FINAL REPORT

Modeling Income in the Near Term - Projections of Retirement Income Through 2020 for the 1931-60 Birth Cohorts

by

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PREFACE

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CHAPTER 1

INTRODUCTION

The Division of Policy Evaluation (DPE) at the Social Security Administration (SSA) is developing a model to evaluate the distributional effects of Social Security policy changes. The model is referred to as Modeling Income in the Near Term, or MINT, because the project sought to develop within a short time frame a model that could assess the effects of reforms through the early retirement years of the early post-war birth cohorts. This technical report describes the results of development work on the MINT model performed under contract to SSA by the Urban Institute (UI) and the Brookings Institution (Brookings). The report discusses the methods used to project future incomes, presents regression results for equations explaining the path of different sources of income, and displays tables that summarize the results of projections. It discusses how income in retirement is projected to change for younger cohorts, relative to birth cohorts retiring in the 1990s, and discusses the sources of projected changes in the distribution of income of retirees.

The base data sets used in the model are 1990-93 panels of the Survey of Income and Program Participation (SIPP), matched to Social Security Earnings Records (SER) and Master Beneficiary Records (MBR). The SERs give earnings histories for the years 1951-1996. The project uses data on the matched files for individuals in the 1931-60 birth cohorts to project their incomes at ages 62 and 67 and post-retirement incomes to the year 2020. As part of the contract, UI and Brookings have supplied the SSA with SAS export files and documentation of all the projections and of the programs that create the projections. This report summarizes the research results that are contained in the data files.

Related work undertaken by the RAND Corporation (RAND) under contract to SSA is described in a separate report[1]. This report uses some of the results of the RAND work as inputs in its simulations.

I. GOALS OF MINT PROJECT

The purpose of the MINT project is to estimate the baseline distribution of income of the population of Social Security retirement beneficiaries from the 1931-60 birth cohorts at the age of retirement (either 62 or 67) and in the year 2020. This baseline distribution can then be used by SSA to assess the impacts that proposed policy reforms would have on different income and other groups. Social Security benefits of individuals depend on their lifetime earnings. But to obtain a complete picture of the distribution of income of Social Security beneficiaries, MINT also creates projections of income from other sources, including pension income, income from non-pension saving, and partial retirement earnings, and then projects the path of income changes after retirement. The projections of earnings, pension income, and non-pension wealth are performed assuming alternative retirement ages of 62 and 67. The estimate of post-retirement earnings includes a projection of which individuals retire at each age between 62 and 67 and then a subsequent projection of partial retirement earnings for those who are retired, where being retired is defined as receiving Social Security retirement benefits.[2]

As part of its output, this study used the MINT database to produce stylized profiles of earnings for both newly retired and projected cohorts of workers. Analysts have in the past used the career earnings of three "representative" earners reported by SSA -- a high earner, a medium earner, and a low earner -- to provide examples of the effects of the Social Security system on individuals, including the fraction of lifetime earnings that benefits replace and the rate of return people earn on Social Security taxes they (and their employers) pay.[3] This report has produced stylized profiles for a wider variety of individuals from weighted averages of actual and projected earnings profiles. The new stylized profiles have two purposes: 1) to illustrate how taking account of the actual age-earnings patterns of representative workers (as opposed to the "level" lifetime wage patterns selected for illustrative purposes by SSA) could affect calculations of the effects of proposed changes in benefit formulas (including partial "privatization" plans that substitute defined contribution accounts for a portion of current retirement benefits) and 2) to enable analysts outside of SSA who lack access to microeconomic data to make rough calculations from appropriately weighted profiles of the budgetary and distributional effects of changes in the benefit formula.

Due to the need to produce a model that the SSA could use to analyze policy proposals by late 1998, the MINT project created a baseline projection without employing a full-scale dynamic micro simulation model. Instead, MINT relied on regression techniques to estimate incomes at retirement from different sources for later cohorts in the SIPP panels, based on the lifetime path of incomes for earlier cohorts in the SIPP panels.[4] Thus, the projections to some degree rely on an assumption that the future growth of income and assets of younger individuals will replicate the past growth of income and assets of similarly situated individuals in earlier cohorts. The projected 2020 income distributions will differ from the current income distribution of retirees for two main reasons. First, younger cohorts have had different paths of earnings and saving in their early working years than older cohorts, which will be reflected in different lifetime earnings and levels of wealth at retirement. Second, changes in birth rates (known) and mortality and divorce rates (projected based on recent experience) will change the future demographic composition of the population and thereby affect the shape of the income distribution and particular features of the distribution of concern to policymakers, such as the proportion of retirees with incomes below the poverty line.

MINT is not a forecast of the macro economy. The model uses the projections of the Social Security Office of the Chief Actuary to derive future values of the average wage and the price level in the economy. All economic variables in the forecasts are expressed as percentages of the average wage in the economy. Thus, MINT seeks to forecast the *distribution* of outcomes relative to the average wage instead of the overall path of incomes in the economy. Average lifetime earnings and wealth for particular cohorts can, however, change relative to both the average wage and to average relative earnings and wealth of earlier cohorts.

II. SEQUENCING OF TASKS IN DEVELOPING THE 2020 DATA BASE

The forecasts of particular items of income proceed sequentially. The results of each projection depend on the previous steps. Due to the magnitude of the project and the time frame involved, we did not incorporate reverse feedbacks from the later projections to the earlier ones -- thus, the different income sources are not estimated simultaneously.

The first step in the project was to project earnings for all workers in the 1931-60 birth cohorts to ages 62 and 67. These projections essentially replicate age-earnings profiles in earlier cohorts and project them to the future, using estimates from a fixed-effects model applied to records in Wave 2 of the 1990-93 SIPP panels. The earnings profiles were then matched with a file created by RAND that projects the year of mortality for individuals with full panel weights in the 1990-93 SIPP panels. Earnings were censored at zero after the projected date of mortality. In addition, a separate model was estimated to predict disability onset, based on demographic variables and a variable created by RAND that projects future health status. Earnings of individuals predicted to receive disability benefits are censored at zero in the year of disability onset.

The second step was to impute earnings records of missing spouses, using a hot-decking procedure that selects missing spouses for individuals from the pool of existing spouses based on matching age and demographic characteristics. The SIPP panels identify the spouses of individuals married, newly divorced, or newly widowed in the year of the survey. There were two categories of missing spouses. The first category was divorced ex-spouses from marriages lasting 10 years or more. Some individuals could claim Social Security benefits based on the earnings of their divorced ex-spouses. The second category was future spouses of those who will marry (either a first marriage or re-marriage) in years subsequent to the SIPP panels used in the study. The RAND projections of marital status impute the date of future marriages for individuals on the 1990-93 SIPP panels who will marry before 2020, but do not select spouses for them.

The third step was to project pension benefits from defined benefit (DB) plans and assets in employer defined contribution plans (DC) and self-directed tax-preferred retirement accounts (Individual Retirement Accounts and Keogh plans), all at ages 62 and 67. These projections use the earnings histories as inputs, both for calculating benefits from DB plans and for calculating annual contributions to DC plans.

The fourth step was to project non-pension wealth of all retirees. This projection was based on equations that forecast wealth outside of pension plans (including IRAs and Keoghs) at ages 62 and 67 as a function of earnings, an indicator for the presence of pension income, and demographic variables, using longitudinal data from the Panel Survey on Income Dynamics (PSID). Separate projections were made for housing wealth and financial assets. The projections use the estimated regression coefficients and values from the earlier projections of earnings and whether the individual has pension income, from either a DB or DC (including IRAs and Keoghs) plan.

The fifth step was to project the year people retire. The projection was based on equations that relate the “hazard” of retirement at ages 62 through 66 to demographic variables, pension coverage, and earnings histories for workers and (where applicable) spouses. The sixth step projects partial retirement earnings at ages 62 through 67 for the subset of people who are projected to be retired, based on demographic variables, the level and composition of wealth, and earnings histories of workers.

The final step projects total income at retirement and in subsequent years. Income at retirement is simply the sum of all income sources projected in earlier steps -- Social Security benefits (based on earnings histories of the worker and, where applicable, his or her spouse), income from pension plans (including IRAs and Keogh plans), income from non-pension wealth, and partial retirement earnings. The path of post-retirement incomes is set by benefits formulas for two sources of income -- Social Security benefits and DB plan benefits. For partial retirement earnings, we estimated a decay function for labor force participation after ages 62 and 67. Housing wealth was assumed to remain constant in real terms after-retirement. Financial assets other than DB pension plans (including DC) plans were assumed to decay based on the coefficients of regression equations (estimated using a synthetic panel from the 1984 and 1990-93 SIPP files) that predict the decline (or increase) of financial assets with age for groups of people over age 62 with varying demographic characteristics, wealth at retirement, and career earnings.

III. ORGANIZATION OF CHAPTERS

The report is organized as follows. Chapters 2 through 6 summarize regression results and other methods used to predict income at retirement, explain how regression estimates and other assumptions were used to project future incomes, and summarize the results of projections. Chapter 2 presents the projections of earnings and disability benefit receipt. An Appendix to Chapter 2 discusses the procedure for imputing earnings records of missing spouses. Chapter 3 presents projections of income from DB pension plans and assets in DC pension plans. Chapter 4 presents projections of financial assets outside of pension plans and housing wealth. Chapter 5 presents projections of the year of retirement. Chapter 6 presents projections of partial retirement earnings. An Appendix to Chapter 6 presents the post-retirement decay function for partial retirement earnings.

Chapter 7 combines the results from previous chapters into a projection of total income at retirement and then presents projections of post-retirement incomes to the year 2020. Chapter 8 presents stylized earnings profiles based on actual and projected earnings of individuals in birth cohorts between 1931-35 and 1956-60. An Appendix to Chapter 8 discusses how using these stylized earnings profiles in place of the traditional high/medium/low earners with stable earnings reported by SSA would affect estimates of the winners and losers from replacing the current Social Security benefit formula with a defined contribution (DC) plan.

Chapter 9 summarizes the principal findings of the study.

CHAPTER 1: REFERENCES

Panis, Constantijn and Lee Lillard, *Near-Term Model Development, Part II*, Final Report, RAND, August 15, 1999.

Iams, Howard M. and Steven H. Sandell, "Projecting Social Security Earnings: Past is Prologue," *Social Security Bulletin*, Vol. 60, No. 3, 1997.

Social Security Administration, "Preliminary SIPP/DPE Model Description," Attachment to Statement of Work, Task Order No. 0600-96-27332, March 10, 1998.

Steuerle, C. Eugene and Jon M. Bakija, *Retooling Social Security for the 21st Century - Right and Wrong Approaches to Reform*, Washington DC, Urban Institute Press, 1994.

CHAPTER 1: ENDNOTES

1. See Panis and Lillard (1999).

2. Retirement under our definition may not be the same as popular conceptions of what it means to be retired. Individuals can be retired from their main career job (and receiving an employer provided pension) and still not receive benefits, if their income from a "bridge" job between their main career and full retirement is too high for them to be eligible for Social Security retirement benefits or if they choose to defer receipt of benefits in spite of being eligible for them. Individuals can still be working in their lifetime job and receive Social Security benefits if they have attained the early retirement age and applied for benefits and their earnings are sufficiently low.

3. See, for example, Steuerle and Jon Bakija (1994).

4. The MINT projections are extensions of earlier work by SSA/DPE in projecting earnings and pension benefits; MINT modifies and expands the methods in these earlier projections and adds projections for other sources of income (income from non-pension wealth and partial retirement earnings). See Iams and Sandell (1997) and Social Security Administration (1998).

CHAPTER 2

ESTIMATION AND PROJECTION OF LIFETIME EARNINGS

ABSTRACT

This chapter describes the estimation and prediction of age-earnings profiles for American men and women born between 1931 and 1960. The estimates are obtained using lifetime earnings records maintained by the Social Security Administration. These data have been combined with demographic information for the same individuals collected in the Survey of Income and Program Participation. The estimates show a substantial rise in lifetime earnings inequality over time and in average lifetime wages earned by American women as compared with men. In addition they show that Baby Boom workers born immediately after the Second World War are likely to enjoy higher average wages relative to economy-wide average earnings than generations born before or after them. The advantage of this cohort over earlier generations is in large measure attributable to major increases in educational attainment. The advantage over later generations is partly due to a small advantage in educational attainment, especially among men, but is primarily due to the very poor job market conditions facing younger members of the Baby Boom generation when they entered the labor force. These adverse conditions persisted for nearly two decades. Under the assumptions of the earnings model estimated here, this early disadvantage will permanently reduce relative lifetime earnings of workers in later Baby Boom cohorts in comparison with the relative earnings enjoyed by the oldest members of the Baby Boom.

I. INTRODUCTION

In order to make forecasts of future Social Security outlays, the future distribution of Social Security pensions and other retirement income, and future impacts on benefits and retirement incomes of changes in the Social Security program, it is necessary to make a prediction of the future level and distribution of labor earnings. Workers' wages and self-employment income determine their eligibility for Social Security benefits and affect the level of benefits and other retirement income to which they will become entitled.

This chapter describes a method for estimating the earnings function that generates typical patterns of career earnings. It is based on a straightforward application of an individual effects statistical model, applied to a rich source of panel data on lifetime earnings. The chapter is organized as follows. The next section describes the estimation problem and statistical approach taken in this project, and the following section describes the data, the empirical estimates, and our methods for making earnings projections based on these estimates. The last section examines some statistical properties of the forecasts.

II. DESCRIPTION OF ESTIMATION PROCEDURES

The profile of annual earned income over the lifetime has a characteristic hump-shaped pattern for typical Americans. Initial earnings are low, reflecting workers' initially modest levels of job tenure, skill, and experience. Earnings rise over time, often in an erratic pattern, as workers accumulate human capital and find jobs that offer wages reflecting the workers' greater skill and job experience. Earnings then fall, either abruptly, as a result of worker retirement or disability, or more gradually, as a result of declining work hours, employer discrimination, or the eroding value of a worker's skills

The characteristic pattern of lifetime earnings profiles is displayed in Figures 2-1 and 2-2, which show the cross-sectional pattern of earned income among women and men, respectively. The higher line in each figure shows the age profile of earnings among all workers who had positive earned incomes in 1996. The profile is estimated as a quadratic function of age using Census Bureau tabulations of average earnings within broad age categories (age 18-24, 25-34, 35-44, and so on). For both women and men the age pattern of earned income, conditional on having positive earnings, shows a rapid rise from ages 22 through 40, slower earnings growth for workers in their 40s, and earnings declines beginning sometime after age 50.

The lower and heavier line in the two figures shows the lifetime profile of average earnings calculated using information from *all* potential workers, including those who do not work. This line shows lower average earnings at each age, especially among women, but it reveals the same characteristic pattern of rapidly rising income when workers are in their 20s and 30s and declining earnings when they are in their 50s and 60s. The estimated peak of expected earnings occurs at an earlier age when people with zero earnings are included in the tabulations. This is because the unconditional earnings profile also incorporates the effects of labor force withdrawal of workers who become disabled or who retire. Since disability and early retirement become more common as workers reach their 50s, the fall in unconditional earnings begins at a younger age.

The lines in the two figures clearly do not represent the earnings experiences of *each* U.S. worker. Instead they reflect the experiences in a single year of all workers when their experiences are averaged together. The cross-sectional pattern of earnings differs widely for workers with different characteristics. The figures show that the patterns for women and men differ noticeably, for example. In comparison with workers who have limited education, workers

Figure 2-1
Age-Earnings Profile of U.S. Women, Including and Excluding Zero Earnings

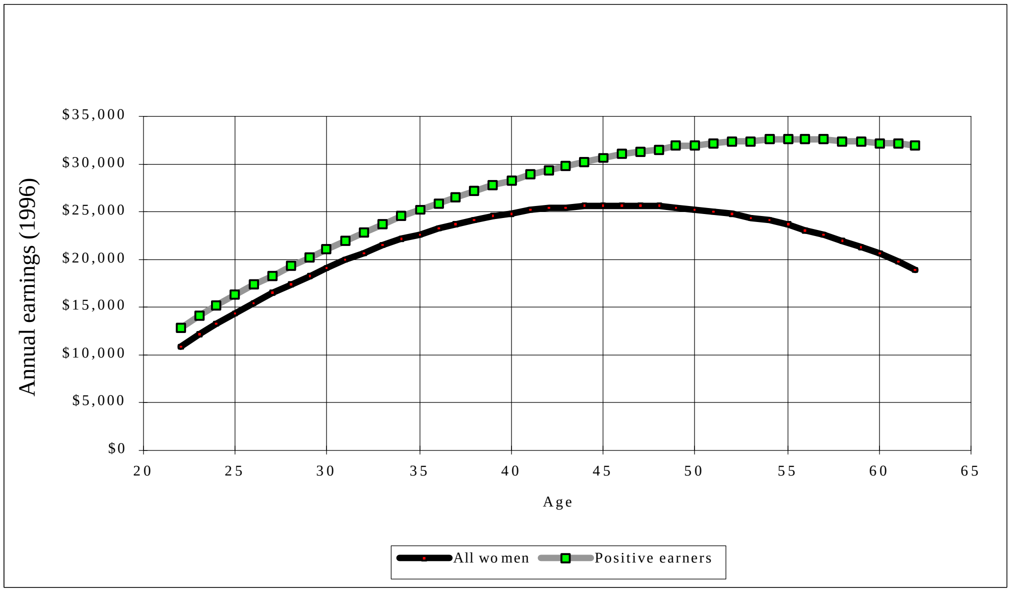
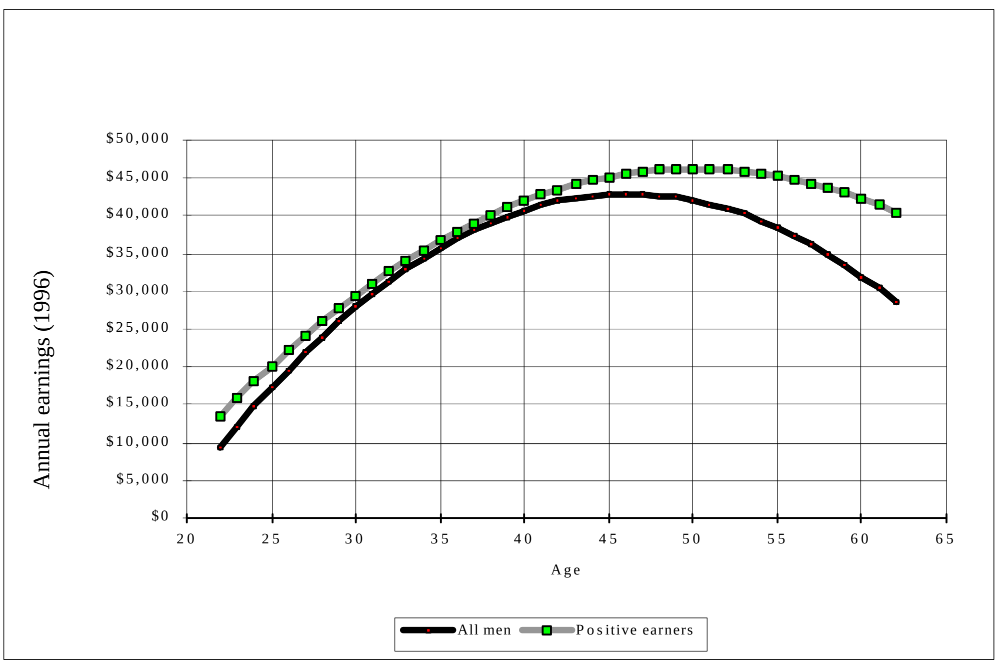


Figure 2-2
Age-Earnings Profile of U.S. Men, Including and Excluding Zero Earnings



with more schooling show a characteristic pattern of steeper earnings growth in their 20s and 30s, and their earnings typically reach a lifetime peak at a later age. The age profile of earnings has not remained fixed over the past few decades. In the 1960s, the cross-sectional age pattern of earnings showed smaller earnings differences between 25-year-old and 45-year-old workers. In other words, the age profile of earnings is now more steeply sloped than it was in the past. Finally, individual workers differ widely from one another. Even among workers with identical observable characteristics, including age, educational attainment, occupational attachment, and job tenure, there are enormous variations in annual earnings and in the pattern of year-to-year earnings change.

1. Basic Specification

To make a forecast of future earnings for workers who have only partially completed their careers, it is necessary to make credible predictions about the structure of future age-earnings profiles. We adopted a simple specification of the basic relation between workers' ages and the change in their earnings. Individual-level earnings is treated as a step-function of age. In particular,

$$y_{it} = \mu_i + f(Age) + \epsilon_{it}, \qquad (1)$$

where

$$f(Age) = \beta_1 A_1 + \beta_2 A_2 + \beta_3 A_3 + ... + \beta_T A_T, \text{ and}$$

A_1 = 1 if Age is less than 25,
= 0, otherwise;
A_2 = 1 if Age is between 25 and 29,
= 0, otherwise;
A_3 = 1 if Age is between 30 and 34,
= 0, otherwise;
A_4 = 1 if Age is between 35 and 39,
= 0, otherwise; ***[This category is omitted in the estimation.]***
A_5 = 1 if Age is between 40 and 44,
= 0, otherwise;
A_6 = 1 if Age is between 45 and 49,
= 0, otherwise;
A_7 = 1 if Age is between 50 and 54,
= 0, otherwise;
A_8 = 1 if Age is between 55 and 57,
= 0, otherwise;
A_9 = 1 if Age is between 58 and 59,
= 0, otherwise;
A_{10} = 1 if Age is between 60 and 61,
= 0, otherwise;
A_{11} = 1 if Age is 62,
= 0, otherwise;
A_{12} = 1 if Age is between 63 and 64,

= 0, otherwise;
A_{13} = 1 if Age is 65,
= 0, otherwise;
A_{14} = 1 if Age is 66 or more,
= 0, otherwise.

Ignoring μ_i and ϵ_{it}, this specification implies that earnings rise by varying amounts, β_A, at each of the age breaks specified in the function f(Age). This specification is obviously far more flexible than the quadratic function used to estimate the cross-sectional age-earnings profiles in Figures 2-1 and 2-2.

Economists have scant basis for predicting the future trend of economy-wide average earnings. This trend will obviously have a crucial influence on the earnings profile of workers who are currently young or middle-aged. Rather than estimate the trend in economy-wide earnings directly, we estimate the relationship between workers' *relative* earnings and their age. Relative earnings in this study is defined as the ratio of a worker's earnings in a given year to the economy-wide average covered wage estimated by the Social Security Administration. Thus, the coefficients β_A in equation (1) refer to the change in a worker's relative earnings at each of the age breaks in the age-earnings function, f(Age). If economy-wide average earnings climb rapidly, the β's will be associated with steep growth in actual earnings during the phase in a worker's career when his or her relative earnings are climbing. If economy-wide real wages are stagnant or declining, the β's will be associated with very modest or even shrinking annual earnings.

As noted above, the pattern of career earnings differs across population groups. Earnings profiles differ between men and women and among workers with differing levels of educational attainment. In this study, we estimated separate earnings functions for men and women, who in turn are divided into five educational groups: those who did not complete high school; those with a high school diploma but no schooling beyond high school; those with one to three years of college education; those with a college diploma; and those with at least one year of education beyond college. Workers can of course be divided into even narrower categories, for example, by race, occupational attachment, marital status, and geographic region. In order to keep the estimation and projection simple, we decided not to examine career earnings profiles in these narrower groups. Several of them, including occupation and marital status, can change over a worker's career. Since we observe these time-varying variables only up through the time an individual is last interviewed, we cannot reliably predict how these variables will change over the remainder of the worker's career. For this reason, we do not think it makes sense to include them at this stage in the estimation model.

We estimated the earnings equation under a fixed-effect specification. That is, we assume that each person in a given sub-population differs from other workers in his or her peer group by a fixed average amount. This individual-specific difference persists over a worker's entire career and is captured by the error term μ_i in equation 1 above. Under the assumptions of the fixed-effect model, we cannot obtain estimates of coefficients of variables that do not change over time for a single observation. The effects of these variables are all captured by the person-specific individual effect. Thus, we do not obtain coefficient estimates in the earnings regressions of the effects of a person's race or birth cohort, because these variables do not change over time for people in the sample. (If analysts want to know the average effects of these variables, they can calculate the average value of the estimated fixed effects of respondents with the relevant characteristics.)

The coefficients of the age terms, β_A ,are essentially determined by the average observed change in relative earnings as workers move up from one age category to the next. For example, the coefficient β_3 shows the average difference in earnings between ages 30-34 and the omitted age category, ages 35-39. This is determined by an estimate of the average gain in relative earnings that persons actually experienced between ages 30-34, on the one hand, and ages 35-39, on the other. This kind of estimate can only be obtained with longitudinal information for a sample of workers. (It is *not* an estimate of the average difference in earnings between people who are 30-34 and people who are 35-39 in a given year.)

For estimates based on this model to be valid, it must be the case that future *relative* earnings increases will mirror the pattern observed during the period covered by the estimation sample. Suppose the sample consists of people born between 1931 and 1960, and earnings are observed for the period from 1981 to 1990. The oldest people in the sample are between 50 and 60 years old during the estimation period. From the experiences of these people we can form estimates of the average increase or decline in earnings that takes place between ages 50-54, 55-57, and 58-59. Under the assumptions of the model, the relative earnings gains or losses experienced by this cohort will be duplicated by later cohorts when they reach ages 50-54, 55-57, and 58-59. Of course, the actual average earnings of younger cohorts will differ from those of the older cohort. The model offers two possible explanations for the difference. First, if economy-wide earnings grow faster when the younger cohorts are between 50 and 60, their actual earnings will grow faster (or decline more slowly) than was the case for the older cohort. Second, the average value of the individual specific error term, μ_i , may differ between the two cohorts, although the difference between two large birth cohorts will probably be small.

2. Employment Patterns

The specification defined by equation 1 represents a single-equation model of the earnings generation process. We emphasize that this approach does not adequately account for the phenomenon of worker retirement. It would be desirable to expand the model to produce separate estimates of the career pattern of employment and the career path of earnings, conditional on employment. Some workers leave the labor force at a comparatively young age as a result of disability or early retirement. These workers may have rising earnings up through the point they leave the labor force. In a single-equation model of earnings, the effects of the labor market withdrawal of these early retirees is combined with the effects of continued earnings gains among workers who remain employed. The estimates of the β_A will provide reasonable estimates of the path of *unconditional* earnings, that is, earnings of workers and nonworkers alike. Unfortunately, they will obscure the potentially distinctive path of average earnings of those workers who remain employed. Equally important, they fail to reflect the abrupt drop in earnings that often accompanies worker retirement or disability.

Although we attempted to estimate a joint model that predicts employment status and average earnings conditional on employment, we encountered two problems implementing the model for purposes of making predictions of future earnings. First, the estimates of the employment equation did not produce very reliable predictions of employment. Unless we used information about each person's actual employment status in the past one or two years, we did not reliably predict the person's employment status in subsequent periods. While it might seem logical to modify the basic employment specification to include additional information about each person's actual employment status in past periods, we do not think this modification would be appropriate without thorough specification tests. Unless we can be confident that we know the correct specification of the effect of past employment status on current status, it is dangerous to make long-range predictions of future employment status based on a specification that includes lagged employment status. (This is true whether the specification explicitly includes past employment status as a regressor or it includes an auto-regressive specification of the disturbance term.) Including such lagged employment information in the specification is helpful in producing reasonably accurate -- though possibly biased -- predictions of employment status in the next period, or even in the next three or four periods. But small misspecification errors can generate large and systematic prediction errors in longer term forecasts. (In this project, we make predictions 25 or more years into the future for some of the youngest sample members.) To minimize the possibility of large out-of-sample prediction errors, analysts should closely investigate the proper time-series specification of the employment equation. Given the time and resource limits of this project, we did not think this was feasible.

A second forecasting problem associated with the two-equation approach to estimation arises because of the logical relationship between the employment-prediction and earnings-prediction equations. The estimated employment-prediction equation explains less than 100 percent of the actual variation in employment status. From the estimated employment equation we can generate predictions of future employment status over the next one to twenty-five years by using a sequence of random numbers to determine whether an individual has covered earnings in successive future years. This prediction method often produces the prediction that a person who has a very low probability of employment -- and very low or negative expected earnings -- will nonetheless be employed. The problem of producing a reasonable prediction of earnings for such an individual is formidable unless the employment-prediction and earnings-prediction equations have been simultaneously estimated, an undertaking that is well beyond the scope of this project.

3. Estimation Procedures

The earnings equation is estimated with data from the 1990-1993 Survey of Income and Program Participation (SIPP) panels matched to Social Security Summary Earnings Records (SER). The sample consisted of 44,792 women and 40,794 men for whom matched SIPP and SER records could be obtained. The sample was restricted to SIPP respondents in the 1990-1993 waves who completed the second periodic interview. (By implication the sample of "full responders" to the SIPP interviews – persons who completed all interviews that were offered to them – represents a subsample of the respondents to the second periodic interview.) The sample was further restricted to persons born between 1926 and 1965.[1]

The SER records contain information on Social-Security-covered earnings by calendar year for the period from 1951 through 1996. These records do not contain information about *all* labor earnings, but only on earnings up to the taxable wage ceiling. Censoring at the taxable maximum wage is a major problem for men in the sample, though not for women. According to our tabulations of the estimation sample, less than 1 percent of the person-year observations of women in the sample are affected by censoring. (For example, women attained the taxable maximum earnings less than 1 percent of the time between 1974 and 1983.) The problem is much more serious for men in the sample. Men's Social Security covered earnings were affected by censoring in about 15 percent of person years between 1974 and 1983. Among men born between 1921 and 1960 who were at least 22 years old, 23 percent earned wages above the taxable maximum at least once between 1984 and 1993 (when the taxable maximum was higher) and 13 percent earned wages above the taxable maximum at least once between 1994 and 1996. Men with above-average expected earnings -- for example, college graduates between 35 and 55 years old -- face a high likelihood of reaching the taxable maximum in a given year.

Censoring would not be a concern if the taxable maximum remained relatively constant. Unfortunately, it increased over the analysis period, possibly giving rise to an upward bias in estimates of the growth rate in earnings for men who have high expected earned incomes. Although we did not implement a formal censoring model, we thought it would be useful to take account of the censoring problem in a less formal and less costly way (though only in the case of males). As part of the work on stylized earnings profiles reported in Chapter 8, we created estimates of "expected earnings above the taxable maximum, but below 2.46 times average economy-wide earnings" for all men with Social Security covered earnings at the taxable maximum. For brevity, we shall refer to this transformed measure of earnings as "less censored" earnings. (This measure of earnings is also used in Chapter 8 of the project, where it was originally developed for analysis of stylized lifetime earnings patterns.)

In adjusting the censored earnings data, we did not alter the wage data for years after 1989, nor did we alter any wage reports when the reported wage was below the taxable ceiling. Starting in 1990, the Social Security taxable maximum reached 2.46 times average earnings, where it has remained. We adjusted the pre-1990 wage reports to reflect a hypothetical wage ceiling equivalent to the average wage ceiling of the 1990-96 period -- that is, a ceiling equal to 2.46 times average earnings.

For earnings in the 1951-77 period, the SER contains information on the quarter in which an individual's wages reached the taxable ceiling. This information is used to impute annual earnings for men at the taxable wage ceiling under the following rules:

Quarter reached maximum	Range of potential earnings (multiples of taxable maximum)	Predicted mean of class
4	1 < w < 4/3	1.14
3	4/3 < w < 2	1.53
2	2 < w < 4	2.36
1	4 < w	5.00

The first column shows the calendar quarter in which an individual is known to have attained the taxable wage ceiling. The second shows the probable earnings range of the individual under the assumption that he earns steady wages throughout the year. For example, a worker who attains the taxable maximum in the fourth quarter might have attained the maximum on the last day of the quarter (in which case he earned exactly the ceiling wage) or on the first day of the quarter (in which case he earned 4/3 times the ceiling wage). Given this estimate of the potential earnings range of each worker, we then derived an estimate of his expected earnings if his earnings were in the predicted range. The class means were derived from the observed distribution of wages in the Current Population Surveys (CPS) of 1965, 1970, 1975. The estimated class means were very similar for all three survey years. These average values were used to impute wages to workers above the taxable maximum for all of the years between 1951 and 1977. The resulting wage values were truncated at a value of 2.46 times the economy-wide average wage to make them consistent in their expected value with the reported data for 1990-96.

For the period 1978-89, the CPS of each year was used to obtain information on the distribution of wages in excess of that year's taxable maximum. Those wage distributions were truncated at 2.46 times the average wage, and the resulting expected values used to compute an average wage in excess of each year's taxable maximum but below 2.46 times average earnings. That conditional average wage was used in place of the value of the ceiling wage.

Once we obtained these estimates of earnings for men at the taxable wage ceiling, we still had to decide how they should be used in estimation and prediction. We chose to include "less censored earnings" as the dependent variable in an earnings regression otherwise specified in the same way as our standard earnings regression. We then compared the predictive power of the resulting estimates with those of the standard regression equation (i.e, the equation estimated on Social Security covered earnings censored at the taxable wage ceiling). The average absolute prediction error is somewhat smaller using results obtained using "less censored earnings."[2]

III. ESTIMATES AND EARNINGS FORECASTS

The dependent variable in the estimation is the worker's annual Social-Security-covered earnings divided by the economy-wide average wage for the relevant year. This ratio, which is designated y_i in equation 1, is multiplied by 100 to convert it into percentage terms. For men in the sample, "less censored earnings" is substituted for Social-Security-covered earnings in calculating the earnings ratio.

The period used in estimation is 1987 through 1996, the last ten years of available earnings data on the SER. Since the SER records cover wages earned back through 1951, we experimented with longer estimation periods. However, we have little confidence in the predictions generated using a substantially longer estimation period. Between 1973 and the present, American workers have experienced dramatic changes in lifetime earnings patterns. The gap between low-, middle-, and high-wage workers increased significantly after 1979. Pay differentials between women and men narrowed sharply. Wages of young workers fell noticeably in comparison with wages paid to middle-aged and older workers. These trends have slowed or leveled off since the late 1980s. When the estimation period includes the ten years from 1977-1986 as well as later years, the estimated coefficients imply that many of the trends observed in the late 1970s and early 1980s will continue into the indefinite future. We do not think this prediction is plausible. For that reason, we restricted the estimation period to the years since 1986, when many earnings patterns have stabilized. For each birth cohort included in the sample, the 10-year estimation period allows each cohort to move between at least two and possibly as many as six age categories defined in the age-earnings function, f(Age).

1. Coefficient Estimates

The basic earnings equation was separately estimated in eight different samples, defined by gender and educational attainment. Respondents in the highest two educational attainment groups were combined into a single estimation sample; the other three educational groups were included in separate estimation samples. The coefficient estimates, their standard errors, and 95-percent confidence intervals are displayed in Tables 2-1 and 2-2, which contain results for women and men, respectively.

Since separate age-earnings profiles are estimated for college graduates and people with post-college education, we estimate a total of 10 earnings profiles, five for women and five for men. The average estimated age-earnings profiles are displayed in Figure 2-3. The top panel shows the age-earnings profiles for five educational classes of women; the lower panel shows the profiles for men. Note that men and women with greater educational attainment have significantly higher earnings than lower education groups at all ages past about age 30. Their peak career earnings are also achieved somewhat later in life.[3] These estimates imply that relative earnings begin to decline for men between ages 40 and 50. Among men with the least

Table 2-1
Female Age-Earnings Profiles, by Educational Attainment
Fixed-Effect Model Estimates

Education = Less than four years of high school.

Fixed-effects (within) regression

sd(u_id)	= 31.40634	Number of obs	= 74357
sd(e_id_t)	= 17.63622	n	= 7687
sd(e_id_t + u_id)	= 36.01936	T-bar	= 9.67308
corr(u_id, Xb)	= 0.0115	R-sq within	= 0.0295
		between	= 0.0309
		overall	= 0.0277
		F(13, 66657)	= 155.80
		Prob > F	= 0.0000

yratio	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Age24	-12.29271	.7160332	-17.168	0.000	-13.69613	-10.88928
Age29	-7.413093	.4267999	-17.369	0.000	-8.24962	-6.576565
Age34	-3.989375	.3190682	-12.503	0.000	-4.614749	-3.364002
Age44	1.516319	.3318492	4.569	0.000	.8658951	2.166744
Age49	1.498146	.4367033	3.431	0.001	.6422076	2.354084
Age54	-.8577039	.526687	-1.628	0.103	-1.89001	.1746024
Age57	-3.946682	.608706	-6.484	0.000	-5.139746	-2.753619
Age59	-6.165832	.6629575	-9.300	0.000	-7.465228	-4.866435
Age61	-8.670656	.6858993	-12.641	0.000	-10.01502	-7.326294
Age62	-11.72871	.7600354	-15.432	0.000	-13.21837	-10.23904
Age64	-16.46597	.7275347	-22.633	0.000	-17.89194	-15.04
Age65	-19.38252	.8203293	-23.628	0.000	-20.99036	-17.77467
Age67	-21.67292	.8536696	-25.388	0.000	-23.34611	-19.99973
_cons	27.08451	.323921	83.615	0.000	26.44963	27.7194
id	F(7686,66657) =		31.175			

Education = Four years of high school.

sd(u_id)	= 43.81776	Number of obs	= 174680
sd(e_id_t)	= 22.76773	n	= 17769
sd(e_id_t + u_id)	= 49.37981	T-bar	= 9.8306
corr(u_id, Xb)	= 0.0397	R-sq within	= 0.0279
		between	= 0.0353
		overall	= 0.0292
		F(13,156898)	= 346.19
		Prob > F	= 0.0000

yratio	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Age24	-10.89394	.5343841	-20.386	0.000	-11.94132	-9.846557
Age29	-7.162824	.3191782	-22.441	0.000	-7.788407	-6.537241
Age34	-4.314175	.2373817	-18.174	0.000	-4.779438	-3.848912
Age44	3.997877	.2495359	16.021	0.000	3.508791	4.486962
Age49	5.875282	.3386881	17.347	0.000	5.211461	6.539104
Age54	4.455451	.424028	10.507	0.000	3.624365	5.286537
Age57	1.000265	.5142488	1.945	0.052	-.0076523	2.008181
Age59	-2.859324	.5814337	-4.918	0.000	-3.998922	-1.719726
Age61	-6.803079	.615085	-11.060	0.000	-8.008633	-5.597525
Age62	-12.33316	.7109171	-17.348	0.000	-13.72654	-10.93978
Age64	-20.02395	.6727037	-29.766	0.000	-21.34243	-18.70546
Age65	-24.95934	.8005149	-31.179	0.000	-26.52834	-23.39035
Age67	-27.52117	.8508359	-32.346	0.000	-29.1888	-25.85355
_cons	46.38095	.2162292	214.499	0.000	45.95714	46.80475
id	F(17768,156898) =		36.405			

Table 2-1 (continued)

Education = One to three years of college.

sd(u_id)	= 52.99556	Number of obs	= 95846
sd(e_id_t)	= 28.36678	n	= 9687
sd(e_id_t + u_id)	= 60.10993	T-bar	= 9.89429
corr(u_id, Xb)	= -0.0288	R-sq within	= 0.0211
		between	= 0.0113
		overall	= 0.0114
		F(13, 86146)	= 143.02
		Prob > F	= 0.0000

yratio	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Age24	-16.69987	.8274249	-20.183	0.000	-18.32162	-15.07813
Age29	-8.444023	.4972576	-16.981	0.000	-9.418643	-7.469402
Age34	-4.359475	.3686321	-11.826	0.000	-5.081991	-3.636959
Age44	7.01602	.3840808	18.267	0.000	6.263225	7.768815
Age49	10.95157	.5347588	20.479	0.000	9.903446	11.99969
Age54	11.76471	.7147145	16.461	0.000	10.36387	13.16554
Age57	9.532564	.9227685	10.330	0.000	7.723946	11.34118
Age59	4.897057	1.08578	4.510	0.000	2.768937	7.025177
Age61	-.1251351	1.16581	-0.107	0.915	-2.410112	2.159842
Age62	-6.855312	1.392399	-4.923	0.000	-9.584402	-4.126221
Age64	-12.16573	1.306853	-9.309	0.000	-14.72715	-9.604307
Age65	-18.95678	1.614956	-11.738	0.000	-22.12208	-15.79148
Age67	-23.27936	1.722018	-13.519	0.000	-26.6545	-19.90422
_cons	59.27902	.3021222	196.209	0.000	58.68687	59.87118
id	F(9686,86146) =		33.950			

Education = Four or more years of college.

sd(u_id)	= 71.29666	Number of obs	= 95633
sd(e_id_t)	= 36.67594	n	= 9649
sd(e_id_t + u_id)	= 80.17691	T-bar	= 9.91118
corr(u_id, Xb)	= -0.0931	R-sq within	= 0.0412
		between	= 0.0018
		overall	= 0.0058
		F(26, 85958)	= 141.94
		Prob > F	= 0.0000

yratio	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Age24	-36.01407	1.235241	-29.156	0.000	-38.43513	-33.59301
Age29	-6.185295	.7504073	-8.243	0.000	-7.656087	-4.714503
Age34	-3.943033	.5617955	-7.019	0.000	-5.044147	-2.841919
Age44	6.572365	.5919927	11.102	0.000	5.412064	7.732666
Age49	13.72039	.8280236	16.570	0.000	12.09747	15.3433
Age54	16.02367	1.136902	14.094	0.000	13.79535	18.25199
Age57	14.26148	1.495558	9.536	0.000	11.3302	17.19276
Age59	9.550628	1.769274	5.398	0.000	6.082866	13.01839
Age61	2.559956	1.899944	1.347	0.178	-1.163918	6.28383
Age62	-5.300336	2.323021	-2.282	0.023	-9.853437	-.7472344
Age64	-15.21764	2.173822	-7.000	0.000	-19.47832	-10.95697
Age65	-23.69783	2.70219	-8.770	0.000	-28.9941	-18.40156
Age67	-32.56209	2.897974	-11.236	0.000	-38.24209	-26.88208
Ag24_Ed5	-38.57714	2.69157	-14.333	0.000	-43.85259	-33.30169
Ag29_Ed5	-21.28159	1.529356	-13.915	0.000	-24.27911	-18.28406
Ag34_Ed5	-5.72276	1.086691	-5.266	0.000	-7.852666	-3.592854
Ag44_Ed5	2.601815	1.018081	2.556	0.011	.6063849	4.597244
Ag49_Ed5	2.579371	1.39273	1.852	0.064	-.1503689	5.30911
Ag54_Ed5	5.545336	1.871429	2.963	0.003	1.877352	9.21332
Ag57_Ed5	3.822669	2.504238	1.526	0.127	-1.085616	8.730954
Ag59_Ed5	-3.725834	2.981212	-1.250	0.211	-9.568984	2.117316
Ag61_Ed5	-4.334154	3.249751	-1.334	0.182	-10.70364	2.03533
Ag62_Ed5	-5.003977	3.939414	-1.270	0.204	-12.7252	2.717242
Ag64_Ed5	-12.50108	3.70212	-3.377	0.001	-19.75721	-5.24496
Ag65_Ed5	-14.97261	4.604314	-3.252	0.001	-23.99703	-5.948195
Ag67_Ed5	-10.07044	4.890624	-2.059	0.039	-19.65602	-.4848578
_cons	82.99281	.3778786	219.628	0.000	82.25217	83.73345
id	F(9648,85958) =		36.224			

Table 2-2
Male Age-Earnings Profiles, by Educational Attainment
Fixed-Effect Model Estimates

Education = Less than four years of high school.

Fixed-effects (within) regression

sd(u_id)	= 56.7756	Number of obs	= 68975
sd(e_id_t)	= 31.80853	n	= 7140
sd(e_id_t + u_id)	= 65.07881	T-bar	= 9.66036
corr(u_id, Xb)	= -0.2280	R-sq within	= 0.1053
		between	= 0.0235
		overall	= 0.0304
		F(13, 61822)	= 559.40
		Prob > F	= 0.0000

yratio	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Age24	-18.09379	1.254757	-14.420	0.000	-20.55312	-15.63446
Age29	-7.052151	.7727004	-9.127	0.000	-8.566645	-5.537656
Age34	-2.235293	.5886969	-3.797	0.000	-3.38914	-1.081446
Age44	-.7398771	.6387606	-1.158	0.247	-1.991849	.5120951
Age49	-5.870017	.8451327	-6.946	0.000	-7.526479	-4.213555
Age54	-13.09429	1.012529	-12.932	0.000	-15.07885	-11.10973
Age57	-26.52734	1.164159	-22.787	0.000	-28.80909	-24.24558
Age59	-34.78413	1.263135	-27.538	0.000	-37.25988	-32.30838
Age61	-44.95629	1.305595	-34.434	0.000	-47.51526	-42.39732
Age62	-56.97512	1.443249	-39.477	0.000	-59.80389	-54.14635
Age64	-76.24629	1.382756	-55.141	0.000	-78.95649	-73.53608
Age65	-88.4447	1.571482	-56.281	0.000	-91.52481	-85.36459
Age67	-95.51312	1.626268	-58.731	0.000	-98.70061	-92.32563
_cons	78.85383	.6119618	128.854	0.000	77.65439	80.05328

id | F(7139,61822) = 28.748

Education = Four years of high school.

sd(u_id)	= 64.88506	Number of obs	= 140285
sd(e_id_t)	= 35.38793	n	= 14230
sd(e_id_t + u_id)	= 73.9079	T-bar	= 9.8584
corr(u_id, Xb)	= -0.1640	R-sq within	= 0.0756
		between	= 0.0291
		overall	= 0.0308
		F(13,126042)	= 792.46
		Prob > F	= 0.0000

yratio	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Age24	-19.81902	.8722068	-22.723	0.000	-21.52853	-18.10951
Age29	-7.842719	.5171317	-15.166	0.000	-8.856288	-6.82915
Age34	-.9857611	.3810928	-2.587	0.010	-1.732696	-.2388258
Age44	-1.930576	.4260428	-4.531	0.000	-2.765613	-1.09554
Age49	-7.554708	.60333	-12.522	0.000	-8.737225	-6.372192
Age54	-17.07835	.7593425	-22.491	0.000	-18.56665	-15.59005
Age57	-30.66509	.9234691	-33.206	0.000	-32.47507	-28.85511
Age59	-44.29774	1.055965	-41.950	0.000	-46.36741	-42.22806
Age61	-59.72219	1.122345	-53.212	0.000	-61.92197	-57.52242
Age62	-75.31036	1.314187	-57.306	0.000	-77.88614	-72.73457
Age64	-94.51296	1.242308	-76.079	0.000	-96.94786	-92.07805
Age65	-109.1274	1.49186	-73.149	0.000	-112.0514	-106.2034
Age67	-117.2749	1.579743	-74.237	0.000	-120.3712	-114.1786
_cons	107.1683	.3496285	306.521	0.000	106.4831	107.8536

id | F(14229,126042) = 31.504

Table 2-2 (continued)

Males: Education = One to three years of college.

sd(u_id)	= 71.31912	Number of obs	= 82523
sd(e_id_t)	= 39.21926	n	= 8332
sd(e_id_t + u_id)	= 81.39145	T-bar	= 9.90434
corr(u_id, Xb)	= -0.1384	R-sq within	= 0.0677
		between	= 0.0220
		overall	= 0.0263
		F(13, 74178)	= 414.62
		Prob > F	= 0.0000

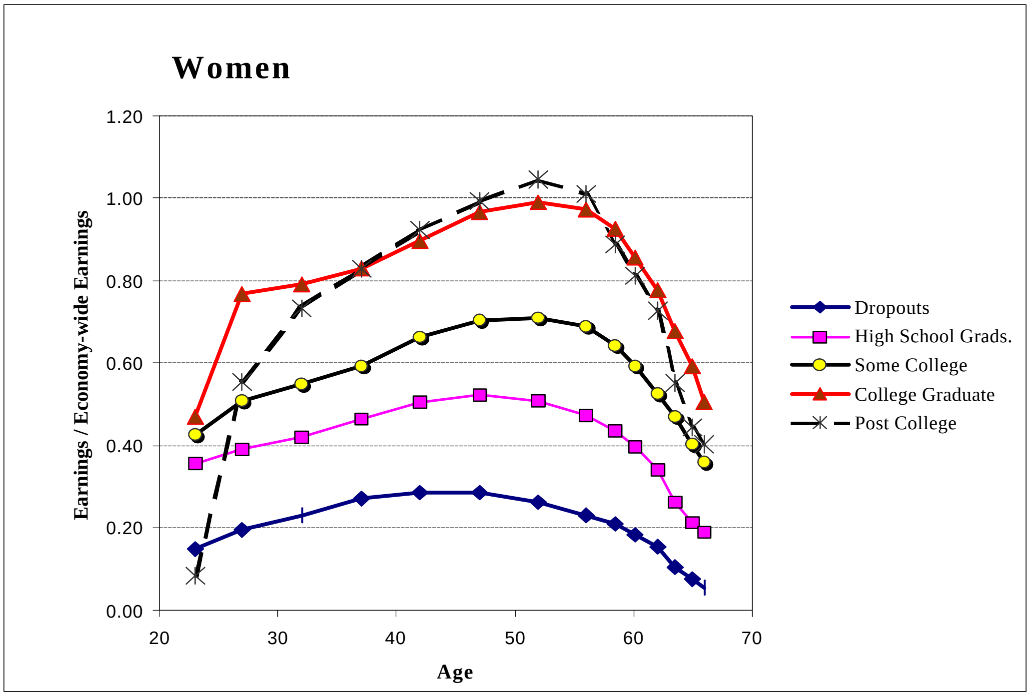
yratio	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Age24	-35.40504	1.269636	-27.886	0.000	-37.89352	-32.91656
Age29	-14.86891	.7660261	-19.410	0.000	-16.37032	-13.3675
Age34	-3.431996	.5596867	-6.132	0.000	-4.52898	-2.335012
Age44	-1.634919	.5545853	-2.948	0.003	-2.721904	-.5479341
Age49	-7.925679	.7744412	-10.234	0.000	-9.44358	-6.407777
Age54	-17.46588	1.043255	-16.742	0.000	-19.51066	-15.42111
Age57	-34.90784	1.353062	-25.799	0.000	-37.55984	-32.25584
Age59	-48.89085	1.583633	-30.873	0.000	-51.99476	-45.78693
Age61	-65.27757	1.696596	-38.476	0.000	-68.60289	-61.95225
Age62	-82.87883	2.035584	-40.715	0.000	-86.86856	-78.88909
Age64	-102.2858	1.909873	-53.556	0.000	-106.0291	-98.54241
Age65	-120.5922	2.404062	-50.162	0.000	-125.3042	-115.8803
Age67	-131.7692	2.57832	-51.107	0.000	-136.8227	-126.7157
_cons	121.7559	.4490658	271.132	0.000	120.8758	122.6361
id	F(8331,74178) =		31.343			

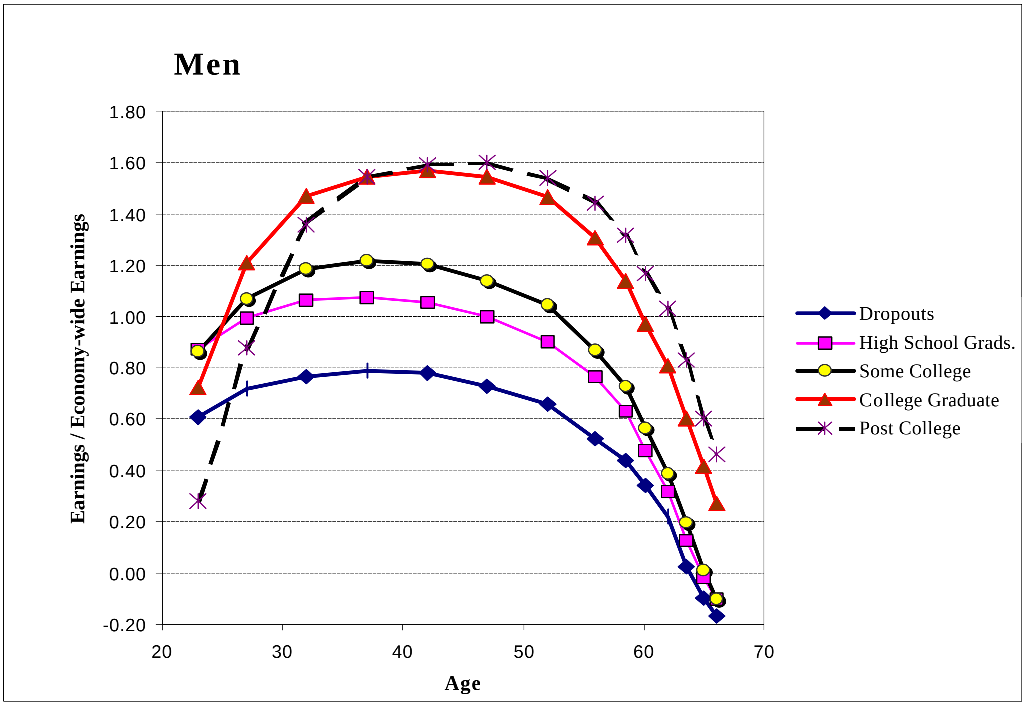
Males: Education = Four or more years of college.

sd(u_id)	= 80.13025	Number of obs	= 109631
sd(e_id_t)	= 44.22211	n	= 11092
sd(e_id_t + u_id)	= 91.52296	T-bar	= 9.88379
corr(u_id, Xb)	= -0.0321	R-sq within	= 0.1027
		between	= 0.0505
		overall	= 0.0594
		F(26, 98513)	= 433.51
		Prob > F	= 0.0000

yratio	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Age24	-82.24171	1.525664	-53.906	0.000	-85.23199	-79.25143
Age29	-33.71748	.9484911	-35.549	0.000	-35.57651	-31.85844
Age34	-7.874092	.7164915	-10.990	0.000	-9.278407	-6.469777
Age44	2.157216	.7038325	3.065	0.002	.7777123	3.536719
Age49	-.0161685	.9500128	-0.017	0.986	-1.878182	1.845845
Age54	-8.21484	1.280029	-6.418	0.000	-10.72368	-5.705999
Age57	-24.02843	1.673674	-14.357	0.000	-27.30881	-20.74805
Age59	-40.89005	1.952824	-20.939	0.000	-44.71756	-37.06254
Age61	-57.72099	2.093298	-27.574	0.000	-61.82383	-53.61815
Age62	-74.04065	2.519158	-29.391	0.000	-78.97817	-69.10313
Age64	-94.50082	2.361653	-40.015	0.000	-99.12963	-89.87201
Age65	-113.0157	2.929603	-38.577	0.000	-118.7577	-107.2737
Age67	-127.6937	3.144102	-40.614	0.000	-133.8561	-121.5313
Ag24_Ed5	-44.49208	3.286473	-13.538	0.000	-50.93353	-38.05063
Ag29_Ed5	-33.26033	1.767411	-18.819	0.000	-36.72443	-29.79623
Ag34_Ed5	-10.8658	1.247064	-8.713	0.000	-13.31003	-8.421567
Ag44_Ed5	2.400491	1.154966	2.078	0.038	.1367715	4.66421
Ag49_Ed5	5.193227	1.52304	3.410	0.001	2.208087	8.178367
Ag54_Ed5	7.662023	1.97888	3.872	0.000	3.783441	11.5406
Ag57_Ed5	13.7329	2.556489	5.372	0.000	8.722213	18.74359
Ag59_Ed5	17.8258	2.980079	5.982	0.000	11.98488	23.66672
Ag61_Ed5	19.80614	3.193394	6.202	0.000	13.54712	26.06515
Ag62_Ed5	22.54329	3.834117	5.880	0.000	15.02846	30.05811
Ag64_Ed5	23.14078	3.602377	6.424	0.000	16.08016	30.20139
Ag65_Ed5	18.61051	4.451451	4.181	0.000	9.885717	27.3353
Ag67_Ed5	19.18038	4.770205	4.021	0.000	9.830832	28.52992
_cons	154.5912	.4682512	330.146	0.000	153.6735	155.509
id	F(11091,98513) =		32.151			

Figure 2-3
Estimated Age-Earnings Profiles
By Sex and Educational Attainment





schooling attainment, relative earnings begin to fall as early as age 40. Men who have completed college do not experience sizable relative earnings declines until their 50s. Earnings peak at a lower level but at a later age among women. Peak lifetime earnings are only slightly higher than the economy-wide average wage for women with college and post-graduate educations. In contrast, among men with similar educational levels, peak earnings are approximately 60 percent higher than economy-wide earnings. Whereas men experience sizable or at least modest drops in average earnings by age 55, well-educated women do not attain their peak lifetime earnings until their middle 50s. Bear in mind that the age-earnings profiles displayed in Figure 2-3 show the combined effects of changing annual earnings among people who continue to work full time as well as steep earnings reductions associated with disability and early retirement for workers affected by these phenomena. If the estimates were based solely on earnings patterns among men and women who continue to work full time, we would see a later and higher peak in lifetime earnings.

2. Adjustments for Disability Onset

RAND Corporation analysts associated with this project generated two kinds of predictions that affect our projections of future earnings. They produced both a prediction of the onset of a health problem that limits the kind or amount of work a person can do and a prediction of the calendar year of death. The latter prediction was used to zero out predicted Social Security covered earnings for all years after the predicted date of death. RAND's prediction of a health limitation was used to help predict the onset of Social Security Disability Insurance (DI) receipt. In this section, we explain how our estimates of DI onset were obtained and how they are used to modify our forecast of earnings for people predicted to receive DI pensions.

We used data in the Social Security Administration's Master Beneficiary Record (MBR) to derive an estimate of the onset of DI payments for matched SIPP-SER sample members. These estimates range back to 1957 (when the DI program was established) up through 1998. Because the MBR data show an unexpected decline in the incidence of new DI awards beginning in 1995, the MBR file does not fully reflect new DI awards in the 1995-98 period. We therefore used the data for the calendar years 1987 - 1994 as a basis for estimating a Probit equation that predicts DI onset.

The Probit coefficients are displayed in Table 2-3, titled "Probit Model of Disability Insurance Onset by Gender, 1987 - 1994." The age category variables are the same as those described above. In addition, the independent variables include race or ethnicity indicator variables ("black" and "whhis" -- white Hispanic), an indicator variable ("disabl") derived from RAND's prediction of the onset of a health problem that limits the kind or amount of work a person can do (set equal to zero in years before RAND predicts a health limit and set equal to one in later years), educational attainment indicator variables ("Edc1" through "Edc5") associated with five levels of schooling (less than four years of high school, one to three years of college, four years of college, and five or more years of college; the *omitted* category is four years of high school), and indicator variables ("avernc1" through "avernc6" or "avernc8") that reflect the person's average Social Security covered earnings in the 10-year period ending in the calendar year before the year in the estimation.

We developed our specification of the effect of past indexed earnings after some experimentation with alternative approaches. Our first approach was to attempt to measure precisely the eligibility status (except for level of health impairment) of each person in the sample. According to the Social Security Act, a person's eligibility is determined under a two-part test that involves the person's total credited quarters of covered earnings and the level of covered earnings in the recent past. To be eligible for a DI pension, a person suffering serious health impairment must meet both these tests. We tried to apply the tests for each year in the estimation period based on earnings information in the SER. According to our calculations, there were a handful of people who began to receive DI pensions even though they did not pass both tests. It is of course possible that our program did not accurately reflect the two-part test for eligibility. It is probable that the person's eligibility was determined on the basis of earnings received in a period different from the one we assumed.

The failure of our program to distinguish accurately between eligible and ineligible workers led us to take a different approach to the specification of DI onset. Workers with no or very low covered earnings in the recent past should be ineligible for DI benefits. However, eligible workers with moderately low earnings are often found to have the highest propensity to apply for benefits. There are two likely reasons for this. First, workers with low recent earnings have low potential earnings. Under the redistributive formula that determines DI pensions, these workers receive benefits that are very generous relative to their potential earnings. The high replacement rate makes it financially more attractive for low-potential-earnings workers to apply for DI. Second, a disproportionately large percentage of low-wage jobs are in manual occupations with physically demanding work requirements. Health impairments are more likely to make it impossible or very unpleasant to continue to work in these jobs. A reasonable specification of the effect of lagged past earnings is that lagged earnings will have a nonlinear effect on the probability of DI onset. Zero and very low past earnings levels should make DI onset very improbable, because the person is not likely to meet the two-part earnings requirements. Somewhat higher past earnings levels should be associated with above-average probability of DI onset. Further increases in lagged earnings above some threshold level should be associated with declining probability of DI onset.

Our final specification of DI onset reflects this reasoning. We divided 10-year-lagged average earnings into 6 to 8 categories. The first category represents a very low level of 10-year-average earnings (15 percent or less of economy-wide average earnings), while other categories reflect successively higher levels of 10-year-average earnings. For calendar years 1977 - 1996, actual earnings are used to derive our estimates of 10-year-average earnings; for calendar years 1997-2024, our predicted Social Security covered earnings are used.

Table 2-3
Probit Model of Disability Insurance Onset
by Gender, 1987 - 1994

Dependent variable is onset of Social Security Disability Insurance /
Sample each year consists of persons who have not begun receiving
DI as of December 31 of the previous calendar year.

Females: Probit model of DI onset.

(Sum of weights is 5.5827e+011)

Probit Estimates

Number of obs = 339323
chi2(21) =2118.29
Prob > chi2 = 0.0000
Pseudo R2 = 0.2035

Log Likelihood = -5165.8543

(standard errors adjusted for clustering on newid)

DI	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
black	.1654386	.0355755	4.650	0.000	.0957119	.2351653
whhis	-.0848271	.0561367	-1.511	0.131	-.1948531	.0251989
disabl	1.074342	.030751	34.937	0.000	1.014071	1.134612
Age34	.0606031	.0654301	0.926	0.354	-.0676374	.1888437
Age39	.0499833	.0677031	0.738	0.460	-.0827124	.1826789
Age44	.153239	.0658025	2.329	0.020	.0242684	.2822095
Age49	.2056123	.0655228	3.138	0.002	.07719	.3340345
Age54	.379617	.0637878	5.951	0.000	.2545952	.5046389
Age57	.5084386	.0678361	7.495	0.000	.3754824	.6413948
Age59	.517327	.0711581	7.270	0.000	.3778598	.6567943
Age61	.4578733	.072932	6.278	0.000	.3149292	.6008174
Age67	.1240795	.0825009	1.504	0.133	-.0376193	.2857784
Edc1	.2479518	.0333937	7.425	0.000	.1825013	.3134023
Edc3	-.0484136	.037074	-1.306	0.192	-.1210773	.0242502
Edc4	-.1559035	.0530473	-2.939	0.003	-.2598744	-.0519327
Edc5	-.2161441	.0749549	-2.884	0.004	-.363053	-.0692351
avernc1	-.6339791	.0411518	-15.406	0.000	-.7146351	-.5533231
avernc2	-.0300959	.0375582	-0.801	0.423	-.1037087	.0435169
avernc4	.0144312	.0406474	0.355	0.723	-.0652362	.0940985
avernc5	.0288912	.0517097	0.559	0.576	-.072458	.1302405
avernc6	-.0621247	.062069	-1.001	0.317	-.1837777	.0595283
_cons	-3.179644	.0578709	-54.944	0.000	-3.293069	-3.066219

Table 2-3 (continued)

Males: Probit model of DI onset.

(Sum of weights is 5.2789e+011)

Probit Estimates	Number of obs = 305837
	chi2(23) =2788.75
	Prob > chi2 = 0.0000
Log Likelihood = -6274.4237	Pseudo R2 = 0.2251

(standard errors adjusted for clustering on newid)

DI	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
black	.2338922	.0377195	6.201	0.000	.1599634	.3078209
whhis	.0065133	.0517531	0.126	0.900	-.0949209	.1079475
disabl	1.084451	.0276792	39.179	0.000	1.030201	1.138701
Age34	.0032535	.0630123	0.052	0.959	-.1202483	.1267553
Age39	.1608041	.0624904	2.573	0.010	.0383252	.2832829
Age44	.1940483	.0627655	3.092	0.002	.0710303	.3170663
Age49	.2852594	.0629421	4.532	0.000	.1618951	.4086236
Age54	.4432983	.0615067	7.207	0.000	.3227475	.5638492
Age57	.6222472	.0656202	9.483	0.000	.493634	.7508603
Age59	.6418724	.0679842	9.441	0.000	.5086258	.7751191
Age61	.6207006	.0716262	8.666	0.000	.4803157	.7610854
Age67	.4473458	.0724628	6.173	0.000	.3053213	.5893702
Edc1	.1511553	.0317329	4.763	0.000	.08896	.2133505
Edc3	-.110161	.0362503	-3.039	0.002	-.1812103	-.0391117
Edc4	-.2139388	.0486935	-4.394	0.000	-.3093763	-.1185013
Edc5	-.1947839	.0616041	-3.162	0.002	-.3155257	-.0740422
avernc1	-.6399623	.0554213	-11.547	0.000	-.748586	-.5313386
avernc2	.0476302	.0468815	1.016	0.310	-.0442558	.1395161
avernc4	-.1028289	.0400632	-2.567	0.010	-.1813513	-.0243066
avernc5	-.0679954	.0417819	-1.627	0.104	-.1498865	.0138956
avernc6	-.2105234	.0426067	-4.941	0.000	-.2940311	-.1270157
avernc7	-.2200916	.0561161	-3.922	0.000	-.3300772	-.1101061
avernc8	-.2441333	.0576828	-4.232	0.000	-.3571895	-.1310772
_cons	-3.125513	.0502278	-62.227	0.000	-3.223958	-3.027069

The exact definitions of the earnings categories, for women and men, respectively, are as follows:

Variable name	Range of 10-year-average earnings as % of economy-wide earnings: Women	Men
avernc1	0 - 15 percent	0 - 15 percent
avernc2	15 - 30	15 - 30
[*Left out category:*	*30 - 70*	*30 - 70]*
avernc4	70 - 100	70 - 100
avernc5	100 - 130	100 - 130
avernc6	130 percent or more	130 - 180
avernc7	------	180 - 210
avernc8	------	210 percent or more

The Probit equations were estimated using weights reflecting the SIPP 2nd interview panel weights. The weighted estimates are virtually identical to those obtained with unweighted estimation, but the predictions of future DI incidence using weighted estimation appeared slightly preferable to those generated with coefficients obtained with unweighted estimation. (In particular, the rise in the predicted incidence of DI as the population ages after 1994 was somewhat smoother using the weighted rather than unweighted coefficient estimates.)

We used information from the MBR to predict DI onset for those persons found to begin receiving DI benefits between 1995 and 1997, inclusive. The people with records in the MBR that show they began receiving DI between 1995-1997 were "predicted" to begin receiving benefits in those years. The probability that other persons in the sample would experience DI onset was adjusted (i.e., was reduced) to reflect the existence of those persons already "predicted" to begin receiving DI because the MBR showed that they actually began to receive DI between 1995-1997. In years starting in 1998, persons were predicted to begin receiving a DI pension based solely on the probabilities predicted by the coefficient estimates in Table 2-3. Assignment to DI status was generated by comparing the person's predicted probability of DI onset to a randomly selected number in the unit interval. Persons with a random number *below* the probability threshold implied by the Probit prediction were identified as beginning to receive DI; persons with a random number *above* the threshold were identified as non-DI recipients for the year. This process was repeated for all calendar years before 2026 in which a person was predicted to be alive and was age 64 or less. (Because people age 65-66 were not eligible for DI benefits between 1987-1994, it is impossible to estimate reliably what fraction of them would begin collecting DI benefits if the Normal Retirement Age were raised to 67, as it will be in the next century.)

The MBR files show that 5.1 percent of males in the matched SIPP/SER sample and 3.6 percent of females in the matched sample began receiving DI pensions between 1957 and 1994 (the final year used to estimate the coefficients displayed in Table 3). Our predictions of DI onset imply that another 15.8 percent of males and 12.9 percent of females will begin receiving DI after

1994 and before they attain age 65 or die. Thus, a total of 20.9 percent of all men and 16.5 percent of all women in the matched sample are observed or predicted to collect DI benefits before reaching age 65. For both sexes combined, the cumulative probability of collecting DI is 18.6 percent, implying that the annual hazard of beginning a DI pension is about 0.47 percent. (That is, if the hazard of disability onset is 0.47 percent a year from age 22 through age 64, 18.6 percent of people who survive through age 64 will collect a DI pension.)

The predictions of DI onset were used to modify our predictions of Social Security covered earnings in years in and after the year of predicted DI onset. We reduced our estimate of predicted earnings to zero. Some workers, of course, will continue to have modest covered earnings, even after they start receiving a monthly DI check. Others will fully or partially recover from their disability and resume regular work. These earnings are suppressed by our procedure of zeroing out earnings after DI onset. It would take a more elaborate model of DI entry and exit than we have developed here to predict the actual pattern of earnings of DI beneficiaries after they have first become eligible for DI pensions.

3. Estimation Issues and Possible Extensions

The predictions of DI onset as well as the integration of these predictions with other components of the MINT model could certainly be improved. As noted above, in our estimation of DI onset we were unable to distinguish reliably between workers who were currently eligible and ineligible for DI benefits, assuming their disability was sufficiently serious. This aspect of the estimation could be improved if more time and effort were devoted to determining whether workers meet the precise covered earnings requirements for current DI eligibility in each calendar year.

The prediction of individual earnings could also be improved if health limitations and DI onset were explicitly taken into account in the estimation of the lifetime earnings function. Our current method of predicting earnings for people whom we predict to receive DI benefits may lead to a problem with the distributional characteristics of predicted earnings. Our one-equation earnings model is estimated using all respondents to the second SIPP interview who were successfully matched to Social Security Earnings Records. Thus, the coefficient estimates reflect earnings patterns in this broad sample, including the members of the sample who begin to receive DI benefits before 1995 and members predicted to receive DI benefits in or after 1995. By implication, our earnings predictions are strictly valid only for this entire sample.

After predicting the future DI status of sample members, however, we “zero out” earnings in years starting in the year people are predicted to begin receiving DI benefits. This procedure produces revised predictions of earnings that will cause an understatement of future earnings for the overall sample. The understatement does not affect future Social Security benefits under certain assumptions. In particular, if the original predicted earnings of DI recipients were accurate and if we have accurately predicted the sample members who will receive DI benefits, then the predicted earnings that have been zeroed out will have little if any impact on Social

Security benefits. That is because the zeroed-out earnings will be received by people with DI pensions, and their pensions should not be affected by the modest wages they earn after DI onset. This assumption is unlikely to be entirely accurate, however. It seems probable that many of the people we predict to receive DI benefits will not receive benefits. Their earnings (before and after the predicted onset of DI benefits) will determine OAI pensions rather than DI pensions.

The magnitude of the prediction problem depends, in part, on the amount of predicted earnings which are zeroed out. People who are predicted to receive DI benefits have much less earnings than average, even before their earnings are zeroed out. This is because the equation that predicts DI onset includes workers' health limitation and lagged earnings as independent variables. Persons with below-average lagged earnings have a much higher predicted probability of obtaining DI benefits than persons with average or above-average earnings. Thus, the extent of the prediction problem is likely to be modest.

A straightforward way to improve the predictions is to estimate a second earnings function, one that is estimated using only the sample that is predicted to survive to age 62 without collecting a DI pension. The coefficient estimates of such a function would produce earnings predictions that have somewhat higher average values than the predictions generated by the current version of the model. Of course, even this is not a fully consistent or satisfactory solution to the estimation problem. In principle, the best theoretical solution is to estimate a model in which workers' annual earnings patterns *and* the onset of worker disability are simultaneously estimated. The theoretical and statistical demands of estimating such a model are beyond the scope of this project, however. The primary goal of estimating DI onset was to remove from the main MINT sample those people predicted to receive DI benefits before attaining age 65. Given this modest goal, the estimated model is probably adequate.

IV. PATTERN OF FUTURE EARNINGS GROWTH

1. Methodology

It is straightforward to generate predictions of earnings outside of the estimation period. An estimate of the individual-specific fixed effect (μ_i) is added to estimates of $X_{it}\,\beta$ to produce an estimate of the person's expected covered earnings in year *t*. In order to generate predictions that have a similar variance to actual covered earnings, we also added a time-varying error term to the prediction. The error term was generated by forming estimates of each person's time-varying error term for each year between 1987 and 1996. We then randomly selected an error term from the ten estimated error terms.

The predictions are similar in some ways to those generated by using simpler estimation methods (e.g., see Iams and Sandell, 1997). As in previous attempts to measure future earnings patterns, the predictions are based on only ten years of past earnings rather than each person's full age-earnings history from age 22 through calendar year 1996. Like the earlier Iams-Sandell estimates, the predictions are based on a fairly standard age-earnings pattern for representative workers from a handful of populations, in our case defined by sex and educational attainment. Our predictions differ in a couple of respects from earlier ones, however. The cohort-specific effects are implicitly assumed to be part of the person-specific error term that is unique to each sample member. The method of predicting future annual earnings introduces substantially more year-to-year variability in post-1996 earnings. It also allows year-to-year earnings fluctuations to differ in a systematic way from one person to the next, based on the observed variability of each person's past earnings during the estimation period. Tabulations performed by the Social Security Administration suggest our predictions of future average indexed monthly earnings (AIME) are similar to those made earlier by Iams and Sandell.

2. Qualifications and Alternative Approaches

Selection of Error Terms

An alternative procedure to the one outlined above would be to select a random term from a normal distribution with mean zero and standard deviation equal to the estimated standard deviation of the time-varying error term. (For female high school dropouts, for example, this standard deviation was estimated to be 17.636 percent of economy-wide average earnings.) The procedure we used is preferable to selecting a purely random error, because it permits the variance of the time-varying error term to differ from one person to the next. Moreover, it does not impose the assumption that the time-varying error terms are normally distributed. (Statistical tests suggest that the time-varying error term is *not* normally distributed.) On the other hand, our procedure takes no account of the fact that the variance of the time-varying error changes as workers grow older. In particular, it is likely that the disturbance pattern for workers past age 55 is different from what it was when the same workers were in their 20s or 30s. In an extension of the present work, it is desirable to investigate this possibility and to adjust the imputed disturbances to reflect it.

Two Equation Model of Employment and Earnings

All of the predictions are obtained using a fixed-effect model of unconditional earnings. Although we attempted to estimate a version of a two-equation model that explained both the employment relationship and the conditional earnings function, the predictions of future earnings produced by this model proved unsatisfactory. Under the two-equation approach, we estimate a first-round *employment* equation and then a second-round *earnings* equation for persons who have positive earnings. The logic behind this approach is that much of the year-to-year variation in covered earnings, especially among women and older men, is produced by entry into or exit from covered employment (i.e., movements between no earnings at all and positive earnings). There may be much smaller variation in earnings among workers, conditional on the fact that the workers have at least $1 of covered earnings. As noted above, the estimates of the first-round employment equation produced unreliable out-of-sample predictions of employment and consequently very poor estimates of the year-to-year pattern of unconditional earnings.

Nonetheless, a useful extension of the current earnings model would take explicit account of lengthy periods of nonemployment, especially periods that begin with the worker's retirement or permanent disability.

