelihood	-1776.50		-1394.47		-1545.24	

Age is measured at the time of each survey. An individual is retired if not working full-time with no further observations of full-time work. Health equals one if in two consecutive surveys (or in the last observed survey) self-reported health is fair or poor.

a. In the wife's retirement equation in column 5, the coefficient for the variable indicating the husband is retired is constrained to be zero.

b. The actual age variable is the observed age minus 55. This is done to facilitate the maximization routine, and it has no implications for the estimates other than affecting the constant terms in the linear forms.

c. The actual vintage is the year of birth minus 1930 for the NLS, and the year of birth minus 1936 for the HRS.

Table 5
Proportion of Households With Husband and Wife Retiring Together

	HRS Data with Employer Reported Pensions	NLS-MW with Self Reported Pensions	NLS-MW with Employer Reported Pensions
Raw Data[a]	0.47[c]	0.25	0.27
Full Model	0.09	0.11	0.14
Without Spouse Retirement[b]	0.05	0.05	0.06
Without Rho	0.08	0.10	0.14
Without Both Spouse Retirement and Rho	0.05	0.04	0.06

a. Results for raw data include only those observations where both spouses retired by the last wave of the survey. Results estimated with model adjust for selection and include those retiring after the age range observed for the survey.
b. When the spouse retirement variable is set equal to zero, the constants are increased so as not cause an increase in the average retirement age.
c. Computed from Table 3 as 205/435.

Table 6
The Structural Model Estimated With HRS Data
Including A Measure of Enjoyment of One's Spouse

	coefficient	t-statistic
Joint consumption exponent	-0.58	-2.7
Husband's parameters		
Constant	-10.02	-11.8
Age	0.45	4.7
Wife's Retirement	0.53	2.0
Wife's Retirement*Enjoy Time With Wife	0.34	1.2
Health	0.71	2.3
Vintage	0.09	2.5
Std. dev. of fixed effects	2.69	5.4
Wife's parameters		
Constant	-9.10	-16.7
Age	0.42	5.3
Husband's Retirement	0.06	0.3
Husband's Retirement*Enjoy Time With Husband	0.52	2.2
Health	1.07	3.3
Vintage	0.12	3.4
Std. dev. of fixed effects	2.36	0.4
Correlation of fixed effects	0.19	3.3
Number of Observations	715	
Log likelihood	-1772.3922	

Table 7
Proportion of HRS Households With Husband and Wife Retiring Together

	HRS Without "Enjoy Spouse"Variable	HRS With "Enjoy Spouse Variable"
Raw Data[a]	0.47[c]	0.47[c]
Full Model	0.09	0.16
Without Spouse Retirement[b]	0.05	0.05
Without Rho	0.08	0.15
Without Both Spouse Retirement and Rho	0.05	0.05

a. Results for raw data include only those observations where both spouses retired by the last wave of the survey. Results estimated with model adjust for selection and include those retiring after the age range observed for the survey.
b. When the spouse retirement variable is set equal to zero, the constants are increased so as not cause an increase in the average retirement age.
c. Computed from Table 3 as 205/435.

Table 8
Effects of Alternative Social Security Schemes on Cumulative Retirements by Age

