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SOCIAL SECURITY REFORM AND LABOR SUPPLY

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ABSTRACT

A structural life-cycle retirement model with an improved specification over previous models is used to analyze and compare the long-run labor supply effects of the rules for Social Security in place in 1972, 1977 and 1983, and for an actuarially fair system. The effects of separate provisions from the 1983 amendments are examined. These include the raising of the normal retirement age to 67, the increase in the delayed retirement credit to 8 percent, and the lowering of the reduction rate for earnings over the test amount to one dollar for every three dollars of earnings.

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I. Introduction

The Social Security System has undergone an evolution in the last decade, largely as a result of changes in the general environment in which the system operates. One of these external changes was the advent of substantially higher rates of general inflation during the late 1960's and the 1970's. The system had been originally conceived, and up until that time had operated, in an environment in which inflation was either non-existent or was at fairly low levels for almost all of the time. The rules governing the calculation of Social Security benefits had been written without paying close attention to the distinction between real and nominal quantities. With the coming of higher inflation rates these rules caused the calculations of benefits to behave in ways that were different from what had been originally intended. To remedy this situation, the Social Security amendments passed in 1977 altered the method for calculating benefits so that the calculations were done largely in real terms, making the system less susceptible to wide variations in the general rate of inflation.

A second major external change, which became increasingly apparent during the late 1970's and early 1980's, was in the demographic composition of the American population. This change had major implications for the financial viability of the system over the long term. Up until that time, most recipients of Social Security benefits appear to have received substantially greater returns on their Social Security contributions than they could have gotten in the private markets, a situation which was made possible for a while by the low ratio of recipients to wage-earners contributing into the system. The recent increase in the number of individuals in the older age brackets, in combination with the gradually declining retirement age which increases the proportion of those individuals drawing benefits and reduces the proportion contributing to the system, has made it impossible to mantain the high level of returns to recipients without rather substantial increases in the taxes levied on the working population. The Social Security amendments of 1983 have addressed this problem by delaying by one-half year the indexing of benefits and by moving the normal retirement age up to 67, both of which will have the effect of reducing the general level of benefits. These amendments also changed certain provisions of the Social Security rules which it was felt discouraged individuals from continuing to work and thereby continuing to contribute to the system.

In addition to responding to problems created by inflation and demographic changes, the Social Security Amendments of 1977 and 1983 have also substantially changed the incentives for individuals to continue working in later years rather than to retire. A number of studies have analyzed the manner in which these incentives are affected by such measures as the early retirement penalty, the delayed retirement credit, the automatic benefit recomputation, the earnings test, and benefits provided to wives and to widows.[1]

A more difficult issue arising from these amendments--an issue

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[1] Recent discussion of some of these incentives include Sammartino (1982), Clark and Gohmann (1983), and Gordon (1983).

that is the subject of this paper--is how the changing incentives have affected the labor supply and retirement decisions of older individuals. In order to assess these effects, it is necessary to have some quantitative estimates of the relations shaping individual retirement decisions.

The most common studies of retirement behavior are based on reduced-form equations. These studies relate the retirement date to a group of variables which describe the individual's characteristics and the nature of the opportunities facing the individual. Unfortunately, it is usually impossible to include enough explanatory variables in such studies to enable them to trace through in any but the crudest way the separate effects of the many actual and potential changes in Social Security rules on retirement behavior.[1] Estimates of structural models, which are more difficult and less common than estimates of reduced-form models, attempt to establish the nature of the underlying preference structures which govern retirement decisions. Structural estimates can conceptually be used to analyze the effects on retirement behavior of almost any potential change in Social Security, but previous estimates of structural models have employed simplifying assumptions which have limited their usefulness for this kind of

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[1] In most cases, the only variables in the reduced-form models which reflect the Social Security rules are a Social Security wealth variable and the so-called Social Security delta (the change in Social Seurity wealth associated with additional work effort). For a discussion of the weaknesses in currently available reduced-form estimates of retirement equations, see Gustman and Steinmeier (1984).

analysis.[1] Accordingly, these models must be regarded as just the beginning of our attempts to understand the manner in which Social Security affects labor supply and retirement behavior.

The present work attempts to analyze the effects of several actual and potential changes in Social Security rules using a recent improved structural life-cycle retirement model which has been estimated and described in Gustman and Steinmeier (1983a). The model allows individuals to choose among full-time work, part-time work at a lower hourly wage, and full retirement. Hours in part-time work are fully variable within any one year, and the individual who chooses part-time work can vary the number of hours from year to year. The individual chooses when to leave full-time work, whether or not to work part-time and if so, how much, and when to retire completely. These choices are assumed to be made so as to maximize lifetime utility subject to a lifetime budget constraint. Such a model can consider the effects of a number of dimensions of Social Security, including changes in the retirement age, the penalty for early retirement, the credit for

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[1] The pathbreaking work of Gordon and Blinder (1980) assumes that hours of work are continuously variable between zero and full-time at a constant wage, an assumption which is contradicted by the observation that many individuals quit a full-time job and take a partial retirement job at a lower wage, even though they are not facing mandatory retirement or strong incentive effects due to private pensions. Mitchell and Fields (1983), at the other extreme, constrain the choice to be between full-time work and complete retirement. Burtless and Moffitt (1983) model the decision to retire partially, but they assume that an individual who partially retires works the same number of hours in each year thereafter as they do in their first year of partial retirement. For further discussions of the problems created by the specifications adopted in these and other structural retirement models, see Gustman and Steinmeier (1983a and 1983b).

delayed retirement, the earnings test amount, the rate at which benefits are reduced for earnings above the test amount, and the general level of benefits. (Since our original model was estimated for a population of white males who were not self-employed, the analysis contained here pertains only to this group. We are currently estimating a version of the model for a sample of nonwhite males.)

This paper is organized along the following lines. The next section briefly outlines the life-cycle retirement model used in the study and indicates the parameters that are estimated for this model. Section III presents the results of simulations for this model, contrasting the effects of the 1972, 1977, and 1983 Social Security amendments, and comparing these with the effects of a hypothetical set of rules which would provide the same level of benefits as the 1983 rules, but which would be actuarially neutral. The following section analyzes the effects of the individual components of the rules changes in the 1983 amendments and assesses which of these components are likely to have important effects on retirement behavior. Section V considers how sensitive these results are to assumptions about the general inflation rate, the real wage levels, and potential reactions of pension plans to changes in the Social Security rules. The simulations in Section VI explore the effects of a group of hypothetical changes which could have been considered in lieu of the changes which were actually passed in 1983. Section VII notes the possibility of substantially better than fair actuarial returns to wives under the 1983 rules and investigates whether these returns might be exploited to encourage additional work effort by older individuals.

A final section briefly summarizes the results and discusses some of their implications and limitations.

II. A Life-Cycle Model of Retirement Behavior

The theoretical model used in this study is a variation on the standard life-cycle model, altered to reflect important features of the work choices actually facing older individuals. Earlier work (Gustman and Steinmeier, 1983b) found that most individuals in their prime working years reported that they could not cut their hours below full-time in the jobs they currently held. Further investigation using individuals from the Retirement History Survey established that there was a significant wage drop among individuals who reported themselves as not retired at all in one survey year and as partially retired in the next survey two years later (Gustman and Steinmeier, 1982). These wage drops were observed whether or not the individuals changed jobs in the process, although the drops were larger for individuals who did have to change jobs in order to retire partially.

These observations led us to postulate a model in which individuals choose between two types of work. If an individual is willing to work full-time in a job, he can obtain a higher wage than he could receive for part-time work. In a sense, one of the compensations for part-time work is the opportunity to choose the amount of work the individual wishes to do rather than being constrained to work full-time. In this setting, the individual chooses time paths for labor supply and consumption so as to maximize the lifetime utility function given by

$$U = \int u[C(t), L(t), t]\, dt$$

subject to the budget constraint

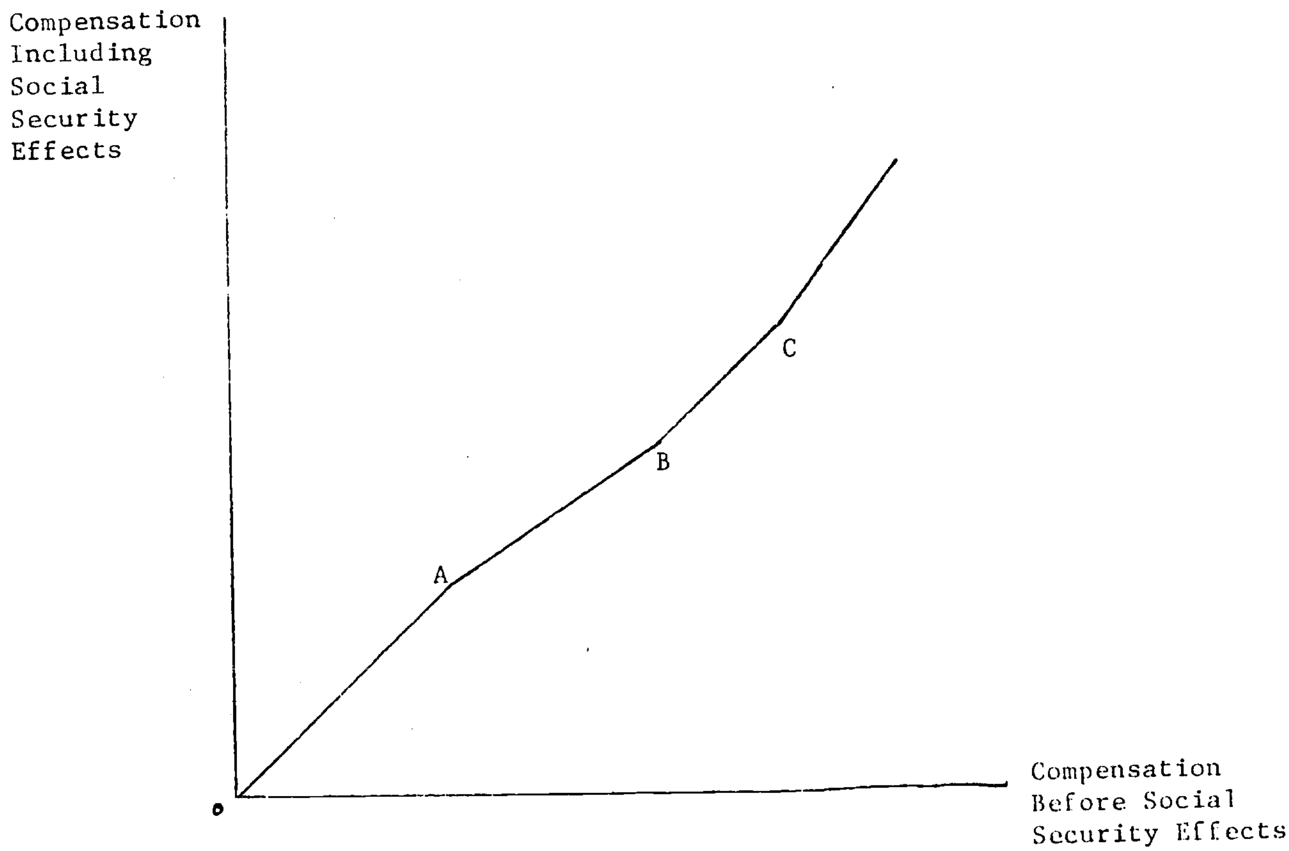
$$\int_0^T e^{-rt} C(t)\, dt = A_o + \int_0^T e^{-rt} g[W_F(t)H_F(t) + W_P(t)H_P(t)]\, dt$$

where C(t) is consumption at time t, L(t) is leisure at time t, r is the real interest rate, and W_F, W_P, H_F, and H_P are the real wage rates and labor supply to full-time and part-time work, respectively, with the relation $L(t) = 1 - H_F(t) - H_P(t)$. Other constraints in the model limit the values of L(t) to range between 0 and 1 and require full-time work if the individual receives $W_F(t)$.

The function g in the budget constraint relates the individual's compensation, including the effects of Social Security--i.e., his net compensation--to his compensation before Social Security. The function g is illustrated in Figure 1. Between the origin and point A in the figure, the individual's earnings are below the earnings test amount, and the Social Security rules do not affect the individual's level of

Figure 1.

The Effects of Social Security Rules on Annual Compensation.



compensation.[1] Between points A and B in the figure, the income is above the earnings test amount. An individual over the early retirement age is subject to a benefit reduction for every dollar of earnings above the test amount. For instance, under 1977 rules the individual loses one dollar of benefits for every two dollars of earnings above the limit. This loss in benefits is at least partly offset by the fact that the individual's later benefits will be raised as a result of forgoing present benefits, either by a reduced early retirement penalty or an increased delayed retirement bonus. The slope of the function between A and B reflects the net result of the lost current benefits and the increased future benefits. Above point B, the individual has exhausted his benefits, and further earnings are not subject to the effects of a benefit reduction. In this range, the individual may again keep all of any incremental earnings. Above point C in the diagram, another consideration comes into play. In this range, the individual has reached an earnings level high enough that he is substituting current earnings for a previous year's earnings in the calculation of the average monthly earnings and the primary insurance

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[1] In drawing the function without a vertical intercept, the diagram implicitly attributes any Social Security benefits for which the individual may currently be eligible to the decisions made in previous years. Symmetrically, a choice to be above point A in the diagram will affect benefits in future years, but these changes are attributed to current compensation. For the current period labor supply decision, however, it makes no difference whether or not a vertical intercept is included, since in a diagram of current period income versus current period labor supply, the indifference curves are vertical displacements of each other, with the implication that a vertical displacement of the current period budget constraint will not affect the amount of labor supplied. For a proof of this proposition, see Gustman and Steinmeier (1983c).

amount. (Actually, point C might occur to the left of point B, a possibility we do not illustrate, but do consider in our simulations.) The individual finds that above point C, not only does he get to keep an additional dollar of earnings, but also the earnings produce later benefits in the form of increased future Social Security benefits. The slope of the function in this range reflects both effects and is greater than unity.