A two-equation approach to estimating earnings offers potentially huge advantages in predicting future patterns of retirement and labor market withdrawal. But if the goal of the forecast is to predict average OAI benefits accurately, the most conservative approach is to obtain good estimates of a single-equation, unconditional earnings function and then to rely on that model for long-term predictions.

Several implications of our choice of approach should be emphasized, however. First, the method produces too few predictions of consistently low or zero earnings, especially among workers nearing typical ages of retirement. In policy simulations where the exact number of years with positive earnings is important (for example, in predicting the impact of increasing eligibility quarters for disability and old-age benefits) this shortcoming can represent a serious problem. Second, the method will produce too few predictions of non-standard age-earnings profiles. For example, few people who are age 40 or younger in 1996 will be predicted to have a "slumped" pattern of lifetime earnings, even though such a pattern occurs fairly often in practice. Third, the absence of an auto-regressive error pattern in the predictions means that the predictions of labor market withdrawal late in life will not mirror actual patterns.

Implications of Model's Treatment of Retirement

"Retirement" is generally interpreted to mean that people's earnings go to zero and then remain there. Although analysts have found that labor force re-entry after retirement is quite common, the popular conception of retirement (complete and permanent exit from the work force) is probably the dominant pattern for most workers. The prediction method used here will under-represent this dominant pattern.

As noted above, the use of a single-equation does not produce biased forecasts of adjusted indexed monthly earnings (AIME) and therefore is a reasonable method for SSA to use to forecast the distribution of Social Security retirement benefits. The failure of the forecasts to capture the increased prevalence of zero or very low earnings (combined with higher average earnings for those who do not retire) among workers between ages 55 and 61 does, however, reduce the quality of the forecasts of other sources of retirement income. In particular,the forecasts of both pension benefits of workers and of non-pension wealth accumulation between ages 55 and 61 are conditional on the pattern of earnings as well as on the AIME. The quality of these projections would be improved, perhaps significantly, if the earnings projections adequately reflected the diversity of outcomes for workers between ages 55 and 61.

It is important to emphasize, however, that MINT does not totally ignore the retirement decision. In Chapter 5, we present a model of the decision to accept Social Security retirement benefits for workers aged 62-66. Chapter 6 presents a model of partial retirement earnings for those workers who are projected to accept retirement benefits. The earnings forecasts derived in Chapters 5 and 6 for workers over age 62 who accept benefits supercede the tentative earnings forecasts for these workers that are derived from the methodology discussed in this chapter.

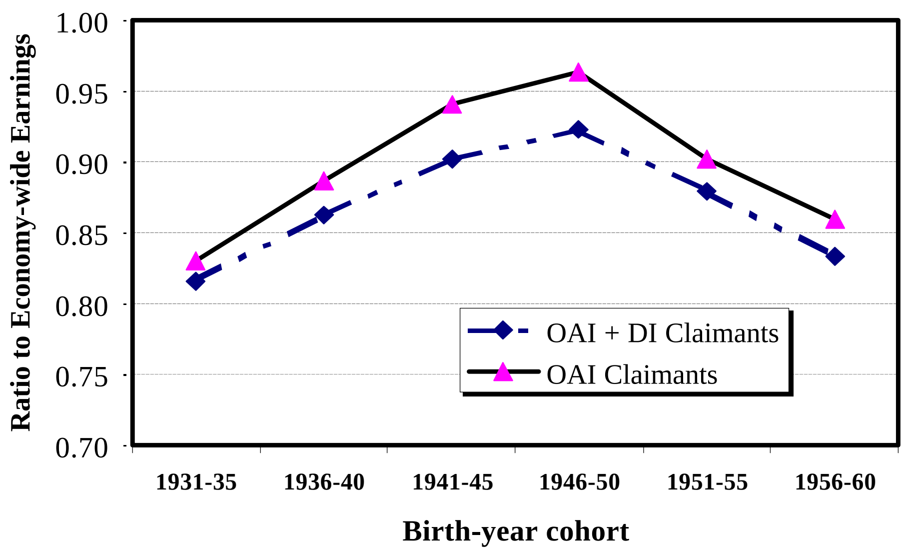
3. Projection Results

Average Lifetime Earnings

Overall, our predictions of future earnings look reasonable. Both the mean of predicted earnings and the variance of the predictions seem sensible in view of the observed trend and distribution of actual earnings over the 1974-1996 period. The calculations displayed below are based on our estimates of each worker's AIME. Our predictions of annual covered earnings are converted into indexed earnings and averaged over a career to calculate the AIME. For workers who claim an Old-Age Insurance (OAI) pension at age 62, AIME is calculated by choosing the highest 35 years of indexed earnings up through age 61 and then dividing by 35 × 12 (35 years times 12 months per year). The AIME formula for workers claiming DI pensions uses a smaller number of years in the calculation, because workers typically apply for benefits before reaching age 62, but the principle of the calculation is the same.[4] After forecasting annual earnings for 1997 and later years, we can create projected lifetime earnings histories for people in the matched SIPP-SER sample. Combining these estimates with RAND's predictions of the age of mortality and our predictions of DI onset, we can make predictions of AIME for workers who obtain enough earnings credits to become eligible for benefits.

Figure 2-4 shows the trend in predicted AIME, measured as the fraction of economy-wide earnings in the year a worker attains age 62. The tabulations cover two groups of workers. Members of both groups must have full panel weights on the 1990-1993 SIPP surveys, must

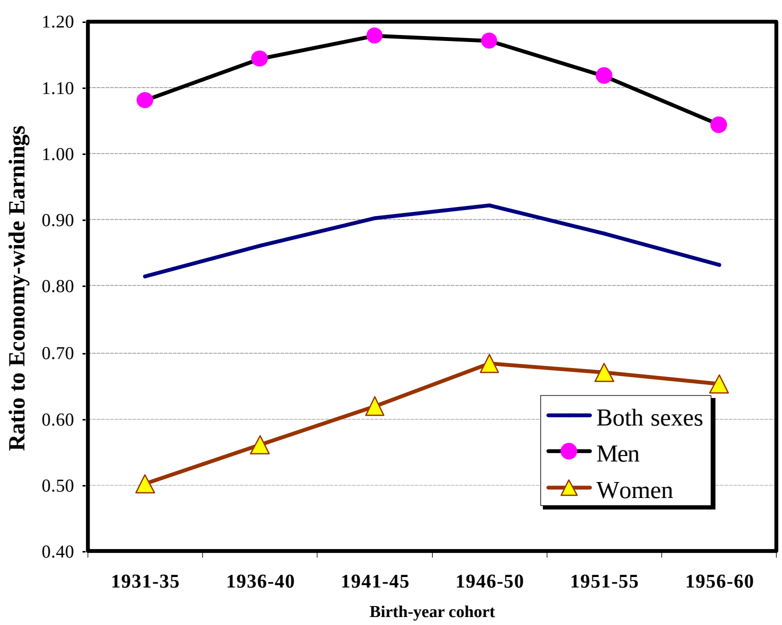
Figure 2-4
Trend in AIME by Birth-Year Cohort: Both Sexes



survive until age 62, and must accumulate enough quarters of Social Security covered earnings to become entitled to OAI or DI pensions. The lower line in the panel shows the AIME of members of the six birth cohorts who qualify for *either* a DI or an OAI pension. The upper line shows the AIME of members of this same group *except* those workers who collect a DI pension before attaining age 62. Not surprisingly, the average earnings of the latter group are higher than those of the former. Workers who receive DI pensions are disproportionately drawn from the low-wage workforce. As a result, the overall level of AIME is about 4 percent smaller in the sample that includes DI recipients than it is in the sample that includes only OAI recipients.

For both groups of workers, the average AIME increases for the first four birth cohorts and then declines for the two most recent cohorts (those born in 1951-55 and 1956-60). For the combined sample of DI and OAI claimants, the average prediction of AIME rises more than 10 percentage points of economy-wide average earnings before falling about 9 percentage points for the two most recent cohorts. Figure 2-5 shows how this overall pattern of rising and then falling average AIMEs is divided between men and women. (The calculations shown in Figure 2-5 and in all subsequent figures and tables are based on the combined sample of DI and OAI claimants.) The solid line in the middle of the figure shows the trend in overall average AIME for both sexes combined. It is identical to the dashed lower line in Figure 2-4. The top line in Figure 2-5 shows the cohort trend in AIME for men. It shows a pattern of gradually rising AIME's for the first three cohorts and somewhat sharper declines in the two most recent cohorts. The lowest line in Figure 2-5 shows the AIME trend among women. The average AIME rises sharply across the earliest four cohorts, increasing by 18 percentage points of economy-wide earnings (more than one-third) in comparison with the AIME of women born between 1931 and 1935. The average projected AIME then declines slightly for women in the two most recent cohorts.

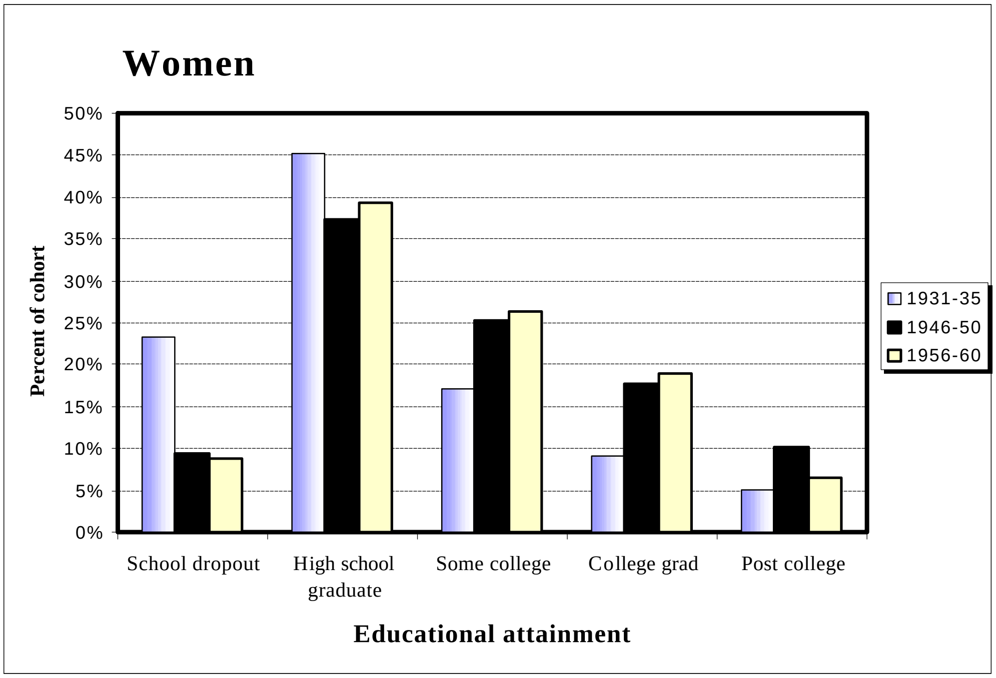
Figure 2-5
Trend in AIME by Birth-Year Cohort: Both Sexes

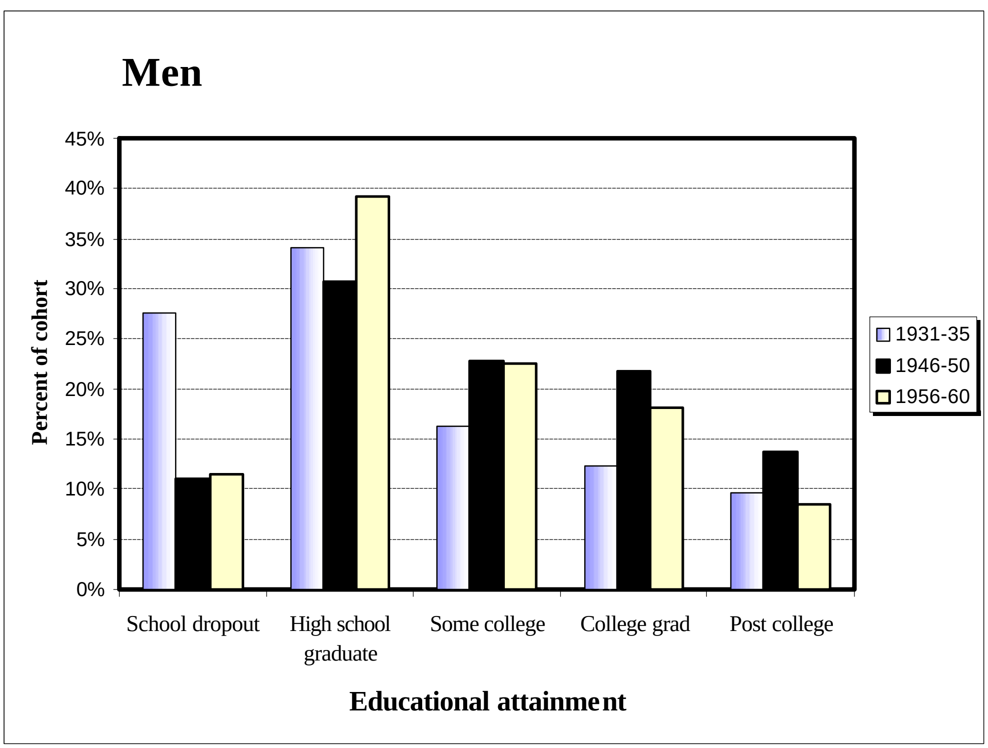


In part the initial rise in predicted AIMEs is explained by increasing levels of school attainment in the work force. Workers with more education enjoy a steeper gain in earnings when they are young and reach their peak earnings at later ages. Figure 2-6 shows the distribution of schooling attainment in three of the birth cohorts, the earliest (born 1931-35), the one with peak AIMEs (born 1946-1950), and the most recent (born 1956-60). The top panel shows the education distribution among women; the lower panel shows the distribution among men. There were clearly sharp drops in the proportion of workers who did not complete high school and sharp increases in the proportion with advanced levels of school attainment for the first Baby Boom cohort, born between 1946 and 1950. Gains in educational attainment are less clear for the most recent cohort. The proportions of women with some college and with a college degree or post-college education continue to increase for the most recent cohorts. For men, however, there is a drop in the proportion of workers with a post-college education and there is even a drop in the fraction who have completed college. Part of these differences may be explained by the timing of the SIPP surveys, which is the source of information on workers' educational attainment. The last SIPP interview for these workers was administered between 1992 and 1995, when workers born in 1960 were between 32 and 35 years old. In contrast, early Baby Boom workers were at least 42 to 45 years old in those years. Some schooling obtained when later Baby Boom workers were in their middle and late 30s will be missed by the SIPP interviews. Completed school attainment of the younger workers will probably be somewhat higher than these tabulations reflect. Nonetheless, it seems likely that men in the latter part of the Baby Boom generation will never attain the levels of advanced education received by early members of the Baby Boom. As a result, fewer of them may achieve the high earnings and steeper wage increases that have been received by the early Baby Boomers.

The decline in average AIMEs among more recent cohorts of workers is also the result of their low levels of relative earnings when they were young. Cross-sectional tabulations of the Current Population Survey (CPS) show that earnings of men in their 20s were sharply lower during the 1980s and early 1990s than was the case in the 1970s, especially for men with less than a college degree (see Levy and Murnane, 1992; Burtless, 1995; and Freeman, 1997). Since the *relative* earnings of these men were lower than those of earlier cohorts at the same age, these men will be predicted to have lower *relative* lifetime earnings under the assumptions of the model. The AIME is simply the unweighted average of relative earnings for the 35 years of highest relative earnings in a worker's career. If the first 10 or 15 years of a worker's career are scarred by low relative earnings, it will be impossible, under the assumptions of the model, for this poor performance to be overcome. It might be the case, of course, that workers in more recent cohorts will experience a steeper rise in their relative earnings as they move from their 20s and 30s to their 40s and 50s than earlier cohorts experienced. Alternatively, they may delay their retirement or experience smaller relative earnings declines in their 50s and 60s than was the case with earlier cohorts. But this kind of forecast seems to me no more likely than the prediction that their age-earnings profiles, after adjustment for their low *initial* earnings experiences, will be no steeper than those of earlier cohorts. By implication, the later Baby Boom workers, especially men, will earn lower relative earnings over their lifetimes than the more advantaged Baby Boom workers who were born immediately after World War II.

Figure 2-6
Distribution of Educational Attainment by Birth Cohort





The distribution of lifetime earnings

Our estimates can also be used to examine the distribution of lifetime earnings within cohorts. Figure 2-7 shows trends in the average AIME within fifths of the AIME distribution and for entire cohorts. The estimates suggest that average AIMEs rose within each fifth of the AIME distribution through the cohort born from 1946 to 1950 and then declined within each fifth of the AIME distribution for the two most recent cohorts. This pattern is especially pronounced at the top end of the AIME distribution, in part because the taxable maximum earnings threshold has risen sharply since the mid-1960s. The trend in AIME *inequality* may be somewhat clearer in Figure 2-8. This figure shows the average AIME in each fifth of the AIME distribution as a ratio of the average AIME in the middle fifth of the AIME distribution. (This ratio is always exactly 1.00 for the middle fifth of the distribution.) Women have a less equal distribution of AIMEs than men. The average AIME in the top fifth of the female distribution is roughly 2.5 times the average AIME in the middle of the female distribution. Among men the same ratio is roughly 1.75. At the other end of the AIME distribution, women in the bottom fifth earn about 28 percent of the average amount earned by women in the middle. Men at the bottom earn about 35 percent of the amount earned by men in the middle.

Figure 2-7
Trend in AIME by Birth Cohort and Fifths of AIME Distribution: Both Sexes

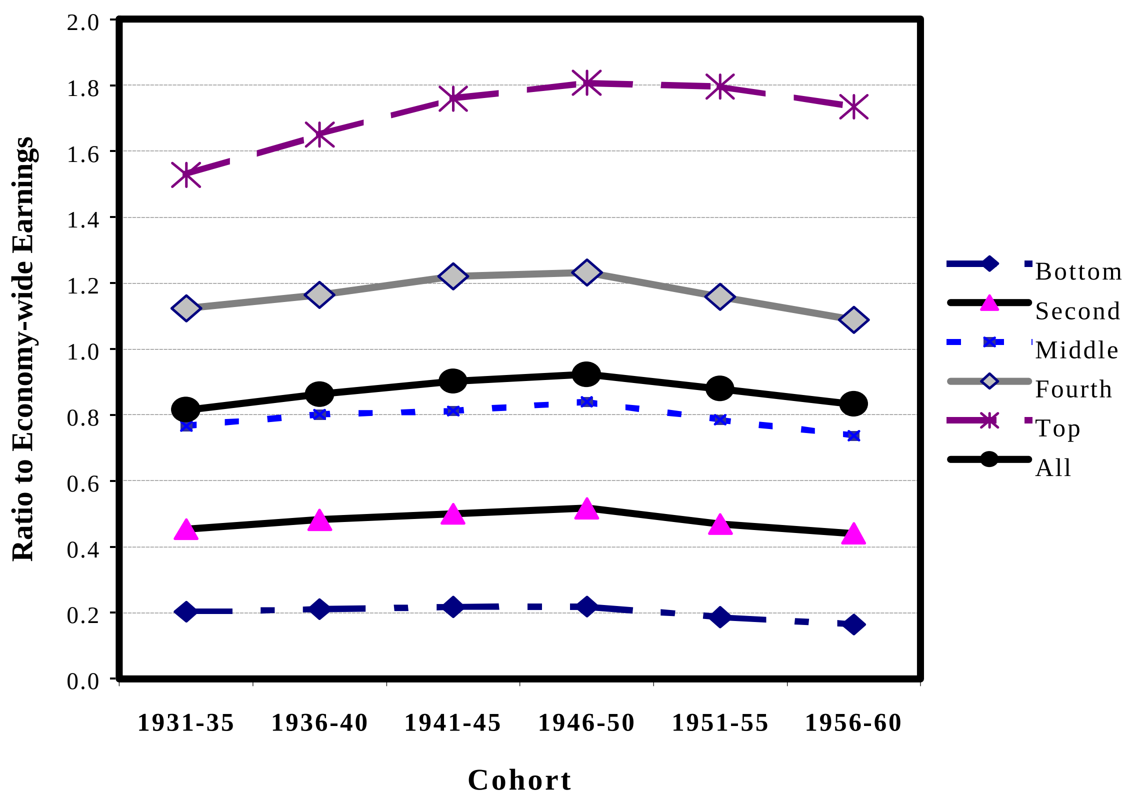
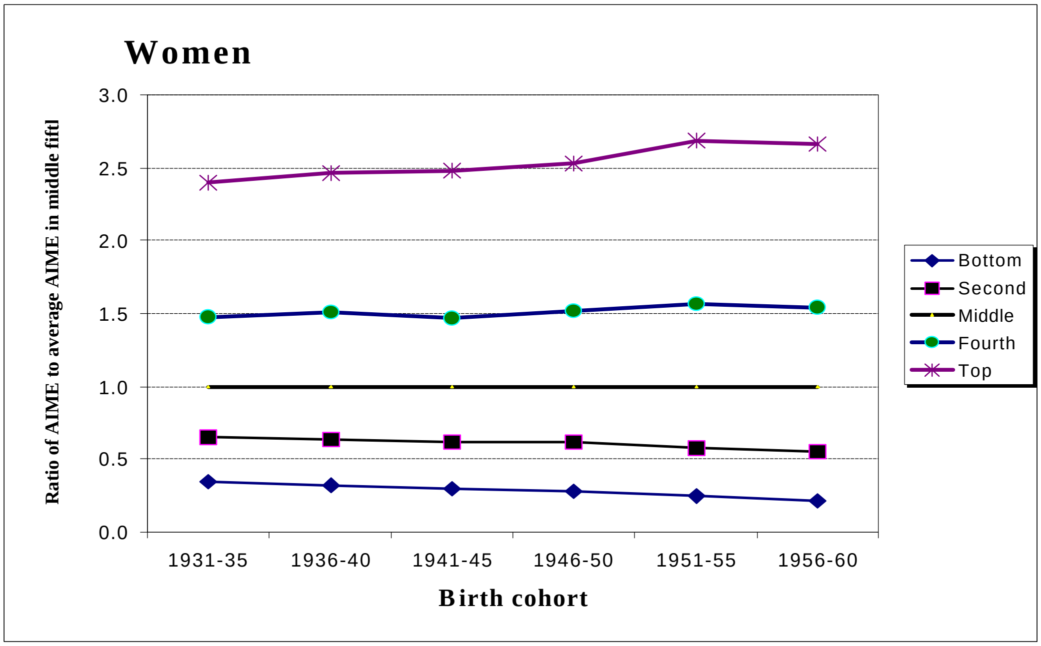
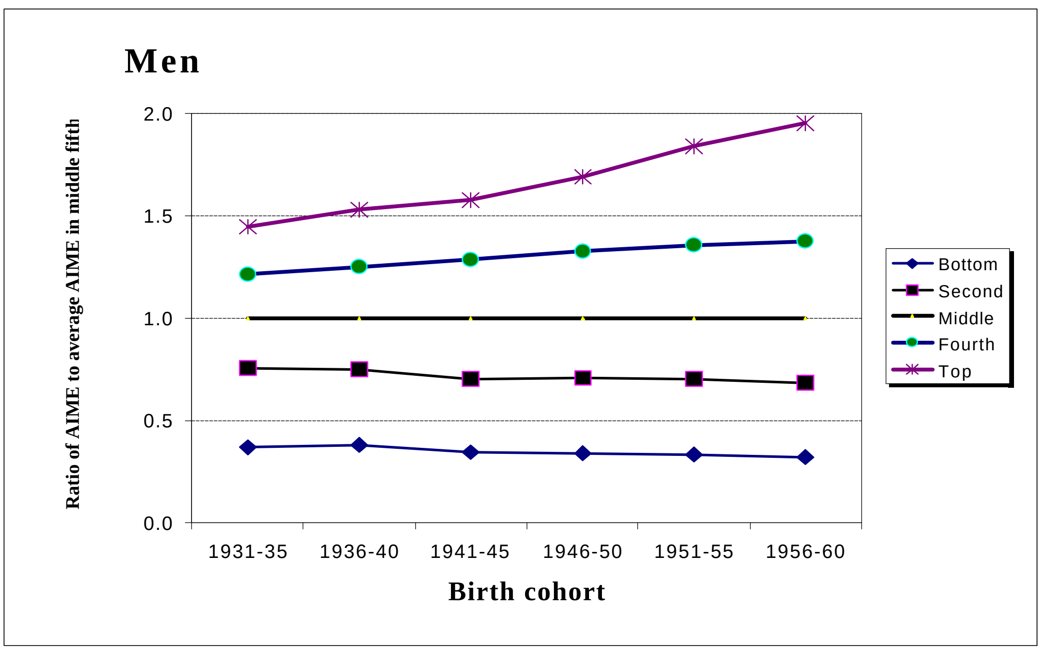


Figure 2-8
Trend in Relative AIME by Birth Cohort
Within Fifths of the AIME Distribution

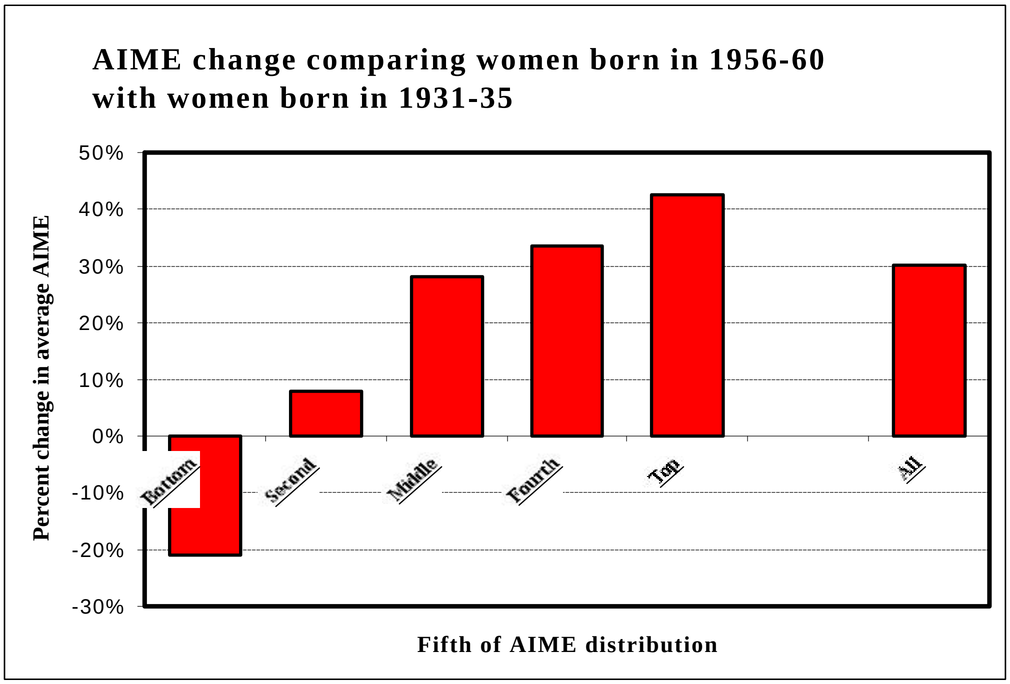


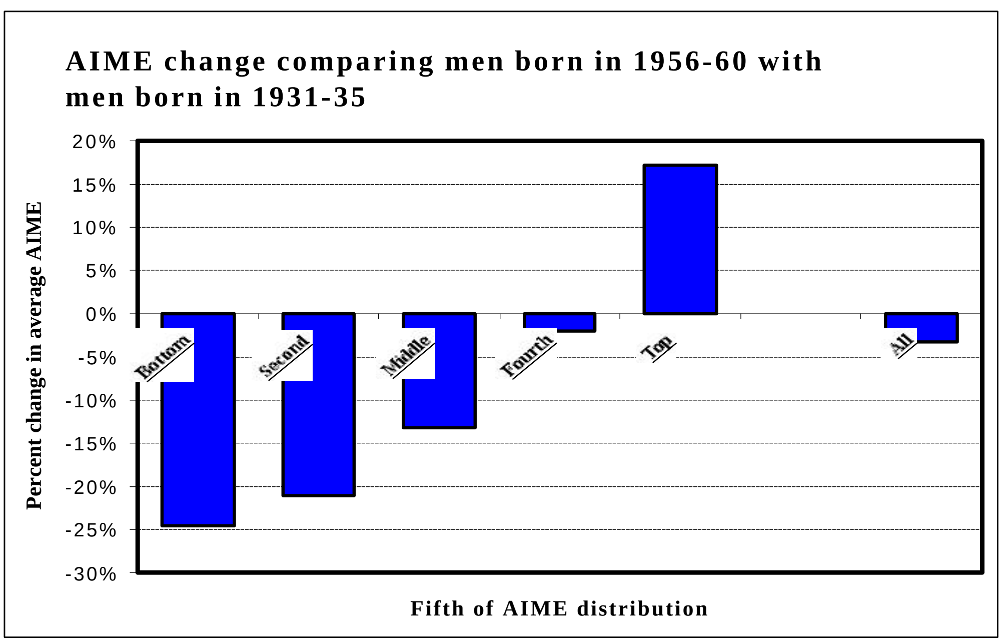


The AIME distribution has grown more unequal over time both for men and women, though the pattern differs somewhat across the two sexes. Men at the top of the earnings distribution have experienced an accelerating rise in the proportional distance between their earnings and those of men in the middle. Men at the bottom suffer only a small decline in their relative earnings compared with men in the middle fifth. In contrast, among women the upward trend in relative earnings at the top of the distribution is more moderate, but the downward drift of relative earnings at the bottom is faster than it is among men. One explanation is that women in the top four fifths experience *gains* in their average AIMEs. This is partly because women in more recent cohorts are more steadily employed throughout their careers, and hence have fewer years with zero earnings than women in earlier cohorts. It is also partly due to the fact that, in comparison with more recent cohorts of men, more recent cohorts of women have experienced faster gains in both hourly earnings and hours worked if they are employed. Figure 2-9 shows the percentage change in average AIME, within each fifth of the AIME distribution, if we compare the more recent with the earliest cohorts in the sample. The right-hand side of the figures shows the *average* change among workers in all parts of the distribution when comparing workers born in 1956-1960 with those born in 1931-1935. The average AIME of women born in 1956-1960 is 30 percent higher than the average AIME of women born between 1931 and 1935. In contrast, the average AIME of men born in 1956-1960 is 3 percent *lower* than the average AIME of men born between 1931 and 1935. Both among men and women the AIME gains are fastest among workers in the top fifth of the AIME distribution. But in contrast to the poor performance of the AIME in the middle three fifths of the male AIME distribution, women in the same positions in the female AIME distribution have experienced increases in their earnings relative to economy-wide average earnings.

In sum, these estimates show that women have made and will continue to make earnings gains compared with men. Workers of either sex will also experience substantial increases in lifetime earnings inequality, mirroring the annual pattern of growing earned income inequality the nation has witnessed over the past twenty years. Finally, workers born in the middle and toward the end of the Baby Boom will experience smaller lifetime earnings gains compared with the first Baby Boom cohort. Workers born immediately after World War II had significantly higher educational attainments than the generations born before them, but successive cohorts of Baby Boomers did not sustain the rapid gains in schooling attainment that earlier generations achieved. The later Baby Boom cohorts also faced the misfortune of entering the labor force when the relative earnings of young workers fell. Indeed, for men in these cohorts *absolute* as well as relative earnings declined. The bad fortune will leave typical members of the later Baby Boom with lower *relative* career wages than those earned by the first cohort born after the Second World War.

Figure 2-9
Change in Average AIME
Within Fifths of AIME Distribution, by Sex and Birth Cohort





***Problems with the projections*.**

There are two main problems with the predictions generated using our method. The more serious problem is that while the procedure generates predictions that have approximately correct expectations and error distributions for most people, the method probably does not generate accurate predictions of the number of years with positive earnings. We are also skeptical that the estimates of earnings can be used to generate wholly reliable estimates of the number of quarters of covered earnings that workers earn in given years. It would probably be preferable to estimate a separate equation to predict how many quarters of coverage a worker obtains for a given expected value of covered earnings in a year. Ultimately, of course, it is desirable to estimate a lifetime earnings model that produces useful predictions of the age of retirement or permanent disability as well as the pattern of pre-retirement annual earnings.

A less serious problem is that the procedure appears to generate excessive predictions of earnings and employment for persons reaching their sixties between 1997 and 2010. The problem seems to be caused by our failure to take proper account of the effect of error truncation in making predictions. The problem is much more serious when expected earnings are very low (as they are when workers reach their sixties) than when expected earnings are higher. The problem will have only a small effect on estimates of the AIME at age 62, but the effect on estimates of the AIME at age 67 will be more noticeable, especially among women. As noted earlier, however, subsequent chapters in this report do not utilize all the estimates in this chapter of earnings between ages 62 and 67. Instead, in Chapters 5 and 6 of this report, we present separate models for workers aged 62 to 67 which forecast the initial year of acceptance of Social Security benefits and then forecast "partial retirement" earnings for those workers who have chosen to receive benefits. The projections in this chapter are used only to forecast the earnings of those workers over aged 62 who do not receive retirement or disability benefits.

APPENDIX A

PROCEDURE FOR ESTIMATING EARNINGS FOR UNOBSERVED FORMER HUSBANDS OF DIVORCED WOMEN

I. INTRODUCTION

An individual's Social Security benefit is the highest among those determined by 1) their own work, 2) their current spouse's work, or 3) under some circumstances, the work history of a divorced or deceased spouse. Because of these alternative ways of computing benefits, it is necessary to ascertain earnings records for multiple spouses to determine the individual's Social Security benefit. The projection file from Rand provides spouse identifiers for spouses observed at the time of the SIPP interview, but no spouse identifiers for marriages that ended before the SIPP panel started or marriages that are projected to occur after the SIPP panel ended. The projection sample does not reveal the earnings and qualification history for former or future spouses. In order to determine Social Security entitlement, we must impute spouses for each unobserved marriage.

Over half of all spouses are unobserved. The Rand projection file has 113,071 individuals comprising 149,445 marriages. About 6 percent (7,302 individuals) of individuals never get married. For about 42 percent (62,102 marriages) of marriages, we observe the real spouse. All other spouses get imputed (87,343 marriages).

The initial RFTOP only required estimating earnings for unobserved former husbands of divorced women. The problem of unobserved spousal earnings extends beyond just divorced women. It also extends to new spouses (i.e., marriages that occur after the SIPP panel) and deceased spouses. On the projection sample, about 18 percent of women get married after the last interview on the SIPP, about 9 percent of women in unobserved marriages get divorced after 10 years of marriage, and about 6 percent of women in unobserved marriages are widowed before age 60.

We used a statistical matching algorithm to find a spouse from the projection sample with the characteristics specified in the demographic projections from Rand (Part II of the TO). For observed marriages, we match to the actual spouse. For unobserved marriages, we impute a spouse. After matching spouses, Social Security entitlement for any individual for any spouse is simply a matter of looking at the marriage and work characteristics for each spouse to see if he or she meets the Social Security entitlement rules. This match works for current spouses, divorced spouses, and deceased spouses.

II. BACKGROUND

Rand's projection file contains demographic and marriage information for each individual born between 1926 and 1965. The demographic information includes the individual's date of birth, race, educational attainment, hispanicity, a measure of permanent income, disability status, date of onset of disability, and date of death. The marriage information includes, for up to 9 marriages, the marriage starting date, the marriage ending date, and the marriage termination status. In addition, it includes the demographic information for each spouse (except for age of death).

Where possible, Rand assigned this information from the SIPP core data and the marriage history topical module. When this information was not available, such as all information for marriage and mortality characteristics that occur after the SIPP panel ended and the demographic information for all marriages that ended before the SIPP panel began, Rand projected it. This file gives us a great deal of information about the characteristics of each spouse. For each person for each marriage, we find the individual on the projection file that best matches Rand's spousal characteristics. This person provides the missing earnings and work history characteristics necessary to calculate individuals' Social Security benefits.

III. METHODOLOGY

To impute spouses, we used a statistical matching algorithm based on minimizing a distance function. We limited the pool of potential spouses to those individuals of the proper gender born within two years of the desired birth year. Within the set of potential donors, we selected the "best" individual to be the spouse, where "best" is defined to be the individual with the smallest distance measured by a distance function. The characteristics in the distance function are limited to those that Rand projects: spouse's birth date, marriage start date, marriage end date, marriage termination status (divorce, widow, death), spouse's disability status, disability date, race, hispanicity, education, and permanent income.

The distance function is defined as follows:

$$D_d = \sum_{j=1}^{n} w_j*[(X_{dj} - X_{rj})/\sigma_j]^2$$

where j is the number of measured attributes in the distance function, w is a weight factor, X is a characteristic measure (permanent income, marriage start date, race, educational attainment, etc.), σ is the standard deviation of the jth X variable in the dataset, d denotes the characteristic of the donor, and r denotes the characteristic of the recipient. The statistical match finds the best match among all records in the donor pool.

The weight factor, w_j, allows the analyst to decide which attributes are more important to match on. For example, if it is critical to get the race and educational attainment of the donor right, these attributes should get relatively higher weights. If race is more important than educational attainment, it should have a higher weight. We calculated the distance, D, for each donor record, and selected the donor record with the smallest value to be the spouse.[5]

We assigned weight factors to optimize the earnings match. Because the purpose of the imputation is essentially to impute a summary earnings record for each spouse, we selected larger weights on characteristics likely to affect earnings. These include permanent income, date of death, and date of disability. Less important characteristics received lower weights. These include marriage start date, marriage termination status, race, and education. The standard deviation in the distance function scales the differences to a common unit and reduces the impact of highly variable characteristics.[6] These values are based on the standard deviation of the spouse variables for first marriages. The specific values used in the distance function are shown in Table 2-A-1.

Table 2-A-1
Weights and Standard Deviations Used in the Distance Function

Variable	Weight	Standard Deviation
Birth date	3	4320.99
Hispanicity	1	0.2761
Education	1	0.6358
Race	1	0.6011
Death date	2	6580.35
Disability date	2	6258.08
Disability status	1	0.2973
Permanent income	5	0.7632
Marriage start date	1	5170.19
Marriage end date	5	8431.54
Marriage termination status	1	0.8090

Source: The Urban Institute.

Date of death is a very important criterion in selecting a potential spouse. If a potential spouse dies before the marriage ends, his or her earnings would be incorrectly censored at the individual's date of death. Rand did not project the date of death for spouses. Instead, they projected the date of marriage termination and the termination status. When the termination status is widowhood, we know the date of death. When the termination status is divorce, we know only that the individual survived until the marriage termination date. In selecting spouses, we only consider individuals who survive at least to age 70 (after the completion of earnings for most individuals) or the marriage termination date.

Similarly, the date of onset of disability (work disability as opposed to Social Security disability) is another important criterion in selecting a potential spouse. If a potential spouse becomes unable to work due to a disability, his or her earnings would be censored or reduced at the individual's disability date. For individuals who do not become disabled, Rand did not assign a disability date. To prevent a missing value from entering the distance function, we assigned disability date to the date of death for individuals not projected to become disabled.

Individuals married at the time of the SIPP panel always select their actual spouse in the marriage match. Rand did joint projections when they assigned marriage characteristics and mortality. Thus, husbands and wives marriage characteristics are internally consistent.

IV. RESULTS

The quality of the match can be evaluated by comparing what we wanted with what we received. A perfect match is one for which the donor record matched each specific criteria we matched against. For example, if we wanted a black, college graduate, born in 1950, we would say we made a good match if we found a black, college graduate, born in 1950. Because many of the characteristics in the distance function are continuous variables, it is extremely unlikely that an exact match exists within the donor pool.

The projection data set consists only of individuals born between 1926 and 1965. Projected spouses, however, are not constrained to be from these birth cohorts. Because the individuals of interest are those born between 1931 and 1960, most spouses will be within the projection dataset. The exceptions are those individuals on the tails of the cohort distribution with considerably older or younger spouses. The best match for these individuals will come from individuals in the tails. For example, if we want someone born in 1920, we match to someone born in 1926 (the earliest birth cohort in our sample). If we want someone born in 1970, we match to someone born in 1965 (the latest birth cohort in our sample). Earnings in every year are systematically off by the difference in the number of years between the age of the imputed and projected spouse. We align the dates of earnings on the imputed spouse to match the age of the projected spouse. In the latter case, for example, the earnings on the matched record (imputed spouse) in 1985 is for a 20 year old, but the spouse I want (projected spouse) is only 15 years old. After the alignment, age 20 (year 1985) earnings from the imputed spouse is age 20 (year 1990) earnings on the projected spouse. We make this adjustment for every year of earnings. For our projection sample (born between 1931 and 1960 with a full panel weight) 1.6 percent are married to someone born before 1926 and 0.6 percent are married to someone born after 1965.

On basic demographic characteristics (race, hispanicity, education, birth date), the match works very well. For real spouses, these characteristics are observed, and we get a perfect match. For the imputed spouses, we find an exact match in almost 100 percent of marriages on hispanicity, 93 percent on educational attainment, and 96 percent on race (see Table 2-A-2). For 91 percent of imputed marriages, we are within two years of the desired date of birth. The donor pool was limited to individuals within two years of birth. All births outside this range are for marriages to individuals born before 1926 or after 1965.

Table 2-A-2
Percent of Imputed Spouses Who Match Specific Characteristics

Characteristic	Imputed Spouse
Birth date (within 2 years)	90.6%
Hispanicity	99.9%
Education	92.6%
Race	96.3%
Death date (within 3 year)	83.2%
Disability date of those projected to become disabled (within 3 years)	36.4%
Disability status	99.6%
Permanent income (within 0.3)	87.9%
Marriage start date (within 3 years)	39.0%
Marriage end date (within 3 years)	47.4%
Marriage termination status	91.8%

Source: The Urban Institute.

Match quality on mortality is comparatively poor. Eighty-three percent of imputed spouses die within three years of the date of death. This statistic is misleading, however, because we really only care about mismatched date of death when the individual dies before the earlier of retirement age (62 or 67) or end of marriage date. For example, if we want a spouse who dies at age 80 and we find a spouse who dies at age 70, the match statistic would indicate that the date difference is 10 years. The earnings history, however, for the spouse would, for the most part, be complete. We limited donors to those individuals who die after age 69 or no sooner than one year before the marriage termination date.

For almost all cases (99.6 percent) where Rand projects spousal disability (disability limits work), we match to someone projected to become disabled. Thirty-six percent of these imputed spouses become disabled within three years of the projected date of onset, and 60 percent become disabled within five years of the projected date of onset. The probability of becoming disabled is lower at younger ages. As with mortality, the match quality on date of disability is comparatively poor for young disability because of small sample size.

We match very well on permanent income. Permanent income is a measure of the family income relative to the average wage. We heavily weighted this characteristic in hopes of capturing potential earnings of the matched spouse. For 88 percent of imputed spouses, the difference in permanent income was less than 0.3.[7]

Earnings are less likely to be associated with marriage start and end dates than with educational attainment and permanent income. Therefore, we gave marriage start and end dates relatively low weights. As such, the match quality of these variables is comparatively poor. For imputed spouses, only 39 percent of marriage start dates are within 3 years and only 47 percent of marriage end dates are within 3 years. This mismatch is unlikely to affect men's earnings. It might affect the timing and duration of drop-out years due to women's child bearing, though these are largely correlated with age and education on which we match quite well.

Marriage termination status is really a measure of mortality. Marriages either end in divorce or death. The quality of the match on termination status is a direct reflection of the quality of the mortality match. As with mortality, we do well on termination status for likely outcomes (death in late years) and poorly on unlikely outcomes (death in early years). For example, the donor pool of individuals who get divorced at young ages is big compared to the donor pool of individuals who die at young ages. If we want someone who divorces at a young age, we match well. If we want someone who dies young, we match comparatively less well. For 92 percent of imputed spouses, we match the marriage termination status.

V. FILE STRUCTURE

The spouse match program creates a file that can easily be used to access any spousal characteristic, including earnings, for multiple marriages. This file contains a random access pointer for each marriage (spindex1-spindex9), a spouse identifier for each marriage equal to PPID*10,000,000 + PPENT*10,000 + PPNUM*10 + PANEL (spid1-spid9) where PANEL ranges from 0 to 3 representing 1990 to 1993, and a spouse imputation flag for each marriage (simpute1-simpute9) where 0=not imputed and 1=imputed. In addition, the file has SIPP and ID for matching to other files.

The strength of the random access spouse pointer is that it does not require multiple sorting and merging. For any spouse of interest, you can use the point option on the SAS set statement to merge on the desired spousal characteristics. To do this requires two things: first, the file you point to must be sorted by SIPP and ID and have 113,071 observations, and second, every spousal characteristic of interest must be explicitly kept and renamed. The first requirement is due to the fact that the pointer to the spouse's record number is based on the full universe of records sorted as specified. The second requirement is due to the fact that any variable on the spouse file that shares a name with the base file will take on the spouse's value. After renaming the variable, the merged file has both the base characteristic and the spouse characteristic.

There is nothing in the data structure of the spouse file that precludes sorting and merging spouses in the traditional fashion. In the case of a woman, for example, with Social Security entitlement to three deceased spouses' Social Security, the sort and merge method becomes cumbersome. Random access pointers allow you to check each spouse's characteristic in one data pass. This allows for easier data management and simpler data processing.

VI. CONCLUSIONS

The quality of the spouse match seems quite high based on characteristic by characteristic comparisons. The match is particularly good for the basic demographic characteristics (hispanicity, education, race). The match is worse in areas outside of our control, such as the limited birth cohort inclusion. After adjusting the earnings series for these cases, this limitation is no longer problematic.

The use of random access spouse pointers simplifies the task of assessing spousal characteristics for multiple marriages. Random access pointers give the analyst access not only to spousal earnings, but also to pensions, wealth, Social Security participation, and partial retirement earnings. This data structure provides a flexible and powerful connection to spousal characteristics.

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CHAPTER 2: ENDNOTES

1. The out-of-sample projections described below pertain to the sample members born between 1931 and 1960, since these people were the principal focus of the study. The estimates were derived using a sample that included people born between 1926 and 1965 to improve the estimation of the earnings function at older ages and to generate earnings predictions for people outside the 1931-1960 frame. In other parts of this project, these estimates are needed to estimate the distribution of earnings among people who might marry or divorce people born between 1931 and 1960.

2. The forecasts of Average Indexed Monthly Earnings, discussed below, are based on earnings reports and earnings predictions *below* the maximum taxable wage, that is, on the covered wages that are actually used by the Social Security Administration to calculate benefits.

3. The age-earnings profiles of college graduates and workers with post-college education have a somewhat different pattern (earnings of people with advanced degrees are sharply lower at early ages, for example), but the two profiles seem to have a similar average level. This is

misleading. The average value of the individual-specific effect probably differs for workers with college and post-graduate degrees, implying that the average level of earnings – not just the pattern of rise and fall over time – also differs between the two groups.

4. The actual AIME of a worker who is predicted to receive a DI pension is calculated at the age of predicted DI onset. This nominal earnings estimate is then indexed through the calendar year that the worker attains 62 and is compared with economy-wide average earnings at age 62. Thus our estimate of the AIME for both DI and OAI beneficiaries is calculated relative to economy-wide earnings in the same year, the year the worker reaches age 62.

5. For a description of statistical matching techniques, see O'Hare (1997).

6. All dates on the file are stored as number of days since January 1, 1960.

7. Permanent income has a mean of 0.127 and a standard error of 0.750. We chose the critical value for permanent income to be within a 90 percent confidence interval from a two-tailed normal distribution.

CHAPTER 3

PROJECTING RETIREMENT INCOME FROM PENSIONS

I. OVERVIEW

The pension projection module estimates pension income for future retirees under two scenarios. The first assumes retirement at age 62 and the second assumes retirement at age 67. Two sets of output variables are produced. The first provides annual benefits from defined benefit (DB) plans, annuitized benefits from defined contribution (DC) accounts (including Keoghs) and IRAs, and account balances of DC accounts (including Keoghs) and IRAs, all as of age 62 under the scenario that assumes retirement at age 62. The second provides similar output as of age 67 under the scenario that assumes retirement at age 67.

The projections of future pension benefits are based primarily on information reported by each adult in the Retirement Expectations and Pension Plan Coverage topical module of the SIPP. This module includes information regarding the type of pension and years of pension plan participation, employee contributions toward pension plans, and 401(k) account balances. In addition, the Annual Income and Retirement Accounts topical module is used to obtain information on annual contributions to 401(k), IRA, and Keogh accounts. The Assets and Liabilities topical module is used to obtain information about IRA and Keogh account balances.

Because some workers who are not covered by a pension plan at the time of the SIPP survey will move into DB or DC pension plans over time, we increase future pension plan participation among workers not currently participating. As people age and possibly earn more income, we randomly assign future pension coverage based on current pension participation rates in the 1990-1993 SIPP based on gender and income quintile.

The pension module is written in the form of subroutines. The module consists of a main program (PENSION.SAS) and other programs that perform the calculations for the different types of pensions. These other programs are called automatically by the main program; there is no need to run the subroutines separately. Through edits in PENSION.SAS, changes can be made easily to many of the underlying assumptions, including the following:

real rate of return on stock investments
real rate of return on bond investments
long run CPI growth factor
proportion of DC contributions (and initial account balances) allocated to stocks

proportion of DC contributions (and initial account balances) allocated to bonds
percentage of benefit paid to widow(er) in a joint and survivor plan
the reduction factor applied to DC annualized benefits to account for risk aversion
the loading factor applied to DC annualized benefits

Separate documentation is available that provides more detail on the main pension program and each of the other programs in the pension module. In addition, the programs themselves are documented.

II. DEFINED BENEFIT (DB) PLAN ESTIMATES

DB benefits are projected using Bureau of Labor Statistics (BLS) replacement rates that vary by years of service in the plan, final salary, age at retirement, occupation, and sector of employment. Rather than using replacement rates from BLS, we had considered matching specific pension plan information from the Health and Retirement Survey or the Pension Benefit Guarantee Corporation's Pension Information Management System (PBGC's PIMS) model. This would provide more heterogeneity in pension benefits. However, after consultation with SSA, we decided to focus our efforts on improving and enhancing the other components of the pension model. Matching plans from other data sources onto SIPP pension plan participants is a possible enhancement for future versions of the model.

The pension model also adjusts DB benefits to account for future job changes, cost-of-living adjustments, and labor force departures prior to attaining age 62 (67). Benefits expected from pensions on previous jobs and current pension income are also included in the DB benefit estimates. We also include pre-retirement survivor benefits. Consistent with SSA's previous pension projection model, we assume that all married workers take a joint and survivor benefit, and adjust initial benefit levels accordingly. We assume that survivors receive 50 percent of the benefit the couple received while both spouses were alive.

One area that was not pursued for this version of the model is the emergence of cash balance plans. Recently, some firms have converted their DB plans to cash balance plans, and cash balance plans may become more prevalent in the future. Among other differences, the accrual patterns in cash balance plans are not as backloaded as accrual patterns in DB plans. However, at this time, the market penetration of cash balance plans is relatively small and data on cash balance plans are only recently becoming available. It may be desirable to incorporate cash balance plans into future versions of the model.

More detail on the method for estimating defined benefits is provided below.

1. Replacement Rates

DB benefit levels are projected using replacement rates that vary by years of service in the plan, final salary, age at retirement, occupation, and sector of employment. These replacement rates, based on BLS tables, include adjustments for early retirement reductions and Social Security integration. The BLS stopped determining occupation specific replacement rates after 1989. Therefore, we developed occupation specific replacement rates by adjusting the replacement rates in 1993 (BLS, 1994, table 147), using the occupation specific replacement rates in 1989 (BLS, 1990, table 85).

2. Final Salary

Final salary estimates vary by the sector of employment and reflect the earnings from the earnings projection module. For private sector workers, final salary is estimated as the average of the highest 5 consecutive years of earnings out of the 10 years preceding retirement. This is the modal method of determining final salary, according to the BLS (1998, table 116).

For federal, state, and local government workers, final salary is estimated as the average of the highest three consecutive years of earnings. For military personnel who joined in or before 1980, the final salary is the last year of earnings. For those joining after 1980, the final salary is the highest three years of earnings.

3. Accounting for Retirement Prior to Age 62 (67)

The pension model incorporates output from the earnings projection model to reflect that some people stop working prior to attaining age 62 (67). The model assumes that individuals work up to the time their earnings drop to zero (or until age 62 (67), whichever is less). Note however, that even for individuals who stop working prior to age 62 (67), we assume that they do not start collecting their pension benefits until age 62 (67).

We had considered allowing workers to begin receiving benefits prior to age 62 (67) so that the commencement of benefits would coincide with labor force withdrawal. If this method were pursued, we would need to reduce pension benefits accordingly and also account for any increase in other non-pension assets due to this income. However, we decided that, at least to some extent, our potential overstatement of pension benefits at age 62 (67) is offset by an understatement of other non-pension assets at age 62 (67). In other words, people who start collecting their pension benefits early might save some of this income, thereby increasing their assets, and therefore increasing their future income from assets at age 62 (67). Therefore, we decided not to introduce the additional complexity of allowing for receipt of pension income prior to age 62 (67). We use this strategy to minimize bias in *total* wealth, rather than to minimize bias in any particular wealth source. However, it might be preferable to revise this strategy in future versions of the model.

4. Cost-of-Living Adjustments (COLAs)

We incorporated COLAs for two reasons. First, in the pension projection module, we need to project the pension income at ages 62 and 67 for persons already collecting pension income at the time of the SIPP interview. These projections need to account for any cost-of-living adjustments granted between the time of the interview and ages 62 and 67. Second, when projecting income to the year 2020 in task 7, DB pension income estimates need to account for any cost-of-living adjustments. (Note that ‘cost-of-living adjustment’ is somewhat of a misnomer; a better term is ‘post-retirement benefit increase’. However, we use the terms interchangeably.)

The DB variables output from the pension module will already reflect cost-of-living adjustments granted prior to age 62 and 67. In addition, the pension module outputs variables needed for the module that projects income to 2020.

The table below summarizes the COLA assumptions used. We randomly assign workers to receive COLAs according to assumptions that vary by sector. The assumptions for each sector are described in more detail in the sections that follow.

Table 3-1
Summary of COLA Assumptions

Sector	Proportion With COLA	COLA Calculation
Private	10%	50 percent of Consumer Price Index (CPI) increase
State and Local	60%	CPI increase up to 3 percent
Federal-FERS	100%	Annual adjustments payable only to retirees age 62 or older (unless they are disability or survivor annuities). Adjustments, unless limited by law, are equal to: (1) the increase in the CPI, if the CPI increases 2 percent or less; (2) 2 percent, if the CPI increases between 2 and 3 percent; (3) the CPI increase minus 1 percent, if the CPI increases 3 percent or more
Federal-CSRS	100%	Annual adjustments fully indexed to the CPI for all annuitants.
Military--Entered on or before 7/31/86	100%	CPI increase
Military--Entered after 7/31/86	100%	PI increase minus 1 percent

Private Sector Employees

Although very few pension plan beneficiaries receive automatic COLAs, many receive ad hoc pension increases. During the 1970s, a majority of DB beneficiaries received cost-of-living adjustments, although most of these were granted on an ad hoc nature rather than automatically (Allen et al 1985). The post-retirement adjustments during this period amounted to about 40 percent of the CPI increase.

During the 1980s, however, defined benefit plans became much less likely to grant ad hoc post-retirement increases (Allen et al, 1992, Weinstein, 1997). Part of the decline appears related to lower inflation; fewer plans grant increases in times of lower inflation. Even in the early 1990s, though, when inflation rates were similar to those in the late 1980s, there were further decreases in the proportion of workers in plans which granted COLAs.

Weinstein (1997) examines the trends in the proportion of workers that are in DB plans that granted post-retirement increases to their retirees. In 1983, 54 percent of full-time DB pension participants were in plans that either granted automatic COLAs or discretionary ad hoc increases to retirees in the last 5 years. This proportion decreased to 10 percent and 7 percent in 1993 and 1995, respectively. We assume that 10 percent of all private sector DB beneficiaries receive post-retirement benefit increases. This is slightly higher than the percentage in 1995, and will therefore allow for a slightly higher proportion of plans that grant ad hoc increases in higher inflationary periods.

In the latest years for which information is available (1983-1988), post-retirement increases amounted to about half of the CPI increase (Weinstein, 1997). Therefore, we assume that post-retirement benefit increases (for those receiving them) are equal to one half of the CPI increase. Although Weinstein (1997) finds that on average, workers with lower benefits receive higher post-retirement increases relative to workers with higher benefits, for simplicity, we do not vary CPI increases by benefit level.

State and Local Employees

State and local employees are much more likely to receive a post-retirement benefit increase than private sector workers. According to Weinstein (1997), 62 percent of state and local government workers were in plans that granted post-retirement benefit increases, the majority of which were automatic cost-of-living adjustments rather than ad hoc increases. The higher rate of increase among public employees is likely due in part to a higher proportion of state and local employees not being covered by Social Security, which grants automatic COLAs. About one-quarter of state and local workers are not covered by Social Security, whereas nearly all private sector workers are covered. It would be preferable to have separate COLA assumptions for covered and non-covered state and local workers. However, post-retirement pension increase information is not available for each group separately. Therefore, we assume that 60 percent of state and local workers receive post-retirement benefit increases, regardless of whether the worker is covered by Social Security.

Of the state and local plans that provide post-retirement benefit increases, about 60 percent limit the increase to 3 percent or less per year (BLS 1988, table 69). Therefore, we assume that the state and local workers assigned to receive post-retirement benefit increases receive increases equal to the increase in CPI up to a maximum of 3 percent.

Federal Employees

COLA factors for federal employees are straightforward. Federal retirees receive cost-of-living adjustments according which plan they are in--FERS or CSRS.

FERS provides annual adjustments payable only to retirees age 62 or older (unless they are disability or survivor annuities). Adjustments, unless limited by law, are equal to:

(1) the increase in the CPI, if the CPI increases 2 percent or less;
(2) 2 percent, if the CPI increases between 2 and 3 percent;
(3) the CPI increase minus 1 percent, if the CPI increases 3 percent or more.

CSRS provides annual adjustments fully indexed to the CPI for all annuitants.

The table below shows the actual cost-of-living adjustments for federal plans from 1990 through 1997.

Table 3-2
Actual COLAs for 1990-1997, Federal Plans

Month and Year of Increase	FERS	CSRS
January 1990	3.7%	4.7%
January 1991	4.4	5.4
January 1992	2.7	3.7
January 1993	2.0	3.0
April 1994	2.0	2.6
April 1995	2.0	2.8
April 1996	2.0	2.6
January 1997	2.0	2.9

Military Personnel

COLA factors for military personnel depend on the date they entered service. Those entering service on or before 7/31/86 receive COLAs equal to the CPI increase. Those entering after 7/31/86 receive COLAs equal to the CPI increase minus one percent.

5. Benefit Reductions for Job Changes

Few workers remain on the same job throughout their career. Workers with defined benefit coverage who change jobs receive lower pension benefits than those who do not change jobs. This results in part because the salaries used in benefit computations are not indexed. Therefore, we adjust benefits to take into account future job changes among workers with DB coverage. This involves two steps. First we determine who changes a job and if so how often. Second, we determine how benefits are reduced for those who change jobs.[1]

***Determining Who Changes Jobs and How Often*.**

We base our estimates of who experiences a job change on the assumption that each year 5 percent of workers in jobs with DB pension coverage will change jobs. This assumption is based on Gustman and Steinmeier's (1995) finding that the average annual rate of job change among male pension participants age 31-50 is 6 percent. We use a 5 percent rate rather than a 6 percent rate to reflect multi-employer plans. That is, workers covered by multi-employer plans will be able to keep their DB coverage without disruption when they change jobs.

Although there is some evidence that the rate of job change is higher for some workers (e.g. younger workers, workers with shorter tenure, workers in certain industries) and lower for other workers (e.g. older workers, workers with longer tenure, workers in certain industries), for simplicity we do not vary the job change rate by either worker or employment characteristics.

The table below shows the resulting distribution of workers across the number of job changes, by the number of years of service remaining in their career. (Years of service remaining is the number of years from a worker's current age until retirement.)

Table 3-3
Distribution of Workers Across Number of Job Changes

Number of Job Changes	Years of Service Remaining: 35	30	25	20	15	10
0	16.6%	21.5%	27.7%	35.8%	46.3%	59.9%
1	30.6	33.9	36.5	37.7	36.6	31.5
2	27.4	25.9	23.0	18.9	13.5	7.5
3+	25.4	18.7	12.8	7.6	3.6	1.1

We assume that all workers age 50 or older remain on their current job until retirement. We also assume that workers with fewer than 10 years of service remaining until retirement remain on their current job until retirement.

Distribution of Job Tenure

Once we have determined how many jobs a worker has in his/her lifetime, we determine how long the worker holds each of these jobs. We've decided to structure a worker's career such that each job is twice as long as the job that preceded it. Two factors contributed to this decision. First, workers tend to change jobs earlier in their career rather than later. Second, the longer a person works on his/her last job, the less changing jobs affects their total pension income.

When determining the length of each job, we ignore information on the amount of service to date on a worker's present job as of the SIPP interview. Therefore, we will understate the time on the first job if the worker has already been on the job longer than we specify through our assumptions. For these workers, we will overstate the time on the last job, and thus, our reductions to pension income due to job changes may be slightly understated. (On the other hand, by ignoring tenure on the current job, we could overstate the probability of job change for those with longer tenures, and thus overstate the reductions to pension income due to job changes.)

The table below shows the resulting years of service on each job by the number of job changes and years of service. (Here, the years of service is the sum of the years of service remaining and the years of service to date on the current job.) For instance, we assume that a worker with 35 years of service who changes jobs 3 times will work 2 years on the first job, 5 years on the second, 9 years on the third, and 19 years on the fourth.

Table 3-4
Years of Service on Each Job, by Number of Job Changes

Total Years of Service	**Number of Job Changes**		
	1	2	3
35	12 years/23 years	5 years/10 years/20 years	2 years/5 years/9 years /19 years
30	10 / 20	4 / 9 / 17	2 / 4 / 8 / 16
25	8 / 17	4 / 7 / 14	2 / 3 / 7 / 13
20	7 / 13	3 / 6 / 11	1 / 3 / 5 / 11
15	5 / 10	2 / 4 / 9	1 / 2 / 4 / 8
10	3 / 7	1 / 3 / 6	1 / 1 / 3 / 5

Reduction in Pension Income

We calculated pension reduction factors that are based on the total years of service (years of service remaining plus years of service on current job to date), the number of job changes, and occupation. In calculating these factors we used a nominal wage growth rate of 4.4 percent. This assumption is based on the long-range intermediate wage growth assumption in the 1998 Social Security *Trustees' Report*.

The table below presents the reduction factors. They are applied to the final pension income. For instance, a professional/administrative worker with 35 years of service with one job change has a DB benefit equal to 83.1 percent of that of a similar worker with no job changes. (Because of the different accrual patterns of cash balance plans as well as the option for a lump-sum distribution upon employment-termination, the reduction factors calculated here will likely somewhat overstate the reduction due to job changes for those with cash balance plans.)

Table 3-5
Pension Reduction Factors

Total Years of Service	**Occupation**	**Number of Job Changes**		
		1	2	3
35	Prof/Admin	83.1%	78.8%	76.2%
	Tech/Clerical	82.6	78.1	75.3
	Prod/Service	86.2	83.3	80.6
30	Prof/Admin	81.7	72.9	69.2
	Tech/Clerical	80.8	71.7	67.9
	Prod/Service	85.8	76.6	72.6
25	Prof/Admin	85.4	74.6	71.4
	Tech/Clerical	84.2	73.1	69.9
	Prod/Service	89.7	78.0	74.6
20	Prof/Admin	90.4	80.4	78.2
	Tech/Clerical	89.2	79.1	77.0
	Prod/Service	94.0	83.2	80.7
15	Prof/Admin	97.1	63.2	58.7
	Tech/Clerical	96.7	62.8	58.3
	Prod/Service	100.0	62.3	58.0
10	Prof/Admin	79.8	73.1	66.3
	Tech/Clerical	79.8	73.1	66.3
	Prod/Service	80.5	74.0	67.4

Workers with Intervening Years of Zero Earnings

The earnings projections could include intervening years of zero earnings for some workers. In other words, these workers leave the work force and return at a later date. For simplicity, we treat workers with intervening years of zero earnings the same as other workers, except that the total years of service used to calculate the reduction factor will not include any years of zero earnings.

This may overstate the pension benefits for those with intervening years of zero earnings, but only for those who return to the work force in new jobs rather than returning to the same job. In any case, the projected pensions for workers with intervening years of zero earnings already partly account for any job changes by using years of service that are reduced for years of zero earnings.

6. Inclusion of Widow(er) Benefits

We include pre-retirement survivor benefits so that we do not understate the income for widow(ers) whose spouses died prior to receiving their pension income. For workers who die prior to age 62 (67), we determine what their pension would be at age 62 (67) if they had left their job the day prior to the day they died. We assume that each of these workers would have taken a 50 percent joint and survivor benefit. Then we assume that the surviving widow(er) begins to receive the survivor benefit when the worker would have attained age 62 (67), had he or she lived. This last assumption is made to be consistent with our assumption that workers do not begin to receive their pension benefits until they attain age 62 (67). For surviving spouses who start receiving survivorship benefits prior to attainment of age 62 (67), we apply COLA adjustments up to age 62 (67), as described above.

7. Current Retirement Income

About 4 percent of persons in the projection sample are currently collecting pension income, with their annual pension benefit averaging about $12,000. We project current pension income to ages 62 and 67. We assume that everyone in this group is collecting income from a DB plan, and we randomly assign COLA increases according to the COLA methods discussed above.

We also make assumptions regarding the survivorship status of those receiving pension benefits. We assume that pension recipients who are not married and report that they have joint and survivor plans are in survivorship mode. For those who are married and report that they have joint and survivor plans, we assume that they are collecting joint benefits. If a member of the couple dies before reaching age 62 or 67, we switch the surviving spouse to survivorship mode and reduce the benefits accordingly.

8. Benefits Expected from a Prior Job

About 11 percent of the persons age 55 to 64 in the 1990 projection sample and 9 percent of those in the 1991 sample expect to receive pension benefits from a prior job. The potential benefits from prior pension coverage can be substantial since workers age 55 to 64 were covered by these prior plans for an average of about 20 years.

The previous pension model already accounted for pensions from a prior job to the extent that these prior pension plan balances are rolled over and included in IRA balances reported in the SIPP. Unfortunately, the 1990 SIPP does not include questions regarding previous lump sum distributions for those under age 62. In the 1991 SIPP, however, 25 percent of those ages 55-64 who expect to receive a pension benefit from a prior job also indicate they previously received a lump sum distribution. Of these, 38 percent claim to have rolled the distribution over. In other words, 10 percent (25% * 38%) of those expecting to receive pension benefits from a prior job also received a lump sum distribution that they then rolled over. This is probably the upper bound on any double counting that would occur if we ignore the possibility that some people who report they expect to receive pension income from a prior job have actually rolled over their pension benefits. Therefore, it is reasonable to accept this potential for double counting rather than to try to impute the proportion of those in the 1990 SIPP who have taken and rolled over any lump sum distributions.

For simplicity, we assume that all of those expecting benefits from a prior job have a DB plan. This is probably reasonable, since those with DC plans are more likely to be eligible for and receive lump sum distributions. To calculate benefits at age 62 and 67, we use the years covered under the plan and the salary as of the quit date (using earnings information from the earnings projection module) and apply the appropriate replacement rate as discussed above.

III. DEFINED CONTRIBUTION (DC) PLAN AND IRA ESTIMATES

The model separately projects account balances for 401(k) plans, non-401(k) DC plans, Keoghs, and IRAs. In general, the output variables for DC plans include 401(k), non-401(k) DC plans, and Keogh plans, but not IRA plans; IRA plan output variables are displayed separately. For plans where account balance information is available, the balance is projected to the retirement date. In addition, monthly contributions are accumulated from the time of the survey until the time of retirement. These contributions reflect the reported employee contribution rates, assigned employer match rates, and earnings projections. For plans where account balance information is not available, monthly contributions are accumulated over the entire period of plan participation.

The model assumes that account balances are invested 50 percent in stocks and 50 percent in bonds. Similarly, it assumes that new contributions are allocated 50 percent to stocks and 50 percent to bonds. Separate rates of return are applied to the stock and bond balances and contributions. The real rates of return are set stochastically. In future versions of the model, it might be desirable to allow for various allocation strategies by age, gender, tenure, and/or income, and to allow for portfolio rebalancing. Time and resource constraints made it impractical to incorporate such variations in this version of the model. The Employee Benefit Research Institute/ICF (EBRI/ICF) database on 401(k) plans is a potential source for informing this type of enhancement.

Upon the pre-retirement death of a worker, we transfer the DC account balance to the spouse.

We annuitize account balances upon attainment of age 62 (67) under two sets of mortality assumptions. The first uses unisex mortality assumptions based on the 1989-1991 Decennial Life Tables as published by the National Center for Health Statistics (NCHS). The second set uses mortality assumptions developed by RAND and based on Panel Study of Income Dynamics (PSID) data corrected for differences between the PSID and Vital Statistics. These mortality rates vary by gender, birth year, race, and education.

1. Employee Contribution Rates

Employee contribution rates for each account balance type (401(k), non-401(k), Keogh, and IRA) are based on self-reported SIPP data. We assume that the percentage contributed to each plan remains a constant percentage of earnings until retirement. We might want to relax this assumption in future versions of the model, and allow contributions to vary by age, gender, tenure, and/or income.

2. Employer Match Rates

The SIPP does not ascertain employer match rate information. We estimate match rates for 401k and non-401k DC plans separately.

401(k) Plans

Using the 1995 Survey of Consumer Finances (SCF), we examined employer and employee contribution rates for 401(k) plans. We found that the employer match decreases with increases in the employee contribution rate. This is consistent with Papke (1997) who finds that worker contribution rates decrease as the employer match increases.

Therefore, we vary employer match rates by the worker contribution rate. For those cases where we do not know whether the employer contributes, we randomly assign employer match rates based on the following distribution:

Table 3-6
Distribution of Workers by Employer Match Rate

Worker Contribution Rate	0% Match	50% Match	100% Match
0.01-5.00%	20%	20%	60%
5.01%+	20%	60%	20%

For those cases where we know whether the employer contributes, we randomly assign employer match rates to those workers whose employer contributes using the following distribution:

Table 3-7
Distribution of Workers by Employer Match Rate

Worker Contribution Rate	0% Match	50% Match	100% Match
0.01-5.00%	na	25%	75%
5.01%+	na	75%	25%

For workers who do not contribute toward their 401(k) plan, we assume an employer contribution rate of 5 percent of salary.

Non-401(k) Plans

We also used the SCF to examine employee and employer contribution rates for non-401(k) contribution plans. Similar to our findings for 401(k) plans, we found that employer match rates for non-401(k) plans vary by the worker contribution rate. Accordingly, we vary employer match rates by the worker contribution rate. For those cases where we do not know whether the employer contributes, we randomly assign employer match rates based on the following distribution:

Table 3-8
Distribution of Workers by Employer Match Rate

Worker Contribution Rate	0% Match	50% Match	100% Match
0.01-4.00%	25%	25%	50%
4.01-8.00%	10%	40%	50%
8.01%+	40%	40%	20%

For those cases where we know whether the employer contributes, we randomly assign employer match rates to those workers whose employer contributes using the following distribution:

Table 3-9
Distribution of Workers by Employer Match Rate

Worker Contribution Rate	0% Match	50% Match	100% Match
0.01-4.00%	na	33%	67%
4.01-8.00%	na	44%	56%
8.01%+	na	67%	33%

For workers who do not contribute to their non-401(k) DC plan, we assume an employer contribution rate of 4.5 percent of salary.

3. Rate of Return on Account Balances

We assume that account balances reported at the time of the SIPP survey are allocated evenly between stocks and bonds and also that new contributions are allocated evenly between stocks and bonds. Based on input from ORES, we assume a CPI growth rate of 3.50 percent, a real rate of return for stocks of 6.98 percent, and a real rate of return for bonds of 3.00 percent. We subtract one percent from each of the stock and bond real rates of return to reflect administrative costs. This is the same administrative fee assumption used in the Advisory Council report for the intermediate return PSA-401(k) plan (1997, vol. 1, page 171). (The pension module programs are structured so that the rates of return can be easily modified.) We apply the stock rate of return to the stock allocations and the bond rate of return to the bond allocations. We vary the investment experience by individual and by year by setting the rates stochastically (i.e., drawing them from a normal distribution). Based on recommendations from RAND, we assume a standard deviation of 17.28 percent for stocks and 2.14 percent for bonds.

4. Annuitization Assumptions

Upon reaching age 62 (67), we calculate annuitized account balances for everyone. These annuitized benefits represent the annual benefits available if the workers choose to annuitize, and therefore, are merely illustrative. When projecting income in the years past age 62 and 67, DC pension wealth is included with non-pension wealth and the decline in wealth is estimated by age. See Chapter 7 of this report for more detail on how wealth and income is projected past ages 62 and 67.

We produce two sets of annuitized benefits. The first set uses unisex mortality assumptions based on the 1989-1991 Decennial Life Tables, as published by the NCHS. Presumably, these would be the rates appropriate under a mandated annuitization scenario. The code has the ability to reduce benefits by a loading factor, which is currently set at 20 percent.

The second set uses mortality assumptions developed by RAND and based on PSID data corrected for differences between the PSID and Vital Statistics. These mortality rates vary by gender, birth year, race, and education. The idea here is that we are simulating withdrawals from the account balance rather than assuming the people actually use their account balances to purchase annuities. However, because we assume that people are risk averse, we assume that people will withdraw less from their DC account in order to save in case they live longer than they expect. Therefore, we reduce the annualized benefit that results from the annuity factor calculations by 20 percent to reflect this risk aversion. The annuity program was written such that this reduction factor can be easily modified.

Regardless of which set of assumptions are used, the estimates of annuitized benefits reflect joint and survivor annuities for married persons. The amount payable to the survivor is currently set at 50 percent, but can easily be modified.

5. Transfer of Account Balances to Widow(er)s

We transfer the account balances of workers who die prior to age 62 (67) to their surviving spouses. The account balances continue to accrue interest until the surviving spouse attains age 62 (67), but no additional contributions are made. When the surviving spouse attains age 62 (67), the account balance is annuitized. If the surviving spouse is already age 62 (67) or older, we annuitize the balance as of the date of the worker's death.

IV. INCREASING FUTURE DB AND DC PENSION PLAN PARTICIPATION

Some workers who are not currently covered by a pension plan (either because they are not participating or their employer does not offer a pension) will move into DB or DC pension plans over time. In particular, pension plan participation increases with age (up to age 50 or so) and with earnings. We randomly increase future pension participation so that it incorporates current trends in pension participation by age and earnings.

Using data from the 1990-1993 SIPP, we created the following matrices of pension plan participation rates by age, gender, and income quintile (determined by gender).

Over time, workers move from one participation rate cell to another as they age and possibly earn more income. As non-participating workers move from one cell to another, we randomly assign them to pension plans such that the overall participation rate for the cell is preserved. (Since we increase pension coverage among nonparticipants only, we avoid having to address whether new coverage replaces or supplements already existing coverage.)

