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ABSTRACT

According to CPS data, men 65 to 69 were about six percentage points less likely to be retired in 2004 than in 1992. CPS and Health and Retirement Study (HRS) data indicate a corresponding difference of 3 percentage points between 1998 and 2004. Simulations with a structural retirement model suggest changes in Social Security rules between 1992 and 2004 increased full time work of 65 to 67 year old married men by a little under 2 percentage points, about a 9 percent increase, and increased their labor force participation by between 1.4 and 2.2 percentage points, or 2 to 4 percent, depending on age. Social Security changes account for about one sixth of the increase in labor force participation between 1998 and 2004, for married men ages 65 to 67. These rule changes encourage deferring retirement from long term jobs, returning to full time work after retiring, and increasing partial retirement. Although married men in their fifties decrease their participation in the labor force over this period, this is not due to changes in Social Security, but may reflect other factors, including changes in disability.

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I. Introduction

When Congress passed Social Security legislation in 1983, one of their goals was to increase the labor force participation of older workers. They raised the normal retirement age and increased the delayed retirement credit, phasing in these changes over decades. In 2000, the Senior Citizens Freedom to Work Act abolished the Social Security earnings test for those between the full retirement age and age 70. Consistent with these rule changes, the labor force participation of men 65 to 67 stopped declining, then stabilized, and more recently has increased -- by about six percentage points between 1992 and 2004, and by 3 to 4 percentage points between 1998 and 2004.

The aim of this paper is to determine the extent to which changes in Social Security are responsible for these changes in retirement of older men. Changes in market factors and government policies induced by the aging of the baby boomers also have undoubtedly played a role.[1] To obtain an estimate of the effects of changes in Social Security rules on retirement, one must standardize for the influence of these other factors.

To isolate the effects of changes in Social Security rules, we use a dynamic, stochastic structural retirement model fit to data for married males from the Health and Retirement Study. This model provides us with an estimate of the preferences that influence the retirement decision. We then change the opportunity set to reflect the differences in the Social Security rules applicable to different cohorts, while holding constant the other factors that shape retirement. We use a newer version of our model of retirement and saving. This version has been expanded

[1] Anderson, Gustman and Steinmeier (1999) explore the effects on retirement of changing Social Security rules, pensions and earnings between 1969 and 1989. Over this period there was a sharp decline in labor for participation of men in the sixties. We found that changes in pensions and Social Security accounted for about a quarter of the decline in labor force participation of men ages 60 and 62 observed in the 1970s and 1980s, with the effects of pension and Social Security changes being roughly of equal importance. This earlier version of our model found that changes in Social Security and pensions did not account for the 24 percent decline in labor force participation of 65 year old men over the period. The changes in Social Security and pensions alone were expected to generate a 7 percent increase in the participation of 65 year old men over the two decades.

to explain not only the fraction who partially retire and who work full time, but also to incorporate reversals in decisions. Some people first decrease their work effort by partially or fully retiring, and then at some time later increase their work effort. Using this model, we find that changes in Social Security increase full time work by those 65 to 67 by about 9 percent between 1992 and 2004, and over the 1998 to 2004 period, account for about a sixth of the observed increase in labor force participation of those 65 to 67.

Section 2 of the paper discusses patterns of labor force participation of older workers and places the recent trend in retirement of males over 65 into perspective. Section 3 summarizes key features of the structural model of retirement and saving. Section 4 calculates the likely effects of changes in Social Security on the retirement of older married men. Section 5 concludes.

2. Patterns of Labor Force Participation of Older Men

Most of the twentieth century was characterized by a decline in the labor force participation rates of older men (Costa, 1998). After 1985, the trend to earlier retirement of men ceased (Quinn, 2002). There has been disagreement over whether the leveling of the trend to earlier retirement is permanent or temporary (Costa 1999 vs. Quinn 1999). But there is no controversy in the literature over the observation that at the end of the 1980s, the trend to earlier retirement of men at least leveled (U.S. Social Security Administration, Technical Report of Expert Panel, 2003). Now a variety of researchers are suggesting that this trend may not only have stabilized, but may have recently reversed.[2]

[2] Much of the evidence for a reversal of the retirement trend is based on data on retirement expectations by those who are still in the labor force (Willis in ongoing work for the HRS, and Maestas, 2006).

In contrast to the gyrations of the labor force participation of older men, in recent decades the labor force participation of older women increased. This finding goes hand-in-hand with the large increase in the labor force participation of women of all ages.

Among the changes in government policies induced by the aging of the baby boomers, the abolition of mandatory retirement and the adoption of other rules prohibiting age discrimination encourage delayed retirement. Employment and compensation policies of firms were also changed to encourage continued work. One important change is the trend in pensions from defined benefit plans, which often had exerted strong incentives for early retirement, to defined contribution plans, which are more neutral when it comes to encouraging retirement at a particular age. On the other side of the ledger, rising incomes encourage earlier retirement. Rapid advances in technology, the rise of international competition and the decline of unionized, durable goods and other industries also exert pressures toward earlier retirement. The influence of changing labor market participation decisions of women also may influence their husbands' retirement decisions.

Our analysis of the relation of changes in Social Security to changing patterns of retirement is based on data from The Health and Retirement Study (HRS). Table 1 shows the various birth cohorts for which retirement data are available in the HRS. There are three groups of 50 to 56 year olds. They include the younger half of the original HRS cohort, those born from 1936 to 1941 who were 50 to 56 in 1992. Also included are members of the war baby cohort, born from 1942 to 1947. They were 50 to 56 in 1998. Lastly, members of the early boomer cohort, born from 1948 to 1953, were 50 to 56 in 2004. There also are three groups of 56 to 62 year olds.[3] One group, born in 1932 to 1937, was 56 to 62 in 1994.[4] Those born in 1936 to 1941

[3] Notice that when using birth years to define cohorts, given that the survey was mid-year, there is some overlap in reported age between cohorts.

were 56 to 62 in 1998, and those born from 1942 to 1947 were 56 to 62 in 2004. Finally, there are two groups of 61 to 67 year olds. They include those born from 1931 to 1936 in 1998, and those born from 1937 to 1942 in 2004.[5]

Descriptive data for the HRS cohorts are presented in Table 2. There we define full time work, partial retirement and full retirement using hours per year of work. A person is said to work full time if hours per year of work are 1250 or higher; to be partially retired if hours of work range from 100 to 1249, and are fully retired if hours of work are 99 or lower. Comparable data by age group and cohort are presented in the two panels in Figure 1.

Consistent with the literature, those over 65 are retiring *later* in 2004 than in earlier years. Contrary to the suggestions in the current literature, according to the data in Table 2, those 50 to 56 have retired *at younger ages* in 2004 than in previous years. Figure 1 indicates that retirement trends are similar when measured either with the HRS or with the CPS surveys. Most important from the perspective of the present study, for those in their sixties, there is an increase in the employment population ratio, with the strongest increase for those 65 and over. According to HRS data, between 1998 and 2004, the fraction of 65 to 67 year old men who were completely retired declined by 3.1 percentage points. According to CPS data, the comparable increase in the employment population ratio for 65 to 67 year old men between 1998 and 2004 was about four percentage points, with a six percentage point increase between 1992 and 2004.