The utility function used in the empirical work is of the following CES specification:

$$u[C(t), L(t), t] = \text{sign}(\delta)\{[C(t)]^{\delta} + e^{\underline{X}_t\underline{\beta}+\varepsilon} [L(t)]^{\delta}\}$$

where $\underline{X}_t$ is a vector of explanatory variables which affect the relative weight of leisure in the utility function at time t, $\underline{\beta}$ is the associated vector of parameters which is presumed to be constant across both time and individuals, ε is a time-invariant stochastic term affecting the relative weight of leisure for the individual, and δ (with $\delta \leq 1$) is a time-invariant stochastic term defining the curvature of the indifference curves. In this specification, which follows that used by Gordon and Blinder, the within-period elasticity of substitution is calculated as $\sigma = 1/(1 - \delta)$.

The parameters for the model are the elements of $\underline{\beta}$ (including a constant and coefficients for age, health status and vintage) and parameters characterizing the distributions of the stochastic terms. These parameters have been estimated by a maximum likelihood estimation procedure which is discussed in Appendix A. That appendix, which is available on request, also discusses the specification for the distribution of the stochastic terms and presents the estimated parameter values.

III. The Evolution of Social Security Rules and Their Effects on Retirement Behavior, 1972-1983

Using estimates of the model just discussed, this section investigates the effects of various changes in the Social Security rules from 1972 to the present. These include the major revisions introduced into the system by the 1977 amendments and the more recent revisions legislated this year (1983). Since it is generally felt that the most recent revisions go a long way toward making the system actuarially fair, this section also investigates the hypothetical effects which would occur if the remaining traces of actuarial bias were removed from the system.

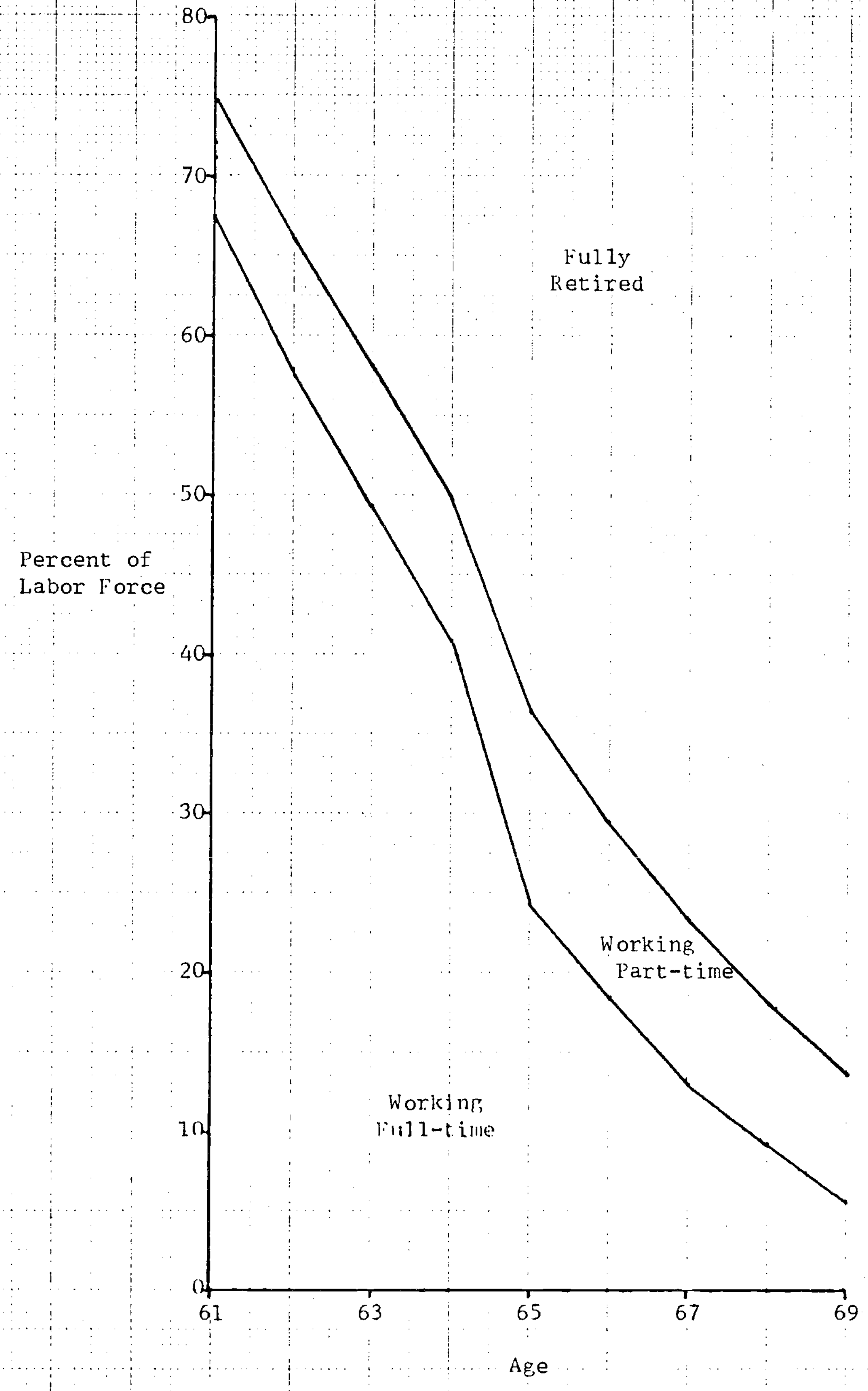
The simulation procedure employed to obtain the results in this and subsequent sections is described in detail in Appendix A, which, as noted, will be made available upon request. The simulations are intended not so much to reflect the effects of the system on the cohorts receiving Social Security today, or in past years, as to indicate the long-term effects of changes in the system on a hypothetical cohort which is held constant across the various sets of rules considered. The most important consequences of this outlook are that the average monthly earnings are calculated with 35 years of earnings and that no maximum is applied to the earnings, which implicitly assumes that any maximum is high enough so that it does not affect a large number of individuals. The simulations thus exclude two different transitory effects which arose during the 1950's and 1960's-- the first arising because the average monthly earnings calculations in those years included a relatively low number of years, and the second because in several years during that period the maximum creditable earnings were low enough to affect a significant number of workers.

For the simulations, the manner in which Social Security rules influence work incentives includes the effects operating through the individual's own benefits and, if he is married, through his wife's benefits and any potential widow's benefits for which she may eventually be eligible. Where appropriate, benefits are reduced if the individual begins to collect the benefits before the normal retirement age and increased if the individual works beyond the normal retirement age and has earnings above the earnings test amount. In some cases an individual will find that it is actuarially advantageous to postpone collecting benefits even though he or she is eligible to do so. Individuals are assumed to postpone collecting benefits under such circumstances. The consequences of this possibility are discussed in more detail in Section VII.

In discussing how the different sets of Social Security rules affect retirement behavior, it will be helpful in the presentation to pick one set of rules as a base case and to compare the effects of the other sets of rules to it. Since later sections will focus on the effects of the 1983 rules relative to the 1977 rules, the results for the 1977 rules will prove to be a convenient choice for a base. Figure 2 provides a general overview of the retirement behavior which arises

Figure 2.

Simulated Retirement Decisions of Older Workers Under the 1977 Social Security Rules.



in the simulations with the 1977 Social Security rules.[1] The most noticeable aspect of the table is the dramatic decline in the number of individuals who continue to work during the period between age 61 and age 69, with almost three-quarters of the individuals working at the earlier age and fewer than one-sixth of the individuals working at the later age. The percentage of individuals who are working part-time is in the 7-8 percent rate up until age 64 and rises to the 10-12 percent range for the three-year span between 65 and 67. Between 64 and 65 the decline in the percentage of individuals who continue working is relatively steeper; this corresponds to the well-documented peak of retirement activity at age 65, which is the normal retirement age for Social Security as well as for many private pension plans.

Figure 3 illustrates the simulated effects of three sets of Social Security rules on retirement activity relative to that which would have occurred with the 1977 rules. The alternating dashed and dotted lines refer to the 1972 rules, the dashed line to the 1983 rules, and the solid line to a set of rules similar to the 1983 rules but omitting the earnings test. The three panels in the figure indicate the effects of the various sets of rules on the percentage of individuals working full-time, working part-time, and fully retired, respectively. The values in the figure refer to the deviation in the percentage of individuals in the particular retirement state from the percentage that would have occurred with the 1977 rules. To illustrate, the dashed

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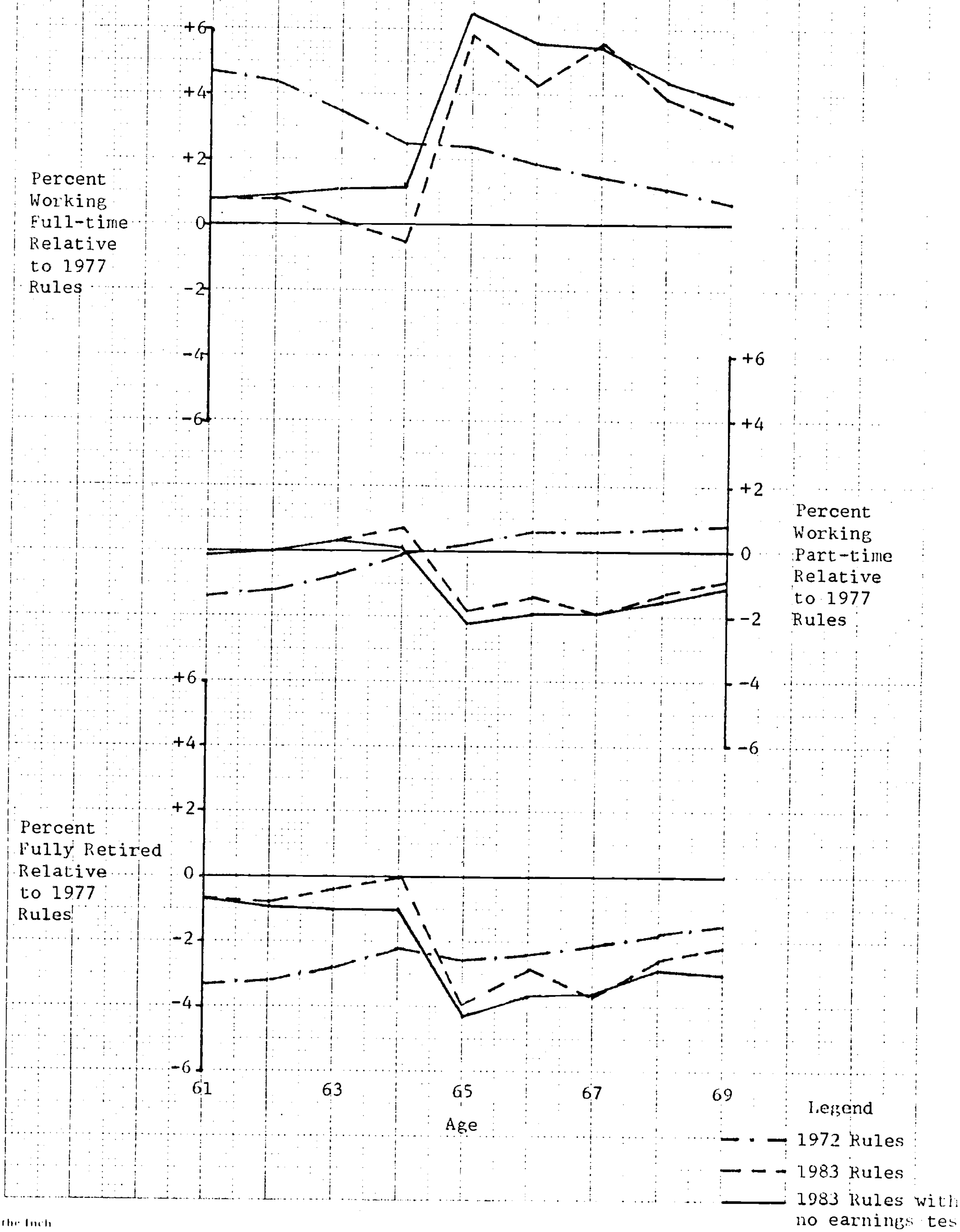
[1] This and subsequent figures are based on Appendix Tables B.1-B.7, which present numerical results for all the simulations and are also available upon request.

Figure 3

Simulated Retirement Behavior of Older Workers Under Alternative Social Security Rules.