Table 3-10
Pension Plan Participation Rates

	Earnings Quintile				
	First	**Second**	**Third**	**Fourth**	**Fifth**
			Men		
Age 30-32	19	34	51	62	68
Age 33-37	28	45	62	72	78
Age 38-42	35	53	69	78	83
Age 43-47	39	57	73	81	86
Age 48-52	42	60	75	83	87
Age 53-57	41	58	74	82	86
Age 58-62	35	53	69	78	83
			Women		
Age 30-32	15	25	43	59	68
Age 33-37	22	33	53	68	76
Age 38-42	25	38	57	72	80
Age 43-47	28	41	60	75	82
Age 48-52	26	39	58	73	81
Age 53-57	25	37	56	72	79
Age 58-62	22	33	53	69	77

We use the following formula to assign pension plan coverage to non-participating workers:

$$\frac{(\text{participation rate}_{\text{age in x years, earnings quintile in x years}} - \text{participation rate}_{\text{current age and earnings quintile}})}{(100\text{-participation rate}_{\text{current age and earnings quintile}})}$$

where current age and earnings quintile are those as of the time of the SIPP survey.

For instance, 45 percent of 35 year old working men with earnings in the second quintile participate in a pension plan. This means that 55 percent do not participate. If in five years, however, the workers who did not participate had earnings in the third quintile and are now age 40, they are now included with the group that participates at a rate of 69 percent. Therefore, (69-45)/55=44% of these workers would become new pension participants at age 40.

We compare participation rates in five year intervals until the worker reaches age 53 or older. In other words, a 35 year old who is not participating at the time of the SIPP survey first has the opportunity to newly participate in a pension plan at age 40. If we do not assign coverage at age 40, the worker has another opportunity to newly participate at age 45, and then again at age 50.

Note that we do not include any explicit cohort effects in assigning participation rates. In other words, we assume that current 35 year olds will have the same participation rate at age 50 as current 50 year olds in the same position in the earnings distribution. However, the future pension participation rates of more recent cohorts will differ from those of current older cohorts to the extent that their earnings distributions differ.

Consistent with current trends in pension plan coverage, we assume that two-thirds of new pension participants join DC plans and one-third join DB plans. (This assumption can be easily modified within the pension module.)

It is also possible that individuals who are not working at the time of the SIPP survey eventually enter the labor force and participate in an employment-based pension plan. To allow for this possibility, we apply the rates in the above pension participation matrix to those individuals who according to the earnings projections, enter the work force. Take for example, a woman who is not working at age 33 but subsequently enters the labor force at age 38. We assign her a 38 percent probability of having pension coverage, the same probability as similarly situated women. Again, we assume that two-thirds of new participants join DC plans and one-third join DB plans.

V. RESULTS

Tables 3-11 through 3-24 summarize the output of the pension module. Tables 3-11 and 3-12 present the coverage rates and mean balance and benefit amounts by various characteristics for the age 62 and age 67 scenarios, respectively. Tables 3-13 through 3-17 present coverage rates by birth cohort, AIME quintile, gender, and retirement age scenario. Table 3-18 presents the mean DB benefits by birth cohort, AIME quintile, gender, and age retirement age scenario. Similarly, Tables 3-19 through 3-21 present mean DC balances and annuitized benefits, and Tables 3-22 through 3-24 present mean IRA balances and annuitized benefits.

Note that under the age 62 scenario, all benefit coverage percentages and mean balance and benefit amounts reflect coverage and amounts at age 62 assuming retirement and annuitization by age 62. Similarly, under the age 67 scenario, all benefit coverage percentages and mean balance and benefit amounts reflect coverage and amounts at age 67 assuming retirement and annuitization by age 67. In these tables, mean balances and benefits reflect those for persons with coverage only.

1. Pension Coverage

The left panel of Table 3-11 presents pension coverage rates under the retirement age 62 scenario. Coverage rates represent the proportion of people in the SIPP sample who will receive pension benefits at age 62. Forty-seven percent have pension coverage from a DB or DC (including Keoghs) plan. In addition, 20 percent have IRA coverage. Overall, 62 percent have pension coverage from any source at age 62 (including DB, DC, and IRA coverage).

The *Income of the Aged Chartbook, 1996* (SSA ORES, 1998, p. 8) shows that 41 percent of aged units receive retirement benefits other than Social Security (includes private pensions and annuities, government employee pensions, railroad retirement, and IRA, Keogh, and 401(k) payments). Our percentages are higher by about 20 percentage points, presumably because we include all persons with DC and IRA account balances, regardless of whether they will actually receive annuitized benefits. (Note also that the *Chartbook* uses aged units, whereas we look at persons.)

The left panel of Table 3-12 presents pension coverage rates under the retirement age 67 scenario. The overall proportion of persons receiving pension income is slightly higher under the age 67 scenario; overall coverage rates including IRA coverage are 63 percent under the age 67 scenario and 62 percent under the age 62 scenario. However, coverage for each type of plan is lower under the age 67 scenario. For example, DB coverage is 35 percent under the age 62 scenario and 33 percent under the age 67 scenario. This suggests that there are fewer people with multiple plan types under the age 67 scenario then there are under the age 62 scenario.

Regardless of the retirement age scenario used, some pension coverage patterns emerge. Although overall coverage rates are roughly similar by birth cohort, overall rates mask the differences by plan type. For instance, IRA coverage is lower among more recent cohorts, primarily because we have chosen not to assign future IRA coverage to those not currently participating in an IRA plan. However, since those with IRA coverage typically also have either DB or DC coverage, this does not change overall coverage rates by cohort. In addition, DB coverage decreases and DC coverage increases among more recent cohorts. This results, in part, from our assumptions regarding new coverage. Our future pension participation module assumes that two-thirds of new pension plan participants are in a DC plan. We feel this is appropriate given current trends in plan types.

Pension coverage increases with lifetime income, as measured by one's AIME as a portion of national average wages in the year one turns age 62 (67). Persons in the highest AIME quintile have pension coverage rates over twice those in the first quintile. In addition, men are more likely to have pension coverage than women, although participation in IRAs is nearly identical. Pension coverage is higher for married persons, those with more education, and whites and non-Hispanics.

Table 3-11
Pension Coverage Rates and Mean Benefits and Balances, Age 62 Scenario

	Coverage					Benefit and Balance Means (as a percentage of average national wage)						
			Employment-Based			DB Benefit	DC Balance	DC Benefit	DC Benefit	IRA Balance	IRA Benefit	IRA Benefit
	DB, DC, or IRA	IRA	DB or DC	DB	DC			(unisex mort)	(indiv mort)		(unisex mort)	(indiv mort)
ALL	61.5%	20.2%	47.2%	34.6%	21.0%	0.281	5.671	0.444	0.403	1.411	0.110	0.100
AIME Quintile												
Quintile 1	37.0	13.7	25.6	21.3	7.6	0.386	4.155	0.325	0.292	0.882	0.069	0.062
Quintile 2	45.0	14.2	32.1	24.8	10.8	0.153	2.783	0.218	0.196	1.443	0.112	0.101
Quintile 3	61.5	15.3	47.6	33.8	19.7	0.168	3.032	0.239	0.217	1.494	0.117	0.106
Quintile 4	75.9	22.1	59.8	42.4	27.2	0.246	4.801	0.377	0.343	1.490	0.117	0.106
Quintile 5	88.2	35.8	70.8	50.5	39.8	0.406	8.699	0.679	0.618	1.514	0.118	0.107
Birth Cohort												
<1931	59.5	32.4	45.6	41.6	7.4	0.474	1.653	0.127	0.119	0.008	0.001	0.001
1931-1935	62.5	32.8	46.5	39.0	15.6	0.416	2.298	0.177	0.166	0.119	0.009	0.009
1936-1940	62.4	27.8	45.2	34.6	20.6	0.355	3.263	0.251	0.235	0.522	0.040	0.038
1941-1945	63.2	24.7	46.9	34.8	22.7	0.294	4.451	0.346	0.317	1.012	0.079	0.072
1949-1950	64.7	22.1	49.2	35.6	24.1	0.265	5.598	0.436	0.398	1.619	0.126	0.114
1951-1955	62.5	17.9	47.8	33.5	23.8	0.230	6.181	0.484	0.440	2.342	0.183	0.166
1956-1960	60.6	13.5	47.5	32.6	22.9	0.199	7.543	0.592	0.534	3.114	0.242	0.219
1961-1965	57.6	8.3	46.7	30.9	21.9	0.174	7.030	0.555	0.498	3.609	0.284	0.255
Gender												
Female	57.2	19.8	44.8	32.8	19.2	0.216	4.983	0.394	0.344	1.466	0.116	0.102
Male	66.5	20.6	49.6	36.4	22.9	0.341	6.276	0.487	0.455	1.355	0.105	0.098
Marital Status												
Single	60.2	13.8	39.1	29.4	17.0	0.258	5.982	0.466	0.419	1.777	0.138	0.123
Married	62.1	24.1	52.1	37.8	23.5	0.292	5.531	0.434	0.396	1.281	0.100	0.092
Education												
HS dropout	37.0	6.2	28.4	22.5	8.4	0.188	2.595	0.202	0.203	0.513	0.040	0.040
HS grad	60.2	17.5	46.3	34.2	19.9	0.246	4.710	0.369	0.340	1.310	0.102	0.094
College	78.5	34.9	60.6	42.7	31.1	0.376	7.624	0.596	0.531	1.627	0.127	0.113
Race												
White	63.2	22.3	48.0	35.0	21.8	0.287	5.790	0.453	0.411	1.396	0.109	0.099
Black	51.0	5.5	42.3	33.2	15.2	0.246	4.211	0.330	0.310	1.639	0.128	0.120
Native	52.6	9.3	42.9	32.3	16.2	0.206	4.066	0.318	0.289	1.240	0.096	0.087
Asian	54.3	17.1	42.7	29.8	20.4	0.235	6.403	0.503	0.453	1.667	0.130	0.117
Hispanic												
No	63.1	21.4	48.3	35.4	21.7	0.285	5.723	0.448	0.407	1.410	0.110	0.100
Yes	43.1	6.4	34.9	25.1	13.8	0.208	4.766	0.373	0.345	1.448	0.113	0.103
Pension Type												
No pension	-	-	-	-	-	na	na	na	na	na	na	na
IRA only	100.0	100.0	-	-	-	na	na	na	na	1.102	0.087	0.079
DC only	100.0	-	100.0	-	100.0	na	5.408	0.426	0.388	na	na	na
DC and IRA	100.0	100.0	100.0	-	100.0	na	7.457	0.585	0.523	2.050	0.158	0.144
DB only	100.0	-	100.0	100.0	-	0.234	na	na	na	na	na	na
DB and IRA	100.0	100.0	100.0	100.0	-	0.369	na	na	na	1.131	0.088	0.080
DB and DC	100.0	-	100.0	100.0	100.0	0.289	4.529	0.352	0.324	na	na	na
DB DC and IRA	100.0	100.0	100.0	100.0	100.0	0.393	6.139	0.476	0.432	1.872	0.146	0.131
SIPP Wave												
1990	61.0	19.7	46.2	32.1	22.2	0.278	6.069	0.475	0.431	1.650	0.129	0.117
1991	62.6	20.0	47.8	36.2	19.5	0.277	5.082	0.397	0.362	1.457	0.113	0.103
1992	62.5	20.1	49.0	37.7	19.3	0.274	5.181	0.406	0.369	1.418	0.111	0.100
1993	59.9	20.9	45.6	32.3	23.0	0.296	6.194	0.484	0.440	1.133	0.089	0.080

Note:
1. AIME Quintile Breaks are: 0.192, 0.498, 0.836, and 1.273 times the national average wage.

Table 3-12
Pension Coverage Rates and Mean Benefits and Balances, Age 67 Scenario

	Coverage					Benefit and Balance Means (as a proportion of average national wage)						
			Employment-Based									
	DB, DC, or IRA	IRA	DB or DC	DB	DC	DB Benefit	DC Balance	DC Benefit (unisex mort)	DC Benefit (indiv mort)	IRA Balance	IRA Benefit (unisex mort)	IRA Benefit (indiv mort)
ALL	62.5%	19.2%	44.7%	32.9%	19.9%	0.258	7.391	0.648	0.569	2.052	0.180	0.157
AIME Quintile												
Quintile 1	38.5	13.4	25.5	21.3	7.7	0.380	6.085	0.534	0.462	1.446	0.128	0.110
Quintile 2	45.6	13.3	30.8	24.1	10.1	0.144	3.723	0.327	0.280	2.018	0.179	0.153
Quintile 3	63.2	14.8	46.5	33.2	19.5	0.155	4.232	0.373	0.325	2.222	0.196	0.170
Quintile 4	76.9	21.2	56.0	40.0	25.5	0.219	6.324	0.557	0.490	2.223	0.195	0.171
Quintile 5	88.4	32.5	63.2	45.3	35.7	0.369	11.078	0.968	0.853	2.118	0.185	0.162
Birth Cohort												
<1931	61.8	31.9	44.3	40.3	7.6	0.416	2.545	0.221	0.196	0.162	0.014	0.013
1931-1935	64.5	30.7	43.2	36.4	14.8	0.379	3.866	0.337	0.304	0.543	0.048	0.043
1936-1940	63.5	26.0	43.0	33.4	19.6	0.343	4.714	0.407	0.368	1.051	0.092	0.082
1941-1945	64.0	23.5	44.2	32.9	21.4	0.276	6.129	0.532	0.474	1.615	0.141	0.125
1949-1950	65.4	20.9	46.4	33.9	22.7	0.249	7.255	0.632	0.559	2.348	0.206	0.179
1951-1955	63.2	16.9	45.1	31.9	22.3	0.213	7.905	0.694	0.610	3.255	0.286	0.247
1956-1960	61.2	12.8	45.0	31.1	21.7	0.181	9.486	0.833	0.727	4.118	0.362	0.312
1961-1965	58.3	7.9	44.3	29.5	20.6	0.157	9.012	0.800	0.688	4.529	0.402	0.344
Gender												
Female	58.6	19.4	44.4	32.8	19.1	0.205	6.741	0.599	0.500	2.252	0.200	0.168
Male	67.4	18.9	44.9	33.1	20.7	0.314	8.017	0.695	0.635	1.836	0.159	0.145
Marital Status												
Single	61.7	12.9	35.1	26.6	15.2	0.242	7.807	0.678	0.587	2.619	0.228	0.194
Married	62.9	24.4	52.6	38.2	23.8	0.267	7.169	0.632	0.559	1.801	0.159	0.140
Education												
HS dropout	38.2	5.9	26.2	20.9	7.7	0.170	3.428	0.297	0.294	0.814	0.071	0.070
HS grad	61.1	16.7	43.9	32.7	18.9	0.227	6.061	0.532	0.475	1.894	0.167	0.148
College	78.8	32.9	57.5	40.8	29.5	0.344	10.025	0.879	0.753	2.374	0.208	0.177
Race												
White	64.2	21.2	45.5	33.3	20.7	0.264	7.554	0.662	0.580	2.041	0.179	0.156
Black	52.2	5.3	39.9	31.3	14.3	0.228	5.388	0.474	0.433	2.224	0.195	0.179
Native	53.5	8.1	39.7	30.7	13.9	0.200	5.230	0.461	0.410	1.885	0.163	0.142
Asian	55.4	16.1	40.7	28.7	19.1	0.223	8.298	0.732	0.634	2.220	0.195	0.168
Hispanic												
No	64.1	20.3	45.7	33.8	20.5	0.262	7.445	0.653	0.572	2.049	0.180	0.157
Yes	44.3	6.2	32.8	23.7	13.0	0.196	6.448	0.563	0.505	2.130	0.187	0.165
Pension Type												
No pension	-	-	-	-	-	na	na	na	na	na	na	na
IRA only	100.0	100.0	-	-	-	na	na	na	na	1.570	0.139	0.122
DC only	100.0	-	100.0	-	100.0	na	6.919	0.608	0.539	na	na	na
DC and IRA	100.0	100.0	100.0	-	100.0	na	9.723	0.852	0.741	2.826	0.248	0.215
DB only	100.0	-	100.0	100.0	-	0.214	na	na	na	na	na	na
DB and IRA	100.0	100.0	100.0	100.0	-	0.334	na	na	na	1.605	0.141	0.124
DB and DC	100.0	-	100.0	100.0	100.0	0.264	5.823	0.511	0.452	na	na	na
DB DC and IRA	100.0	100.0	100.0	100.0	100.0	0.371	8.322	0.728	0.628	2.931	0.257	0.220
SIPP Wave												
1990	62.1	18.5	43.5	30.6	20.8	0.255	7.890	0.693	0.608	2.396	0.211	0.183
1991	63.8	19.2	45.2	34.4	18.4	0.253	6.823	0.598	0.525	2.001	0.176	0.153
1992	63.4	19.2	46.6	36.0	18.4	0.255	6.808	0.597	0.524	2.145	0.188	0.164
1993	60.8	19.8	43.3	30.9	21.9	0.270	7.883	0.691	0.606	1.689	0.149	0.129

Note:
1. AIME Quintile Breaks are: 0.192, 0.498, 0.836, and 1.273 times the national average wage.

Table 3-13 through 3-17 present coverage rates (DB/DC/IRA, IRA, DB/DC, DB, and DC) by birth cohort, gender, AIME quintile, and retirement age scenario. Among women, the percentage with pension coverage from any source (including IRAs) remains fairly steady across cohorts (Table 3-13). However, an interesting trend emerges when examining the percentage of women with either DB or DC coverage (Table 3-14). Although coverage rates by birth cohort remain fairly steady within AIME quintiles, coverage rates increase for more recent cohorts in the aggregate. This likely reflects a shift in the distribution of women by AIME quintile; women in more recent birth cohorts are more likely to be in higher AIME quintiles, and therefore are more likely to have pension coverage. This trend is consistent with Johnson (1999), who concludes that the gender gap in pension coverage is due primarily to gender differences in income.

Among men, the percentage with pension coverage from any source (including IRAs) decreases slightly, both within AIME quintiles and overall (Table 3-13). Decreases within the lowest two AIME quintiles are more dramatic than those in the higher AIME quintile, suggesting that low lifetime earners in more recent cohorts are relatively worse off than low lifetime earners in older cohorts. Similar trends are evident when examining the percentage of men with either DB or DC coverage (Table 3-14).

When examining DB coverage in particular, coverage rates hold steady for women by birth cohort (although in general, rates decrease by cohort within AIME quintiles) and decrease for men by birth cohort, both within AIME quintiles and overall (Table 3-15). DC coverage rates increase by cohort, for both men and women, both overall and within AIME quintiles (Table 3-16). Again, however, these trends in overall coverage rates by coverage type reflect our assumption that two-thirds of new pension participants will be in DC plans. Finally, IRA coverage decreases by birth cohort for both women and men, both within AIME quintiles and overall, reflecting that we do not assign future IRA coverage to those not currently participating in an IRA plan (Table 3-17).

2. DB Benefits

The right panels of Tables 3-11 and 3-12 present the mean benefits and balances for the various pension types. Note again that means are for those with coverage only. Mean DB benefits are 0.28 times and 0.26 times the national average salary, under the age 62 and age 67 scenarios, respectively. Benefits are slightly lower under the age 67 scenario because workers are more likely to leave their job prior to age 67 than they are to leave prior to age 62. Because final salaries used in DB benefit computations are not indexed, leaving a job prior to age 62 (67) will result in lower benefits.

In general, patterns of DB benefits are similar to those in pension plan coverage. Among those receiving DB benefits, average DB benefits are higher among men, married persons, more educated persons, whites, and non-hispanics. Although DB benefits increase from AIME

Table 3-13
Percentage with DB, DC, or IRA Coverage

Percentage with DB, DC, or IRA Coverage at 62, by Birth Cohort and AIME Quintile
Age 62 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	62	59	62	62	63	65	63	61	58
	AIME Quintile									
	Quintile 1	37	39	41	39	38	40	37	32	30
	Quintile 2	45	54	52	50	48	45	39	42	41
	Quintile 3	61	61	67	64	63	62	63	61	57
	Quintile 4	76	77	73	73	75	79	78	76	74
	Quintile 5	88	90	89	89	89	90	88	87	85
Female	ALL	57	50	56	56	58	60	59	58	57
	AIME Quintile									
	Quintile 1	34	36	38	35	34	35	34	32	29
	Quintile 2	48	56	54	52	53	48	43	43	42
	Quintile 3	70	71	78	77	71	71	69	68	65
	Quintile 4	84	87	88	84	87	87	84	82	78
	Quintile 5	90	92	89	93	91	92	89	89	89
Male	ALL	66	70	70	70	69	70	67	64	59
	AIME Quintile									
	Quintile 1	47	54	58	60	54	55	43	32	35
	Quintile 2	38	46	47	42	36	34	30	41	39
	Quintile 3	50	50	52	46	49	48	54	52	47
	Quintile 4	71	75	68	68	68	72	74	71	70
	Quintile 5	88	90	89	88	89	89	88	86	83

Percentage with DB, DC, or IRA Coverage at 67, by Birth Cohort and AIME Quintile
Age 67 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	63	62	65	64	64	65	63	61	58
	AIME Quintile									
	Quintile 1	38	41	44	42	40	41	38	33	32
	Quintile 2	46	56	53	50	49	45	40	42	42
	Quintile 3	63	63	70	65	64	64	64	63	59
	Quintile 4	77	77	75	75	76	80	79	77	75
	Quintile 5	88	91	89	89	90	90	88	87	85
Female	ALL	59	53	58	58	59	61	60	59	58
	AIME Quintile									
	Quintile 1	36	37	41	37	36	36	35	33	30
	Quintile 2	48	58	54	52	53	49	44	43	43
	Quintile 3	71	74	79	76	71	72	71	70	67
	Quintile 4	84	86	89	85	86	87	84	82	80
	Quintile 5	90	95	91	93	91	92	90	89	87
Male	ALL	67	72	72	71	70	70	67	64	59
	AIME Quintile									
	Quintile 1	49	58	60	62	56	56	46	34	38
	Quintile 2	38	48	50	43	35	33	29	40	39
	Quintile 3	52	49	55	46	51	51	55	55	49
	Quintile 4	72	75	69	70	69	74	75	72	70
	Quintile 5	88	91	89	88	90	89	88	85	83

Table 3-14
Percentage with DB or DC Coverage

Percentage with DB or DC Coverage at 62, by Birth Cohort and AIME Quintile
Age 62 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	47	46	47	45	47	49	48	47	47
	AIME Quintile									
	Quintile 1	26	25	25	24	25	29	27	25	24
	Quintile 2	32	40	37	35	32	31	27	31	32
	Quintile 3	48	50	52	46	48	48	48	48	45
	Quintile 4	60	63	57	54	59	60	61	61	61
	Quintile 5	71	74	73	71	69	71	70	70	72
Female	ALL	45	35	39	40	43	48	47	48	49
	AIME Quintile									
	Quintile 1	23	20	20	19	21	25	26	25	24
	Quintile 2	34	40	36	36	35	34	31	33	34
	Quintile 3	57	56	62	59	56	58	56	58	56
	Quintile 4	72	73	76	70	75	75	72	72	70
	Quintile 5	80	86	78	80	78	82	79	78	82
Male	ALL	50	58	55	51	51	51	48	47	45
	AIME Quintile									
	Quintile 1	35	50	47	46	40	42	30	24	26
	Quintile 2	27	39	39	30	25	23	20	27	29
	Quintile 3	36	43	39	30	35	34	37	37	35
	Quintile 4	53	62	51	47	50	51	54	53	54
	Quintile 5	68	73	73	70	67	68	67	67	67

Percentage with DB or DC Coverage at 67, by Birth Cohort and AIME Quintile
Age 67 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	45	44	43	43	44	46	45	45	44
	AIME Quintile									
	Quintile 1	26	24	25	25	25	29	27	24	25
	Quintile 2	31	40	33	33	31	29	26	30	32
	Quintile 3	47	48	50	44	46	46	47	48	45
	Quintile 4	56	58	52	51	55	57	57	57	56
	Quintile 5	63	69	63	63	62	64	63	63	63
Female	ALL	44	36	39	40	43	47	47	47	48
	AIME Quintile									
	Quintile 1	23	20	22	21	22	25	26	25	24
	Quintile 2	34	40	33	35	34	33	31	32	35
	Quintile 3	57	56	59	56	56	58	56	58	56
	Quintile 4	69	71	72	66	70	71	69	69	68
	Quintile 5	76	80	75	77	75	77	76	74	78
Male	ALL	45	54	48	46	46	46	44	43	40
	AIME Quintile									
	Quintile 1	33	48	39	43	37	37	30	22	25
	Quintile 2	25	37	33	28	22	20	17	25	27
	Quintile 3	34	37	37	28	32	32	37	37	34
	Quintile 4	48	55	44	44	46	48	49	48	47
	Quintile 5	60	68	62	61	59	60	58	58	56

Table 3-15
Percentage with DB Coverage

Percentage with DB Coverage at 62, by Birth Cohort and AIME Quintile
Age 62 Scenario

		ALL	Birth Cohort <1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	35	42	39	35	35	36	34	33	31
	AIME Quintile									
	Quintile 1	21	23	22	20	20	24	22	20	20
	Quintile 2	25	36	30	27	24	22	20	24	25
	Quintile 3	34	45	43	34	34	33	33	32	30
	Quintile 4	42	58	47	41	43	42	41	40	37
	Quintile 5	51	65	60	53	51	51	48	46	44
Female	ALL	33	32	32	30	32	35	34	34	33
	AIME Quintile									
	Quintile 1	19	19	17	15	17	20	21	20	20
	Quintile 2	26	36	29	27	26	24	22	26	25
	Quintile 3	40	50	51	42	42	39	38	38	37
	Quintile 4	50	66	61	53	52	54	49	48	43
	Quintile 5	56	78	60	63	56	63	55	52	51
Male	ALL	36	53	47	39	38	37	33	31	29
	AIME Quintile									
	Quintile 1	29	48	43	39	32	34	24	19	19
	Quintile 2	22	36	35	25	19	17	15	20	23
	Quintile 3	26	40	33	24	24	25	26	26	23
	Quintile 4	38	57	43	36	38	35	35	34	33
	Quintile 5	49	65	61	52	50	48	46	44	41

Percentage with DB Coverage at 67, by Birth Cohort and AIME Quintile
Age 67 Scenario

		ALL	Birth Cohort <1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	33	40	36	33	33	34	32	31	29
	AIME Quintile									
	Quintile 1	21	23	21	21	20	23	22	20	20
	Quintile 2	24	36	28	26	23	22	20	23	24
	Quintile 3	33	43	42	33	34	32	33	32	29
	Quintile 4	40	53	43	40	41	41	39	38	35
	Quintile 5	45	62	52	48	45	46	43	41	39
Female	ALL	33	32	32	31	32	34	33	33	33
	AIME Quintile									
	Quintile 1	19	19	18	18	18	21	21	20	20
	Quintile 2	26	36	28	27	25	24	23	25	26
	Quintile 3	40	49	49	41	43	39	39	38	37
	Quintile 4	49	63	58	52	47	50	49	47	43
	Quintile 5	53	71	56	60	55	59	52	49	48
Male	ALL	33	50	41	36	34	33	30	29	26
	AIME Quintile									
	Quintile 1	27	46	36	37	29	30	23	17	19
	Quintile 2	20	35	29	23	17	16	13	18	22
	Quintile 3	25	35	31	22	21	23	26	26	22
	Quintile 4	35	51	38	34	37	34	33	31	29
	Quintile 5	43	61	52	46	43	43	40	38	35

Table 3-16
Percentage with DC Coverage

Percentage with DC Coverage at 62, by Birth Cohort and AIME Quintile
Age 62 Scenario

		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
			Birth Cohort							
ALL	ALL	21	7	16	21	23	24	24	23	22
	AIME Quintile									
	Quintile 1	8	3	6	8	9	11	9	8	6
	Quintile 2	11	7	12	14	13	12	11	10	9
	Quintile 3	20	8	17	21	22	22	21	20	20
	Quintile 4	27	10	18	24	27	30	31	31	32
	Quintile 5	40	17	31	38	40	40	42	44	45
Female	ALL	19	5	13	18	20	23	23	22	21
	AIME Quintile									
	Quintile 1	6	2	5	6	7	9	8	7	6
	Quintile 2	12	6	12	15	14	13	13	10	10
	Quintile 3	25	10	21	29	25	28	26	26	25
	Quintile 4	36	17	27	34	40	41	37	36	37
	Quintile 5	47	16	39	41	47	45	50	49	50
Male	ALL	23	10	19	24	26	25	25	24	22
	AIME Quintile									
	Quintile 1	12	5	8	19	17	16	13	10	8
	Quintile 2	9	7	11	9	11	8	8	10	8
	Quintile 3	14	5	10	11	17	14	15	14	15
	Quintile 4	22	8	15	19	20	24	27	27	28
	Quintile 5	38	17	31	38	39	39	40	42	43

Percentage with DC Coverage at 67, by Birth Cohort and AIME Quintile
Age 67 Scenario

		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
			Birth Cohort							
ALL	ALL	20	8	15	20	21	23	22	22	21
	AIME Quintile									
	Quintile 1	8	3	6	9	9	10	9	8	6
	Quintile 2	10	6	10	13	12	11	10	10	9
	Quintile 3	20	8	16	20	21	22	21	20	20
	Quintile 4	25	10	17	22	25	29	28	29	29
	Quintile 5	36	15	28	34	37	37	39	39	40
Female	ALL	19	6	13	17	19	22	22	21	21
	AIME Quintile									
	Quintile 1	7	3	6	6	8	9	8	7	5
	Quintile 2	11	6	10	14	13	12	12	10	11
	Quintile 3	25	11	20	28	25	28	26	26	24
	Quintile 4	34	18	27	30	37	38	35	34	35
	Quintile 5	46	20	40	43	46	44	49	47	48
Male	ALL	21	9	17	22	23	23	22	22	20
	AIME Quintile									
	Quintile 1	11	5	7	18	16	14	12	10	9
	Quintile 2	8	6	9	8	10	6	6	9	7
	Quintile 3	13	4	11	10	16	14	15	14	15
	Quintile 4	20	8	13	19	18	22	24	25	25
	Quintile 5	33	15	27	33	35	35	35	36	36

Table 3-17
Percentage with IRA Coverage

Percentage with IRA Coverage at 62, by Birth Cohort and AIME Quintile
Age 62 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	20	32	33	28	25	22	18	13	8
	AIME Quintile									
	Quintile 1	14	23	24	20	16	13	10	6	3
	Quintile 2	14	28	27	23	19	15	11	9	4
	Quintile 3	15	27	30	24	21	16	14	10	7
	Quintile 4	22	38	32	30	26	24	20	16	10
	Quintile 5	36	63	56	44	40	37	33	26	20
Female	ALL	20	29	31	28	24	22	18	14	8
	AIME Quintile									
	Quintile 1	14	23	24	19	16	14	10	6	3
	Quintile 2	17	31	29	26	22	18	13	10	5
	Quintile 3	20	35	40	33	26	21	17	12	8
	Quintile 4	27	53	48	44	35	32	25	19	12
	Quintile 5	36	66	55	50	43	41	38	34	23
Male	ALL	21	36	35	28	26	22	18	13	8
	AIME Quintile									
	Quintile 1	12	22	26	22	17	13	9	4	2
	Quintile 2	8	16	20	11	10	10	5	7	3
	Quintile 3	9	18	16	14	13	9	9	7	5
	Quintile 4	20	35	27	24	21	18	17	14	9
	Quintile 5	36	63	56	43	39	36	31	24	18

Percentage with IRA Coverage at 67, by Birth Cohort and AIME Quintile
Age 67 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	19	32	31	26	24	21	17	13	8
	AIME Quintile									
	Quintile 1	13	22	24	19	16	13	9	6	3
	Quintile 2	13	25	25	21	18	15	11	8	4
	Quintile 3	15	28	27	22	20	16	13	10	6
	Quintile 4	21	36	31	29	26	23	19	15	10
	Quintile 5	32	58	48	38	36	34	30	24	18
Female	ALL	19	29	30	27	23	22	18	13	8
	AIME Quintile									
	Quintile 1	14	22	24	19	16	13	10	6	3
	Quintile 2	16	29	27	24	22	17	14	10	5
	Quintile 3	20	37	36	31	25	20	17	12	8
	Quintile 4	26	50	47	42	34	31	23	18	11
	Quintile 5	35	57	52	47	39	40	36	32	23
Male	ALL	19	35	31	25	24	20	16	12	7
	AIME Quintile									
	Quintile 1	11	22	23	21	15	13	9	5	2
	Quintile 2	7	14	18	11	9	8	4	6	2
	Quintile 3	9	16	15	11	14	9	9	7	5
	Quintile 4	18	32	24	23	21	17	16	13	9
	Quintile 5	32	58	48	37	35	32	27	21	15

quintile two up to AIME quintile five, average DB benefits for those in the lowest AIME quintile are nearly that of those in the highest AIME quintile. This counterintuitive result might be caused, in part, by workers who are not covered by Social Security. These noncovered workers will have an AIME of zero, but will actually have nonzero lifetime earnings, and since they are most likely to be government workers, they will have generous DB benefits. This could be artificially increasing the mean benefits of those in AIME quintile one. Average DB benefits among those receiving benefits decrease by birth cohort, for both women and men, within AIME quintiles and overall (Table 3-18).

Average DB benefits are lower among more recent cohorts, which likely reflects the method of projecting earnings. Earnings are projected based on a single-equation approach (using earnings of persons reporting both positive earnings as well as those with zero earnings in given years) rather than a two-equation approach (the first equation estimates whether individuals have positive covered earnings; the second estimates the level of earnings for those with earnings). As a result of using the single-equation approach, earnings in later years will be understated for many individuals who continue to work and will be overstated for those who stop working.

Since DB benefits rely on the earnings projections to estimate final salary (defined in the DB pension model as the highest five consecutive years of earnings out of the last 10 years of earnings), any over- or understatements in earnings will affect DB benefit levels. For older workers who continue working, the final salary used in the DB benefit estimation may be too low, and therefore their benefits may be understated. Any understatement of benefits will be concentrated among the more recent cohorts because the potential for understating earnings among older workers increases for more recent cohorts.

For those who left the labor force prior to reaching age 62 or 67, the single-equation approach can result in several years of low, rather than zero, earnings at the end of a worker's career. Although this method may overstate earnings later in life, the final salary may actually be understated because it will reflect the artificially low earnings rather than the actual earnings that preceded labor force departure. Since the single-equation method may overstate the number of years of service, however, it is unclear whether the DB benefits will be over- or understated for those who leave the labor force prior to age 62 or 67.

3. DC Balances and Potential Annuitized Benefits

Average DC balances under the retirement age 62 scenario are 5.67 times the national average wage (Table 3-11, middle panel). There is a 30 percent increase in DC balances from the age 62 scenario to the age 67 scenario, when balances are 7.39 times the national average salary. This is due in part to additional contributions between age 62 and 67. However, it is probably primarily due to our investment assumptions. The combination of a 50 percent stock/50 percent bond allocation of initial account balances and future contributions along with the higher rates of

Table 3-18
DB Benefit

DB Benefit at 62 (as a Proportion of National Average Wages), by Birth Cohort and AIME Quintile
Age 62 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	0.28	0.47	0.42	0.36	0.29	0.27	0.23	0.20	0.17
	AIME Quintile									
	Quintile 1	0.39	0.52	0.50	0.55	0.50	0.42	0.35	0.19	0.09
	Quintile 2	0.15	0.32	0.30	0.21	0.16	0.14	0.09	0.08	0.07
	Quintile 3	0.17	0.36	0.29	0.21	0.16	0.14	0.12	0.12	0.12
	Quintile 4	0.25	0.43	0.37	0.29	0.22	0.21	0.19	0.19	0.19
	Quintile 5	0.41	0.72	0.56	0.48	0.40	0.36	0.34	0.34	0.33
Female	ALL	0.22	0.32	0.28	0.25	0.22	0.22	0.21	0.18	0.16
	AIME Quintile									
	Quintile 1	0.26	0.36	0.33	0.35	0.32	0.28	0.26	0.14	0.08
	Quintile 2	0.11	0.19	0.18	0.13	0.10	0.11	0.09	0.08	0.07
	Quintile 3	0.16	0.29	0.22	0.17	0.15	0.14	0.13	0.13	0.13
	Quintile 4	0.24	0.48	0.41	0.29	0.23	0.21	0.21	0.20	0.20
	Quintile 5	0.40	0.97	0.56	0.55	0.41	0.39	0.39	0.36	0.34
Male	ALL	0.34	0.58	0.52	0.44	0.36	0.31	0.25	0.22	0.19
	AIME Quintile									
	Quintile 1	0.64	0.84	0.84	0.91	0.87	0.63	0.53	0.32	0.11
	Quintile 2	0.26	0.70	0.64	0.46	0.34	0.24	0.08	0.09	0.06
	Quintile 3	0.19	0.47	0.42	0.29	0.18	0.15	0.10	0.10	0.10
	Quintile 4	0.25	0.42	0.35	0.30	0.21	0.20	0.16	0.17	0.18
	Quintile 5	0.41	0.71	0.56	0.47	0.39	0.34	0.33	0.33	0.32

DB Benefit at 67 (as a Proportion of National Average Wages), by Birth Cohort and AIME Quintile
Age 67 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	0.26	0.42	0.38	0.34	0.28	0.25	0.21	0.18	0.16
	AIME Quintile									
	Quintile 1	0.38	0.47	0.48	0.57	0.50	0.43	0.36	0.19	0.09
	Quintile 2	0.14	0.29	0.29	0.20	0.15	0.15	0.09	0.08	0.06
	Quintile 3	0.15	0.31	0.26	0.21	0.16	0.14	0.11	0.11	0.11
	Quintile 4	0.22	0.35	0.34	0.27	0.21	0.19	0.17	0.17	0.17
	Quintile 5	0.37	0.62	0.49	0.43	0.36	0.32	0.31	0.31	0.31
Female	ALL	0.20	0.29	0.27	0.25	0.21	0.21	0.20	0.17	0.15
	AIME Quintile									
	Quintile 1	0.26	0.34	0.34	0.36	0.32	0.28	0.26	0.14	0.08
	Quintile 2	0.11	0.18	0.18	0.13	0.10	0.12	0.09	0.08	0.07
	Quintile 3	0.15	0.24	0.20	0.17	0.14	0.13	0.12	0.12	0.12
	Quintile 4	0.22	0.39	0.35	0.25	0.22	0.19	0.20	0.19	0.19
	Quintile 5	0.37	0.78	0.57	0.46	0.36	0.35	0.36	0.34	0.33
Male	ALL	0.31	0.51	0.47	0.43	0.34	0.29	0.23	0.20	0.16
	AIME Quintile									
	Quintile 1	0.65	0.74	0.83	1.00	0.91	0.70	0.57	0.34	0.11
	Quintile 2	0.24	0.65	0.62	0.46	0.35	0.26	0.08	0.08	0.06
	Quintile 3	0.17	0.43	0.40	0.30	0.19	0.16	0.10	0.08	0.09
	Quintile 4	0.22	0.34	0.33	0.29	0.20	0.19	0.14	0.15	0.15
	Quintile 5	0.37	0.61	0.48	0.43	0.36	0.30	0.29	0.29	0.29

return for stocks means that by the time people reach retirement age, a majority of their account balances are invested in stocks. This, in turn, means that a greater proportion of their accounts receive the higher stock rates of return. In future revisions to this module, it may be preferable to assume periodic portfolio re-balancing.

Regardless of the retirement age scenario, DC balances are higher for men, single persons, more educated persons, whites and Asians, and non-Hispanics. DC balances are somewhat higher for AIME quintile one then for quintile two, and then increase steadily from quintile two through quintile five. DC balances are also higher among younger birth cohorts, primarily because of the stock/bond allocation assumptions mentioned above. More recent cohorts have had more time to accumulate their balances, and therefore, have an even higher proportion of their portfolios invested in stocks (with their higher rate of return) by retirement age than do older cohorts. Thus, in the aggregate, while projected DB benefits among more recent cohorts may be biased downward, there could be an offsetting upward bias in projected DC balances.

We calculated potential annuitized DC benefits per dollar of DC balances using two mortality assumptions. The first assumes a unisex mortality under the 1989-1991 Decennial Life Tables, as published by the NCHS. The second set uses mortality assumptions developed by RAND and based on PSID data corrected for differences between the PSID and Vital Statistics. These mortality rates vary by gender, birth year, race, and education. We refer to these as the group-specific mortality assumptions.

Under the age 62 scenario, average annuitized DC benefits are 0.44 and 0.40 times the national average salary using the unisex and group-specific mortality assumptions, respectively. The benefits under the group-specific mortality assumptions are lower than those under the unisex mortality assumptions because under the group-specific mortality assumptions, mortality is expected to improve over time. The unisex mortality assumptions do not include a cohort effect, resulting in higher mortality rates, and therefore, higher benefits because they are expected to be paid over a shorter period of time.

The use of group-specific annuity rates exacerbates the differences in mean DC benefits by gender. Women's longer life expectancies translate into lower annual benefits. Although use of the group-specific annuity rates appears to narrow the differences in mean DC benefits by education and race, these results might also reflect correlations between education, race, and gender.

Annuitized benefits under the age 67 scenario are greater than those under the age 62 scenario for two reasons. First, the account balances are greater. Second, the shorter life expectancy at age 67 results in higher benefits.

In general, DC balances and annuitized benefits increase for younger birth cohorts for both women and men, both overall and within AIME cohorts (Tables 3-19 through 3-21). As mentioned above, more recent cohorts have more time to accumulate their balances, and therefore, have an even higher proportion of their portfolios invested in stocks (with their higher rate of return) by retirement age than do older cohorts.

4. IRA Balances and Potential Annuitized Benefits

Average IRA balances are only one-quarter of those for DC plans. Average IRA balances are 1.41 and 2.10 times the national average wage under the age 62 and age 67 scenarios, respectively. Similar to the DC balances, there is a large increase from the age 62 scenario to the age 67 scenario, likely due primarily to our investment assumptions.

Potential average IRA annuitized benefits under the age 62 scenario are 0.11 and 0.10 times the national average wage, under the unisex and individual mortality assumptions, respectively. Benefits under the age 67 scenario are almost two-thirds greater, reflecting larger account balances and shorter life expectancies.

IRA balances and annuitized benefits increase for younger birth cohorts for both women and men, both overall and within AIME cohorts (Tables 3-22 through 3-24). This reflects the longer period of time that more recent cohorts can contribute toward their IRA plans.

VI. SUMMARY OF IMPROVEMENTS OVER PREVIOUS MODEL

Much of the pension benefit model builds off of the previous pension model developed as part of the SIPP/DPE model. We enumerate the major improvements to the model below.

1. Replacement Rates by Occupation. The previous pension model varied replacement rates by years of service in the plan, final salary, age at retirement, and sector of employment, but not by occupation. We refined the replacement rates used so that they also account for differences by occupation. For instance, blue collar workers are likely to have flat dollar pension benefits that do not vary by final earnings. Therefore, their replacement rates decrease as final earnings increase. In contrast, white collar workers are more likely to have replacement rates that either do not vary or increase with final earnings.

2. Earnings. Earnings used to calculate DB benefits and those used to calculate DC, Keogh, and IRA contributions reflect the new earnings projections.

Table 3-19
DC Balance

DC Balance at 62 (as a Proportion of National Average Wages), by Birth Cohort and AIME Quintile
Age 62 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	5.67	1.65	2.30	3.26	4.45	5.60	6.18	7.54	7.03
	AIME Quintile									
	Quintile 1	4.16	1.54	2.56	3.79	5.23	4.29	5.26	4.74	2.38
	Quintile 2	2.78	1.01	1.38	1.64	2.55	4.51	2.91	3.08	3.01
	Quintile 3	3.03	1.59	1.88	2.23	2.75	2.69	3.03	3.62	3.69
	Quintile 4	4.80	1.72	1.87	3.23	3.26	4.03	4.89	6.59	6.12
	Quintile 5	8.70	2.04	3.09	4.22	6.18	8.37	9.45	11.73	12.08
Female	ALL	4.98	1.90	2.14	2.81	4.03	4.45	5.32	6.77	6.06
	AIME Quintile									
	Quintile 1	3.79	2.18	2.67	3.15	5.23	4.02	3.74	4.79	2.29
	Quintile 2	2.65	0.83	1.35	1.57	2.78	3.57	3.00	3.11	2.91
	Quintile 3	3.08	1.90	2.16	2.31	3.05	2.69	3.13	3.56	3.77
	Quintile 4	5.28	2.86	2.35	4.24	3.76	4.42	5.15	7.33	5.93
	Quintile 5	9.77	6.03	3.60	3.99	6.72	7.63	9.74	12.16	11.79
Male	ALL	6.28	1.49	2.41	3.61	4.79	6.65	6.97	8.25	8.00
	AIME Quintile									
	Quintile 1	4.75	0.22	2.22	4.68	5.23	4.70	7.30	4.66	2.54
	Quintile 2	3.19	1.48	1.47	1.99	1.77	8.69	2.58	3.02	3.20
	Quintile 3	2.93	0.92	1.10	1.94	2.07	2.70	2.84	3.74	3.58
	Quintile 4	4.36	1.27	1.60	2.49	2.73	3.62	4.64	5.87	6.32
	Quintile 5	8.35	1.91	3.05	4.25	6.07	8.61	9.32	11.54	12.24

DC Balance at 67 (as a Proportion of National Average Wages), by Birth Cohort and AIME Quintile
Age 67 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	7.39	2.54	3.87	4.71	6.13	7.25	7.91	9.49	9.01
	AIME Quintile									
	Quintile 1	6.08	5.7	4.51	6.11	7.18	6.09	6.93	7.09	2.99
	Quintile 2	3.72	1	2.46	1.94	5.06	4.67	4.02	4.35	3.37
	Quintile 3	4.23	1.64	4.1	2.88	3.79	4.39	4.06	4.96	4.7
	Quintile 4	6.32	2.45	2.92	4.49	4.84	5.71	6.56	7.82	8.07
	Quintile 5	11.08	2.55	4.66	6.24	7.91	10.31	11.79	14.85	16.1
Female	ALL	6.74	3.34	4.1	4.23	5.67	6.26	6.92	8.72	8.04
	AIME Quintile									
	Quintile 1	5.86	7.74	4.59	5.35	6.77	6.16	5.18	7.55	3.18
	Quintile 2	3.76	0.69	2.56	1.74	5.76	4.44	4.27	4.7	2.93
	Quintile 3	4.39	1.74	4.96	3.02	4.14	4.46	3.87	5.35	4.89
	Quintile 4	6.88	4.21	3.73	5.96	5.14	6.72	7.29	7.84	7.95
	Quintile 5	12.36	4.24	5.22	7.43	7.96	9.13	11.69	15.85	16.41
Male	ALL	8.02	1.92	3.66	5.12	6.54	8.23	8.89	10.24	10.07
	AIME Quintile									
	Quintile 1	6.49	0.47	4.15	7.34	7.91	5.99	9.35	6.29	2.69
	Quintile 2	3.59	1.97	2.03	3.05	2.66	5.83	2.81	3.64	4.37
	Quintile 3	3.9	1.28	1.8	2.36	3.01	4.2	4.45	4.17	4.41
	Quintile 4	5.76	1.5	2.25	3.4	4.47	4.55	5.81	7.8	8.2
	Quintile 5	10.59	2.44	4.59	6.03	7.9	10.74	11.84	14.36	15.92

Table 3-20
DC Benefit, Unisex

DC Benefit at 62 (as a Proportion of National Average Wages), Unisex Mortality, by Birth Cohort and AIME Quintile
Age 62 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	0.44	0.13	0.18	0.25	0.35	0.44	0.48	0.59	0.56
	AIME Quintile									
	Quintile 1	0.33	0.12	0.20	0.29	0.41	0.34	0.42	0.37	0.19
	Quintile 2	0.22	0.08	0.11	0.13	0.20	0.35	0.23	0.24	0.24
	Quintile 3	0.24	0.13	0.15	0.17	0.22	0.21	0.24	0.29	0.29
	Quintile 4	0.38	0.13	0.14	0.25	0.26	0.31	0.38	0.52	0.48
	Quintile 5	0.68	0.15	0.24	0.32	0.48	0.65	0.74	0.92	0.95
Female	ALL	0.39	0.15	0.17	0.22	0.32	0.35	0.42	0.53	0.48
	AIME Quintile									
	Quintile 1	0.30	0.17	0.21	0.25	0.41	0.32	0.29	0.38	0.18
	Quintile 2	0.21	0.07	0.11	0.12	0.22	0.28	0.24	0.25	0.23
	Quintile 3	0.24	0.15	0.17	0.18	0.24	0.21	0.25	0.28	0.30
	Quintile 4	0.42	0.22	0.19	0.33	0.30	0.35	0.41	0.58	0.47
	Quintile 5	0.77	0.47	0.29	0.31	0.53	0.60	0.77	0.96	0.94
Male	ALL	0.49	0.11	0.18	0.27	0.37	0.51	0.54	0.64	0.63
	AIME Quintile									
	Quintile 1	0.37	0.02	0.17	0.36	0.40	0.36	0.58	0.36	0.20
	Quintile 2	0.25	0.11	0.12	0.15	0.14	0.67	0.20	0.23	0.25
	Quintile 3	0.23	0.07	0.08	0.15	0.16	0.21	0.22	0.29	0.28
	Quintile 4	0.34	0.10	0.12	0.19	0.21	0.28	0.36	0.46	0.50
	Quintile 5	0.65	0.14	0.23	0.32	0.46	0.66	0.72	0.90	0.96

DC Benefit at 62 (as a Proportion of National Average Wages), Unisex Mortality, by Birth Cohort and AIME Quintile
Age 67 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	0.65	0.22	0.34	0.41	0.53	0.63	0.69	0.83	0.80
	AIME Quintile									
	Quintile 1	0.53	0.50	0.40	0.53	0.62	0.53	0.61	0.62	0.27
	Quintile 2	0.33	0.09	0.21	0.17	0.44	0.41	0.35	0.38	0.30
	Quintile 3	0.37	0.15	0.37	0.25	0.33	0.39	0.36	0.44	0.42
	Quintile 4	0.56	0.21	0.26	0.39	0.43	0.50	0.58	0.69	0.72
	Quintile 5	0.97	0.22	0.40	0.53	0.68	0.89	1.03	1.30	1.43
Female	ALL	0.60	0.29	0.37	0.37	0.50	0.56	0.62	0.77	0.71
	AIME Quintile									
	Quintile 1	0.52	0.68	0.41	0.47	0.59	0.55	0.46	0.67	0.28
	Quintile 2	0.33	0.06	0.23	0.16	0.50	0.39	0.38	0.42	0.26
	Quintile 3	0.39	0.16	0.45	0.27	0.37	0.39	0.34	0.47	0.43
	Quintile 4	0.61	0.37	0.33	0.52	0.46	0.60	0.65	0.70	0.71
	Quintile 5	1.10	0.37	0.48	0.65	0.71	0.81	1.04	1.41	1.46
Male	ALL	0.70	0.16	0.31	0.43	0.56	0.71	0.77	0.89	0.89
	AIME Quintile									
	Quintile 1	0.56	0.04	0.34	0.63	0.67	0.51	0.83	0.54	0.24
	Quintile 2	0.31	0.17	0.17	0.26	0.23	0.49	0.24	0.31	0.39
	Quintile 3	0.34	0.11	0.15	0.20	0.26	0.36	0.38	0.36	0.39
	Quintile 4	0.50	0.13	0.19	0.29	0.38	0.39	0.50	0.68	0.72
	Quintile 5	0.92	0.21	0.39	0.51	0.67	0.92	1.03	1.25	1.41

Table 3-21
DC Benefit, Individual

DC Benefit at 62 (as a Proportion of National Average Wages), Individual Mortality, by Birth Cohort and AIME Quintile
Age 62 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	0.40	0.12	0.17	0.23	0.32	0.40	0.44	0.53	0.50
	AIME Quintile									
	Quintile 1	0.29	0.11	0.18	0.27	0.36	0.30	0.37	0.33	0.17
	Quintile 2	0.20	0.07	0.10	0.12	0.18	0.32	0.20	0.22	0.21
	Quintile 3	0.22	0.12	0.14	0.16	0.20	0.19	0.22	0.26	0.26
	Quintile 4	0.34	0.12	0.14	0.23	0.23	0.29	0.35	0.47	0.44
	Quintile 5	0.62	0.15	0.22	0.30	0.44	0.60	0.67	0.83	0.86
Female	ALL	0.34	0.13	0.15	0.20	0.28	0.31	0.37	0.46	0.41
	AIME Quintile									
	Quintile 1	0.26	0.15	0.19	0.22	0.35	0.28	0.25	0.33	0.16
	Quintile 2	0.18	0.06	0.10	0.11	0.19	0.25	0.21	0.21	0.19
	Quintile 3	0.22	0.14	0.16	0.16	0.21	0.19	0.22	0.25	0.26
	Quintile 4	0.37	0.20	0.17	0.30	0.27	0.31	0.36	0.50	0.41
	Quintile 5	0.67	0.40	0.26	0.28	0.48	0.52	0.67	0.83	0.80
Male	ALL	0.45	0.11	0.18	0.26	0.35	0.48	0.51	0.60	0.58
	AIME Quintile									
	Quintile 1	0.35	0.02	0.16	0.34	0.38	0.34	0.53	0.34	0.19
	Quintile 2	0.24	0.11	0.11	0.15	0.13	0.66	0.19	0.22	0.23
	Quintile 3	0.22	0.07	0.08	0.15	0.16	0.20	0.21	0.28	0.26
	Quintile 4	0.32	0.10	0.12	0.19	0.20	0.26	0.34	0.43	0.46
	Quintile 5	0.60	0.14	0.22	0.31	0.44	0.62	0.67	0.83	0.89

DC Benefit at 67 (as a Proportion of National Average Wages), Individual Mortality, by Birth Cohort and AIME Quintile
Age 67 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	0.57	0.20	0.30	0.37	0.47	0.56	0.61	0.73	0.69
	AIME Quintile									
	Quintile 1	0.46	0.41	0.35	0.47	0.54	0.47	0.53	0.54	0.23
	Quintile 2	0.28	0.08	0.19	0.16	0.37	0.35	0.30	0.33	0.25
	Quintile 3	0.33	0.13	0.33	0.22	0.29	0.34	0.32	0.38	0.36
	Quintile 4	0.49	0.19	0.23	0.35	0.38	0.44	0.51	0.60	0.62
	Quintile 5	0.85	0.20	0.37	0.49	0.62	0.80	0.91	1.14	1.23
Female	ALL	0.50	0.25	0.32	0.32	0.43	0.47	0.52	0.64	0.59
	AIME Quintile									
	Quintile 1	0.43	0.56	0.35	0.41	0.49	0.46	0.38	0.55	0.23
	Quintile 2	0.28	0.05	0.20	0.14	0.42	0.33	0.31	0.34	0.21
	Quintile 3	0.33	0.14	0.39	0.23	0.31	0.34	0.29	0.40	0.36
	Quintile 4	0.52	0.32	0.29	0.44	0.40	0.50	0.55	0.58	0.59
	Quintile 5	0.91	0.31	0.41	0.56	0.60	0.68	0.87	1.16	1.17
Male	ALL	0.63	0.15	0.29	0.41	0.52	0.65	0.70	0.81	0.80
	AIME Quintile									
	Quintile 1	0.51	0.04	0.31	0.57	0.62	0.47	0.73	0.50	0.23
	Quintile 2	0.29	0.16	0.17	0.24	0.22	0.47	0.23	0.29	0.35
	Quintile 3	0.32	0.11	0.15	0.19	0.25	0.34	0.36	0.34	0.35
	Quintile 4	0.46	0.13	0.19	0.28	0.36	0.37	0.47	0.63	0.66
	Quintile 5	0.83	0.19	0.36	0.48	0.62	0.84	0.93	1.13	1.26

Table 3-22
IRA Balance

IRA Balance at 62 (as a Proportion of National Average Wages), by Birth Cohort and AIME Quintile
Age 62 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	1.41	0.01	0.12	0.52	1.01	1.62	2.34	3.11	3.61
	AIME Quintile									
	Quintile 1	0.88	0.03	0.12	0.46	0.95	1.48	2.08	2.91	3.48
	Quintile 2	1.44	-	0.10	0.49	1.06	1.69	2.34	4.53	3.28
	Quintile 3	1.49	-	0.13	0.56	1.04	1.63	2.58	2.67	3.83
	Quintile 4	1.49	-	0.12	0.56	1.05	1.59	2.47	3.06	3.43
	Quintile 5	1.51	-	0.13	0.52	0.98	1.65	2.24	2.88	3.73
Female	ALL	1.47	0.02	0.12	0.54	1.04	1.70	2.51	3.10	3.51
	AIME Quintile									
	Quintile 1	0.90	0.04	0.13	0.46	0.96	1.56	2.24	3.18	3.78
	Quintile 2	1.25	-	0.10	0.50	1.02	1.67	2.43	3.03	3.59
	Quintile 3	1.47	-	0.13	0.59	1.09	1.61	2.76	2.93	3.57
	Quintile 4	1.82	0.01	0.11	0.64	1.13	1.73	2.77	3.42	3.24
	Quintile 5	2.17	-	0.16	0.56	1.01	1.90	2.24	2.98	3.58
Male	ALL	1.35	-	0.12	0.50	0.98	1.54	2.17	3.13	3.72
	AIME Quintile									
	Quintile 1	0.82	-	0.06	0.46	0.90	1.25	1.66	1.94	2.38
	Quintile 2	2.37	-	0.10	0.41	1.26	1.80	1.79	8.50	2.41
	Quintile 3	1.54	-	0.11	0.46	0.89	1.67	2.18	2.22	4.26
	Quintile 4	1.24	-	0.13	0.50	0.98	1.44	2.18	2.70	3.61
	Quintile 5	1.34	-	0.12	0.52	0.98	1.57	2.24	2.82	3.82

IRA Balance at 67 (as a Proportion of National Average Wages), by Birth Cohort and AIME Quintile
Age 67 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	2.05	0.16	0.54	1.05	1.62	2.35	3.25	4.12	4.53
	AIME Quintile									
	Quintile 1	1.45	0.29	0.55	0.97	1.47	2.16	2.79	4.26	4.13
	Quintile 2	2.02	0.11	0.52	0.96	1.70	2.37	3.79	4.26	4.39
	Quintile 3	2.22	0.13	0.64	1.11	1.78	2.51	3.54	3.80	4.67
	Quintile 4	2.22	0.13	0.53	1.11	1.63	2.50	3.52	4.09	4.66
	Quintile 5	2.12	0.13	0.52	1.07	1.56	2.26	2.92	4.20	4.45
Female	ALL	2.25	0.21	0.58	1.11	1.73	2.54	3.62	4.51	4.65
	AIME Quintile									
	Quintile 1	1.47	0.33	0.58	0.98	1.47	2.34	3.03	4.57	4.13
	Quintile 2	2.01	0.10	0.54	0.98	1.67	2.41	3.92	4.20	4.74
	Quintile 3	2.28	0.14	0.67	1.19	1.91	2.71	3.79	4.08	4.89
	Quintile 4	2.70	0.19	0.55	1.32	1.88	2.74	4.04	4.79	4.83
	Quintile 5	3.05	0.16	0.62	1.22	1.71	2.46	3.16	4.80	4.35
Male	ALL	1.84	0.12	0.50	0.98	1.50	2.13	2.85	3.68	4.39
	AIME Quintile									
	Quintile 1	1.35	0.08	0.40	0.92	1.45	1.68	2.21	3.23	4.10
	Quintile 2	2.07	0.16	0.44	0.75	1.91	2.14	2.91	4.44	3.23
	Quintile 3	2.07	0.11	0.51	0.83	1.43	1.94	2.99	3.27	4.30
	Quintile 4	1.81	0.11	0.52	0.93	1.40	2.20	3.00	3.40	4.49
	Quintile 5	1.84	0.13	0.51	1.04	1.52	2.18	2.81	3.85	4.52

Table 3-23
IRA Benefit, Unisex

IRA Balance at 62 (as a Proportion of National Average Wages), by Birth Cohort and AIME Quintile
Age 62 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	1.41	0.01	0.12	0.52	1.01	1.62	2.34	3.11	3.61
	AIME Quintile									
	Quintile 1	0.88	0.03	0.12	0.46	0.95	1.48	2.08	2.91	3.48
	Quintile 2	1.44	-	0.10	0.49	1.06	1.69	2.34	4.53	3.28
	Quintile 3	1.49	-	0.13	0.56	1.04	1.63	2.58	2.67	3.83
	Quintile 4	1.49	-	0.12	0.56	1.05	1.59	2.47	3.06	3.43
	Quintile 5	1.51	-	0.13	0.52	0.98	1.65	2.24	2.88	3.73
Female	ALL	1.47	0.02	0.12	0.54	1.04	1.70	2.51	3.10	3.51
	AIME Quintile									
	Quintile 1	0.90	0.04	0.13	0.46	0.96	1.56	2.24	3.18	3.78
	Quintile 2	1.25	-	0.10	0.50	1.02	1.67	2.43	3.03	3.59
	Quintile 3	1.47	-	0.13	0.59	1.09	1.61	2.76	2.93	3.57
	Quintile 4	1.82	0.01	0.11	0.64	1.13	1.73	2.77	3.42	3.24
	Quintile 5	2.17	-	0.16	0.56	1.01	1.90	2.24	2.98	3.58
Male	ALL	1.35	-	0.12	0.50	0.98	1.54	2.17	3.13	3.72
	AIME Quintile									
	Quintile 1	0.82	-	0.06	0.46	0.90	1.25	1.66	1.94	2.38
	Quintile 2	2.37	-	0.10	0.41	1.26	1.80	1.79	8.50	2.41
	Quintile 3	1.54	-	0.11	0.46	0.89	1.67	2.18	2.22	4.26
	Quintile 4	1.24	-	0.13	0.50	0.98	1.44	2.18	2.70	3.61
	Quintile 5	1.34	-	0.12	0.52	0.98	1.57	2.24	2.82	3.82

IRA Balance at 67 (as a Proportion of National Average Wages), by Birth Cohort and AIME Quintile
Age 67 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	2.05	0.16	0.54	1.05	1.62	2.35	3.25	4.12	4.53
	AIME Quintile									
	Quintile 1	1.45	0.29	0.55	0.97	1.47	2.16	2.79	4.26	4.13
	Quintile 2	2.02	0.11	0.52	0.96	1.70	2.37	3.79	4.26	4.39
	Quintile 3	2.22	0.13	0.64	1.11	1.78	2.51	3.54	3.80	4.67
	Quintile 4	2.22	0.13	0.53	1.11	1.63	2.50	3.52	4.09	4.66
	Quintile 5	2.12	0.13	0.52	1.07	1.56	2.26	2.92	4.20	4.45
Female	ALL	2.25	0.21	0.58	1.11	1.73	2.54	3.62	4.51	4.65
	AIME Quintile									
	Quintile 1	1.47	0.33	0.58	0.98	1.47	2.34	3.03	4.57	4.13
	Quintile 2	2.01	0.10	0.54	0.98	1.67	2.41	3.92	4.20	4.74
	Quintile 3	2.28	0.14	0.67	1.19	1.91	2.71	3.79	4.08	4.89
	Quintile 4	2.70	0.19	0.55	1.32	1.88	2.74	4.04	4.79	4.83
	Quintile 5	3.05	0.16	0.62	1.22	1.71	2.46	3.16	4.80	4.35
Male	ALL	1.84	0.12	0.50	0.98	1.50	2.13	2.85	3.68	4.39
	AIME Quintile									
	Quintile 1	1.35	0.08	0.40	0.92	1.45	1.68	2.21	3.23	4.10
	Quintile 2	2.07	0.16	0.44	0.75	1.91	2.14	2.91	4.44	3.23
	Quintile 3	2.07	0.11	0.51	0.83	1.43	1.94	2.99	3.27	4.30
	Quintile 4	1.81	0.11	0.52	0.93	1.40	2.20	3.00	3.40	4.49
	Quintile 5	1.84	0.13	0.51	1.04	1.52	2.18	2.81	3.85	4.52

Table 3-24
IRA Benefit, Individual

IRA Benefit at 62 (as a Proportion of National Average Wages), Individual Mortality, by Birth Cohort and AIME Quintile
Age 62 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	0.10	-	0.01	0.04	0.07	0.11	0.17	0.22	0.25
	AIME Quintile									
	Quintile 1	0.06	-	0.01	0.03	0.07	0.10	0.15	0.20	0.24
	Quintile 2	0.10	-	0.01	0.04	0.08	0.12	0.16	0.31	0.23
	Quintile 3	0.11	-	0.01	0.04	0.07	0.12	0.18	0.19	0.27
	Quintile 4	0.11	-	0.01	0.04	0.07	0.11	0.18	0.21	0.24
	Quintile 5	0.11	-	0.01	0.04	0.07	0.12	0.16	0.20	0.26
Female	ALL	0.10	-	0.01	0.04	0.07	0.12	0.17	0.21	0.24
	AIME Quintile									
	Quintile 1	0.06	-	0.01	0.03	0.07	0.11	0.16	0.22	0.26
	Quintile 2	0.09	-	0.01	0.04	0.07	0.12	0.17	0.21	0.25
	Quintile 3	0.10	-	0.01	0.04	0.08	0.11	0.19	0.20	0.24
	Quintile 4	0.13	-	0.01	0.05	0.08	0.12	0.19	0.23	0.22
	Quintile 5	0.15	-	0.01	0.04	0.07	0.13	0.15	0.20	0.24
Male	ALL	0.10	-	0.01	0.04	0.07	0.11	0.16	0.22	0.27
	AIME Quintile									
	Quintile 1	0.06	-	-	0.03	0.06	0.09	0.12	0.14	0.17
	Quintile 2	0.17	-	0.01	0.03	0.09	0.13	0.13	0.59	0.17
	Quintile 3	0.11	-	0.01	0.03	0.07	0.12	0.16	0.16	0.31
	Quintile 4	0.09	-	0.01	0.04	0.07	0.10	0.16	0.20	0.26
	Quintile 5	0.10	-	0.01	0.04	0.07	0.11	0.16	0.20	0.28

IRA Benefit at 67 (as a Proportion of National Average Wages), Individual Mortality, by Birth Cohort and AIME Quintile
Age 67 Scenario

			Birth Cohort							
		ALL	<1931	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1961+
ALL	ALL	0.16	0.01	0.04	0.08	0.12	0.18	0.25	0.31	0.34
	AIME Quintile									
	Quintile 1	0.11	0.02	0.04	0.08	0.11	0.16	0.21	0.32	0.32
	Quintile 2	0.15	0.01	0.04	0.07	0.13	0.18	0.28	0.32	0.33
	Quintile 3	0.17	0.01	0.05	0.09	0.14	0.19	0.27	0.29	0.35
	Quintile 4	0.17	0.01	0.04	0.09	0.13	0.19	0.27	0.31	0.36
	Quintile 5	0.16	0.01	0.04	0.08	0.12	0.17	0.22	0.32	0.34
Female	ALL	0.17	0.02	0.05	0.09	0.13	0.19	0.27	0.33	0.34
	AIME Quintile									
	Quintile 1	0.11	0.02	0.05	0.08	0.11	0.18	0.23	0.34	0.31
	Quintile 2	0.15	0.01	0.04	0.08	0.13	0.18	0.29	0.31	0.35
	Quintile 3	0.17	0.01	0.05	0.09	0.14	0.20	0.28	0.30	0.36
	Quintile 4	0.20	0.01	0.04	0.10	0.14	0.20	0.30	0.35	0.36
	Quintile 5	0.22	0.01	0.05	0.09	0.13	0.18	0.23	0.35	0.31
Male	ALL	0.15	0.01	0.04	0.08	0.12	0.17	0.22	0.29	0.35
	AIME Quintile									
	Quintile 1	0.11	0.01	0.03	0.07	0.11	0.13	0.17	0.27	0.34
	Quintile 2	0.16	0.01	0.03	0.06	0.15	0.17	0.23	0.35	0.25
	Quintile 3	0.17	0.01	0.04	0.07	0.12	0.16	0.24	0.26	0.34
	Quintile 4	0.14	0.01	0.04	0.08	0.11	0.17	0.24	0.27	0.36
	Quintile 5	0.14	0.01	0.04	0.08	0.12	0.17	0.22	0.30	0.36

3. Accounting for Retirement Prior to Age 62 (67). The previous pension model assumed that all workers continue on their current job until age 62. However, some people stop working prior to attaining age 62. Therefore, we use output from the earnings projections module to take into account retirement prior to age 62 (67). Rather than assuming that workers continue to work up to age 62 (67), we assume that workers work up to the time their earnings drop to zero (or until ages 62 (67), whichever comes first). Note however, that even for workers who stop working prior to age 62 (67), we assume that they do not start collecting their pension benefits until age 62 (67).

4. Incorporating Cost-of-living Adjustments (COLAs). The prior model did not include any provisions for cost-of-living adjustments (COLAs). We incorporated COLAs for two reasons. First, in the pension projection module, we need to project the pension income at ages 62 and 67 for persons already collecting pension income at the time of the SIPP interview. These projections need to account for any cost-of-living adjustments granted between the time of the interview and ages 62 and 67. Second, when projecting income to the year 2020 in Chapter 7, DB pension income estimates need to account for any cost-of-living adjustments.

5. Accounting for Job Changes. The prior model assumed that workers will continue at their current job until retirement. However, few workers remain on the same job throughout their career. Workers with defined benefit coverage who change jobs receive lower pension benefits than those who do not change jobs. This results in part because the salaries used in benefit computations are not indexed. Therefore, we adjust benefits to take into account future job changes among workers with DB coverage. This involves two steps. First we determine who changes a job and if so how often. Second, we determine how benefits are reduced for those who change jobs.

6. Inclusion of Widow(er) Benefits. The previous pension model ignored any pre-retirement survivor benefits. This understates the income for widow(er)s whose spouses died prior to receiving their pension income. We revised the model to include pre-retirement DB survivor benefits. We also transfer the account balances of workers who die prior to age 62 (67) to their surviving spouses. The account balances continue to accrue interest until the surviving spouse attains age 62 (67), but no additional contributions are made. When the surviving spouse attains age 62 (67), the account balance is annuitized. If the surviving spouse is already age 62 (67) or older, we annuitize the balance as of the date of the worker's death.

7. Inclusion of Benefits for Older Individuals in the Sample. The prior model accounted for neither the current receipt of pension income nor for pensions from previous jobs. Both of these omissions cause pension income to be understated in the prior SIPP/DPE model, particularly for older individuals in the SIPP file. We revised the pension module to include these pension benefits.

8. Refined Employer Match Rates. We updated the employer match assumptions. For 401(k) plans, the previous model assumed a 50 percent match rate for all employee contributions. For non-401(k) contributory DC plans, the previous model assumed a 50 percent match rate for employees who contribute less than 16 percent of pay and an employer contribution of 7 percent of pay for employees who contribute more than 16 percent of pay (the maximum combined contribution was set at 25 percent of pay). We refined these assumptions so that they more closely parallel the distribution of employer match rates.

9. Refined Rate of Return. The prior model set the rate of return stochastically with an assumed rate of 3.5 percent (a blend of stock and interest bearing rates of return) and a standard deviation equal to the assumed rate. The variation accounts for differences in investment allocation across those with DC plans. We have updated the model to include assumptions regarding investment allocation. We assume that 50 percent of account balances are invested in stocks and 50 percent are invested in bonds. We also assume that 50 percent of new contributions are allocated to stocks and 50 percent are allocated to bonds. Then we apply the stock rate of return to the stock allocations and the bond rate of return to the bond allocations. We continue to set these rates stochastically (i.e., we draw them from a normal distribution).

10. Refined Annuitization Assumptions. The prior model used insurance industry annuity rates to convert DC and IRA account balances at retirement into an annual flow of annuity income. We produce two estimates of annual annuitized benefits from account balances at retirement. The first uses unisex mortality assumptions based on the 1989-1991 Decennial Life Tables, as published by the NCHS. The second uses mortality assumptions, developed by RAND based on PSID data, that vary by gender, birth year, race, and education.

VII. POTENTIAL FUTURE IMPROVEMENTS TO THE MODEL

1. Explicitly Modeling Different Retirement Dates From DB Plans. The current model assumes that individuals do not begin collecting pension benefits until age 62 (67) regardless of whether they left the labor force prior to attaining this age. In future versions of the model, it may be preferable to relax this assumption,

which would require additional coordination with the assets projection module. This modification would complement a revision of the earnings model (described in Chapter 2) to include a more explicit projection of the retirement decision between ages 55 and 61.

2. Match Actual Plan Data to SIPP Pension Plan Participants. It may be preferable to use actual plan data rather than BLS replacement rates for workers with DB coverage. Possible data sources are the Health and Retirement Study (HRS) pension plan data and PBGC's PIMS model.

3. Incorporate Cash Balance Plans. The current model does not incorporate cash balance plans. It might be desirable to include cash balance plans as more data on these plans becomes available.

4. Incorporate a More Sophisticated Job Transition Subroutine. Rather than applying benefit reduction rates to account for benefits lost due to job transitions, it might be preferable to actually simulate a work history for each worker. The probability of changing jobs in any given year could reflect gender, age, tenure, industry, occupation, pension coverage, etc. This option, especially when combined with the option for matching actual pension plans to workers, could enhance the model's ability to estimate pension benefits for workers who change jobs.

5. Varying DC Contribution Rates and Asset Allocations Over Time. In future versions of the model, it might be desirable to allow for various contribution rates by age, gender, tenure, and/or income. It might also be desirable to allow for various allocation strategies by age, gender, tenure, and/or income, and to allow for portfolio rebalancing. Time and resource constraints made it impractical to incorporate such variations in this version of the model. The EBRI/ICF database on 401(k) plans is a potential source for informing these types of enhancement.

6. Lump Sum Distributions. In the event that a worker changes jobs or leaves the work force, the model assumes that all account balances are left to accumulate. In future versions of the model, it might be preferable to allow workers to take lump sum distributions. This would require coordination with the non-pension asset accumulation module described in Chapter 4.

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CHAPTER 3: ENDNOTES

1. Rather than applying benefit reduction rates to account for benefits lost due to job transitions, we considered simulating a work history for each worker, with the probability of changing jobs in any given year reflecting gender, age, tenure, industry, occupation, pension coverage, etc. Because of the time and resource constraints we chose the former option. The latter option might be worth considering for future versions of the model.

CHAPTER 4

PROJECTIONS OF NON-PENSION WEALTH AND INCOME

I. OVERVIEW

It is quite likely, given recent changes in private pension coverage and uncertainty over the course of future Social Security reform efforts, that personal saving will play an increasingly important role in the income security of future retirees. This chapter describes the methodology and results of our projections of non-pension assets at age 62 and 67 for individuals contained on the merged SIPP-SER data file.

We focus separately on housing and non-housing wealth, because it is likely that individuals perceive a clear distinction between both forms of savings. In addition, research (Hurd, 1990; Gustman and Juster, 1996) suggests retirees are less likely to spend down housing wealth, at least in the early stages of retirement. Calculation of the income flows associated with these asset stocks are described in Chapter 7 of this report.