In contrast, for men in their early fifties, employment population ratios decline between 1992 and 2004, and for those in their late fifties, there is a decline between 1998 and 2004. Over

[4] For the 56-62 year olds, there are no 62 year-old eligibles in the original HRS cohort in 1992. It didn't seem wise to shift the age range, so the first group of 56-62 year olds relates to the 1932-1937 cohorts in 1994, not 1992. The underlying reason for this problem is that the original cohort contained only 11 birth years, so it could not be divided up into two 6 year groups corresponding to the later cohorts. As a result, as the HRS cohorts are moved through time, one has to change either the birth cohorts or the age ranges.

[5] For similar reasons to those noted in the previous footnote 2, the 61-67 group in 2004 was born in 1937-1942, not 1936-1941. That is, in order to keep the same age range in 2004 as in 1998, we borrowed a birth year from the war babies cohort.

this period, the percentage of 50 to 56 year old men who are not retired – that is, working 1250 hours or more, declined from 77.1 to 75.5 percent. The percent who are fully retired increased 1.7 percentage points. This change is consistent with the long run trend toward earlier retirement, but as suggested by ongoing work by Hurd and Rohwedder, it is also consistent with very early exit from the labor force, perhaps due to increased disability. Consider next the change between 1998 and 2004. The 75.5 percent of males 50 to 56 years old who worked 1250 hours or more in 2004 represents a decline from 80.4 percent who worked 1250 hours or more in 1998. Almost two percentage points of the decline in the number working full time is mirrored by a corresponding increase in the share of 50 to 56 year old males working part time (defined as working 100 to 1249 hours). But again, in contradiction to the idea that early retirement is becoming less common, the fraction of 51 to 56 year old males fully retired (i.e., working less than 100 hours per year) increased from 16.2 percentage points in 1998 to 19.4 percent in 2004. With standard deviations of between 0.8 and 1.2 years, the retirement rates observed between 1998 and 2004 are significantly different from each other.

Figure 2 shows comparable data for women fifty and over. The trend to increased labor force participation of women is found to be reflected in lower retirement rates, with work effort of older women having increased consistently through all age groups.

3. Methodology for Simulating the Effects of Social Security Changes With A Structural Model of Retirement and Saving

To isolate the retirement effects of changes in Social Security policies, we apply a dynamic-stochastic model of retirement and saving. With this model we hold constant the preferences of potential retirees and other components of their opportunity set, while allowing Social Security rules to change. Wages, incentives from pensions, and layoffs are among the

other factors that are included in the opportunity set, and are held constant when we simulate the effects of changes in Social Security over time. More specifically, we simulate retirement using the Social Security rules applicable to the original HRS cohort, and then again simulate retirement using the Social Security rules that apply to those born six and twelve years later. The retirement changes simulated by the model are then matched against those observed in the descriptive data.

Our approach standardizes not only for the effects of changes in demand for members of different cohorts over time, but also for unique events, such as the stock market boom, which affected members of different cohorts at different stages of their life cycles.

Empirical Estimates of the Retirement Model.

The model we use was estimated in Gustman and Steinmeier (2006). That paper presents a detailed description of the model and our estimation strategy. Here we briefly outline the model and then use the estimated model to simulate the effects of the different Social Security rules that applied to the different age groups sampled by the Health and Retirement Study.

As in a standard life cycle model, individuals maximize expected utility subject to an asset evolution constraint. Consumption and leisure over the lifetime are the choice variables in the model. The stochastic variables include the returns to assets, mortality outcomes, and retirement preferences. Potential wages and health are treated as exogenous and non-stochastic. Preferences for retirement may change once a person has retired, creating a mechanism that accounts for reversals from states of greater to lesser work.

In the model, for each year i, the individual chooses consumption C and leisure L to maximize expected utility:

$$EU_i = E_i\left[\sum_{t=i}^{T}\left\{e^{-\rho t}\sum_{m=1}^{3} s_{m,t}\left(\tfrac{1}{\alpha}C_{m,t}^{\alpha} + h_t L_{m,t}^{\gamma}\right)\right\}\right]$$

L takes on a value of 1 if the individual is retired, 0 if he or she is working, and 0.5 if the individual is partially retired. h_t indicates the strength of the individual's preference for retirement, which may vary from one person to the next. ρ is the time preference rate, which also may vary from one person to the next.

The model is estimated for married men. The income of the spouse is assumed to be exogenous and non-stochastic. The index m takes on three values indicating whether both members of the couple survive until year t, only the husband survives, or only the spouse survives. $s_{m,t}$ is the probability that the household will have the composition described by m in year t. T corresponds to the maximum age beyond which the household's survival probabilities are too small to matter.

The asset constraint is given by

$$A_t = (1 + r_t) A_{t-1} + W_t (1 - L_{m,t}) + E_{m,t} + B_{m,t} - C_{m,t}$$

A_t is the level of assets in year t, and r_t is the stochastic return on those assets in year t. Assets are assumed to start out at 0 at the beginning of the working life and are not permitted to be negative. W_t is the wage rate at time t, which will depend on whether the individual has stayed on his or her career job, which we also label as his or her main job, or has previously retired and is going back to work. The career (main) job is considered to be the job the individual holds until he fully or partially retires for the first time. The term $E_{m,t}$ is the income accruing to the spouse, including earnings and pensions. The spouse is assumed to have a retirement date unaffected by the individual's choices, and the term is taken to be zero in states where the spouse is no longer alive.

$B_{m,t}$ is the amount of the individual's pension and the household's Social Security benefits, both of which will be affected by the individual's retirement decisions. For defined

benefit pensions, the benefit amount is determined by the retirement date and continues until death. For defined contribution pensions, the contributions are put into an account and allowed to accrue subject to the same stochastic return as is applied to assets. The account is assumed to be made available to the individual when the individual retires from the career job. Household Social Security benefits are calculated according to the Social Security rules, depending on previous retirement decisions and the composition of the surviving household. Since most individuals claim benefits as soon as eligible (Coile et al., 2002; Gustman and Steinmeier, 2002), we do not try to model the acceptance decision here and instead assume that the individuals will claim the benefits as soon as they can, consistent with the earnings test.[6]

Individuals are assumed to be heterogeneous with regard to both their time preference rate and their retirement preferences. With regard to time preference, we assume that ρ has a different value for different individuals and essentially treat it as a fixed effect in the estimation.[7] Retirement preferences are reflected in the coefficient to the leisure term in the utility function and are characterized by

$$h_t = e^{\beta X_t + \varepsilon_t}$$

The linear form βX_t has three terms: a constant, age, and health status. The coefficient of age is taken to be positive, so that retirement gradually becomes more desirable as the individual ages and finds work to be more difficult.

The ε_t term in h_t reflects relative preference for leisure. An individual starts out with a value of ε drawn from a distribution with mean 0 and standard deviation σ_ε and keeps this value until he retires from the career job. Upon retirement, the individual may find that

[6] For a model that includes benefit claiming as an endogenous decision, see Gustman and Steinmeier (2007).
[7] In a different context, Ippolito (1997) makes differential time preference rates a central focus. His analysis concerns the employer demand for labor and the structure of pensions.

retirement is more or less fulfilling than anticipated, or perhaps the individual may find that he values consumption relatively more than he had thought. In any case, experience allows the value of ε to change after retirement, and the model reflects this by allowing the value of ε_t to vary after retirement, with values in successive years correlated with a correlation parameter ρ_ε. If the individual finds that retirement is substantially less fulfilling than anticipated, a return to work, albeit at a reduced wage as compared to the career job, may be the optimal decision.