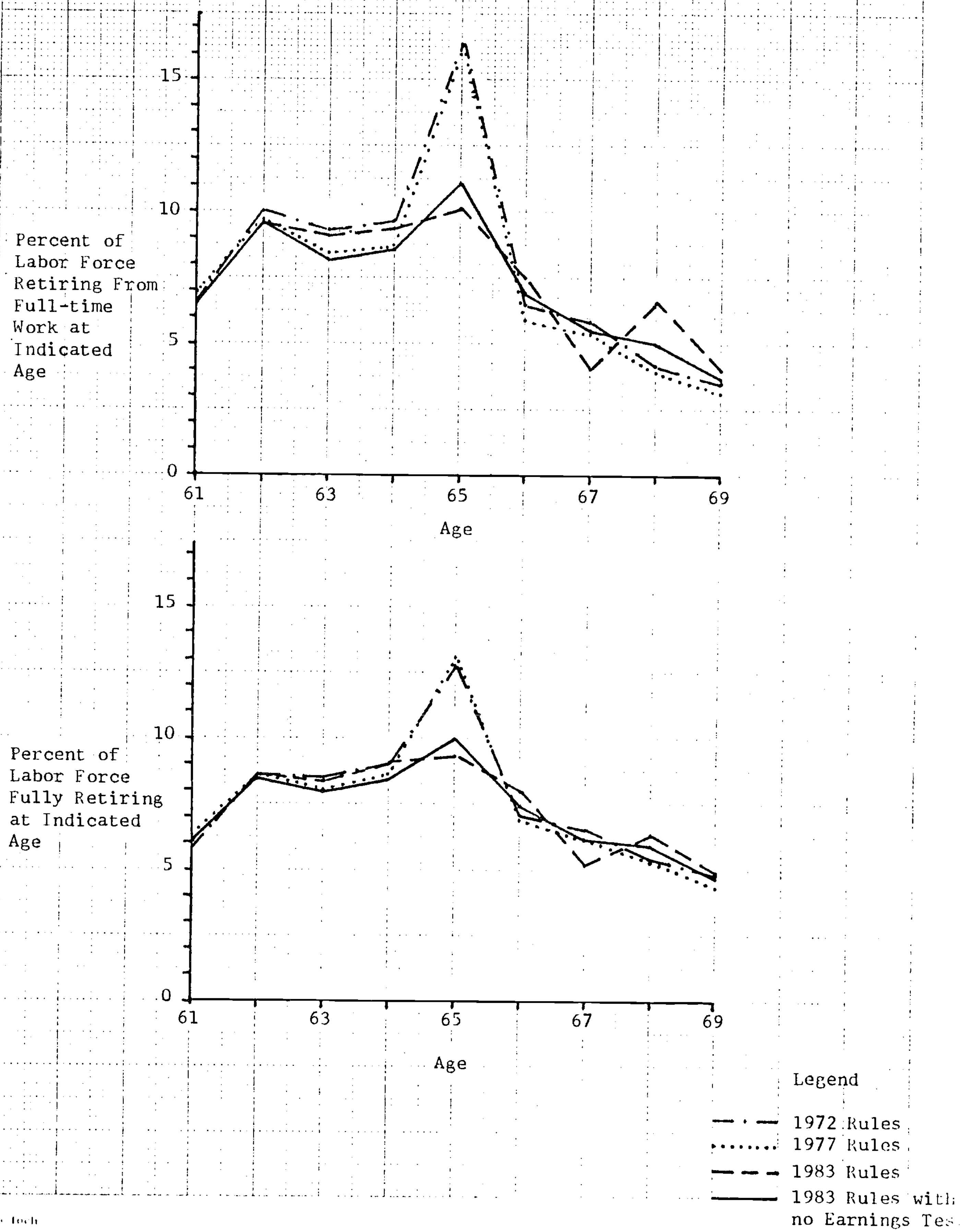
line in the upper panel of the figure reaches a value of 5.8 percent at age 65, meaning that under the 1983 rules, the percentage of individuals working full-time will be 5.8 percentage points higher than under the 1977 rules. From Figure 2 it can be seen that 24.3 percent of the individuals would be working full-time under the 1977 rules. Thus by implication, 30.1 percent would be working full-time under the 1983 rules.

Figure 4 presents the information in a manner which emphasizes the number of individuals who retire at different ages. These values are calculated as the difference between the percentage of individuals who are retired at a particular age and the percentage who were retired one year previously. For example, from Figure 2, 40.7 percent of the individuals are working full-time at age 64 and 24.3 percent are working full-time at age 65. The difference of 16.4 percent represents the percentage of individuals who retire from full-time work at age 65. That value is plotted in Figure 4 along the dotted line (representing the 1977 Social Security rules) at age 65.

The major labor supply effects of the evolution of Social Security rules over the period can be characterized fairly easily. Compared to the 1972 rules, the introduction of the 1977 rules appears to have generally decreased the percentage of individuals working full-time and increased the percentage retired between 61 and 69. They had relatively little effect on the distribution of ages at which individuals left full-time jobs or left work altogether in this age range, however, and in particular they had no effect in reducing the peak of retirement activity at age 65, as illustrated in Figure 4. The

Figure 4

Simulated Retirement Decisions of Older Workers Under Alternative Social Security Rules



1983 rules, when they take full effect, should have a fairly small impact on the number of people working full-time or the number retired before age 65, but at age 65 and thereafter the percentage of individuals working full-time will be noticeably increased and the percentages working part-time or retired will both decline. This is reflected in Figure 4 as a dramatic decline in the peak of retirement activity at age 65, both for individuals retiring from full-time jobs and individuals retiring from work altogether. As shown by the solid lines in the two figures, the 1983 rules have an impact that is close to the impact that would be observed if the rules were actuarially fair, in the sense that the earnings test were entirely eliminated. That is, if individuals were allowed to accept Social Security payments regardless of whether or not they were working, there would be relatively little change from the retirement behavior under the 1983 rules.

The general decline in retirement ages brought about by the 1977 rules appears to have been caused by changes in the manner in which average monthly earnings (AME) and the primary insurance amount (PIA) were calculated. Up until 1977, the AME calculations had been done strictly in nominal terms. With the introduction of the 1977 rules, however, all earnings before the age of 60 were adjusted up to that age by an index of average monthly earnings, while earnings after that age continued to be entered in the average in nominal terms. This indexing of the earnings calculation had the effect of increasing the value of AME, with two consequences. First, the indexing of the earnings figures for earlier years would have made it less likely that current earnings would displace an earlier year from the calculations, and if it did, the substitution would have increased the average less than without indexing. Secondly, the higher average would have placed the individual in higher brackets in the PIA formula for which the marginal impact of a given increase in AME would have been less than before. Thus, under the 1977 amendments, the combination of a smaller increase in AME coupled with a smaller marginal impact on PIA lessened the amount by which current work would increase future benefits through the AME and hence would have lowered the incentives for continued work. This effect was reinforced by the fact that the marginal effect of AME on PIA in the highest bracket fell from 20 percent under the 1972 rules to 15 percent under the 1977 rules.

Countering this encouragement toward earlier retirement, but not to a very great degree, were 1977 rules changes in the penalties for retiring before age 65 and in the credits for retiring after age 65, which had the effect of encouraging later retirement throughout the age range. For retirement after 65, the 1977 rules introduced a 3 percent increase in future benefits for each year after 65 that an individual did not collect benefits. This had the effect of reducing the size of the penalty for working later and encouraging a later retirement than otherwise. For retirement before 65, the 1977 rules started to index the value of any penalty for early retirement, a value which under the previous rules had not been indexed. This had the effect of increasing the real value of any penalty for early retirement and hence of encouraging later retirement. The magnitude of this effect, as brought out in the debate between Burkhauser and Turner (1981) and Blinder, Gordon and Wise (1981), depends on the inflation rate and its associated nominal discount rate. The simulations here are performed under the assumption of a relatively moderate inflation rate (the average rate over the 1947-1982 period), and hence the indexing of the early retirement penalty only moderately encouraged later retirement. In any case, the 1977 changes in the early retirement penalties and the delayed retirement credit were swamped by the changes in the method of calculating the AME and the PIA, both in terms of their effects of the work incentives provided to the individuals in the sample and in terms of the response of the individuals to these changed incentives.

In comparison to the 1977 rules, the 1983 rules recently enacted can be expected to have relatively little impact on individuals under age 65, but a much sharper impact thereafter. Between the ages of 65 and 68, the new rules should ultimately cause the number of individuals working full-time to be 4 to 6 percentage points higher than they would otherwise be. These increases are coming on top of a relatively small base of individuals still working in this age range, so in percentage terms the increases in full-time work appear to be fairly substantial. For example, the increase of 4.3 percentage points in the number of 66-year-olds working full-time represnts an increase from 18.4 percent to 22.7 percent of the 67-year-olds who are working. In other words, the number of 66-year-olds who are working full-time will increase by about one-quarter, with similar if not larger figures applying to the other age categories above age 65. Looking at the result in terms of the number of individuals retiring at different ages, the 1983 rules should cause the peak in retirement from full-time work at age 65 to fall by more than one-third, from 16.4 percent to 10.1 percent.

Although a detailed examination of the individual components of the 1983 changes will be postponed until the next section, the principal element responsible for this increase in post-65-year-olds still working full-time is not hard to spot--namely, the increase in the delayed retirement credit from 3 percent to 8 percent. This figure, which also applies to any widow's benefits for which the individual's spouse may ultimately be eligible, causes the Social Security system to be about actuarially fair until the late sixties or early seventies. The only individual for whom the system is not fair in this age range is an individual who has a spouse over 67. In this case, if an individual works enough to cause benefits to be lost to the earnings test, the spouse will lose benefits also, and in the Social Security rules there is no provision for a spouse over this age to recover any lost benefits through increases in later benefits. Even in this case, however, the system will not be seriously unfair. For reasons discussed in Section VII, the 1983 rules will foster, for almost everyone over 65, a considerably greater degree of encouragement for full-time work.

To investigate further the proposition that the 1983 rules had taken the Social Security system most of the distance toward actuarial neutrality, we turn to the results of a simulation which was done using the 1983 rules, but eliminating the earnings test. With no earnings test, the early retirement penalties and the delayed retirement credits, along with their associated actuarial biases, become irrelevant for the work decision because the work decision and the decision as to whether or not to accept Social Security benefits become two separate issues. The results, as illustrated in Figures 3 and 4, indicate that the removal of the last traces of actuarial influence on the work decisions causes some further increase in full-time work, as might be expected, but the increase is fairly minor in comparison with the changes resulting from the 1977 and 1983 rules changes. The clear implication is that there is very little further potential for increases in full-time work effort induced by additional changes in the Social Security system, removing the last traces of the effects of actuarial bias on work effort.

IV. Effects of the Separate Components of the 1983 Changes

The new 1983 legislation changed a number of elements of the Social Security system. The major provisions of the legislation which are investigated in this paper include: (a) the eventual increase in the age of normal retirement to 67, with the associated increase in the penalty for retirement at 62 to 30 percent, (b) the eventual increase in the delayed retirement credit to 8 percent per year for benefits that are lost after the normal retirement age, (c) the reduction in the rate at which benefits are lowered for earnings over the test amount to one dollar of benefits foregone for every three dollars in earnings over the test amount (this provision applies only to individuals over the normal retirement age), and (d) the delay by six months in the inflation adjustment to benefit levels.[1] The effects of the first three of these provisions are illustrated in figures 5 and 6, which are analogous to Figures 3 and 4 presented earlier. The effects of the delay in the inflation adjustment were very small, never exceeding two- or three-tenths of a percentage point. In order to avoid further cluttering in the graphs, the results of this change were not included.

Both the increase in the retirement age and the increase in the delayed retirement credit reduce the peak in retirement at age 65 and increase the number of individuals who are working full-time at 65 and 66, largely because both of these measures bring the Social Security system much closer to actuarially fair at these ages. The effects of the two measures are different for individuals 67 and over, however. For the increase in the delayed retirement credit, individuals over 67

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[1] Another provision of the recently passed amendments, the taxation of half of the benefits if total income exceeds a given income level, could not be simulated very well within the context of the present model. The given income level is high enough so that very few individuals in the sample would be affected on the basis of labor earnings alone, and the model is probably not very robust in terms of simulating non-labor income. For further discussion on this last point, see Gustman and Steinmeier (1983a).

Figure 5

Effects of the Separate 1983 Rules Changes on the Simulated Retirement Behavior of Older Workers.