The existing economic literature on why people save is theoretically sophisticated, with most research based on applications of the life-cycle hypothesis (LCH) (Modigliani and Brumberg, 1954). But empirical evidence on the LCH is mixed and no theory does a very good job of explaining data on wealth trajectories. While both demographic characteristics (race, education, marriage, divorce, and number of children) and income levels affect rates of wealth accumulation, the data reveal substantial heterogeneity in wealth at retirement among individuals with similar demographic characteristics and earnings histories. This makes the development of equations that provide reliable projections of future wealth accumulation a daunting task.

To project wealth of individuals for the MINT project, we developed an equation to explain non-pension wealth as a function of age, demographic characteristics of individuals, and economic and demographic variables (marital status, earnings history, and availability of a pension) projected in earlier stages of the project. This equation was then used to project wealth at ages 62 and 67 for individuals in the 1990-93 SIPP files. In keeping with the overall methodology of the MINT project, all of the wealth figures presented are relative to the average national wage in the particular year for which the projections were made and the results are shown on an individual (per person) basis. To derive individual wealth for married couples, each spouse was allocated one half of estimated total family wealth. Finally, the projection equations were calibrated to actual wealth data on the 1990-93 SIPP files, so that the difference between reported wealth of any individual on the SIPP file and predicted wealth of that individual at the corresponding age was treated as an individual-specific error term. This error term was then used to adjust the predictions of wealth at ages 62 and 67.

The outline of this chapter is as follows. The next section describes our overall approach and data sources used in the estimates and projections and then summarizes the methodology for estimation, calibration, and projection of wealth at ages 62 and 67. The following section presents our econometric estimates for wealth at ages 62 and 67. The final section presents the results of our projections of wealth at ages 62 and 67, based on the econometric estimates and calibration to data on the 1990-93 SIPP files, and discusses qualifications and potential improvements. Two appendicies present the results of alternative econometric specifications.

II. METHODOLOGY

1. Overall Approach and Data Sources

Selection of Overall Approach

We considered two overall approaches to projecting lifetime wealth accumulation patterns of future retirees. The first approach relied on the simulation of annual consumption decisions, deriving wealth at retirement as the cumulative outcome of annual saving (income minus consumption) and rates of return on assets. This approach was rejected on a number of grounds, including a concern that it would not be feasible to simulate such complex processes in the very tight time-frame of the MINT project. Also, it was believed that this approach presumed a knowledge of saving behavior that does not exist.

The second approach, which was the one we selected, used a reduced-form equation to estimate the wealth of individuals as a function of age, earnings histories, and demographic characteristics. The resulting age-wealth profiles reflect the combined effects of decisions on how much to save, portfolio allocations, and realized rates of return on assets. While this approach has less detail than the first approach on the process of wealth accumulation, it does allow straightforward estimation of the pattern of wealth changes over the life cycle.

In deriving age-wealth profiles, we developed separate econometric estimates and projections for housing and non-housing wealth. We define housing wealth as the difference between home value and outstanding mortgage debt (i.e., home equity). Non-housing, non-pension wealth is calculated as the sum of the net value of: vehicles, other real estate, farm and business equity (value - debt), stocks, mutual funds, bonds, checking accounts, savings accounts, money market accounts, and certificate of deposit account balances, less unsecured debt.

Choice of Panel Survey of Income Dynamics (PSID) for Estimates

In performing these estimates, we utilized longitudinal data from the Panel Study on Income Dynamics (PSID). We chose the PSID instead of the Survey of Income and Program Participation (SIPP) to perform this estimation because the PSID enables us to observe the wealth-generating process for an individual over a longer period (approximately ten years) than the SIPP and to isolate individual-specific effects better. Once parameter estimates are obtained from the PSID, they are used to impute wealth at ages 62 and 67 onto the merged SIPP data files covering the years 1990 to 1993.

The PSID is a rich, longitudinal data set that tracks the income, demographic and family characteristics of approximately 5,000 households from 1968 to the present. Detailed information on earnings, sources of income, health, marital status and education are available for most members of the household. Beginning in 1984, a series of questions relating to the types and amounts of financial and non-financial assets were asked. These questions were asked every five years (i.e., in 1984, 1989 and 1994) and they serve as the basis of our estimation. Because the PSID reports wealth on a family basis, we needed to allocate wealth among individual family members. We chose to divide assets equally between both spouses for purpose of estimating the time profile of individual wealth accumulation.

Comparison of SIPP and PSID

One potential concern about using SIPP data in the projections is that SIPP respondents may underreport their wealth. As one check on both underreporting of wealth and potential inconsistencies between the data files used for estimation and projection, we report comparisons of housing and other wealth reported on both files in Tables 4-1 and 4-2 below. All figures shown are weighted and are relative to the average economy-wide wage in the year of the survey.

Table 4-1
Comparison of SIPP and PSID Family Wealth Data: Mean Housing Wealth Divided by Economy-Wide Average Wage, by Age

Age of Family Head	SIPP	PSID
Under 35	0.52	0.40
35 to 44	1.37	1.60
45 to 54	2.13	2.41
55 to 64	2.72	2.96
65 to 74	2.85	2.51
75 and Over	N.A.	1.74
Total	1.58	1.64

Table 4-2
Comparison of SIPP and PSID Family Wealth Data: Mean Other, Non-Pension Wealth Divided by Economy-Wide Average Wage, by Age

Age of Family Head	SIPP	SIPP [a/]	PSID [a/]
Under 35	0.65	0.70	1.15
35 Under 45	1.28	1.45	3.12
45 Under 55	2.26	2.60	6.69
55 Under 65	2.98	3.47	6.41
65 Under 75	2.91	3.47	5.50
75 and Over	N.A.	N.A.	4.27
Total	1.66	1.90	3.83

[a/] Includes IRA and Keogh balances for comparability across files.

For housing wealth, the two files are remarkably similar, with the average value of home equity (as a fraction of the economy-wide wage in the year of the survey) generally rising with the age of the family head. The figures are not strictly comparable because the PSID is a rather unique data set and includes families that were observed over the 1984 to 1994 period, while the SIPP figures are from the merged 1990 to 1993 panel files. In addition, the PSID sample includes all families in the panel while the SIPP estimates reflect only those in the MINT cohorts (1931-60), who ranged from ages 30 to 63 in 1990-93. This is why we do not report figures for older heads of families on the SIPP.

A different picture emerges in the case of non-housing wealth, where the PSID reports roughly twice the average value as the SIPP. This discrepancy is maintained across all age groups. Similar findings have been reported by other researchers. (See, for example, Gustman and Juster, 1996). Table 4-2 compares wealth reported on the SIPP and the PSID.

The PSID reported wealth variable includes wealth in IRAs and Keogh Plans, but does not report these components of wealth separately, while the task order for this project requested that we estimate separately non-pension wealth *excluding IRAs and Keogh plans*. In order to provide a consistent comparison, Table 4-2 reports both the SIPP wealth variable we used for the projections and SIPP wealth including IRA and Keogh Plans. The difference in wealth definitions accounts for only a small fraction of the difference between PSID wealth and the SIPP wealth measure we used.

We use the wealth figures reported on the SIPP instead of PSID wealth in the projections, because they reflect the distribution of wealth of the population under study and provide the appropriate correlations between wealth and other variables. An issue is whether we should adjust the SIPP wealth data upward to reflect the understatement of wealth on the SIPP, compared with other data files such as the PSID and the Survey of Consumer Finances (SCF). Consistent with views of SSA, we relied on the unadjusted wealth data. One rationale for this choice is that a substantial part of the understatement of wealth on the SIPP is for the highest wealth families and we are relatively less concerned with an accurate measure of retirement income of these families for the purpose of analyzing the future adequacy of Social Security benefits.

An indication that the difference is mostly at the high end is that *median* wealth holdings in the two files are quite similar, even though *mean* values are quite different. Table 4-3 reports the median values (i.e., the 50th percentile) of family wealth on the SIPP and PSID files as well as the values at other percentiles of the wealth distribution on the two files. It shows that there is little difference between reported wealth on the two files through the 90th percentile and that PSID wealth is only about 40 percent higher than the SIPP wealth even for families at the 98th percentile. The large discrepancy in mean wealth in the two files is due almost entirely to differences in reported wealth for individuals in the top *two percent* of the wealth distribution.

Table 4-3
Comparison of Family Wealth on the SIPP with the PSID at Fixed Percentiles of the Wealth Distribution
(in 1996 Dollars)

Percentile Cutoff	SIPP	PSID
10th Percentile	0	0
20th Percentile	2,279	2,880
30th Percentile	9,875	11,271
40th Percentile	26,479	25,672
50th Percentile	52,017	47,838
60th Percentile	84,352	76,390
70th Percentile	130,311	122,725
80th Percentile	197,791	199,116
90th Percentile	329,317	359,160
98th Percentile	728,620	1,030,267

2. Procedure for Deriving Wealth Projections at Ages 62 and 67

The derivation of wealth projections at ages 62 and 67 involved three phases. In the first phase (the *estimation* phase), we estimated a reduced-form equation relating family wealth in year t, to a vector of income and demographic variables, using data from the PSID. In the second phase (the *calibration* phase), we used these estimates to center predicted wealth estimates on the SIPP file. We calculated an individual-specific "residual" which placed each individual on his or her regression line in the year of the SIPP survey. This calibration phase was necessary to control for out-of-sample effects from using parameter estimates from a different data file and also to take into account unobserved heterogeneity. In the third phase (the *projection* phase), these individual residuals were combined with the relevant income and demographic information (both actual and projected in earlier phases of the MINT study) at ages 62 and 67 to obtain projections of housing and other wealth.

Estimation Methodology

The estimates involved a two-step process: (i) estimation and then imputation of a probability of having positive wealth (both housing and other wealth) and (ii) estimation of and projection of the level of wealth, conditional on having positive wealth. Whether or not an imputation of positive wealth was made in step (i) was determined by comparing the imputed probability using the estimated coefficients of the regression equation with a uniformly distributed random number between zero and one.

We chose this strategy after experimenting with a number of alternative reduced-form models of lifetime wealth accumulation. In particular, experiments with a Tobit specification suggested to us that the process which determines whether a family has positive wealth or not is likely to be quite different from the process which determines the level of that wealth. Appendix 4-A contains a brief summary of the alternative specifications with which we experiment.

For the projections of wealth level, conditional on having positive wealth, at ages 62 and 67, we estimate a reduced-form equations of the form for both housing and non-housing wealth:

$$W_{it} = X_{it}\,\beta + \mu_i + \gamma_t + C_a + \epsilon_{it}$$

where W_{it} = wealth for family i in year t, X_{it} = income and demographic variables individual i in year five, γ_t = a dummy variable for year (1984, 1989, or 1994), C_a = a dummy variable for for each 5-year birth cohort beginning with the cohort born in 1931, μ_i = an individual-specific error term to control for heterogeneity, and ϵ_{it} is the usual regression residual. The dependent variable (W_{it}) in each of the estimating equations is the natural logarithm of the dollar value of wealth (housing and other non-pension wealth) divided by the economy-wide average wage in the year the wealth was reported.

In choosing variables to include in the X-array, we used an approach that is common in the literature of predicting age-wealth profiles. The age of the family head and his or her age squared were included to capture life-cycle trajectories of asset accumulation. Dummy variables to indicate whether the head of the family was married, divorced, widowed or headed by a male were included to control for these circumstances, all of which have important effects on lifetime wealth accumulation. A dummy variable to indicate whether the head of the family was white was included because large disparities in wealth accumulation by race, even after adjusting for income, are apparent in reported data. Family size should also be an important predictor of wealth, given the added costs of raising children. Because the presence of young children can also affect the path of wealth accumulation, the age of the youngest child interacted with marital status of the household head was included. Health status of the family head was included because individuals in poor health are likely to have higher than average costs associated with maintaining a household, and therefore accumulate less wealth at any given income level.

Dummy variables to represent the birth cohort of the family head starting in 1930 at five-year intervals were included to capture differences in wealth accumulation among cohorts. (The excluded cohorts are all cohorts born before 1930 or after 1960.)[1] Parameter estimates were scaled to be measured relative to 1994 wealth by including the dummy variables for 1984 and 1989.[2]

Average earnings for both spouses in the prior five years was chosen as a proxy for permanent or lifetime income. We chose this variable because we believed it important to tie the projections closely to the earnings histories. Other specifications were tested, and average earnings over the previous five years appeared to perform well in comparison to other measures. A variable to capture transitory movements in current earnings was included and calculated as the difference between current earnings and average earnings in the previous five years. A dummy variable for married couples to indicate if both spouses worked was included to capture the added costs of maintaining two careers. The fraction of current wealth held in equities was included to capture the fact that these assets generally have higher rates of return than less risky investments. Dummy variables were also included if the household received any pension income and if the household owned (rather than rented) a home.

Calibration and Projection

Once parameter estimates were obtained, they were used to impute an estimate of family wealth onto the merged SIPP file in the base year of the survey for those families reporting positive wealth.[3] At this stage, an individual-specific “residual” (RESIDH and RESIDW) was computed as the difference between the actual wealth reported on the file and predicted wealth from the estimated equation. This residual was used to center the predicted wealth estimates to match reported wealth on the SIPP and was then added to projected wealth at ages 62 and 67 to obtain final wealth estimates. In cases where an individual has a change in marital status, the average of the residuals of both spouses (if present at age of projection) was used in the projections.

Use of a residual wealth component in this manner helps to ensure that the projections are tied to reported wealth in the base SIPP files. It has the added benefit of attempting to capture the "propensity" of certain individuals to be above- or below-average savers. One drawback of this approach is that it implicitly assumes this propensity is carried throughout an individual's lifetime. This seems a particularly strong assumption for the younger cohorts, but is quite reasonable for those in the SIPP data set (60 year-olds, say) who are nearing retirement or at mid-career.

In general, predictions were made using the coefficients of the estimated equation, adjusted for the calibrated individual-specific effect. Some of the variables which were included to obtain better estimates of the age coefficient in the estimated equation required modification in the projections equation.

One variable that needed to be modified for the projections was the variable for family size. Because younger families are more likely to still have children living with them and this is likely to have a negative effect on their level of wealth, it is necessary to control for this in the wealth equations. But family compositional changes not being forecast in MINT are not necessarily related to family size at the time of the MINT sample, so family size cannot be used as a variable to forecast future wealth of individuals in the 1990-93 SIPP panels. For purposes of the projections, we therefore set the value of the family size variable to two for married couples and to one for single individuals. At ages 62 and 67, few families have children living in the home, so setting the family size to or two only slightly overstates the projection of aggregate wealth.

Another variable that could not be used as is in the projections was the difference between current earnings and a measure of permanent income (WDELTA). The purpose of including WDELTA was to control for unexpected, transitory movements in income which could (temporarily) affect wealth accumulation if consumption does not respond much to transitory movements in income. A decline in earnings at older ages for anticipated life cycle reasons does not have the same interpretation as a transitory decline during working years, however, and should not be expected to produce a similar decline in wealth. Therefore, for purposes of the projections, we set WDELTA equal to zero.

III. ESTIMATES OF WEALTH AT AGES 62 AND 67

1. Housing Wealth

As described above, a two-stage procedure was used to project housing wealth at ages 62 and 67. In the first stage, a probability of having positive home equity was determined. In the second stage, an amount conditional on having a positive value was imputed.

Probability of Positive Housing Wealth

Table 4-4 contains the parameter estimates used in this equation. We chose a relatively parsimonious model for the probability of having positive housing wealth. The results indicate that the age of the family head increases the probability of having positive home equity; being white and married also have strong, positive effects. Family size and average earnings in the prior five years have strong positive effects on the accumulation of housing wealth. Having both couples in the labor force reduces this probability. All coefficients are statistically significant at the 95 percent level.

Estimation of Housing Wealth At Ages 62 and 67

Table 4-5 contains the parameter estimates of a random effects model of housing wealth, conditional on having positive wealth. The dependent variable is the natural logarithm of housing wealth (housing value less home mortgage debt) divided by the economy-wide average wage. The results indicate that housing wealth increases with age, but with a decreasing rate as indicated by the negative coefficient on the age-squared term. Divorce has a negative effect on housing wealth as does being widowed. Married couples with two earners have less housing wealth than an otherwise identical couple where only one is in the labor force. Average earnings in the prior five years has a strong, positive effect on the value of housing wealth. Positive effects on housing wealth are also indicated by the fraction of assets held in equities, whether the household head is male (but this effect is not statistically different from zero), and if the head is in good health. Family size is positively related to housing wealth. Cohort effects are generally positive, except for the youngest cohort where housing wealth is lower, after controlling for other characteristics. (Recall that the missing cohorts have heads of household born before 1930 and after 1960.)

2. Non-Housing Wealth

Probability of Positive Non-Housing Wealth.

To determine whether an individual would have positive non-housing wealth at age 62 or 67, a probability was calculated using a random effects probit model estimated from the PSID. We used a model similar to that used for the housing wealth imputation and the parameter estimates are shown in Table 4-6. The estimates indicate that the probability of having positive wealth increases with the age of the family head and with the size of average earnings. A negative effect on the probability of having positive non-housing wealth is observed for two-earner couples. (This means that two-earner couples have a slightly lower probability of having positive housing wealth after controlling for earnings, family size, age and race.) Finally, the results suggest this probability is also lower for larger families. All coefficients are statistically significant at the 95 percent level.

Table 4-4
Random Effects Model for Home Ownership

```
GENERAL ESTIMATING EQUATION FOR PANEL DATA        NUMBER OF OBS     =     22653
GROUP VARIABLE:                      ENTRYID      NUMBER OF GROUPS =     11620
LINK:                                 PROBIT      OBS/GROUP, MIN   =         1
FAMILY:                             BINOMIAL                 AVG   =      1.95
CORRELATION:                    EXCHANGEABLE                 MAX   =         3
                                                  CHI2(6)          =   4865.71
SCALE PARAMETER:                           1      PROB > CHI2      =    0.0000
PEARSON CHI2(22646):                22450.38      DEVIANCE         =  23732.05
DISPERSION (PEARSON):               .9913617      DISPERSION       =  1.047958
```

Variable	Coeficient	Std.Err.	Description
AGEH	.0318355**	.0006646	AGE OF FAMILY HEAD
MARRIED	.6684303**	.0293448	MARITAL STATUS (1=MARRIED,0=OTHERWISE)
WHITE	.2710493**	.0193593	RACE OF FAMILY HEAD (1=WHITE,0=OTHERWISE)
TWOEARN	.0740953**	.0301678	TWO EARNER COUPLE (1=YES, 0=NO)
FAMSIZE	.0818698**	.007483	FAMILY SIZE
AVEW5	.4199301**	.0133128	AVERAGE EARNINGS IN THE LAST 5 YEARS
_CONS	2.347942	.0419664	CONSTANT TERM

**SIGNIFICANT AT 95% CONFIDENCE LEVEL

Table 4-5
Random Effects Model for Home Equity

```
RANDOM-EFFECTS GLS REGRESSION
SD(U_ENTRYID)                 =  .8447528          NUMBER OF OBS =   11730
SD(E_ENTRYID_T)               =   .614591                      N =    6324
SD(E_ENTRYID_T + U_ENTRYID)   =  1.044667                  T-BAR = 1.47918
CORR(U_ENTRYID, X)            =  0 (ASSUMED)           R-SQ WITHIN   =  0.1773
                                                            BETWEEN  =  0.2114
                                                            OVERALL  =  0.2327
------------------- THETA --------------------
  MIN      5%       MEDIAN       95%      MAX          CHI2( 23)     = 2884.60
0.4117   0.4117     0.5425     0.6127   0.6127           PROB > CHI2 =  0.0000
```

Variable	Coefficent	Std.Err.	Description
AGEH	.0711246**	.0049428	AGE OF FAMILY HEAD
AGESQU	-.0004375**	.000048	AGE OF FAMILY HEAD SQUARED
AGEYMS	-.0010634	.0019232	AGE OF YOUNGEST CHILD * MARRIED
MARRIED	-.0653245	.0524478	MARITAL STATUS (1=MARRIED,0=OTHERWISE)
DIVORCE	-.243517**	.0528379	DIVORCE STATUS (1=DIVORCED,0=OTHERWISE)
WHITE	.2582437**	.026842	RACE OF FAMILY HEAD (1=WHITE,0=OTHERWISE)
MALE	.0771856*	.0416846	SEX OF FAMILY HEAD (1=MALE,0=OTHERWISE)
FAMSIZE	.030562**	.0081368	FAMILY SIZE
HEALTH	.1056517**	.0217015	HEALTH STATUS OF HEAD(1=GOOD,0=OTHERWISE)
WDELTA	.0953282**	.0138442	CURRENT EARNINGS LESS AVERAGE EARNINGS
STOCKPCT	.0707172**	.0164373	FRACTION OF WEALTH HELD IN EQUITIES
C01	.1794287**	.0544402	DUMMY VARIABLE FOR 1930-1934 BIRTH COHORT
C02	.1284095**	.0577457	DUMMY VARIABLE FOR 1935-1939 BIRTH COHORT
C03	.1268119**	.0528962	DUMMY VARIABLE FOR 1940-1944 BIRTH COHORT
C04	.1760489**	.0445504	DUMMY VARIABLE FOR 1945-1949 BIRTH COHORT
C05	.0831315**	.0423746	DUMMY VARIABLE FOR 1950-1954 BIRTH COHORT
C06	-.1154209**	.043027	DUMMY VARIABLE FOR 1955-1959 BIRTH COHORT
Y1984	-.4925764**	.028821	DUMMY VARIABLE FOR 1984
Y1989	-.3571948**	.026782	DUMMY VARIABLE FOR 1989
AVEW5	.2126162**	.0125009	AVERAGE EARNINGS IN PREVIOUS 5 YEARS
TWOEARN	-.0895436**	.026112	TWO EARNER COUPLE(1=YES,0=NO)
PENSION	.2161221**	.0250284	PENSION INCOME INDICATOR (1=YES,0=NO)
WIDOWED	-.127434**	.0592256	WIDOWED STATUS (1=YES,0=OTHERWISE)
_CONS	-2.311579	.1206449	CONSTANT TERM

** SIGNIFICANT AT 95% CONFIDENCE LEVEL
* SIGNIFICANT AT 90% CONFIDENCE LEVEL

Table 4-6
Random Effects Probit Model for Presence of Positive Other Wealth

GENERAL ESTIMATING EQUATION FOR PANEL DATA		NUMBER OF OBS =	22653
GROUP VARIABLE:	ENTRYID	NUMBER OF GROUPS =	11620
LINK:	PROBIT	OBS/GROUP, MIN =	1
FAMILY:	BINOMIAL	AVG =	1.95
CORRELATION:	EXCHANGEABLE	MAX =	3
		CHI2(6) =	2582.23
SCALE PARAMETER:	1	PROB > CHI2 =	0.0000
PEARSON CHI2(22646):	23490.44	DEVIANCE =	20896.35
DISPERSION (PEARSON):	1.037289	DISPERSION =	.922739

Variable	Coefficient	Std.Err.	Description
AGEH	.0112677**	.0006371	AGE OF FAMILY HEAD
MARRIED	.5361912**	.0309842	MARITAL STATUS (1=MARRIED,0=OTHERWISE)
WHITE	.4978503**	.0225575	RACE OF FAMILY HEAD
TWOEARN	-.0699946**	.0336925	TWO EARNER COUPLE (1=YES, 0=NO)
FAMSIZE	-.0451171**	.0075319	FAMILY SIZE
AVEW5	.4157107**	.0160942	AVERAGE EARNINGS IN THE LAST 5 YEARS
_CONS	-.3150706	.0379231	CONSTANT TERM
**SIGNIFICANT AT 95% CONFIDENCE LEVEL			

Estimation of Other (Non-Housing) Wealth At Ages 62 and 67.

Table 4-7 shows the results of a random effects model for other wealth, conditional on it being positive, estimated from the PSID.

The dependent variable in Table 4-7 is the natural logarithm of other wealth divided by the economy-wide average wage. The parameter estimates corroborate much of what has been found by other researchers and are suggestive of the following:

- Coefficients on age and age-squared show the familiar curvature of empirical age-wealth profiles -- the age term is positive and the age-squared term is negative;
- Married couples have higher wealth than families headed by persons who have never been married;
- Divorce has a negative effect on asset accumulation;

Table 4-7
Random Effects Model For Other Wealth

```
RANDOM-EFFECTS GLS REGRESSION
SD(U_ENTRYID)                =  1.211939           NUMBER OF OBS =   17335
SD(E_ENTRYID_T)              =  1.090656                       N =    9486
SD(E_ENTRYID_T + U_ENTRYID)  =  1.630438                   T-BAR =  1.4622
CORR(U_ENTRYID, X)           =  0 (ASSUMED)        R-SQ WITHIN   =  0.1428
BETWEEN  =  0.3369                                      OVERALL  =  0.3271
------------------- THETA --------------------
  MIN      5%       MEDIAN        95%      MAX         CHI2( 24)     = 5902.01
0.3311   0.3311     0.4631     0.5389   0.5389           PROB > CHI2 =  0.0000
```

Variable	Coefficient	Std. Error	Description
AGEH	.0516739**	.0064644	AGE OF FAMILY HEAD
AGESQU	-.0002816**	.000064	AGE OF FAMILY HEAD SQUARED
AGEYMS	-.0095816**	.0030315	AGE OF YOUNGEST CHILD * MARRIED
MARRIED	.2154922**	.0547575	MARITAL STATUS (1=MARRIED,0=OTHERWISE)
DIVORCE	-.3043057**	.0519517	DIVORCE STATUS (1=DIVORCED,0=OTHERWISE)
WHITE	.5549008**	.0346952	RACE OF FAMILY HEAD (1=WHITE,0=OTHERWISE)
MALE	.3088287**	.0462454	SEX OF FAMILY HEAD (1=MALE,0=OTHERWISE)
FAMSIZE	-.0592723**	.0108611	FAMILY SIZE
HEALTH	.1842078**	.0302921	HEALTH STATUS OF HEAD (1=GOOD,0=OTHERWISE
WDELTA	.3420059**	.0203431	CURRENT EARNINGS LESS AVERAGE EARNINGS
STOCKPCT	.0780171**	.0289176	FRACTION OF WEALTH HELD IN EQUITIES
C01	-.1114624	.0775325	DUMMY VARIABLE FOR 1930-1934 BIRTH COHORT
C02	.048001	.0815694	DUMMY VARIABLE FOR 1935-1939 BIRTH COHORT
C03	.080252	.0725842	DUMMY VARIABLE FOR 1940-1944 BIRTH COHORT
C04	.0738006	.0606003	DUMMY VARIABLE FOR 1945-1949 BIRTH COHORT
C05	-.0681498	.0532004	DUMMY VARIABLE FOR 1950-1954 BIRTH COHORT
C06	-.1244007**	.0487746	DUMMY VARIABLE FOR 1955-1959 BIRTH COHORT
Y1984	-.9284874**	.0384727	DUMMY VARIABLE FOR 1984
Y1989	-.7322598**	.0362317	DUMMY VARIABLE FOR 1989
AVEW5	.5721058**	.0183561	AVERAGE EARNINGS IN PREVIOUS 5 YEARS
TWOEARN	-.115793**	.036885	TWO EARNER COUPLE(1=YES,0=NO)
TENURE	.5157948**	.0295728	HOME OWNERSHIP INDICATOR (1=YES,0=NO)
PENSION	.4029462**	.0383109	PENSION INCOME INDICATOR (1=YES,0=NO)
WIDOWED	-.1956565**	.0715522	WIDOWED STATUS INCICATOR (1=YES,0=NO)
_CONS	-3.042983	.1378594	CONSTANT TERM

** SIGNIFICANT AT 95% CONFIDENCE LEVEL

- Being white and residing in a male-headed household has a strong positive effect on wealth;
- Increases in family size reduce wealth;
- Good health can have an important effect on lifetime wealth accumulation;
- The fraction of wealth held in equities has a positive impact on wealth, but this could just reflect the time period over which the estimates were obtained (1984-1994);
- Average earnings in the previous five years has an unambiguous, positive effect on wealth accumulation;
- Married couples with two-earners have less wealth than one-earner couples with the same income, possibly reflecting the added costs of managing two careers; and
- Owning a home is positively correlated with wealth accumulation.

IV. PROJECTIONS OF WEALTH AT AGES 62 AND 67

Wealth projections were obtained by replacing values of the independent variables in the equations for estimating the determination of wealth with the appropriate values in place at ages 62 and 67 for members of the MINT population. Wage histories were updated to reflect projected earnings after 1996; marital status and family compositional changes were incorporated; homeownership status was updated; and the residual term was added to predicted wealth. In order to facilitate a discussion of the projections, Table 4-8 shows the mean values by five-year birth cohort of selected independent variables that were used in the projections for wealth at age 62.

By reading across each row of the table, one can examine how certain economic and demographic variables are likely to be affecting the projections. For example, more recent cohorts are less likely to be married; are more likely to reach age 62 divorced; and family heads are slightly less likely to be white males. Average wages in the five years leading up to retirement show an interesting pattern, with the middle cohorts experiencing slightly higher wages (as a fraction of the economy-wide average) than both the earlier and later cohorts.

1. Projections of Housing Wealth

We assumed that those households who were homeowners on the base SIPP file remained homeowners throughout the projection period. For those who were not homeowners in the base period, a random effects probit model was used to determine a probability of having positive housing wealth.

Table 4-8
Mean Values of Selected Independent Variables at Age 62, By Birth Cohort

Variable	1931 to 1935	1936 to 1940	1941 to 1945	1946 to 1950	1951 to 1955	1956 to 1960
MARRIED	0.7356	0.7016	0.6902	0.6850	0.6733	0.6648
DIVORCE	0.1020	0.1413	0.1547	0.1666	0.1654	0.1705
WHITE	0.8750	0.8722	0.8634	0.8523	0.8438	0.8305
MALE	0.8145	0.7931	0.7950	0.7930	0.7901	0.7834
HEALTH	0.4317	0.5146	0.5724	0.6326	0.6591	0.6912
STOCKPCT	0.0731	0.0686	0.0650	0.0622	0.0593	0.0506
AVEW5	1.2507	1.2714	1.3180	1.3420	1.2577	1.1689
TWOEARN	0.4150	0.4367	0.4396	0.4585	0.4567	0.4575
WIDOWED	0.1188	0.1137	0.1048	0.0897	0.0928	0.0922
RESIDH	0.1431	0.1838	0.2295	0.2583	0.2074	0.1862
RESIDW	0.7601	1.0301	1.1699	1.1380	1.0400	1.0300

Variable definitions: MARRIED = dummy variable for whether the head of household is married; DIVORCE = dummy variable for whether head of household is divorced; WHITE = dummy variable for whether head of household is white; MALE = dummy variable for whether household is headed by a male; HEALTH = dummy variable for health status of family head (1 if good; 0 otherwise); STOCKPCT = fraction of wealth held in equities ; AVEW5 = average earnings for both spouses in the previous five years; TWO EARN = dummy variable to indicate if both spouses worked; WIDOWED = dummy for whether head of household is widowed; RESIDH = difference between housing wealth on SIPP file and predicted housing wealth; and RESIDW = difference between non-housing wealth on SIPP file and predicted non-housing wealth.

For those individuals who were not homeowners on the base-year SIPP file, the probit value from the equation in Table 4-4 was compared with a uniformly distributed random number to determine if the family would receive an imputed value for housing wealth at age 62. We then assumed that homeownership status remained unchanged between the ages of 62 and 67. [4]

Applying the coefficients from Table 4-4 to predict future homeownership of individuals on the SIPP with no home equity results in an over-estimate of the number of individuals in the earliest cohorts (the oldest people in the 1990-93 SIPP files) who have positive home equity because it is unlikely that these individuals would purchase a home late in life if they have not already done so. This over-estimate becomes less serious as the procedure is applied to each subsequent cohort because younger individuals who do not own homes in the 1990-93 SIPP are more likely to become homeowners than older non-homeowners. The correct probability to use in the projections is the conditional probability of purchasing a home at age 62 (or 67) given that one was not a homeowner at the time of the SIPP interview. Because we do not know when a 62 or 67 year old homeowner on the PSID purchased his or her home, we are unable to estimate this conditional probability on the PSID. To compensate for the over-estimate we approximated the conditional probability by adding an age-specific constant adjustment to the projection equation that makes the overall projected probabilities of home ownership by age in the projection equal to the probability of home ownership by age in the base year SIPP data. Therefore, the equation is selecting which people in the SIPP will become homeowners, based on their characteristics, but does not provide an independent projection of the future rate of homeownership.

After we had projected whether housing wealth was positive, we then projected the level of housing wealth at ages 62 and 67 for those with positive wealth. The equation for housing wealth, conditional on homeownership, from Table 4-5 was used in the projections at both age 62 and at age 67, with all values of the independent variables updated to reflect earnings and demographic changes consistent with the projections of the other tasks. Tables 4-9 to 4-11 contain the results of the projections, showing the mean housing wealth at ages 62 and 67 for all individuals on the file and the fraction with positive home equity by birth cohort, first for all individuals and then separately for married couples and unmarried individuals.

The projections indicate that approximately 85 percent of families will have some housing wealth at ages 62 and 67. This seems a bit high compared with the baseline SIPP data where the figure is about 77 percent for those in the earliest cohort. We suspect this result is a consequence of our assumption that individuals who are homeowners in the base-year SIPP file remain homeowners throughout the projection period. Additionally, this assumption means that for a married couple who owns a home in the base year and subsequently gets divorced, each spouse will continue to be a homeowner in the projection period. It is difficult to say if this is a realistic assumption given projections that individuals in more recent cohorts are more likely to reach retirement age in a divorced state. We return to this issue later when we discuss the projections of non-housing wealth.

Table 4-9
Mean Housing Wealth as a Fraction of the Economy-Wide Average Wage at Ages 62 and 67, by Birth Cohort — All Individuals

Birth Cohort	Proportion With Positive Housing Wealth		Average for All Individuals	
	Age 62	Age 67	Age 62	Age 67
1931 to 1935	0.84	0.85	1.89	1.93
1936 to 1940	0.84	0.85	1.78	1.79
1941 to 1945	0.85	0.85	1.79	1.78
1946 to 1950	0.84	0.84	1.78	1.77
1951 to 1955	0.82	0.82	1.66	1.65
1956 to 1960	0.80	0.80	1.40	1.39

Table 4-10
Mean Housing Wealth as a Fraction of the Economy-Wide Average Wage at Ages 62 and 67, by Birth Cohort — Married Individuals

Birth Cohort	Proportion With Positive Housing Wealth		Average for All Individuals	
	Age 62	Age 67	Age 62	Age 67
1931 to 1935	0.92	0.92	1.84	1.75
1936 to 1940	0.91	0.90	1.72	1.64
1941 to 1945	0.91	0.91	1.67	1.58
1946 to 1950	0.92	0.92	1.68	1.61
1951 to 1955	0.89	0.88	1.61	1.53
1956 to 1960	0.88	0.87	1.34	1.27

Table 4-11
Mean Housing Wealth as a Fraction of the Economy-Wide Average Wage at Age 62, by Birth Cohort — Single Individuals

Birth Cohort	Proportion With Positive Housing Wealth		Average for All Individuals	
	Age 62	Age 67	Age 62	Age 67
1931 to 1935	0.64	0.71	2.01	2.30
1936 to 1940	0.65	0.71	1.90	2.06
1941 to 1945	0.71	0.74	2.08	2.16
1946 to 1950	0.68	0.71	2.00	2.09
1951 to 1955	0.68	0.71	1.77	1.87
1956 to 1960	0.65	0.68	1.51	1.60

The projections show lower mean housing wealth relative to the average wage for the two more recent cohorts than for earlier cohorts. The decline in the ratio of housing wealth to the average wage is quite substantial. For all individuals, at age 62, mean housing wealth relative to the average wage is over 20 percent lower for the 1956-60 birth cohort than for the 1946-50 birth cohort.

Examination of the mean values of the independent variables in Table 4-5 suggests two possible sources of the decline in housing wealth -- 1) slightly lower wages in the previous five years (about 7 percent below the preceding cohorts) and 2) a slightly larger proportion of divorced individuals than in the earlier cohorts.

The projections also indicate that the mean, per person housing wealth of single individuals is slightly above that of married couples. That is, while married couples are projected to have higher mean housing wealth than do single individuals, they do not have twice as much more, on average. In contrast, the base year SIPP data for the oldest cohorts show that per person hsouing wealth is about the same for married couples and single individuals. There are two explanations for this result. First, the coefficient on the MARRIED term enters the equation with a negative sign (-0.065), indicating that, on the PSID, married couples have slightly less housing wealth per capita than single individuals, after controlling for other variables. Second, the treatment of divorced couples in the projections may overstate housing wealth of some single individuals at ages 62 and 67. This is because we assume that individuals who were homeowners in the base year SIPP, but subsequently divorce before reaching age 62 or 67, continue to be homeowners after they divorce. This assumption could raise the number of single homeowners in the projections, relative to the base year SIPP, thereby causing overall average housing wealth for unmarried individuals to be slightly higher relative to the average for married couples than in the base year SIPP.

Tables 4-12 and 4-13 show average housing wealth as a fraction of the economy-wide average wage at age 62 and 67, respectively, arrayed by birth cohort and income quintile. For purposes of these tables, the income measure used was income at first receipt of Social Security benefits. Income is defined as the sum of earnings, Social Security benefits, benefits from defined benefit pension plans, the annuitized return on defined contribution plans and non-pension financial wealth, and imputed rental income from owner-occupied housing. (Some of these sources of income are projected in subsequent chapters of this report. A more complete description of the income measure is provided in Chapter 7.)

The projections of housing wealth at age 62 and 67 by income quintile show average home equity in the top quintile is about three times the home equity for the lowest quintile in all cohorts, but the percentage differential between the top and bottom quintiles declines slightly for the most recent cohorts. Home equity relative to the average wage at ages 62 and 67 remains approximately constant between the 1931-35 and 1946-50 birth cohorts for the bottom two quintiles and declines for the top three quintiles. Home equity relative to the average wage at ages 62 and 67 declines between the 1946-50 and 1956-60 cohorts in all five income quintiles.

Table 4-12
Mean Housing Wealth as a Fraction of the Economy-Wide Average Wage at age 62, by Birth Cohort and Income Quintile - All Individuals

Income Quintile	1931 to 1935	1936 to 1940	1941 to 1945	1946 to 1950	1951 to 1955	1956 to 1960
First Quintile	0.93	0.85	0.98	0.91	0.82	0.76
Second Quintile	1.32	1.32	1.32	1.28	1.16	1.02
Third Quintile	1.79	1.67	1.64	1.66	1.52	1.28
Fourth Quintile	2.27	2.03	2.01	2.02	1.90	1.56
Fifth Quintile	3.09	2.82	2.68	2.74	2.68	2.21

Table 4-13
Mean Housing Wealth as a Fraction of the Economy-Wide Average Wage at age 67, by Birth Cohort and Income Quintile - All Individuals

Income Quintile	1931 to 1935	1936 to 1940	1941 to 1945	1946 to 1950	1951 to 1955	1956 to 1960
First Quintile	0.99	0.89	1.03	0.96	0.86	0.80
Second Quintile	1.36	1.36	1.35	1.28	1.17	1.04
Third Quintile	1.80	1.68	1.63	1.63	1.50	1.25
Fourth Quintile	2.24	2.02	1.96	1.96	1.84	1.52
Fifth Quintile	2.97	2.76	2.58	2.61	2.55	2.09

2. Projections of Other (Non-Housing Wealth)

A similar procedure was employed to project other wealth at ages 62 and 67 as was used to project housing wealth. First, a probability of having non-zero other wealth was determined and compared with a uniformly distributed (pseudo-) random number to decide if a positive value was to be imputed. The calculated probability was compared with a uniform random number to determine if the family should be given a wealth imputation at age 62. In the second stage, a value of other wealth was imputed for those with positive wealth at both ages 62 and 67.

The results of the housing wealth projections were utilized in this stage of the process through a dummy variable indicating home ownership appears on the right hand side of the equation for non-housing wealth.

After the independent variables were updated this equation was used to determine the level of non-housing wealth. Tables 4-14 to 4-16 contain the results of the projections, showing mean other wealth at ages 62 and 67 for all individuals on the file and the fraction with positive amounts by birth cohort, first for all individuals and then separately for married and unmarried persons. Tables 4-17 and 4-18 show mean non-housing wealth by birth cohort and income quintile at age 62 and 67 respectively. As before, the income measure used here is the income at first receipt of Social Security benefits. This is to ensure that a complete picture of the income of future retirees is used.

Approximately 90 percent of individuals are projected to have positive non-housing, non-pension wealth at ages 62 and 67. The projections also indicate that single individuals will reach retirement age with significantly less wealth (on a per person basis) than married individuals. This result is consistent across cohorts.

The percentage of individuals with positive wealth remains about the same for more recent birth cohorts as for the earlier cohorts. But projected non-housing, non-pension wealth is much lower in relation to the average wage for recent birth cohorts than for the earlier cohorts. For example, at age 62, the average wealth (relative to the average wage) for all individuals in the 1956-60 birth cohorts is about 40 percent lower than the average non-housing non-pension wealth for all individuals in the 1931-35 birth cohorts. While the decline in *this component* of wealth is striking, we emphasize that it results mostly from a shift in the *composition* of financial wealth between pension and non-pension wealth instead of from a decline in total wealth. In particular, more recent birth cohorts are projected to accumulate more wealth in defined contribution pension plans, including 401(k) plans, and individual retirement accounts. The results reported in Chapter 7 suggest that total income from financial wealth as a proportion of the average wage will in general remain stable across cohorts, although it will decline for the most recent (1956-60) birth cohort. But even for this cohort the decline in total financial wealth is much more modest than the projected decline in non-pension wealth.

The lower projected wealth for most recent birth cohorts largely reflects the effect of the individual-specific residual calculated as part of the calibration phase. More recent birth cohorts (the youngest individuals in the SIPP files) are further below their predicted age-wealth profile than earlier cohorts at the time of the SIPP interview, based on the regression estimates shown in Table 4-6. Because we allow this residual to be carried forward to age 62, they will, on average, be projected to have less wealth than a member of the oldest cohort with similar characteristics. The lower average earnings later in life of the two most recent cohorts also contribute to their lower projected wealth at ages 62 and 67.

Table 4-14
Mean Other Wealth as a Fraction of the Economy-Wide Average Wage at Ages 62 and 67, by Birth Cohort — All Individuals

Birth Cohort	Proportion With Positive Other Wealth		Average for All Individuals	
	Age 62	Age 67	Age 62	Age 67
1931 to 1935	0.91	0.90	2.15	1.68
1936 to 1940	0.90	0.89	1.84	1.49
1941 to 1945	0.91	0.90	1.83	1.42
1946 to 1950	0.91	0.90	1.66	1.31
1951 to 1955	0.90	0.89	1.47	1.14
1956 to 1960	0.90	0.89	1.26	0.99

Table 4-15
Mean Other Wealth as a Fraction of the Economy-Wide Average Wage at Ages 62 and 67, by Birth Cohort — Married Individuals

Birth Cohort	Proportion With Positive Other Wealth		Average for All Individuals	
	Age 62	Age 67	Age 62	Age 67
1931 to 1935	0.95	0.94	2.28	1.80
1936 to 1940	0.95	0.94	2.05	1.62
1941 to 1945	0.95	0.95	1.96	1.47
1946 to 1950	0.95	0.94	1.84	1.38
1951 to 1955	0.95	0.94	1.64	1.22
1956 to 1960	0.94	0.93	1.36	1.01

Table 4-16
Mean Other Wealth as a Fraction of the Economy-Wide Average Wage at Ages 62 and 67, by Birth Cohort — Single Individuals

Birth Cohort	Proportion With Positive Other Wealth		Average for All Individuals	
	Age 62	Age 67	Age 62	Age 67
1931 to 1935	0.80	0.81	1.81	1.43
1936 to 1940	0.80	0.81	1.36	1.26
1941 to 1945	0.81	0.80	1.53	1.34
1946 to 1950	0.83	0.81	1.29	1.16
1951 to 1955	0.80	0.82	1.13	1.01
1956 to 1960	0.82	0.82	1.05	0.96

Table 4-17
Mean Other Wealth as a Fraction of the Economy-Wide Average Wage at Age 62, by Birth Cohort and Income Quintile - All Individuals

Income Quintile	1931 to 1935	1936 to 1940	1941 to 1945	1946 to 1950	1951 to 1955	1956 to 1960
First Quintile	0.47	0.57	0.52	0.51	0.47	0.48
Second Quintile	0.83	0.83	0.73	0.72	0.67	0.62
Third Quintile	1.30	1.06	1.17	1.17	1.00	0.88
Fourth Quintile	2.05	1.79	1.89	1.77	1.52	1.32
Fifth Quintile	6.08	4.93	4.74	4.05	3.69	2.95

Table 4-18
Mean Other Wealth as a Fraction of the Economy-Wide Average Wage at age 67, by Birth Cohort and Income Quintile - All Individuals

Income Quintile	1931 to 1935	1936 to 1940	1941 to 1945	1946 to 1950	1951 to 1955	1956 to 1960
First Quintile	0.44	0.53	0.49	0.48	0.46	0.45
Second Quintile	0.66	0.71	0.62	0.61	0.59	0.55
Third Quintile	1.07	0.87	0.96	0.93	0.80	0.72
Fourth Quintile	1.61	1.46	1.42	1.36	1.13	1.03
Fifth Quintile	4.33	3.84	3.49	3.04	2.68	2.17

Future wealth of more recent cohorts may be higher than we projected if they receive larger inheritances, relative to the economy-wide average wage, than earlier cohorts. But our model does not capture the effects of differential inheritances among cohorts. Projecting inheritances by cohort would require us to model the evolution of bequests as a function of wealth accumulation and the disposition of bequests among successive cohorts. Such a model is beyond the scope of this project.

Projections of wealth by income quintile are presented in Tables 4-17 and 4-18. The projections, as expected, show the ratio of mean wealth to wages is higher for higher income groups at both ages 62 and 67 in all birth cohorts. Mean other wealth in the highest income group at age 62 is about 13 times as high as in the lowest group for the 1931-35 cohorts, reflecting a wider dispersion of non-housing, non-pension wealth than of housing wealth. The dispersion of other wealth remains larger than the dispersion of housing wealth in subsequent cohorts, but narrows over time. In the 1956-60 cohorts, mean other wealth in the top quintile at age 62 is about 6 times as high as mean other wealth in the bottom quintile.

Mean other wealth declines monotonically from earlier to more recent cohorts for the top quintile of families, who are by far the largest holders of wealth. In the other four quintiles, mean other wealth either increases or declines moderately between the 1931-35 and 1946-50 birth cohorts, but then it declines for all quintiles between 1946-50 and 1956-60.

3. Qualifications and Suggested Improvements

One major issue with the method is whether we are adequately capturing the variance in wealth at ages 62 and 67 among individuals. This is important because one concern of the entire MINT project is to project the number of individuals who will have inadequate income in retirement. For this purpose, a projection method that understates the variance in non-pension wealth at retirement will underestimate the number of individuals who have little or no retirement income from these assets, although some of these individuals may have other sources of income (from pensions, Social Security benefits, or earnings) that make up for the lack of income from non-pension saving.

Variance of the Estimates

There was some concern that the projection methods employed in this task would understate the true variance of the observed wealth distribution of future retirees. While the calibration method captures the dispersion in wealth accumulation among individuals within each age group of the 1990-93 SIPP samples, it does not capture any dispersion in future rates of wealth accumulation beyond that explained by differences in right-hand side variables (such as average wages) that change over time in the projections. Thus, it is possible that the projections *understate* the dispersion of wealth at ages 62 and 67.

One potential test of whether the projections are showing too much or too little variance is to compare coefficients of variation (the ratio of the standard deviation to the mean) of wealth at ages 62 and 67 for different birth cohorts. The variance for the 1931-35 cohorts at age 62 should differ little from the actual variance on the SIPP files because for these observations wealth at 62 or 67 is determined mostly by the initial (actual) level of wealth and only marginally by the several years of wealth accumulation or decumulation after the date of the SIPP panel surveys. In contrast, the age-wealth profile as determined by the projection equation has much more influence relative to the initial starting point in projecting wealth to age 62 for the more recent birth cohorts who were younger at the time of the SIPP surveys. If the projections were systematically understating the dispersion of wealth, we should expect the coefficient of variation in the projections to be declining from earlier to later cohorts.

Table 4-19 compares the coefficients of variation of the wealth projections by birth cohort for housing and other wealth. It reveals no clear downward trend in the coefficient of variation for later birth cohorts. For housing wealth, the coefficient of variation is slightly higher for later cohorts than for earlier cohorts at ages 62 and 67. For other (non-housing, non-pension) wealth, the coefficient of variation rises through the 1941-45 cohorts and then declines in the most recent birth cohorts.

Table 4-19
Coefficient of Variation of Wealth Estimates, By Birth Cohort

Birth Cohort	Housing Wealth at Age 62	Housing Wealth at Age 67	Other Wealth at Age 62	Other Wealth at Age 67
1931 to 1935	101.01	103.47	208.22	206.55
1936 to 1940	102.83	104.30	200.49	203.64
1941 to 1945	104.81	107.12	279.21	267.76
1946 to 1950	108.32	108.93	255.92	240.24
1951 to 1955	114.85	116.25	216.98	222.78
1956 to 1960	123.69	124.26	222.39	247.14

While the coefficient of variation is not decreasing over time, it still may be too low if more recent cohorts in fact will be experiencing more dispersion than earlier cohorts. Therefore, future refinements of the model might consider explicit ways of modeling the dispersion of wealth.

Other Issues

In addition to the concern about variance, there are a number of other areas where further refinement of the model might be desirable.

Definition of the Earnings Variable. In the general reduced form framework, differences in the path of earnings must be an important determinant of differences among individuals in wealth accumulation. Our choice in using the last five years of earnings in our estimation equation was not entirely arbitrary, because observations on the PSID were spaced at five year intervals, but other measures could result in improved estimates, particularly for later cohorts. The choice of the previous five years of earnings was certainly appropriate for the earlier cohorts, where the projection horizon was quite short and observations on wealth were available.

Age-Wealth Profile. Our estimates assume a quadratic relationship between age and wealth. The coefficient of age and age-squared imply that wealth increases monotonically with age until well past age 67 and is inconsistent with the life cycle model and with data showing that wealth begins to decline at much younger ages than implied by our coefficients. In part, this reflects the fact that the coefficient on earnings is picking up the effects of age for individuals over age 55 whose projected earnings are falling with age. Consequently, the coefficients on age and age-squared do not reveal the aggregate relationship between wealth and age in our projections, but only show the partial effect of age with all other variables constant.

Nonetheless, a more detailed specification with dummy variables may better capture the shape of the age-wealth relationship. Appendix 4-C discusses the effects of using alternative functional forms for the age variable in the estimating equation.

Housing Wealth. Our procedure for projecting housing wealth should most likely be reconsidered, especially for those individuals who change marital status during the projection period. There is a difficult trade-off here, because we would like the projection method to be consistent with the underlying SIPP data file with respect to home-ownership and housing wealth. Our assumptions about homeownership are probably more defensible for earlier cohorts.

Two adjustments to our methodology are worth considering. First, we need to model the effects of divorce on homeownership. The current model assumes that both individuals remain homeowners after a divorce, but that is likely not the case for many divorcing home-owning couples. Second, we need to capture better the changes in aggregate homeownership by relaxing the assumption that homeownership incidence among later cohorts at age 62 and 67 will be the same as the incidence of homeownership among 62 and 67 year olds in the 1990-93 SIPP files. This would require developing a two-stage process to project total homeownership and then to assign probabilities of changing homeownership status among younger non-owners in the SIPP files.

APPENDIX A
ALTERNATIVE ECONOMETRIC SPECIFICATIONS

In the early phase of the project, we experimented with four different specifications of the projection equations. This appendix presents results from the four specifications we estimated. The dependent variable in each equation is the natural logarithm of other (non-pension) wealth.

Preliminary testing of equations similar to the one reported in the text revealed several characteristics of the underlying data that could necessitate the use of specifications other than ordinary least squares. First, a significant number of families (about 12 percent) reported zero or negative wealth on the PSID. This clustering is likely to bias regression coefficients estimated using OLS. Second, OLS ignores individual-specific effects, and persistence in individual wealth holdings over time could create a bias in the estimates of β. Third, the data included small number of households with very large wealth. These households could excessively influence the results, making the equations worse predictors of the age-wealth profiles of most households.

To address these issues, we tested four different general specifications:

1) *Ordinary least squares*. OLS was used on the pooled observations for each year in which non-zero wealth was observed.

2) *Quantile (median) regression*. A median regression was estimated on the pooled data with non-zero wealth. This is equivalent to minimizing the sum of the absolute deviations of the residuals and reduces the effect of outliers.

3) *Random effects model*. A random effects model was estimated to isolate the individual-specific effect contained in the μ_i. Because the PSID represents a random sample from a larger population, we chose this specification over the fixed effects model.

4) *Tobit model*. A Tobit model was estimated on the pooled data using zero as the truncation point. (A few households with negative reported wealth were assumed to have zero wealth.)

Parameter estimates from the first three models are quite similar. Estimates from the Tobit specification, however, are often very different. For example, coefficients on the age and age-squared terms reverse sign. This suggests that the process generating whether or not a family has positive wealth may be quite different than the process generating the amount of this wealth, conditional on it being positive. As a result of this preliminary analysis, we chose a two-stage approach for predicting wealth where the probability of having non-zero wealth was estimated in the first stage via a probit specification and a random effects model was used in the second stage.

Table 4-A-1
OLS Estimates of Non-Pension Wealth

Source	SS	df	MS
Model	22199.2425	24	924.968436
Residual	45321.3674	17312	2.61791632
Total	67520.6099	17336	3.8948206

Number of obs	=	17337
F(24, 17312)	=	353.32
Prob > F	=	0.0000
R-squared	=	0.3288
Adj R-squared	=	0.3278
Root MSE	=	1.618

lnwlth1	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ageh	.0293287	.0063319	4.632	0.000	.0169176	.0417397
agesqu	-.0001017	.0000625	-1.628	0.104	-.0002242	.0000208
ageyms	-.0124633	.0034931	-3.568	0.000	-.0193101	-.0056165
married	.3054901	.0533615	5.725	0.000	.2008962	.410084
divorce	-.2874366	.0483523	-5.945	0.000	-.382212	-.1926612
white	.8109704	.035016	23.160	0.000	.7423356	.8796053
male	.2800115	.0415374	6.741	0.000	.1985941	.361429
famsize	-.099161	.0108279	-9.158	0.000	-.1203847	-.0779372
health	.4029935	.0334959	12.031	0.000	.3373381	.4686489
wdelta	.0001253	.0000996	1.258	0.208	-.0000699	.0003204
stockpct	.1616533	.032601	4.959	0.000	.0977521	.2255546
c01	-.1050892	.0619348	-1.697	0.090	-.2264876	.0163092
c02	.0664632	.0654669	1.015	0.310	-.0618586	.194785
c03	.1286764	.0596457	2.157	0.031	.0117647	.2455881
c04	.1323134	.0506834	2.611	0.009	.0329689	.231658
c05	-.032133	.0446253	-0.720	0.471	-.1196031	.0553371
c06	-.06463	.0410617	-1.574	0.116	-.1451151	.0158552
y1984	-1.233218	.0422172	-29.211	0.000	-1.315968	-1.150468
y1989	-.9799199	.0411001	-23.842	0.000	-1.06048	-.8993595
avew5	.0228808	.0006181	37.017	0.000	.0216692	.0240923
twoearn	-.1421335	.0372968	-3.811	0.000	-.215239	-.0690279
tenure	.722499	.0296725	24.349	0.000	.6643379	.78066
pension	.3633051	.0402741	9.021	0.000	.2843638	.4422463
widowed	-.2395633	.064252	-3.728	0.000	-.3655037	-.1136229

Table 4-A-2
Median Regression Estimates of Non-Pension Wealth

Median Regression Number of obs = 17337
Raw sum of deviations 27014.95 (about 9.595603)
Min sum of deviations 21281.79 Pseudo R2 = 0.2122

lnwlth1	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ageh	.0304047	.0059682	5.094	0.000	.0187064	.042103
agesqu	-.0000824	.0000589	-1.399	0.162	-.0001978	.0000331
ageyms	-.0132126	.0032915	-4.014	0.000	-.0196642	-.006761
married	.2645963	.0502888	5.262	0.000	.1660251	.3631675
divorce	-.3671339	.0455654	-8.057	0.000	-.4564467	-.2778211
white	.6731704	.0330151	20.390	0.000	.6084576	.7378833
male	.2934008	.0391512	7.494	0.000	.2166606	.370141
famsize	-.1300097	.0101866	-12.763	0.000	-.1499765	-.110043
health	.3329332	.0315724	10.545	0.000	.2710482	.3948182
wdelta	5.43e-06	.0000834	0.065	0.948	-.000158	.0001688
stockpct	.8716776	.0307422	28.354	0.000	.8114198	.9319353
c01	-.0048528	.0583433	-0.083	0.934	-.1192116	.109506
c02	.1329323	.0617135	2.154	0.031	.0119677	.253897
c03	.0876548	.0561895	1.560	0.119	-.0224823	.1977919
c04	.1070763	.0477803	2.241	0.025	.013422	.2007305
c05	-.0128076	.0420651	-0.304	0.761	-.0952595	.0696442
c06	-.0290027	.0387059	-0.749	0.454	-.1048702	.0468648
y1984	-1.064694	.0397995	-26.751	0.000	-1.142705	-.986683
y1989	-.832094	.0387503	-21.473	0.000	-.9080486	-.7561394
avew5	.0225327	.0005827	38.670	0.000	.0213906	.0236748
twoearn	-.176531	.0351404	-5.024	0.000	-.2454097	-.1076523
tenure	.6027899	.0279755	21.547	0.000	.547955	.6576247
pension	.4015276	.0379641	10.577	0.000	.3271142	.475941
widowed	-.2809615	.0605508	-4.640	0.000	-.3996471	-.1622759
_cons	7.804974	.127691	61.124	0.000	7.554687	8.055261

Table 4-A-3
Random Effects Estimates of Non-Pension Wealth

```
sd(u_entryid)                =  1.225467              Number of obs =    17335
sd(e_entryid_t)              =  1.092338                          n =     9486
sd(e_entryid_t + u_entryid)  =  1.641637                      T-bar =   1.4622
corr(u_entryid, X)           =  0 (assumed)           R-sq within   =   0.1410
                                                           between  =   0.3248
                                                           overall  =   0.3226
------------------- theta --------------------
  min      5%       median        95%      max        chi2( 24)      = 5635.36
0.3346   0.3346     0.4668     0.5424   0.5424          Prob > chi2 =   0.0000

------------------------------------------------------------------------------
 lnwlth1 |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
    ageh |   .0495983    .006522      7.605   0.000       .0368155    .0623812
  agesqu |  -.0003203   .0000643     -4.984   0.000      -.0004463   -.0001944
  ageyms |  -.0072291   .0030406     -2.378   0.017      -.0131886   -.0012696
 married |   .3060794   .0548955      5.576   0.000       .1984861    .4136727
 divorce |   -.273879   .0523051     -5.236   0.000      -.3763951    -.171363
   white |   .5943649   .0348283     17.066   0.000       .5261028     .662627
    male |   .3511839   .0464772      7.556   0.000       .2600904    .4422775
 famsize |  -.0716045   .0108979     -6.570   0.000      -.0929639    -.050245
  health |   .2239798    .030401      7.368   0.000       .1643949    .2835648
  wdelta |   .0001821   .0000832      2.189   0.029        .000019    .0003451
stockpct |   .0855346   .0290275      2.947   0.003       .0286418    .1424275
     c01 |  -.1201581   .0781493     -1.538   0.124      -.2733279    .0330117
     c02 |   .0376976   .0822243      0.458   0.647      -.1234592    .1988543
     c03 |   .1064208   .0731327      1.455   0.146      -.0369166    .2497583
     c04 |   .1182982   .0610065      1.939   0.052      -.0012724    .2378688
     c05 |  -.0598341   .0536091     -1.116   0.264      -.1649061    .0452378
     c06 |  -.1115107   .0491453     -2.269   0.023      -.2078336   -.0151877
   y1984 |  -.9818571   .0383334    -25.614   0.000      -1.056989   -.9067251
   y1989 |  -.7354849   .0362926    -20.265   0.000      -.8066171   -.6643527
   avew5 |   .0177455   .0006353     27.930   0.000       .0165003    .0189908
 twoearn |  -.0647489   .0358629     -1.805   0.071       -.135039    .0055411
  tenure |   .5612197   .0295709     18.979   0.000       .5032617    .6191776
 pension |   .2909765   .0381639      7.624   0.000       .2161765    .3657764
 widowed |   -.110072   .0720228     -1.528   0.126       -.251234    .0310901
   _cons |   7.319754   .1396728     52.406   0.000          7.046    7.593507
```

Table 4-A-4
TOBIT Estimates of Non-Pension Wealth

Tobit Estimates

Number of obs = 22657
chi2(24) =8064.97
Prob > chi2 = 0.0000
Log Likelihood = -56559.635
Pseudo R2 = 0.0666

lnwlth1	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ageh	-.0503349	.0159612	-3.154	0.002	-.08162	-.0190497
agesqu	.0007053	.0001584	4.453	0.000	.0003948	.0010157
ageyms	.0152987	.0093019	1.645	0.100	-.0029337	.033531
married	1.515099	.131916	11.485	0.000	1.256535	1.773664
divorce	.700743	.1126127	6.223	0.000	.4800144	.9214717
white	2.243521	.0871913	25.731	0.000	2.07262	2.414422
male	1.291132	.0995466	12.970	0.000	1.096014	1.48625
famsize	-.2712382	.0263218	-10.305	0.000	-.3228307	-.2196457
health	.8901867	.0853516	10.430	0.000	.7228917	1.057482
wdelta	.0005052	.0002812	1.797	0.072	-.0000459	.0010564
stockpct	.9972555	.0919571	10.845	0.000	.8170133	1.177498
c01	-.0017042	.1602294	-0.011	0.992	-.3157648	.3123565
c02	.0982653	.1685484	0.583	0.560	-.2321011	.4286318
c03	.4778047	.1553428	3.076	0.002	.1733222	.7822871
c04	.3200034	.1316745	2.430	0.015	.0619124	.5780943
c05	.0210909	.1128943	0.187	0.852	-.2001896	.2423714
c06	.0371084	.1023157	0.363	0.717	-.1634374	.2376542
y1984	-1.706617	.1023238	-16.679	0.000	-1.907178	-1.506055
y1989	-1.771994	.0997258	-17.769	0.000	-1.967464	-1.576525
avew5	.0438894	.0016842	26.059	0.000	.0405882	.0471906
twoearn	.0210249	.0981525	0.214	0.830	-.1713607	.2134105
tenure	2.527377	.0752069	33.606	0.000	2.379967	2.674788
pension	.8647954	.1055722	8.192	0.000	.6578667	1.071724
widowed	.9110909	.1559956	5.840	0.000	.6053288	1.216853
_cons	3.746167	.3381798	11.077	0.000	3.083311	4.409023
_se	4.57969	.0264857		(Ancillary parameter)		

APPENDIX B
ALTERNATIVE SPECIFICATION OF AGE EFFECTS

In order to capture life-cycle effects of saving and wealth accumulation, we included variables in our regression equation to represent the age of the family head and age-squared. The squared term was added to capture the fact that wealth should, at some point in the life-cycle, turn downward as households begin to dissave in retirement. Our parameter estimates had the appropriate signs -- a positive coefficient on age and a negative coefficient on age-squared. Both were statistically significant at a 95 percent confidence level.

Our estimates of the (mean) age-wealth profile implicit in the parameter estimates suggest, however, that the ages at which housing and other wealth begins to decline is quite high -- about 81 years for housing wealth and 92 for other wealth. This means that, *all other things equal*, no one decumulates wealth until very late in life, a situation not observed in the cross-sectional data on the distribution of wealth by age. Our projections do show wealth declining earlier than the age coefficients themselves imply because the equations include an earnings term that causes wealth to be lower as earnings decline in the latter part of the average earner's working life.

In order to test the sensitivity of the estimates to the specification of age, we re-estimated the equations for housing and other wealth and substituted dummy variables for age in place of age and age-squared. The results of these new equations are shown in Tables B-1 and B-2 below. We included 11 dummy variables to capture these age effects. AGE01 was set equal to one if the family head was under 31 years of age (this variable was dropped from the estimation) and zero otherwise. AGE02 through AGE10 were set equal to one if the family head was, respectively, between 31 and 35, 36 and 40, 41 and 45, and so forth up to ages 71 and 75. AGE11 was set to one if the family head was older than 75. We also included interaction terms to capture the effects of age and earnings. These variables are labeled AE01-AE11.

The use of dummy variables in place of the quadratic functional form does not appear to have a significant effect on the partial relationship between age and wealth, with all other variables constant. We compared the two functional forms by calculating for each equation the percentage change in non-housing wealth between ages 45 and 65, with all other explanatory variables fixed. With the quadratic form, wealth at age 65 is 51.28 percent higher than wealth at age 45. Using a series of age dummies, as in the equations in this appendix, the change in wealth between ages 45 and 65 is 51.34%, or virtually the same as with the quadratic functional form.

Table 4-B-1
Projection Equation for Housing Wealth With Dummy Variables for Age

```
                                                    Random-effects GLS regression
sd(u_entryid)                =   .846745                  Number of obs =    11730
sd(e_entryid_t)              =  .6142938                              n =     6324
sd(e_entryid_t + u_entryid)  =  1.046104                          T-bar = 1.47918

corr(u_entryid, X)           =  0 (assumed)               R-sq within   =  0.1786
                                                               between  =  0.2058
                                                               overall  =  0.2247
------------------- theta --------------------
  min      5%       median        95%      max            chi2( 35)     = 2805.39
0.4128   0.4128     0.5436     0.6137   0.6137              Prob > chi2 =  0.0000
```

lnhomeq	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ageyms	-.0004017	.0019918	-0.202	0.840	-.0043057	.0035022
married	-.0470029	.0527931	-0.890	0.373	-.1504755	.0564697
divorce	-.211301	.0529906	-3.988	0.000	-.3151607	-.1074413
white	.2524143	.0269492	9.366	0.000	.1995948	.3052337
male	.0805786	.04184	1.926	0.054	-.0014262	.1625835
famsize	.030349	.0083549	3.632	0.000	.0139737	.0467244
age02	.3656104	.05828	6.273	0.000	.2513837	.4798371
age03	.6702154	.0585753	11.442	0.000	.55541	.7850208
age04	.7799013	.0613748	12.707	0.000	.659609	.9001937
age05	.9206856	.0649748	14.170	0.000	.7933374	1.048034
age06	1.133275	.0658443	17.211	0.000	1.004223	1.262328
age07	1.204261	.0653608	18.425	0.000	1.076156	1.332366
age08	1.264167	.0636573	19.859	0.000	1.139401	1.388933
age09	1.427201	.0629528	22.671	0.000	1.303816	1.550586
age10	1.341704	.0657857	20.395	0.000	1.212766	1.470641
age11	1.394973	.0679068	20.542	0.000	1.261879	1.528068
ae02	-.0037812	.0366009	-0.103	0.918	-.0755177	.0679553
ae03	-.0757764	.0359853	-2.106	0.035	-.1463062	-.0052465
ae04	-.0323214	.03655	-0.884	0.377	-.103958	.0393153
ae05	-.0361541	.0381466	-0.948	0.343	-.1109201	.038612
ae06	-.0793206	.0401837	-1.974	0.048	-.1580791	-.0005621
ae07	-.0294227	.0416848	-0.706	0.480	-.1111234	.052278
ae08	-.0074866	.0424819	-0.176	0.860	-.0907495	.0757763
ae09	-.1540036	.053162	-2.897	0.004	-.2581991	-.0498081
ae10	-.0499875	.1014364	-0.493	0.622	-.2487993	.1488242
ae11	-.0942115	.1664143	-0.566	0.571	-.4203776	.2319545
health	.1104692	.021613	5.111	0.000	.0681086	.1528298
wdelta	.0954425	.0140088	6.813	0.000	.0679858	.1228993
stockpct	.0708702	.0164786	4.301	0.000	.0385728	.1031676
y1984	-.4759873	.0288525	-16.497	0.000	-.5325371	-.4194375
y1989	-.3509022	.0268493	-13.069	0.000	-.4035258	-.2982785
avew5	.2578843	.0321052	8.032	0.000	.1949593	.3208093
twoearn	-.0900857	.0262903	-3.427	0.001	-.1416138	-.0385577
pension	.2130511	.0256052	8.321	0.000	.1628659	.2632363
widowed	-.1118281	.0597046	-1.873	0.061	-.228847	.0051907
_cons	-.8272929	.0640202	-12.922	0.000	-.9527702	-.7018156

Table 4-B-2
Projection Equation for Other Wealth with Dummy Variables for Age

```
                                                   Random-effects GLS regression
sd(u_entryid)                =  1.205792                 Number of obs =    17335
sd(e_entryid_t)              =  1.093757                             n =     9486
sd(e_entryid_t + u_entryid)  =  1.627956                         T-bar =  1.4622

corr(u_entryid, X)           =  0 (assumed)              R-sq within   =  0.1418
                                                              between  =  0.3388
                                                              overall  =  0.3277
------------------- theta --------------------
  min      5%      median        95%      max            chi2( 36)     = 5902.54
0.3281   0.3281     0.4601     0.5361   0.5361             Prob > chi2 =  0.0000
```

lnvwlth1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ageyms	-.009167	.0031227	-2.936	0.003	-.0152874	-.0030465
married	.2289664	.0549988	4.163	0.000	.1211708	.3367621
divorce	-.2686803	.0518607	-5.181	0.000	-.3703254	-.1670353
white	.5603245	.0347573	16.121	0.000	.4922014	.6284476
male	.305683	.0462173	6.614	0.000	.2150988	.3962671
famsize	-.0553805	.0110676	-5.004	0.000	-.0770725	-.0336885
age02	.2189216	.061184	3.578	0.000	.0990032	.3388399
age03	.4133094	.0669148	6.177	0.000	.2821587	.5444601
age04	.5876249	.0738286	7.959	0.000	.4429234	.7323264
age05	.7478025	.082601	9.053	0.000	.5859075	.9096975
age06	.6679172	.0865916	7.713	0.000	.4982008	.8376336
age07	.9032182	.0863747	10.457	0.000	.7339269	1.072509
age08	1.002014	.0829289	12.083	0.000	.8394768	1.164552
age09	1.127883	.0803806	14.032	0.000	.9703399	1.285426
age10	1.140505	.0837755	13.614	0.000	.9763084	1.304702
age11	1.222803	.0850703	14.374	0.000	1.056068	1.389538
ae02	-.0080804	.0430363	-0.188	0.851	-.09243	.0762691
ae03	-.0260821	.0435074	-0.599	0.549	-.111355	.0591908
ae04	-.0373977	.045359	-0.824	0.410	-.1262998	.0515044
ae05	-.008029	.0489515	-0.164	0.870	-.1039722	.0879142
ae06	.0357198	.0535514	0.667	0.505	-.069239	.1406785
ae07	.0076826	.0570606	0.135	0.893	-.104154	.1195193
ae08	-.0557424	.0592061	-0.941	0.346	-.1717843	.0602994
ae09	.1495142	.0798942	1.871	0.061	-.0070755	.3061039
ae10	.0050059	.1588551	0.032	0.975	-.3063444	.3163563
ae11	.1215177	.2578508	0.471	0.637	-.3838605	.626896
health	.1789965	.0301379	5.939	0.000	.1199274	.2380656
wdelta	.348186	.0205226	16.966	0.000	.3079625	.3884095
stockpct	.0783248	.0289695	2.704	0.007	.0215456	.1351041
y1984	-.917398	.0387157	-23.696	0.000	-.9932795	-.8415165
y1989	-.7235808	.0364028	-19.877	0.000	-.7949289	-.6522326
avew5	.5957117	.0365947	16.279	0.000	.5239873	.667436
twoearn	-.1125771	.037173	-3.028	0.002	-.1854349	-.0397193
tenure	.5313395	.0295915	17.956	0.000	.4733413	.5893376
pension	.3932966	.0391116	10.056	0.000	.3166393	.4699539
widowed	-.163029	.0719575	-2.266	0.023	-.3040631	-.0219949
_cons	-1.975892	.0584115	-33.827	0.000	-2.090377	-1.861408

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CHAPTER 4: ENDNOTES

1. This differs slightly from the way cohorts are defined in other tables presented in this report, where the first cohort begins in 1931.

2. Including age, time and cohort effects results in an equation that is over-determined since, by definition, t = a + c where t equals time, a equals age and c is cohort (year of birth). Perfect collinearity was not present in the estimated model because the cohort dummies were defined in broad, 5-year age groups. Nevertheless, the estimates of the cohort effects need to be interpreted with caution.

3. For a small number of families with negative wealth, we set these values to zero.

4. This seems like a reasonable assumption to make for housing wealth. That is, it is unlikely that someone who did not own a home at age 62 would purchase one by age 67. This assumption had very little effect on the results.

CHAPTER 5

PROJECTIONS OF RETIREMENT DECISION

I. OVERVIEW

For nearly eight percent of the MINT sample, administrative data provide information on timing of first receipt of old-age and survivor benefits from Social Security.[1] For the remainder of the MINT population, a statistical model assigns timing of Social Security benefit receipt. This model combines both stochastic (equation-based) and deterministic (rule-based) functions. The deterministic functions mandate benefit receipt for low-earning widows and widowers who are widowed at or before age 60 or 61.[2] For those in the population who are not low-earning widowers thus defined, logistic equations determine each individual's probability of receiving Social Security at each age *t* between 62 and 67 given that he/she did not receive benefits at age *t-1*. The logistic equations are reduced-form rather than structural in nature. That is, instead of directly relying on rules about optimizing behavior near retirement, they capture the existing relationship between an individual's benefit receipt timing and aspects of his/her life trajectory (e.g., educational, marital, and earnings history) and fixed characteristics (e.g., sex).[3] The equations were estimated from Survey of Income and Program Participation (SIPP) data matched to Summary Earnings Records (SER) and the Social Security Administration's Master Beneficiary Record (MBR). The SIPP panels used for estimation included 1990 through 1993.