L^γ is proportional to the utility value of leisure. It has a value of zero if the individual is working full time (L = 0), a value of one if the individual is fully retired (L = 1), and a value of one-half if the individual is partially retired (L = ½). $L^\gamma = (½)^\gamma$ should take on a value between 0.5 and 1 if diminishing marginal utility of leisure is to be satisfied. Call this value V_p. If V_p is close to unity, full time work is particularly onerous compared to partial retirement work, and most people should go through a period of partial retirement. If, on the other hand, V_p is close to 0.5, the marginal disutility of work is rising very slowly with additional work. As with time preferences and ε, we assume that individuals are heterogeneous with regard to their valuation of partial retirement leisure. For any individual, V_p comes from a random draw from the truncated exponential distribution $f(Vp) = ke^{\delta V_p}$, defined on the interval 0.5 to 1. For a given δ, k is the value needed to make the distribution function integrate to unity over the interval. If δ is positive, values of V_p toward unity will be more common, while if δ is negative, values near 0.5 will be more common. δ is a function of age: $\delta = \delta_0 + \delta_a$ Age. The value of V_p is set to 0.5 for individuals with health problems.

The individual carries several state variables from one period to the next; these are variables which are consequences of past decisions and random events which have a bearing on the current decision. Five state variables are applicable in all periods. These are the level of

assets A_t, the time preference rate ρ, the level of overall leisure preferences ε_t, the relative utility of part-time leisure V_p, and whether or not the individual is still in the career job. If the individual is still in the career job and that job has a defined contribution pension, there is another state variable relating to the size of the defined contribution balance. After the individual has left the career job, additional state variables related to the value of defined benefit pension amounts and Social Security benefits are introduced. Before retirement from the career job, the defined benefit and Social Security amounts are completely determined from the fact that the individual is still in the career job, and thus these amounts do not have to be included as separate state variables.

To summarize, the utility function contains three elements which are heterogeneous between different individuals. They are (1) the time preference rate ρ, (2) the initial value of the overall leisure preference term ε, and (3) the relative attractiveness of part-time vs. full time work, as reflected in V_p. In the estimation and subsequent simulations, the time preference rate is taken as a fixed effect whose value is calculated for each individual, while V_p and the initial value of ε are treated as random effects whose values are drawn from the specified distributions.

The Data

The model was estimated for members of the original HRS cohort covering outcomes through 2002. It uses matched Social Security records where available and requires matched records for respondents with pensions. There is a slightly different definition of retirement from that used in the descriptive data, where the detailed information used to define retirement with HRS data was not available for the CPS data. Individuals working at least 30 hours per week and 1560 hours per year are counted as full-time. Individuals working at least 100 hours per year

but no more than 25 hours per week or 1250 hours per year are counted as part time, and individuals not doing any work at all are counted as fully retired. Individuals who fall between full time and part time or between part time and retired are classified on the basis of self reports. Wealth is measured in the 1992 survey.

The final sample consists of 2,231 respondents for whom we can construct, at least approximately, the details of their earnings and income opportunities, and for whom the model seems appropriate. This is slightly less than half of the number of married men available in the original HRS sample.

Estimation of the model.

The parameters are estimated using the Generalized Method of Moments (GMM). They include the consumption parameter α, the standard deviation σ_ε for the retirement preference variable ε, the correlation ρ_ε of the values of ε once the individual leaves the main job, the two coefficients δ_0 and δ_a which describe the distribution of V_p, and the coefficients in the linear term βX_t which affects retirement preferences. These coefficients include β_o, the constants, β_a, the coefficient of age, and β_h, the coefficient of health.

The coefficients estimated by the simulated GMM procedure are reported in Table 3. The estimated coefficients are all significantly different from zero by conventional standards. Of particular importance, the coefficient of the age variable implies that retirement leisure is increasing in value by 5.4 percent per year. This relatively low value means that economic incentives should be able to have considerable influence on retirement. The autocorrelation coefficient for the leisure preference term is significantly less than unity, which means that individuals can experience changes in their perception of retirement after they begin to experience it. If they find retirement less attractive than anticipated, they may well reverse

course and go back to work for a while, at least until the inexorable march of age finally makes retirement appealing again. Poor health increases the value of retirement leisure by approximately the same amount as being over seven years older.

The overall fit of the model is measured by the q-statistic. In the present context, there are 43 moments and 8 parameters, so there are 35 degrees of freedom.[8] The statistic of 41.56 is well within the bounds of a χ^2 with 35 degrees of freedom, which has a 5 percent critical value of 49.80. This means that, at least among the moments considered in the estimation, there is no evidence that the model does not fit the data well.

Time preference rates are heterogeneous. Half the population exhibits time preference rates below 5 percent and may be expected to respond relatively strongly to delayed incentives. On the other hand, over a third exhibits time preference rates of 20 percent or greater and may be expected essentially to respond only to incentives which affect current consumption.[9]

Table 4 reports observed retirement outcomes for the original HRS cohort, and simulated retirement outcomes under the current program, with each included individual having the work history actually experienced, and reflected in own Social Security earnings record and reported job history. The spike in retirements from full time work at age 62 is approximately the right height, although the spike at age 65 is a couple of percentage points too low. Comparing the

[8] These moments include percentages working full-time and working at all at various ages, the percentages working full-time with high income, with low income, and with poor health, the percentage working at all in poor health, and the percentage who increase their labor supply within two year periods corresponding to the HRS survey dates.

[9] Distribution of Time Preference Rates

Range of Time Preferences	Number of Observations	Range of Time Preferences	Number of Observations
0.00-0.05	1125	0.25-0.50	41
0.05-0.10	236	0.50-1.00	24
0.10-0.25	133	>1.00	675

flow into full retirement, the spike at 62 is a couple of points low, but the spike at 65 is approximately the right height.

The simulations also do a fairly good job of matching reverse flows.[10] For example, 3.3 percent of the respondents who were between 54 and 66 in 1994 and 1996 were observed to be working full-time in 1996 and either fully or partially retired in 1994. In the simulations, 3.2 percent of the respondents who were between 54 and 66 in 1994 and 1996 were simulated to be working full-time in 1996 and fully or partially retired in 1994.

4. Estimates of the Effects of Changes in Social Security on Recent Trends in Labor Force Participation

The effects on retirement of evolving Social Security policies are simulated by altering the budget constraint described above. We begin with the assumption that each person in the Health and Retirement Study is covered by whatever set of Social Security rules has governed the benefits the person is actually scheduled to receive. We then ask what happens to retirement outcomes when these rules are changed. In particular, we consider the effects of changing the normal retirement age, the earnings test and the delayed retirement credit. (We do not consider the effects of changing the covered earnings limits.)

Our approach is to present the numbers falling in different retirement states by age in Table 5, and the corresponding flows among retirement states in Table 6. Under each outcome, we present the simulated numbers first for the actual rules that governed the behavior of the

[10] Reversals from full or partial retirement in one year to full time work in the next.

Year	1992-1994	1994-1996	1996-1998	1998-2000	2000-2002
Observed	2.3	3.3	3.0	3.6	2.3
Simulated	3.9	3.2	2.7	3.1	3.3

person during their lifetime, then in the following column advancing the Social Security rules as if they came from a cohort six years younger, and in a final comparison advancing the rules by another six years, applying the Social Security rules that would apply to a cohort twelve years younger. We leave all other aspects of earnings, pensions and health constant.