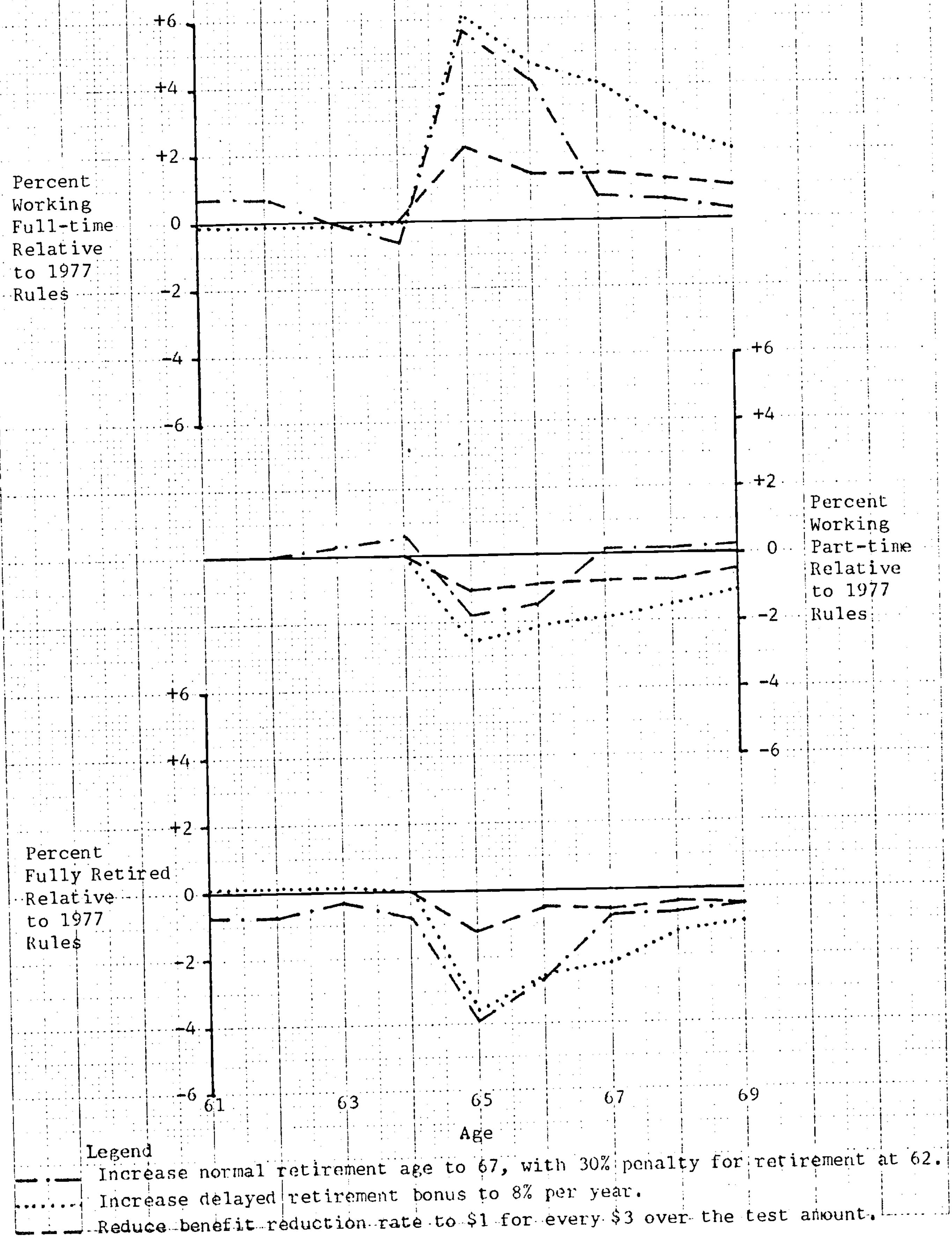
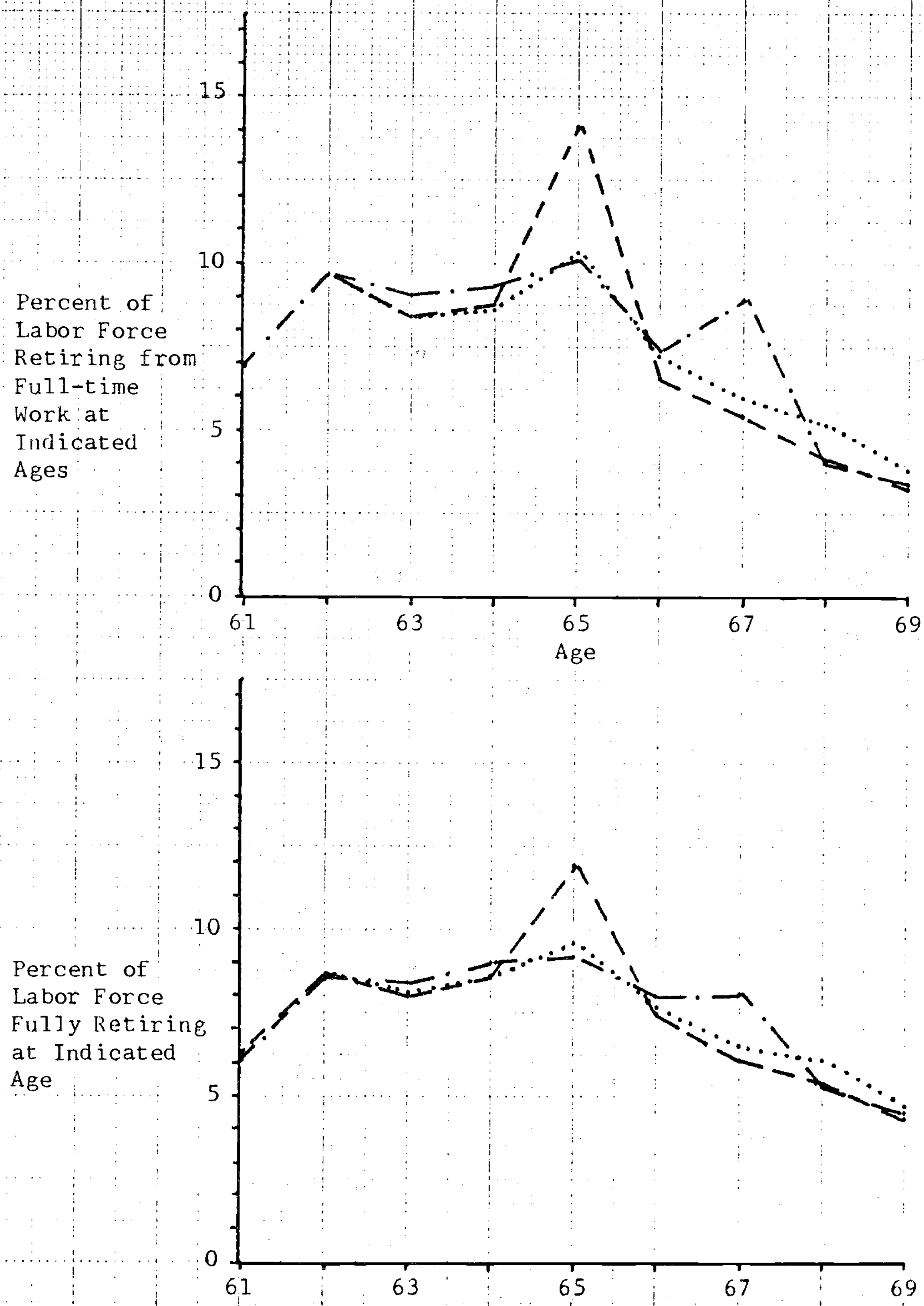


Figure 6

Effects of the Separate 1983 Rules Changes on the Simulated Retirement Behavior of Older Workers.



Legend

—·— Increase normal retirement age to 67, with 30% penalty for retirement at 62.

······ Increase delayed retirement bonus to 8% per year.

— — — Reduce benefit reduction rate to $1 for every $3 over the test amount.

will continue to work full-time more than they otherwise would. An increase in the normal retirement age to 67, on the other hand, will cause a new peak of retirement to occur at that age, but work activity after this age will be little affected. It is evident from comparing the effects of the individual components to the overall effects of the 1983 changes that the dominant effect arises from the increase in the delayed retirement credit. The reason for this result is fairly clear: if the delayed retirement bonus rate is increased to a level comparable to the early retirement penalty rate, it makes relatively little difference what age is formally designated as the normal retirement age, since the incentive effects on either side of that age are approximately the same.

The reduction in the rate at which benefits are lowered to one dollar for every three dollars in earnings over the test amount serves to dilute the actuarial penalties per hour worked for additional work. For instance, if the effect of the delayed retirement credit were to raise future benefits by forty cents for each dollar of benefits lost to the earnings test, and if the wage were $10 per hour, then the actuarial penalty per hour of additional work would be $3 (calculated as $10 times 0.5 times the 0.6 penalty rate) with a one dollar for every two dollars reduction rate, but only two dollars with a one dollar for every three dollars reduction rate. This change has the same general effects as the combined changes (which are approximately actuarially neutral), both in terms of the reduction in the peak of retirement activity at 65 and the increase in full-time work thereafter. But the magnitude of the effects from this change alone is less than half the magnitude of the effect of the combined changes.

As for the delay in the inflation adjustment, an important reason why this provision has so little effect on retirement and work activity is that under moderate inflation assumptions, benefits are affected by only a relatively small amount. Furthermore, this measure is essentially a uniform reduction in benefit levels. Hence, there are no strong intertemporal labor substitution effects which would shift the peaks and valleys in retirement activity.

V. Sensitivity of the Findings

Three additional sets of simulations were undertaken to assess how sensitive the comparison between the effects of the 1977 rules and the 1983 rules is to various assumptions about the environment in which the comparison is made. Figure 7 illustrates the results of these simulations. For reference, the solid lines in the figure indicate the previous results. The aim of this section is to determine how much any changes in assumptions will cause the results to deviate from these lines.

The first set of simulations makes the comparison between the two sets of rules using an inflation rate that is 5 percentage points higher than the inflation rate used in the previous simulations. A second pair of simulations investigates how the results might be different for an individual whose wage rates, pension benefits, and other real quantities were adjusted upward to levels that might pertain to individuals who would be age 65 in the year 2000. Neither of these changes in assumptions appears to have a very significant impact on the measured effects of the 1983 changes in the Social Security rules. The most noticeable difference is that under either change, slightly fewer people would be working full-time and slightly more would be working part-time betwen the ages of 65 and 68. These deviations are very small in comparison with the overall effects of the 1983 rules changes, however. Accordingly, it would appear that the results reported in the previous sections are fairly robust with respect to these kinds of changes in assumptions.

A third set of results in Figure 7 seeks to establish how the comparison between the 1977 and 1983 rules would be affected if private pension plans change their normal retirement ages to match the changes in the Social Security normal retirement age. More specifically, the dashed lines in the figure make the assumption that if a pension plan had previously specified age 65 as the normal retirement age, that age will be increased to 67 when the 1983 Social Security rules take effect.[1] This change in assumptions does make a noticeable difference, increasing full-time work at ages 65 and 66 by 3 to 4 percentage points in comparison to the previous results. This would serve to shift the remaining peak in retirement activity at age 65, as illustrated in Figure 4, to age 67. As the bottom two panels in Figure 7 show, the increase in full-time work would come partly at the expense of part-time work and partly at the expense of full retirement.

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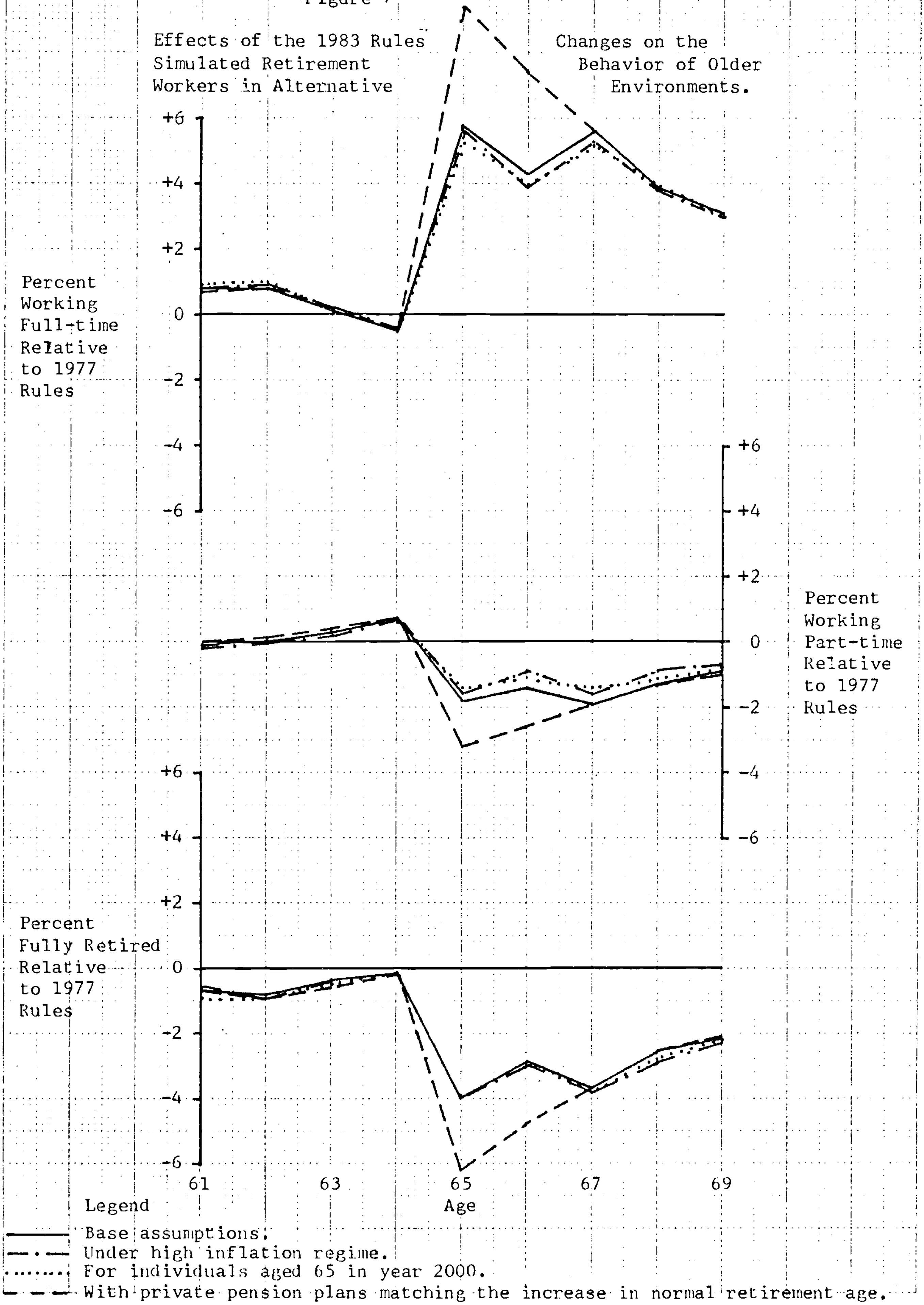
[1] We are aware that pension plans may be changed to offset rather than to augment the incentives created by changes in Social Security. Such changes are one implication of the literature which relates pension plan provisions to the goal of designing labor market contracts so as to raise labor productivity over the life cycle. See, for example, Lazear (1982) and Blinder (1982). This literature suggests that the net effect of changes in the provisions of Social Security legislation will be weaker than those indicated in our analysis.

Figure 7

Effects of the 1983 Rules Changes on the Simulated Retirement Behavior of Older Workers in Alternative Environments.