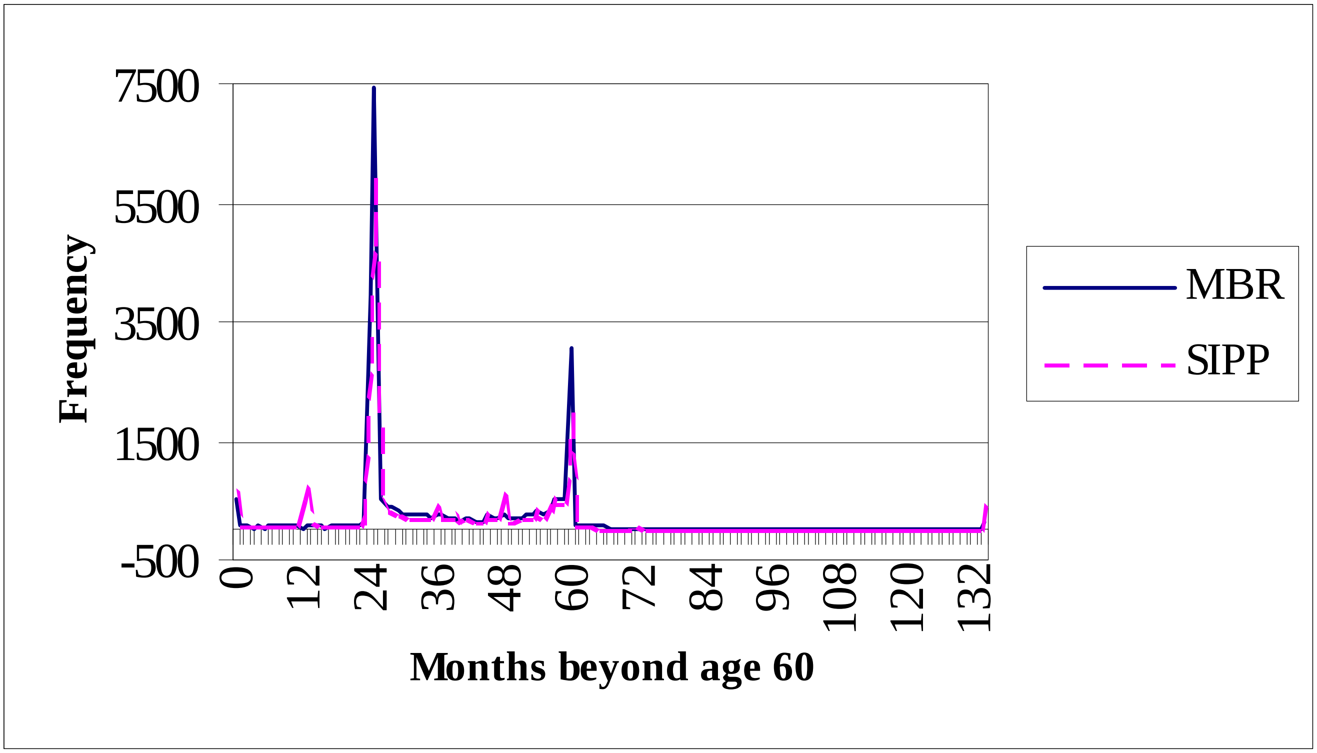
II. TIMING OF RECEIPT OF SOCIAL SECURITY RETIREMENT BENEFITS

1. Estimation Strategy

We estimated separate logistic equations for three groups--married males, married females, and unmarried males and unmarried females pooled together.[4] We screened individuals in the sample for receipt of Social Security disabled worker benefits based on the payment dates that the Master Beneficiary file reports, and excluded any individuals who had, to date, received disabled worker benefits from the population. Such cases made up just over five percent of the total number of person-year observations. Sample sizes for nondisabled members of the three final estimation groups were as follows: 2,808 person years at risk for currently married men; 2,283 person years at risk for currently married women; and 2,147 person years at risk for men and women who were not currently married.

To estimate the equations, we examined SIPP participants late in the year of each single year of age from age 62 onward to see if they had, according to MBR data, begun to receive Social Security benefits in that year.[5] Figure 5-1, based on SIPP and MBR data, shows patterns

Figure 5-1
Month of First Benefit Entitlement,
Where First Entitlement is Age 60 or Above,
Using SIPP and MBR Birthdates



Source: Urban Institute tabulation from 1990-1993 SIPP matched to the 1990-1993 MBR (462 cases unmatched)
Sample: Individuals who, according to SIPP birthdate, reach any age between 61 and 70 at any point during the life of the panel
MBR N=26,867 (7,768 cases missing, 283 cases with invalid dates of first receipt, 2,827 early recipients)
SIPP N=24,040 (10,221 cases missing, 0 cases with invalid dates of first receipt, 3,946 early recipients)

of Social Security receipt for persons in the estimation data. The figure reveals that Social Security benefit receipt is highly clustered around one's birth date at ages 62 (24 months beyond age 60) and 65 (60 months beyond age 60). (The figure also illustrates an important measurement issue that both endnote one and Appendix A discuss.) Because the unit of analysis is a person-year, a single person could be represented in the estimation file more than once (to a maximum of four times, in the 1991 panel which tracked some households for up to 40 months). About 88 percent of the person-year observations from SIPP were matched to an earnings record. Those observations for which a match was not obtained were then dropped from the sample. Also excluded were those individuals who took up their Social Security benefits at age 60 or 61, given that they are, as described above, excluded from the stochastic determination process.

To replicate the actual benefit application process as closely as possible, we attempted to screen the sample for eligibility for Social Security retirement benefits, based on SER information on both one's own and one's current spouse's OASDI coverage history and any other evidence of Social Security benefit eligibility. We abandoned this effort for three reasons. First, exactly defining the Social Security-eligible population based on the SIPP-match files was not possible, because not all former spouses of members of the sample can be observed. Second, the crude eligibility screen greatly diminished sample sizes. Third, eliminating the screen did not cause major changes to parameter estimates.[6]

Most determinants in the descriptive prediction equations are contemporaneous, although in some cases we used lagged values. Explanatory variables within each group include age (coded as single-year dummies), education (coded categorically), and measures of earnings, income, and wealth, all of which are expressed in relation to the average national wage. Earnings measures include covered earnings at year t-1,[7] average covered earnings in younger working years (ages 35 to 55), and recent covered earnings (from ages 56 to 61). Whether one is covered by either a defined benefit (DB) pension or a defined contribution (DC) retirement account (e.g., an IRA, Keogh, or 401(k) plan) is another determinant in the equations.[8] Other wealth measures in the model include family net worth less home value and home equity, sometimes coded as a dummy variable indicating whether this is greater than zero and other times the actual value. Preliminary estimates considered asset income, but the direct wealth measures just described are more consistent with the estimates in Chapter Four. An indicator of race-ethnicity, specifically a dummy variable for non-Hispanic whites versus others, is also included in the models.

For individuals who were married in the month of potential Social Security receipt, additional variables in the logistic equations describe the spouse's characteristics, including his/her age, earnings history, education, and wealth, including pension coverage. The spouses of members of the estimation sample were born as early as 1908 and as late as 1970. As a result, a spouse's earnings could always be examined at t-1, but information was not always available on her/his average earnings from the ages 35 to 55. Where spouses were too old to have reported earnings from this age range, we used their earnings from the years 1951 to 1971 as a proxy. Where spouses were too young, we took their 20 most recent years of earnings (through 1996).

Preliminary regressions suggested that several additional variables are good predictors of the timing of receipt of Social Security benefits. These include the duration of one's most recent work spell (i.e., how long it has been since one had a zero earnings year) and one's total number of years in the labor force, both of which can be considered measures of attachment to the labor force and perhaps "taste" for work. We have not included these in the current MINT model because the approach for forecasting earnings trajectories in MINT that Chapter Two describes, while effective at generating AIMEs, is not particularly effective at generating realistic patterns of spells of work/not work in employment histories. This choice may be worthy of re-consideration at some future point in MINT's development.

2. Coefficient Estimates

Table 5-1 reports the logistic estimates for the final models for the three separate groups, including the standard errors and significance levels for each coefficient. Coefficients from the equations can be interpreted as the effects of each variable on the *log-odds* of taking up Social Security benefits at age t given non-receipt at age t-1.

The results in Table 5-1 suggest that across all three of these groups, age, earnings, and race-ethnicity are consistently strong predictors of timing of Social Security benefit receipt. Age has non-linear effects on the probability of receipt, with individuals generally more likely to retire at ages 62 and 65 than at 63, 64, and older ages, all else being equal. Both social norms and incentives (e.g., eligibility for Medicare at age 65) contribute to this pattern. While earnings between ages 35 and 55 and between ages 56 and 61 are both positively associated with the likelihood of benefit receipt (i.e., the higher the average earnings, the greater the likelihood of collecting Social Security) for nearly all groups, earnings at t-1 are negatively associated with receipt. This pattern is sensible, since those with higher lifetime earnings have greater resources from which to draw, making a comfortable retirement more likely, yet those continuing to work beyond age sixty both demonstrate higher current earning ability and have already exhibited that they are less likely to retire for some unobservable reason (perhaps a "taste" for work, as described above). For all three groups, those persons who are non-Hispanic whites begin benefit receipt at a significantly faster rate than those who are not (i.e., Hispanic whites and nonwhites), other factors being equal.

In these estimates, whether one is covered by a pension has differing effects on Social Security benefit take-up across the groups. Pensions represent resources from which a person can draw in retirement, but they also might suggest characteristics of one's employer. While pension coverage serves to accelerate married men's retirement timing, it serves to decelerate married women's retirement timing. For married women, a spouse's pension coverage, does, however, increase the probability of starting Social Security receipt, though not significantly. For single people, pension coverage does has a positive coefficient (implying that coverage makes Social Security retirement more likely), though the relationship with benefit take-up is not statistically significant at the .05 level.

Table 5-1
Logistic Regression Coefficients Currently Employed in MINT: Social Security Benefit Receipt Timing

Variable	Parameter Estimate (Standard Error)		
	Married Men (N=2808)	**Married Women (N=2283)**	**Unmarried People (N=2147)**
Intercept	-2.3859** (0.5465)	-2.2842** (0.7561)	-0.5755** (0.1601)
Age 63	-1.1243** (0.1304)	-1.6080** (0.1448)	-1.3359** (0.1456)
Age 64	0.3890** (0.1235)	-0.5367** (0.1418)	-0.4756** (0.1322)
Age 65	1.4978** (0.1621)	-0.1443 (0.1763)	0.5582** (0.1508)
Age 66	-0.2732 (0.2488)	-1.2332** (0.2456)	-1.1512** (0.2243)
Age 67	-0.8792** (0.3017)	-1.2641** (0.2532)	-0.5951** (0.1961)
Education < 12	0.1340 (0.1250)	-0.1014 (0.1349)	0.2210 (0.1227)
Education > 12	-0.1702 (0.1174)	-0.0927 (0.1251)	-0.1775 (0.1201)
Non-Hispanic white	0.4141** (0.1491)	0.3157* (0.1473)	0.4088** (0.1180)
Have any pension?	0.3292** (0.1067)	-0.3119** (0.1109)	0.0299 (0.1087)
Earnings ages 35-55	1.6485** (0.1455)	1.4474** (0.2427)	0.9120** (0.1728)
Earnings ages 56-61	0.3440** (0.1277)	0.2942 (0.2464)	0.0851 (0.1736)
Earnings at t-1	-1.4664** (0.1004)	-1.7848** (0.2207)	-0.7840** (0.1380)
Spouse’s age	0.0133 (0.00869)	0.0289** (0.0112)	
Spouse’s education < 12	0.1104 (0.1255)	0.1953 (0.1379)	
Spouse’s education > 12	-0.1012 (0.1162)	-0.1495 (0.1285)	
Spouse’s earnings 35-55	0.3421* (0.1534)	1.0697** (0.1061)	
Spouse’s earnings at t-1	-0.1654 (0.1121)	-0.5266** (0.0703)	
Spouse has a pension?		0.1381 (0.1149)	
Male			-0.1172 (0.1143)
Widowed			0.1542 (0.1015)
Log value of non-housing wealth	-0.0155 (0.0524)		
Own a home			-0.0441 (0.1042)
Value of home	-0.0257 (0.0148)		

* indicates p<.05; ** indicates p<.01

Once earnings and pensions are taken into account, education has little to no effect on the timing of Social Security benefit receipt. Married men and single persons with less than a high school education are more likely to start Social Security retirement than are their counterparts with a high school degree (the omitted category), and more educated persons in all three groups, those with greater than a high school education, are less likely to begin receipt than their less well-educated colleagues. However, none of these relationships is statistically significant. If the coefficients were significant, such patterns would not be surprising, as education is likely to be highly correlated with the prospect of having a rewarding job. For married women in these cohorts, however, there is a somewhat different relationship between education and benefit receipt timing. For them, the less-educated are less likely than the high school graduates to retire, though again we cannot say with any confidence that this coefficient differs from zero. As married women's educational and earnings trajectories begin to resemble married men's more closely, the factors influencing women's decisions about Social Security may change. This case illustrates the general difficulties that one faces using estimates from data on current workers in their sixties to project patterns for workers who will enter their sixties in the next century.[9]

A spouse's mid-career earnings (again, measured from age 35 to 55, with exceptions noted above) appear to have a significant, positive influence on the likelihood of benefit receipt of both married men and married women in these cohorts. A spouse's lagged earnings are also quite important for both husbands' and wives' benefit timing, negatively associated with receipt (though the coefficient is not significant for the married men). Among both married men and married women, a spouse's age appears to play a minor role in this process: the older one's spouse, the more likely a person is to begin receiving benefits, though this coefficient was not statistically significant for the married men. A spouse's education does not have significant effects on married persons' Social Security take-up net of these other factors, though the signs mirrored the effects for a person's own education (the likelihood of receipt decreases with more education).

We found that measures of family wealth had negligible effects on the timing of Social Security benefit receipt once all these other elements were taken into account.[10] Likewise, housing wealth had only marginally significant effects. Overall, individuals' earnings and, implicitly, the Social Security wealth that they generate thus appear far more important to this process than other forms of wealth.

3. Simulation of Eligibility Screen

These three equations were applied to a subset of the MINT population that was screened for OASDI eligibility, based upon the individual's and, where applicable, his/her spouse's quarters of Social Security coverage. To screen for eligibility, we compute a Primary Insurance Amount (PIA) for each person in the sample. If the PIA is above zero, then he or she is eligible to retire in his/her own right. We also check, where applicable, each person's current or past Social Security-qualified spouse or spouses. If a person is not currently married (or was widowed but remarried after age 60) and he or she has had more than one Social Security qualifying marriage, we examine multiple past spouses for a non-zero PIA that would render the person qualified for benefits.

4. Assignment of Retirement Timing with Scheduled Increases in the Normal Retirement Age

As these equations were estimated on recent SIPP data, they depict patterns of Social Security benefit timing under the current Social Security system, in which the Normal Retirement Age is set at 65 and the Age of Earliest Eligibility is set at 62. For the sake of simplicity and closer integration with other aspects of the model, in the projections we assume that workers elect to receive their benefits by or at the ultimate Normal Retirement Age (67). Although this has clearly never been the case historically, it is true that only a small fraction of past workers, around six percent in recent years, have elected to receive their benefits after the Normal Retirement Age. Model users might consider extending the sample to include people at risk up to age seventy, the point at which the benefit of delaying benefit receipt falls to zero. We have re-estimated the equations to include more people (i.e., those who still have not applied for Social Security benefits at ages 67 through 69), thus allowing MINT users to relax the assumption of universal receipt by age 67 in future work. Table 5-A-3 in the appendix presents sample estimates of logistic coefficients where the age of first receipt is not capped at 67, but rather at age 69.

Some of the birth cohorts of greatest interest for MINT will begin to receive Social Security benefits after 1999, and will thus face a Normal Retirement Age that will be higher than age 65 but an Age of Earliest Eligibility that will be set at the same level as today (62). (Table 7-A-1 in Chapter Seven depicts the scheduled increases in the Normal Retirement Age, by birth cohort.) Applying the SIPP equations to populations that will face a different set of Social Security rules is surely problematic. Unfortunately, we cannot directly estimate the effects of the Normal Retirement Age (or changes to the NRA) on retirement benefit receipt timing patterns because it has not varied in the years for which we have reliable data.[11] We must therefore instead make assumptions, ideally guided by theory and empirical research, about whether changes in retirement behavior will accompany this change in policy and, if so, how large these changes would be. While we have made the implicit assumption that changes will be negligible, there are several ways that we could modify this assumption.

A first way to modify this assumption would be simply to adjust the coefficients on the age terms in the projection in an *ad hoc* fashion to achieve a targeted level of behavioral adjustment. One could, for example, use estimates of behavioral response from the Social Security Office of the Chief Actuary to set these targets.

Using expected Social Security benefits or Primary Insurance Amounts rather than lifetime earnings as explanatory variables in these equations is another feasible, and perhaps more satisfying but nonetheless still *ad hoc*, way to extend the model and modify this assumption.[12] Such an approach would both capture the non-linear replacement of income by Social Security and also allow us to account explicitly for changes in future Social Security benefits already mandated in the law through the increases in the Normal Retirement Age. In changing the model in this way, we would need to be cautious and to consider that individuals' responses to benefit changes may not mirror the existing variation in receipt choices by benefit levels. Responses to changes in benefits might also be better captured using benefit thresholds rather than continuous benefit levels (which would imply that individuals always shift with a benefit cut) or perhaps interactions between benefit and educational levels.

In other work, several members of the Urban Institute MINT team have used these same data (SIPP matched to the MBR and SER) to attempt to estimate the effects of tax rates on earnings on work and benefit receipt choices (See Favreault, Ratcliffe, and Toder, 1999). They developed a joint model of Social Security benefit receipt and work (at and after age 62). Rather than applying the MINT Chapter Five and Chapter Six functions sequentially, in this work, a single, multinomial hazard model predicts individuals' transitions into one of four separate states: collect Social Security benefits and not work, collect Social Security benefits and work, do not collect Social Security benefits and work, do not collect Social Security benefits and do not work. Such a model implies that work and benefit receipt choices are so tightly coupled that one best represents them with a single process. Predictors in this model included one's expected Social Security benefit at the time of potential receipt, which had a negative effect on the likelihood of working (i.e., the higher the benefits, the less likely it is that one would work), and the total tax rate on earnings, which also had a negative effect on work effort (i.e., the higher the tax rate on earnings, the less likely it is that one would work). Researchers at SSA may wish to consider implementing this sort of specification in MINT. As with the current, binary model, one needs to be cautious about interpreting the results of such a reduced-form model in the face of structural changes to Social Security. The model can nonetheless give some limited insight into the potential directions and magnitudes of benefit receipt and work choices in the face of scheduled benefit cuts (e.g., by means of the increase in the Normal Retirement Age).

While Figure 5-1 reveals that individuals' dates of first receipt cluster around their birth month at ages 62 and 65, it also suggests that they do not cluster in this way at ages 63 and 64. Further, into the future, individuals may be influenced by the Normal Retirement Age signal of age 65 or 66 and a certain number of months. Accounting for heterogeneity in Social Security benefit timing *within* single-year age groups could thus be advantageous for investigating changes that would result from raising the Early and/or Normal Retirement Ages. The model described here could be extended to account for within-year heterogeneity in several different ways. We have chosen the simplest approach: imposing within-year heterogeneity randomly by using historical distributions. This approach should be adequate unless there are significant distributional differences in *within-year* benefit timing (e.g., if it is the case that wealthy people are more likely to retire right after a birthday, while less well-off people are more likely to apply for benefits mid-year).

If this assumption of randomly distributed within-year variation in retirement timing is problematic, these differentials could be integrated into the model in the estimation phase.

Maintaining a discrete-time event history framework, we could examine semi-annual, quarterly, or even monthly observations on the persons at risk, rather than annual ones.[13] We could alternatively model the dependent variable as a continuous rather than discrete outcome and estimate a continuous-time hazard model, since exact dates of birth and months of Social Security receipt are available in the estimation data sources. Continuous- and discrete-time event history models tend to yield similar results (see, for example, discussion in Alison, 1984), but have different limitations and requirements.

5. Results from Simulation Analyses

When we use these estimated coefficients from SIPP to project timing of Social Security benefit receipt for members of the MINT population, we find that almost 60 percent (4.6 + 1.2 + 53.9) of eligible individuals elect to receive their benefits at or before age 62. Table 5-2 reports the frequency of retirees at each age in Column A and the corresponding weighted and unweighted percentages in Columns B and C. The table reveals that the weighted and unweighted distributions from MINT are very similar, and henceforth, we present weighted estimates.

Table 5-2
Percentages of MINT and Historical (1996) Populations Electing to Receive Social Security Benefits at Given Ages

	MINT Predictions			Historical Estimates				Difference
Age	A Unweighted Frequency	B Unweighted Percentage	C Weighted Percentage	D All Retired Workers	E D Less Disability Conver-sions	F E Plus Wives* of Retired Workers	G F Plus Most Survivors	H (C-G) MINT Minus Most Similar Historical
60	3,752	4.8	4.6	-	-	-	4.6	0
61	1,019	1.3	1.2	-	-	-	1.3	-0.1
62	41,980	53.4	53.9	53.1	60.1	59.5	56.5	-2.6
63	7,961	10.1	10.3	6.6	7.5	7.6	7.1	+3.2
64	11,226	14.3	14.2	9.6	10.8	10.7	9.9	+4.3
65	7,646	9.7	9.6	25.4	15.7	15.3	14.2	-4.6
66	1,654	2.1	2.0	1.8	2.0	2.1	1.9	+0.1
67+	3,752	4.4	4.2	3.5	4.0	4.7	4.4	-0.2
N/A	34,399							

*Husbands of retired workers are not included in this column because of the small number of affected cases.
MINT Source: Urban Institute tabulations, September, 1999
Historical Source: *Annual Statistical Supplement*, 1997, Tables 6.A4 and 6.D3

Table 5-2 also contrasts the estimates for the MINT population to similar historical estimates based on Social Security Administration data. There are no historical data that are exactly analogous to the estimates the model produces, because people who die before receiving benefits or who do not apply for benefits despite their eligibility are not included in Social Security records. The closest source for comparison is new award data for those first receiving Social Security retirement benefits in 1996 (the most recent year for which detailed statistics are available), from which we can construct a synthetic retirement cohort.[14]

For these comparisons, we first consider data on retired workers (in Column D). We need to eliminate disability conversions from these historical estimates, because individuals who converted their benefits from DI to retired worker benefits were not included in either the original estimation or the projection. When we do so, in Column E, we see that the historical spike in Social Security receipt at age 65 declines greatly, and an even higher proportion of workers retires at 62. We also wish to include spouse recipients in our comparisons, because they were included in both the estimation and projection phases. We add them in Column F, causing only minor changes to the totals retiring at each age. Survivors whose first Social Security receipt is as a survivor should also be included in these estimates. We do so in Column G, but caution that this poses some challenges.[15]

Contrasting the MINT projection estimates (Column C) to the closest possible historical data on benefit receipt timing (Column G), we see some similarities. Differences between the two estimates are presented in Column H. The proportions of Social Security recipients retiring at ages 62 and 65 are somewhat lower in MINT than in the historical figures, while proportions starting Social Security at 63 and 64 are a bit higher in MINT than observed historically. Otherwise, though, the patterns are quite close. While the discrepancies at ages 62 and 65 may suggest potential improvements for the model, we should of course expect some differences between the MINT and historical estimates. The composition of the U.S. population eligible for Social Security should change considerably between 1996 and 2031 (the year that the youngest members of the MINT sample turn age 66). Women's greater likelihood of receiving Social Security benefits as workers (as opposed to solely as wives) could be playing an especially important role in the changes. Further, the method employed for projecting earnings leads to substantially different distributions of the variable for earnings at time t-1, one of the key determinants of benefit receipt timing, in the projection and estimation samples. For men, means on this variable are much lower in the projection sample than in the estimation group, leading to higher predicted probabilities, and hence more retirements at ages 63 and 64, than we observe historically. For women, we see similar, though less extreme, results at ages 63 and 64.

The final row in Table 5-2, labeled "N/A," reveals that almost 35,000 MINT persons, just over thirty percent of the total, are not assigned a Social Security retirement age in the model. There are three reasons why an individual would not be assigned a benefit receipt age: he or she died before becoming eligible for Social Security (and, to promote consistency with earnings projections in Chapter 2, this includes attainment of eligibility within the year of death) or before electing to retire, he or she became disabled (as defined using the DI_PRED variable that is used in Chapter 2) before retirement, or he or she is not eligible for a Social Security benefit.[16] About a quarter of the MINT population dies or becomes disabled before reaching age 62, and almost a third before reaching age 67. Only a small fraction of the MINT population is ineligible for Social Security as either a worker or a spouse, a total of just under 5,300 persons, or a bit less than 4.7 percent of the total population. Individuals in this group include long-term government workers who are not married to Social Security qualified workers and also individuals without significant attachment to the labor force.

Returning to those members of the MINT population designated to be Social Security recipients, Tables 5-3A and 5-3B document important distributional differences for men and women, respectively, between those who elect to receive their benefits early and those who collect Social Security later. The differences by sex that are revealed in these tables appear to be quite important. On average, MINT women elect to receive Social Security benefits about a quarter of a year earlier than do MINT men (men's average age at first receipt is 63.01, while women's is 62.74). About 64 percent of MINT women receive their benefits at or before age 62, compared to just over 54 percent of all men. While women tend to receive their benefits earlier than men, they are also slightly more likely to wait until age 67 before receiving them than are men. This projected gender differential in benefit receipt timing is similar to that observed in historical data. Table 5-A-4 in the Appendix details differences between the MINT and historical estimates by sex.

Marriage patterns also appear to be quite important to benefit timing, with ever married women projected to begin benefit receipt on average almost a year earlier than their never married counterparts. While 65 percent of ever married women begin to receive Social Security benefit at or by age 62, only 44 percent of the never married women do. The availability of noncontributory benefits to ever married women surely plays an important role in this difference. Never married men also retire later than ever married men, by about half a year, but the difference is not quite as extreme as with the women. This suggests that the never married men may have more resources from which to draw than do the never married women. Racial differences in benefit timing also appear quite sizable in these tables, with nonwhite men and women more likely to postpone retirement than white men and women. The proportion of nonwhites retiring at age 67 is about double the proportion of whites retiring at this age for both men and women. On average, nonwhites retire about a third of a year later than whites.

Patterns in benefit receipt by birth cohort are less obvious than the gender, racial, or marital history patterns. The figures do not reveal any clear pattern in Social Security receipt across the cohorts in MINT.[17] The lack/modesty of cohort change observed in these projections is surely due in part to our assumption of no change in behavior with increments to the Normal Retirement Age. One can justify such an assumption by the fact that Social Security offers so compelling a change in income from non-work at age 62 that changes to benefit levels may need to be quite large to offset the lure of retirement, especially for those in unrewarding occupations. We are unsatisfied with this assumption, however, and hope to pursue alternative specifications.

Table 5-3A
Projected Percentage of MINT Men in Various Demographic and Economic Groups Electing to Receive Social Security Benefits at Given Ages

	60	61	62	63	64	65	66	67	Mean
All Men	1.0	0.3	53.1	12.1	17.3	10.7	1.8	3.6	63.01
Ever married	1.1	0.3	53.4	12.2	17.4	10.6	1.7	3.3	63.00
Never married	-	-	46.9	10.8	14.0	13.3	4.9	10.1	63.49
1931-35	0.3	0.1	54.4	10.9	17.8	12.3	1.0	3.2	63.02
1936-40	0.7	0.1	53.1	12.5	19.4	10.4	1.4	2.4	62.98
1941-45	0.8	0.3	55.5	13.6	16.7	8.9	1.1	3.0	62.85
1946-50	1.0	0.2	53.9	12.9	17.8	9.5	1.4	3.1	62.83
1951-55	1.3	0.4	54.6	13.4	16.5	9.5	1.3	3.1	62.98
1956-60	1.4	0.3	54.0	12.8	17.2	9.7	1.2	3.3	62.88
Nonwhite	2.0	0.7	43.1	11.8	16.8	15.4	3.0	7.2	63.34
White	0.9	0.3	54.6	12.2	17.3	10.1	1.7	3.1	62.98
1st real AIME quintile	5.1	1.1	34.6	7.7	15.2	16.7	3.4	16.1	63.70
2nd real AIME quintile	2.8	1.0	41.1	8.4	18.4	18.2	3.0	7.1	63.41
3rd real AIME quintile	1.4	0.6	49.9	11.0	19.9	12.2	1.8	3.3	63.07
4th real AIME quintile	0.3	0.1	55.0	13.9	17.6	9.7	1.7	1.7	62.93
5th real AIME quintile	0.0	0.0	60.6	13.4	16.0	7.4	1.2	1.3	62.78

Source: Urban Institute tabulation from MINT file, September, 1999

Table 5-3B
Projected Percentage of MINT Women in Various Demographic and Economic Groups Electing to Receive Social Security Benefits at Given Ages

	60	61	62	63	64	65	66	67	Mean
All Women	7.4	2.0	54.6	8.8	11.7	8.6	2.2	4.8	62.74
Ever married	8.1	3.0	54.2	9.5	11.1	8.2	1.1	4.9	62.66
Never married	-	-	45.0	10.5	16.7	14.0	1.1	12.7	63.55
1931-35	7.4	3.0	55.5	8.6	11.1	8.5	1.9	4.0	62.66
1936-40	8.8	2.5	55.6	7.7	11.9	7.8	1.7	4.0	62.61
1941-45	9.2	1.9	55.0	8.2	12.2	8.0	1.4	4.0	62.56
1946-50	7.3	1.6	57.7	8.7	11.8	8.2	1.3	3.4	62.63
1951-55	7.1	1.9	56.7	8.9	11.6	7.9	1.6	4.3	62.68
1956-60	6.8	1.7	55.3	9.7	12.3	8.6	1.8	3.8	62.71
Nonwhite	8.4	2.2	46.0	8.7	12.3	11.4	2.7	8.3	63.01
White	7.3	1.9	56.0	8.8	11.6	8.1	2.1	4.2	62.69
1st real AIME quintile	15.0	2.1	51.8	6.9	9.2	6.7	2.6	5.7	62.52
2nd real AIME quintile	9.4	3.4	53.3	8.4	11.1	8.6	1.6	4.2	62.62
3rd real AIME quintile	2.3	1.8	56.4	9.8	13.1	9.6	2.3	4.9	62.92
4th real AIME quintile	0.7	0.6	56.7	10.7	14.5	10.4	2.3	4.1	62.99
5th real AIME quintile	0.2	0.1	59.5	10.6	13.6	9.9	1.9	4.2	62.96

Source: Urban Institute tabulation from MINT file, September, 1999

Position in the income distribution, defined by ranking people by unisex quintiles of average indexed monthly (covered) earnings (AIME) at age 62, has different effects on the timing of Social Security benefit receipt for men and women.[18] Men with higher earnings are more likely to retire early than are other men. In contrast, women's likelihood of retiring increases if they have very low lifetime earnings. Low relative lifetime earnings clearly implies very different things about men and women in these cohorts. For women, low AIMEs sometimes reflect a choice not to participate in the labor force, perhaps because a husband's income is adequate, whereas for the men low AIMEs nearly always reflect low wages. It is not surprising, then, that women in this group would take-up benefits early, while men in the group may have no choice but to continue to work to make ends meet. When interpreting these quintile results, it is also important to keep in mind that there are very few women in the upper two AIME quintiles, and that it is therefore quite difficult to make inferences about high-income women's behavior based on these estimates.

6. Forces Generating Changes in Timing of Social Security Benefit Receipt

The modesty of the cohort changes that we have seen in the last few tables mask several important trends affecting the composition of Social Security awards. One striking change across cohorts that affects both the composition and timing of first Social Security benefit receipt is the dramatic increase in predicted disability rates over time. Disability rates range from 12.8 percent for men and 8.2 percent for women in the earliest MINT cohorts (1926 to 1930) to almost 24 percent for men and 18.8 percent for women in the latest cohorts (1961 to 1965). This sizable shift greatly diminishes the pool at risk of experiencing the transition to retired worker status through the stochastic process.

Changes in women's earnings are a second dramatic influence on the composition of Social Security benefits by type (i.e., more women will receive first benefits as workers rather than as spouses or dual entitlees), but they may have offsetting effects on the timing of women's benefit receipt. While about two-thirds of the women in the first cohorts qualify for Social Security benefits on their own records (i.e., have accrued at least 40 covered quarters), virtually all (just shy of 97 percent) of the women in the last cohorts do. As women's lifetime income gains serve to accelerate their retirement, their greater education, pension coverage, and returns to work, combined with their greater likelihood of being unmarried at the time of retirement, simultaneously serve to slow it down.

7. Potential Inconsistencies in the Estimates

The main estimates presented here are based upon a September, 1999 simulation. For this simulation, we made a single pass through the MINT population, examining each person at each age at which he/she was eligible but had not yet begun to receive Social Security benefits. For couples, each spouse's projections were made independently, based on whether each member of the couple was theoretically eligible to receive benefits (either as a spouse or as a worker). This means that an individual who is eligible for benefits *only* as a spouse (as opposed to as a worker or dually entitled worker) could potentially be assigned a Social Security retirement age that is earlier than that of the worker on whose record he/she is entitled to benefits. This is a scenario that could not occur in actuality. Because women are more likely than men to qualify as spouses and also tend to be younger than their husbands, this inconsistency is not likely to affect a large number of cases, especially at age 67. Nonetheless, an improved simulation would correct this discrepancy.

8. Current Integration of these Results into Other Parts of MINT

Social Security benefit receipt timing information is currently being used in two separate places in MINT. In Chapter Six, information on each person's age at Social Security benefit receipt is used to determine whether earnings in partial retirement need to be projected. For those cases where earnings in partial retirement are projected, the earnings initially projected in Chapter Two are overwritten with the new partial retirement earnings. This should lead to a more realistic distribution of earnings between ages 62 and 67. Information from this project is also relevant for Chapter Seven, which projects resources, including Social Security income and wealth, in each year of retirement.

In principle, information about benefit receipt timing could be used in other parts of the model as well. For example, one could assume that individuals draw their pensions at the same time as they draw their Social Security benefits. This would require revising the pension projection methodology, a task that would take considerable time and effort.

III. CALCULATION OF SOCIAL SECURITY BENEFITS FOR CHAPTER 7

We compute a lifetime stream of Social Security benefits for all members of the MINT sample who become disabled and are eligible for Social Security disabled worker benefits or who live to receive a Social Security retirement age (as described above) and either are eligible for benefits themselves or are married to an eligible worker. Some simplifications were made in these algorithms, and there is thus considerable opportunity for extension of this section of the model.

Within the determination of one's age of Social Security receipt, we make two important computations. First, as described in the section on our eligibility screen, we compute a person's AIME and PIA at time t, taking into account any additional earnings that the person may have had at time t-1. We then convert this PIA into a benefit by applying cost-of-living adjustments and any actuarial reductions or delayed retirement credits for which the worker is eligible. At the same time, we also identify each person's reference spouse, if applicable, at each potential retirement age. For most people, the reference spouse is either the current or most recent spouse. Only about 4,300 MINT sample members have competing spousal entitlements (that is, more than one spousal record on which they are potentially eligible for Social Security benefits) at the time of their first Social Security entitlement. Where a person has competing spousal entitlements, we take the highest possible spousal PIA (adjusted for cost-of-living changes and the fraction of this spouse's PIA replaced in the benefit: 50 percent as a spouse, 81.5 percent as a disabled widow/widower, or 100 hundred percent as a survivor) at time t as the basis for computing any potential auxiliary benefit. We then compare a worker's own benefit with the potential spousal benefit and assign the worker the higher of the two as the starting value for his/her Social Security benefit.

After first disablement or first Social Security retirement benefit take-up, the model updates initial benefits annually to account for cost-of-living adjustments (at the rate assigned in the 1998 Trustees' Report). The model also monitors Social Security beneficiaries for family changes that could increase a recipient's benefit level. These changes include having a spouse die, reach Social Security retirement age, or become disabled in the projection period. Where one of these changes occurs, the model compares the person's worker benefit, if he or she is eligible for one, to any spousal benefit for which he or she might be eligible and, again, takes the higher of the competing entitlements. While we have not included new marriages after first entitlement into the updating algorithm, we could add this extension fairly readily. Only about five percent of the sample remarries after age 62, and a much smaller fraction would experience a change in entitlement as a result of remarriage (e.g., few men who remarry would do better as a spouse than as a worker, and few widowed women would do better with half of a new spouse's PIA than with a survivor benefit based on 100 percent of a former spouse's PIA).

A few additional caveats about the estimated Social Security benefits are warranted. As noted in the prior section on the retirement timing algorithms, the model accounts for within-year variation in retirement timing in a relatively crude way. We have randomly imputed a distribution of dates of receipt within the year based on historical patterns. Urban Institute tabulations from the MBR suggest that while relatively small fractions of those starting to receive benefits at age 62 or 65 first collect in the last six months of their birth year (10.3 and 5.6 percent, respectively), the majority (64.4 percent) of those first collecting at Social Security age 64 do so. Sixty-three year old recipients are evenly split between the first and second half of the birth year (51.7 and 48.3 percent). The full distribution of probabilities of first receipt at each month by age of first entitlement is available in the file projectr.sas, under the SAS macro "%addmonth." We do not adjust the Social Security benefit in the year of first receipt based on the month of retirement, as earnings in partial retirement are estimated based on the assumption of a full year in partial retirement.

APPENDIX A
MEASUREMENT ISSUES

SIPP birthdates differ fairly significantly from the birthdates reported on the MBR. Figure 5-A-1 reveals a large spike, of about ten percent, of people who in the SIPP reported their birth year as being exactly one year later than it appears in the MBR.[19] Further, discrepancies are skewed to the right (i.e., people are more likely to report their age as younger than the age on the MBR rather than older than the age on the MBR) at other age levels as well. The birthdate that we used for both estimation of the logistic coefficients and projection of future states was the MBR birthdate. While we believe that using the MBR information minimizes reporting error on this key variable, we know that it does not eliminates error altogether. There are certainly typographical and other errors in the MBR reports, and there are possibilities for analysts to misinterpret values on the MBR file (e.g., to mistake a missing data code for a valid year, or to make century errors on birthdates, since a small number of Social Security recipients observed in the SIPP could indeed have been born in the last century).

Knowing a person's birth year with certainty is important for all aspects of MINT, from assigning his/her annual earnings levels, to determining his/her disability dates from administrative records and simulation algorithms, to computing her/his date of death (and hence remaining life span at various ages). In the assignment of age of first benefit receipt in MINT, discrepancies in birthdates have particularly noticeable and troublesome effects. This problem is due to the fact that we derive a sizable fraction, about 7.9 percent, of the assignments of the ssage variable from data on first receipt of Social Security benefits from the MBR. Specifically, if the person's date of entitlement is after the point at which he/she turns age 60 and his/her type of benefit from the MBR is listed as retired worker or survivor, then we compute his/her age at first benefit receipt using his/her birthdate and the MBR date of first entitlement instead of simulating it using the logistic function. In prior simulations, when we assumed that the person's birthdate was in fact the date found on the core MINT file, base0322.sd2, we generated inappropriate spikes in retirement timing (analogous to those illustrated by the SIPP line in Figure 5-1) at ages 61 and 64. When we overwrote the person's MINT birthdate with her/his MBR birthdate, these spikes disappeared almost completely.

Unfortunately, though, whether, how, and when we overwrite the birthdate on the base0322.sd2 file has implications elsewhere in the model. There are a number of different ways in which one could make this change; changes can be conditional or unconditional, they can be permanent or temporary. Alternative approaches yield different results, and have different strengths and weaknesses. Understanding the mechanics of the procedures currently employed in MINT and used in past simulations can thus shed light both on the limits of the method and on the advantages and disadvantages to various alternative approaches. To be more concrete, in earlier simulations, we overwrote the SIPP birthdates with MBR birthdates only when the new (MBR) birthdate still fell within the MINT time frame, that is, when the new (MBR) birthdate fell between 1926 and 1965, inclusive. This approach had the comparative advantage of greatly reducing the number of age sixty-one and sixty-four recipients, and also of minimizing the number of large shifts in birthdates. It had the disadvantage of failing to take into account some information that would enable us to make a more accurate assignment. For example, tabulations from the MBR suggest that about 180 people in MINT were born in 1925. Another disadvantage to this approach was that permanently using MBR birthdates caused consistency problems with other aspects of the model, most notably with the demographic projections from RAND. By permanently shifting the birthdates of a substantial fraction of the MINT population downward, we were necessarily changing the model's implicit assumptions about life expectancy, an action that was clearly problematic and, moreover, outside of the domain of our work.

In our current approach, when making assignment of Social Security first receipt age from the MBR, we thus chose to *temporarily*, rather than permanently, overwrite a person's MINT/SIPP birthdate with her/his MBR (presumably real) birthday. We return to using the RAND birthdate once we have assigned all MBR-generated ages of first receipt. Further, in all cases, not just those in which birthdates fall between 1926 and 1965, we assume that the MBR estimate is superior to the SIPP estimate. A major advantage of this approach is that we do not cause any changes to the aggregate demographic assumptions. We obtain what is probably a better estimate of the age at first receipt, again greatly reducing age 61 and 64 spikes, even if our year of first receipt will be somewhat flawed. Disadvantages arise when there are problems with MBR birthdates and/or receipt dates. Further, these estimates may be inconsistent with individuals apparent demographic status (with respect to marriage) at retirement age.

We do not, then, believe that this solution is ideal. Fortunately, MINT users have already developed programs to overwrite our predictions when demographic inconsistencies arise. Users of MINT at SSA may wish to consider changing these important assumptions more fundamentally in future development of the model. Because of time constraints, we were unable to ensure consistency in assumed year of birth of each sample member across estimation and projection data sources. As we have tried to illustrate, subtle yet sometimes important differences arise with minor changes to these assumptions.

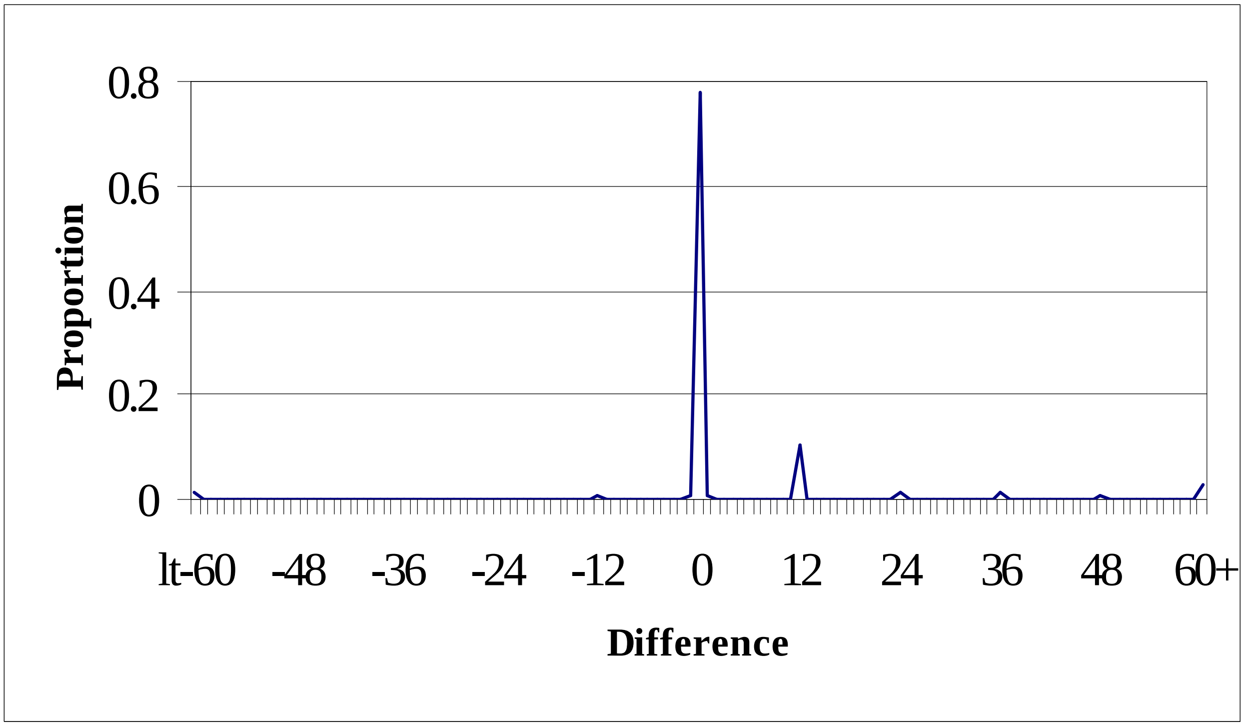
TECHNICAL NOTE

Throughout the programs that generate these estimates, we rely heavily on the SAS function "intnx" to develop reference dates of events that impact Social Security entitlement. Due to a subtle difference in the way that this function increments dates when using year values (as opposed to month or day values), we have inadvertently rounded some event dates to January 1 of the year in question, rather than using the proper date.

As this issue was discovered late in the preparation of this report, we were unable to correct it. While we do not expect that changing these portions of the computer code would have large consequences, MINT users at SSA may nonetheless wish to correct this problem in future simulations. Improved code provided in the program called "projecr2.sas" addresses this issue.

Figure 5-A-1
Distribution of Differences
Between MBR Ages and SIPP Ages

(N=28,732)



Source: Urban Institute tabulation from 1990-1993 SIPP matched to the 1990-1993 MBR
Sample: Individuals who, according to SIPP birthdate, reach any age between 61 and 70 at any point during the life of the panel
Missing Values: 9013

SUPPLEMENTAL TABLES

Table 5-A-1
Percentages of MINT Population Electing to Receive Social Security Benefits at Given Ages According to MBR data

Age	Frequency (N=8934)	Percentage
60	522	5.84
61	134	1.50
62	5371	60.12
63	699	7.82
64	1000	11.19
65	988	11.06
66	91	1.02
67+	129	1.44

Source: Urban Institute tabulation of MINT projection file (base0322.sd2) merged with Master Beneficiary Record data, September, 1999.

Table 5-A-2
Logistic Regression Coefficients:
Social Security Benefit Receipt Timing for Married Men
Where no Wealth Variables are Employed

Variable	**Parameter Estimate** **(Standard Error)** **(N=2895)**
Intercept	-2.4717** (0.5372)
Age 63	-1.0951** (0.1277)
Age 64	0.3798** (0.1213)
Age 65	1.4421** (0.1580)
Age 66	-0.2173 (0.2409)
Age 67	-0.8007** (0.2860)
Education < 12	0.1471 (0.1224)
Education > 12	-0.2061 (0.1152)
Non-Hispanic white	0.3615* (0.1457)
Have any pension?	0.2968** (0.1025)
Earnings ages 35-55	1.6563** (0.1425)
Earnings ages 56-61	0.3268** (0.1248)
Earnings at t-1	-1.4460** (0.0981)
Spouse’s age	0.0144 (0.00854)
Spouse’s education < 12	0.0904 (0.1227)
Spouse’s education > 12	-0.0926 (0.1137)
Spouse’s earnings 35-55	0.3806* (0.1502)
Spouse’s earnings at t-1	-0.1941 (0.1107)

* indicates p<.05; ** indicates p<.01

Table 5-A-3
Logistic Regression Coefficients: Social Security Benefit Receipt Timing Where Receipt is Capped at Age 69, Rather than Age 67

Variable	Parameter Estimate (Standard Error)		
	Married Men (N=2936)	**Married Women (N=2439)**	**Unmarried People (N=2390)**
Intercept	-2.3011** (0.5334)	-2.2255** (0.7213)	-0.6626** (0.1561)
Age 63	-1.1260** (0.1298)	-1.6153** (0.1448)	-1.3431** (0.1459)
Age 64	0.3780** (0.1227)	-0.5388** (0.1416)	-0.4789* (0.1324)
Age 65	1.4739** (0.1609)	-0.1283 (0.1760)	0.5669** (0.1511)
Age 66	-0.2500 (0.2474)	-1.2103** (0.2457)	-1.1357** (0.2246)
Age 67	-0.8490** (0.3001)	-1.2333** (0.2531)	-0.5800** (0.1964)
Age 68+	-0.1501 (0.2381)	-0.9158** (0.1993)	-0.9988** (0.1734)
Education < 12	0.1302 (0.1217)	-0.0216 (0.1304)	0.1933 (0.1170)
Education > 12	-0.1420 (0.1149)	-0.0879 (0.1208)	-0.1587 (0.1160)
Non-Hispanic white	0.3218* (0.1437)	0.3074* (0.1422)	0.4723** (0.1128)
Have any pension?	0.2739** (0.1039)	-0.3231** (0.1074)	0.0174 (0.1046)
Earnings ages 35-55	1.6772** (0.1432)	1.4546** (0.2392)	0.9950** (0.1691)
Earnings ages 56-61	0.3116* (0.1249)	0.2524 (0.2404)	0.0108 (0.1694)
Earnings at t-1	-1.4041** (0.0977)	-1.7043** (0.2134)	-0.7537** (0.1339)
Spouse’s age	0.0125 (0.00845)	0.0260* (0.0106)	
Spouse’s education < 12	0.1140 (0.1221)	0.2085 (0.1325)	
Spouse’s education > 12	-0.0844 (0.1134)	-0.0922 (0.1241)	
Spouse’s earnings 35-55	0.3484* (0.1494)	1.1499** (0.1023)	
Spouse’s earnings at t-1	-0.1525 (0.1096)	-0.5278** (0.0685)	
Spouse has a pension?		0.1413 (0.1101)	
Male			-0.1773 (0.1098)
Widowed			0.2030** (0.0973)
Log value of non-housing wealth	-0.0204 (0.0513)		
Own a home			0.00953 (0.0999)
Value of home	-0.0188 (0.0144)		

* indicates p<.05; ** indicates p<.01

Table 5-A-4
Percentages of MINT and Historical (1996) Populations Electing to Receive Social Security Benefits at Given Ages, by Sex

	60	61	62	63	64	65	66	67+
All men in current MINT (weighted)	1.02	0.32	53.12	12.13	17.27	10.74	1.82	3.57
Most similar historical	0.54	0.27	56.70	8.08	11.00	16.93	2.29	4.20
Difference (current MINT-historical)	+0.48	+0.05	-3.58	+4.05	+6.27	-6.19	-0.47	-0.63
All women in current MINT (weighted)	7.44	1.96	54.57	8.79	11.68	8.61	2.17	4.78
Most similar historical	8.01	2.24	56.36	6.26	9.04	11.88	1.65	4.55
Difference (current MINT-historical)	-0.57	-0.28	-1.79	+2.53	+2.64	-3.27	+0.52	+0.23

MINT Source: Urban Institute tabulation, September, 1999
Historical Source: *Annual Statistical Supplement*, 1997, Tables 6.A4 and 6.D3

Table 5-A-5
Indicators of Future Social Security Eligibility of Americans: Percentage with Various Levels of Quarters of Social Security Coverage as of 1996 by Sex and Birth Cohort (Unweighted)

	Birth Cohort and Sex															
Number of Quarters	1926-30		1931-35		1936-40		1941-45		1946-50		1951-55		1956-60		1961-65	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
0	8.2	1.6	3.4	1.0	2.8	0.8	2.2	0.8	1.9	0.7	1.6	0.7	2.2	0.7	2.6	1.3
1-5	6.9	1.1	3.6	0.5	3.0	0.3	2.5	0.5	1.9	0.5	2.3	0.6	2.3	0.6	2.7	0.6
6-10	4.1	0.8	3.6	0.8	2.8	0.4	2.0	0.5	2.1	0.8	1.8	0.6	2.3	0.8	2.7	0.9
11-15	4.0	0.8	3.2	1.0	2.6	0.5	2.7	0.6	2.4	0.8	2.3	0.9	2.5	0.7	3.1	1.4
16-20	3.2	1.3	3.2	0.9	3.4	1.0	2.7	0.7	2.6	1.2	2.9	1.1	3.1	1.1	3.9	1.6
21-25	3.7	1.3	3.1	1.0	3.2	0.9	2.7	1.1	2.9	1.2	2.9	1.3	3.0	1.6	4.1	1.7
26-30	2.8	1.2	3.0	0.7	2.4	0.9	2.2	1.0	2.6	0.9	2.7	1.7	3.6	1.6	4.2	2.5
31-35	3.2	0.9	2.7	0.8	2.9	1.2	3.1	1.6	2.8	1.1	2.9	1.4	4.2	1.9	5.1	3.3
36-40	2.4	1.2	2.6	1.2	3.0	1.1	3.1	1.5	2.7	1.6	3.8	1.9	4.1	2.5	5.8	4.7
>40	61.6	89.8	71.6	92.2	74.0	93.1	76.8	91.8	78.2	91.3	76.7	90.0	72.9	88.6	65.8	81.9

Source: Urban Institute tabulation from Survey of Income and Program Participation merged to Summary Earnings Records, July, 1999

Table 5-A-6
Indicators of Future Social Security Eligibility of Americans:
Percentage with Various Levels of Quarters of Social Security Coverage
as of 1996 by Sex and Birth Cohort (Weighted)

	Birth Cohort and Sex															
Number of Quarters	1926-30		1931-35		1936-40		1941-45		1946-50		1951-55		1956-60		1961-65	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
0	8.8	1.6	3.5	0.8	3.0	0.7	2.2	0.6	1.9	0.7	1.6	0.8	2.2	0.8	2.6	1.3
1-5	6.5	1.1	3.6	0.4	2.9	0.2	2.6	0.4	1.9	0.4	2.1	0.6	2.4	0.8	2.5	0.5
6-10	4.2	0.7	3.4	0.8	2.8	0.4	1.9	0.6	2.1	0.9	1.8	0.6	2.2	0.9	2.6	0.9
11-15	3.6	0.9	3.2	0.9	2.3	0.6	2.7	0.5	2.7	0.7	2.4	0.9	2.5	0.5	3.2	1.2
16-20	3.5	1.3	3.3	0.9	3.8	0.9	2.9	0.7	2.5	1.2	2.4	0.9	3.1	1.0	3.7	1.8
21-25	3.9	1.3	3.3	1.0	3.0	1.1	2.4	1.0	2.8	1.4	2.9	1.2	2.9	1.3	4.0	2.0
26-30	2.9	1.3	2.8	0.6	2.3	0.9	2.2	1.1	2.7	0.9	2.7	1.5	3.4	1.6	4.0	2.0
31-35	3.3	1.0	2.6	0.8	2.7	1.1	2.8	1.5	2.8	1.0	3.0	1.5	4.2	2.2	5.0	3.4
36-40	2.3	1.1	2.4	1.1	2.8	1.2	3.1	1.3	2.3	1.7	3.9	2.0	3.8	2.6	5.8	4.8
>40	60.9	89.9	71.8	92.7	74.5	92.9	77.2	92.3	78.4	91.1	77.3	90.1	73.4	88.1	66.5	82.2

Source: Urban Institute tabulation from Survey of Income and Program Participation merged to Summary Earnings Records, July, 1999

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CHAPTER 5: ENDNOTES

1. Table 5-A-1 in Appendix A presents estimates of the distribution of ages of first receipt found in the administrative records. An additional section in the appendix provides a discussion of measurement issues associated with using the administrative and survey data, and estimates of the nontrivial differences in observed outcomes when one uses birth dates from different data sources (self-reports versus administrative reports).

2. Low-earning is defined in terms of the exempt amount for earnings before the Normal Retirement Age. Aggregate data suggest that a deterministic function reasonably approximates this process over the historical period. In 1996, nearly a quarter (about twenty-three percent) of all new benefits for surviving spouses were paid to 60 year-olds (Social Security Administration, 1997, Table 6.D7).

3. This results in part from the structure of MINT, which to a large extent precludes a traditional economic framework of utility maximization. While different aspects of earnings histories and family composition included in the equations may suggest some simple optimization rules (e.g., spouses tend to coordinate their timing decisions), these structures are not explicit.

4. Separate equations by sex for those men and women who were not married at the time they were at risk of receiving Social Security appeared unnecessary. Coefficient estimates suggest no significant differences between men and women in the pooled equation and no significant gender interaction terms.

5. Because exact *months* of first Social Security receipt could be determined using the MBR but exact *dates* could not, we examine individuals in the eleventh month after a birthday. For example, if a person was born in November, we checked to see whether he or she received Social Security benefits by the end of October. (The month of analysis is coded as a parameter in the estimation program, even0908.sas, and can be easily modified.) In order to maximize the number of observations in the analysis, we allowed a person to reach the month before his/her (self-reported) birth month in any month of the survey. This implies that individuals included in the estimation ranged in age from 62 to 67 in the 1989 to 1995 period (and were thus born between 1922 and 1933).

6. Estimates of intercepts were usually slightly higher with the screen. This is sensible, since the overall likelihood of retirement should go up when ineligible individuals are excluded from the risk pool. In later simulations, model users at SSA could adjust the intercepts slightly upward to account for this difference, though our provisions for "mandatory" retirement of eligible individuals at age 67 should prevent any major problems from this slight discrepancy.

7. Because this function helps to predict earnings at age t, these earnings cannot be used in the equations. To capture lagged earnings in the estimation, we used the annual values from the Summary Earnings Record rather than the monthly levels from SIPP. This is problematic in that SER earnings at t-1 represent very different things for individuals who were born in January and December of the same year. For one person in a given birth cohort, t-1 earnings could represent his/her earnings from eleven months in which he/she was 61 and one month in which he/she was 62, while for another person in the same cohort, the same variable would represent earnings from the opposite grouping of months.

8. We used pension *coverage* rather than pension *wealth* or pension *income* because the former can be defined more consistently within MINT. While in theory pension wealth is the most relevant of the three variables, the MINT projections of pension wealth/income apply only to those workers who wait until age 62 before collecting benefits, a restriction we could not easily make in the SIPP estimation data. Further, using an income indicator in the SIPP data would have led us to confound pension take-up and pension wealth, as information about the value of defined benefit pension balances is only available when the person is collecting a pension.

9. While using multivariate equations like these for projection allows one to capture changes in the *composition* of the population into the future, it does not allow one to account for any future changes in the underlying *structure* of a process (in this case, timing of Social Security benefit receipt). Assuming a constant structure is more problematic when a process is changing rapidly for a given group. For married women, the process of Social Security benefit timing has been changing in important ways in recent years. With each succeeding cohort, a smaller fraction of women receives benefits as wives and a greater fraction receives benefits as workers. As a result, the relative weights that the SIPP equation for married women attaches to husbands' and wives' experiences may be less appropriate for future groups of married women.

10. While the equation for married men currently includes two wealth measures, users may wish to omit the wealth measures for this group in future simulations given the coefficients' lack of statistical significance. Table 5-A-2 presents coefficients for married males where these two variables are omitted.

11. For example, using age minus the Normal Retirement Age rather than age as a predictor in the equations simply reduces to age, but with a different scale.

12. We could implement either PIA or expected benefit as a predictor quite readily in re-estimating these equations, since we now have a detailed Social Security benefit calculator written in SAS. Preliminary estimates, however, indicate that the earnings measures now used in MINT may provide a better fit than PIA. (Estimates were not made using expected benefits as a predictor.) This does not, however, imply that some other non-linear earnings measure might have greater explanatory power than the three earnings measures used here. An indicator variable for eligibility as a spousal recipient could also potentially improve the model.

13. There are of course complications, and potential disadvantages, to each of these approaches. While many of the important predictors of benefit receipt are measured monthly in the SIPP, the earnings picture could become more muddled using finer gradations. If one wished to use a person-month rather than person-year specification, one could consider using the SER to capture permanent earnings, and rely on the SIPP for finer detail on earnings in and close to retirement.

14. The *Annual Statistical Supplement* for 1998 has been released, but the definition of the population included in Table 6.A4 changed between the 1997 and 1998 editions of the *Supplement*, rendering the 1998 figures less comparable to the MINT estimates that we present here. We therefore rely on data from the 1997 *Supplement*, which reflect receipt patterns in 1996.

15. Data on newly awarded survivors' benefit include both new Social Security recipients and spousal recipients who change status upon the death of a spouse. While one can fairly safely assume that those receiving benefits before age 62 are new Social Security recipients, it is not possible to distinguish between first-time and other Social Security recipients at higher ages in

these aggregated statistics. We thus expect some double counting of individuals at higher ages in these estimates.

16. MINT users at SSA may wish to change this assumption so that non-disabled individuals will be allowed to collect Social Security for the first time in their year of death. They may do so by changing the greater than or equal to sign in the following phrase in the SAS macro "decidret" in the program projectr.sas to a less than sign:

```
if doby+index >= dody then ssage=.;
```

17. There is a considerable spike in receipt at age 67 among both men and women in the 1926-1930 birth cohorts. We suspect that this may be due to incomplete reporting of receipt of Social Security in the MBR, given that ages of first receipt are derived from the MBR for most members of these cohorts. As these cohorts are not a part of the core sample, we have nor pursued this issue.

18. The thresholds for these quintiles, expressed as a percentage of the average wage, are as follows: 0.19227, 0.49778, 0.83603, and 1.27268.

19. This may be due in part to inaccurate information or mistaken calculations by a household member who answers the questionnaire, rather than by the person that the data record describes.

CHAPTER 6

PROJECTING PARTIAL RETIREMENT EARNINGS

I. OVERVIEW

This chapter focuses on projecting the work behavior and earnings of 62 and 67 year old Social Security beneficiaries. The projections are carried out on a sample of persons born between 1931 and 1960 who were Social Security beneficiaries at age 62 and/or age 67. For this sample of individuals, partial retirement earnings at age 62 are projected to the year 2022 and partial retirement earnings at age 67 are projected to the year 2027.

The projections, which take account of scheduled increases in the Social Security exempt amount between 1996 and 2002, are carried out in two steps. The first step involves estimating a statistical model which captures beneficiaries' decisions about whether to work and their level of earnings. This model is estimated with data from the 1984 and 1990-92 panels of the Survey of Income and Program Participation (SIPP). The second step uses the estimated coefficients from the statistical model as a means of projecting partial retirement earnings of 62 and 67 year olds to the year 2027.

This chapter first considers the estimation phase, and includes a discussion of the data set and sample, the statistical model, and the estimated coefficients. This is followed by a discussion of the projection methodology and results.

II. ESTIMATING PARTIAL RETIREMENT EARNINGS

1. Data Set and Sample

The estimation of partial retirement earnings is carried out using the 1984 and 1990-92 panels of the SIPP. Earnings data from the Social Security Summary Earnings Records (SER) were merged with the SIPP data for all four panels, providing information on covered earnings from 1951 through 1996. Additionally, information about (1) the year an individual first received Social Security benefits and (2) whether the individual received disability benefits is obtained from the Master Beneficiary Record (MBR) for panels 1984 and 1990-91. The MBR for the 1992 SIPP panel was not available at the time the estimation was carried out, so this information was obtained from self reports as recorded in the 1992 SIPP. The 1984, 1990 and 1991 SIPP panels provide two full calendar years of information (1984-85, 1990-91, and 1991-92, respectively), while the 1992 SIPP panel provides three full calendar years of information (1992-94).

Rather than estimating the statistical models with only 62 and 67 year olds, we expand the age criteria as a way of increasing the sample size. For the younger group, we include both 62 and 63 year olds in the analysis, and for the older group, we include persons ages 65 through 68. A slight data "mismatch" arises regarding individuals' ages because an individual's age is spread across two calendar years (except for persons born on January 1), while the Social Security rules regarding benefit receipt and SER reported earnings are based on a calendar year. In this analysis, we follow people over a calendar year rather than a birth year.

To capture the work behavior of Social Security beneficiaries accurately, we restrict the sample to individuals who are beneficiaries over the entire calendar year. This restriction places an additional constraint on the calendar year in which we can examine the work behavior of 62 year old beneficiaries. Because the majority of individuals are first eligible for benefits at age 62, we analyze the work behavior of 62 year old beneficiaries in the calendar year *after* their 62nd birthday. In other words, an individual's age in a particular calendar year is defined as his/her age on January 1 of that year. For consistency across the sample, the ages of all individuals in the sample are defined similarly.

The discussion of the data below separately considers 62-63 year old beneficiaries and 65-68 year old beneficiaries because the statistical models are estimated separately for these two groups. One reason for estimating the models separately is that the two populations may behave differently, as 62-63 year olds are in the early stages of retirement relative to 65-68 year olds. A second reason is that the available data allow us to observe exogenous changes in the exempt amount (relative to the average wage) for persons age 65 through 68, but not for persons age 62 through 63. Between 1977 and 1982 there were exogenous increases in the exempt amount for persons age 65-68. This program difference translates into differences in data availability and specification of the estimating model. For projection purposes, this information is of particular interest for 67 year old beneficiaries because the Social Security exempt amount is scheduled to increase from $14,500 in 1998 to $30,000 in the year 2002 for persons at or above the normal retirement age, but is not scheduled to increase (relative to the average wage) for persons under the normal retirement age.[1]

Estimating the partial retirement earnings of 62 and 63 year olds is carried out using the 1990-92 panels of the SIPP. Only the most recent 1990-92 data are used for this younger group of retirees because nothing is gained, in terms of observing ad hoc adjustments to the exempt amount, by using the earlier 1984 data. Focusing on 62-63 year old beneficiaries gives a sample of persons who were born between 1926 and 1931.[2] If an individual meets this age criterion in two different calendar years, then that individual is included in the sample twice.[3] Allowing persons to enter the sample more than once was done in order to increase the sample size.[4]

Combining the 1990 through 1992 panels of the SIPP in this manner provides a sample of 1,533 62 and 63 year olds who are receiving Social Security benefits, of whom 439 (28.6 percent) are working.[5]

For persons age 65 through 68 we use the 1990-92 SIPP panels, as well as the 1984 SIPP panel. The design of the data set from the 1990-92 panels is similar to that described above, where individuals are included in the data set multiple times if they meet the inclusion criteria.[6] For the 1990-92 SIPP panels, the sample consists of persons who were born between 1921 and 1928.[7] The final sample includes 6,138 persons age 65-68 receiving Social Security, of whom 1,226 (25.0 percent) are working.

The 1984 SIPP panel is also used for 65-68 year old beneficiaries because it allows us to observe a time period during which the Social Security exempt amount (relative to the national average wage) changed for persons in this age group. Between 1977 and 1983 the exempt amount for 65-68 year olds more than doubled, increasing from $3,000 in 1977 to $6,600 in 1983.[8] While the 1984 SIPP primarily has individuals' information beginning in 1984, the SER data allow us to observe individuals' earnings during this 1977-83 time period. Thus, we use the 1984 SIPP (along with the SER and MBR) to examine Social Security recipients' work behavior and earnings from 1976 through 1983. The primary difference between the data sets created from the 1984 and 1990-92 SIPP panels is that the data set created from the 1984 SIPP does not contain information on individuals' non-labor income in the same year that earnings are observed (i.e., the information is not coterminous).[9] The final sample of persons from the 1984 SIPP were born between 1907 and 1917; that is, persons who were age 68-68 in 1976-83. In this case, the sample size was expanded by allowing individuals to be included multiple times. The resulting sample from the 1984 SIPP includes 5,942 Social Security recipients, of whom 1,389 (23.4 percent) are working.

Prior research has shown that a large portion of Social Security beneficiaries locate near or at the exempt amount, and that a relatively small proportion have earnings well above the exempt amount.[10] Figures 6-1 through 6-3 present the ratio of earnings to the exempt amount and their relative frequencies for the three samples described above.[11]

Figure 6-1, which displays information for 65-68 year old beneficiaries from the 1984 SIPP, shows that beneficiaries (1) cluster around the point where earnings equals the exempt amount (i.e., the ratio of earnings to the exempt amount equals one) and (2) seldom have earnings well above the exempt amount. Figures 6-2 and 6-3 show a somewhat similar pattern for beneficiaries in 1990-92, but the clustering around the point where earnings equals the exempt amount is less pronounced. The primary similarity between the three figures is that there are a relatively small number of people with earnings well above the exempt amount.

Figure 6-1
Ratio of Earnings to Exempt Amount
Persons Age 65 to 68, SIPP 1984

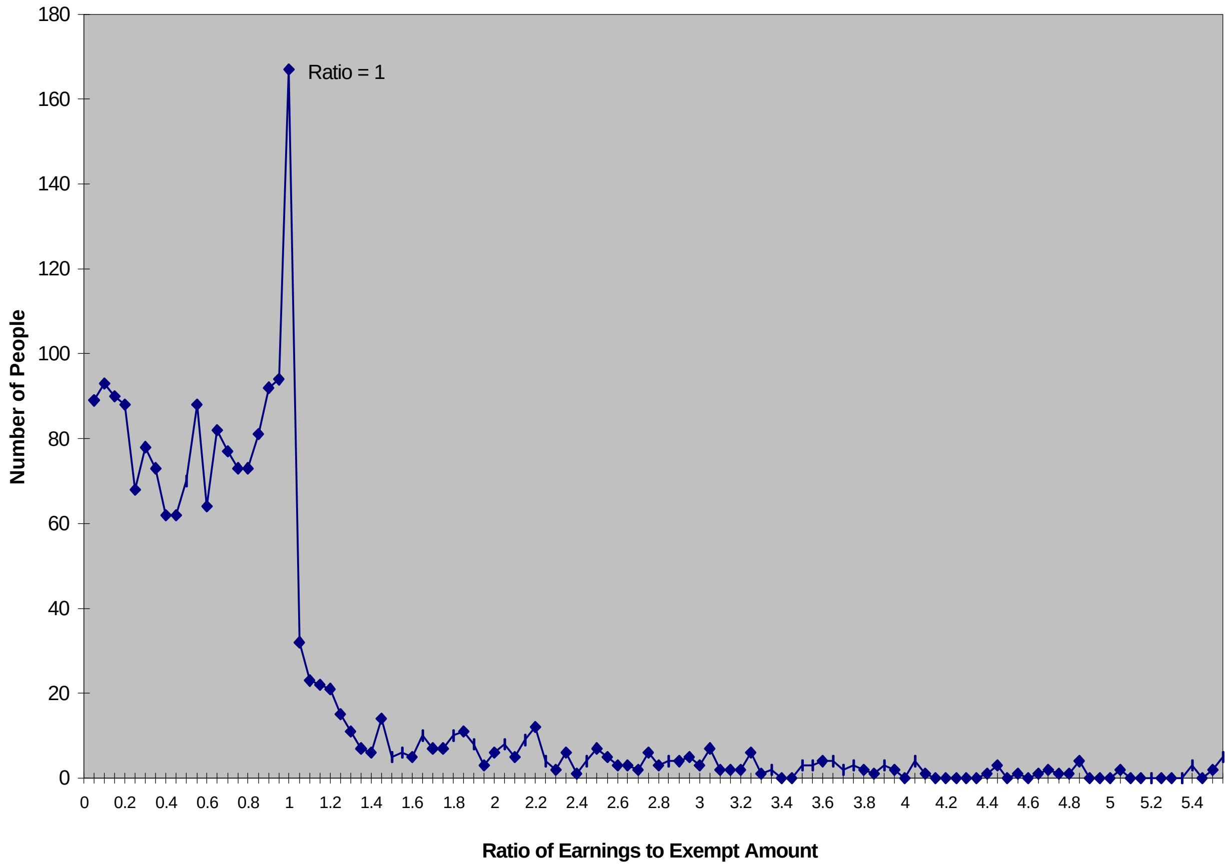


Figure 6-2
Ratio of Earnings to Exempt Amount
Persons Age 65 to 68, SIPP 1990-92

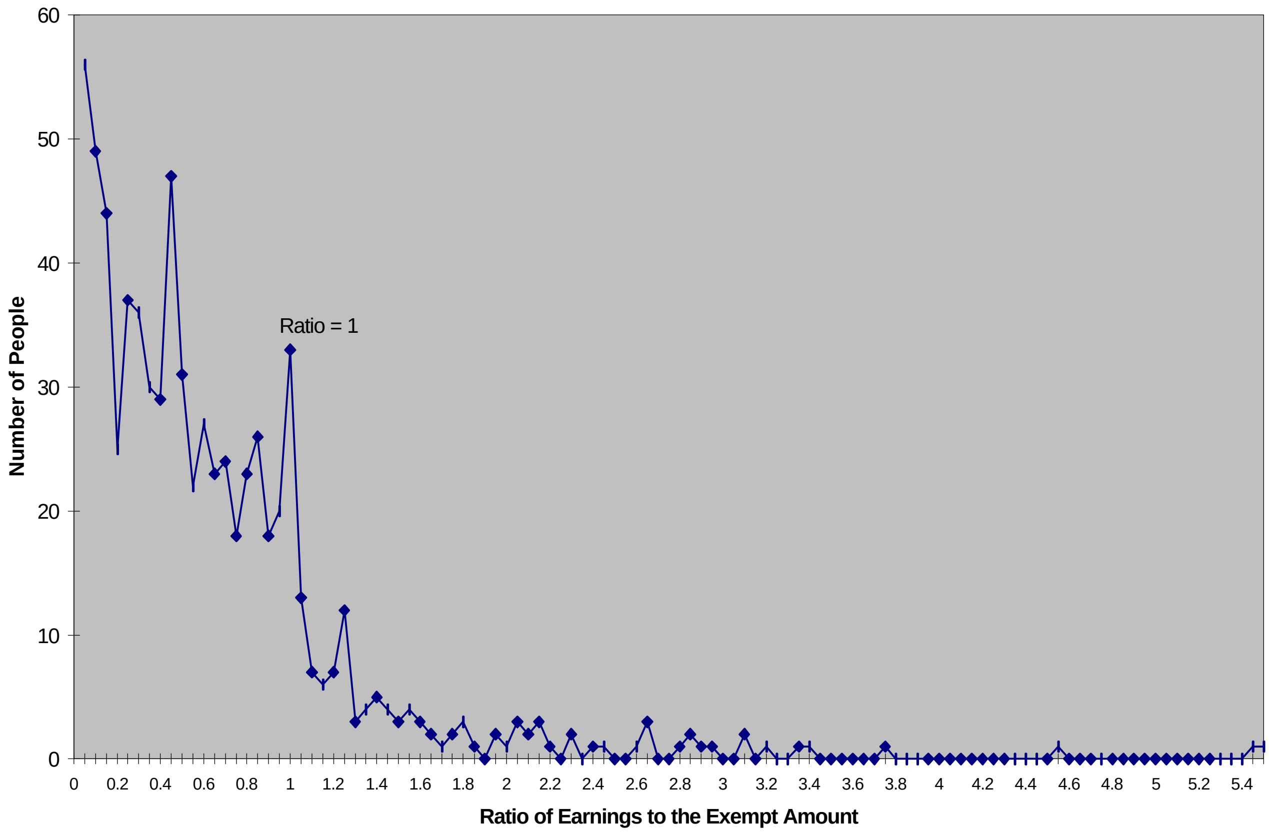
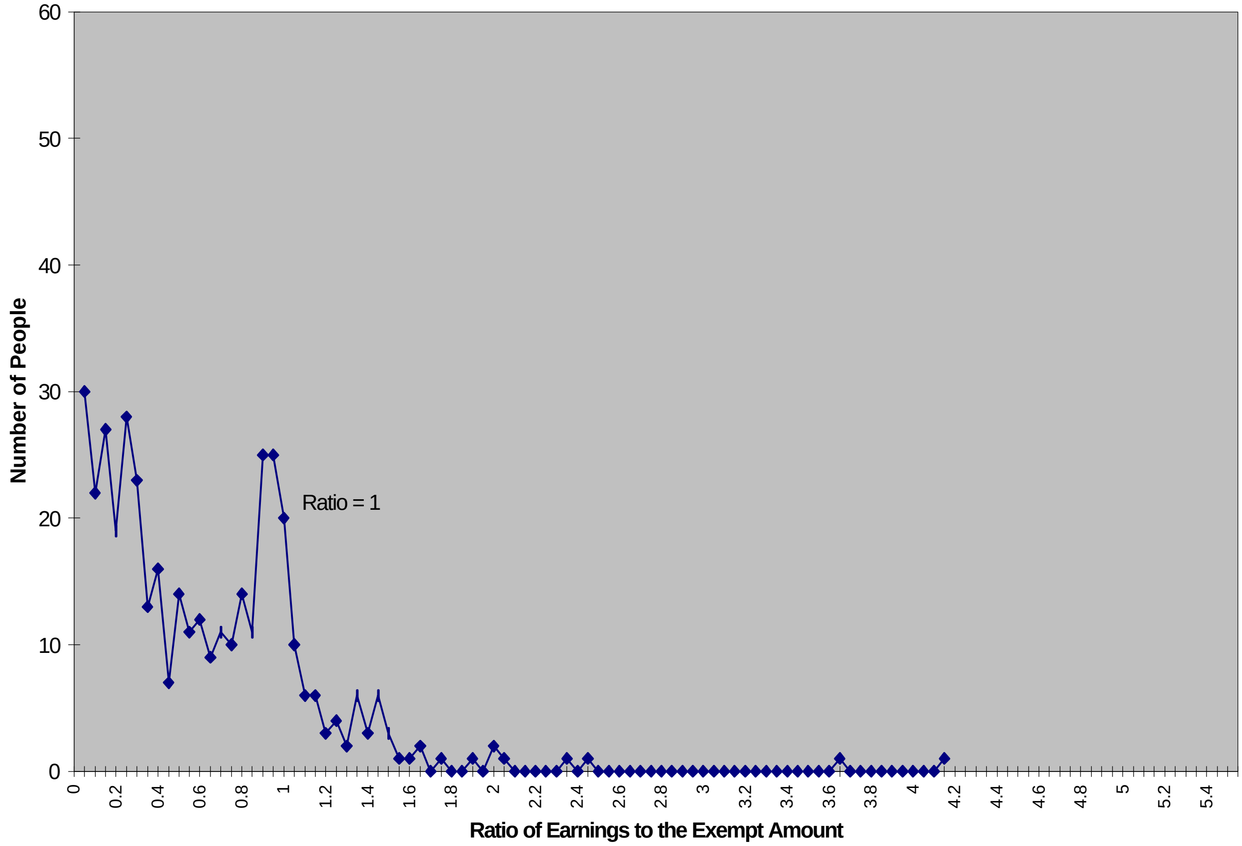


Figure 6-3
Ratio of Earnings to Exempt Amount
Persons Age 62 to 63, SIPP 1990-92



2. Estimating Model

In this statistical analysis, we estimate two models. We began with a two-equation model, where the first equation incorporates the decision to work or not work, and the second equation estimates the level of earnings for those individuals who work. This first model is referred to as the *probit/earnings model*.[12] In preliminary analyses, we found that the second stage earnings equation had very limited explanatory power. In other words, the observable characteristics of *working* beneficiaries provide little information about their earnings *levels*.