To facilitate an understanding of how the changing Social Security rules affect retirement outcomes, Tables 8 and 9 present the differences in the outcomes, using outcomes under Social Security rules for those six years younger compared to the baseline outcome (zero years younger), then comparing outcomes using Social Security rules for those twelve years younger than the HRS cohort compared to outcomes under Social Security rules for those six years younger, and finally comparing outcomes under Social Security rules for those twelve years younger compared to the outcomes under the baseline Social Security rules.

A. Baseline Results

First consider baseline results where retirement outcomes are predicted using the actual rules that will apply to each of the relevant individuals in the Health and Retirement Study. Columns 1, 4, 7 and 10 of Table 5 show retirement outcomes under actual rules that applied to the HRS cohort, that is the cohort born from 1931 to 1941, which include the normal retirement age and delayed retirement credit dependent on year of birth, and the earnings test as the respondent experienced it. By age 60, from columns 1 and 4, 60.3 percent (50.4 + 9.9) are still working full time, with 50.4 percent still on their long term job, and another 9.9 percent of the population working on a full time job after having retired. Still another 9.9 percent is partially retired, leaving 29.8 percent completely retired. By age 62, the fraction working on the main job declines to about one third, with another 7.4 percent working full time after retiring, and 15.3 percent partially retired, so that 56.1 (33.4 + 7.4 +15.3) percent of the population is engaged in

some type of work, with 60 percent of them still on their main job. By age 65, only 15.9 percent are working on their main job, with 7.4 percent working full time after having retired, and 17.1 percent partially retired. Thus by 65 as many older men are partially retired as are working on their main job. By age 65, 59.6 percent of the married male population is fully retired, out of the labor force entirely. By age 69, 7.9 percent are working full time on their main job, 8.3 percent are working full time after having retired, and 16.6 percent are partially retired.

With four retirement states in each year, at each year of age there are 16 different retirement flows. For brevity, we highlight only five of them, most combining more than one flow. Table 6, columns 1, 4, 7, 10 and 13 show the five highlighted flows among various retirement states under the rules that were in place during the work life of the respondent. Column 1 reports the net flow out of full time work (flow out minus flow in). At age 62, where the respondent is first eligible to receive Social Security benefits, 14.6 percent of the population leaves full time work. The net flow into full retirement, as shown in column 4, is 10.2 percent. As seen in column 7, the percentage newly returning to full time work increases slightly with age, with the flow ranging between 2.0 and 4.1 percent of the population. In most years, the percent flowing into part time work is of the same order of magnitude, and is shown in column 10. However, there is a spike in the flow into part time work at age 62, with 8.7 percent of the population entering part time work. As can be seen by comparing columns 1, 10 and 13, until age 65 most of those entering part time work come from full employment. After age 65, more than half of those entering part time work come from full retirement.

It is also of interest to compare the flows in Table 6 with the corresponding stocks in Table 5. From age 62 on, the fraction partially retired in Table 5 is roughly 15 percent to 17

percent. After age 62, the flow into partial retirement from Table 6 is about 4 percentage points each year. This suggests an average duration of partial retirement of about four years.

B. Changes in Retirement Outcomes with Changing Social Security Rules

Remembering that the underlying levels of outcomes and flows are available in Tables 5 and 6, we turn now to the differences in retirement outcomes and retirement flows that result from differences in Social Security rules affecting each cohort. These differences in retirement outcomes are shown in Tables 7 and 8.

Starting at age 62, there is a small effect of Social Security rule changes on retirement outcomes. From Table 7, columns 3 and 6, accelerating the rules by 12 years would reduce the number working full time at age 62 by 2.0 percentage points, with 1.3 percentage points coming from the main job, and 0.7 percentage points coming from those working full time after they had previously retired. With 40.8 percent of the 62 year old population working full time under baseline conditions, the reduction in full time work due to Social Security rule changes amounts to 5 percent of the 62 year old workers at full time employment under the baseline rules. In Table 8 there is a corresponding difference in the flow of those retiring from full time work at age 62.

In contrast, for 65 year old workers, we see from Table 7 that the fraction at full time work increases by 2.0 (1.4 + 0.6) percentage points as a result of changes in the rules over twelve years, with 1.4 percentage points coming from an increase in work on the main job, and another 0.6 percentage points coming from an increase in the percent in full time work after retiring. At age 66, rule changes foster an increase of 2.0 percentage points (1.0 + 1.0), which with 20.8 percent of those age 66 at full time work in the baseline (13.0 + 7.8), amounts to an increase of 10 percent in 66 year olds at full time work. At 65 there is a 0.3 percentage point increase in part

time work due to Social Security rule changes. There are smaller, but analogous increases in full time work for those 67 to 69. Turning to Table 8, from 63 to 66, under the Social Security rules applying to younger compared to older cohorts, the net percent retiring from full time work is lower by zero to two points. From ages 67 to 69, the percent retiring from full time work is increased by the new rules.

Overall, Table 2 revealed an increase of 3 (27.5 – 24.5) percentage points in the fraction of the 65 to 67 year old population at full time work between 1998 and 2004; an increase of 0.1 percentage points at part time work; and a corresponding decline of 3.1 percentage points in the fraction of the population fully retired. Averaging the effect of the differences for those 65 to 67 in Table 5 between columns 3 and 2, and columns 6 and 5, over half a percentage point, or about 18 percent of the total increase observed in Table 2, is due to changes in incentives from Social Security.

Another finding from the top half of each table, i.e., through age 61, is that differences in the Social Security rules that apply to different cohorts have almost no effect on retirement outcomes or flows until age 62, the age of earliest eligibility for Social Security benefits, is achieved. Although the forward looking agents simulated in this model will shape their behavior at younger ages in light of Social Security rules that will affect their benefits in later years, there appears to be no differences in incentives resulting from differences in the rules among cohorts. Thus the decline in labor force participation observed for those in their fifties in the underlying data is not the result of changing Social Security rules.

5. Summary and Conclusions:

This paper has examined how the differences in Social Security rules applying to those with different birthdates have affected the retirement behavior of men over time. We document

the changes in retirement status among cohorts in the Health and Retirement Study. For those 65 to 67, there is a clear trend toward later retirement.

Changes in Social Security rules that have been phased in between 1992 and 2004 increase *full time work* by those 65 to 67 by a little under 2 percentage points, raising their full time work by about 9 percent. Altogether, the changes in Social Security benefits increase *labor force participation* of those 65 to 67 by between 1.4 and 2.2 percentage points, or by 2 to 4 percent, depending on age. Social Security changes implemented between 1998 and 2004 account for about one sixth of the overall increase in labor force participation observed.

The changes in Social Security rules that increased the reward to postponing retirement have been in place for over two decades. This is sufficient time for the differences in retirement between HRS cohorts to represent long run, rather than short run, behavioral adjustments.

To isolate the effects of Social Security rule changes on retirement outcomes, it has been important to distinguish the different employment outcomes undertaken by older workers, working full time on the main job, full time on another job, or work when partially retired. We have used a dynamic, stochastic model of retirement and saving capable of analyzing full and partial retirement outcomes to simulate the effects of the changing Social Security rules. We would not have been able to distinguish full time work after leaving the main job if the model were not designed to allow older persons to choose to increase their work effort after having reduced it. The model also included individual differences in time preference, so that it is capable of explaining why so many people retire at age 62, even though Social Security and pensions do not provide special financial incentives to retire at that age. The advantage of using a structural econometric model is that it has allowed us to standardize for the influence of all

other factors except the changing Social Security rules, and then to isolate the effects of the evolving Social Security rules.