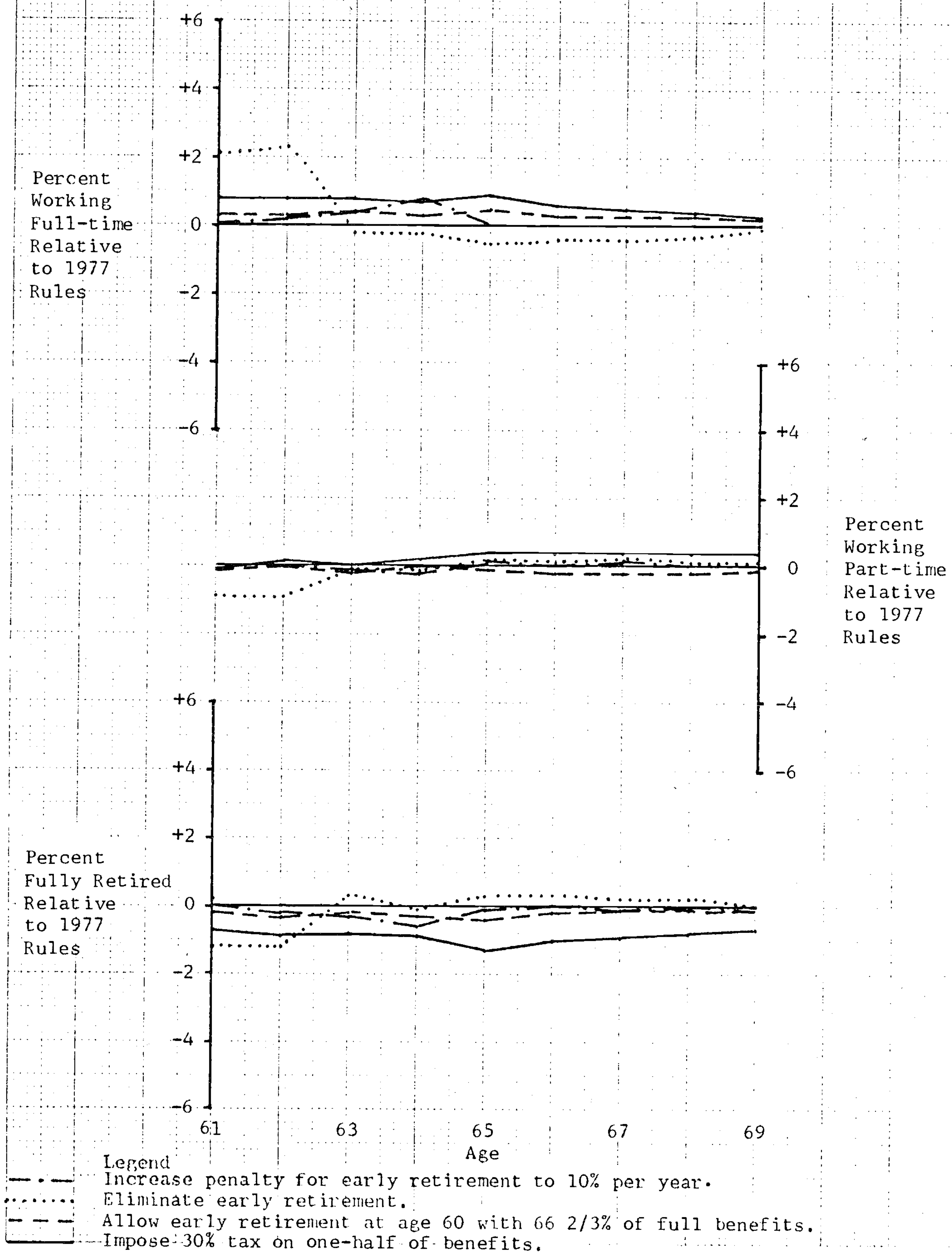
VI. Alternative Potential Changes in the Benefit Structure

This section investigates the effects of several alternative changes to the Social Security rules which might have been made instead of or in addition to those that were actually adopted in 1983. Figure 8 illustrates the results of the simulations undertaken for this purpose. The base of comparison is, as in the other figures presented above, the set of rules under the 1977 amendments. It is evident from only a quick glance at the figure that none of the changes explored in this section has a very large effect on retirement and labor supply behavior in comparison with the changes examined in previous sections.

The changes illustrated in Figure 8 are as follows: (1) In the first simulation, the penalty for early retirement at age 62 is increased to 30 percent, holding the other rules of the system to the 1977 set of rules. This change seems to have so little effect largely because the early retirement penalty rate under the 1977 law was already approximately actuarially fair, and with the increased penalty, individuals would simply evade a more than fair actuarial reduction by delaying registration for benefits. (2) The second simulation investigates the effects of eliminating early retirement completely. Since the actuarial adjustment between the early and normal retirement ages is rarely strongly unfair under the 1977 rules, this change too

Figure 8

Effects of Alternative Rules Changes on the Simulated Retirement Behavior of Older Workers.



would apparently have had little effect on labor supply.[1] (3) The third simulation allows individuals to begin collecting benefits at age 60, with the early retirement penalty rate remaining at 6 2/3 percent per year. Because individuals considering retiring at age 60 or 61 would have to give up relatively fewer benefits (they would be eligible to collect only 66 2/3 percent and 73 1/2 percent of the PIA's, respectively) in order to secure an increase of 6 2/3 percent of the PIA in all of their future benefits, postponing the benefits would be more

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[1] The increase in full-time work at 61 and 62 in this simulation is an artifact of the manner in which the simulations were done. More specifically, all individuals were started in the simulations at age 25, and under these circumstances all individuals would begin replacing years in their average monthly earnings calculations, and would hence experience a reduction in the returns to continuing full-time work, two years before the early retirement age (this assumes that if the early retirement age were to change, the number of years used in the average monthly earnings calculations would change accordingly). In the other simulations reported in this paper, a similar effect can be found, but the impact of this effect is before age 60, which falls outside the range for which the simulations are illustrated in the figures.

than actuarially fair for most individuals, and hence the change would have almost no effect because almost no one would find it advantageous to begin collecting at the earlier date. (4) In the last simulation of this section, one-half of the benefits are taxed at a uniform 30 percent rate, which is the equivalent of a reduction in benefits to 85 percent of the levels they would otherwise be. Such a tax could be expected to raise full-time work at most ages by a few tenths of a percentage point, with a corresponding decline in full retirement and relatively little effect on part-time work. This result suggests that any change in the benefit structure which has the effect of raising or lowering benefits uniformly are unlikely to change labor supply and retirement behavior by much, primarily because they do not create large substitution incentives between years.

VII. Better than Fair Actuarial Returns in the 1983 Rules

The Social Security amendments of 1983 contain one implication which was rarely mentioned in the public debate, but which nevertheless follows from the manner in which the rules were changed. Specifically, under the 1983 rules many wives will have very strong incentives to delay registering for Social Security benefits even if they are eligible for the benefits and the husbands are not working sufficiently that any benefits would be lost to the earnings test. The incentives reflect the fact that under the 1983 rules, for the first couple of years after they attain early retirement age, for most wives actuarial returns to delaying registration are much better than fair.

To illustrate, consider a 62-year-old wife who is deciding whether or not to postpone registration for another year. With five years of reduction at 8 1/3 percent per year, the amount she would be eligible to collect at age 62 would be just 58 percent of her full benefits. If she delays until age 63, she gives up this amount and gets in return an increase of 8 1/3 percent of the full benefits from age 63 on--that is to say, all her future benefits are increased by 14.3 percent (calculated by dividing 8 1/3 percent by .58). If her husband is the same age, then for each dollar of benefits postponed during her 62nd year, she may expect to recover about $1.77 in discounted future benefits. Analogous figures for other ages are shown in the top part of Table 1. The age differential between the wife and her husband enters because after the husband dies, the wife becomes eligible for widow's benefits, and any decision on whether or not to postpone registering for wife's benefits will have no effect on her potential widow's benefits. The general story told in the top half of the table is that there are very strong incentives to postpone registering at age 62, fairly strong incentives at age 63, and somewhat milder incentives at age 64. The bottom half of the table presents the corresponding figures for actuarial returns under the 1977 rules. As the figures indicate, for most wives there is a mild inducement to postpone registration until 63 under the 1977 rules, but in general the incentives to postpone registration at any given age under the 1977 rules are not nearly as strong as the incentives under the 1983 rules.

As long as it is actuarially advantageous for the wife to postpone registering and she in fact does so, the labor supply decisions of the husband do not cause the wife to lose benefits. Once the wife does

Table 1

Returns from Delaying Acceptance of Wife's Social Security Benefits[a]

A. 1983 Rules

Age differential between husband and wife[b]		Wife's Age 62	63	64	65	66
	-2			1.26	1.08	0.94
	-1		1.45	1.23	1.06	0.92
	0	1.71	1.43	1.22	1.05	0.91
	1	1.66	1.39	1.18	1.02	0.88
	2	1.60	1.34	1.14	0.98	0.85
	3	1.55	1.30	1.10	0.95	0.82
	4	1.50	1.25	1.06	0.91	0.78
	5	1.44	1.20	1.02	0.87	0.75

B. 1977 Rules

Age differential between husband and wife[b]		Wife's Age 62	63	64
	-2			1.03
	-1		1.16	1.01
	0	1.33	1.15	1.00
	1	1.29	1.11	0.97
	2	1.25	1.08	0.93
	3	1.21	1.04	0.90
	4	1.17	1.00	0.87
	5	1.12	0.96	0.83

[a] The figures in the table are calculated as the ratio between the increase in the present discounted value of future benefits and the amount of benefits foregone if the wife postpones registering for benefits at the indicated age. The real interest rate used in the calculations is 0.01.

[b] This differential is positive if the husband is older and negative if the wife is older.

register for benefits, the work decisions of the husband do affect the benefits of the wife if he earns more than the test amount, since she cannot collect benefits for a larger fraction of the year than he does. In short, if the wife is subject to less than actuarially fair returns, it will lower the net returns for continued work by the husband, but the reverse is not true, for if the wife faces a better than actuarially fair return, she can collect this return simply by delaying registration regardless of the work decisions of the husband.

With such high actuarial returns for a wife in her early sixties who postpones registration, it is possible to ask whether these returns can be used to induce the husband to continue working. The mechanism would be to allow the wife to postpone registration only if the husband continued to work. With this question in mind, a simulation was done which permitted wives to postpone benefits only if the husband were losing benefits to the earnings test. The results of this simulation are illustrated in Figure 9.[1] It is clear that such a change would

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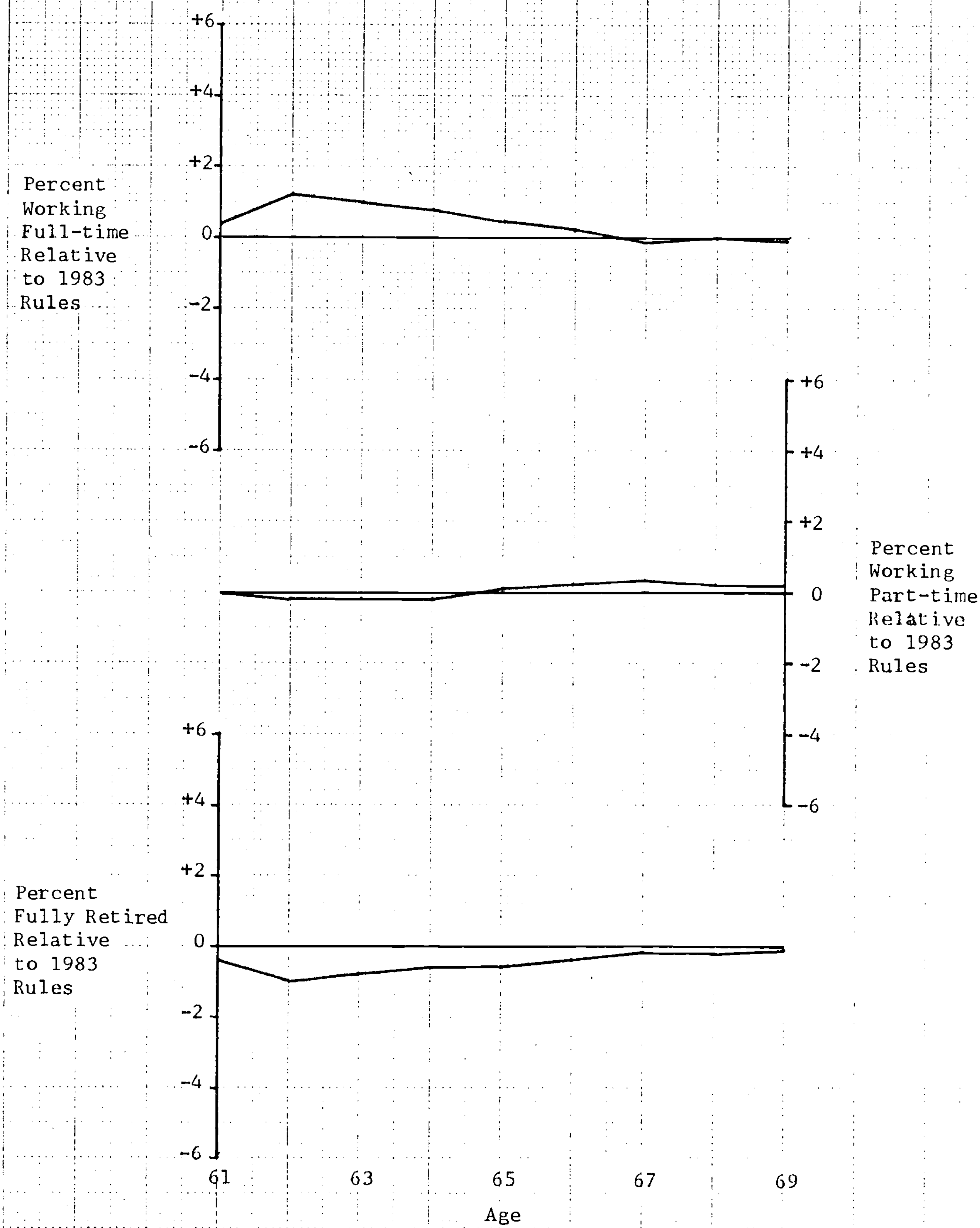
[1] In this simulation, a further change in the rules was made to permit individuals to begin receiving any increased benefits immediately rather than waiting until age 67, regardless of whether or not the individual had registered. Otherwise, the wife of an individual whose full-time earnings were insufficient to cause his benefits to be exhausted by the earnings test would find that by registering and collecting part-year benefits, the return on her remaining benefits may well be negative even though the returns from simply postponing registration were positive. This effect, which arises from the fact that once a person registers for benefits, he or she must wait until age 67 before the benefits are adjusted, runs contrary to the spirit of the simulation, so the effect was suppressed by allowing individuals to receive any increased benefits immediately.

Figure 9

Effects of Tying the Wife's Postponement of Benefits to the Husband's Continued Work



indeed work in the direction indicated, but the magnitude of the effects are not very large, increasing full-time work by only slightly more than a percentage point at 62 and 63 and less thereafter. The reason for this rather weak result is that although the returns are high per dollar of benefits that the wife loses, the returns per dollar income that the husband earns are considerably less. For instance, if a husband with a 62-year-old wife earns an additional dollar of income over the test amount, the wife's benefits are reduced by less than 14 cents, first because his benefits are reduced only 33 cents per dollar of income, and second because her benefit reductions are porportional to his, and her benefits are less than half of his (.58 percent of one-half the PIA versus at least seven times the full PIA). When account is taken of the fact that some fraction of the husband's full-time earnings will be below the earnings test, the apparently large actuarial returns to the wife may serve to increase the husband's full-time compensation by only 5 percent or so. The net result is that tying the wife's postponement to the husband's continued work provides only a very mild additional inducement to further work and generates only a small increase in full-time work effort.