In the earnings equations for both young (62-63) and old (65-68) working beneficiaries, none of the coefficients for demographic variables (such as age, marital status, educational attainment) were statistically significant at the 10 percent level of significance. For the older beneficiaries, a few of the economic variables had statistically significant effects, but none of these variables had statistically significant effects for the younger beneficiaries.[13] The limited explanatory power of the earnings equations, particularly for younger beneficiaries, makes it difficult to obtain reliable earnings projections.

The limited ability of the probit/earnings model to explain working beneficiaries *level* of earnings led us consider an alternate modeling approach. Rather than predicting individuals' *level* of earnings, we predict "roughly" where on the earnings distribution an individual will fall. To do this we use an ordered probit model.[14] To estimate this model, the earnings distribution is divided into four segments, where the break points are based on the information provided in Figures 6-1 through 6-3. These segments are: (1) no earnings, (2) earnings greater than 0 but less than 85 percent of the exempt amount ($0 <$ ratio of earnings to the exempt amount < 0.85), (3) earnings between 85 percent and 115 percent of the exempt amount ($0.85 \leq$ ratio of earnings to the exempt amount ≤ 1.15), and (4) earnings greater than 115 percent of the exempt amount (ratio of earnings to the exempt amount > 1.15). The estimated coefficients from the ordered probit model allow us to project where on the earnings distribution future beneficiaries will fall. This approach, however, does not have a second stage earnings equation, so in the projection phase earnings are assigned randomly.[15]

For 62-63 year old beneficiaries, the probit/earnings and ordered probit models were estimated using the 1990-92 SIPP data. For 65-68 year olds there are multiple options because two data sets were created -- one with the 1984 SIPP and one with the 1990-92 SIPP. The 1984 SIPP is of significant value because it can be used to exploit the exogenous increases in the Social Security exempt amount that occurred between 1977 and 1983. That is, we can estimate the effect of an increase in the exempt amount on the earnings of beneficiaries aged 65-68 using the 1984 SIPP data. One option is to use only the 1984 SIPP to estimate the earnings of 65-68 year old beneficiaries. However, as described previously, using the 1984 SIPP data in this way has a drawback. Detailed coterminous data on several key explanatory variables are not available (these variables include IRA, 401k, and Keogh account balances, pension income, and wealth).

We address this issue by estimating the models for 65-68 year olds separately on the 1984 SIPP and the 1990-92 SIPP data sets, and then using the information from both analyses in the projection. Combining information from models estimated with the 1984 SIPP data and the 1990-92 SIPP data may provide the most complete set of information for projection purposes. In this case, we do the following: (1) estimate the model using the 1984 SIPP, where the exempt amount is one of the explanatory variables and (2) estimate the model using the 1990-92 SIPP data, where the coterminous variables are among the explanatory variables. With this approach, the projection is carried out using the estimated coefficient on the exempt amount obtained from the analysis using the 1984 SIPP, and all other estimated coefficients come from the models estimated with the 1990-92 SIPP data.[16]

For older beneficiaries, we estimate both the probit/earnings and ordered probit models with the 1984 and 1990-92 SIPP data sets. With the 1984 SIPP, we estimate an additional three earnings equations, where the ranges of earnings are defined by break points used in the ordered probit model.[17] We estimate these additional earnings equations to obtain additional information regarding how a $1 increase in the exempt amount affects beneficiaries' earnings.

Information obtained from estimating the probit/earnings models with the 1990-92 SIPP (for both older and younger beneficiaries) was not used in the projection phase, so these models are not discussed in detail. See Appendix 6-B for the results from these models. The focus of the discussion below is on the following models:

- 62-63 Year Old Beneficiaries, 1990-92 SIPP: Ordered probit model
- 65-68 Year Old Beneficiaries, 1990-92 SIPP: Ordered probit model
- 65-68 Year Old Beneficiaries, 1984 SIPP: Probit/earnings model, ordered probit model, plus other earnings equations.

The explanatory variables included in the models are listed below (interactions between some of these variables are also included in the models).[18]

In the ordered probit and probit models the explanatory variables are:

- Social Security exempt amount (1984 only)
- average earnings (*two* measures): age 35-55 and age 56-61 (1990-92, 62-63 year olds)/ age 35-59 and age 60-64 (1990-92, 65-68 year olds)/ age 45-59 and age 60-64 (1984)[19]
- family pension income (1990-92 only)
- family wealth (1990-92 only)
- family balance of IRA, 401k, and Keogh accounts (1990-92 only)
- indicators of age

- indicator of whether the individual is non-Hispanic white
- indicator of whether the individual has less than a high school education
- indicator of whether the individual has a high school education only
- indicator of the individuals' gender and marital status[20]
- spouse's age (where applicable)

and in the earnings equation estimated with the 1984 SIPP the explanatory variables are:

- Social Security exempt amount
- average earnings: age 60-64[21]
- indicators of age

The results of the models are presented in the following order: (1) 62-63 year old beneficiaries using the 1990-92 SIPP, (2) 65-68 year old beneficiaries using the 1990-92 SIPP, and (3) 65-68 year old beneficiaries using the 1984 SIPP. Recall that in the ordered probit, individuals are placed into four groups:

Group 0: No earnings.
Group 1: Earnings greater than 0 but less than 85 percent of the exempt amount.
Group 2: Earnings between 85 percent and 115 percent of the exempt amount.
Group 3: Earnings greater than 115 percent of the exempt amount.

Ordered Probit Model Results for 62-63 Year Old Beneficiaries, 1990-92 SIPP

The explanatory variables in the ordered probit model for 62 year old beneficiaries include those variables listed in the previous section. This model, however, distinguishes between married female beneficiaries and all other beneficiaries. Specification tests revealed that married females behave differently with regard to post-retirement employment and earnings, as compared to unmarried persons and married males. In addition to including a variable indicating whether an individual is a married female, married female status is interacted with several other explanatory variables.

The ordered probit model presented in Table 6-1 was estimated on a sample of 1,533 persons, where 1,094 persons are in earnings group 0, 300 are in earnings group 1, 94 are in earnings group 2, and 45 are in earnings group 3. The model includes 13 explanatory variables, of which eight have effects statistically different from zero at the 5 percent level (P-values less than 0.05), but the other five variables do not have statistically significant effects at even the 10

Table 6-1
Ordered Probit Model[a]
Social Security Beneficiaries Age 62 to 63, 1990-92 SIPP

Explanatory Variable	Ordered Probit (obs=1,533)	
Non-Hispanic White	0.1549	(0.1015)
Education Less than 12th Grade	-0.3413 **	(0.0955)
Education Equal to 12th Grade	-0.1011	(0.0843)
Age 63	-0.0657	(0.0682)
Married Female	-0.4693 **	(0.1183)
Married Female * Spouse Age	-0.0334 **	(0.0159)
Family Wealth[b]	-0.0023	(0.0053)
Family Pension Benefits	-0.7562 **	(0.1348)
Family Pension * Married Female	0.4393 **	(0.1904)
Family Retirement Balances (IRA, 401k, Keogh)	-0.0209	(0.0391)
Average Past Earnings (ages 35-55)	-0.1772 **	(0.0897)
Average Recent Earnings (ages 56-61)	0.4913 **	(0.0886)
Average Recent Earnings * Married Female	0.5721 **	(0.1898)
Pseudo R-square	0.0580	
Chi-squared	148.36 (df=13)	
Cutoff value 1	0.2870	(0.1346)
Cutoff value 2	1.1194	(0.1371)
Cutoff value 3	1.7111	(0.1450)

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.

b) Family wealth, family pension benefits, average past earnings, and average recent earnings are divided by national average earnings.

c) Standard errors in parentheses.

d) Significance at 5 percent is represented by "**".

percent level. Of these five coefficients, three have P-values ranging between 0.13 and 0.34, and two measures of a family's financial well-being -- family wealth and family retirement balances -- have significantly higher P-values of about 0.65. Coefficients for both of these financial well-being variables have the expected sign, so we have chosen to keep them in the model.

Coefficients from an ordered probit equation are somewhat difficult to interpret, but they do produce some important unambiguous results. One such result is that a positive coefficient indicates that an increase in the explanatory variable will cause the probability of working to rise and a negative coefficient indicates that an increase in the explanatory variable will cause the probability of working to decline.

Discussion of the results for the younger beneficiaries focuses first on the variables found to have statistically significant effects at the 5 percent level. Starting with the demographic variables, the model results suggest that persons with less than a high school education are *less* likely to work than persons with more than a high school education. We also find that married female beneficiaries are *less* likely to work than other beneficiaries. Married female status is interacted with the spouse's age and the estimated coefficient suggests that women who are married to older men are *less* likely to work than women who are married to younger men, all else being equal. The model does not include an interaction between spouse's age and married male status because spouse's age was not found to influence significantly the behavior of married men.

The model suggests that higher pension benefits *reduce* the probability of working. This reduction, however, is smaller for married females than for other beneficiaries. This smaller effect for married females is evident from the positive and statistically significant coefficient on the interaction term between pension benefit level and the indicator of married female status.

Table 6-1 also shows that while beneficiaries with higher average recent earnings (between ages 56 and 61) are more likely to work, the positive (and large) coefficient on the interaction term of recent earnings and married female status suggests that recent earnings play a larger role in the work decision of married female beneficiaries. Although higher average *recent* earnings (ages 56 to 61) is found to increase the probability of working, higher average *past* earnings (ages 35 to 55) is found to decrease the probability of working. A comparison of these two coefficients shows that the negative impact of past earnings is substantially smaller than the positive impact of more recent earnings.

For the five variables with effects that are not statistically different from zero, yet are included in the projection component, we find the following: (1) non-Hispanic white beneficiaries are *more* likely to work than minority beneficiaries, (2) beneficiaries with a high school degree (only) are *less* likely to work than beneficiaries with more than a high school degree, (3) 63 year old beneficiaries are *less* likely to work than 62 year old beneficiaries, (4) higher wealth holdings *reduce* the probability of working, and finally, (5) higher retirement account balances (IRA, 401k, and Keogh) *reduce* the probability of working.

The relatively large number of explanatory variables with significant effects is reflected in the chi-squared statistic. The chi-squared statistic has a value of 148.36, and with 13 degrees of freedom it is well above the critical value of 22.36. Since this is not a linear model, we cannot compute an R-squared value. However, we have calculated a pseudo-R-squared statistic. This calculation is based on the log-likelihood value in the estimated model (the "restricted" model) and the log-likelihood value in a model with only a constant (the "unrestricted" model).[22] In this ordered probit model, the value of this pseudo-R-squared is 0.058.

Ordered Probit Model Results for 65-68 Year Old Beneficiaries, 1990-92 SIPP.

For the older beneficiaries (age 65-68), we have more flexibility because the sample size is substantially larger (6,138 versus 1,533).[23] The estimated coefficients from the preliminary ordered probit models suggest that married beneficiaries are less likely to work than unmarried beneficiaries, so we *split* the sample by marital status and estimated two separate equations. The estimation of identical model specifications for unmarried beneficiaries and married beneficiaries resulted in coefficient estimates that were quite different, providing evidence that splitting the sample is preferred. An indicator variable for gender was included in these two models, and the coefficient estimates suggest that *unmarried* males and females are similar, while *married* males and females differ. As a result, we further split the sample of married persons into married males and married females. The net result is that, for older beneficiaries, we estimate three separate ordered probit equations -- one for unmarried persons (n=1,831), a second for married males (n=2,121), and a third for married females (n=2,186).

The models estimated for older beneficiaries include explanatory variables that were taken from the set of variables included for younger beneficiaries. Variables with highly insignificant coefficients were omitted from the estimation equation because these coefficients have a high probability of being zero, and therefore, we do not want to include them in the projection phase. As a result, the estimation equations for the three groups do not have the same set of explanatory variables. The estimated coefficients are presented in Table 6-2. The results are presented first for unmarried persons, then for married males, and finally, for married females.

***Unmarried Beneficiaries*:** The model for unmarried beneficiaries includes nine explanatory variables, of which five have statistically significant effects at the five percent level and one has statistically significant effects at the 10 percent level. The statistically significant coefficients include those for an indicator of whether the individual has less than a high school education, three indicator variables for beneficiaries' ages, family pension benefits, and average

Table 6-2
Ordered Probit Model by Marital Status and Gender[a]
Social Security Beneficiaries Age 65 to 68, 1990-92 SIPP

Explanatory Variable	Unmarried People (n=1,831)		Married Males (n=2,121)		Married Females (n=2,186)	
Education Less than 12th Grade	-0.3766 **	(0.0885)	-0.2947 **	(0.0661)		
Education Equal to 12th Grade	-0.1127	(0.0842)				
Spouse's Age			-0.0171 **	(0.0052)	-0.0126	(0.0081)
Age 66	-0.1770 *	(0.0955)				
Age 67	-0.2572 **	(0.0940)	-0.1800 **	(0.0717)	-0.1516 *	(0.0881)
Age 68	-0.3177 **	(0.0942)	-0.3171 **	(0.0729)	-0.2836 **	(0.0959)
Family Wealth [b]	-0.0002	(0.0094)	-0.0007	(0.0046)		
Family Pension Benefits	-1.2946 **	(0.1836)	-0.6591 **	(0.0807)	-0.3996 **	(0.0964)
Average Past Earnings (ages 35-59)	-0.1109	(0.0957)	-0.5460 **	(0.0769)		
Average Recent Earnings (ages 60-64)	1.0328 **	(0.0885)	0.7097 **	(0.0531)	1.4470 **	(0.0920)
Pseudo R-squared	0.0913		0.0845		0.1283	
Chi-squared	229.98 (df=9)		278.02 (df=8)		257.74 (df=5)	
Cutoff value 1	0.5757	(0.1042)	-1.0196	(0.3316)	0.3831	(0.5565)
Cutoff value 2	1.4070	(0.1104)	-0.0222	(0.3315)	1.3188	(0.5586)
Cutoff value 3	1.7707	(0.1180)	0.3688	(0.3326)	1.7084	(0.5616)

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Family wealth, family pension benefits, average past earnings, and average recent earnings are measured relative to national average earnings.
c) Standard errors in parenthesis.
d) Significance at 5 percent is represented by "**".
e) Significance at 10 percent is represented by "*".

recent earnings. The coefficients on these six variables indicate the following with respect to the work behavior of unmarried beneficiaries: (1) beneficiaries with less than a high school education are *less* likely to work than beneficiaries with more than a high school education, (2) beneficiaries between the ages of 66 and 68 are *less* likely to work than 65 year old beneficiaries, (3) beneficiaries with higher pension benefits are *less* likely to work, and (4) beneficiaries with higher average earnings between the ages of 60 and 64 are *more* likely to work.

The effect of the indicator variable for whether the beneficiary has a high school degree (only) is not statistically significant at conventional levels, but it remains in the model because the P-value is not particularly high (0.18) and the coefficient has the expected sign (negative). Also, the magnitude of the coefficient is reasonable in that it suggests that individuals with a high school degree (only) have (1) a *lower* probability of working as compared to beneficiaries with more than a high school degree, but (2) a *higher* probability of working as compared to individuals with less than a high school degree. The coefficient on average past earnings (age 35-59) has a somewhat higher P-value (0.25), but remains in the model. The negative sign on this coefficient is consistent with the findings for younger beneficiaries; while higher *recent* earnings *increase* the probability of working, higher *past* earnings *decrease* the probability of working.

The coefficient on family wealth is small (negative) and not statistically significant. Estimating the model with an alternative measure of wealth -- family income from assets -- produces a negative and statistically significant (at the 10 percent level) coefficient. The final model, however, does not include income from assets because this variable is measured differently in the SIPP data set than in the MINT projection data set. Because wealth, when measured in terms of income from assets, has statistically significant effects, we chose to keep the wealth variable in the model even if, as measured, its effects are highly insignificant. The negative coefficient on the wealth variable suggests that beneficiaries with a higher level of wealth are less likely to work.

In addition to this model for unmarried beneficiaries, we estimated another, similar model, with the addition of a variable capturing family retirement account balances (i.e., 401(k), IRA, and Keogh). The results of this model, presented in Appendix 6-D Table 6-D-1, suggest that persons with higher 401(k), IRA, and Keogh account balances are *more* likely to work (significant at the five percent level). While these retirement account balances were found to increase the probability of working, family wealth and pension benefit levels were found to have the opposite effect. One explanation for this apparently anomalous result is that persons with high account balances are likely to be self-employed, particularly because this measure includes Keogh accounts. The positive and significant coefficient may be therefore picking up a self-employment effect instead of an effect of higher retirement account balances. Because individual contributions to retirement accounts are increasing and a larger percentage of contributions in the future will be for employees (rather than the self-employed), this estimated positive relationship between account wealth and working is not likely to persist. Therefore, our final projections for older beneficiaries exclude the effect of these retirement accounts.[24]

For this model, the chi-squared statistic has a value of 229.98, which is well above the critical value of 16.92 (9 degrees of freedom). This is not a linear model, so we compute a pseudo-R-squared statistic rather than an R-squared value. In this model, the value of the pseudo-R-squared is 0.091.

***Married Male Beneficiaries*:** The estimated coefficients from the ordered probit model for married male beneficiaries are presented in column 2 of Table 6-2. Unlike the model for unmarried beneficiaries, this model excludes an indicator of educational attainment equal to high school and an indicator variable for age 66. These variables are excluded because their effects are highly insignificant.[25]

The results for married males are similar to those found for unmarried persons, although the former model includes an indicator of the spouse's age. The results suggest that the work decision of married male beneficiaries is influenced by the age of their wife. Men who are married to younger women are more likely to work in retirement, as compared to men who are married to older women. Recall that in the model for younger beneficiaries we found that married men's work decisions were not affected by their wives' age.

***Married Female Beneficiaries*:** The third model considers the work behavior of married female beneficiaries (see column 3 of Table 6-2). In this model we include only five explanatory variables -- indicator variables for age 67 and age 68, family pension benefits, average recent earnings, and age of the spouse. The results of this model, in terms of the signs of the coefficients, suggest that (1) beneficiaries are *less* likely to work as they get older, (2) higher pension benefits lead to a *lower* probability of working, (3) beneficiaries with higher recent earnings are *more* likely to work, and (4) female beneficiaries married to older men are *less* likely to work.

Average past earnings (age 35-59) and the indicators of educational attainment and age are not included in the list of explanatory variables because they have highly insignificant effects.[26] The family wealth variable is excluded from the model for two reasons. First, neither the coefficient on family income from assets nor family wealth is statistically different from zero. In addition, the coefficients on these two variables are of opposite signs, making the direction in which wealth affects the post-retirement work decision at age 67 ambiguous.

As was the case with the other models, the chi-squared statistic for these two models (married males and married female) is well above the critical value. The pseudo-R-squared is 0.085 for the married male model and 0.128 for the married female model.

***Results for 65-68 Year Old Beneficiaries Using the 1984 SIPP*.**

Models estimated with the 1984 SIPP include the (1) probit/earnings model, (2) ordered probit model, and (3) three additional earnings equation. The additional earnings equations are estimated as a means of obtaining more information about how a one dollar increase in the exempt amount affects beneficiaries earnings. These three models are discussed in turn below.

The two-equation probit/earnings model is presented in Table 6-3.[27] Recall that the first equation incorporates the decision to work or not work, and the second equation estimates the level of earnings for those individuals who work. In the work/no work equation, the coefficient on the Social Security exempt amount is negative, but the coefficient is not statistically different from zero. A negative coefficient on this variable would suggest that an increase in the exempt amount reduces the probability that an individual will work (not the expected sign). In the *earnings equation*, however, the coefficient on the exempt amount is positive and statistically different from zero at the one percent level of significance, suggesting that an increase in the exempt amount increases the earnings of *working* beneficiaries. The estimated coefficient of 0.466 suggests that a one dollar increase in the exempt amount will in turn increase the earnings of working beneficiaries by 46.6 cents. Overall, this model suggests that the Social Security exempt amount does not influence beneficiaries' decisions about whether to work, but does influence their decisions about how much to earn.

The next model that we consider is the ordered probit model, which is presented in Table 6-4. The estimated coefficient on the Social Security exempt amount from this ordered probit model is negative and is not statistically significant, as in the probit model.[28] If we look only at the ordered probit results, we would conclude that the Social Security exempt amount does not influence beneficiaries earnings behavior. The results of the probit/earnings model, however, suggest otherwise.

Because the probit/earnings model result indicating that an increase in the Social Security exempt amount increases the *earnings* of working beneficiaries is strong (i.e., the coefficient on the exempt amount in the earnings equation is significant at the one percent level), we choose to incorporate this information into the projection phase. That is, the projection phase will be such that the Social Security exempt amount does not influence beneficiaries' decisions about whether to work, but does influence their decisions about how much to earn.

The projections could be carried out using the estimated coefficient from the earnings equation which suggests that a one dollar increase in the exempt amount leads to a 46.6 cent increase in the earnings of working beneficiaries. One drawback of this approach is that *all* working beneficiaries' earnings are assumed to be identically affected by a given increase in the Social Security exempt amount. For example, if the exempt amount increases by 10 dollars, the earnings of all working beneficiaries will rise by $4.66, regardless of whether that beneficiary has earnings well below the exempt amount or at the exempt amount.

Table 6-3
Probit/Earnings Model
Persons Age 65 to 68, SIPP 1984

Explanatory Variable	Probit (obs=5942)		Earnings (obs=1389)	
Social Security Exempt Amount	-0.3929	(0.4243)	** 0.4663	(0.2005)
Non-Hispanic white	** -0.1429	(0.0570)		
Education less than 12th grade	**-0.1410	(0.0509)		
Education equal to 12th grade	0.0445	(0.0546)		
Male	** 0.2290	(0.0456)		
Age 66	** -0.1012	(0.0506)	-0.0207	(0.0228)
Age 67	** -0.1964	(0.0517)	-0.0209	(0.0243)
Age 68	** -0.2882	(0.0529)	-0.0203	(0.0261)
Average past earnings (ages 45-59)	** -0.1881	(0.0692)		
Average recent earnings (ages 60-64)	** 0.6527	(0.0593)	** 0.1971	(0.0264)
Constant	0.1216	(0.0941)	** -0.6199	(0.1782)
Inverse Mills Ratio[a]			-0.0917	(0.0809)
Pseudo R-squared/R-squared[b]	0.06130		0.1093	
Chi-squared / F-statistic[c]	395.92 (df = 10)		17.93 (df= 6, 1382)	

a) The inverse mills ratio is the correction term as described in appendix A.
b) Pseudo R-squared calculated for ordered probit and R-squared calculated for earnings equations.
c) Chi-squared calculated for the ordered probit and F-statistic calculated for the earnings equations.
d) Standard errors in parenthesis.
e) Significance at 10 percent is represented by "*".
f) Significance at 5 percent is represented by "**".

Table 6-4
Ordered Probit Model
Social Security Beneficiaries Age 65 to 68, 1984 SIPP

Explanatory Variable	**Ordered Probit** (obs=5,942)	
Social Security Exempt Amount	-0.5619	(0.4061)
Non-Hispanic white	** -0.1222	(0.0547)
Education less than 12th grade	** -0.1540	(0.0476)
Education equal to 12th grade	0.0066	(0.0511)
Male	** 0.2251	(0.0440)
Age 66	** -0.1107	(0.0482)
Age 67	** -0.1970	(0.0492)
Age 68	** -0.3030	(0.0507)
Average past earnings (ages 45-59)	** -0.2067	(0.0663)
Average recent earnings (ages 60-64)	** 0.7134	(0.0567)
Pseudo R-squared	0.0533	
Chi-squared	480.51 (df=10)	
Cutoff value 1	0.5710	(0.1705)
Cutoff value 2	1.2527	(0.1711)
Cutoff value 3	1.7028	(0.1722)

a) Standard errors in parenthesis.
b) Significance at 10 percent is represented by "*".
c) Significance at 5 percent is represented by "**".

It is unlikely that beneficiaries at different point of the earnings distribution are similarly affected by changes in the Social Security exempt amount, so we split the earnings distribution into three segments and estimate a separate earnings equation for each segment: the first earnings equation includes beneficiaries with earnings greater than 0 but less than 85 percent of the exempt amount, the second earnings equation includes beneficiaries with earnings between 85 percent and 115 percent of the exempt amount, and the third earnings equation includes beneficiaries with earnings greater than 115 percent of the exempt amount. The results of these three earnings equations are presented in Table 6-5.

In all three of the earnings equations, the coefficient on the exempt amount is positive, suggesting that an increase in the exempt amount increases the earnings of working beneficiaries. The estimated coefficients and standard errors from the earnings equations suggest that these coefficients are statistically different from zero. The coefficient estimates suggest that a $1 increase in the exempt amount will increase earnings by (1) $0.25 for beneficiaries with earnings well below the exempt amount (group 1), (2) $0.94 for beneficiaries with earnings in the near or at the exempt amount (group 2), and (3) $1.44 for beneficiaries with earnings over the exempt amount (group 3).[29] While we would not expect the value for this last group to be greater than $1, we cannot reject the null hypothesis that a $1 increase in the exempt amount increases the earnings by $1. This is because the standard error on the coefficient is relatively large -- the coefficient is 1.44 and the standard error is 0.50. These are estimates that are included in the projection phase.

III. PROJECTING PARTIAL RETIREMENT EARNINGS

1. Procedure Used to Project Partial Retirement Earnings

Partial retirement earnings are projected using a sample of individuals from the 1990-1993 SIPP panels who were born between 1931 and 1960. These projections are carried out using the subset of individuals who are Social Security beneficiaries (see Chapter 5). Other MINT projections used here include those for mortality, marital status, covered earnings, non-pension wealth, pension benefits, and IRA, 401(k) and Keogh account balances.

The projections are carried out in two steps. The first step is to determine into which of the four earnings groups individuals fall. This placement is based on the interaction between individual characteristics and the estimated coefficients from the ordered probit model. The second step is to assign working beneficiaries' a level of earnings. Because the earnings equations for working beneficiaries have little explanatory power, the earnings of working beneficiaries within these groups are assigned based only on a random number and a fixed distribution of earnings (from the 1990-1992 SIPP), not on individual characteristics.

Table 6-5
Earnings Equations for Working Beneficiaries, by Earnings Group
Social Security Beneficiaries Age 65 to 68, 1984 SIPP

Explanatory Variable	Earnings, Group 1 0< ratio < 0.85[a] (obs=871)		Earnings, Group 2 0.85<= ratio <=1.15[a] (obs=290)		Earnings, Group 3 ratio >1.15[a] (obs=228)	
Social Security Exempt Amount	** 0.2532	(0.0702)	** 0.9424	(0.0308)	** 1.4448	(0.4959)
Age 66	0.0139	(0.0095)	-0.0037	(0.0044)	-0.0517	(0.0609)
Age 67	0.0016	(0.0108)	0.0036	(0.0050)	0.0449	(0.0786)
Age 68	* 0.0232	(0.0129)	0.0011	(0.0061)	* 0.1764	(0.0910)
Average past earnings (ages 45-59)						
Average recent earnings (ages 60-64)	0.0139	(0.0212)	-0.0011	(0.0102)	0.2146	(0.1409)
Constant	0.0473	(0.0405)	0.0324	(0.0262)	-0.1648	(0.1956)
Inverse Mills Ratio[b]	-0.0097	(0.0292)	-0.0157	(0.0133)	** 2.2050	(0.9017)
R-squared	0.0288		0.7256		0.3152	
F-statistic	5.06 (df= 6, 864)		165.62 (df= 6, 283)		11.9 (df= 6, 221)	

a) Ratio is defined as earnings divided by the exempt amount.
b) This inverse mills ratio is "adjusted" to take account of the fact that individuals who enter each of the the earnings groups are a select group of individuals.
c) Standard errors in parenthesis.
d) Significance at 10 percent is represented by "*".
e) Significance at 5 percent is represented by "**".

Projecting Individuals' Earnings Group

These projections are based on the estimated coefficients from the ordered probit models. We multiply the individual characteristics of each beneficiary on the MINT file (X_i) by the estimated coefficients ($\hat{\beta}$). The resulting value ($X_i\hat{\beta}$) is used to calculate, for each individual, the predicted probability of falling into each of the four earnings groups. The predicted probabilities are based on the normal distribution and are defined as follows:

Probability Earnings Group 0: $\Phi(cutoff\ value\ 1 - X_i\hat{\beta})$
Probability Earnings Group 1: $\Phi(cutoff\ value\ 2 - X_i\hat{\beta})$ - $\Phi(cutoff\ value\ 1 - X_i\hat{\beta})$
Probability Earnings Group 2: $\Phi(cutoff\ value\ 3 - X_i\hat{\beta})$ - $\Phi(cutoff\ value\ 2 - X_i\hat{\beta})$
Probability Earnings Group 3: 1 - $\Phi(cutoff\ value\ 3 - X_i\hat{\beta})$

The cutoff values 1-3 are presented, along with the estimated coefficients, in Tables 6-1 and 6-2.

To determine in which of the four earnings groups an individual will be placed, we compare the newly calculated predicted probabilities to a random draw probability from a uniform distribution (between 0 and 1). The following example helps highlight this process. Suppose that the calculated probabilities for an individual are as follows:

Predicted probability of group 0 is 0.532 (cumulative probability equals 0.532)
Predicted probability of group 1 is 0.251 (cumulative probability equals 0.783)
Predicted probability of group 2 is 0.148 (cumulative probability equals 0.931)
Predicted probability of group 3 is 0.069 (cumulative probability equals 1.000)

If the random draw is 0.456, then the individual is placed into group 0, because the random draw is lower than the predicted probability of being in group 0. However, if the random draw is 0.900 then the individual is placed into group 2, because the random draw falls above the group 1 cumulative probability but falls below the group 2 cumulative probability.

To impose consistency in individuals' earnings trajectories, we use the same random draw for both the age 62 and age 67 projections.

Projecting Individuals' Level of Earnings

As mentioned above, working beneficiaries' projected earnings are not based on individual characteristics, but are based on a (second) random draw and a fixed distribution of earnings. For the projections carried out here, the distribution of earnings is taken from the 1990-92 SIPP estimation data set.[30] Because individuals are placed into one of three earnings groups with non-zero earnings, the level of earnings from the SIPP data has been divided into three separate data sets. For example, individuals placed into earnings group 1 will be randomly assigned a level of earnings *from* the earnings of group 1 beneficiaries in the 1990-92 SIPP estimation data set.

In assigning working beneficiaries a level of earnings, the first step is to look at the individuals' assigned earnings group. Based on this assigned earnings group, the (SAS) program points to the appropriate earnings data set and based on a (second) random draw from a uniform distribution, the individual is assigned a level of earnings based on that draw. The level of earnings in these three separate SAS data sets are sorted from low to high, so a person with a low random draw will be assigned low earnings (relative to that group) and a person with a higher random draw will be assigned high earnings (relative to that group).[31]

2. Projections for 62 Year Old Beneficiaries

Projected Earnings Group

Overall, the results of our projections suggest that a higher fraction of 62 year old beneficiaries will be employed over the next two decades than the fraction of beneficiaries currently employed, as calculated from the 1990-92 SIPP. Table 6-6 presents a comparison of calculations from the 1990-92 SIPP (the "current" data) and MINT projection file (the "projected" data) by earnings group and marital status/gender. Calculations from the current data show that 70.4 percent of beneficiaries are not employed (i.e., in earnings group 0), whereas the projections based on the MINT file indicate that only 60.7 percent of beneficiaries will not work over the next few decades -- a difference of 10 percentage points.[32]

A comparison of these percentages by marital status and gender shows that the largest difference is for married females. While the projections suggest that 32.7 percent of married female beneficiaries will work (or 67.3 percent will not work), in the current data only 21.2 percent work. This difference of almost 12 percentage points is, in part, due to an increase in the pre-retirement employment of married women. While pre-retirement employment is not explicitly taken into account in our model, the model does incorporate individuals' earnings. Average recent earnings (divided by national average earnings) for married females has a mean value of 0.20 in the current data and has a significantly higher mean of 0.51 in the MINT projection data set.

The findings also suggest that married male beneficiaries and unmarried beneficiaries are more likely to be employed over the next few decades, but their increase in employment is less than for married females. The projections suggest that 43.7 percent of married male beneficiaries have non-zero earnings, while calculations based on the current data show that 35.1 percent have non-zero earnings, an increase of 8.6 percentage points. For unmarried persons, the increase is 8.2 percentage points.

Table 6-6 also compares the current and projected percentage of 62 year old beneficiaries in earnings groups 1 through 3, by marital status and gender. Columns 3 through 8 of the table show that the projected results place a higher fraction of beneficiaries into each of the three positive earnings groups (earnings group 1-3), as compared to the current estimates. Differences between the current and projected values range from 0.6 percentage points to 6.9 percentage points.

Tables 6-7 through 6-10 examine beneficiaries' work behavior by cohort. Beneficiaries born between 1931 and 1960 are placed into one of six cohort groups, where the cohort groups are in five-year increments. Looking down the six cohort groups in Table 6-7 reveals a decline, from the oldest to the youngest cohort, in the number of 62 year old beneficiaries who do *not* work. While 67.9 percent of beneficiaries in the 1931-35 cohort do not work, only 58.4 percent

Table 6-6
Percentage of 62 Year Old Beneficiaries in Each Earnings Group[a]
A Comparison of Current and Projected Values[b]

Marital Status/ Gender	Earnings Group 0		Earnings Group 1		Earnings Group 2		Earnings Group 3	
	Current	Projected	Current	Projected	Current	Projected	Current	Projected
Total	70.4%	60.7%	20.3%	24.7%	6.2%	8.9%	3.2%	5.7%
Unmarried People	65.3	57.1	20.6	27.5	8.2	9.6	5.2	5.8
Married Males	64.9	56.3	25.3	27.1	7.0	10.2	2.8	6.4
Married Females	78.8	67.3	15.9	20.5	3.4	7.2	1.9	5.1

Table 6-7
Projected Percentage of
62 Year Old Beneficiaries in Each Earnings Group[a,b]
By Cohort

Cohort	Earnings Group 0	Earnings Group 1	Earnings Group 2	Earnings Group 3
Total	60.7%	24.7%	8.9%	5.7%
1931-35	67.9	20.6	7.1	4.4
1936-40	62.7	23.3	8.4	5.6
1941-45	61.9	24.6	8.1	5.4
1946-50	59.6	25.7	8.7	5.9
1951-55	58.1	25.9	9.8	6.2
1956-60	58.4	25.6	9.9	6.1

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file. Current, Urban Institute tabulations from the 1990-92 SIPP.

Table 6-8
Projected Percentage of 62 Year Old
Beneficiaries in Each Earnings Group[a,b]
By Cohort and Gender

Cohort	Earnings Group 0		Earnings Group 1		Earnings Group 2		Earnings Group 3	
	Male	Female	Male	Female	Male	Female	Male	Female
Total	56.1%	63.9%	27.4%	22.8%	10.0%	8.1%	6.5%	5.2%
1931-35	63.3	70.8	21.9	19.8	8.8	6.1	6.1	3.3
1936-40	57.7	66.0	25.4	21.9	9.6	7.6	7.2	4.5
1941-45	57.5	64.9	27.3	22.8	9.4	7.2	5.7	5.2
1946-50	54.6	63.2	29.0	23.5	9.6	8.1	6.8	5.3
1951-55	52.9	61.6	29.5	23.5	10.9	9.1	6.7	5.9
1956-60	54.8	61.0	27.9	24.0	10.8	9.3	6.5	5.8

Table 6-9
Projected Percentage of 62 Year Old Beneficiaries Who Do and Do Not Work[b]
By Cohort and Gender/Marital Status

	Not Working				Working			
Cohort	Unmarried Males	Married Males	Unmarried Females	Married Females	Unmarried Males	Married Males	Unmarried Females	Married Females
Total	55.2%	56.3%	57.8%	67.3%	44.8%	43.7%	42.2%	32.8%
1931-35	65.2	63.0	61.8	74.8	34.8	37.0	38.3	25.2
1936-40	57.7	57.8	58.7	70.1	42.3	42.3	41.3	29.9
1941-45	56.0	58.0	59.4	67.8	44.0	42.0	40.6	32.2
1946-50	54.0	54.7	59.4	65.2	46.0	45.3	40.6	34.8
1951-55	51.1	53.5	55.4	65.1	48.9	46.5	44.6	34.9
1956-60	55.8	54.5	55.7	64.2	44.2	45.5	44.3	35.8

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file.

Table 6-10
Partial Retirement Earnings of
62 Year Old Beneficiaries in Each Earnings Group
A Comparison of Current and Projected Values[a]

Marital Status/	Earnings Group 1		Earnings Group 2		Earnings Group 3	
Gender	Current	Projected	Current	Projected	Current	Projected
Total	0.107	0.108	0.314	0.314	0.516	0.520
Unmarried People	0.112	0.108	0.319	0.314	0.477	0.510
Married Males	0.111	0.107	0.309	0.313	0.548	0.538
Married Females	0.098	0.110	0.311	0.315	0.559	0.509

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file. Current, Urban Institute tabulations from the 1990-92 SIPP.

of beneficiaries in the 1956-60 cohort do not work.[33] The fraction of beneficiaries not working falls for each successive cohort (moving from the oldest to youngest cohort), except for the youngest cohort, where the fraction not working increases very slightly. This slight increase in the fraction of persons with no earnings in the youngest cohort is consistent with the observed decline in projected earnings for this cohort. The mean of recent earnings (relative to the average wage) for 62 year old beneficiaries falls from 0.77 for the 1951-55 cohort to 0.72 for the 1956-60 cohort.

The fraction of beneficiaries in the other three earnings groups does not increase consistently across the six cohorts, but the fraction of beneficiaries in each group does follow an upward trend across the six cohorts.

Examining the distribution of beneficiaries across the four earnings groups by cohort and gender reveals that females are more likely than males to not work (see Table 6-8). This differential exists for all six cohort groups. It is smaller, however, for the youngest cohort (1956-60) than for the oldest cohort (1931-35).

Table 6-9 further breaks down beneficiaries by gender and marital status, enabling us to examine by cohort the work behavior of unmarried males, married males, unmarried females, and married females. For simplicity, earnings groups 1 through 3 are combined and we look only at the fraction of beneficiaries who *do* and *do not* work.

The largest difference across cohorts occurs between the 1931-35 and 1936-40 cohorts for unmarried males. While 65.2 percent of unmarried male beneficiaries in the 1931-35 cohort do not work, only 57.7 percent of unmarried males in the 1936-40 cohort do not work. This large decline is consistent with the decline in unmarried male beneficiaries' family pension benefits from the first to the second cohort. While the average family pension benefit (measured relative to national average earnings) is 0.31 for the 1931-35 cohort of unmarried male beneficiaries, it is only 0.17 for the 1936-40 cohort of unmarried male beneficiaries, a difference of 0.14. The difference in family pension benefits between the first and second cohort is most pronounced for the group of unmarried male beneficiaries, and ranges between 0.03 and 0.08 for the other three groups of 62 year old beneficiaries.

Separating beneficiaries by gender and marital status produces a trend across cohort groups that is less smooth as compared to the scenario when all 62 year old beneficiaries are grouped together (see Table 6-7). The trend for married females follows most closely that of all beneficiaries. The fraction of married females who are not working declines across all six cohorts. Among the other three demographic groups, the fraction not working is also lower for the 1956-60 cohort as compared to the 1931-35 cohort, but there is not a smooth trend across cohorts.

Projected Partial Retirement Earnings

After individuals are placed into one of the four earnings groups, those in groups 1 through 3 are assigned a level of earnings, which is measured relative to national average earnings. Projected partial retirement earnings are similar to the partial retirement earnings of current beneficiaries, as shown in Table 6-10. The similarities occur within each of the three earnings groups as well as across the three demographic groups. The mean of partial retirement earnings (divided by national average earnings) from the projection is 0.108 for beneficiaries in earnings group 1, 0.314 for beneficiaries in earnings group 2, and 0.520 for beneficiaries in earnings group 3.

The final table for 62 year old beneficiaries examines beneficiaries' projected earnings by cohort. The first column of Table 6-11 presents average partial retirement earnings for *all* 62 year old beneficiaries, including those beneficiaries with no earnings. Average partial retirement earnings among all beneficiaries is high for the younger cohorts than the older cohorts. This is consistent with the projections presented in Table 6-7 that shows a higher fraction of beneficiaries in the younger cohort have nonzero earnings as compared to beneficiaries in the older cohorts. Projected earnings for beneficiaries in earnings groups 1 through 3 are similar across the six cohort groups, although less so for the third earnings group.

Table 6-11
Projected Partial Retirement Earnings of 62 Year Old Beneficiaries in Each Earnings Group[a,b]
By Cohort

Cohort	Total	Earnings Group 1	Earnings Group 2	Earnings Group 3
Total	0.084	0.106	0.314	0.505
1931-35	.067	.106	.314	.502
1936-40	.076	.106	.313	.488
1941-45	.086	.107	.315	.526
1946-50	.086	.105	.315	.486
1951-55	.094	.104	.314	.505
1956-60	.085	.109	.313	.516

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (April 1999) from the MINT projection file. Current, Urban Institute tabulations (January 1999) from the 1990-92 SIPP.

3. Projections for 67 Year Old Beneficiaries

Projected Earnings Group

As with 62 year old beneficiaries, the projections for older beneficiaries suggest that a higher fraction of beneficiaries will be employed over the next few decades, as compared to current estimates.[34] The difference between the current rate of employment and the projected rate of employment, however, is smaller for older beneficiaries. There is a 2.6 percentage point difference for older beneficiaries, as compared to a 9.7 percentage point difference for younger beneficiaries. Calculations from the current data show that 79.2 percent of older beneficiaries are not employed, whereas projections based on the MINT file suggest that 76.6 percent of beneficiaries will not be employed (see Table 6-12).

Table 6-12
Percentage of 67 Year Old Beneficiaries in Each Earnings Group[a]
A Comparison of Current and Projected Values

	Earnings Group 0		Earnings Group 1		Earnings Group 2		Earnings Group 3	
Marital Status/ Gender	**Current**	**Projected**	**Current**	**Projected**	**Current**	**Projected**	**Current**	**Projected**
Total	**79.2%**	**76.6%**	**15.5%**	**16.2%**	**2.7%**	**3.3%**	**2.7%**	**3.9%**
Unmarried People	**78.1**	**74.9**	**15.5**	**16.0**	**3.0**	**3.9**	**3.5**	**5.3**
Married Males	**72.0**	**74.3**	**21.1**	**19.5**	**3.5**	**3.4**	**3.5**	**2.9**
Married Females	**87.1**	**80.9**	**9.9**	**12.8**	**1.6**	**2.6**	**1.3**	**3.6**

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.

b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file. C urrent, Urban Institute tabulations . from the 1990-92 SIPP.

Again, as with younger beneficiaries, a comparison of these percentages by marital status and gender shows that the largest difference is for married females. The projections suggest that the percentage of employed married female beneficiaries will on average be 6.2 percentage points higher over the next few decades than currently--19.1 percent in the projections sample compared with 12.9 percent in the baseline. This higher participation is due, in part, to the projected increase in the pre-retirement earnings of married women.

The findings also suggest that unmarried beneficiaries will be more likely to work over the next few decades. The projections suggest that 25.1 percent of unmarried beneficiaries will work (or that 74.9 percent will not work), while calculations based on the current data show that 21.9 percent are employed. This represents a difference of 3.2 percentage points. Projections for married male beneficiaries, however, show the opposite effect. Married male beneficiaries are projected to have slightly lower employment rates over the next few decades. This can be seen by the increase in the probability of being in earnings group 0. While 72.0 percent of married male beneficiaries in the current data were in earnings groups 0, the projections suggest that 74.3 percent of married male beneficiaries will be in earnings groups 0. This represents an increase of 2.3 percentage points.

A comparison of the current and projected data for the percentage of 67 year old beneficiaries in earnings groups 1 through 3 is also presented in Table 6-12. For both unmarried persons and married females, the projections show a higher proportion of beneficiaries in earnings groups 1 through 3. For married male beneficiaries, on the other hand, the projections show a *lower* proportion of beneficiaries in earnings groups 1 through 3, as compared to the current data.

Table 6-13 examines the work behavior of 67 year old beneficiaries by cohort. Looking down the six cohort groups reveals a slight decline in the projected fraction of 67 year old beneficiaries not working. While 78.4 percent of beneficiaries in the 1931-35 cohort do not work, 75.7 percent of beneficiaries in the 1956-60 cohort do not work. The magnitude of the decline in the fraction of 67 year old beneficiaries not working is significantly smaller than the decline found for 62 year old beneficiaries (2.7 percentage points vs. 9.5 percentage points).

Table 6-13
Projected Percentage
of 67 Year Old Beneficiaries in Each Earnings Group[a,b]
By Cohort

Cohort	Earnings Group 0	Earnings Group 1	Earnings Group 2	Earnings Group 3
Total	75.9%	16.9%	3.3%	3.9%
1931-35	78.3	15.1	3.3	3.4
1936-40	77.1	16.2	3.1	3.5
1941-45	76.1	17.0	3.3	3.6
1946-50	75.2	17.5	3.3	3.9
1951-55	74.8	17.0	4.0	4.2
1956-60	75.5	17.5	2.8	4.2

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (April 1999) from the MINT projection file.

Examining beneficiaries by gender shows that females are more likely to not work as compared to male (see Table 6-14). This differential exists across all six cohort groups, but the differential declines from 8.9 percentage points for the 1931-35 cohort to 2.7 percentage points for the 1956-60 cohort.

Table 6-15 further separates beneficiaries by gender and marital status: unmarried males, married males, unmarried females, and married females. While there is some variation across the cohorts, the differences across cohorts for 67 year old beneficiaries are somewhat smaller than the differences projected for 62 year old beneficiaries. For example, the difference between the oldest and youngest cohort in the fraction of married female beneficiaries not working is 5.2 percentage points for 67 year old beneficiaries, but was double this (10.6 percentage points) for 62 year old beneficiaries. This lower degree of variation for 67 year old beneficiaries is consistent with the lower degree of variation in recent earnings and family pension benefits for 67 year old beneficiaries, as compared to 62 year old beneficiaries.

Table 6-14
Projected Percentage of 67 Year Old Beneficiaries in Each Earnings Group[a,b] By Cohort and Gender

	Not Working				Working			
Cohort	**Unmarried Males**	**Married Males**	**Unmarried Females**	**Married Females**	**Unmarried Males**	**Married Males**	**Unmarried Females**	**Married Females**
Total	75.4%	74.3%	74.7%	80.9%	24.6%	25.8%	25.3%	19.1%
1931-35	74.9	72.9	78.7	84.7	25.1	27.1	21.3	15.3
1936-40	78.2	75.8	76.6	83.2	21.8	24.3	23.4	16.9
1941-45	77.0	74.6	73.7	81.4	23.0	25.4	26.3	18.6
1946-50	76.1	74.8	73.6	80.4	23.9	25.2	26.4	19.7
1951-55	75.1	73.0	74.4	79.2	24.9	27.0	25.6	20.9
1956-60	73.1	74.6	73.5	79.5	26.9	25.4	26.5	20.5

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file.

Table 6-15
Projected Percentage of 67 Year Old Beneficiaries Who Do Not and Do Work [a] by Cohort and Gender/Marital Status

	Earnings Group 0		Earnings Group 1		Earnings Group 2		Earnings Group 3	
Cohort	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Total	74.5%	78.2%	18.6%	14.3%	3.4%	3.2%	3.5%	4.2%
1931-35	73.2	82.1	18.7	12.1	3.8	2.4	4.3	3.4
1936-40	76.2	80.2	17.4	13.2	3.0	2.9	3.5	3.7
1941-45	75.1	78.2	18.1	14.3	3.5	3.1	3.3	4.4
1946-50	75.1	77.5	18.2	14.7	3.0	3.2	3.7	4.7
1951-55	73.5	77.1	19.5	15.2	3.3	3.6	3.7	4.2
1956-60	74.2	76.9	19.0	15.1	3.8	3.6	3.0	4.5

Projected Partial Retirement Earnings

Once individuals are placed into one of the four earnings groups, individuals are assigned a level of earnings.[35] This procedure is more involved for older beneficiaries, as compared to the younger beneficiaries. This difference is due to the scheduled ad hoc increases, between 1995 and 2002, in the Social Security exempt amount for older beneficiaries. These ad hoc adjustments were enacted into law in March 1996, and substantially increased the exempt amount for older beneficiaries. In the absence of these ad hoc increases, the Social Security exempt amount for 67 year old beneficiaries would be roughly $14,500 in the year 2002, while it is scheduled to be $30,000 in the year 2002.[36]

Table 6-16 presents projected (average) partial retirement earnings for 67 year olds under two scenarios: (1) the projection *does not* take account of the scheduled increase in the exempt amount and (2) the projection *does* take account of the scheduled increase in the exempt amount. Models estimated with the 1984 SIPP suggest that a $1 increase in the exempt amount will increase earnings by (1) $0.25 for beneficiaries with earnings well below the exempt amount (group 1), (2) $0.94 for beneficiaries with earnings near or at the exempt amount (group 2), and (3) $1.00 for beneficiaries with earnings over the exempt amount (group 3).[37]

When the scheduled increases in the exempt amount are *not* taken into account, projected partial retirement earnings are similar to the partial retirement earnings of current beneficiaries. The similarities occur within each of the three earnings groups as well as across the three demographic groups. This can be seen by comparing columns one and two, columns four and five, and columns seven and eight. The mean of partial retirement earnings from the projection

Table 6-16
Average Partial Retirement Earnings of 67 Year Old Beneficiaries by Earnings Group[a]
A Comparison of Current and Projected Values[b]

	Earning Group 1			Earning Groups 2			Earning Group 3		
	Current	Projection Includes Scheduled Increase in Exempt Amount		Current	Projection Includes Scheduled Increase in Exempt Amount		Current	Projection Includes Scheduled Increase in Exempt Amount	
Marital Status/ Gender		No	Yes		No	Yes		No	Yes
Total	0.156	0.153	0.270	0.435	0.436	0.869	0.887	0.833	1.293
Unmarried People	0.158	0.159	0.276	0.433	0.433	0.871	0.798	0.806	1.271
Married Males	0.161	0.156	0.272	0.430	0.429	0.853	1.023	0.998	1.444
Married Females	0.140	0.142	0.259	0.447	0.449	0.889	0.733	0.739	1.202

that excludes the scheduled increase in the Social Security exempt amount is 0.153 for beneficiaries in earnings group 1, 0.436 for beneficiaries in earnings group 2, and 0.833 for beneficiaries in earnings group 3.

When the scheduled increases in the exempt amount are taken into account, projected partial retirement earnings are considerably higher. The mean of partial retirement earnings is 0.270 for beneficiaries in earnings group 1, 0.869 for beneficiaries in earnings group 2, and 1.293 for beneficiaries in earnings group 3. This increase occurs in all three demographic groups that are shown in Table 6-16 -- unmarried persons, married males, and married females.

The final table examines beneficiaries' projected earnings by cohort. Because scheduled increases in the Social Security exempt amount affect later cohorts more than earlier cohorts, primarily the 1931-35 cohort, this table presents projected earnings that both do and do not take account of scheduled increases in the exempt amount. The first column of Table 6-17 presents projections of average partial retirement earnings for all 67 year old beneficiaries, which do not take account of scheduled increases in the exempt amount, and includes those beneficiaries with zero earnings. Average partial retirement earnings do not differ substantially across the six cohorts, although earnings are projected to be higher for beneficiaries in the younger cohorts as compared to beneficiaries in the older cohorts. This is consistent with the finding that, in general, a larger fraction of beneficiaries in the younger cohorts will be working than beneficiaries in the older cohorts. Within earnings groups 1 through 3, projected earnings that exclude scheduled increases in the exempt amount are similar across cohorts. However, when the scheduled increase in the exempt amount is taken into account there is a large difference between the partial retirement earnings of beneficiaries in the first cohort as compared to later cohorts. This is because beneficiaries in the first cohort are least affected by this policy change.

Table 6-17
Projected Partial Retirement Earnings of 67 Year Old Beneficiaries in each Earning Group[a,b]
By Cohort

Cohort	Total		Earning Group 1		Earning Groups 2		Earning Group 3	
	Includes Exempt Amount Increase		Includes Exempt Amount Increase		Includes Exempt Amount Increase		Includes Exempt Amount Increase	
	No	Yes	No	Yes	No	Yes	No	Yes
Total	0.072	0.123	0.153	0.270	0.436	0.869	0.833	1.293
1931-35	0.067	0.090	0.151	0.207	0.436	0.641	0.842	1.075
1936-40	0.065	0.114	0.151	0.275	0.430	0.891	0.812	1.300
1941-45	0.071	0.125	0.151	0.275	0.436	0.896	0.824	1.312
1946-50	0.075	0.130	0.156	0.276	0.436	0.896	0.840	1.329
1951-55	0.074	0.131	0.153	0.276	0.436	0.896	0.835	1.323
1956-60	0.074	0.131	0.155	0.279	0.437	0.898	0.839	1.328

a) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file.Current, Urban Institute tabulations from the 1990-92 SIPP.

APPENDIX A
ESTIMATING MODELS

The discussion in this appendix uses the model for 65-68 year olds as the base case, but references are made where the models for 65-68 year olds and 62-63 year olds differ.

Model 1: Probit and Earnings: The first equation in this two-equation model incorporates the decision to work or not work, and the second is the earnings equation for those individuals who work. The equation for the decision to work is defined below, where the first subscript refers to the model number (in this case model 1) and the second subscript refers to the equation number within the model:

$$W^* = \beta_{1,1}Z + \gamma_{1,1}R + \delta_{1,1}AvgEarn_{(35-59)} + \psi_{1,1}AvgEarn_{(60-64)} + \xi_{1,1}EX + \varepsilon_{1,1}$$

Z is a vector of demographic characteristics (including race/ethnicity, educational attainment, gender, marital status, and age), R includes measures of non-labor income available in retirement (401(k), IRA, and Keogh account balances, pension income, and wealth), $AvgEarn_{(35-59)}$ is individuals' average earnings from age 35 through age 59 (where earnings in each year are divided by national average earnings), $AvgEarn_{(60-64)}$ is individuals' average earnings from age 60 through age 64 (divided by national average earnings), and finally, EX is the Social Security exempt amount (which is also divided by national average earnings).[38]

The second equation in this two-step model is the reduced-form equation for level of earnings, and it is estimated only on the subset of persons who have nonzero earnings. Thus, earnings for this group of beneficiaries are greater than zero but less than the amount at which the Social Security benefit is reduced to zero.

$$E = b_{1,2}Age + \gamma_{1,2}R + \psi_{1,2}AvgEarn_{(60-64)} + \xi_{1,2}EX + \lambda + \varepsilon_{1,2}$$

The set of explanatory variables is similar to those in the first-stage probit equation, but average earnings from age 35 to age 59 and most of the demographic variables are omitted. This earnings variable is excluded from the model because it is unlikely that, for this group of Social Security beneficiaries, average earnings from age 35 to 59 adds additional information beyond earnings from age 60 to 64.[39] Another difference is that this equation includes a sample selection term, λ. This term, referred to the literature as the "inverse mills ratio," takes account of the fact that working recipients are different from non-working recipients. In this model, the probit and earnings equation are estimated as a system so the standard errors are efficient.

Model 2: Ordered Probit and Earnings: This model examines factors that influence on which segment of the earnings distribution a beneficiary falls. In this specification of the model, beneficiary are in one of four earnings groups: (1) zero earnings, (2) earnings greater than 0 but less than 85 percent of the exempt amount, (3) earnings between 85 percent and 115 percent of the exempt amount, and (4) earnings greater than 115 percent of the exempt amount. The equation for model 2 is very similar to the probit equation estimated under Model 1, and can be written as:

$$S^{*} = \beta_{2,1}Z + \gamma_{2,1}R + \delta_{2,1}AvgEarn_{(35-59)} + \psi_{2,1}AvgEarn_{(60-64)} + \xi_{2,1}EX + \varepsilon_{2,1}$$

The dependent variable S* indicates in which segment of the earnings distribution an individual falls, and equals 0 if the individual has zero earnings, 1 if the individual has earnings greater than 0 but less than 85 percent of the exempt amount, etc. The independent variables are as described above under model 1.

APPENDIX B
PROBIT/EARNINGS MODELS

This appendix presents the results of preliminary probit/earnings models estimated with the 1990-92 SIPP data. The model results are presented first for 62-63 year old beneficiaries and then for 65-68 year old beneficiaries.

Table 6-B-1
Probit/Earnings Model
Social Security Beneficiaries Age 62 to 63, 1990-92 SIPP

Explanatory Variable	Probit (obs=1,560)		Earnings Ratio (obs=437)	
Non-Hispanic white	0.1297	(0.1053)		
Education less than 12th grade	** -0.4097	(0.1004)		
Education equal to 12th grade	-0.1355	(0.0887)		
Male	* 0.1830	(0.1010)		
Married in calender year	-0.1233	(0.0810)		
Age 63	-0.0722	(0.0718)	-0.0220	(0.0524)
Family pension	** -0.0284	(0.0049)	-0.0013	(0.0054)
Income from assets	-0.0071	(0.0048)	-0.0001	(0.0027)
Balance of 401K, IRA, Keogh	0.0001	(0.0019)	-0.0005	(0.0012)
Average past earnings (ages 35-55)	-0.1348	(0.1115)		
Average recent earnings (ages 56-61)	** 0.5486	(0.0905)	0.0660	(0.0903)
Constant	** 0.6862	(0.1367)	** -0.7244	(0.2253)
Inverse Mills Ratio[a]			-0.1329	(0.1847)
Pseudo R-squared/R-squared[b]	0.066		0.0151	
Chi-squared / F-statistic[c]	122.07 (df=11)		1.03 (df= 6, 430)	

a) The inverse mills ratio is the correction term as described in appendix A.
b) Pseudo R-squared calculated for ordered probit and R-squared calculated for earnings equations.
c) Chi-squared calculated for the ordered probit and F-statistic calculated for the earnings equations.
d) Standard errors in parenthesis.
e) Significance at 10 percent is represented by "*".
f) Significance at 5 percent is represented by "**".

Table 6-B-2
Probit/Earnings Model
Social Security Beneficiaries Age 65 to 68, 1990-92 SIPP

Explanatory Variable	Probit (obs=3,574)		Earnings (obs=822)	
Non-Hispanic white	-0.0613	(0.0711)		
Education less than 12th grade	** -0.3032	(0.0663)		
Education equal to 12th grade	-0.0610	(0.0609)		
Male	** 0.3330	(0.0655)		
Married in calender year	* -0.1083	(0.0555)		
Age 66	-0.0690	(0.0658)	0.0175	(0.0249)
Age 67	** -0.2633	(0.0686)	0.0229	(0.0275)
Age 68	** -0.3120	(0.0698)	-0.0333	(0.0277)
Family pension	** -0.0276	(0.0036)	** -0.00306	(0.0015)
Income from assets	** -0.0083	(0.0031)	0.0007	(0.0012)
Balance of 401K, IRA, Keogh	** 0.0020	(0.0010)	* -0.0006	(0.0003)
Average past earnings (ages 35-59)	** -0.3122	(0.0709)		
Average recent earnings (ages 60-64)	** 0.8761	(0.0613)	** 0.1307	(0.0240)
Constant	** 0.50913	(0.0938)	** -0.3496	(0.4839)
Inverse Mills Ratio[a]			-0.0641	(0.0618)
Pseudo R-squared/R-squared[b]	0.1051		0.1457	
Chi-squared / F-statistic[c]	405.14 (df=13)		7.40 (df= 8, 813)	

a) The inverse mills ratio is the correction term as described in appendix A.
b) Pseudo R-squared calculated for ordered probit and R-squared calculated for earnings equations.
c) Chi-squared calculated for the ordered probit and F-statistic calculated for the earnings equations.
d) Standard errors in parenthesis.
e) Significance at 10 percent is represented by "*".
f) Significance at 5 percent is represented by "**".

APPENDIX C
VARIABLES

This appendix presents a brief explanation of the variables included in the models.

Dependent Variables:

Earnings Group: In the ordered probit model, this variable equals 0 if the individual has no earnings, equals 1 if earnings are greater than 0 but less than 85 percent of the exempt amount, equals 2 if earnings are between 85 percent and 115 percent of the exempt amount , and equals 3 in earnings are greater than 115 percent of the exempt amount.

Earnings: Ratio of individual earnings to national average earnings.

Explanatory Variables:

Exempt Amount: Ratio of the Social Security exempt amount to national average earnings.

Average Earnings: Earnings, as described above, averaged over the appropriate years.

Family Pension Income: Family (individual and spouse) pension income divided by national average earnings.

Family Wealth: Family wealth divided by national average earnings.

Family Retirement Account Balances (IRA, 401k, and Keogh): Family account balances divided by national average earnings.

Age: Dummy variables for age. In the model for 65-68 year olds, the excluded age is 65. In the model for 62-63 year olds, the excluded age is 62.

Non-Hispanic White: Variable equals 1 if the individual is non-Hispanic white, and equals zero otherwise. Other race/ethnicity categories were considered, but the groups are small -- 86 percent of the sample is non-Hispanic white.

Education: Two education variables are included in the models -- education less than high school and education equals to high school (the excluded category is education greater than high school). Seventy-three percent of the sample members have a high school degree or less.

Male: This variable equals 1 if the individual is male, and equals 0 if the individual is female.

Married: This variables equals 1 if the individual was married during the particular calendar year, and equals zero otherwise.

APPENDIX D
ESTIMATION AND PROJECTION RESULTS THAT INCLUDE RETIREMENT ACCOUNT BALANCES

This appendix presents results of the estimation and projection of partial retirement earnings for beneficiaries when family retirement account balances are taken into account in the analysis.

Table 6-D-1
Ordered Probit Model by Marital Status and Gender[a]
Social Security Beneficiaries Age 65 to 68, 1990-92 SIPP

Explanatory Variable	Unmarried People (n=1,831)		Married Males (n=2,121)		Married Females (n=2,170)	
Education Less than 12th Grade	-0.3636 **	(0.0887)	-0.2947 **	(0.0661)		
Education Equal to 12th Grade	-0.1082	(0.0843)				
Spouse's Age			-0.0171 **	(0.0052)	-0.0127	(0.0082)
Age 66	-0.1799 *	(0.0956)				
Age 67	-0.2590 **	(0.0941)	-0.1800 **	(0.0717)	-0.1525 *	(0.0882)
Age 68	-0.3134 **	(0.0943)	-0.3171 **	(0.0729)	-0.2771 **	(0.0963)
Family Wealth [b]	-0.0071	(0.0098)	-0.0007	(0.0046)		
Family Pension Benefits	-1.2981 **	(0.1838)	-0.6591 **	(0.0807)	-0.3993 **	(0.0964)
Family Retirement Account Balances	0.1461 **	(0.0486)			0.0346	(0.0256)
Average Past Earnings (ages 35-59)	-0.1254	(0.0957)	-0.5460 **	(0.0769)		
Average Recent Earnings (ages 60-64)	1.0067 **	(0.0891)	0.7097 **	(0.0531)	1.4283 **	(0.0928)
Pseudo R-squared	0.0949		0.0845		0.1292	
Chi-squared	238.94 (df=10)		278.02 (df=8)		259.03 (df=6)	
Cutoff value 1	0.5887	(0.1044)	-1.0196	(0.3316)	0.3906	(0.5619)
Cutoff value 2	1.4245	(0.1108)	-0.0222	(0.3315)	1.3291	(0.5641)
Cutoff value 3	1.7888	(0.1183)	0.3688	(0.3326)	1.7201	(0.5670)

a These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent of the exempt amount; and Group 3, earnings greater than 115 percent of the exempt amount.
b Family wealth, family pension benefits, average past earnings, and average recent earnings are divided by national average earnings.
c Standard errors in parenthesis.
d Significance at 5 percent is represented by "**".
e Significance at 10 percent is represented by "*".

Table 6-D-2[a]
Percentage of 67 Year Old Beneficiaries in Each Earnings Group[b]
A Comparison of Current and Projected Values[c]

Marital Status/ Gender	Earnings Group 0		Earnings Group 1		Earnings Group 2		Earnings Group 3	
	Current	Projected	Current	Projected	Current	Projected	Current	Projected
Total	79.1%	75.1%	15.5%	16.3%	2.7%	3.3%	2.7%	5.3%
Unmarried People	78.1	71.5	15.5	16.0	3.0	3.8	3.5	8.8
Married Males	72.0	74.3	21.1	19.5	3.5	3.4	3.5	2.9
Married Females	87.1	79.9	10.0	13.2	1.6	2.8	1.3	4.1

Table 6-D-3[a]
Average Partial Retirement Earnings
of 67 Year Old Beneficiaries by Earnings Group[a]
A Comparison of Current and Projected Values[b]

Marital Status/ Gender	Earning Group 1			Earning Groups 2			Earning Group 3		
	Current	Projection Includes Scheduled Increase in Exempt Amount		Current	Projection Includes Scheduled Increase in Exempt Amount		Current	Projection Includes Scheduled Increase in Exempt Amount	
		No	Yes		No	Yes		No	Yes
Total	0.156	0.151	0.268	0.435	0.436	0.871	0.887	0.823	1.288
Unmarried People	0.158	0.156	0.273	0.433	0.432	0.871	0.798	0.805	1.275
Married Males	0.161	0.156	0.272	0.430	0.429	0.853	1.023	0.998	1.444
Married Females	0.140	0.138	0.255	0.447	0.450	0.893	0.733	0.738	1.203

a) This table is based on the ordered probit model presented in Table 6-D-1, which includes family retirement balances.
b) These groups are: Group 0, no earnings; Group 1, earnings greater than 0 but less than 85 percent of the exempt amount; Group 2, earnings between 85 percent and 115 percent amount; and Group 3, earnings greater than 115 percent of the exempt of the exempt amount.
c) Source: Projected, Urban Institute tabulations (September 1999) from the MINT projection file.
Current, Urban Institute tabulations from the 1990-92 SIPP.

APPENDIX E
SIMULATING WORK BEHAVIOR FROM AGES 63 TO 66 AND AFTER 67

I. OVERVIEW

This appendix describes the method that the MINT model employs for filling in individual earnings between ages 62 and 67 and after age 67. This part of the model combines information from Chapters 2 and 6 with a simple model of the likelihood of remaining in partial retirement. It creates a full stream of earnings from age 62 until death for each person who survives to age 62.

When each person in the MINT sample attains age 62, we determine whether he or she has begun to collect Social Security benefits. If he or she has, then we set his/her earnings level in that year using the projections from the current chapter. If the person has not yet begun receiving Social Security, we continue to use the Chapter 2 projection estimates for his/her earnings level until the time of Social Security benefit take-up. When a person starts Social Security benefit receipt after age 62, he/she receives a starting value for partial retirement earnings at the point of take-up (if retiring at age 67, this is the exact value for earnings at 67 from earlier in this chapter). Any person who begins receiving her/his benefits before age 67 is then subjected to a probability of remaining in the labor force for each age between the age of first receipt and age 66. If the person's probability of remaining at work in a given year is higher than a random draw, then he or she continues to work and receives the same wages as he/she received in the prior year. At age 67, nearly all members of the population receive their Chapter 6 earnings projection. After age 67, those who are still working are similarly subjected to a probability of remaining at work in each subsequent year, and they continue to work at their age 67 wage level until they either die or one of their random draws is higher than their stay-at-work probability for that year. Individuals' probabilities of continuing to work are generated by a relatively simple logistic regression equation which we describe below.

Four separate groups thus receive differential treatment in the process of updating earnings after age 62. These include: those who begin Social Security receipt at age 62, those who begin Social Security receipt between ages 63 and 66, inclusive, those who begin Social Security receipt at age 67, and those who do not collect Social Security. To detail operation of the model more clearly, we illustrate the treatment of each of these four groups in turn.

1. Person Starts to Receive Social Security at or before age 62

If an individual begins receiving Social Security benefits at or before age 62, we overwrite the Chapter 2 prediction of earnings at age 62 with the partial retirement earnings prediction from Chapter 6. If predicted earnings are positive, we look forward to see if this person will, according to the Chapter 6 estimate, still be working at age 67. If so, we then use the person's predicted probability of working at age 62 to adjust each of the person's random draws from age 63 to age 66 downward so that each draw will be lower than the probability of staying in partial retirement. We do this in order to promote consistency in work trajectories, so that people will not be jumping into and out of partial retirement each year. If the person is not selected to work at age 67, then he/she is exposed to random draws that are adjusted upward. (These two adjustments are made in such a way as to preserve the initial uniform distribution from which draws are made). When workers choose, through the random process, to continue to work, their earnings levels are kept constant from the prior year. After age 67, if the person is working at t-1 then he/she is again exposed annually to a probability of remaining in partial retirement and an independent random draw from a uniform distribution determines whether he/she continues working. If he or she continues to work, he or she does so at the age 67 wage level.

2. Person Starts to Receive Social Security between ages 63 and 66

A person who does not retire until after age 62 retains earnings values from Chapter 2 until the year of Social Security retirement. Since people who do not receive Social Security until after age 62 are not subjected to the Chapter 6 projections at age 62, we need some kind of starting value for their earnings in partial retirement. We use a separate prediction, produced by applying the algorithm for 62 year-olds from earlier in this chapter to the general population rather than just the age 62 retiree population, to generate a starting value for these people. We then update this projection, using the logistic equations and random draws as above, through age 66. If applicable, this process continues at ages 68 and beyond, using the age 67 earnings level prediction.

3. Start to Receive Social Security at age 67

The starting value for earnings of individuals in this group is simply the Chapter 6 prediction at age 67. For each successive year at risk (i.e., each year with nonzero earnings at t-1), a new probability of remaining in partial retirement is calculated and an independent random draw is taken. If, on the basis of the random draw, a person chooses to continue to work, then her/his earnings level at age 67 is maintained.

4. Never Receive Social Security

For the small fraction of the population that never receives Social Security, earnings from Chapter 2 are maintained from age 62 through age 67 and earnings are set to zero thereafter.

II. EQUATIONS FOR GENERATING PROBABILITY OF REMAINING IN PARTIAL RETIREMENT

The MINT model of likelihood of remaining in partial retirement is structurally quite similar to the Social Security benefit receipt model. It is also a discrete-time, conditional transition probability model, and it was estimated from the same data sources. As the preceding discussion suggests, in this case the probability we are modeling is the probability that one remains in partial retirement given that one was engaged in partial retirement (that is, work concurrent to Social Security benefit receipt) at time t-1. For estimation of this model, person-year observations start at age 63 rather than age 62 (since most people cannot be partially retired at age 61) and continue much further than in the benefit take-up model, up to age 80.

As in the Social Security benefit take-up model, we use a person-birth year rather than a person-calendar year as the unit of analysis for estimating model parameters. This implies that while we use MBR data to confirm a person's Social Security receipt, we use SIPP monthly self-report data on earnings rather than annual (i.e., calendar-year) data from Summary Earnings Records. Determining whether an individual is a worker or a non-worker in a given birth year of partial retirement poses numerous measurement challenges. In a series of alternative tabulations, we found that our estimates are extremely sensitive to whether we use just the birth month or the birth month and the prior month, or some other combination of lags, in assessing work behavior.

The SIPP estimates suggest that these partial retirees are a special, select group. We did not identify any significant differences in likelihood of staying in partial retirement across gender, racial, or marital status lines, and thus chose to estimate a single equation rather than separate equations by sex or marital status group for this portion of MINT. The explanatory variables in the model of partial retirement focus on two major characteristics: one's *taste for work* and the *return that one gets from working*. Taste for work is reflected first by the duration of the current work spell, that is, the time that has elapsed since one has had a year of zero earnings. A term interacting age with a dummy variable indicating whether one has less than a high school education reflects the hypthesized increasing lack of desirability of work for the less educated as one ages. Persons with less than a high school education are far more likely to be in positions that are unrewarding and/or physically demanding, and strains of such jobs are likely to increase with age. A person's lagged earnings reflects both his or her revealed preference for work and her/his potential returns from working. An age 65 dummy variable captures a person's eligibility for Medicare at this age, a factor which greatly diminishes one significant incentive to continued work, the availability of employer-provided health insurance benefits. A person's wealth profile is reflected in the model through both a home ownership dummy variable and an age-home ownership interaction term.