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Table 1: Cohorts for Which Retirement Data Is Available in the Health and Retirement Study

	Calendar Year		
Birth Year	1992	1998	2004
1931-36	56-62*	61-67	
1936-41	50-56	56-62	61-67**
1942-47		50-56	56-62
1948-53			50-56

*****The values for 56 to 62 year olds are reported for those born from 1932 to 1937 as of 1994. There were no 62 year old age eligibles in HRS in 1992.
**The 61 to 67 year old group in 2004 was born from 1937 to 1942, not 1936 to 1941. See footnotes 2 and 3 for further explanations.

Table 2: Retirement Status of Males in HRS Cohorts by Age and Year Using Hours per Year to Define Retirement

	Not Retired			Partially Retired			Fully Retired		
Age	1992	1998	2004	1992	1998	2004	1992	1998	2004
50-56	77.1	80.4	75.5	5.2	3.4	5.3	17.7	16.2	19.4
56-62	69.9*	62.2	61.9	5.7	7.7	8.2	24.5	30.1	29.9
61-67		33.3	34.9		11.2	11.6		55.6	53.5
65-67		24.5	27.5		11.9	12		63.6	60.5

Data are unweighted. Not retired = 1250+ hours; Partially retired = 100 – 1249 hours; Fully retired = 0-99 hours.

* This figure refers to 1994, as noted in the footnotes to Table 1.

Table 3 Estimated Parameter Results			
Symbol	Description	Coefficient Value	t-statistic
α	Consumption parameter	-0.14	3.07
	Parameters in β		
β_0	Constant	-9.61	390.05
β_a	Coefficient of Age[a]	0.054	11.39
β_h	Coefficient of Health[c]	7.23	16.53
ρ_ε	Correlation of ε after retirement	0.84	22.96
	Parameters in δ		
δ_0	Constant	-3.71	7.93
δ_a	Coefficient of Age[b]	0.21	1.88
σ_ε	Standard Deviation of ε[c]	7.98	13.98
	q value	41.56	
	Number of observations	2231	

Several variables are differenced from their approximate means in the sample in order to facilitate estimation. They are:

[a] The actual variable is age - 62.

[b] The actual variable is age - 65.

[c] These coefficients are all relative to the age coefficient, again to facilitate estimation.

Table 4: Observed and Projected Retirement Percentages

Observed Retirement Percentages						Projected Retirement Percentages			
	Net Percentage Retiring		Percentage Retired			Net Percentage Retiring		Percentage Retired	
Age	From FT Work	Completely	From FT Work	Completely	Observations	From FT Work	Completely	From FT Work	Completely
50	4.1	3.3	4.1	3.3	243			10.9	8.2
51	0.9	0.0	5.0	3.3	361	0.7	0.2	11.7	8.4
52	2.7	2.2	7.6	5.5	510	0.7	0.4	12.4	8.8
53	2.0	1.1	9.7	6.6	621	1.6	1.2	14.0	10.0
54	2.1	1.3	11.8	7.9	712	1.8	1.2	15.8	11.2
55	3.1	2.7	14.9	10.6	801	3.5	2.6	19.3	13.8
56	1.9	2.1	16.8	12.7	907	2.6	1.9	21.9	15.7
57	4.0	3.2	20.8	15.9	990	3.3	2.6	25.2	18.3
58	3.0	2.1	23.8	18.0	1064	3.8	3.1	29.1	21.4
59	3.6	2.1	27.4	20.1	1132	4.3	3.5	33.4	24.9
60	6.0	6.4	33.4	26.4	1121	6.3	4.9	39.7	29.8
61	6.3	5.5	39.7	31.9	1043	4.9	3.9	44.6	33.7
62	15.1	12.5	54.8	44.4	986	14.6	10.2	59.2	43.9
63	5.6	3.4	60.4	47.9	909	4.4	3.7	63.6	47.6
64	6.7	6.7	67.1	54.6	843	5.8	5.4	69.4	53.0
65	9.1	6.7	76.2	61.3	744	7.4	6.6	76.7	59.6
66	4.5	3.9	80.7	65.2	658	2.5	2.5	79.2	62.1
67	2.8	2.9	83.5	68.1	565	2.5	2.5	81.7	64.6
68	3.1	3.3	86.7	71.4	472	1.7	1.6	83.4	66.2
69	1.7	4.6	88.4	76.0	379	0.4	0.9	83.8	67.2
Total number of observed respondents: 2231									

Table 5: Retirement Outcomes with Social Security Rules Advanced by Zero, Six and Twelve Years
(Baseline is rules that applied to HRS respondents over their lifetime.)

	Percent in Main Job			Percent in Full Time Work After Retiring			Percent in Part Time Work			Percent Completely Retired		
	Social Security Rules Advanced			Social Security Rules Advanced			Social Security Rules Advanced			Social Security Rules Advanced		
Age	Zero Years	Six Years	Twelve Years	Zero Years	Six Years	Twelve Years	Zero Years	Six Years	Twelve Years	Zero Years	Six Years	Twelve Years
50	89.1	89.1	89.1				2.7	2.7	2.7	8.2	8.2	8.2
51	86.0	86.1	86.1	2.3	2.3	2.3	3.3	3.3	3.3	8.4	8.4	8.4
52	83.6	83.7	83.7	4.0	4.0	4.0	3.6	3.6	3.6	8.8	8.8	8.8
53	81.2	81.2	81.2	4.8	4.8	4.8	4.0	4.0	4.0	10.0	10.0	9.9
54	78.4	78.4	78.4	5.8	5.8	5.8	4.6	4.6	4.6	11.2	11.2	11.2
55	74.1	74.2	74.2	6.6	6.6	6.6	5.5	5.5	5.5	13.8	13.8	13.8
56	70.6	70.7	70.7	7.5	7.5	7.5	6.2	6.2	6.2	15.7	15.7	15.7
57	66.6	66.7	66.7	8.1	8.1	8.1	6.9	6.9	6.9	18.3	18.2	18.2
58	62.0	62.0	62.1	9.0	9.0	9.0	7.7	7.7	7.7	21.4	21.3	21.2
59	57.0	57.1	57.2	9.5	9.5	9.6	8.5	8.5	8.5	24.9	24.8	24.7
60	50.4	50.5	50.6	9.9	9.9	10	9.9	9.9	9.9	29.8	29.6	29.5
61	44.7	44.8	44.8	10.6	10.7	10.7	10.9	10.9	10.9	33.7	33.6	33.6
62	33.4	32.7	32.1	7.4	7.0	6.7	15.3	15.7	16.0	43.9	44.6	45.1
63	28.5	28.4	28.2	7.9	8.2	8.5	16.0	16.2	16.4	47.6	47.2	47.0
64	23.0	23.0	23.0	7.6	7.8	8.1	16.4	16.7	16.9	53.0	52.4	52.1
65	15.9	16.7	17.3	7.4	7.9	8.0	17.1	17.2	17.4	59.6	58.2	57.4
66	13.0	13.7	14.0	7.8	8.5	8.8	17.1	16.9	16.9	62.1	60.9	60.3
67	10.8	11.4	11.6	7.5	8.1	8.2	17.0	16.9	16.9	64.6	63.6	63.2
68	9.2	9.7	9.9	7.4	8.0	8.2	17.1	17.0	17.1	66.2	65.3	64.9
69	7.9	8.3	8.5	8.3	8.8	9.0	16.6	16.6	16.7	67.2	66.3	65.9

Table 6: Selected Flows Among Various Retirement States with Social Security Rules Advanced by Zero, Six and Twelve Years
(Baseline is rules that applied to HRS respondents over their lifetime.)