VIII. Summary and Conclusions

The simulations of this paper have suggested that the rules changes specified in the recent Social Security legislation will have two principal effects. First, the peak of retirement activity at age 65 will be reduced somewhat and spread over later years. Second, while total work activity at 65 will be increased slightly, the fraction of individuals over 65 working part-time will fall relative to the fraction working full-time. This has evident implications for other groups who are competing with older workers for full-time or part-time jobs. The rules changes largely eliminate the effect on labor supply of actuarial penalties arising from the Social Security system, and as a result it appears that almost exactly the same results with regard to labor supply and retirement behavior could have been obtained by eliminating the earnings test entirely. Under either set of circumstances, the only real influence that Social Security rules would have on labor supply would be the effects arising if additional work displaces earlier years in the calculation of AME.

There are several qualifications which should be kept in mind while interpreting these results. Most importantly, these results refer to the long-run effects of a change in the rules, and as noted at the outset, apply only to white males who are not self-employed. In addition, individuals in the sample are presumed to average 35 years of earnings, with no maximum, in the AME calculations, a situation which will eventually be true for most people but is not necessarily true for the actual cohorts eligible for benefits today. Also, the model and the simulations assume that a uniform set of rules are in force for any particular simulation, and that these rules are correctly perceived by individuals. The paper has not attempted to ask questions pertaining to the reactions of individuals who had thought that they would be subject to one set of rules but find out in the middle of their life cycles that they will in fact be subject to another. It is not that we view this as an uninteresting question. But the model used in the paper is not as robust as one would like in terms of answering questions about unanticipated change, and it is not easy to see how to get around this problem without the availability of data sets that have somewhat better consumption data than is available in the RHS.[1] Nor does the model allow individuals to make mistakes in their maximizing calculations.

Another important qualification is that the simulations indicate how older workers might change their labor supply in the face of the various Social Security rules changes, but it does not consider whether this change in supply would change the wage offers of the individuals

[1] See Gustman and Steinmeier (1983a) for further discussion of this point.

and through this the amount of work they actually do. Moreover, only one potential change in the pension structure offered by the firms was considered. In short, this paper looks at the supply side of the market for these workers and indicates how the supply curve might move. It does not consider either the demand side of the market or the ultimate effects on wages and labor supply after a new equilibrium has been reached. This shortcoming is particularly serious in markets where older workers make up a significant part of the labor force, as in the market for part-time work.

An additional qualification is that the simulations are done using the actual pension coverage that was found for the sample for the Retirement History Survey. Pension coverage today is considerably greater than it was for the individuals in that sample. Since most pensions are not even as actuarially fair as the 1972 or 1977 Social Security rules, much less as the system will be after the changes mandated by the recent legislation, there is the possibility that retirement behavior may be driven more by features of the pension and less by the nature of the Social Security system than has been indicated by these simulations.

A futher qualification is that in the simulations, the spouse is presumed to draw the wife's benefits rather than drawing any benefits for which she might be eligible on her own. This is probably not a major qualification, however, since both under the 1977 rules and the 1983 rules the wife's actuarial return to delaying the receipt of benefits is either close to fair or better than fair until she reaches the normal retirement age. By the time she reaches normal retirement age and begins to be a potentially signficant factor in the husband's labor supply calculations, however, the husband in most cases will have already reached a decision either to retire or to work part-time at a level where he is influenced in only a minor way by Social Security considerations. That is to say, in most cases the incentives created by the wife's benefits do not play a major role in the husband's calculations, so that it probably does not matter a great deal whether the model treats her as drawing benefits as a wife or drawing benefits in her own right, if she is eligible to do so.

A related qualification has to do with the benefits a widow is eligible to draw. Unlike the wife's benefits, the widow's benefits enter in a more prominent manner into the calculations of the marginal benefit of additional work, because the amount the husband's benefits are reduced or augmented by the early retirement penalty or the delayed retirement credit are likely to be the limiting factor to the amount that the widow will be eligible to receive. Accordingly, any decision of his which would affect the amount by which his benefits are reduced or augmented will change the widow's benefits. The question which arises with respect to widow's benefits is the extent to which the husband takes account in his labor supply calculations of the potential benefits to be received by his widow after he is no longer around. Since the widow's benefits are always an additional positive inducement in the marginal labor supply decisions, a failure to include fully the widow's benefits in his calculations would probably induce an individual to retire at a slightly earlier age than these simulations might indicate.

A final qualification has to do with the fact that the model employed in these simulations takes no account of any potential liquidity constraint facing an individual. The degree to which older individuals are really liquidity-constrained is not completely evident. On the one hand, models such as this would predict that most individuals should enter their retirement years with a positive level of assets as long as the expected Social Security and pension receipts fail to replace completely the former wage. On the other hand, for many individuals these assets take the form largely of housing, which is not a very liquid asset. If individuals are postponing retirement simply because they are liquidity-constrained, then most of the effect of this constraint should show up as an increased amount of retirement around age 62, when individuals first become eligible for benefits under the system. However, simulations previously done using a closely related model for individuals during the actual sample period seemed to do an adequate job of explaining the bunching of retirement at age 62 even without invoking liquidity constraints as a part of the model.[1] Further, even if liquidity constraints do cause some amount of bunching of retirement at age 62, this should not strongly affect the results of most of these simulations, since the recent changes in the Social Security rules and all but two of the hypothetical changes considered in this paper do not entail a change in the age at which individuals can first obtain benefits, and so relieve their liquidity constraints. This consideration might inject a note of caution, though, in interpreting those simulations that do entail a change in the early retirement age.

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[1] See Gustman and Steinmeier (1983a) for a discussion of these results.

On a final note, the Social Security system is closer to actuarial neutrality under the 1977 rules than it was a decade ago, and after the recent legislation takes effect, it will be very close to being completely actuarially neutral. Under these circumstances, it will be difficult to change the various formulas in the Social Security system to make them better than actuarially fair so as to encourage later work, since under the current rules the individual is always free to collect better than actuarially fair returns simply by delaying registration for benefits. In order to use the Social Security system as more of an inducement to work than it is now, it will be necessary to change the rules so that an individual eligible to collect benefits must start collecting them unless the husband continues to work, and to make returns for delaying benefits for this reason more than actuarially fair. This would probably have to entail further increases in the early retirement penalty and the delayed retirement credit for the husband, however, since our findings indicate that simply tying the postponement of benefits to continued work will not be sufficient to increase work effort by much under the 1983 rules, even with the apparent high actuarial returns to women.

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Appendix A

Specification, Estimation, and Simulation of a Life-Cycle Model of Retirement Behavior

In previous work we have specified and estimated a life-cycle structural model which is capable of addressing the question of labor supply response to Social Security changes. This appendix will briefly sketch the specification of the model and its estimation; a more complete description is contained in Gustman and Steinmeier (1983a). The last part of this appendix will also indicate more precisely how the simulations reported in the body of the paper were carried out.

A. A Life-Cycle Model of Retirement Behavior. The theoretical model used in this study is a variation on the standard life-cycle model. In this model an individual can choose between full-time work or part-time work at a lower wage. In this setting, the individual chooses time paths for labor supply and consumption so as to maximize the lifetime utility function given by

$$U = \int_0^T u[C(t), L(t), t]\, dt$$

subject to the budget constraint

$$\int_0^T e^{-rt} C(t) dt = A_0 + \int_0^T e^{-rt} g[W_F(t)H_F(t) + W_P(t)H_P(t)]dt$$

where the various variables have already been defined in the text. As

MaCurdy (1981) has shown, the problem may be reduced to the problem of maximizing the following quantity at each moment in time

$$u[C(t), L(t), t] + k\ S(t)$$

where k is a parameter whose value is constant across time and S(t) is the discounted value of savings at time t, defined as

$$S(t) = e^{-rt}\ \{[W_F(t)H_F(t) + W_P(t)H_P(t)] - C(t)\}$$

In this problem, the individual generates utility during the current period in three ways: directly through consumption, directly through leisure, or indirectly through savings which are then converted to direct utility in other periods. At each moment in time the individual chooses how much to consume and how much to work in which type of job, and thereby how much leisure he will have and how much savings he will generate, so as to maximize the utility, both direct and indirect, generated during the period. In this formulation, the parameter k has a natural interpretation as the marginal utility of discounted savings either generated or used during the period. Its value depends upon the wage offers and the shape of the utility function throughout the entire life cycle, and it is thus the vehicle through which decisions and opportunities in other periods affect the choices in the current period. The appropriate value of k is the value such that when the above maximization problem is solved at each moment in time, the volume of savings generated and used over the life cycle just satisfies the budget constraint, which may be written in terms of S(t) as

$$A_0 + \int_0^T S(t)dt = 0$$

To complete the specification, it is necessary to choose a specific parametric form for u which specifies how the explanatory variables and stochastic terms affect utility and to specify the nature of the parametric distributions for the stochastic variables. The utility function used in the empirical analysis is the CES function:

$$u[C(t), L(t), t] = \text{sign}(\delta)\ \{[C(t)]^{\delta} + e^{\underline{X}_t\underline{\beta}+\varepsilon}\ [L(t)]^{\delta}\}$$

where δ and ε are time-invariant individual stochastic variables related to the within-period elasticity of substitution between consumption and leisure and to the relative weight attached to leisure, respectively. δ is assumed to come from an exponential distribution

$$f(\delta) = \gamma e^{-\gamma(1-\delta)},\ \delta \leq 1$$

where γ is a positive parameter defining the distribution. The normal distribution is used for the stochastic distribution of ε:

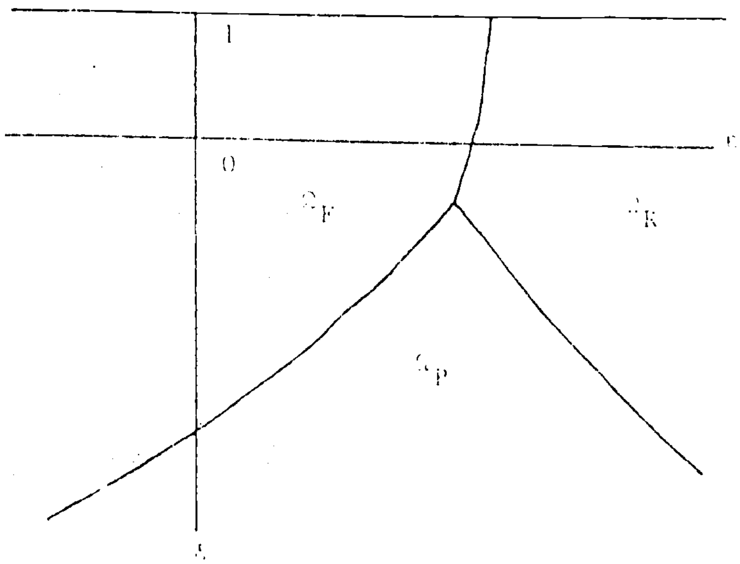
$$\varepsilon|\delta \sim n(\rho\delta,\ \sigma_{\varepsilon}^2)$$

with the parameter ρ providing a means by which δ and ε may be correlated.

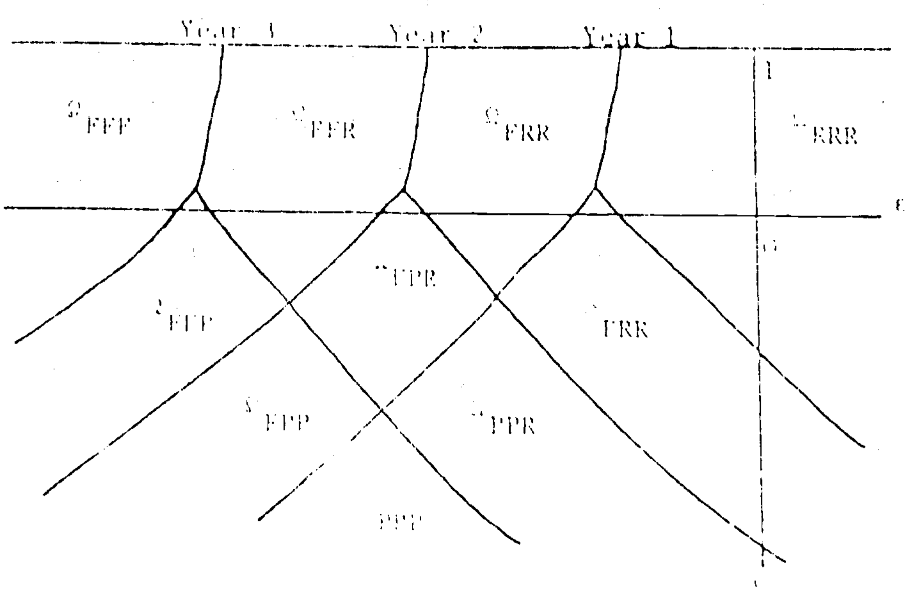
B. Estimation Procedure. The maximum likelihood estimation procedure is based on the fact that for a given set of values for the parameters of the model, an observed set of retirement decisions by a particular individual is consistent with only a limited range of values for the stochastic variables. To illustrate the technique, consider an individual who is observed to be fully retired, working part-time, or working full-time as of a specific date. For a given set of parameter values, his observed behavior is consistent with only a subset of possible values for δ and ε, as illustrated in the top panel of Figure A.1. For example, all combinations of values of δ and ε in the area denoted as Ω_R, which includes high values of ε signifying a large weight on leisure in the utility function, imply in the model that the individual would be retired as of the specific date. Similarly, the region denoted as Ω_F includes generally low values of ε, signifying that the individual places relatively little value on leisure, and combinations of δ and ε in this region imply that the individual would be working full-time as of the date. Finally, for individuals with a sufficiently low elasticity of substitution between consumption and leisure and with an intermediate value of ε such that they fall in the region Ω_P in the diagram, the model implies that they would be working part-time as of the date.