A. Model Without Enjoy Spouse Variable

	Current System		Private Accounts		Divide Earnings	
age	husband	wife	husband	wife	husband	wife
45	0.1	1.2	0.1	0.9	0.1	0.8
46	0.1	1.8	0.1	1.4	0.1	1.3
47	0.3	2.6	0.2	2.1	0.2	2.0
48	0.5	3.6	0.4	3.0	0.4	2.8
49	0.8	5.0	0.7	4.2	0.7	4.0
50	1.3	6.9	1.2	5.9	1.1	5.6
51	2.1	9.4	1.8	8.2	1.8	7.9
52	3.2	12.3	2.8	10.9	2.9	10.6
53	4.7	15.9	4.2	14.4	4.2	14.1
54	6.6	20.4	6.0	18.6	6.1	18.4
55	9.5	25.8	8.7	23.8	8.8	23.7
56	12.9	31.5	11.9	29.4	12.1	29.4
57	17.2	38.0	16.0	35.9	16.2	36.0
58	22.5	45.2	21.2	43.1	21.4	43.3
59	28.8	52.2	27.3	50.1	27.6	50.4
60	36.2	59.7	34.5	57.8	34.9	58.1
61	43.4	66.6	41.7	64.9	42.1	65.3
62	50.9	74.0	49.1	71.6	49.6	72.0
63	58.3	79.7	56.6	77.6	57.1	78.0
64	65.4	84.7	63.8	83.0	64.7	83.3
65	72.7	89.1	70.9	87.5	72.4	88.1
66	78.6	92.2	77.0	90.9	78.6	91.6
67	84.0	94.6	82.4	93.6	84.0	94.2
68	88.3	96.3	86.9	95.6	88.4	96.2
69	91.7	97.6	90.5	97.1	91.7	97.5
70	93.6	98.2	93.3	98.1	93.4	98.2
71	95.6	98.8	95.4	98.8	95.5	98.9
72	97.1	99.3	97.0	99.3	97.0	99.3
73	98.1	99.6	98.1	99.6	98.1	99.6
74	98.8	99.8	98.8	99.8	98.8	99.8
75	100.0	100.0	100.0	100.0	100.0	100.0

Table 8
Effects of Alternative Social Security Schemes on Cumulative Retirements by Age

B. Model With Enjoy Spouse Variable

	Current System		Private Accounts		Divide Earnings	
age	husband	wife	husband	wife	husband	wife
45	0.1	1.1	0.1	1.0	0.1	0.9
46	0.2	1.7	0.2	1.4	0.2	1.3
47	0.3	2.5	0.3	2.2	0.3	2.0
48	0.5	3.5	0.5	3.0	0.5	2.8
49	0.9	4.8	0.8	4.2	0.8	4.0
50	1.4	6.6	1.3	5.9	1.3	5.7
51	2.2	9.2	2.0	8.2	2.0	7.9
52	3.3	12.1	3.0	10.9	3.0	10.7
53	4.8	15.7	4.3	14.4	4.3	14.1
54	6.8	20.2	6.2	18.6	6.2	18.4
55	9.7	25.6	8.9	23.8	8.9	23.7
56	13.2	31.3	12.1	29.4	12.3	29.4
57	17.5	37.9	16.3	35.9	16.4	36.0
58	22.9	45.0	21.4	42.9	21.7	43.1
59	29.3	52.0	27.7	49.9	28.0	50.2
60	36.8	59.5	35.0	57.5	35.4	57.9
61	44.1	66.0	42.2	64.6	42.7	65.0
62	51.8	73.8	49.8	71.3	50.3	71.7
63	59.4	79.5	57.4	77.4	58.1	77.8
64	66.5	84.5	64.6	82.7	65.6	83.0
65	74.0	89.0	72.1	87.2	73.7	87.9
66	79.7	92.1	77.9	90.7	79.5	91.4
67	85.1	94.5	83.4	93.4	85.0	94.1
68	89.2	96.3	87.7	95.5	89.1	96.0
69	92.5	97.6	91.2	96.9	92.4	97.4
70	94.2	98.1	93.8	98.0	94.0	98.1
71	96.0	98.8	95.8	98.8	95.9	98.8
72	97.4	99.3	97.2	99.2	97.3	99.3
73	98.3	99.6	98.2	99.6	98.3	99.6
74	99.0	99.8	98.9	99.7	98.9	99.7
75	100.0	100.0	100.0	100.0	100.0	100.0

Figure 1
Distribution of Differences in Retirement Dates Between Husband and Wife