	Net Percent Retiring from Full Time Work			Net Percent Completely Retiring			Percent Newly Returned to Full Time Work			Percent Newly in Part Time Work			Percent Newly Returned to Part Time Work, Previously Retired		
	Social Security Rules Advanced			Social Security Rules Advanced			Social Security Rules Advanced			Social Security Rules Advanced			Social Security Rules Advanced		
Age	0 Yrs	6 Yrs	12 Yrs	0 Yrs	6 Yrs	12 Yrs	0 Years	6 Yrs	12 Yrs	0 Years	6 Yrs	12 Yrs	0 Years	6 Yrs	12 Yrs
50															
51	0.7	0.7	0.7	0.2	0.2	0.2	2.3	2.3	2.3	1.7	1.7	1.7	0.7	0.7	0.7
52	0.7	0.7	0.7	0.4	0.4	0.4	2.2	2.2	2.2	1.6	1.6	1.6	0.7	0.7	0.7
53	1.6	1.6	1.6	1.2	1.2	1.2	1.8	1.8	1.7	1.8	1.8	1.8	0.6	0.6	0.6
54	1.8	1.8	1.8	1.2	1.2	1.2	2.2	2.2	2.2	2.1	2.1	2.1	0.8	0.8	0.8
55	3.5	3.5	3.5	2.6	2.6	2.6	2.0	2.0	2.0	2.6	2.6	2.6	0.7	0.7	0.7
56	2.6	2.6	2.6	1.9	1.9	1.9	2.3	2.3	2.3	2.6	2.6	2.6	0.8	0.8	0.8
57	3.3	3.3	3.3	2.6	2.5	2.5	2.4	2.4	2.4	2.8	2.8	2.8	0.9	0.9	0.9
58	3.8	3.8	3.8	3.1	3.1	3.0	2.7	2.7	2.7	2.9	2.9	2.9	1.0	1.0	1.0
59	4.3	4.3	4.3	3.5	3.5	3.5	2.8	2.8	2.8	3.1	3.1	3.1	1.0	1.0	1.0
60	6.3	6.2	6.2	4.9	4.9	4.8	2.9	2.9	2.9	3.7	3.7	3.7	1.1	1.1	1.1
61	4.9	5.0	5.1	3.9	4.0	4.0	3.2	3.3	3.3	3.7	3.7	3.7	1.3	1.3	1.3
62	14.6	15.8	16.7	10.2	11.0	11.6	2.8	2.4	2.2	8.7	9.0	9.1	1.0	1.0	1.0
63	4.4	3.1	2.2	3.7	2.6	1.8	3.2	3.6	3.9	4.1	4.1	4.1	1.9	2.0	2.1
64	5.8	5.7	5.6	5.4	5.2	5.1	3.0	3.0	3.1	4.1	4.2	4.2	1.9	2.0	2.0
65	7.4	6.4	5.9	6.6	5.8	5.3	3.3	3.5	3.3	4.8	4.5	4.5	2.3	2.2	2.2
66	2.5	2.5	2.4	2.5	2.7	3.0	3.6	4.1	4.3	4.0	4.0	4.0	2.4	2.4	2.4
67	2.5	2.7	2.9	2.5	2.7	2.9	3.3	3.4	3.4	3.8	3.8	3.8	2.3	2.2	2.2
68	1.7	1.8	1.8	1.6	1.7	1.7	3.4	3.6	3.6	3.6	3.7	3.7	2.3	2.3	2.3
69	0.4	0.6	0.6	0.9	1.0	1.0	4.1	4.2	4.3	3.3	3.3	3.4	2.3	2.3	2.3

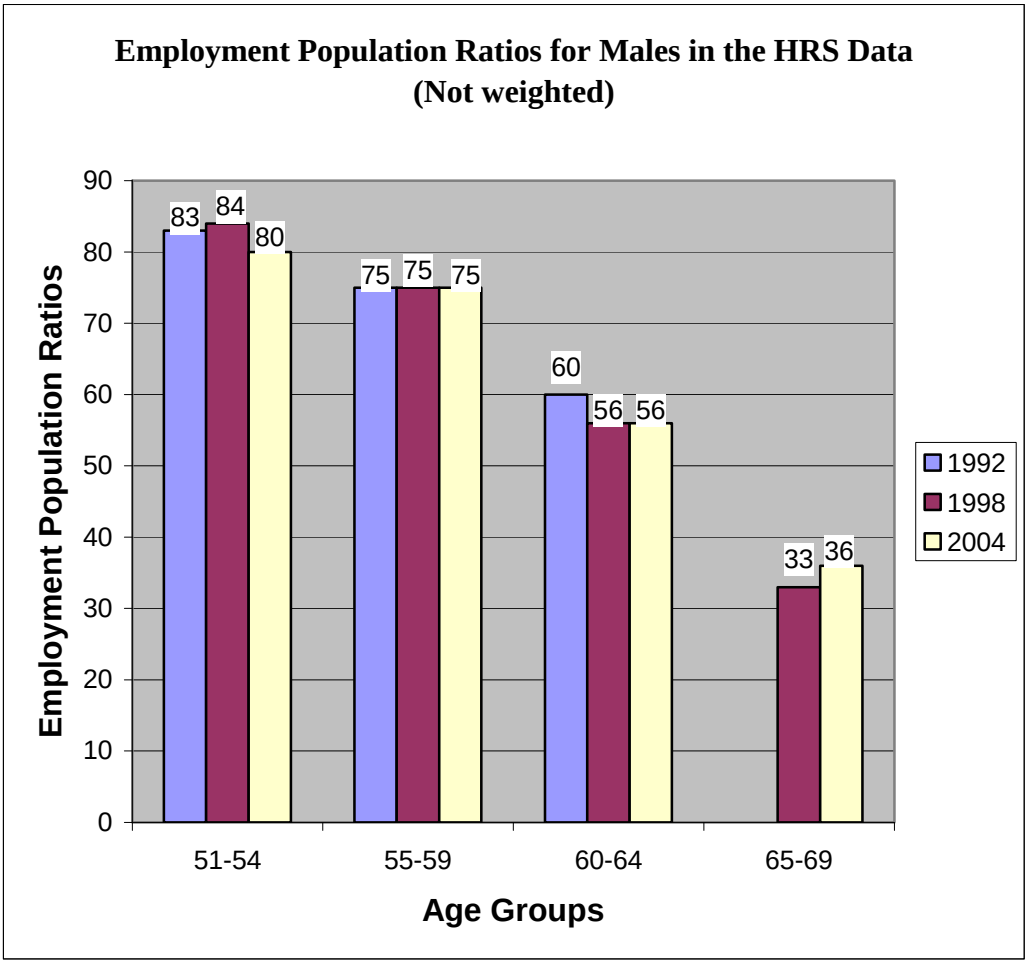
Table 7: Differences in Labor Force Outcomes Associated with Changing Social Security Rules