III. COEFFICIENT ESTIMATES

Table 6-E-1 presents the logistic coefficients from the model estimation phase. We see that the likelihood of remaining in partial retirement increases with our indicators of attachment to the labor force and returns to working, as evidenced by the positive signs on coefficients for duration of work spell and level of lagged earnings, and decreases when work incentives decline, as evidenced by the negative sign on the coefficient for the age 65 dummy variable. Past earnings tend to depress the likelihood of continuing to work, with higher earnings from both ages 35 to 55 and ages 56 to 61 suggesting a lesser likelihood of additional work, though these relationships are not statistically significant. While wealth, as evidenced here through homeownership, actually increases the likelihood of staying at work, this effect declines with age. For those with very little education (less than a high school degree), the likelihood of working declines with age.

Table 6-E-1
Logistic regression coefficients: Remain in Partial Retirement

Variable	**Parameter Estimate (Standard Error) N=3317 person years**
Intercept	0.4324** (0.1019)
Age 65	-0.2457** (0.1299)
Duration of current work spell	0.0205** (0.00275)
Age*Education < 12	-0.00341** (0.00127)
Age*Homeowner	-0.0255* (0.0124)
Homeowner?	2.0373* (0.8559)
Earnings ages 35-55	-0.1531 (0.1169)
Earnings ages 56-61	-0.1519 (0.0950)
Earnings at t-1	0.1930* (0.0836)

* indicates p<.05; ** indicates p<.01

Source: Urban Institute estimates, September, 1999

IV. RESULTS FROM SIMULATION ANALYSES

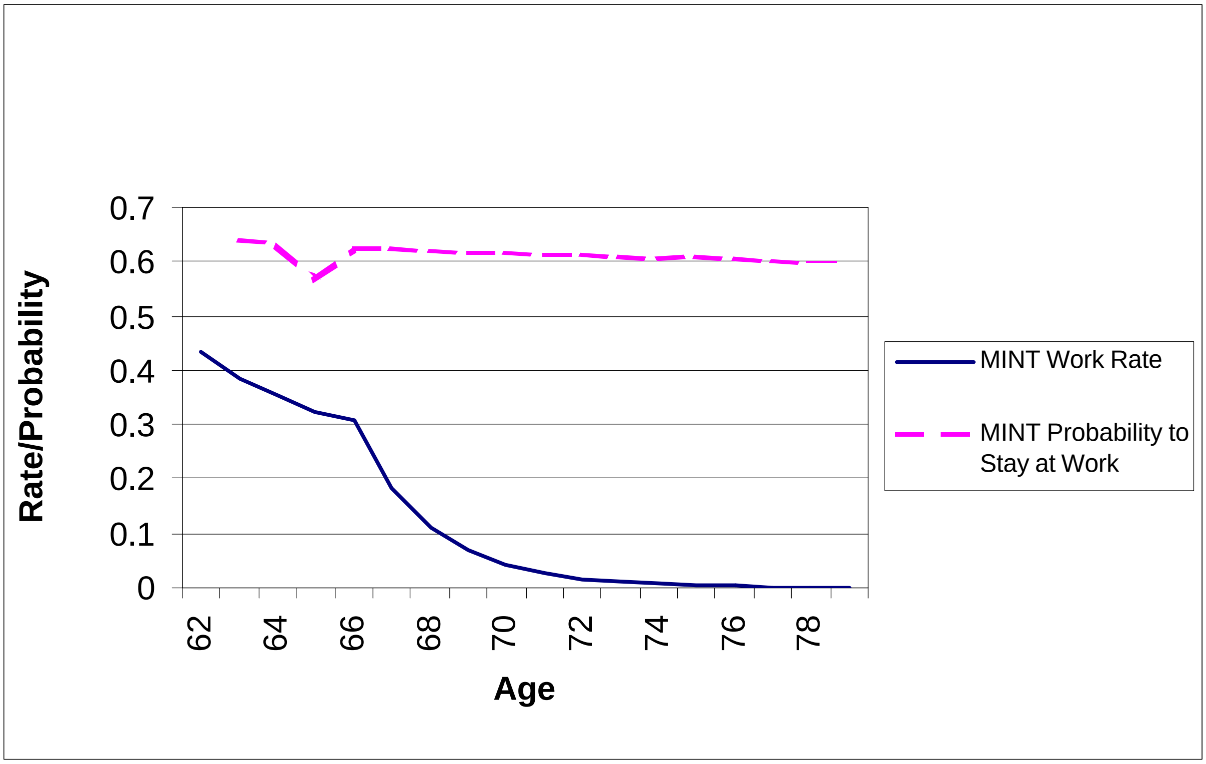
When we apply these coefficients annually to the members of the MINT sample who are partially retired, we find that average probabilities of remaining in partial retirement are around 0.63 in the first years of retirement, between ages 62 and 64, decline to 0.57 at age 65, but then level off to a rate of around 0.60 at later ages. Figure 6-E-1 contrasts MINT generated probabilities to remain in work after age 62 and the work rates that these probabilities imply. While the average probabilities that MINT generates are roughly consistent with estimates from other sources, the work rates are systematically lower in MINT, even for workers in older cohorts, than are found in data sets like SIPP and CPS. While fractions of U.S. residents in the labor force after age 75 are indeed small, less than one in twenty according to recent (1996) U.S. Census Bureau estimates, they are nontrivial, and MINT clearly understates them.

There are several reasons for the discrepancy between MINT and other sources. First, because the MINT model assumes full retirement (for Social Security purposes) at age 67, and thus earnings levels within a fairly constrained range for older workers, this portion of the model generates an unrealistically low proportion of the population in the labor force at ages greater than 67. Recall from Table 6-E-1 that lagged earnings are a major predictor of subsequent work. If lagged earnings cannot go above 1.5 times the Social Security exempt amount, then probabilities of staying at work will be too low at several critical points. The fact that the model does not currently allow re-entry into employment after age 67 further exacerbates this problem.

It is also important to note that beyond age 70 the earnings of Social Security recipients are no longer subject to the retirement test, so individuals no longer have an incentive to keep earnings at or below the exempt amount. MINT does not at this time take this policy into account. While few individuals are affected by this change, this shift could greatly impact the aggregate amount of earnings income generated in the model.

In general, then, additional development of this portion of the model could address these shortcomings, and help to calibrate its estimates more closely to external benchmarks. Greater calibration of this portion of MINT could make it a valuable tool for examining this small but interesting group of working Social Security recipients.

Figure 6-E-1
Age Patterns in Work at and after Age 62



Source: Urban Institute tabulation, September, 1999

CHAPTER 6: REFERENCES

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CHAPTER 6: ENDNOTES

1. The normal retirement age is currently 65 years old but is scheduled to increase to 67 by the year 2022.

2. Individuals from the 1990 SIPP panel were born between 1926 and 1928, individuals from the 1991 panel were born between 1927 and 1929, and individuals from the 1992 panel were born between 1928 and 1931.

3. For example, beneficiaries who were 62 years old in 1990 and 63 year olds in 1991 were included in the sample twice.

4. Allowing an individual to enter the sample more than once implicitly assumes that their behavior in one year is independent of their behavior in the next year. While independence across time may not hold, models estimated for older beneficiaries (age 65-68) suggest that including beneficiaries in the sample multiple times has little effect on the estimated coefficients (see below).

5. An individual is identified as working if they have covered earnings, as recorded on the SER data file.

6. The sample of older beneficiaries (65-68 year olds) is significantly larger than the sample for younger beneficiaries, so we estimated models on a sample of unique individuals as well as on a sample where individuals are included multiple times. The estimated coefficients from these two models were similar.

7. Individuals from the 1990 SIPP panel were born between 1921 and 1925, individuals from the 1991 panel were born between 1922 and 1926, and individuals from the 1992 panel were born between 1923 and 1928.

8. In the 20 years prior to 1995, the 1977-83 period is the only one in which there was an exogenous (or "ad hoc") increase in the exempt amount (relative to the average wage) for persons age 65 through 68. Also, during this time, there was no exogenous increase in the exempt amount (relative to the average wage) for persons age 62 through 64.

9. This is because the design requires us to use the 1984 SIPP to look "back" at individuals' behavior between 1977 through 1983.

10. Burtless and Moffitt (1984) p. 156.

11. The samples are: 65-68 year olds with the 1984 SIPP, 65-68 year olds with the 1990-92 SIPP, and 62-63 year olds with the 1990-92 SIPP.

12. See Appendix 6-A for details of the probit/earnings model.

13. These models were estimated with the 1990-92 SIPP and are presented in Appendix 6-B, Tables B-6-1 and B-6-2.

14. See Appendix 6-A for details of the ordered probit model.

15. The earnings are assigned in a way that allows us to incorporate the effect of the scheduled increases in the Social Security exempt amount on beneficiaries' earnings. This procedure is described in more detail in the next section.

16. This approach is valid because the Social Security exempt amount is orthogonal to the other explanatory variables in the model (i.e., the individuals' demographic and economic characteristics).

17. The first earnings equation includes all persons with earnings greater than 0 but less than 85 percent of the exempt amount, the second earnings equation includes persons with earnings between 85 percent and 115 percent of the exempt amount, and the third earnings equation includes persons with earnings greater than 115 percent of the exempt amount.

18. See Appendix 6-C for details about these explanatory variables.

19. Average earnings are calculated starting at age 45 in the sample from the 1984 SIPP because it is the first age at which earnings is available for the entire sample (since the earliest year of earnings is 1951).

20. Marital status is excluded from the analysis of the 1984 SIPP because this variable is missing for roughly 50 percent of sample. This large percentage of missing data is due to the fact that the marital history questions were asked at the end of the survey period. Note that the model results were altered only minimally when this variable was included.

21. Only the more recent measure of average earnings is included in the earnings equation because it is unlikely that, for this group of Social Security beneficiaries, average earnings from the more distant past adds additional information beyond recent earnings.

22. The pseudo-R-squared is defined as (1 - Lu/Lr), where (1) "Lu" is the log-likelihood value of the "unrestricted" model and (2) "Lr" is the log-likelihood value of the "restricted" model. The ratio of the unrestricted log-likelihood and restricted log-likelihood (Lu/Lr) is between zero and one, so the pseudo-R-squared also falls between zero and one.

23. Of the 6,138 beneficiaries, 4,912 are in earnings group 0, 912 in earnings group 1, 156 in earnings group 2, and 158 in earnings group 3.

24. While the final projections exclude the effects of family retirement account (401(k), IRA, and Keogh) balances, Table 6-D-2 in Appendix 6-D presents the projections based on the coefficients that include family account balances.

25. The P-value for the estimated coefficients are 0.44 to 0.91, respectively. Also note that family retirement account balances is excluded because the P-value is very high at 0.94.

26. The P-values range from 0.73 to 0.93.

27. An extension of this approach would be to estimate different effects by gender and marital status.

28. The model results with regard to the other variables in the model suggest that (1) non-Hispanic whites are less likely to work, (2) persons with less than a high school education are less likely to work, (3) males are more likely to work, (4) older persons are less likely to work, and (5) higher average earnings between the ages of 60 and 64 increases the probability of working, while higher average earnings between the ages of 45 and 59 decrease the probability of working.

29. Subsequent refinements of the model should, however, incorporate revised definitions of the earnings groups. Further tests of beneficiaries' responses to increases in the Social Security exempt amount suggest that our estimates may be biased upwards. Our additional work suggests that the regression coefficient is about 0.06 (rather than 0.25) for beneficiaries in group 1 and 0.80 (rather than 0.94) for beneficiaries in group 2. It is unlikely, however, that this will have the significant effect on the overall MINT results.

30. Earnings are measured as the ratio of nominal earnings to national average earnings.

31. The weights available in 1990-92 SIPP panels are taken into account with this procedure.

32. These percentages and all other percentages presented below are based on weighted data.

33. Individuals in 1931-35 cohort are age 62 between 1993 and 1997, while individuals in the 1956-60 cohort are age 62 between 2018 and 2022.

34. As is the case for younger beneficiaries, the current rates of employment are based on calculations from the 1990-92 SIPP.

35. As with younger beneficiaries, earnings are measured relative to national average earning.

36. This estimate of $14,500 is based on the expected increase in the exempt amount for younger beneficiaries (i.e., persons under the normal retirement age) to the year 2002.

37. The estimated coefficient on the exempt amount for earnings group 3 is 1.44, but we use 1.00 in the projection because (1) we cannot reject the null hypothesis that this coefficient is equal to 1.0 and (2) we do not expect this coefficient to be higher than 1.0.

38. The model for 62-63 year olds is similar except that (1) earnings are average from age 35 to age 55 for the first earnings measure and from age 56 to age 61 for the second earnings measure and (2) the exempt amount is excluded from the model (since there is no variation in the exempt amount for this group).

39. For 62-63 year old beneficiaries, average earnings from age 35 to age 55 is excluded from the earnings equation.

CHAPTER 7

PROJECTING RETIREMENT INCOMES TO 2020

I. OVERVIEW

This chapter brings together all components of income and assets at the age of initial Social Security receipt. It then projects total annual family income for all remaining years of life, for every person on the merged SIPP-SER files in the 1931-1960 birth cohorts, through the year 2020. The projection of total family income allows us to estimate family well-being of Social Security recipients born between 1931 and 1960 from 1997 through the year 2020.

The predictions of income and assets from early retirement until death use as inputs the results of previous chapters in this report and the demographic projections by RAND. They use RAND's demographic projections to determine marital status and mortality. They use the earnings projections from Chapter 2 to determine Adjusted Indexed Monthly Earnings (AIME) and Social Security benefits. They use the projections of income at retirement from defined benefit (DB) plans and characteristics of DB plans from Chapter 3 to project DB plan income, including any cost-of-living adjustments, throughout retirement. They use the projections of defined contribution (DC) pension balances and IRA balances from Chapter 3 and the projections of housing and other financial wealth reported in Chapter 4 to determine initial stocks of housing wealth and "non-annuitized" financial wealth at retirement. They use the starting age of Social Security benefits from Chapter 5 to determine the date of retirement and the projection of partial retirement earnings from Chapter 6 to determine income from earnings of Social Security beneficiaries.

The inputs from earlier chapters, combined with an assumption that housing wealth remains constant in real terms, gives us the path in retirement of all sources of income except income from non-annuitized financial assets. To obtain the latter, we need to know the rate at which the stock of these assets changes in retirement, which depends on the decisions of individuals and couples on how much to consume and how much to save. We project changes in the stock of post-retirement financial wealth using a reduced-form model of the rate of decline of financial assets with age for older Americans. This model is estimated from a synthetic panel consisting of multiple panels (1984 and 1990-93) of Survey of Income and Program Participation (SIPP) data merged with earnings data from the Summary Earnings Records (SER) and Social Security entitlement and mortality data from the Master Beneficiary Records (MBR). Finally, we convert the stock of financial assets into income by calculating the annuity the individual or couple could purchase from 80 percent of these assets. This model allows families to save from their income or borrow from their assets.

The projections we report show that unmarried individuals and nonwhites are becoming an increasing proportion of the aged population. Because these groups have a relatively high incidence of poverty, we estimate that poverty rates among the aged will increase. We find that the poverty rate of later cohorts is higher than the poverty rate of earlier cohorts, and that per capita income is becoming less evenly distributed over time. About 10 percent of the youngest Social Security beneficiaries will be in poverty in the year 2020, compared to about 8 percent of similarly aged Social Security beneficiaries in 1990. High school dropouts and individuals who never marry are increasingly in poverty in retirement in 2020 compared to 1990.

The organization of this chapter is as follows. In section II, we summarize our statistical estimates of the changes in financial assets as people age and describe the data we used in the estimation. In section III, we describe our methodology for decaying income from assets over time and our methodology for calculating family income in retirement. In section IV, we describe the change in the composition of initial Social Security recipients by cohort. We focus on the compositional changes by cohort that are important for our model of the decay of financial assets in retirement. We then describe family income of Social Security beneficiaries at first benefit receipt. We do this separately for husbands, wives, and single individuals, and then for all individuals on a per capita basis. Then we describe the distribution of income by gender and cohort. In section V, we first describe the characteristics of our projection sample in the year 2020 and show their projected income as a percent of poverty. Next, we describe the changes in poverty rates among the aged in the year 2020. We then compare characteristics and income of the 1990 aged population with the 2020 aged population. Finally, in section VI, we present our conclusions.

II. ESTIMATES OF POST-RETIREMENT CHANGES IN FINANCIAL ASSETS WITH AGE

We estimated a reduced-form model of the rate of decline of financial assets for older Americans. These estimates are based on a cohort analysis of multiple panels of Survey of Income and Program Participation (SIPP) data merged with earnings data from the Summary Earnings Records (SER) and Social Security entitlement and mortality data from the Master Beneficiary Records (MBR).

1. Description of the Estimating Equation

The rate of decline of financial assets for aged families is represented as a function of demographic variables, birth cohort, past earnings, current Social Security benefit and DB pension income, and mortality. The equation estimates the curvature of the age-wealth profile for various population subgroups and should capture the rate of saving or dissaving of retired individuals as they age. The form of the equation is as follows:

$$Ln(W) = \beta_0 + \beta_1 X + \beta_2 Y(age) + \epsilon$$

where, W is financial assets, Ln is the natural logarithmic transformation, β_0 is an intercept term, X is a vector of covariates expected to influence financial wealth, Y is a vector of covariates interacted with age, the β_is are parameters to be estimated, and ϵ is a random error term.

The X vector includes the following explanatory variables: family Social Security benefit, DB pension income, average indexed annual earnings from age 50 to age 60, gender, marital status, race, educational attainment, natural logarithm of home equity for homeowners, an indicator for the last 27 months of life, and birth cohort. The Y vector includes interaction terms (slope parameters) between age and dummy variables for race, homeownership, presence of a high earner in the household, defined benefit pension coverage indicator, and widowhood. In all cases, we express income and wealth as a percentage of the economy-wide average wage. While other characteristics might also explain changes in financial wealth in old age, we are limited to those variables available in the MINT model. Therefore, we cannot include explanatory variables such as health status, health insurance coverage, living arrangement, farm ownership, or business ownership, among others in our model.[1]

Individuals differ greatly in both their ability to accumulate assets into retirement and their willingness to spend them post-retirement. The estimates in this section reflect this heterogeneity.

Our model allows families to increase or reduce their financial wealth in retirement. Figures 7-1 and 7-2 illustrate two different patterns of wealth change. Figure 7-1 displays the amount and composition of total wealth for a man expected to live until age 83, who might be characterized as a “financial asset saver” because he consumes less than his income from financial assets. (He still consumes more than his total economic income because the bulk of his total wealth is in the form of annuitized assets, which permits him to consume from principal as well as income.) Ignoring the impact of cost-of-living adjustments, he gets an annual Social Security benefit of 30 percent of the economy-wide average wage, a defined benefit pension of 40 percent of the average wage, and employment earnings at age 65 to age 67 of 50 percent of the average wage. The remainder of his wealth is in other financial assets. At age 65, this amounts to three times the average wage. Each year he can consume from his total wealth. Since he is a saver, even though his total wealth is declining, the value of his financial assets (deflated by the average wage) increases. In contrast, Figure 7-2 displays the amount and composition of wealth for a man with the same initial wealth and life expectancy, who might be characterized as a “permanent income dissaver” because he consumes more than his permanent income. His other financial assets are essentially depleted by age 75, and he lives his surviving days on his Social Security benefit and defined benefit pension.

Figure 7-1
Amount and Composition of Wealth by Age
Financial Asset Saver

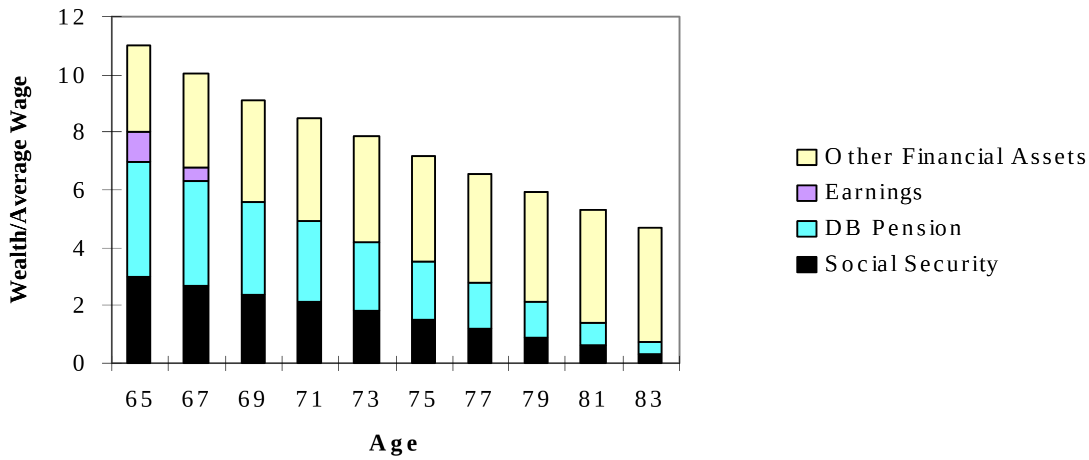
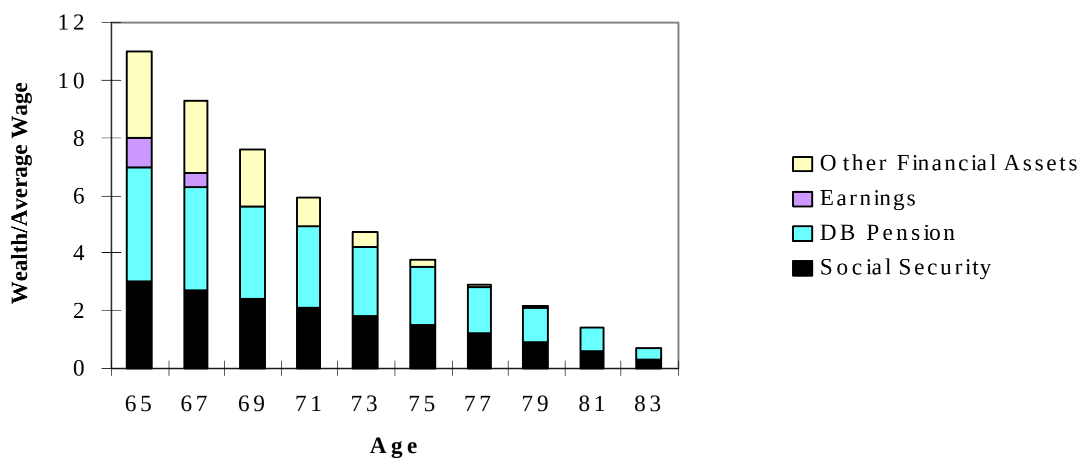


Figure 7-2
Amount and Compostion of Wealth by Age
Permanent Income Dissaver



2. Data

We constructed a sample of families from the 1984, 1990, 1991, 1992 and 1993 SIPP panels including the pension and wealth topical module information. From the SIPP, we obtain demographic data including age, gender, marital status, educational attainment, race, and birth date. The SIPP also reports DB pension incomes from private payers, state and local government, the military, and other federal government. From the pension plan coverage topical modules, we obtain IRA, Keogh, and 401(k) balances, information on joint and survivor pension participation, and an indicator for whether pensions receive a cost-of-living adjustment.[2] The wealth topical modules report home, vehicle, other real estate, and farm and business equity (value - debt). The SIPP also shows stock, mutual fund, and bond values, checking, saving, money market, and certificate of deposit account balances, and unsecured debt (credit card and doctor bills).

Our measure of financial assets is the sum of family IRA, Keogh, and 401(k) balances; vehicle, other real estate, and farm and business equity (value - debt); stock, mutual fund, and bond values; checking, saving, money market, and certificate of deposit account balances, less unsecured debt. For simplicity, we call this sum "financial assets," but it really represents a more general definition of wealth.

The Bureau of the Census matched each of these SIPP panels to the Social Security Administration Summary Earnings Records (SER) and the Social Security Administration Master Beneficiary Records (MBR). The SER has information on Social Security covered earnings and the number of covered quarters per year from 1951 to 1996. The MBR contains the Social Security monthly benefit amount (MBA), primary insurance amount (PIA), and type of benefit paid, for three different periods. The three different periods vary by SIPP panel. Table 7-1 shows the dates that the MBR records cover by SIPP panel. For 62-year-olds in 1984, we can observe their Social Security benefit even if they don't start receiving it until age 73. It also has the date of current entitlement, date of initial entitlement, date of birth, and date of death. For beneficiaries who die, the MBA is set to zero, but the PIA is left intact. For beneficiaries who die after the SIPP survey but before the first MBR observation, we calculate the MBA from the PIA. Individuals who never receive a Social Security benefit do not have an MBR record. This includes uncovered workers and individuals who are below the retirement age and not collecting disability or survivors' benefits.

Social Security income is included as an explanatory variable in our model of post-retirement financial assets. At the time of the SIPP survey, however, some of the individuals in our sample are not receiving Social Security yet. Their Social Security wealth, however, influences both their accumulation and rate of decay of these assets. For individuals not

Table 7-1
Date of Master Beneficiary Record Information by SIPP Panel

SIPP Panel	First MBR Date	Second MBR Date	Third MBR Date
1984	1991	1992	1995
1990	1991	1992	1995
1991	1992	1993	1995
1992	1993	1994	1998
1993	1994	1995	1998

Source: Social Security Administration.

receiving Social Security benefits at the SIPP interview, but who will receive Social Security in the future, we assign their Social Security income to be their future Social Security income discounted for the number of years until they begin to receive Social Security. This effectively turns Social Security income in the regression into a measure of price adjusted lifetime earnings.

Consistent with other tasks in the MINT project, we measure financial wealth in any year by its value relative to the average annual wage of Social Security covered employees in that year. Consequently, changes in wealth are measured relative to changes in the average wage. For example, if the average wage increases by two percent per year and nominal wealth increases by one percent per year over the same period, our measure would show wealth *declining* by approximately one percent per year.

Table 7-2 compares growth rates in the average wage and in the price level, as measured by the CPI-U, over years spanning the estimation period (1983-93) and the projection period (1997-2020). In most 5-year periods, wages grew (and are projected to grow) faster than prices -- that is, the real wage was increasing, although for two of the 5-year periods (1980-84 and 1990-94), real wages declined slightly. Because wages are rising slightly faster than prices throughout the projection period (by almost one percent per year after 2010), real wealth will decline slightly less, or increase slightly more, than our measure of wealth (which is a multiple of the average wage).

We limited our sample to families that include individuals born in or before 1922. For married couples, we retained all the information about the spouse regardless of his or her age. For the 1984 panel, individuals born in 1922 were 62 years old. In the 1990 panel, individuals born in 1922 were 68 years old. By the 1993 panel, they were 71 years old. Combining the SIPP panels in this fashion creates a synthetic panel. While we do not follow specific individuals over time, we can observe the characteristics and wealth of samples of the aged as they age.

Table 7-2
Average Annual Growth in Average Wage and CPI-U--1980 to 2019

Year	Average Annual Growth		Real Wage Growth
	Average Wage	CPI-U	
1980 - 1984	7.1%	7.3%	-0.3%
1985 - 1989	4.5%	3.2%	1.2%
1990 - 1994	3.4%	3.9%	-0.5%
1995 - 1999	4.0%	2.4%	1.6%
2000 - 2004	3.9%	3.5%	0.4%
2005 - 2009	4.4%	3.5%	0.8%
2010 - 2014	4.4%	3.5%	0.9%
2015 - 2019	4.4%	3.5%	0.9%
1997 - 1999	3.6%	2.1%	1.5%

Source: Historical CPI-U growth rates are from the Bureau of Labor Statistics.

Average Wage growth rates and projected CPI-U are from the 1998 Social Security Administration OASDI Trustees' Report.

3. Estimation Results

We estimated financial wealth for married couples and single individuals separately. In estimating financial wealth for married couples, we included explanatory variables for both the husbands' and wives' characteristics. We omitted two families with exceptionally high values of financial assets (over 100 times the average wage) from the couple estimation sample. Including these observations might bias the results towards showing a higher average wealth in the year in which these individuals were included relative to the sample years that did not include any very high-wealth individuals.

Single individuals are a diverse group. They include widows from historically high earning families and from low earning families, as well as individuals who are divorced or never married. While we have historical earnings information for individuals in our sample, we do not have data on the historical earnings of former spouses who were absent or deceased at the time of the SIPP panel. Because many women in our estimation cohorts have little or no earnings, their earnings could be a poor predictor of financial assets at retirement, which would depend more on earnings of former spouses. Therefore, for single people, we omit the earnings explanatory variable and depend on family Social Security benefit to control for lifetime earnings. This provides the best, though imperfect, available indicator of the combined lifetime earnings of the individual and any former long-time spouses.

The regression results are displayed in Table 7-3. For married couples, other financial wealth is positively correlated with increased Social Security benefit, home value, pension income, and average indexed earnings between ages 50 and 60. The husband's level of education is positively related to wealth. For the husband, completion of a high school education increases estimated financial wealth by about 44 percent and completion of a college education increases estimated financial wealth by about 66 percent, compared to high school dropouts (the omitted education category in the regressions). The return for women's education is not as large as for men's education, but it is still positive. Compared with high school dropouts, wives' completion of a high school education increases the couple's estimated financial wealth by about 43 percent and their completion of a college education increases estimated financial wealth by about 45 percent.

Age of initial Social Security entitlement increases the estimated value of other financial wealth. Most families that postpone retirement continue to work and presumably also save. Postponing retirement also increases the Social Security benefit, both due to the effect of the actuarial reduction for early retirement and to the inclusion of a potentially higher level of earnings in the AIME calculation. For a husband, estimated other financial assets increase one percent for every year he waits to collect Social Security. For a wife, estimated other financial assets increase about two percent for every year she waits to collect Social Security.

Financial assets vary among cohorts, but in a complicated way. The first earnings observation we have for any individual is 1951. Therefore, we have fewer earnings observations for each earlier birth cohort. For earlier birth cohorts, the 1951 earnings are for late in the career, and therefore higher on average. These high earnings were subject to a lower taxable maximum, because the taxable maximum was considerably lower in the 1950s than in the 1980s (see Figure 7-3). Social Security beneficiaries first entitled after 1978 (born before 1917) were based on an average monthly wage calculation (AMW). Beginning in 1979, the formula for calculating Social Security benefits was changed to be based on the average indexed monthly earnings (AIME). This effectively reduced the Social Security entitlement for those born in 1917 or later. As a political gesture, Congress phased in the effect of the AMW to AIME switch for individuals first entitled to Social Security between 1979 and 1983 (born between 1917 and 1921).

We included cohort identifiers in the model to control for these complex changes. Our results show that husbands born between 1906 and 1910 have about 11 percent lower estimated financial assets compared to husbands born before 1906. Husbands born between 1911 and 1916 have 29 percent lower estimated financial assets compared to husbands born before 1906, and those born after 1917 have 44 percent lower estimated financial assets. These figures indicate the expected wealth in any cohort, controlling for fixed amounts of other independent variables. While not all of the cohort parameter estimates are individually statistically significant at the 95 percent confidence level, the group of cohort parameters estimates is statistically significant.
One reason that later cohorts have lower wealth, relative to the other predictors is that they have higher covered earnings than earlier cohorts, reflecting increased Social Security taxes and

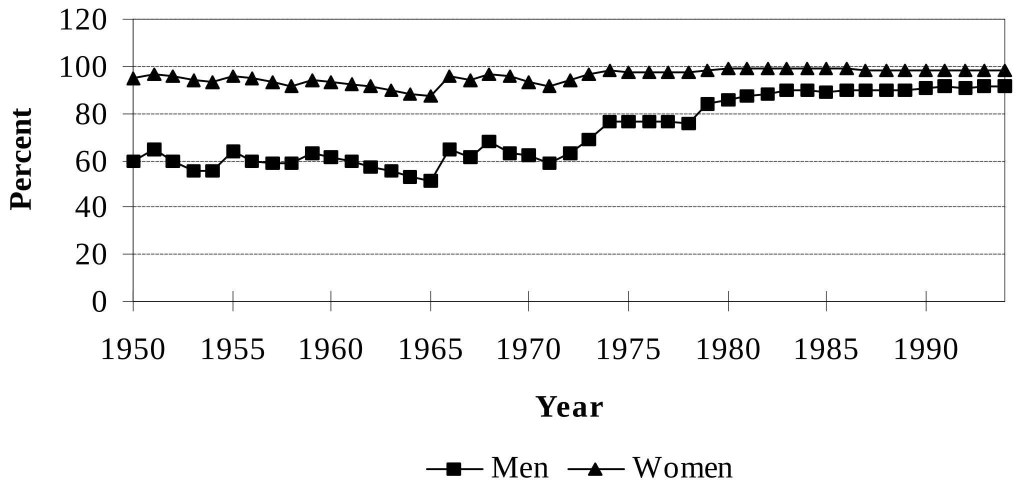
Table 7-3
OLS Regression Results by Marital Status for Dependent Variable Log Financial Assets

Variable	Couples		Singles	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept terms				
Intercept	**-2.523**	0.772	**-1.790**	0.516
Social Security benefit	**1.130**	0.184	**2.524**	0.203
Log of home wealth	**0.405**	0.033	**0.342**	0.032
Head DB pension	**0.726**	0.094	**1.374**	0.117
Wife DB pension	**0.376**	0.228	.	.
Head average earn age 50 to 60	**0.400**	0.073	.	.
Wife average earn age 50 to 60	0.026	0.079	.	.
Male	.	.	0.063	0.062
Divorced	.	.	**-0.366**	0.103
Widow	.	.	**1.924**	0.585
Black	.	.	**-0.904**	0.220
Hispanic	.	.	-0.317	0.189
Head high school	**0.438**	0.064	**0.498**	0.053
Wife high school	**0.426**	0.063	.	.
Head college	**0.658**	0.099	**0.937**	0.096
Wife college	**0.450**	0.119	.	.
Head age initial entitlement	0.011	0.010	**0.016**	0.007
Wife age initial entitlement	**0.019**	0.007	.	.
1906<=head born<=1910	-0.106	0.121	**-0.277**	0.082
1911<=head born<=1916	**-0.290**	0.111	**-0.405**	0.085
1917<=head born+	**-0.437**	0.115	**-0.588**	0.102
Head or wife dies within 27 months	**-0.207**	0.079	**-0.256**	0.085
Slope terms				
Head age by homeowner	**-0.019**	0.003	**-0.016**	0.002
Head age by black	-0.004	0.003	.	.
Head age by white	**0.009**	0.002	**0.007**	0.003
Head age by family get pension	**-0.003**	0.001	.	.
Head age by high earnings			**0.004**	0.001
Head age by widowed			**-0.027**	0.008

Source: The Urban Institute tabulations of the SIPP merged with SER and MBR data.

Notes: Bolded parameter estimates are statistically significant at the 5 percent level.

Figure 7-3
Percent of Workers With Earnings Below the Taxable Maximum for Men and Women by Year



Source: Social Security Administration Annual Statistical Supplement 1998.

benefits over time. This occurs because Social Security replaces a larger percent of high earnings (determined by the taxable maximum) for younger than for older cohorts in the estimation sample. Despite the negative parameter estimates for wealth for the later cohorts, *holding other explanatory variables constant*, later cohorts have on average a higher estimated ratio of financial assets to the average wage than do earlier cohorts.

We controlled for the effect of mortality on wealth by including in the model a term for whether a person is in the last 27 months of life. If poorer families systematically die younger, then the average wealth for younger families will be low compared to the average value of just the survivors. Educational attainment, race, and earnings control for much of the wealth variation attributed to mortality. Additionally, Lubitz, Beebe and Baker (1995) found that health care spending in the last year of life is very high. From the MBR, we can observe mortality up until age 73. Our model shows that other financial wealth declines by about 20 percent as either the husband or wife nears death. The dramatic decline in estimated financial wealth may be in part due to the high out-of-pocket spending families incur near death for health and long-term care. But a full explanation of the factors that cause household wealth to decline dramatically in the last year or two of life is beyond the scope of this report.

The key parameter of interest for our projections is the relationship between age and financial wealth. We included four variables in the model for married couples that capture the interaction between age and other characteristics: age of head times a dummy for homeownership status, age of head times a dummy indicating whether the head is black, age of head times a dummy indicating whether the head is white, and age of head times a dummy indicating whether the family receives a pension. Separate terms for age and age-squared did not significantly affect the level of financial wealth, once the age-interaction terms are included in the equation. Also, age interacted with a positive earnings indicator and age interacted with age of death indicators did not have significant effects.

The estimates show that financial assets decline for married homeowners as they age. At the same time, the value of a home has a large positive effect on the predicted level of wealth. The combined effect of these two coefficients is that homeowners begin retirement with substantially higher estimated financial wealth than renters, but experience a larger decline in wealth as their age increases past retirement. The home provides the family some precautionary saving. Therefore, homeowners can consume more of their financial assets relative to renters and maintain the same level of precautionary saving as renters.

The story is similar for individuals with defined benefit pensions. Other financial wealth declines faster with age for these pensioners than for nonpensioners. Pensioners also begin retirement with substantially higher estimated financial wealth than nonpensioners.

The age slope coefficient for blacks is negative, but positive for whites. This indicates that blacks reduce their financial assets more quickly than whites, and in fact whites may increase their financial assets as they age. Given the shorter life expectancy of blacks relative to whites, a steeper slope for blacks is a logical result.

The combination of homeownership, pension receipt, and race generates 12 separate slope estimates for married couples. Table 7-4 shows the approximate percent change in financial assets per year of age and the standard error of the estimates for these 12 categories. Combined with the mortality parameter, we estimate 24 separate wealth slopes for couples. For example, black, married, homeowners with a pension reduce financial assets on average by about 2.56 percent per year until the year the husband or wife dies. In this year, their financial assets decline by about 21 percent.[3]

Table 7-4
OLS Regression Results for Married Couples for Dependent Variable Log Financial Assets
Percent Change in Financial Assets and Standard Error Per Year of Age

		Race		
		Black	**White Nonhispanic**	**White Hispanic**
		Percent Change in Financial Assets Per Year of Age[1]		
Home Status	**Pension Status**			
Homeowner	**Pension**	**-2.56%**	**-1.21%**	**-2.15%**
	No Pension	**-2.29%**	**-0.93%**	**-1.87%**
Renter	**Pension**	**-0.69%**	**0.66%**	**-0.28%**
	No Pension	-0.42%	**0.94%**	**0.00%**
Percent Change in Financial Assets in the Last Year of Life				**-20.7%**
		Standard Error of the Percent Change Per Year of Age		
Homeowner	**Pension**	0.447	0.303	0.266
	No Pension	0.359	0.299	0.257
Renter	**Pension**	0.266	0.217	0.088
	No Pension	0.257	0.204	0.000
Percent Change in Financial Assets in the Last Year of Life[2]				7.842

Source: The Urban Institute projections.

Note: Bolded percent changes are statistically significant at the 95 percent confidence interval.

1/ Parameter estimates are in a logarithmic scale and are approximations of percent change for small values.

2/ Standard error for a black, home owning couple with a pension.

Estimates for single individuals show a similar pattern as for married couples (see Table 7-3). For single individuals, the omitted group is nonwhite, never married, high school dropouts, born before 1906. Estimated financial wealth is positively correlated with Social Security benefits, home value, and pension income. Being male raises financial wealth by about six percent compared with women. Being widowed approximately doubles financial wealth compared with individuals who never married, and being divorced reduces financial wealth by about 37 percent relative to individuals who never married. Controlling for other determinants of wealth, blacks have about 90 percent less financial wealth than nonblacks, and Hispanics have about 32 percent less financial wealth than nonhispanic whites. As with married couples, the return to education is substantial. Compared with high school dropouts, a high school education increases financial assets by about 50 percent and a college education raises financial assets of individuals by about 94 percent.

As with married couples, the partial effect of belonging to a later birth cohort on wealth is negative. Controlling for other determinants of wealth, cohorts born after 1906 have less financial wealth than individuals born before 1906 -- 28 percent less for individuals born between 1906 and 1910, 41 percent for individuals born between 1911 and 1916, and 59 percent for individuals born after 1917. However, because later cohorts have higher covered earnings, they, on average, also have higher estimated financial assets than earlier cohorts.

As with couples, age of initial Social Security entitlement increases the estimated value of financial wealth for single individuals. Postponing Social Security retirement increases estimated financial assets by about two percent per year. Estimated financial assets decline by about 26 percent in a single individual’s last year of life. This is slightly higher than the decline for married couples.

We included four slope parameters (age terms) in the model for single individuals: age by homeownership, age by white, age by high earnings (average earnings between age 50 and 60 greater than 1.2 times the average wage), and age by widowhood. As in the model for married couples, age terms by themselves are not statistically significant when the age-demographic interaction terms are included in the equation.

Estimated financial assets decline for homeowners as single individuals age. Combined with the large estimated positive coefficient on the value of a home, homeowners have substantially higher estimated financial wealth at retirement than renters, although their wealth falls more rapidly. The parameter estimate for whites is positive, indicating that whites have higher financial assets compared to blacks. The slope parameter estimate for single blacks was not significantly different than zero. The slope parameter estimate for single whites is positive, suggesting whites may increase financial assets as they age. The insignificant coefficient for blacks occurs largely because the observations in our estimation sample have very few financial assets and continue to have few financial assets as they age. Finally, the slope parameter for widows is negative, indicating that widows' estimated financial assets decline as they age.

The combination of homeownership, earning status, race, and marital status generates 16 separate slope estimates for single individuals. Table 7-5 shows the approximate percent change in financial assets per year of age and the standard error of the estimates for these 16 categories. Combined with the mortality parameter, we estimate 32 separate wealth slopes for single individuals. For example, white, widowed, low earning homeowners reduce financial assets on average by about 3.65 percent per year until their last year of life. In this year, their financial assets decline by about 25 percent.[4]

In conclusion, the regression results indicate that other financial assets relative to wages decline with age for most groups, but the rate of decline varies among groups. Other financial assets declines the fastest for groups with the highest level of other financial wealth at retirement -- homeowners, people with pensions, and widows. Whites on average save more of their other financial wealth in retirement than do blacks.

III. METHODOLOGY

1. Projecting Changes in Financial Wealth

We calculate total financial assets at the date of initial Social Security receipt. Total financial assets is the sum of predicted financial assets from Chapter 4 and DC pension balances and IRA/Keogh account balances from Chapter 3. In MINT, initial receipt of Social Security retirement benefits is between ages 62 and 67 (with some individuals collecting disability or survivors benefits earlier) based on a model of Social Security retirement as described in Chapter 5. If the individual retires at age 62 or younger, we calculate the total financial assets at age 62. Otherwise we calculate the total financial assets at age 67. For each year after initial Social Security receipt, we update the balance of financial assets based on the characteristics of the family in each year. Each change is measured as a percentage change in financial assets relative to the previous year's balance.

We predict the annual percentage change in financial assets, using the reduced-form model of the rate of decline of financial assets by demographic characteristic and age as described in the previous section, and shown in Table 7-3. We apply the age-interaction coefficients to the starting level of financial assets to calculate these assets in the post retirement

Table 7-5
OLS Regression Results for Single Individuals for Dependent Variable Log Financial Assets
Percent Change in Financial Assets and Standard Error Per Year of Age

		Race by Marital Status			
		White Nonhispanic		Other	
		Widowed	Divorced or Never Married	Widowed	Divorced or Never Married
		Percent Change in Financial Assets Per Year of Age[1]			
Home Status	**Earnings Age 50-60**				
Homeowner	**Low Earner**	**-3.65%**	**-0.94%**	**-4.31%**	**-1.60%**
	High Earner	**-3.28%**	**-0.56%**	**-3.94%**	**-1.23%**
Renter	**Low Earner**	**-2.05%**	**0.66%**	**-2.71%**	**0.00%**
	High Earner	**-1.68%**	**1.04%**	**-2.34%**	**0.37%**
Percent Change in Financial Assets in the Last Year of Life					**-25.6%**
		Standard Error in Percent Change Per Year of Age			
Homeowner	**Low Earner**	0.763	0.371	0.763	0.225
	High Earner	0.734	0.398	0.772	0.266
Renter	**Low Earner**	0.724	0.304	0.759	0.000
	High Earner	0.732	0.334	0.766	0.137
Percent Change in Financial Assets in the Last Year of Life[2]					8.454

Source: The Urban Institute projections.

Note: Bolded percent changes are statistically significant at the 95 percent confidence interval.

1/ Parameter estimates are in a logarithmic scale and are approximations of percent change for small values.

2/ Standard error for a black, home owning couple with a pension.

years. In effect, we introduce an individual-specific error term for each observation in the regressions so that predicted wealth from the equation equals projected wealth at retirement from the earlier MINT tasks. This error term is maintained throughout retirement; that is, as individuals age they maintain the same percentage difference above or below the regression line as in the initial year of retirement. For the projections, the regression equations give us the *rate of decline* in wealth, but not the initial level at retirement.

For a white, married, home owning couple with a pension, for example, the rate of decline of financial assets as a percent of the average wage is about 1.2 percent per year (see Table 7-4). This is the sum of the slope parameters for a married couple with these characteristics from Table 7-3. A white, renting couple without a pension increases its financial assets by almost 1 percent per year. In each case, we calculate the predicted financial assets relative to the prior year's value. Given an initial value, the rate of decline of assets is determined by the family's demographic characteristics, marital status change, and mortality.

We assume that, upon the death of a married spouse, the survivor inherits all of the financial assets and the home equity, and the survivor gets half of the deceased spouse's DB pension. Upon divorce of a married couple, each partner retains half of the financial assets, half of the home, and half of the combined DB pension income. Each partner's financial assets decline at the divorced rate. For a married couple, financial assets first decline at the married rate. In the year of the first partner's death, financial assets decline at the married, last year of life rate. Financial assets then decline at the widow's rate, and finally, financial assets decline at the widowed, last year of life rate.

2. Measuring Income

We calculate income from financial assets by determining the annual annuity amount the family could buy if it annuitized 80 percent of its financial assets. Financial assets are updated annually based on our model of the decay of these assets. The annuity calculation is simply a method of transforming these assets into income to measure well-being. This allows us to say that families with more financial assets are better off than families with fewer assets, and that families with long life expectancy must make these assets last longer than families with shorter life expectancy.

The annuity value is a function of both life expectancy and a rate of return on assets. We use RAND's life expectancy projections based on the individual's age, gender, race, and educational attainment. For married couples, we use the joint life expectancy and assume a 50 percent survivor annuity. We assume a real rate of return of three percent per year and CPI growth of 3.5 percent per year. While the annuity assumes a fixed annual per capita income over the individual's or couple's lifetime, we update income from assets annually for both changes in wealth amounts, based on our model of wealth decumulation, and changes in life expectancy, given that the person attained an additional year of age. Because the annuity value takes into account life expectancy, given the same starting asset amount, individuals with longer life expectancy will have lower income from assets than individuals with shorter life expectancy.

Total annual income in any year is the sum of projected income from financial assets, Social Security benefit income, earned income, and defined benefit pension income. For homeowners, we also include in total income an imputed rental income based on a three percent per year rate of return on home equity. Income derived in this manner gives us one measure of the well-being of Social Security recipients for different cohorts and demographic groups.

In all cases, income is calculated as a percentage of the economy-wide average wage. While this metric standardizes the comparison of incomes in different years, it complicates the story a bit for describing post-retirement Social Security benefits because post-retirement benefits are indexed to changes in the CPI instead of changes in the wage level. Thus, in an economy with growing real wages, Social Security benefits of retirees will decline relative to the average wage as the retirees age. Over the projection period (1997-2020), the Social Security Administration actuaries are projecting average wage increases to be higher than price increases by varying amounts that stabilize at a difference of 0.9 percent per year after 2010 (see Table 7-2). As a consequence, even though Social Security benefits are updated for price changes, our measure of Social Security income will decline each year relative to average wages (except, for example, when an event like death of a spouse triggers a change in benefit level). This relative income decline is also true for DB pensions and imputed rental income because DB pensions are indexed, if at all, at most to CPI growth, and housing values are assumed to remain constant in inflation-adjusted terms.

IV. RESULTS OF PROJECTIONS - CHARACTERISTICS AND INCOME AT FIRST YEAR OF BENEFIT RECEIPT

1. Universe for First Benefit Analysis

In MINT, we project pensions, saving, and partial retirement earnings for Social Security beneficiaries at age 62 and at age 67. We also project the age at first Social Security benefit receipt. This age can range from age 62 to age 67, or before age 62 in the case of disability or survivors benefits. Social Security benefits at all ages are consistent with the projected age of initial benefit receipt. Initial total income, however, is constrained to ages 62 or 67 because of the methods we used in the models of pensions, saving, and partial retirement earnings.

The age 62 beneficiary population for this analysis includes all individuals projected to receive Social Security benefits at or before age 62, provided they survive to age 62. This includes individuals who receive Social Security disability and survivor benefits that start before age 62. The age 62 beneficiary population also includes individuals who are not entitled to Social Security benefits even with their work and marriage histories up to age 67. We included this latter group to allow for changes in Social Security policy that might subsequently change their Social Security eligibility. Including them also allows for more complete income and poverty analysis of the aged population.

The age 67 beneficiary population includes all individuals projected to receive Social Security benefits after age 62. Individuals who are eligible for Social Security, but who die before receiving benefits are not included in this analysis.

The new beneficiary population includes the age 62 plus the age 67 populations. Total new beneficiary income for the age 62 population is the sum of projected DB pension income, asset income, Social Security, and earnings at age 62. Total new beneficiary income for the age 67 population is the sum of the same projected values at age 67. For each year after initial benefit receipt until death, we update their income sources for COLAs and consumption of assets.

2. Characteristics of the Population at First Benefit Receipt

Several rather dramatic demographic changes have occurred among the cohorts born between 1931 and 1960. These demographic changes affect both the accumulation of income to retirement and the projected path of income in retirement. These changes include increases in the size of cohorts, increases in educational attainment, increases in the proportion of nonwhites, increases in the proportion of the population entering retirement divorced and never married, and increases in life expectancy.

The Baby Boom is a result of a rise in birth rates after World War II. The effect of this is an increase in the size of later cohorts as they enter retirement. For the 1931 to 1960 birth cohorts, those born between 1931 and 1935 are 11 percent of new beneficiaries (see Table 7-6). This proportion increases with each cohort, and those born between 1956 to 1960 are 23 percent of new beneficiaries. In addition to the increase in the size of later cohorts, the general composition of cohorts has changed.

Educational attainment was increasing over time, but has decreased recently. About 19 percent of the earliest cohort, those born between 1931 and 1935, have some college education. This proportion increases to 31 percent for those born between 1946 and 1950, but then declines to 27 percent for those born between 1956 and 1960. A quarter of the earliest cohort never completed high school, but only 10 percent of the latest cohorts never completed high school. This change is significant because initial wealth is highly correlated with educational attainment. College educated individuals accumulate more wealth over their lifetimes compared to less educated individuals.

Nonwhites are becoming a larger proportion of the total population. About 87 percent of new beneficiaries born between 1931 and 1935 are white, but this declines to only 83 percent of new beneficiaries born between 1956 and 1960. This is significant because initial wealth and the rate of decline of financial assets are highly correlated with race. Nonwhites accumulate less wealth over their lifetime compared with whites and experience greater proportional declines in financial wealth in retirement.

Table 7-6
Percent of Individuals at Initial Social Security Receipt by Individual Characteristic and Cohort

		Cohort					
	All	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
		Percent of Social Security Recipients[1]					
All Social Security Recipients	100%	11%	12%	15%	19%	21%	23%
		Percent of Individuals					
Total	100%	100%	100%	100%	100%	100%	100%
Educational Attainment							
High School Dropout	13%	25%	19%	15%	10%	9%	10%
High School Graduate	60%	57%	60%	59%	58%	61%	63%
College	26%	19%	21%	26%	31%	29%	27%
Race							
White	85%	87%	87%	86%	85%	84%	83%
Black	11%	10%	10%	10%	10%	12%	12%
Asian, Native American	4%	3%	3%	4%	5%	4%	4%
Gender							
Female	54%	54%	54%	54%	54%	54%	54%
Male	46%	46%	46%	46%	46%	46%	46%
Marital Status by Gender							
Never Married	6%	4%	4%	5%	6%	7%	7%
Married	68%	72%	68%	68%	68%	67%	66%
Widowed	11%	14%	13%	12%	10%	10%	10%
Divorced	16%	10%	14%	16%	17%	16%	17%

Source: The Urban Institute projections.

1/ These percents include individuals not eligible of Social Security by age 67.

Individuals from later cohorts are less likely to be married at initial Social Security receipt compared to those from earlier cohorts. About 72 percent of individuals born between 1931 and 1935 are married at first receipt. This proportion declines to only 66 percent for those born between 1956 and 1960. Life expectancy is increasing for later cohorts, so fewer from the later cohorts are widowed at first benefit receipt. Members of later cohorts are also more likely to be divorced than members of earlier cohorts. For example, only 10 percent of the earliest cohort is divorced at first benefit receipt, but 17 percent of those born between 1956 and 1960 are. This is significant because both wealth accumulation and the rate of decline of financial assets are correlated with marital status.

Our model of the rate of decline of financial assets varies with homeownership, DB pension receipt, race (black, white, other), being a high earning single, marital status, and mortality. Each individual starts their accumulation or decline in financial assets based on their initial wealth and their characteristics at first entitlement. Changes in marital status or mortality then change the slope of the individual's trajectory.

The average age at initial entitlement is fairly constant across cohorts, while the average age of death is monotonically increasing for later cohorts (see Table 7-7). These are both important because they determine the number of years of life the financial assets will have to support. Also, with the scheduled increase in the normal retirement age, individuals from later cohorts who retire early, will receive lower benefits relative to earlier cohorts retiring at the same age.[5] The average age of Social Security retirement is between 63.5 and 63.7 for all cohorts. Our projected average age of death for the earliest cohort is 84 years old, but this increases to over 86 years old for the latest cohort. Along with increased overall age of death, the age at widowhood is also increasing. Average age of widowhood is increasing from a little under 79 for the earliest cohort to over 80 for the latest cohort. The increased longevity of the later cohorts means that members of later cohorts have to make their financial assets last about two and one half years longer than the members of the earlier cohorts. In our projections, we continue to decay the financial assets at the same rate over their longer life-spans. As a consequence, later cohorts draw off a smaller share of income from these assets each year, but for more years.

Homeownership rates are declining among later cohorts. We predict a 1.6 percent per year reduction in financial assets for single homeowners, independent of race, earnings, and widowhood. Eighty-four percent of unmarried individuals at first benefit receipt are homeowners in the earliest cohort, but only 76 percent of later cohorts are homeowners. This is significant because both the initial value of wealth is higher and the rate of decline of financial assets is greater for homeowners. With more of the later cohorts being single and fewer of the them owning a home, a larger proportion of the later cohorts will have less initial wealth in retirement. On the other hand, based on our wealth in retirement model, renters actually may increase their wealth in retirement. We predict a 1.9 percent per year reduction in financial assets for married homeowners, independent of race and pension status. Homeownership rates for

Table 7-7
Sources of Changes in Projected Financial Assets by Individual Characteristic at Initial Social Security Benefit Receipt and Cohort

	Cohort						
	All	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
				Mean Value			
All Families							
Age of Initial Benefit Receipt	63.6	63.7	63.6	63.5	63.5	63.5	63.6
Age of Death	85.7	84.0	85.2	85.5	86.1	86.0	86.4
Age of Widowhood	80.2	78.8	80.1	80.4	80.7	80.4	80.4
				Percent of Individuals			
Single Individuals							
Homeownership Rates	0.80	0.84	0.83	0.83	0.81	0.80	0.76
Family Gets Pension	0.42	0.45	0.42	0.42	0.42	0.40	0.41
White	0.84	0.86	0.86	0.85	0.85	0.84	0.82
Black	0.16	0.15	0.14	0.15	0.15	0.16	0.18
High Earner	0.21	0.17	0.19	0.21	0.24	0.22	0.20
Married Couples							
Homeownership Rates	0.96	0.98	0.98	0.96	0.97	0.96	0.94
Family Gets Pension	0.51	0.55	0.51	0.50	0.51	0.51	0.51
White	0.91	0.92	0.92	0.92	0.92	0.91	0.90
Black	0.09	0.08	0.08	0.08	0.08	0.09	0.10

Source: The Urban Institute projections.

married couples are also declining for later cohorts. About 98 percent of married couples born between 1931 and 1935 own homes. This rate declines to 94 percent for couples born between 1956 and 1960. As with unmarried individuals, married renters may increase their wealth in retirement.

A larger proportion of later cohorts, both married and single, are black compared to earlier cohorts. We predict that whites increase their financial assets independent of other characteristics. Single whites increase their financial assets 0.7 percent per year, while single blacks, independent of other characteristics, keep their financial assets constant, relative to the average wage, as they age. Fifteen percent of singles born between 1931 and 1935 are black, rising to 18 percent for those born between 1956 and 1960. A smaller proportion of whites in later cohorts will yield a smaller share of singles increasing their assets as they age. For married couples, we predict a rate of decline of financial assets for blacks of about 0.4 percent per year and white couples increase their financial wealth, independent of other characteristics, by 0.9 percent per year. As the proportion of black married couples increases for later cohorts, we would expect a higher proportion of married couples with lower income from assets.

A larger proportion of single individuals in later cohorts have high earnings (average earnings between age 50 and 60 greater than 1.2 times the average wage). We predict that high earning singles, independent of other characteristics, increase their financial assets by 0.4 percent per year. Seventeen percent of singles born between 1931 and 1935 have high earnings. This proportion rises to 24 percent for singles born between 1946 and 1950 and then declines to 20 percent for singles born between 1956 and 1960. As a larger proportion of singles enter retirement with high earnings, more of them will increase financial assets as they age. These increased financial assets will peak for those born between 1946 and 1950.

A smaller proportion of married couples in later cohorts have a DB pension compared to early cohorts. We predict that couples with DB pensions reduce their financial assets 0.3 percent per year, independent of other characteristics. Fifty-five percent of couples born between 1931 and 1935 have DB pensions, and only 51 percent of couples born between 1956 and 1960 have. The reduction in DB pension coverage will increase financial assets (or slow the rate of decline) of married couples in later cohorts compared to earlier cohorts. Of course, lack of a DB pension is also correlated with lower initial wealth.

3. Composition of Income in First Year of Social Security Benefit Receipt

In this section, we look at total income and the amount of income from Social Security, financial assets, DB pensions, earnings, and imputed rental income at first Social Security receipt by various characteristics. This pulls together the separate components projected from the prior sections. We look at composition of income separately for married men, married women, and unmarried individuals at first benefit receipt.

Assessing family income of married couples in the first year of benefit receipt is complicated by the fact that married couples are two people. They may each have different employment and Social Security benefit statuses at different points in time. In this analysis, we evaluate income at each individual's initial year of Social Security receipt. For married couples, the husband, for example, may start collecting Social Security at age 62 and work in partial retirement for a couple of years until the wife retires when she reaches age 62. Alternatively, the husband may work until he is 67 and retire when his wife is eligible for Social Security benefits. Thus, the year of first benefit receipt may differ for the husband and wife.

The average family income of new Social Security beneficiary husbands is about 1.68 times the average wage (see Table 7-8). Average family income increases as educational attainment increases. For example, family income of high school dropout husbands is at the average wage (1.0), but, for college-educated husbands, family income is more than twice the average wage (2.26). Family income at husband's first benefit receipt is about 32 percent higher for white families than for black families (1.73 versus 1.31). Family income increases by cohort until the 1946 to 1950 birth cohort, rising from 1.69 to 1.75 times the average wage. After the 1950 birth cohort, family income declines to 1.58 times the average wage for those born between 1956 and 1960.

Average family income generally increases as average indexed monthly earnings (AIME) increases. An individual's AIME, however, does not tell the whole story. Individuals never working in Social Security covered employment or working fewer than forty covered quarters have an AIME of zero, but when these individuals are married to high earning partners or are working in high paying noncovered work, they could well have relatively high income in retirement. We calculated AIME quintiles for all individuals by cohort in our projection sample. We then use these AIME quintile breaks to distribute income at first benefit receipt. Average family income for married men with wages in the bottom AIME quintile is higher than average family income for married men with wages in the second AIME quintile. Many individuals in the bottom AIME quintile have high DB pension income, so they clearly have strong noncovered labor force attachment and earnings.

About 30 percent of total family income at the husband's initial receipt of Social Security is from Social Security itself (see Table 7-9). Social Security benefits are a larger proportion of total income for families with less educated husbands than for families with more educated husbands. Social Security makes up about 42 percent of total income for families with high school dropout husbands, but only 24 percent of total income for families with college educated husbands. Social Security income as a percent of the average wage increases from earlier to later cohorts. Earlier cohorts had more of their earnings, especially late career earnings, subject to the Social Security taxable maximum. This causes Social Security to replace less income for earlier cohorts relative to later cohorts. Later cohorts are adversely affected by the increase in the normal retirement age and the actuarial reduction. Despite the increase in the normal retirement age, Social Security as a percent of total income is increasing for all later cohorts. Husbands born between 1931 and 1935 receive about 30 percent of their total income from Social Security, and husbands born between 1956 and 1960 receive about 32 percent of their total income from Social Security.

Table 7-8
Percent of Husbands and Average Family Income Divided by the Average Wage at the Husband's Initial Social Security Benefit Receipt by Individual Characteristic and Income Source

		Family Income Source					
	Percent of Husbands	Total Income	Social Security	Financial Income	DB Pension Income	Earned Income	Imputed Rental Income
		Average Family Income/Average Wage					
Total	100%	1.68	0.51	0.52	0.17	0.37	0.11
Educational Attainment							
High School Dropout	13%	1.00	0.42	0.20	0.07	0.23	0.07
High School Graduate	57%	1.53	0.50	0.42	0.16	0.36	0.10
College	30%	2.26	0.55	0.86	0.24	0.47	0.14
Race							
White	87%	1.73	0.52	0.55	0.18	0.37	0.11
Black	9%	1.31	0.46	0.27	0.16	0.36	0.07
Asian, Native American	4%	1.55	0.44	0.48	0.12	0.41	0.11
Cohort							
1931-1935	12%	1.69	0.51	0.43	0.28	0.36	0.11
1936-1940	12%	1.72	0.50	0.46	0.23	0.42	0.11
1941-1945	14%	1.72	0.49	0.52	0.19	0.42	0.11
1946-1950	19%	1.75	0.52	0.56	0.17	0.40	0.11
1951-1955	21%	1.67	0.52	0.55	0.13	0.36	0.11
1956-1960	22%	1.58	0.51	0.55	0.11	0.32	0.09
AIME Quintile of Husband							
1	9%	1.23	0.22	0.37	0.28	0.27	0.10
2	11%	1.09	0.35	0.27	0.09	0.30	0.08
3	17%	1.24	0.45	0.30	0.08	0.33	0.08
4	27%	1.54	0.55	0.41	0.13	0.36	0.09
5	37%	2.27	0.62	0.82	0.24	0.45	0.14
Per Capita Income Quintile							
1	19%	0.52	0.33	0.07	0.02	0.05	0.06
2	21%	0.94	0.49	0.15	0.09	0.13	0.08
3	21%	1.34	0.54	0.29	0.17	0.25	0.10
4	21%	1.91	0.57	0.53	0.24	0.45	0.12
5	19%	3.41	0.58	1.46	0.32	0.90	0.16

Source: The Urban Institute projections.

Table 7-9
Percent of Total Family Income by Family Income Source at Husband's Initial Social Security Benefit Receipt for Married Couples by Individual Characteristic and Income Source

	Family Income Source					
	Total Income	Social Security	Financial Income	DB Pension Income	Earned Income	Imputed Rental Income
	Percent of Total Family Income by Income Source					
Total	100%	30%	31%	10%	22%	6%
Educational Attainment						
High School Dropout	100%	42%	20%	7%	23%	7%
High School Graduate	100%	33%	27%	10%	23%	6%
College	100%	24%	38%	11%	21%	6%
Race						
White	100%	30%	32%	10%	22%	6%
Black	100%	35%	20%	12%	27%	5%
Asian, Native American	100%	28%	31%	8%	26%	7%
Cohort						
1931-1935	100%	30%	25%	17%	21%	7%
1936-1940	100%	29%	27%	13%	24%	7%
1941-1945	100%	29%	30%	11%	24%	6%
1946-1950	100%	29%	32%	10%	23%	6%
1951-1955	100%	31%	33%	8%	21%	6%
1956-1960	100%	32%	35%	7%	20%	6%
AIME Quintile of Husband						
1	100%	18%	30%	23%	22%	8%
2	100%	32%	25%	9%	27%	7%
3	100%	36%	24%	7%	26%	7%
4	100%	36%	27%	8%	23%	6%
5	100%	27%	36%	11%	20%	6%
Per Capita Income Quintile						
1	100%	64%	13%	4%	9%	11%
2	100%	52%	16%	9%	14%	8%
3	100%	40%	22%	12%	19%	7%
4	100%	30%	28%	12%	24%	6%
5	100%	17%	43%	9%	26%	5%

Source: The Urban Institute projections.

Ignoring the bottom AIME quintile, which includes noncovered workers, Social Security is a higher share of total family income for families with husbands who have lower lifetime earnings than for families with husbands who have higher lifetime earnings. For example, Social Security accounts for about 32 percent of total income for families with husbands in the second AIME quintile, but only 27 percent of family income for families with husbands in the highest AIME quintile.

One of the biggest changes in the components of income across cohorts is a systematic shift in the share of income from DB pensions to other financial assets. This is due to a shift in pension types over time from DB to DC. The earliest cohort receives about 17 percent of its total family income from DB pensions at husband's first benefit, but this proportion declines to only 7 percent for the latest cohort. This decline corresponds directly to an increase in the proportion of income from financial assets, which includes the additional DC pension assets. The increase in financial asset income, however, is not as large as the decrease in DB pension income. DB pension income declines by 0.17 times the average wage from the earliest cohort to the latest cohort, but financial asset income increases only 0.12 times the average wage for the same cohorts. Of course, Social Security taxes have increased along with the increase in the taxable maximum, and this has an impact on later cohorts' ability to save for retirement compared to earlier cohorts.

Average family DB pension income for new Social Security beneficiary husbands is about 0.17 times the average wage (see Table 7-8). Families with college educated and high earning husbands have higher DB pension income. Families with college educated husbands receive about 24 percent of the average wage from DB pensions, while families with high school dropout husbands receive only 7 percent of the average wage from DB pensions. Families with white husbands get about 18 percent of the average wage in DB pensions compared to about 16 percent of the average wage for families with black husbands. Interestingly, the group with the highest DB pension income is families with husbands in the lowest AIME quintile. The men in this quintile are largely noncovered workers who receive other, more generous DB pensions instead of Social Security. Many are federal government employees and noncovered state and local government workers.

Average family income from financial assets for families with new Social Security beneficiary husbands is about 0.52 times the average wage. Families with higher educated husbands have substantially more financial asset income than families with less educated husbands. Families with college educated husbands receive about 38 percent of their initial post-retirement income from financial assets, compared to about 20 percent for families with high school dropout husbands. They receive more than four times the income from financial assets as families with high school dropout husbands (0.86 versus 0.20). Men with a college education live longer, on average, than men with less education. If we remove the effect of this longer life expectancy on husbands' annuitized income from financial assets, families with college educated husbands would have almost five times the financial income as families with high school dropout husbands. Families with white husbands have about twice as much income from financial assets as families with black husbands, and financial asset income amounts to a larger share of their total family income. Families with white husbands receive about 32 percent of total family income from financial assets compared with only 20 percent for families with black husbands.

Families with high earning husbands have considerably more income from financial assets than families with low earning husbands. Once again, ignoring the bottom AIME quintile, which has noncovered Social Security workers, the average income from financial assets for families with husbands in the second AIME quintile is about 27 percent of the average wage, but families with husbands in the top AIME quintile have financial asset income equal to about 82 percent of the average wage (more than three times as much).

Average family income from earnings for families with new Social Security beneficiary husbands is 0.37 times the average wage. Family earnings income is complicated for married couples because some of the earnings can be from a non-retired spouse. We find that higher earnings is positively correlated with higher educational attainment. Families with college educated husbands have earned income equal to about 47 percent of the average wage, while families with high school dropout husbands have earned income of only 23 percent of the average wage. Families with husbands in the bottom AIME quintile receive earned income equal to about 27 percent of the average wage, while families with husbands in the top AIME quintile receive about 45 percent of the average wage in earned income. These earnings drop off fairly quickly after initial Social Security retirement (see the Appendix to Chapter 6), but they are a sizeable share of total income at initial retirement.

Average imputed rental income for families with new Social Security beneficiary husbands is 0.11 times the average wage. As with other income sources, imputed rental income is higher for families with college educated husbands than for families with less educated husbands. It is higher for whites than for blacks. It is very evenly distributed across cohorts, but with a notable drop in the last cohort (0.11 to 0.09). The decline for the last cohort is symptomatic of a general decline in projected income from all sources.

Among families with new Social Security beneficiary husbands, those families in the lowest per capita income quintile have very few resources other than Social Security benefits. Their Social Security benefits are only 33 percent of the average wage, and their total income is only 52 percent of the average wage. Families in the highest per capita income quintile have higher income from all sources, especially income from financial assets and earnings. Their total income is about 3.4 times the average wage. Over 40 percent of this income comes from financial assets and about 26 percent comes from earnings.

Table 7-10
Percent of Wives and Average Family Income Divided by the Average Wage at the Wife's Initial Social Security Benefit Receipt by Individual Characteristic and Income Source

		Family Income Source					
	Percent of Wives	Total Income	Social Security	Financial Income	DB Pension Income	Earned Income	Imputed Rental Income
		Average Family Income/Average Wage					
Total	100%	1.60	0.54	0.50	0.17	0.28	0.11
Educational Attainment							
High School Dropout	12%	0.93	0.44	0.18	0.08	0.15	0.08
High School Graduate	64%	1.50	0.54	0.44	0.16	0.26	0.10
College	23%	2.25	0.61	0.86	0.24	0.41	0.14
Race							
White	87%	1.65	0.55	0.53	0.17	0.29	0.11
Black	9%	1.17	0.50	0.24	0.16	0.20	0.07
Asian, Native American	4%	1.48	0.49	0.45	0.15	0.27	0.12
Cohort							
1931-1935	12%	1.65	0.58	0.42	0.27	0.27	0.12
1936-1940	12%	1.57	0.54	0.42	0.22	0.28	0.11
1941-1945	15%	1.60	0.54	0.47	0.19	0.30	0.11
1946-1950	19%	1.64	0.54	0.53	0.16	0.30	0.11
1951-1955	21%	1.62	0.54	0.54	0.14	0.29	0.11
1956-1960	22%	1.56	0.54	0.56	0.12	0.25	0.09
AIME Quintile of Wife							
1	29%	1.29	0.43	0.41	0.16	0.19	0.10
2	28%	1.36	0.49	0.40	0.12	0.25	0.10
3	21%	1.59	0.59	0.46	0.16	0.28	0.10
4	14%	2.04	0.68	0.63	0.23	0.38	0.11
5	7%	2.96	0.77	1.15	0.32	0.57	0.15
Per Capita Income Quintile							
1	19%	0.51	0.33	0.07	0.02	0.03	0.06
2	22%	0.94	0.53	0.16	0.08	0.09	0.08
3	21%	1.34	0.60	0.30	0.17	0.17	0.10
4	20%	1.90	0.62	0.56	0.25	0.34	0.13
5	17%	3.38	0.61	1.48	0.33	0.79	0.16

Source: The Urban Institute projections.

Average family income of new Social Security beneficiary wives is 1.6 times the average wage (see Table 7-10). This is slightly lower than the average family income of new Social Security beneficiary husbands. These are, by and large, the same couples, but at different points in time. Because wives are on average younger than their husbands, by the time the wife retires, the couple is older, the husband has generally left the labor force, and they have begun consuming their retirement savings. All three factors lead to a lower family income for new beneficiary wives than for new beneficiary husbands. At wife's initial Social Security receipt, family income from Social Security increases relative to at husband's initial receipt, but only by 6 percent (from 0.51 to 0.54 times the average wage) and family income from earnings decreases by 24 percent (from 0.37 to 0.28 times the average wage).

Families with new Social Security beneficiary wives are projected to experience a lower income from DB pensions for later cohorts than for earlier cohorts. As with new beneficiary husbands, this decline for later cohorts is somewhat offset by a corresponding increase in financial asset income, which includes DC pension income. Average family DB pension income at first benefit receipt for wives born between 1931 and 1935 is 0.27 times the average wage. For wives born between 1956 and 1960, this amount drops to only 0.12 times the average wage (a reduction of 0.15). At the same time, financial asset income increased from 0.42 times the average wage for new beneficiary wives born between 1931 and 1935 to 0.56 times the average wage for wives born between 1956 and 1960 (an increase of 0.14)

At first benefit receipt, married women are much more likely to be in the lower AIME quintiles than married men. For example, 29 percent of married women are in the bottom AIME quintile, but only 9 percent of married men are. Only 7 percent of married women are in the top AIME quintile, but 37 percent of married men are. Total family income is higher at wife's first benefit receipt than at husband's first benefit receipt for all AIME quintiles as wives' Social Security income becomes available. Total family income, however, is considerably higher for families where the wife does work and has lifetime earnings above the bottom quintile. Family income for new beneficiary wives in the highest AIME quintile is 30 percent higher than family income for husbands in the highest earning quintile at first benefit receipt. For example, the average family income for married women in the top AIME quintile is almost 3 times the average wage at wife's first benefit, while the family income for married men in the top AIME quintile is only 2.27 times the average wage at husband's first benefit receipt.

For unmarried individuals at initial Social Security benefit receipt, average family income is 0.83 times the average wage. This is a little less than half of the family income of married couples at husband's first benefit receipt (see Tables 7-8 and 7-11). Compared with couples at husband's first benefit receipt, unmarried individuals receive on average a lower share of their income from earnings because they never have a spouse contributing to those earnings.

Table 7-11
Percent of Single Individuals and Average Family Income Divided by the Average Wage at Single Individual's Initial Social Security Benefit Receipt by Individual Characteristic and Income Source

		Income Source					
	Percent of Singles	Total Income	Social Security	Financial Income	DB Pension Income	Earned Income	Imputed Rental Income
		Average Family Income/Average Wage					
Total	100%	0.83	0.31	0.24	0.11	0.10	0.07
Educational Attainment							
High School Dropout	15%	0.42	0.22	0.07	0.04	0.04	0.04
High School Graduate	60%	0.75	0.31	0.19	0.09	0.10	0.06
College	25%	1.24	0.37	0.45	0.18	0.16	0.09
Race							
White	81%	0.88	0.32	0.27	0.11	0.11	0.07
Black	16%	0.56	0.26	0.09	0.09	0.08	0.04
Asian, Native American	4%	0.79	0.29	0.25	0.09	0.09	0.07
Gender							
Female	67%	0.78	0.30	0.21	0.10	0.11	0.06
Male	33%	0.93	0.34	0.31	0.13	0.09	0.07
Marital Status by Gender							
Widowed Male	7%	1.03	0.36	0.34	0.16	0.10	0.08
Widowed Female	27%	0.83	0.32	0.24	0.12	0.09	0.07
Divorced Male	18%	0.94	0.35	0.30	0.13	0.10	0.07
Divorced Female	30%	0.73	0.30	0.18	0.08	0.12	0.06
Never Married Male	8%	0.80	0.28	0.29	0.08	0.08	0.06
Never Married Female	10%	0.75	0.26	0.21	0.11	0.12	0.06
Cohort							
1931-1935	10%	0.81	0.31	0.17	0.17	0.09	0.08
1936-1940	12%	0.81	0.32	0.19	0.13	0.10	0.07
1941-1945	14%	0.83	0.32	0.23	0.11	0.11	0.07
1946-1950	19%	0.86	0.32	0.26	0.11	0.11	0.07
1951-1955	22%	0.83	0.31	0.25	0.10	0.11	0.06
1956-1960	24%	0.81	0.30	0.28	0.08	0.10	0.05
AIME Quintile at Age 62							
1	23%	0.49	0.17	0.12	0.10	0.05	0.05
2	22%	0.57	0.26	0.14	0.05	0.07	0.06
3	22%	0.73	0.32	0.18	0.08	0.10	0.06
4	19%	1.05	0.41	0.30	0.13	0.15	0.07
5	14%	1.61	0.48	0.61	0.24	0.19	0.10
Per Capita Income Quintile							
1	27%	0.24	0.17	0.03	0.01	0.01	0.03
2	21%	0.46	0.30	0.06	0.03	0.03	0.05
3	18%	0.67	0.34	0.11	0.08	0.07	0.07
4	16%	0.95	0.38	0.21	0.16	0.11	0.08
5	18%	1.94	0.42	0.82	0.28	0.32	0.11

Source: The Urban Institute projections.