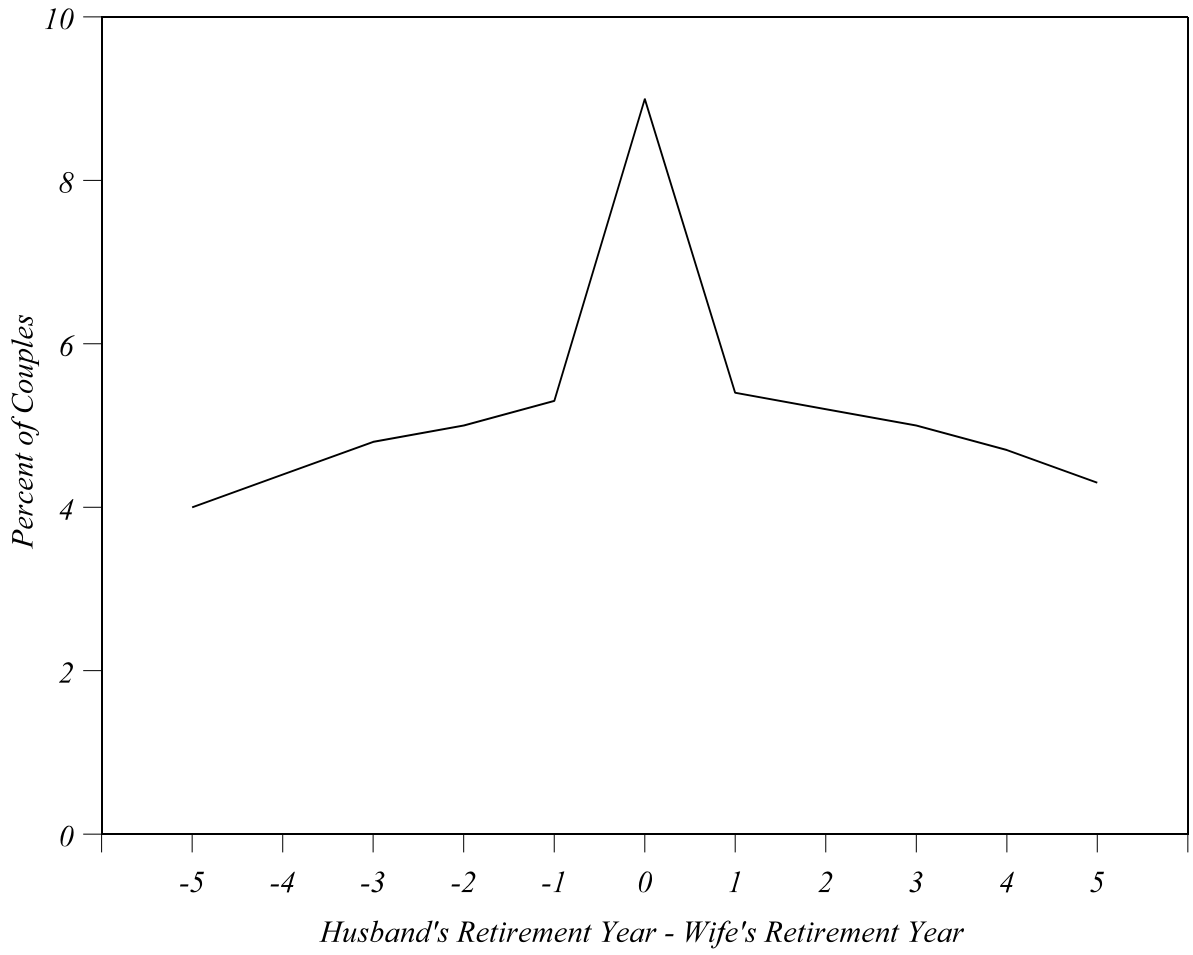

Figure 2
Distribution of Differences in Retirement Dates Between Husband and Wife
Using the Model with the "Enjoy Spouse Retirement" Variable