	Percent in Main Job			Percent in Full Time Work After Retiring			Percent in Part Time Work			Percent Completely Retired		
	Social Security Rules Advanced			Social Security Rules Advanced			Social Security Rules Advanced			Social Security Rules Advanced		
Age	6-0 Yrs	12-6 Yrs	12-0 Yrs	6-0 Yrs	12-6 Yrs	12-0 Yrs	6-0 Yrs	12-6 Yrs	12-0 Yrs	6-0 Yrs	12-6 Yrs	12-0 Yrs
50	0	0	0	0	0	0	0	0	0	0	0	0
51	0.1	0	0.1	0	0	0	0	0	0	0	0	0
52	0.1	0	0.1	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	-0.1	-0.1
54	0	0	0	0	0	0	0	0	0	0	0	0
55	0.1	0	0.1	0	0	0	0	0	0	0	0	0
56	0.1	0	0.1	0	0	0	0	0	0	0	0	0
57	0.1	0	0.1	0	0	0	0	0	0	-0.1	0	-0.1
58	0	0.1	0.1	0	0	0	0	0	0	-0.1	-0.1	-0.2
59	0.1	0.1	0.2	0	0.1	0.1	0	0	0	-0.1	-0.1	-0.2
60	0.1	0.1	0.2	0	0.1	0.1	0	0	0	-0.2	-0.1	-0.3
61	0.1	0	0.1	0.1	0	0.1	0	0	0	-0.1	0	-0.1
62	-0.7	-0.6	-1.3	-0.4	-0.3	-0.7	0.4	0.3	0.7	0.7	0.5	1.2
63	-0.1	-0.2	-0.3	0.3	0.3	0.6	0.2	0.2	0.4	-0.4	-0.2	-0.6
64	0	0	0	0.2	0.3	0.5	0.3	0.2	0.5	-0.6	-0.3	-0.9
65	0.8	0.6	1.4	0.5	0.1	0.6	0.1	0.2	0.3	-1.4	-0.8	-2.2
66	0.7	0.3	1.0	0.7	0.3	1.0	-0.2	0	-0.2	-1.2	-0.6	-1.8
67	0.6	0.2	0.8	0.6	0.1	0.7	-0.1	0	-0.1	-1.0	-0.4	-1.4
68	0.5	0.2	0.7	0.6	0.2	0.8	-0.1	0.1	0	-0.9	-0.4	-1.3
69	0.4	0.2	0.6	0.5	0.2	0.7	0	0.1	0.1	-0.9	-0.4	-1.3

Table 8: Differences in Labor Force Flows Associated with Changing Social Security Rules

	Net Percent Retiring from Full Time Work			Net Percent Completely Retiring			Percent Newly Returned to Full Time Work			Percent Newly in Part Time Work			Percent Newly Returned to Part Time Work, Previously Retired		
Age	6-0 Yrs	12-6 Yrs	12-0 Yrs	6-0 Yrs	12-6 Yrs	12-0 Yrs	6-0 Yrs	12-6 Yrs	12-0 Yrs	6-0 Yrs	12-6 Yrs	12-0 Yrs	6-0 Yrs	12-6 Yrs	12-0 Yrs
50															
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	-0.1	-0.1	0	0	0	0	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	-0.1	0	-0.1	0	0	0	0	0	0	0	0	0
58	0	0	0	0	-0.1	-0.1	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	-0.1	0	-0.1	0	-0.1	-0.1	0	0	0	0	0	0	0	0	0
61	0.1	0.1	0.2	0.1	0	0.1	0.1	0	0.1	0	0	0	0	0	0
62	1.2	0.9	2.1	0.8	0.6	1.4	-0.4	-0.2	-0.6	0.3	0.1	0.4	0	0	0
63	-1.3	-0.9	-2.2	-1.1	-0.8	-1.9	0.4	0.3	0.7	0	0	0	0.1	0.1	0.2
64	-0.1	-0.1	-0.2	-0.2	-0.1	-0.3	0	0.1	0.1	0.1	0	0.1	0.1	0	0.1
65	-1.0	-0.5	-1.5	-0.8	-0.5	-1.3	0.2	-0.2	0	-0.3	0	-0.3	-0.1	0	-0.1
66	0	-0.1	-0.1	0.2	0.3	0.5	0.5	0.2	0.7	0	0	0	0	0	0
67	0.2	0.2	0.4	0.2	0.2	0.4	0.1	0	0.1	0	0	0	-0.1	0	-0.1
68	0.1	0	0.1	0.1	0	0.1	0.2	0	0.2	0.1	0	0.1	0	0	0
69	0.2	0	0.2	0.1	0	0.1	0.1	0.1	0.2	0	0.1	0.1	0	0	0