Similar regions can be defined for an individual who is observed in several different years. Figure A.1b illustrates a typical case involving observations in three different years. In this diagram, the right-hand inverted Y separates the (δ,ε) plane into three parts according to whether the individual would be fully retired, working part-time, or working full-time in the first year. The remaining inverted Y's define

Figure A.1. Regions of the Stochastic Variables Corresponding to Particular Retirement Sequences



(a) Single Year



(b) Multiple Years

similar areas for the other two years. These inverted Y's will be to the left of the original inverted Y due to the effect of the time-dependent explanatory variables in $\underline{X}_t$ in the utility function, which will cause the individual to place a relatively greater weight on leisure as he grows older. This, in turn, implies that the region for which the individual will be fully retired will be larger in the second and third years than in the first year, and the region for which the individual will be working full-time will be smaller. In combination, the three inverted Y's defined in this manner divide the (δ, ε) plane into a series of regions corresponding to various retirement sequences. For instance, the region Ω_{FPR} defines a region of values for δ and ε for which the individual would be working full-time in Year 1 and part-time in Year 2, and would be fully retired in Year 3.

To calculate the probability that individual i would have chosen the observed retirement sequence S_i, first find the region $\Omega_{S_i}(\underline{\beta})$ which defines the combinations of δ and ε which would have caused the individual to have followed the observed retirement sequence S_i. Note that the boundaries of this region depend explicitly on the parameter vector $\underline{\beta}$, since these parameters in part determine how the individual will behave when confronted with a given time path of wages. The probability that the stochastic variables would have taken on values in the region $\Omega_{S_i}(\underline{\beta})$ and hence would have generated the sequence S_i is:

$$Pr_i(S_i;\underline{\theta}) = \iint_{\Omega_{S_i}(\underline{\beta})} f(\delta,\ \varepsilon;\ \gamma,\ \sigma_\varepsilon^2,\ \rho)\ d\varepsilon d\delta$$

where $\underline{\theta}$ is a vector of all of the parameters to be estimated ($\underline{\beta}$, γ, σ_ε^2

and ρ) and where the joint probability density function f of the stochastic variables δ and ε depends on the parameters γ, σ_ε^2 and ρ, as noted explicitly in the function. The likelihood function of the sample is calculated as the product of the probability for each observation in the sample:

$$\ell(\underline{\theta}) = \sum_{i=1}^{N} Pr_i(S_i; \underline{\theta})$$

where N is the number of individuals in the sample. Maximum likelihood estimates of the parameters of the model are found by maximizing this likelihood function with respect to the parameters. On the assumption that the specification of the model is correct, these estimates are known to have optimal properties for large samples.

C. Empirical Specifications. The data set used in this study is the Retirement History Survey (RHS), a random longitudinal sample of approximately 11,000 households. The RHS consists of households whose heads were between the ages of 58 and 63 in 1969. Detailed questionnaires were administered to these households every two years from 1969 through 1979. This study uses the survey results through 1975, which were the latest results available at the time the study was begun. Due to the complexity of the estimation and simulation procedures, the sample actually actually used for this paper is formed by taking every tenth household from the RHS, and the sample is further restricted to white males who were not self-employed when working full-time. Observations are dropped if critical information is missing, although a major effort is made to impute missing information if at all possible.

In view of the complexity of estimating an optimal control model, a parsimonious choice is made for the set of explanatory variables to be included in the vector $\underline{X}_t$. The explanatory variables used in the empirical analysis include a constant, age, a dummy variable equal to unity if the individual has previously experienced a long-term health problem, and vintage. The coefficients associated with these variables are β_0, β_1, β_2, and β_3. For positive values of β_1 and β_2 (the coefficients of age and the health dummy variable, respectively), the utility function for an individual places an increasing emphasis on leisure over time, which eventually causes retirement in the model.

The model requires two time paths for wage offers, one for the wage offer for full-time work and one for the offer for part-time work. It should be evident that whereas we have called $W_F(t)$ and $W_P(t)$ "wage offers," what is really required for the estimation and simulations is a measure of total compensation for additional work, including the wage *per se* as well as any increases in pension values and Social Security values attributable to the additional work. In order to impute the time paths for wages *per se*, separate wage equations are imputed for full-time work and for part-time work. From whatever information can be extracted from the data about an individual's job history, a pair of wage offer curves is constructed using available information about the individual's wages as an indication of the general height of the curves and allowing the profile of the wage paths to be determined by the tenure and experience variables in the wage equations. For full-time work, the pension component of compensation is calculated on the basis of available information on normal and early retirement ages, tenure in the job, and the level of benefits. With no information available about the type of pension, all pensions are treated as though they were of a defined benefit type with payments proportional to years of service and with reductions for early retirement which are imputed from industry data reported by Hatch et al. (1981). The Social Security component of compensation is based on the set of rules in force during the sample period, including the effects of the automatic benefit recomputation as stressed by Blinder, Gordon, and Wise and the effect of the lack of indexing of the early retirement penalty as stressed by Burkhauser and Turner (1982).[1] The calculations use the individual's actual covered wages through age 55 and imputed wages thereafter, since after that age the Social Security earnings records increasingly fail to reflect potential earnings for those who partially or fully retire.

The retirement sequences used in the estimation procedure are formed on the basis of a question which asked the respondents whether they considered themselves to be completely retired, partially retired, or not retired at all. For most individuals, the retirement sequence consists of a set of four observations (one observation every two years from 1969 to 1975). In cases where the individual dropped out of the sample etierh because of death or refusal to answer the questionnaire,

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[1] Due to the additional complexity that would have been created in the estimation program, the effect of recomputing the AME is calculated only for full-time work and not for part-time work. This implicitly assumes that annual earnings from partial retirement work are low enough that they do not replace any years already used in the AME calculations, or alternatively, that the effect of a change in AME is not an important part of the Social Security component of part-time compensation relative to either effect.

the retirement sequence includes fewer than four observations. The estimation procedure described above can be used for any number of observations on retirement status, and hence it is possible to use whatever observations are available for each individual in the data set. Individual responses are taken at face value except for some cases where an individual classified himself as partially retired even though he was fairly clearly fully retired for purposes of labor-force participation. Problems arise in a few cases wherein individuals went backwards along the sequence of full-time work, part-time work, and full retirement, since regression along this sequence would in general not be generated by any combination of the stochastic terms within the context of the model. For such individuals, the estimation procedure uses whatever information in the retirement sequence that provides useful information about the slope and curvature of the individual's indifference curves between consumption and leisure and ignores those parts of the sequence which contain little such information but would require a considerably more complicated model (involving perhaps the reactions of individuals to unexpected occurrences) to explain adequately.

D. Parameter estimates. Table A.1 presents the parameter estimates obtained by applying the estimation procedure described above. All of the parameters with the exception of the coefficient on vintage are highly significant at any conventional level, and the small standard errors indicate that most of them are determined quite precisely. Three of these parameters have particularly important implications about the manner in which individuals behave. First, the value of γ implies

Table A.1

Parameter Estimates.[a]

γ	0.61 (0.04)
σ_{ε}	0.99 (0.02)
ρ	-8.78 (0.22)
β_0	-5.02 (0.10)
β_1	0.21 (0.01)
β_2	0.84 (0.10)
β_3	0.06 (0.03)

[a]Estimates are based on 478 observations. Estimated standard errors are in parentheses.

that the median value of the elasticity of substitution between consumption and leisure in the utility function is 0.87, which is just on the inelastic side of unity. Within the context of the life-cycle model used in the estimation procedure, this value reflects in part the rather weak correlation between the age of retirement and the general level of lifetime wages (a high value of the substitution elasticity, for example, implies a strong negative correlation between them) and in part the relative proportion of the sample who showed themselves to be willing to accept a lower hourly rate of pay in return for being able to work part-time (a high value of the substitution elasticity would indicate that very few people would be willing to make this trade-off). The estimated value is considerably lower than the value of 10 found by Gordon and Blinder, who did not use any information on the choice of full-time work versus part-time work at a lower wage in their study. The second important parameter is β_1, the parameter which determines the rate at which the leisure term is gaining weight in the utility function as the individual ages, and hence the rate at which the indifference curves between consumption and leisure are becoming steeper over time. The value of this parameter indicates that the indifference curves become steep fairly rapidly, increasing their slope by 23 percent per year.[1] In large measure, this rather rapid rate reflects the fact that among the individuals who do in fact work part-time, the length of the period that they spend in part-time work is typically fairly short. If the indif-

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[1] The percentage figures in this paragraph are calculated as 100 $(e^c - 1)$, where c is the estimated coefficient value.

ference curves were becoming steeper only slowly, then one would expect that many of the individuals who work part-time would do so for a relatively long period of time, and it is this consideration which leads the estimation procedure to its rather high estimate of the effect of age on the slopes of the curves. The third critical parameter is σ_ε^2, which indicates the degree of heterogeneity of individual preferences regarding the weight of the leisure term in the utility function. The estimated value of 0.99 suggests that there is a high degree of heterogeneity among individuals, with a single standard deviation in the stochastic preference variable representing a change of 169 percent in the slope of an indifference curve at a given age. This large variation in individual preferences combined with the relatively smaller yearly effects of age on the slope of the indifference curves causes individuals to retire over a range of ages beginning in the mid-50's and extending into the 70's.

E. The Simulation Method. The simulations are performed as follows. For each individual in the sample, the value of the vector $\underline{X}_t$ and the wage paths $W_F(t)$ and $W_P(t)$ are calculated according to the procedure described above. The individual will retire, according to the life-cycle model, at some age R whose value depends on the stochastic variables δ and ε. Let $\Omega_i(R)$ be the set of all combinations of δ and ε which imply that this individual would retire at age R. Then the probability that an individual with the characteristics indicated by $\underline{X}_t$ and facing the wage paths $W_F(t)$ and $W_P(t)$ will retire at age R is found by integrating the probability density function for δ and ε over the region $\Omega_i(R)$.

$$f_i(R) = \iint_{\Omega_i(R)} f(\delta,\varepsilon)\, d\varepsilon d\delta$$

For the entire sample, the simulated percentage of individuals who retire at a given age R is found by taking the average value of $f_i(R)$ over the sample:

$$f(R) = \frac{1}{N} \sum_{i=1}^{N} f_i(R).$$

The same procedure can be used to calculate the distribution of any other statistic of interest concerning the simulated retirement decisions of the sample.

The simulations are based on a set of assumptions about the Social Security system that are intended no so much to reflect the effects of the system on the cohorts receiving Social Security today as to indicate the long-term effects of changes in the system. More specifically, the Social Security system which is used in the simulations includes the following features: (1) The number of earnings to be included in the AME calculations is found by subtracting 27 from the age when individuals were first eligible to begin drawing early retirement benefits. No maximum is applied to the earnings, which implicitly assumes that the maximum is high enough that it does not affect a large number of individuals. Earnings in part-time work are assumed to be sufficiently low that they will not affect the AME computations, an assumption which is made to simplify the computations and which is particularly likely to be true in cases when earnings from earlier years are indexed. (2) The PIA is based on a calculation made at the early retirement age using the rates and bend points for the appropriate year. No maximum or minimum is applied to this calculation. Afterwards, the benefits are assumed to be adjusted upward to reflect any increases in the cost of living and any increases in the AME calculations. (3) Benefits are reduced for each month before the normal retirement age that the individual registers for benefits, with a recalculation done at the normal retirement age to reflect any time during which the individual lost benefits due to the earnings test. After the normal retirement age, future benefits are increased for every month's worth of benefits that are lost to the earnings test. The individual is presumed to make an actuarial calculation and to postpone accepting benefits until it is no longer actuarially advantageous for him to do so. At this point he registers for benefits as soon as his earnings fall to a level which would allow him to collect them, and any earnings after that point are subject to the earnings test.[1] Earnings above the earnings test cause benefits to be reduced by

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[1] Even though it would be actuarially advantageous to give up an entire year's worth of benefits if he did not work, an individual at age 62 who decides to work enough so that most of his benefits would be postponed may find it advantageous to postpone registering altogether. The reason is that if the individual postpones registering, any increase in benefits will take effect immediately, whereas if the benefits are registered for and then foregone, increases in future benefits will not accrue until the normal retirement age. However, this effect is likely to be rather small in comparison with other changes in incentives occurring because of the Social Security system (i.e., the wife reaching normal retirement age and hence losing permanently any foregone benefits, or the husband reaching normal retirement age and facing a very sharp drop in the actuarial return to foregone benefits). Furthermore, it would considerably complicate the solution of the life-cycle model to take account of this effect because the decision depends on future labor supply decisions. For these reasons, the effect is not considered in the simulation, and instead it is assumed that once the actuarial rate falls below unity and the individual's earnings fall to the point where he can begin drawing benefits, he does so.

a fraction of earnings above the test amount. (4) All wives are assumed to make their calculations as if they were eligible for one-half the husband's PIA, with the benefits reduced for each month before the normal retirement age that the wife registers for the benefits. The wife is presumed to postpone benefits until the point in time where it becomes actuarially disadvantageous to delay any further, and then to register. After she registers, her benefits in any particular year are reduced because of the effect of the earnings test, but if she is below the normal retirement age some of the lost benefits will be recovered via increases in future benefits. (5) A widow is eligible, starting two years before the early retirement age, for benefits that are reduced for each month before the normal retirement age that she registers for the benefits. She also is presumed to delay the registration until it becomes actuarially disadvantageous to do so further. Her benefits are limited to the amount her husband would have been eligible to receive, including any early retirement penalties and/or delayed retirement credits, as long as the benefits would not fall below 82.5 percent of the primary insurance amount for this reason.

In addition to the assumptions regarding Social Security that are used in the simulation, the following other assumptions and adjustments are also made. First, the growth rates of real and nominal wage rates are presumed to be equal to the 35-year average growth rate during the period 1947-1982, and the real interest rate used in the calculations is presumed to be approximately equal to the growth rate of real wages. Secondly, in order to simulate the effects of the Social Security changes at approximately today's wage levels, all nominal wage and pension quantities are adjusted upward to levels appropriate for an individual who would be 65 in 1985. Finally, in order to reflect an important change in the law since the period of the Retirement History Survey, the wage streams constructed for the purposes of the simulation presume that if the individual faced a mandatory retirement age before 70, the value of the mandatory retirement age for the purposes of the simulations is changed to 70.

Appendix B

Table B.1

Simulations of the Effects of Various Sets of Social Security Rules.

	percent retiring, by age: from full-time work	percent retiring, by age: from all work	percent working full-time	percent working part-time	percent fully retired
	A. Under 1972 Rules.				
age					
60	6.6	5.4	78.7	5.1	16.2
61	6.5	5.8	72.2	5.8	22.0
62	10.0	8.6	62.2	7.1	30.7
63	9.3	8.5	52.9	8.0	39.1
64	9.7	9.1	43.2	8.6	48.2
65	16.4	12.8	26.7	12.2	61.1
66	6.5	7.1	20.3	11.6	68.1
67	5.8	6.5	14.5	10.9	74.6
68	4.2	5.4	10.2	9.7	80.1
69	3.5	4.8	6.7	8.5	84.8
70	1.0	2.8	5.7	6.7	87.6
average age[a]	62.6	63.8			
	B. Under 1977 Rules.				
age					
60	8.5	6.5	74.4	6.6	19.0
61	6.9	6.3	67.5	7.2	25.3
62	9.7	8.6	57.8	8.3	33.9
63	8.4	8.1	49.4	8.7	41.9
64	8.7	8.6	40.7	8.7	50.6
65	16.4	13.1	24.3	12.0	63.7
66	5.9	6.9	18.4	11.1	70.5
67	5.4	6.2	13.0	10.3	76.7
68	3.9	5.3	9.1	9.0	81.9
69	3.1	4.3	6.0	7.7	86.3
70	1.2	2.8	4.8	6.1	89.1
average age	62.3	63.4			
	C. Under 1983 Rules.				
age					
60	8.2	6.3	75.1	6.4	18.5
61	6.8	6.1	68.3	7.1	24.6
62	9.7	8.5	58.6	8.3	33.1
63	9.1	8.4	49.5	9.0	41.5
64	9.3	9.0	40.2	9.4	50.4
65	10.1	9.3	30.1	10.2	59.7
66	7.5	8.0	22.7	9.7	67.6
67	4.0	5.2	18.6	8.4	73.0
68	5.6	6.3	13.0	7.7	79.3
69	4.0	4.9	9.1	6.8	84.1
70	3.5	4.2	5.6	6.0	88.4
average age	62.5	63.7			

Table B.1 (continued)

D. Under 1983 Rules, but with no Earnings Test.

	percent retiring, by age				
age	from full-time work	from all work	percent working full-time	percent working part-time	percent fully retired
60	8.2	6.3	75.1	6.4	18.5
61	6.8	6.1	68.3	7.1	24.6
62	9.6	8.4	58.7	8.3	33.0
63	8.2	7.9	50.5	8.6	40.9
64	8.6	8.4	41.9	8.7	49.4
65	11.1	10.0	30.8	9.8	59.4
66	6.9	7.4	24.0	9.2	66.8
67	5.5	6.2	18.5	8.4	73.1
68	5.0	5.9	13.5	7.5	79.0
69	3.7	4.7	9.8	6.6	83.6
70	4.4	5.0	5.4	6.0	88.6
average age	62.6	63.7			

[a] These averages are calculated from the distributions of retirement ages ranging between 56 and 72, and not simply from the 10 year age range reported in these tables.

Table B.2

Simulations of the Effects of the Individual Components of the 1983 Changes in the Social Security Rules.

	percent retiring, by age: from full-time work	percent retiring, by age: from all work	percent working full-time	percent working part-time	percent fully retired
A. Increase Normal Retirement Age to 67, with a 30% Penalty for Retirement at Age 62.					
age					
60	8.3	6.4	75.0	6.4	18.6
61	6.9	6.1	68.2	7.2	24.6
62	9.7	8.5	58.5	8.3	33.2
63	9.1	8.4	49.4	9.0	41.6
64	9.3	9.0	40.1	9.3	49.6
65	10.1	9.2	30.0	10.2	59.8
66	7.4	8.0	22.6	9.6	67.8
67	8.9	8.1	13.7	10.4	75.9
68	4.0	5.3	9.7	9.1	81.2
69	3.4	4.5	6.3	7.9	85.8
70	1.3	2.9	5.0	6.3	88.7
average age	62.4	63.6			
B. Increase Delayed Retirement Bonus to 8% per Year.					
age					
60	8.5	6.5	74.4	6.6	19.0
61	6.9	6.3	67.4	7.2	25.4
62	9.7	8.6	57.7	8.3	34.0
63	8.4	8.1	49.3	8.7	42.0
64	8.6	8.6	40.7	8.7	50.6
65	10.3	9.6	30.4	9.5	60.1
66	7.3	7.7	23.1	9.0	67.9
67	6.0	6.5	17.1	8.4	74.5
68	5.2	6.1	11.9	7.5	80.6
69	3.8	4.7	8.1	6.6	85.3
70	2.6	3.7	5.5	5.6	88.9
average age	62.5	63.6			
C. Reduce Benefit Reduction Rate to $1 for Every $3 in Earnings over the Earnings Test Amount.					
age					
60	8.5	6.5	74.4	6.6	19.0
61	6.9	6.3	67.5	7.2	25.3
62	9.7	8.6	57.8	8.3	33.9
63	8.4	8.0	49.4	8.7	41.9
64	8.7	8.6	40.7	8.7	50.6
65	14.2	11.9	26.5	11.0	62.5
66	6.6	7.5	19.8	10.2	70.0
67	5.4	6.1	14.4	9.5	76.1
68	4.1	5.4	10.3	8.2	81.5
69	3.3	4.3	7.0	7.2	85.8
70	1.8	3.1	5.3	5.8	88.9
average age	62.3	63.5			

Table B.2 -- (continued)

age	percent retiring, by age: from full-time work	percent retiring, by age: from all work	percent working full-time	percent working part-time	percent fully retired
	D. Delay Inflation Adjustment by One-half Year.				
60	8.4	6.5	74.6	6.5	18.9
61	6.9	6.3	67.6	7.2	25.2
62	9.7	8.6	57.9	8.4	33.7
63	8.4	8.0	49.5	8.7	41.8
64	8.6	8.6	40.8	8.8	50.4
65	16.4	13.0	24.4	12.1	63.5
66	6.0	6.9	18.5	11.2	70.3
67	5.4	6.2	13.1	10.4	76.5
68	3.9	5.3	9.2	9.0	81.8
69	3.1	5.3	6.1	7.8	86.1
70	1.2	2.8	4.9	6.2	88.9
average age	62.3	63.5			

Table B.3

Simulations of the Effects of Potential Changes in Social Security Rules.

age	percent retiring, by age: from full-time work	percent retiring, by age: from all work	percent working full-time	percent working part-time	percent fully retired
A. Increase Penalty for Early Retirement to 10% per Year.					
60	8.4	6.4	74.4	6.6	19.0
61	6.9	6.3	67.5	7.2	25.3
62	9.6	8.5	58.0	8.3	33.7
63	8.2	7.9	49.8	8.6	41.6
64	8.3	8.4	41.5	8.5	50.0
65	17.2	13.6	24.3	12.1	63.6
66	5.9	6.9	18.4	11.1	70.5
67	5.4	6.1	13.0	10.4	76.6
68	3.9	5.2	9.1	9.0	81.9
69	3.1	4.3	6.0	7.8	86.2
70	1.2	2.8	4.8	6.1	89.1
average age	62.3	63.5			
B. Eliminate Early Retirement.					
60	6.4	5.5	76.6	5.4	18.0
61	7.0	6.2	69.6	6.3	24.1
62	9.5	8.6	60.1	7.2	32.7
63	10.9	9.4	49.2	8.6	42.2
64	8.3	8.3	40.9	8.6	50.5
65	17.1	13.5	23.8	12.2	64.0
66	5.8	6.8	18.0	11.2	70.8
67	5.4	6.1	12.6	10.5	76.9
68	3.8	5.2	8.8	9.1	82.1
69	3.0	4.3	5.9	7.8	86.3
70	1.2	2.8	4.7	6.1	89.2
average age	62.3	63.5			
C. Allow Early Retirement at Age 60 with 66 2/3% of Full Benefits.					
60	6.6	5.6	74.6	6.5	18.9
61	6.8	6.2	67.8	7.1	25.1
62	9.7	8.5	58.1	8.3	33.6
63	8.3	8.0	49.8	8.5	41.7
64	8.8	8.7	41.0	8.7	50.3
65	16.2	13.0	24.8	11.9	63.3
66	6.0	7.0	18.7	10.9	70.3
67	5.4	6.2	13.3	10.1	76.6
68	4.0	5.3	9.4	8.8	81.8
69	3.2	4.3	6.2	7.6	86.2
70	1.2	2.8	5.0	6.0	89.0
average age	62.3	63.5			

Table B.3 (continued)

age	percent retiring, by age: from full-time work	percent retiring, by age: from all work	percent working full-time	percent working part-time	percent fully retired
D. Impose 30% Tax on One-half of Benefits.					
60	8.2	6.3	75.1	6.4	18.5
61	6.8	6.1	68.3	7.1	24.6
62	9.7	8.5	58.6	8.4	33.0
63	8.4	8.0	50.2	8.7	41.1
64	8.8	8.6	41.4	8.9	49.7
65	16.2	12.8	25.2	12.4	62.4
66	6.1	7.1	19.0	11.5	69.5
67	5.6	6.3	13.5	10.7	75.8
68	3.9	5.2	9.5	9.4	81.1
69	3.2	4.6	6.3	8.1	85.6
70	1.3	2.9	5.0	6.5	88.5
average age	62.3	63.6			

Table B.4

Simulations of the 1977 and 1983 Social Security Rules Under a High Inflation Regime.

	percent retiring, by age: from full-time work	percent retiring, by age: from all work	percent working full-time	percent working part-time	percent fully retired
	A. Under 1977 Rules.				
age					
60	8.1	6.3	75.3	6.2	18.5
61	6.7	6.0	68.7	6.9	24.4
62	9.5	8.4	59.1	8.0	32.9
63	8.2	7.8	51.0	8.4	40.6
64	8.5	8.5	42.4	8.4	49.2
65	15.0	12.6	27.4	10.8	61.8
66	6.3	7.2	21.1	9.9	69.0
67	5.6	6.2	15.6	9.3	75.1
68	4.3	5.5	11.3	8.1	80.6
69	3.5	4.5	7.8	7.0	85.2
70	1.8	3.1	6.0	5.7	88.3
average age	62.5	63.6			
	B. Under 1983 Rules.				
age					
60	7.9	6.1	76.1	6.1	17.8
61	6.6	6.0	69.5	6.7	23.8
62	9.5	8.2	60.0	8.0	32.0
63	8.8	8.2	51.2	8.6	40.2
64	9.2	8.8	42.0	9.0	49.0
65	9.1	8.9	33.0	9.2	57.8
66	8.0	8.1	25.0	9.0	66.0
67	4.1	5.3	20.9	7.8	71.3
68	5.8	6.4	15.1	7.2	77.7
69	4.3	5.2	10.8	6.3	82.9
70	4.2	4.8	6.6	5.7	87.7
average age	62.8	63.8			

Table B.5

Simulations of the Effects of the 1977 and 1983 Social Security Rules for Individuals Who Would Be Age 65 in Year 2000.

	percent retiring, by age		percent working full-time	percent working part-time	percent fully retired
	from full-time work	from any work			
	A. Under 1977 Rules.				
age					
60	8.4	6.6	71.3	7.4	21.3
61	6.9	6.6	64.4	7.6	28.0
62	9.2	8.6	55.2	8.3	36.5
63	7.9	8.0	47.3	8.3	44.4
64	8.1	8.5	39.2	7.9	52.9
65	15.2	12.9	24.0	10.2	65.8
66	5.7	6.8	18.3	9.1	72.6
67	5.0	6.0	13.3	8.1	78.6
68	3.9	5.0	9.4	7.0	83.6
69	3.0	4.2	6.4	5.7	87.9
70	1.2	2.5	5.2	4.4	90.4
average age	62.1	63.1			
	B. Under 1983 Rules.				
age					
60	8.2	6.4	72.0	7.4	20.6
61	6.8	6.5	65.3	7.6	27.1
62	9.1	8.4	56.2	8.4	35.4
63	8.8	8.5	47.4	8.7	43.9
64	8.7	8.8	38.7	8.5	52.8
65	9.4	9.2	29.3	8.8	61.9
66	7.0	7.8	22.3	8.0	69.7
67	3.8	5.2	18.5	6.7	74.8
68	5.2	6.0	13.3	5.9	80.8
69	3.9	4.9	9.4	4.9	85.7
70	3.4	4.0	6.0	4.3	89.7
average age	62.3	63.3			

Table B.6

Simulation of the 1983 Social Security Rules Under Assumption That the Normal Retirement Ages in Private Pension Plans Will Change to Match The Social Security Normal Retirement Age.

age	percent retiring, by age: from full-time work	percent retiring, by age: from all work	percent working full-time	percent working part-time	percent fully retired
60	8.3	6.4	75.0	6.4	18.6
61	6.9	6.1	68.2	7.2	24.6
62	9.6	8.4	58.6	8.4	33.0
63	9.0	8.4	49.6	9.1	41.3
64	9.3	9.0	40.2	9.4	50.4
65	6.5	7.1	33.7	8.8	57.5
66	7.9	8.1	25.8	8.5	65.7
67	7.2	7.3	18.6	8.4	73.0
68	5.6	6.3	13.0	7.7	79.3
69	4.0	4.9	9.1	6.7	84.2
70	3.5	4.3	5.6	5.9	88.5
average age	62.6	63.7			

Table B.7

Simulation of 1983 Social Security Rules Modified So That an Individual Can Only Postpone Benefits if He Continues to Work.

age	percent retiring, by age: from full-time work	percent retiring, by age: from any work	percent working full-time	percent working part-time	percent fully retired
60	8.1	6.2	75.5	6.4	18.1
61	6.8	6.1	68.7	7.1	24.2
62	9.0	8.0	59.8	8.1	32.1
63	9.2	8.5	50.5	8.8	40.7
64	9.5	9.1	41.0	9.2	49.8
65	10.4	9.4	30.6	10.3	59.1
66	7.8	8.2	22.9	9.9	67.2
67	4.3	5.5	18.5	8.7	72.8
68	5.6	6.3	13.0	7.9	79.1
69	4.0	5.0	9.0	7.0	84.0
70	3.3	4.1	5.7	6.2	88.1
average age	62.6	63.7			