Figure 1: Trends in Retirement for Males



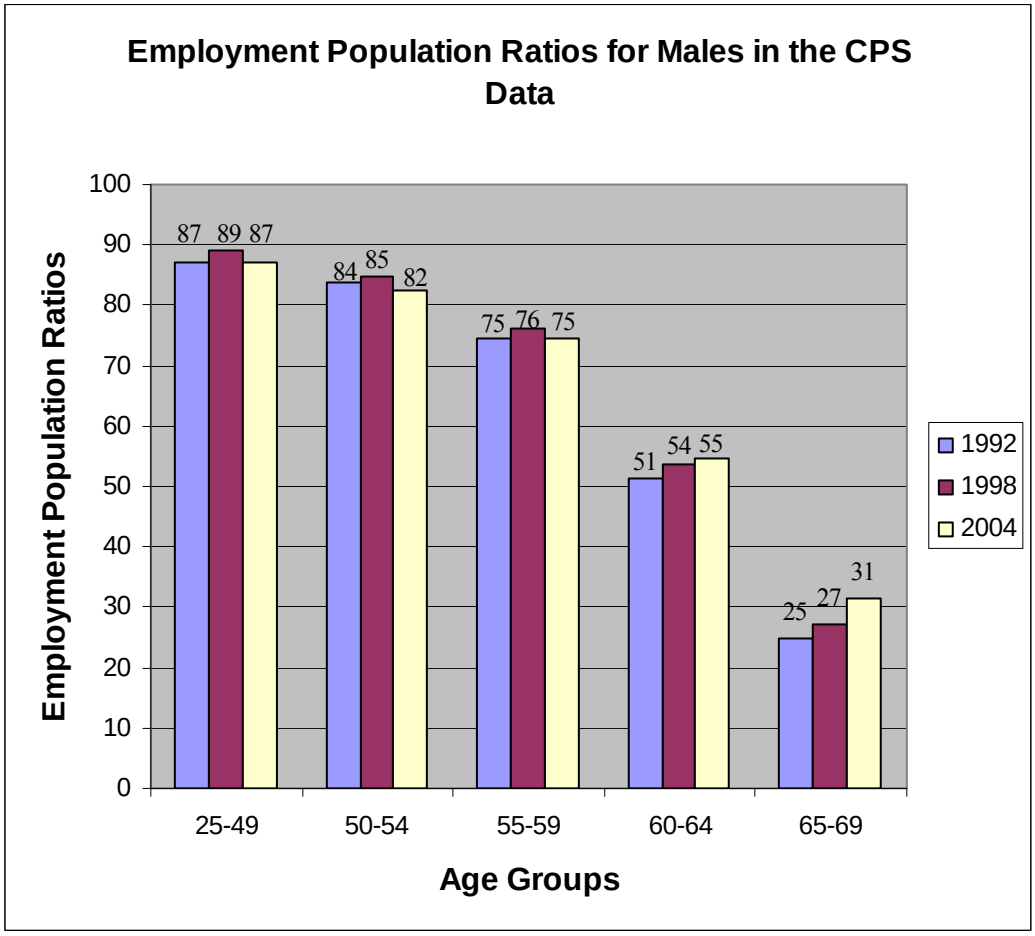
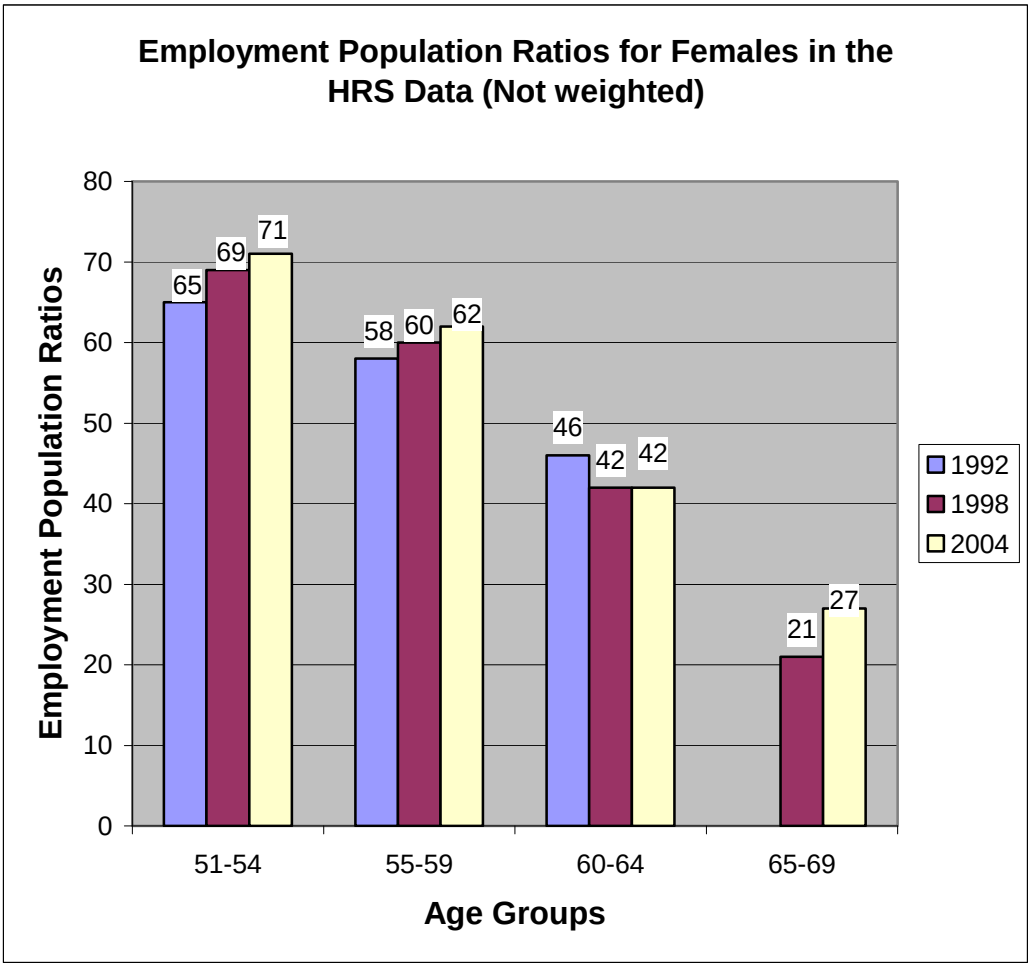
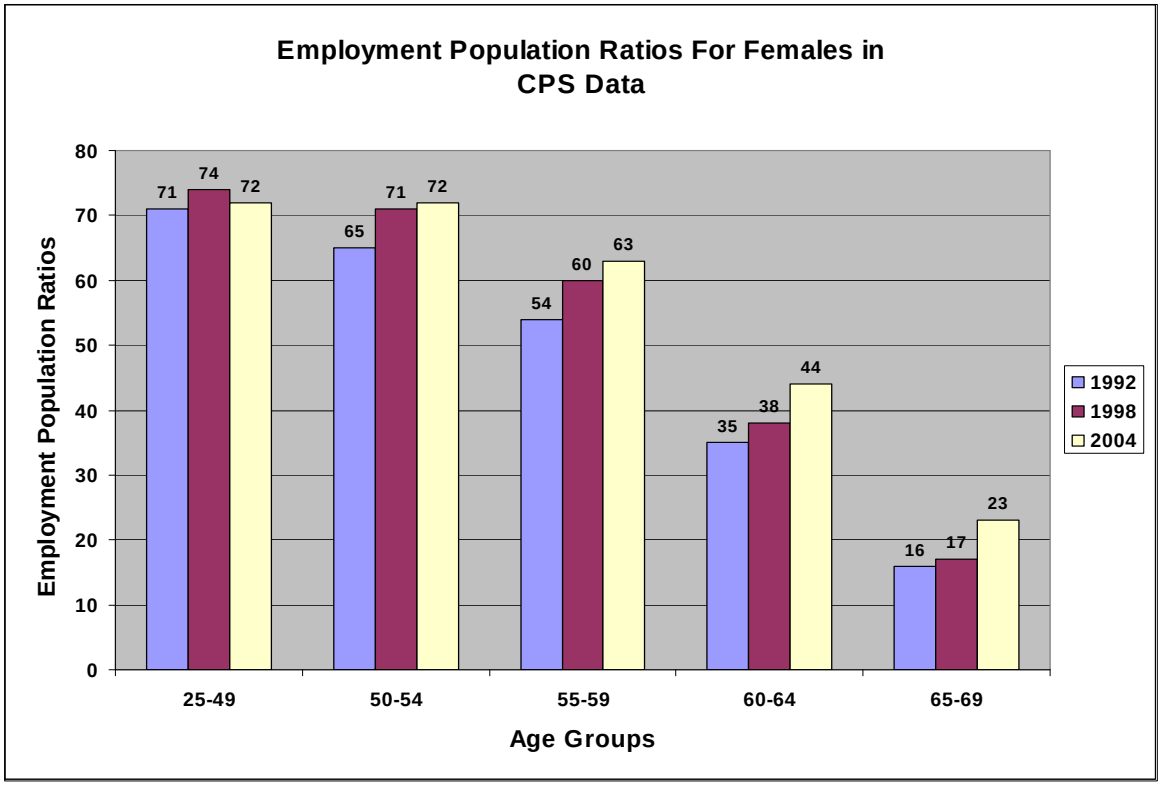

Employment Population Ratios for Males in the CPS Data
Employment Population Ratios
100
90
80
70
60
50
40
30
20
10
0
87 89 87
84 85 82
75 76 75
51 54 55
25 27 31
25-49
50-54
55-59
60-64
65-69
Age Groups
1992
1998
2004

Figure 2: Trends in Retirement for Females




Employment Population Ratios For Females in CPS Data
Employment Population Ratios
80
70
60
50
40
30
20
10
0
71
74
72
65
71
72
54
60
63
35
38
44
16
17
23
25-49
50-54
55-59
60-64
65-69
Age Groups
1992
1998
2004