Unmarried individuals also receive slightly higher Social Security benefits per capita than married couples at husband's first benefit receipt because, for couples, it is often the case that the benefit does not include the wife's benefit (when the wife is too young to collect benefits) or it includes a spousal benefit that is smaller than the average benefit of workers.

Among unmarried new Social Security beneficiaries, men have more income than women, those with a college education have more income than high school dropouts, and whites have more income than nonwhites. As with married couples, there is shift of income from DB pensions to financial income for the later cohorts. Unlike new beneficiary husbands and wives, the increase in financial asset income, which captures the increased DC pension balances, more than offsets the decrease in DB pension income for later cohorts. Women are a larger share of unmarried new beneficiaries (67 percent versus 33 percent), and they are more likely to be in jobs covered by a DC pension than a DB pension. More women in later cohorts work, and later cohorts are more likely to have DC than DB pensions.

Widowed and divorced men have about 25 percent more initial retirement income than widowed and divorced women, respectively. Interestingly, though, at initial Social Security receipt, never married men have only 7 percent more initial retirement income than never married women -- 80 and 75 percent of the average wage respectively.

As with married couples, total income of unmarried individuals rises slightly from the earliest cohorts to the middle cohorts and then declines for the latest cohorts. The decline in total income of the latest cohorts is particularly significant because the proportion of the population who are unmarried at first retirement is increasing over time.

In order to compare incomes of married couples with unmarried individuals, we calculate per capita income--that is, couple income divided by two for married couples, and individual income for unmarried individuals. Using this measure, husbands and wives share income from all sources equally, and a couple would need twice the income of an unmarried individual to have the same per capita income. Using our measure of per capita income, if a husband has employment income, for example, and the wife does not, we say that they both have employment income. Appendix Table 7-A-2 shows the population percent and average per capita income at first Social Security benefit for the MINT sample by selected characteristics. Appendix Table 7-A-3 shows the percent of individuals receiving family income by income source and selected characteristics.

The incomes reported in Tables 7-8, 7-10 and 7-11 include zeros. While virtually all individuals have some source of income, the specific combination of sources varies. If we look at the specific sources of income, there are a few items of interest.

First, Social Security coverage has increased over time. For new beneficiaries born between 1931 and 1935, 95 percent have some Social Security income. This share increases to

98 percent for new beneficiaries born between 1956 and 1960 (see Table 7-A-3). This increase in coverage is mostly due to more universal Social Security coverage from employment rather than an increase in labor force participation. Our analysis of income of new beneficiaries includes noncovered workers. Some of these noncovered workers have earnings, but in jobs not covered by Social Security. Other noncovered workers do not have the required number of covered quarters to be eligible for Social Security. These two noncovered populations are very different in their financial resources.

Second, 19 percent of new beneficiaries in the bottom per capita income quintile have employment income. Many of these low income workers work because they have no retirement pension including Social Security. Almost seventy percent of new beneficiaries in the top per capita income quintile have employment income. Many of these high income new beneficiaries work despite having high incomes from other sources including Social Security.

Finally, we do not project Supplemental Security Income (SSI). While SSI is an important source of income for the elderly poor, SSI benefits are not enough to raise them out of poverty. SSI as a percent of the average wage is very low and its omission does not substantially change our results.

4. Distribution of Income at First Benefit Receipt

Per capita income is becoming increasingly less equally distributed over time-- that is, the rich are getting richer, and the poor are getting poorer. The average per capita income at initial benefit receipt for all individuals in the MINT sample is 0.824 times the average wage (see Table 7-12). The average per capita income for individuals in the bottom fifth of the income distribution is 0.249 times the average wage, and the average per capita income for individuals in the top fifth of the income distribution is 1.778 times the average wage. For those in the bottom fifth of the income distribution, average per capita income is declining from 0.267 times the average wage for those born between 1931 and 1935 to 0.221 for those born between 1956 and 1960. That is a 17 percent reduction in average income for those in the bottom fifth of the income distribution. Women are disproportionately among the income losers. They suffer a 20 percent decline in per capita income from the earliest cohort to the latest cohort.

For those in the top fifth of the income distribution, average per capita income is increasing from 1.723 times the average wage for those born between 1931 and 1935 to 1.810 times the average wage for those born between 1956 and 1960. That is a 5 percent increase in average income for those in the top fifth of the income distribution. Women are also disproportionately among the income winners. They enjoy a 8 percent increase in per capita income from the earliest cohort to the latest cohort.

Table 7-12
Average Per Capita Income as a Percent of the Average Wage at Initial Social Security Benefit Receipt by Gender, Cohort, and Per Capita Income Quintile

		Per Capita Income Quintile					
		All	**1**	**2**	**3**	**4**	**5**
			Average Per Capita Income/Average Wage				
Total	**Cohort**						
	All	0.824	0.249	0.469	0.670	0.951	1.778
	1931-1935	0.827	0.267	0.499	0.691	0.959	1.723
	1936-1940	0.822	0.268	0.486	0.684	0.963	1.709
	1941-1945	0.832	0.263	0.485	0.687	0.959	1.766
	1946-1950	0.852	0.254	0.490	0.705	0.992	1.819
	1951-1955	0.823	0.245	0.461	0.667	0.955	1.786
	1956-1960	0.794	0.221	0.423	0.618	0.898	1.810
Percent Change[1]		-4%	-17%	-15%	-11%	-6%	5%
Women							
	All	0.792	0.245	0.469	0.669	0.948	1.783
	1931-1935	0.785	0.268	0.498	0.689	0.959	1.707
	1936-1940	0.773	0.263	0.488	0.682	0.961	1.698
	1941-1945	0.794	0.260	0.485	0.683	0.958	1.773
	1946-1950	0.816	0.246	0.492	0.705	0.988	1.800
	1951-1955	0.801	0.244	0.461	0.666	0.952	1.793
	1956-1960	0.774	0.215	0.423	0.616	0.896	1.840
Percent Change		-1%	-20%	-15%	-11%	-7%	8%
Men							
	All	0.861	0.254	0.468	0.672	0.954	1.774
	1931-1935	0.877	0.265	0.500	0.692	0.959	1.737
	1936-1940	0.879	0.275	0.485	0.686	0.965	1.717
	1941-1945	0.876	0.268	0.483	0.692	0.961	1.759
	1946-1950	0.894	0.264	0.489	0.705	0.996	1.838
	1951-1955	0.849	0.246	0.462	0.668	0.959	1.779
	1956-1960	0.817	0.230	0.424	0.619	0.902	1.778
Percent Change		-7%	-13%	-15%	-11%	-6%	2%

Source: The Urban Institute projections.

1/ Percent change is the average per capita income of the 1956 to 1960 cohort compared to the 1931 to 1935 cohort.

Women's income has become more unevenly distributed than men's income, reversing an historic trend. At initial Social Security receipt, women born between 1931 and 1935 who are in the top fifth of the income distribution at retirement had 6.4 times the income of those in the bottom fifth of the income distribution. For those born between 1956 and 1960, this difference has risen to 8.6 times the income. Men born between 1931 and 1935 who are in the top fifth of the income distribution at retirement had 6.6 times the income of those in the bottom fifth of the income distribution. For those born between 1956 and 1960, this difference has risen to 7.7 times the income.

V. RESULTS OF PROJECTIONS: CHARACTERISTICS AND INCOME OF THE RETIRED POPULATION IN THE YEAR 2020

1. Characteristics of the Retired Population in 2020

So far, we have only looked at the characteristics of 1931 to 1960 birth cohorts at initial Social Security receipt. In 1997, the first year of our projections, only those born between 1931 and 1935 are eligible for aged Social Security retirement benefits. In each succeeding year, an additional cohort becomes eligible for Social Security, and all of the beneficiaries receiving Social Security become one year older. By the year 2020, members of the cohort born in 1931 will be 89 years old and members of the cohort born in 1960 will be 60 years old. The earliest cohort will have been spending down their financial assets for as many as 25 years, and the latest cohort will not have started receiving Social Security retirement benefits yet. In 2020, our projection sample is made up of 60- to 89-year-olds. While this is a large proportion of the Social Security beneficiaries in 2020, we are missing all beneficiaries age 90 and older (about 5.6 percent of the 65 and older population). These oldest beneficiaries are, of course, the most vulnerable.

Of individuals receiving Social Security in 2020, only 7 percent are between ages 85 and 90 (born between 1931 and 1935, see Table 7-13). This proportion increases with succeeding cohorts, reflecting both the increasing number of survivors in younger age groups and the increasing size of subsequent cohorts. The highest proportion of Social Security beneficiaries in 2020 are those born between 1951 and 1955, who will then be between 65 and 69 years old. They are a larger share because mortality has not taken a major toll on this group and because they are a larger birth cohort in general. There are fewer beneficiaries in the 1956-1960 cohort because, even though they are a bigger group than the 1951-1955 cohort, many of them have not yet begun to receive benefits. Note that, in the MINT model, we calculate income as of first Social Security benefit, but this is restricted to age 62 or age 67. Individuals who did not take up Social Security benefits at age 62 are then assigned incomes at age 67. Social Security benefits

Table 7-13
Percent of Social Security Recipients in Year 2020 by Individual Characteristic and Cohort

		Cohort					
	All	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
			Percent of Social Security Recipients				
All Social Security Recipients	100%	7%	11%	17%	25%	26%	14%
		Percent of Beneficiaries Receiving Social Security in 2020					
All Individuals	66%	43%	62%	76%	88%	83%	40%
		Percent of Social Security Recipients by Cohort					
Total	100%	100%	100%	100%	100%	100%	100%
Educational Attainment							
High School Dropout	12%	18%	15%	13%	10%	9%	11%
High School Graduate	61%	61%	62%	60%	59%	62%	63%
College	27%	21%	23%	27%	32%	29%	25%
Race							
White	86%	89%	88%	86%	85%	85%	84%
Black	10%	8%	9%	10%	10%	11%	12%
Asian, Native American	4%	3%	3%	4%	5%	4%	4%
Gender							
Female	58%	68%	63%	60%	56%	55%	56%
Male	42%	32%	37%	40%	44%	45%	44%
Marital Status							
Never Married	6%	3%	4%	5%	6%	7%	8%
Married	58%	42%	50%	55%	61%	63%	64%
Widowed	19%	43%	31%	23%	16%	14%	12%
Divorced	17%	12%	16%	17%	18%	17%	16%

Source: The Urban Institute projections.

Note: This table includes all individuals age 67 or older in 2020 or age 62 to 66 receiving Social Security and individuals not eligible for Social Security.

and earnings are calculated year-by-year, but pensions and wealth are only projected to age 62 or age 67. Therefore our post retirement income is restricted to starting at age 62 or age 67. Individuals born in 1959 and 1960 are ages 61 and 60 respectively and, despite any Social Security disability status, are not considered Social Security recipients in 2020. For those born between 1954 and 1958 (age 63 to 66 in 2020), our 2020 population only includes those who accept Social Security at age 62. For example, only 43 percent of Social Security beneficiaries born between 1931 and 1935 are projected to survive to 2020, and only 40 percent of those born between 1956 and 1960 are projected to receive Social Security in 2020.

For the oldest Social Security recipients in our projection sample (those born between 1931 and 1935), about 68 percent are female and about 43 percent are widowed. These proportions are both substantially higher than for the youngest Social Security recipients (those born between 1956 and 1960). Of the youngest recipients, only 56 percent are female and 12 percent are widowed. Except for the differential effect of mortality, the proportions of Social Security beneficiaries by educational attainment, race, gender and marital status for each cohort in 2020 are the same as at first benefit receipt (Table 7-6), but the differential effects of mortality matter for the earlier cohorts. Women, whites, and college educated all have higher life expectancy. Therefore, for those born between 1931 and 1935, these groups are projected to be a higher proportion of the cohort in 2020 than their respective shares at first Social Security benefit receipt.

2. Sources of Income of Retirees in 2020

Average per capita income in 2020 of Social Security beneficiaries born between 1931 and 1960 is projected to be 0.76 times the average wage (see Table 7-14). On average, Social Security and returns from financial assets each account for about 40 percent of this income, but this varies dramatically by income and demographic group. Social Security accounts for more than half of the income of high school dropouts (0.22 versus 0.41 times the average wage), but only a third of the income of college graduates (0.33 versus 1.05 times the average wage). In contrast, income from financial assets accounts for only a quarter of the income of high school dropouts and almost half (45 percent) of the income of college graduates. White Social Security recipients in 2020 have about 50 percent higher per capita income than black recipients (0.79 versus 0.52).

Generally, average per capita income of Social Security beneficiaries in 2020 decreases as age increases. This reflects the combined effect of some sources of incomes not keeping up with average wage growth and cohort effects in the original accumulation of wealth. Two notable exceptions, however, are the youngest and the oldest cohorts. The youngest cohort of Social Security beneficiaries are really a bimodal group. They include both relatively poor individuals,

Table 7-14
Average Per Capita Income as a Percent of the Average Wage in 2020 by Individual Characteristic and Income Source

		Per Capita Income/Average Wage by Income Source								
								Financial Asset Income[1]		
	Percent of Individuals	Total	Social Security	Financial Income	DB Pension Income	Earnings	Imputed Rental Income	DC Pension	IRA	Saving
Total	100%	0.76	0.29	0.28	0.08	0.04	0.06	0.11	0.03	0.14
Educational Attainment										
High School Dropout	12%	0.41	0.22	0.10	0.03	0.02	0.04	0.03	0.01	0.07
High School Graduate	61%	0.69	0.29	0.24	0.07	0.04	0.05	0.10	0.03	0.12
College	27%	1.05	0.33	0.47	0.12	0.06	0.07	0.19	0.05	0.23
Race										
White	86%	0.79	0.30	0.31	0.08	0.04	0.06	0.12	0.03	0.15
Black	10%	0.52	0.26	0.12	0.07	0.04	0.04	0.06	0.01	0.05
Asian, Native American	4%	0.71	0.26	0.27	0.07	0.04	0.06	0.10	0.03	0.14
Gender										
Female	58%	0.72	0.29	0.26	0.08	0.03	0.06	0.10	0.03	0.13
Male	42%	0.80	0.29	0.32	0.08	0.05	0.06	0.13	0.03	0.16
Marital Status by Gender										
Never Married	6%	0.70	0.25	0.28	0.08	0.03	0.06	0.11	0.03	0.14
Married	58%	0.76	0.29	0.30	0.08	0.05	0.05	0.11	0.03	0.15
Widowed	19%	0.78	0.31	0.27	0.10	0.02	0.08	0.11	0.03	0.13
Divorced	17%	0.73	0.30	0.26	0.08	0.04	0.06	0.12	0.03	0.11
Age										
85 and Older	7%	0.77	0.29	0.30	0.10	0.00	0.07	0.05	0.01	0.25
80 to 84	11%	0.72	0.29	0.28	0.09	0.00	0.06	0.08	0.02	0.18
75 to 79	17%	0.72	0.29	0.29	0.08	0.00	0.06	0.11	0.03	0.16
70 to 74	25%	0.76	0.30	0.29	0.09	0.02	0.06	0.13	0.03	0.13
65 to 69	26%	0.78	0.30	0.28	0.08	0.08	0.06	0.13	0.04	0.11
62 to 64	14%	0.76	0.27	0.27	0.06	0.11	0.05	0.13	0.04	0.10
AIME Quintile at Age 62										
1	20%	0.57	0.20	0.20	0.09	0.02	0.05	0.06	0.02	0.12
2	20%	0.58	0.25	0.19	0.05	0.03	0.05	0.06	0.03	0.11
3	20%	0.65	0.29	0.21	0.06	0.04	0.05	0.08	0.03	0.11
4	20%	0.81	0.34	0.29	0.08	0.05	0.06	0.13	0.04	0.13
5	20%	1.17	0.38	0.53	0.13	0.06	0.08	0.24	0.05	0.24
Per Capita Income Quintile										
1	20%	0.24	0.17	0.03	0.01	0.00	0.03	0.00	0.00	0.03
2	20%	0.44	0.28	0.07	0.03	0.01	0.04	0.02	0.01	0.05
3	20%	0.60	0.31	0.14	0.07	0.03	0.05	0.04	0.02	0.07
4	20%	0.85	0.34	0.28	0.12	0.05	0.07	0.10	0.04	0.13
5	20%	1.65	0.36	0.90	0.18	0.12	0.09	0.40	0.08	0.42

Source: The Urban Institute projections.

1/ This allocation of financial asset income assumes proportionate consumption of initial assets by type of asset over time.

for whom Social Security provides a high replacement rate on earnings, and wealthier individuals who have chosen to retire early. Members of the oldest cohort in 2020 are systematically individuals with long life expectancy. Longer life expectancy is generally correlated with higher income, so not surprisingly, we find that the oldest old have on average higher per capita income than the younger old. Selective mortality affects income in all age groups, but is most notable in the oldest group.

Despite the fact that later cohorts have higher financial assets than earlier cohorts at first Social Security benefit, the proportion of income that comes from financial assets is increasing with increased age. For example, the youngest Social Security beneficiaries in 2020 receive about 35 percent of their per capita income from financial assets (0.27/0.76). This proportion increases for the older ages, and the oldest beneficiaries in 2020 receive about 40 percent of their income from financial assets (0.30/0.77). Two main factors contribute to this anomaly. First, those who survive to old age are more likely to be wealthy, which increases the average wealth of survivors, and second, our model of the rate of dissaving from wealth predicts that families do not reduce their financial assets as fast as a full annuity model would predict. This means that potential annuity income from non-annuitized wealth increases as people age. Both factors contribute to the build up in the share of income that comes from financial assets by age.

Projected average per capita income of Social Security beneficiaries in the highest fifth of the income distribution in 2020 is more than six and a half times higher than for those in the lowest fifth of the income distribution. The sources of income vary dramatically among income quintiles. Those in the bottom fifth of the distribution rely almost solely on Social Security, and those in the top fifth of the income distribution have high income from a variety of sources. The top income group receives on average about a quarter of its income from Social Security and over half from financial assets (including DC pensions). Interestingly, for the top income recipients, earned income is still a significant share (seven percent) of total income, though these earnings are almost entirely among the youngest beneficiaries.

The composition of financial assets changes by age group. Our model for the rate of dissaving from financial assets does not distinguish dissaving by asset source. If, however, individuals and families dissave from each asset source at the same rate over time, the share of financial assets from IRAs and DC balances increases for younger beneficiaries compared with older beneficiaries along with a decrease in other financial wealth (wealth outside of retirement accounts).

3. Changes in Poverty Rates of Retirees

Besides per capita income, an additional measure of well-being is family income relative to the family poverty threshold. The poverty thresholds attempt to account for the economies of shared resources including accommodations that married couples enjoy and the lower expenses that those over age 65 (and presumably not working) enjoy. In 1997, the poverty threshold for a married couple under age 65 was $10,805. For a married couple age 65 and older, the poverty threshold was $9,712. For a single individual under age 65, the poverty threshold was $8,350, and for a single individual age 65 and older, the poverty threshold was $7,698. These poverty thresholds are updated each year for increases in the CPI-U. Imputed rental income is not included in the Census measure of poverty, so we omit it in the income measure for these calculations. Otherwise, our income measure in the next two tables is the same as those used earlier in the chapter.

The effect of the higher threshold for families and individuals under age 65 is that it systematically reduces the income to poverty threshold of the youngest retirees, making the under 65 population look worse off relative to the older population. To make the poverty rates for the under 65 Social Security beneficiaries comparable to the 65 and over beneficiaries, we have calculated poverty thresholds for the younger group using the older group thresholds.

In 2020, the average income of Social Security beneficiaries is projected to be about 3.8 times the poverty threshold (see Table 7-15). Family income relative to poverty is higher for later cohorts (younger retirees) than for earlier cohorts (older retirees). We project that the income of the oldest beneficiaries, those born between 1931 and 1935, will be about 3.6 times poverty, and the income of the youngest beneficiaries, those born between 1956 and 1960 using the over age 65 thresholds, will be about 4 times poverty. This difference, in part, reflects the decline in incomes after retirement which older retirees (but not younger ones) have experienced. Note that, unlike per capita income, the income to poverty ratio for those born between 1931 and 1935 (age 85 and older) exceeds the income to poverty ratio of those born between 1936 and 1940. This is because many more individuals are widowed in this higher age group, which means that their incomes are measured relative to the single person poverty threshold. Before accounting for changes in income, becoming widowed amounts to a doubling of income on a per capita basis, but only a 26 percent increase in income on a poverty threshold basis.

As with per capita income, college educated beneficiaries have substantially higher income relative to poverty than beneficiaries with lower educational attainment in all age groups. White beneficiaries have higher income relative to poverty than nonwhites in all age groups. Males have higher income relative to poverty than females in all age groups, but the difference between males and females is less among younger retirees, possibly reflecting the smaller number of younger retired females who are widowed.

For many subgroups of the population, the ratio of income to poverty in 2020 is higher for younger beneficiaries. For divorced and never married individuals in 2020, however, this is not true. For Social Security beneficiaries who never married, the average ratio of income to

Table 7-15
Average Family Total Income as a Percent of Poverty in 2020 by Individual Characteristic and Cohort

	Cohort							
	All	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1956-1960[1]
		Average Total Family Income as a Percent of Poverty						
Total	3.80	3.55	3.48	3.62	3.86	4.06	3.77	4.04
Educational Attainment								
High School Dropout	1.96	2.13	2.02	1.94	1.92	1.95	1.84	1.97
High School Graduate	3.43	3.37	3.24	3.22	3.47	3.62	3.44	3.67
College	5.38	5.30	5.12	5.33	5.19	5.66	5.50	5.89
Race								
White	3.96	3.70	3.63	3.77	4.03	4.24	3.96	4.24
Black	2.52	2.34	2.08	2.33	2.60	2.78	2.46	2.63
Asian, Native American	3.57	2.56	3.12	3.44	3.59	3.86	3.84	4.07
Gender								
Female	3.46	3.14	3.05	3.24	3.52	3.81	3.54	3.75
Male	4.27	4.43	4.20	4.19	4.30	4.37	4.07	4.40
Marital Status								
Never Married	2.59	3.54	2.62	2.31	2.62	2.89	2.06	2.23
Married	4.55	4.59	4.39	4.42	4.54	4.72	4.46	4.75
Widowed	2.83	2.73	2.60	2.56	3.00	3.19	2.93	3.18
Divorced	2.71	2.95	2.56	2.77	2.75	2.78	2.47	2.68
AIME Quintile at Age 62								
1	2.80	3.07	3.02	2.98	2.82	2.79	2.27	2.40
2	2.82	2.66	2.67	2.57	2.92	2.94	2.88	3.07
3	3.18	3.06	2.74	3.14	3.25	3.40	3.08	3.28
4	4.06	3.53	3.61	3.64	4.17	4.42	4.27	4.59
5	6.13	5.43	5.38	5.76	6.16	6.73	6.37	6.85
Per Capita Income Quintile								
1	1.14	1.14	1.14	1.16	1.18	1.15	1.00	1.07
2	2.15	2.05	2.03	2.03	2.22	2.27	2.05	2.17
3	3.05	2.76	2.75	2.88	3.17	3.29	2.99	3.18
4	4.30	3.83	3.80	4.00	4.38	4.75	4.33	4.61
5	8.36	8.01	7.70	8.03	8.37	8.83	8.52	9.16

Source: The Urban Institute projections.

Note: Total family income excludes imputed rental income.

This table includes all individuals age 67 or older in 2020 or age 62 to 66 receiving or not eligible for Social Security.

1/ Poverty rate calculated with the age 65 and over poverty thresholds for all families.

poverty is 3.5 for the oldest retirees, but is only 2.1 for the youngest retirees. For divorced beneficiaries, the average ratio of income to poverty is 3.0 for older retirees and 2.5 for younger retirees. Married couples have higher ratios of income to poverty in all cohorts compared with single individuals. Their ratio of income to poverty is lower for younger than for older retirees, but only by a small amount.

We project that about 8.5 percent of Social Security beneficiaries in our sample will be in poverty in the year 2020, but the proportion varies considerably by educational attainment, race, gender, marital status, and age (see Table 7-16). A little over 3 percent of college graduates will be in poverty in 2020, compared with over 25 percent of high school dropouts. The impact of a lack of education on poverty is expected to increase over time. For example, we project that 19 percent of the oldest high school dropouts will be in poverty in 2020, while about 27 percent of the youngest dropouts will be in poverty.

Blacks are more likely to be in poverty in 2020 than whites. In 2020, we project that about 20 percent of black Social Security beneficiaries will be in poverty, while only a little under 7 percent of white beneficiaries will be. The poverty impact of being both black and under-educated is projected to increase over time. For example, among black, high school dropouts, we project about 27 percent of those born between 1931 and 1935 will be in poverty, compared with over 44 percent of those born between 1956 and 1960 (using the over 65 thesholds).

We project much higher poverty rates for unmarried individuals than for married couples. About 2.8 percent of married couples will be in poverty in the year 2020, while almost 30 percent of never married retirees, about 13 percent of widows, and 17 percent of divorced retirees will be in poverty.

The analysis of Social Security beneficiaries in 2020 by age is complicated by the fact that our universe includes only beneficiaries (and individuals not eligible for benefits) and only those who survive to 2020. As described in Section V.1 of this chapter, this group faces selection in two dimensions. First, the youngest beneficiaries are all early retirees, and second, the oldest beneficiaries all have long life expectancy. To facilitate cross age comparisons, we compare our projected income and poverty rates of the 2020 Social Security beneficiaries with Social Security beneficiaries in the early 1990s.

We generated income and poverty statistics for the early 1990s by combining the 1990 to 1993 SIPP panels. Annual family income is the sum of family income for the first 12 months of the panel, and family poverty threshold is the sum of the monthly poverty thresholds divided by 12.[6] To be consistent with the MINT population, we included only current Social Security recipients among those ages 62 and 66 and all individuals age 67 or older. The family income on the SIPP is the sum of Social Security and other transfer income, pension income, earned

Table 7-16
Percent of Individuals in Poverty in 2020 by Individual Characteristic and Cohort

	Cohort							
	All	1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960	1956-1960[1]
	Percent of Individuals in Poverty in 2020							
Total	8.5%	8.3%	8.6%	8.1%	7.9%	8.3%	10.3%	9.2%
Educational Attainment								
High School Dropout	25.1%	19.1%	20.9%	22.0%	26.5%	29.7%	29.5%	27.2%
High School Graduate	7.8%	6.7%	7.6%	7.1%	7.5%	7.5%	10.1%	8.7%
College	3.1%	4.0%	3.4%	3.4%	3.1%	3.0%	2.2%	2.2%
Race								
White	6.8%	6.7%	7.3%	6.8%	6.3%	6.7%	7.8%	6.8%
Black	19.6%	19.0%	19.6%	17.4%	19.2%	17.7%	26.1%	24.5%
Asian, Native American	15.0%	29.4%	15.8%	13.5%	13.1%	14.8%	14.6%	13.4%
Race by Education								
Non-Black								
High School Dropout	22.7%	17.9%	18.5%	20.4%	24.4%	27.1%	25.4%	23.2%
High School Graduate	6.6%	5.9%	6.8%	6.2%	6.5%	6.5%	7.8%	6.4%
College	2.7%	3.5%	3.4%	3.0%	2.5%	2.7%	2.1%	2.0%
Black								
High School Dropout	36.0%	26.7%	32.1%	29.4%	36.6%	40.0%	47.2%	44.4%
High School Graduate	17.3%	17.5%	16.3%	14.5%	16.4%	14.7%	25.9%	24.2%
College	8.5%	10.4%	3.8%	9.5%	12.6%	7.8%	3.4%	3.4%
Gender								
Female	10.7%	10.2%	11.8%	10.8%	10.4%	10.1%	12.0%	10.9%
Male	5.3%	4.4%	3.3%	4.0%	4.8%	6.0%	8.2%	6.9%
Marital Status								
Never Married	29.4%	26.1%	27.6%	29.2%	28.9%	27.6%	35.0%	34.8%
Married	2.8%	2.8%	2.1%	2.2%	2.3%	2.9%	4.2%	3.6%
Widowed	12.6%	10.6%	13.6%	12.2%	12.9%	11.6%	16.3%	13.2%
Divorced	16.5%	14.9%	14.6%	15.6%	16.0%	17.7%	18.5%	16.2%

Source: The Urban Institute projections.

Notes: Total family income excludes imputed rental income.

1/ Poverty rate calculated with the age 65 and over poverty thresholds for all families.

income, and income from assets. The SIPP measure of income from assets is the sum of interest, dividends, rental income, and royalties. The MINT measure of income from assets is based on the annuity the individual or couple could purchase with 80 percent of their financial assets. These two measures could be very different. Our measure includes some consumption of asset principal -- Census's measure does not. Our measure does not vary with varying annual rates of return on assets -- Census's measure does. Our measure includes some income from nonincome generating assets, such as cars -- Census's measure does not. To facilitate comparing incomes, we calculated family income for the 1990s Social Security beneficiaries using the MINT measure of income from assets.

As we have seen earlier in this chapter, educational attainment of Social Security recipients in 2020 is higher than in the early 1990s. Twelve percent of beneficiaries had a college education in the early 1990s, compared with 27 percent of beneficiaries in 2020 (see Table 7-17). The proportion of nonwhite Social Security beneficiaries is increasing. Ninety percent of beneficiaries in the early 1990s were white, while only 86 percent of beneficiaries in 2020 will be. The proportion of divorced Social Security beneficiaries is increasing and the proportion of widowed beneficiaries is decreasing. Six percent of beneficiaries in the early 1990s were divorced, while 17 percent of beneficiaries in 2020 will be, and 32 percent of beneficiaries in the early 1990s were widowed, while only 19 percent of beneficiaries in 2020 will be. This is the cumulative effect of increased life expectancy, which reduces the number of widows, and the increasing number of beneficiaries entering retirement divorced. The share of young Social Security beneficiaries is increasing. Eleven percent of the beneficiaries in the early 1990s were ages 62 to 64, while 14 percent of beneficiaries in 2020 will be. Despite increasing longevity, the sheer size of the younger cohorts in 2020 overwhelms the longevity effect.

Comparing the Census income measure to the MINT income measure in the 1990s shows that the MINT measure is higher (column 3 and 4 on Table 7-17). Average family income using the Census measure is 3.1 times the poverty threshold. The MINT income measure increases income by about 10 percent to 3.4 times the poverty threshold. The MINT definition raises measured income in all groups. Income is higher in the MINT measure because it includes some return of principal and income from assets (cars for example) that are not counted in the Census measure, which counts only cash income.

The projected ratio of average income to poverty for Social Security beneficiaries is higher in 2020 than in the early 1990s. Comparing the MINT measure of income for the two groups, average income to poverty is 10 percent higher in 2020 than in the early 1990s (3.80 versus 3.44). Interestingly, though, average income to poverty is lower for all education groups in 2020 than in the early 1990s and is especially low for high school dropouts. Average income to poverty is about 20 percent lower for high school dropouts in 2020 compared to the early 1990s, and it is about 7 percent lower for high school and college graduates. The increasing level of education of the population causes average incomes to increase even though the income of

Table 7-17
Percent of Retirees, Average Family Income as a Percent of Poverty, and Percent of Retirees Below Poverty by Individual Characteristic in the Early 1990s and 2020

			Census Measure	UI Measure		Census Measure	UI Measure	
	Early 1990s	2020	Early 1990s	Early 1990s	2020	Early 1990s	Early 1990s	2020
	Percent of Retirees		Average Family Income / Poverty Threshold			Percent of Retirees Below Poverty		
Total	100%	100%	3.12	3.44	3.80	8.8%	8.0%	8.5%
Educational Attainment								
High School Dropout	41%	12%	2.23	2.44	1.96	15.5%	14.5%	25.1%
High School Graduate	47%	61%	3.38	3.72	3.43	4.4%	3.9%	7.8%
College	12%	27%	5.22	5.77	5.38	2.2%	2.1%	3.1%
Race								
White	90%	86%	3.23	3.57	3.96	7.1%	6.3%	6.8%
Black	8%	10%	2.00	2.08	2.52	25.9%	25.3%	19.6%
Asian, Native American	2%	4%	2.94	3.18	3.57	11.5%	12.8%	15.0%
Gender								
Female	59%	58%	2.89	3.14	3.46	11.5%	10.6%	10.7%
Male	41%	42%	3.45	3.86	4.27	5.0%	4.4%	5.3%
Marital Status								
Never Married	5%	6%	2.63	2.76	2.59	17.4%	16.2%	29.4%
Married	57%	58%	3.64	4.07	4.55	2.7%	2.4%	2.8%
Widowed	32%	19%	2.43	2.60	2.83	15.5%	14.4%	12.6%
Divorced	6%	17%	2.27	2.42	2.71	22.3%	21.2%	16.5%
Age								
62 to 64	11%	14%	3.17	3.41	3.77	7.9%	7.9%	10.3%
62 to 641	11%	14%	3.50	3.77	4.04	6.8%	6.7%	9.2%
65 to 69	28%	26%	3.44	3.76	4.06	6.5%	5.9%	8.3%
70 to 74	24%	25%	3.18	3.50	3.86	7.9%	7.2%	7.9%
75 to 79	18%	17%	3.01	3.33	3.62	9.6%	9.0%	8.1%
80 and Older2	19%	18%	2.63	2.96	3.51	13.0%	11.8%	8.5%

Source: The Urban Institute projections.
Note: Total family income excludes imputed rental income.
This table includes all individuals age 67 or older in 2020 or age 62 to 66 receiving or not eligible for Social Security.
The early 1990s is the first 12 months of the 1990, 1991, 1992, and 1993 SIPP panels combined.
The alternate income measure replaces property income with financial asset annuity income.
1/ Poverty rate calculated with the age 65 and over poverty thresholds for all families.
2/ The oldest retirees in the MINT database in 2020 are 89 years old. The 1990 poverty numbers include all retirees over age 89.

each education group is falling. In contrast, average income to poverty is higher for all race categories in 2020 than in the early 1990s, with blacks doing significantly better in the 2020s than in the early 1990s. The ratio of average income to poverty increased by over 20 percent for blacks and by about 11 percent for whites. Divorced Social Security beneficiaries have about 12 percent higher income to poverty ratios in 2020 than those in the early 1990s, but never married beneficiaries have about six percent lower income to poverty ratios than those in the early 1990s. Average income to poverty is also higher for all age groups in 2020 compared to the early 1990s. The youngest beneficiaries have about 10 percent higher ratios of income to poverty in 2020 than the youngest beneficiaries in the early 1990s. The oldest beneficiaries have about a 18 percent higher ratio of income to poverty in 2020 than the oldest beneficiaries in the early 1990s, although this statistic is not completely comparable, because the 1990 population includes individuals age 90 and older (about three percent of Social Security beneficiaries) and the 2020 population does not.

While family income relative to the poverty threshold is increasing from the early 1990s compared to 2020, the proportion of the population with income below poverty is also increasing. Using the MINT definition of asset income, eight percent of Social Security beneficiaries were in poverty in the early 1990s, and we project that 8.5 percent of beneficiaries will be in poverty in 2020. The poverty rate of the under-educated is increasing. For example, 14.5 percent of high school dropout beneficiaries were in poverty in the early 1990s, but we project that a much higher 25.1 percent of the 2020 dropouts will be. There are fewer dropouts in 2020 (12 percent in 2020 compared to 41 percent in 1990), but those without higher education in 2020 are much more likely to end up in poverty than less-educated retirees in the early 1990s.

While the poverty rate for blacks continues to be higher than the poverty rate for whites, black Social Security beneficiaries in 2020 are doing better than those in the early 1990s. A little over 25 percent of blacks were in poverty in the early 1990s, and 20 percent will be in poverty in 2020. Poverty rates for both men and women are higher in 2020 than in the early 1990s, but more so for men than for women. On the other hand, women are a larger share of the aged population and have about twice the poverty rate as men in both 1990 and 2020.

Social Security beneficiaries who never married are much more likely to be in poverty in 2020 than in the early 1990s. Sixteen percent of the never married beneficiaries were in poverty in the early 1990s, and over 29 percent are projected to be in poverty in 2020. Divorced beneficiaries, on the other hand, are less likely to be in poverty in 2020 compared to the early 1990s. Twenty-one percent of the early 1990 divorced beneficiaries were in poverty, and only 16.5 percent of the 2020 divorced beneficiaries will be. Married beneficiaries continue to have a low probability of being in poverty, but the poverty rate among them is rising slightly.

Younger Social Security beneficiaries are more likely to be in poverty in 2020 than they were in the early 1990s. Using the over age 65 poverty thresholds, over 9 percent of the 62- to 64-year-old beneficiaries will be in poverty in 2020, compared with just 6.7 percent in the early 1990s. Poverty rates are higher for all age groups in 2020 compared to the early 1990s up until age 75 and older, at which point the poverty rates of the oldest retirees is lower in 2020 than in 1990. The combined effect of MINT missing the oldest old and increased longevity means that the oldest beneficiaries in 2020 have not confronted the dramatic decline in financial assets that occurs in the last year of life. Both of these factors reduce the poverty rates of the oldest beneficiaries in 2020 compared to the early 1990s. Also, we assumed that all DB pensions are joint and survivor pensions. Although pension plans are required to allow spouses to elect a joint and survivor annuity, some people may still choose a single survivor annuity, especially if the spouse has other sources of income. To the extent that some DB beneficiaries do not choose joint and survivor pensions, our estimates overstate the incomes of the oldest beneficiaries in our sample and understate the incomes of the younger beneficiaries. If no married DB beneficiaries choose joint and survivor pensions, the poverty rate from assuming no joint and survivor annuities of the oldest beneficiaries in 2020 would increase modestly from 8.5 percent to 9.1 percent, which would still be much lower than the poverty rate for the oldest beneficiaries in the early 1990s. The impact on poverty is even smaller for younger beneficiaries because mortality has not had as big an impact on them and a lower proportion of younger beneficiaries have DB pensions.[7]

About 55 percent of the MINT population in 2020 who are not entitled to Social Security benefits are in poverty, but this percent varies by age. These are individuals who do not have enough quarters of covered employment to be eligible for a retired worker benefit and who also do not qualify for a spouse or survivor benefit. About 78 percent of survivors between age 62 and 64 in 2020 who are never eligible for Social Security benefits are in poverty compared to about 46 percent of those age 80 and older. This difference reflects both the higher mortality rates of poorer individuals and the higher share of beneficiaries entering retirement with no entitlement to Social Security. Higher divorce rates for later cohorts causes more former wives to enter retirement with no entitlement to their former spouse’s Social Security. While those not eligible for Social Security are a small proportion of the aged (about 4.5 percent) they are very likely to be in poverty. While SSI, which we do not project, would provide some income to these beneficiaries, SSI income is not high enough to lift them out of poverty. They are still a very vulnerable group. Appendix Table 7-A-4 shows the percent of the 2020 population with income from each income source. Those without Social Security entitlement are more likely to be black, under educated, and never married.

VI. CONCLUSIONS

In this chapter, we have estimated changes in income and wealth as people age after retirement, compared incomes of different cohorts and demographic groups at retirement, and projected income of retirees of the 1931 to 1960 birth cohorts to the year 2020. We have examined trends in the distribution of income among successive cohorts of retirees and compared the population of Social Security recipients in 2020 with those in the early 1990s.

The rate of change of financial wealth for single and married retirees varies by age and other economic and demographic characteristics, including homeownership, race, presence of a pension, presence of high earnings, widowhood status, and mortality. For most groups, financial wealth declines with age. The decline in financial wealth with age is relatively larger for homeowners compared with renters, blacks compared with whites, families with pensions compared with those without them, individuals outside of the highest earning group compared with high earners, and widows compared with divorced people and those never married.

The proportion of Social Security beneficiaries who are nonwhite and unmarried is increasing over time. This change leads to an increase in the proportion of Social Security beneficiaries with lower incomes over time. At the same time, educational attainment and female labor force participation are increasing over time. This change leads to an increase in the proportion of Social Security beneficiaries with higher incomes over time. These demographic changes along with increases in life expectancy and the sheer size of the Baby Boom cohorts will change the fundamental composition of Social Security beneficiaries over time. These changes affect both the accumulation of assets and the rate of consumption from these assets for successive cohorts of Social Security beneficiaries out to the year 2020 and beyond.

For new retirees, Social Security and income from financial assets (other than DB pensions) are the two most important components of income, with Social Security being only a slightly higher share of total income. Social Security benefits are about 28 percent of the average wage on average and they account for about 34 percent of total income at initial retirement. Social Security is a more important source of total income for blacks and lower educated individuals then for whites and those with a college education.

Financial assets are an important source of income for those Social Security beneficiaries with financial assets, but financial assets are very unevenly distributed. College educated beneficiaries and whites have the bulk of these assets. Nonwhites and high school dropouts have comparatively little savings at retirement. Earnings are an important source of income for many of the elderly at initial Social Security receipt. Earnings are a relatively more important source of income for individuals with the highest incomes. Overall, Social Security benefits are the most important income source for lower income groups and financial assets and earned income the most important source for people in the top income quintile.

Total income at first retirement will peak for Social Security beneficiaries born between 1946 and 1950 and is projected to decline for post 1950 birth cohorts. Social Security and income from financial assets (including income from DC plans) are increasing as a share of income for more recent birth cohorts, and DB pension income is decreasing as a share of income for more recent cohorts.

Per capita income of Social Security recipients at initial receipt is quite unevenly distributed, with individuals in the highest income quintile having about 7.1 times as much income as individuals in the lowest quintile. Over time, this differential is increasing. Incomes are increasing in the highest quintile and decreasing in the lowest quintile.

Older Social Security beneficiaries in 2020 are more likely to be widowed women than younger Social Security beneficiaries. Older beneficiaries, because of the differential impact of mortality, are also more likely to be white, higher educated, and higher income.

Comparisons of projected Social Security beneficiaries in 2020 with those in the early 1990s show that the average income of future beneficiaries is projected to increase, but poverty rates will also increase. This occurs because incomes are becoming more unevenly distributed. Family well-being is highly correlated with marital status, educational attainment, and race. Married couples have more income than single individuals, higher educated individuals have more income than lower educated individuals, and whites have more income than nonwhites.

Educational attainment of Social Security beneficiaries in 2020 is higher than that of Social Security beneficiaries in the early 1990s. Higher educated beneficiaries are more likely to be wealthy. Social Security beneficiaries in 2020 are more likely to be nonwhite, divorced, and or never married compared to beneficiaries in the early 1990s. These groups are more likely to be poor. These demographic changes are contributing to higher incomes for those better off and higher poverty rates for those worse off. Those most at risk in 2020 are the less educated single beneficiaries. These groups are an increasing proportion of the youngest beneficiaries in 2020. Many of them will begin their retirement in poverty, and, if the past is a guide, the incidence of poverty in this cohort will increase as they age.

APPENDIX A

TABLE 7-A-1
Increases in Full Retirement Age and Delayed Retirement Credits, with Resulting Benefit, As a Percent of Primary Insurance Amount [PIA], Payable at Selected Ages, for Persons Born in 1924 or Later

Year of birth	Age 62 attained in--	"Normal retirement age"	Credit for each year of delayed retirement after normal retirement age	Benefit, as a percent of PIA, beginning at age-- 62	65	66	67	70
1924...........	1986...........	65.........	3	80	100	103	106	115
1925-26........	1987-88........	65.........	3 1/2	80	100	103 1/2	107	117 1/2
1927-28........	1989-90........	65.........	4	80	100	104	108	120
1929-30........	1991-92........	65.........	4 1/2	80	100	104 1/2	109	122 1/2
1931-32........	1993-94........	65.........	5	80	100	105	110	125
1933-34........	1995-96........	65.........	5 1/2	80	100	105 1/2	111	127 1/2
1935-36........	1997-98........	65.........	6	80	100	106	112	130
1937...........	1999...........	65.........	6 1/2	80	100	106 1/2	113	132 1/2
1938...........	2000...........	65, 2 mo...	6 1/2	79 1/6	98 8/9	105 5/12	111 11/12	131 5/12
1939...........	2001...........	65, 4 mo...	7	78 1/3	97 7/9	104 2/3	111 2/3	132 2/3
1940...........	2002...........	65, 6 mo...	7	77 1/2	96 2/3	103 1/2	110 1/2	131 1/2
1941...........	2003...........	65, 8 mo...	7 1/2	76 2/3	95 5/9	102 1/2	110	132 1/2
1942...........	2004...........	65, 10 mo..	7 1/2	75 5/6	94 4/9	101 1/4	108 3/4	131 1/4
1943-54........	2005-16........	66.........	8	75	93 1/3	100	108	132
1955...........	2017...........	66, 2 mo...	8	74 1/6	92 2/9	98 8/9	106 2/3	130 2/3
1956...........	2018...........	66, 4 mo...	8	73 1/3	91 1/9	97 7/9	105 1/3	129 1/3
1957...........	2019...........	66, 6 mo...	8	72 1/2	90	96 2/3	104	128
1958...........	2020...........	66, 8 mo...	8	71 2/3	88 8/9	95 5/9	102 2/3	126 2/3
1959...........	2021...........	66, 10 mo..	8	70 5/6	87 7/9	94 4/9	101 1/3	125 1/3
1960 or later..	2022 or later..	67.........	8	70	86 2/3	93 1/3	100	124

Source: Table 1-8 from Committee on Ways and Means U.S. House of Representatives, Green Book (1996).

Table 7-A-2
Percent of Individuals and Average Per Capita Income as a Percent of the Average Wage at the Individual's Initial Social Security Benefit Receipt by Income Source and Income Source

		Family Income Source						Financial Asset Income		
	Percent of Individuals	Total Income	Social Security	Financial Income	DB Pension Income	Earned Income	Imputed Rental Income	DC Pension Income	IRA Income	Saving Income
		Average Per Capita Income/Average Wage by Income Source								
Total	100%	0.82	0.28	0.25	0.09	0.15	0.06	0.11	0.03	0.12
Educational Attainment										
High School Dropout	13%	0.46	0.22	0.09	0.04	0.08	0.04	0.03	0.00	0.06
High School Graduate	60%	0.76	0.28	0.21	0.08	0.14	0.05	0.09	0.02	0.10
College	26%	1.16	0.31	0.44	0.14	0.20	0.07	0.18	0.05	0.20
Race										
White	85%	0.86	0.28	0.27	0.10	0.15	0.06	0.11	0.03	0.13
Black	11%	0.59	0.25	0.11	0.08	0.11	0.03	0.06	0.01	0.04
Asian, Native American	4%	0.77	0.25	0.24	0.07	0.15	0.06	0.10	0.03	0.12
Gender										
Female	54%	0.79	0.28	0.23	0.09	0.13	0.06	0.10	0.03	0.11
Male	46%	0.86	0.27	0.27	0.10	0.17	0.06	0.11	0.03	0.13
Marital Status by Gender										
Never Married Female	3%	0.75	0.26	0.21	0.11	0.12	0.06	0.10	0.02	0.10
Never Married Male	2%	0.80	0.28	0.29	0.08	0.08	0.06	0.12	0.03	0.15
Married Women	32%	0.80	0.27	0.25	0.09	0.14	0.05	0.10	0.03	0.13
Married Men	35%	0.84	0.25	0.26	0.09	0.19	0.05	0.10	0.03	0.13
Widowed Female	9%	0.83	0.32	0.24	0.12	0.09	0.07	0.13	0.04	0.07
Widowed Male	2%	1.03	0.36	0.34	0.16	0.10	0.08	0.18	0.04	0.12
Divorced Female	10%	0.73	0.30	0.18	0.08	0.12	0.06	0.09	0.02	0.07
Divorced Male	6%	0.94	0.35	0.30	0.13	0.10	0.07	0.15	0.03	0.12
Cohort										
1931-1935	11%	0.83	0.28	0.20	0.15	0.14	0.06	0.03	0.01	0.16
1936-1940	12%	0.82	0.28	0.21	0.12	0.15	0.06	0.06	0.02	0.14
1941-1945	15%	0.83	0.28	0.24	0.10	0.16	0.06	0.09	0.02	0.13
1956-1950	19%	0.85	0.28	0.27	0.09	0.15	0.06	0.12	0.03	0.12
1951-1955	21%	0.82	0.28	0.27	0.08	0.14	0.06	0.12	0.04	0.11
1956-1960	23%	0.79	0.27	0.28	0.07	0.13	0.05	0.15	0.04	0.09
AIME Quintile										
1	20%	0.58	0.18	0.17	0.10	0.08	0.05	0.05	0.02	0.10
2	20%	0.62	0.24	0.17	0.05	0.11	0.05	0.05	0.02	0.09
3	20%	0.72	0.28	0.19	0.07	0.13	0.05	0.07	0.02	0.09
4	20%	0.91	0.33	0.26	0.10	0.17	0.06	0.12	0.03	0.11
5	20%	1.29	0.36	0.48	0.15	0.23	0.08	0.23	0.05	0.21
Per Capita Income Quintile										
1	20%	0.25	0.17	0.03	0.01	0.01	0.03	0.00	0.00	0.03
2	20%	0.47	0.27	0.07	0.04	0.05	0.04	0.02	0.01	0.05
3	20%	0.67	0.30	0.14	0.08	0.10	0.05	0.04	0.02	0.07
4	20%	0.95	0.32	0.26	0.13	0.18	0.07	0.10	0.04	0.12
5	20%	1.78	0.34	0.76	0.20	0.39	0.09	0.36	0.07	0.33

Source: The Urban Institute projections.

Table 7-A-3
Percent of Individuals Receiving Family Income by Income Source at the Individual's Initial Social Security Benefit Receipt

		Family Income Source						Financial Asset Income		
	Percent of Individuals	Total Income	Social Security	Financial Income	DB Pension Income	Earned Income	Imputed Rental Income	DC Pension Income	IRA Income	Saving Income
		Percent of Individuals Receiving Family Income by Income Source								
Total	100%	1.00	0.96	0.94	0.48	0.46	0.91	0.36	0.30	0.91
Educational Attainment										
High School Dropout	13%	0.99	0.91	0.89	0.33	0.33	0.84	0.17	0.10	0.87
High School Graduate	60%	1.00	0.97	0.94	0.49	0.46	0.91	0.35	0.27	0.91
College	26%	1.00	0.97	0.97	0.55	0.54	0.94	0.46	0.49	0.94
Race										
White	85%	1.00	0.97	0.96	0.49	0.48	0.93	0.37	0.33	0.93
Black	11%	0.99	0.94	0.85	0.46	0.36	0.78	0.25	0.09	0.81
Asian, Native American	4%	1.00	0.94	0.89	0.42	0.45	0.86	0.31	0.25	0.85
Gender										
Female	54%	1.00	0.96	0.94	0.48	0.41	0.90	0.34	0.30	0.90
Male	46%	1.00	0.97	0.95	0.49	0.53	0.92	0.38	0.31	0.93
Marital Status by Gender										
Never Married Female	3%	0.98	0.85	0.87	0.38	0.28	0.66	0.26	0.19	0.83
Never Married Male	2%	0.98	0.86	0.88	0.33	0.26	0.65	0.22	0.23	0.82
Married Women	32%	1.00	0.96	0.97	0.51	0.47	0.96	0.39	0.35	0.95
Married Men	35%	1.00	0.97	0.97	0.51	0.60	0.96	0.41	0.34	0.95
Widowed Female	9%	1.00	0.98	0.88	0.52	0.32	0.87	0.25	0.26	0.83
Widowed Male	2%	1.00	0.98	0.90	0.54	0.28	0.87	0.28	0.24	0.85
Divorced Female	10%	1.00	0.97	0.88	0.34	0.32	0.80	0.25	0.18	0.83
Divorced Male	6%	1.00	0.96	0.89	0.40	0.28	0.82	0.28	0.21	0.83
Cohort										
1931-1935	11%	1.00	0.95	0.94	0.52	0.45	0.94	0.23	0.42	0.91
1936-1940	12%	1.00	0.95	0.94	0.48	0.46	0.93	0.33	0.38	0.91
1941-1945	15%	1.00	0.95	0.95	0.48	0.47	0.92	0.36	0.34	0.92
1956-1950	19%	1.00	0.96	0.95	0.48	0.47	0.91	0.39	0.31	0.92
1951-1955	21%	1.00	0.97	0.94	0.48	0.47	0.90	0.38	0.27	0.91
1956-1960	23%	1.00	0.98	0.94	0.47	0.45	0.88	0.38	0.21	0.91
AIME Quintile										
1	20%	0.99	0.81	0.90	0.38	0.32	0.85	0.22	0.21	0.87
2	20%	1.00	1.00	0.92	0.39	0.38	0.87	0.26	0.23	0.89
3	20%	1.00	1.00	0.95	0.48	0.44	0.90	0.34	0.26	0.91
4	20%	1.00	1.00	0.97	0.55	0.53	0.94	0.42	0.33	0.93
5	20%	1.00	1.00	0.99	0.61	0.64	0.98	0.53	0.48	0.97
Per Capita Income Quintile										
1	20%	0.99	0.89	0.84	0.19	0.19	0.76	0.09	0.06	0.82
2	20%	1.00	0.98	0.94	0.43	0.35	0.90	0.22	0.17	0.90
3	20%	1.00	0.98	0.97	0.57	0.49	0.94	0.35	0.30	0.93
4	20%	1.00	0.98	0.98	0.62	0.60	0.96	0.48	0.43	0.95
5	20%	1.00	0.98	0.99	0.60	0.69	0.97	0.64	0.56	0.97

Source: The Urban Institute projections.

Table 7-A-4
Percent of Individuals with Family Income by Income Source in 2020
by Individual Characteristic and Income Source

		Per Capita Income/Average Wage by Income Source								
								Financial Asset Income[1]		
	Percent of Individuals	Total	Social Security	Financial Assets	DB Pension	Earnings	Imputed Rent	DC Pension	IRA	Saving
		Percent of Individuals with Family Income by Income Source								
Total	100%	1.00	0.97	0.95	0.53	0.15	0.91	0.37	0.32	0.92
Educational Attainment										
High School Dropout	12%	0.99	0.92	0.89	0.35	0.09	0.84	0.18	0.09	0.88
High School Graduate	61%	1.00	0.98	0.94	0.53	0.15	0.91	0.36	0.28	0.91
College	27%	1.00	0.98	0.98	0.60	0.18	0.94	0.47	0.51	0.94
Race										
White	86%	1.00	0.98	0.96	0.53	0.16	0.93	0.38	0.35	0.93
Black	10%	0.99	0.94	0.86	0.50	0.14	0.78	0.27	0.10	0.81
Asian, Native American	4%	0.99	0.94	0.91	0.46	0.16	0.87	0.33	0.27	0.86
Gender										
Female	58%	1.00	0.97	0.94	0.52	0.12	0.91	0.35	0.31	0.90
Male	42%	1.00	0.97	0.96	0.54	0.20	0.92	0.40	0.33	0.93
Marital Status by Gender										
Never Married	6%	0.98	0.84	0.89	0.36	0.10	0.67	0.25	0.22	0.84
Married	58%	1.00	0.98	0.98	0.58	0.20	0.97	0.43	0.36	0.96
Widowed	19%	1.00	0.98	0.92	0.54	0.07	0.91	0.29	0.32	0.88
Divorced	17%	1.00	0.96	0.89	0.38	0.10	0.82	0.28	0.21	0.84
Age										
85 and Older	7%	1.00	0.97	0.95	0.59	0.00	0.94	0.25	0.46	0.92
80 to 84	11%	1.00	0.97	0.95	0.55	0.01	0.93	0.34	0.40	0.91
75 to 79	17%	1.00	0.97	0.95	0.54	0.01	0.92	0.37	0.35	0.92
70 to 74	25%	1.00	0.97	0.95	0.54	0.06	0.92	0.39	0.32	0.92
65 to 69	26%	1.00	0.97	0.94	0.51	0.27	0.91	0.39	0.27	0.91
62 to 64	14%	1.00	0.97	0.94	0.48	0.47	0.88	0.37	0.23	0.91
AIME Quintile at Age 62										
1	20%	0.99	0.86	0.90	0.42	0.11	0.86	0.24	0.23	0.87
2	20%	1.00	1.00	0.92	0.43	0.13	0.88	0.26	0.25	0.89
3	20%	1.00	1.00	0.95	0.53	0.15	0.91	0.36	0.27	0.91
4	20%	1.00	1.00	0.97	0.60	0.17	0.94	0.44	0.35	0.94
5	20%	1.00	1.00	0.99	0.66	0.20	0.98	0.55	0.49	0.97
Per Capita Income Quintile										
1	20%	0.99	0.90	0.84	0.23	0.06	0.77	0.08	0.05	0.81
2	20%	1.00	0.99	0.94	0.47	0.11	0.91	0.22	0.17	0.90
3	20%	1.00	0.99	0.98	0.62	0.15	0.95	0.35	0.32	0.94
4	20%	1.00	0.99	0.99	0.69	0.19	0.97	0.51	0.45	0.96
5	20%	1.00	0.98	1.00	0.63	0.25	0.98	0.68	0.60	0.97

Source: The Urban Institute projections.

1/ This allocation of financial asset income assumes equal consumption of initial assets by type of asset over time.

CHAPTER 7: REFERENCES

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CHAPTER 7: ENDNOTES

1. This model specification does not include wealth in the base period, as described in our letter report 7.1 to SSA. McNeil and Lamas (1988) found that the annual variation in reported wealth between the two financial asset topical modules was not reliable. Therefore, we rejected using a fixed-effects specification.

2. The SIPP wealth topical modules for the 1990s ask about 401(k) balances. Our sample, however, is limited to families with heads age 62 or older in 1984. 401(k) plans did not start being popular until the mid-1980s. By then, most of our sample would have retired, and would not have had an opportunity to accumulate any savings in them.

3. The parameter estimates are in the logarithmic scale and are close approximations of percent change for small values (less than five percent). The parameter estimate for the last year of life (-23.26=-20.7-2.56) in the nominal scale is 20.7 percent per year of age.

4. The parameter estimates are in the logarithmic scale and are close approximations of percent change for small values (less than five percent). The parameter estimate for the last year of life (-29.25=-25.6-3.65) in the nominal scale is 25.3 percent per year of age.

5. Beginning with individuals born after 1937, the “normal retirement age” is scheduled to increase from age 65 by two months for every year until it reaches age 66 for the 1943 cohort. It remains at

age 66 until it again increases for cohorts born after 1954 by two months for every year until it reaches age 67 for the 1960 cohort. Along with the increase in the age of normal retirement, the actuarial reduction will increase by 5/12 of one percent for every month in excess of 36 months. This gradually increases the maximum reduction from 20 percent for the 1938 cohort to 30 percent for the 1960 cohort.

The delayed retirement credit is also increasing over time, but at later ages. See Appendix 7-A-1 for more information in the impact of legislated changes in Social Security by cohort.

6. The SIPP reports annual poverty thresholds for each month. A family is in poverty in a particular month if its monthly family income is less than the annual poverty threshold divided by 12. A family is in poverty in a year if its annual income is below their average annual poverty threshold.

7. If no DB beneficiaries chose joint and survivor pensions, projected poverty rates would be 10.1 percent for 62- to 64-year-olds (using the over 65 thresholds), 8.1 percent for the 65- to 69-year-olds, 8.3 percent for the 70-to-74-year-olds, 9.2 percent for the 75- to 79-year-olds, and 9.1 percent for those age 80 and older.

CHAPTER 8

STYLIZED EARNINGS FOR BIRTH COHORTS 1931-60

I. INTRODUCTION

This chapter presents stylized earnings profiles for workers in birth cohorts 1931-60. It displays the patterns of Social Security qualifying earnings between three periods of a worker's career -- ages 31-40, 41-50, and 51-60. It divides workers into groups based on the level and shape of their career earnings patterns and then displays the earnings patterns for the average or typical workers in each group. Separate earnings patterns are shown for male and female workers.

The next section of the chapter discusses the methodology used. The following section displays some preliminary earnings patterns for workers in the 1931-40 birth cohort who have completed their working careers. This was the basis for much of the initial exploration of the characteristics of the earnings patterns. The last section creates patterns for all the 1931-60 birth cohorts, based on the projections of earnings reported in Chapter 2.

II. BASIC METHODOLOGY

Individuals' earnings are expressed as relatives by dividing each year's earnings by the economy-wide average wage of that year. Because the reported earnings are truncated by the taxable wage ceiling of each year, we adjusted earnings of those at the ceiling to put them on a basis that is consistent with the current relationship of the taxable ceiling to the average wage.[1] The wage data are then lined up by age, and we developed a classification system based on the pattern of individuals' earnings from age 32 through age 61.[2] We excluded earnings for ages below 32 because nearly all workers had rising earnings over this period and some individuals have very low earnings because they are still in school. We computed the average of the earnings relatives in each of the three 10-year sub-periods extending from age 32 through age 61, labeled as A, B, and C.

Workers are classified in terms of three characteristics: (1) their "lifetime wage" computed as the average of their wage relatives over the 30-year period (low, middle, and high), (2) the trend change in the relative wage between sub-periods A and C (falling, level, rising), and (3) a profile based on whether the average wage during period B differs from the average of A and C (sag, level, humped):

<u>Trend</u>

$t = (C-A) / (C+A)$

Declining	$t < -1/9$
Level	$-1/9 < t > 1/9$
Increasing	$t > 1/9$

<u>Profile</u>

$p = (B -(A+C)/2) / (B + (A+C)/2)$

Sag	$p < -1/9$
linear	$-1/9 < p > 1/9$
humped	$p > 1/9$

The three categories of the 30-year average wage were computed as equal thirds of the distribution of "lifetime" wages for all the birth cohorts between 1931 and 1960. The middle class interval was from 0.37 to 1.04 of the average wage.[3] The cutoffs for the trend and profile characteristics were chosen to be symmetric and yield roughly a third of the observations in each of the three categories. The result is a three-way table with a total of 27 entries.

The analysis includes all individuals who are predicted to survive to age 62, and the actual earnings records extend through 1996. Thus, the earnings profile is based on actual data for those born in 1931-35, but the projected earnings from Chapter 2 become progressively more important for later cohorts.

III. STYLIZED EARNINGS - 1931-40 BIRTH COHORT

The exploration of the historical data was based on the earnings records of those individuals born in the interval of 1931-40 and included in the 1991-93 SIPPs. The initial analysis indicated a surprisingly high degree of diversity in the earnings patterns. The 27 patterns are displayed in Figure 8-1 and the distribution of individuals is reported in Table 8-1. Roughly equal numbers of workers have declining as have rising relative earnings over their primary working years. Similarly, nearly as many workers have a slump of earnings in their middle work years as have the prototypical hump. While men and women differ substantially in the levels of their lifetime earnings, they exhibit equally wide variations in the shape of the earnings profiles.

In an effort to account for the diversity, we related the distribution of individuals among the earning profiles to other attributes, such as gender, race and education. The results of that exercise are summarized in Table 8-2. The largest difference in the level of average work life earnings can be traced to gender, as only 14 percent of the men are in the lowest third of the distribution compared to 53 percent for women. On the other hand, women are more likely to

Figure 8-1
Age Profiles of Earnings, 1931-40 Birth Cohorts, 27 Groups

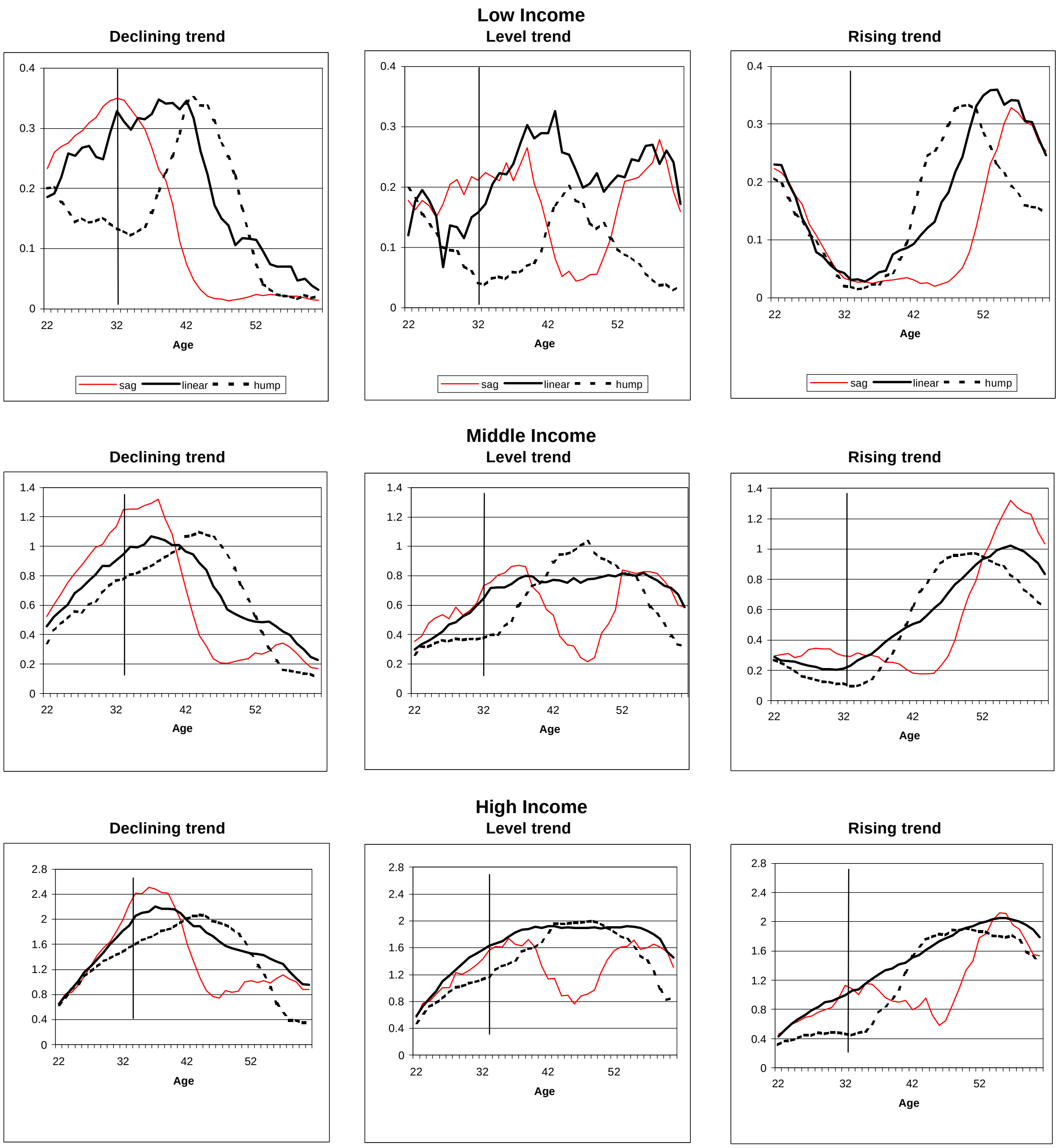


Table 8-1
Distribution of Individuals by Age Profile of Earnings, 27 Groups

Percentage distribution.
Individuals born in 1931-40, includes years of zero earnings

		All Persons				Males				Females			
		Profile				Profile				Profile			
		sag	linear	humped		sag	linear	humped		sag	linear	humped	
Low Earnings													
	declining	10.4	2.0	5.4	17.8	6.9	1.2	2.1	10.2	13.7	2.7	8.6	25.0
Trend	level	0.6	0.2	1.7	2.6	0.2	0.0	0.2	0.5	1.0	0.4	3.2	4.6
	rising	7.3	1.8	5.1	14.3	2.6	0.3	1.0	3.8	11.8	3.3	8.9	24.1
		18.3	4.0	12.2	34.6	9.6	1.6	3.3	14.5	26.6	6.4	20.7	53.6
Middle Earnings		sag	linear	humped		sag	linear	humped		sag	linear	humped	
	declining	3.8	4.5	5.5	13.8	6.1	6.3	6.4	18.8	1.6	2.8	4.6	9.0
Trend	level	0.6	2.2	1.6	4.5	0.7	1.8	1.0	3.4	0.6	2.7	2.2	5.4
	rising	2.2	4.7	6.4	13.3	1.2	1.0	2.0	4.2	3.1	8.2	10.5	21.8
		6.6	11.4	13.5	31.5	8.0	9.1	9.4	26.4	5.3	13.6	17.3	36.2
High Earnings		sag	linear	humped		sag	linear	humped		sag	linear	humped	
	declining	1.2	5.1	6.5	12.8	2.5	10.2	12.1	24.9	0.0	0.2	1.2	1.4
Trend	level	0.4	10.2	2.3	13.0	0.8	19.3	4.0	24.1	0.1	1.7	0.8	2.5
	rising	0.4	5.4	2.3	8.1	0.6	7.1	2.4	10.1	0.2	3.8	2.2	6.2
					100.0				100.0				
		2.1	20.7	11.1	33.9	3.9	36.6	18.5	59.1	0.3	5.7	4.2	10.2

Table 8-2
Distribution of Individuals by Characteristics and Earnings Profile, 1931-40 Birth Cohort

Percent of cohort population

	Non-disabled									
						Highest Degree Attained				
	Total	Male	Female	Black	Hispanic	No degree	High School Diploma	College Degree	Qualified	Disabled
					Income Level					
Low	34.4	13.7	52.9	38.9	44.3	46.5	34.0	25.4	24.1	35.8
Middle	29.9	22.8	36.2	40.4	32.4	31.1	32.8	21.1	34.6	42.0
High	35.6	63.4	10.9	20.7	23.3	22.4	33.3	53.5	41.3	22.2
					Trend					
Declining	40.0	48.0	32.8	45.1	40.6	50.4	38.6	34.6	37.9	74.1
Level	21.4	31.3	12.6	18.9	18.4	19.9	21.4	22.9	23.3	10.6
Rising	38.6	20.7	54.6	36.1	41.1	29.6	40.0	42.5	38.8	15.3
					Profile					
Slumped	27.3	21.1	32.7	32.1	30.1	32.2	26.9	23.8	21.1	25.4
Linear	38.2	50.8	27.0	34.8	29.7	32.2	37.8	44.6	43.6	22.4
Humped	34.6	28.1	40.3	33.1	40.2	35.6	35.3	31.5	35.3	52.2

have a rising pattern of earnings over their work life, while the most common pattern for men is one of decline. For the profile characteristic, women are somewhat more likely to be at the extremes with a significant hump or slump to their earnings in their middle working years. Black and Hispanic workers are also scarce in the upper portions of the wage distribution, and black workers are somewhat more likely to have declining relative earnings over the work life. In addition, workers with low levels of education are far more likely to be in the bottom of the distribution of earnings and to experience a decline in their relative earnings over their work life. Finally, as illustrated in columns (9) and (10), the distribution of individuals by level and trend of earnings is very strongly impacted by the exclusion of those who do not have the 40 quarters of coverage required to qualify for a pension and the disabled.

1. Boundaries

As shown above in Section II, the separation of earnings patterns by trend (t) and profile (p) was based on a common cutoff value of 1/9th above and below zero for both t and p where A, B, and C are the average earnings in consecutive 10-year subperiods from age 32 to 61. We have tested for the sensitivity to variations in the boundaries. While a widening of the band about zero increases the proportion of the sample that falls in the midgroup, there is little effect on the general shape of the earnings profiles. For example, a widening of the boundary from 1/9th to 1/6th increases the proportion of the sample in the middle categories by one-third, but it has little discernable effect on the shape of the earnings profile. We conclude that the choice of the boundary does not have a major effect on our conclusions about the diversity of earnings patterns, but that we also have little basis for choosing a specific value. The 1/9th was chosen to yield roughly equal numbers of individuals in each of the three categories of the trend and profile.

2. Non-zero Earnings

The original set of earnings patterns were computed by including the earnings of all individuals in the category regardless of whether they had earnings in a given year. We also computed a second earnings profile for each group that excluded individuals with earnings of less than 0.01 of the average in each specific year. In addition, we can show the proportion of individuals in the category that had zero earnings in a given year.

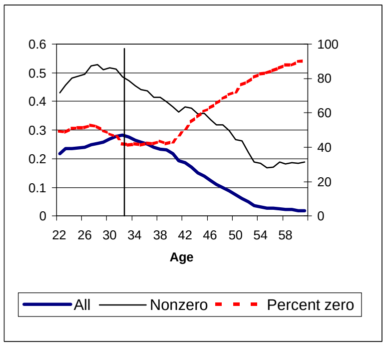
These results are illustrated in Figures 8-2a through 8-2c. In order to reduce the number of comparisons to a manageable level, the profile dimension is suppressed, and the figures are presented for 9 categories that separate individuals by the level and trend of the income profile. The profiles are also shown separately for men and women. The exclusion of nonearners in each year will obviously result in a higher earnings profile where the magnitude of difference is related to the proportion of individuals with zero earnings. But the two earnings profiles remain remarkably similar in appearance. A surprisingly small proportion of the variation in the earnings profile is related to changes in the proportion of individuals with zero earnings.

Figure 8-2a
Earnings Profiles With and Without Zero Earnings Years, All Persons

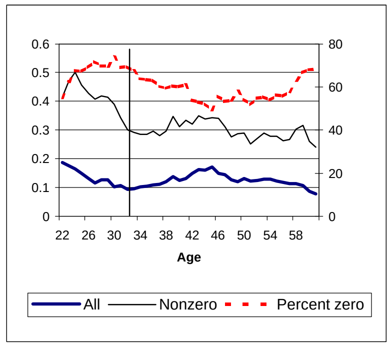
1931-40 Cohort

Low Income

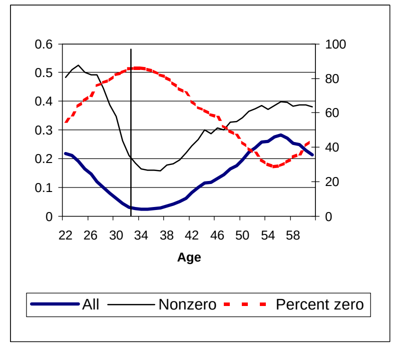
Declining Trend



Level Trend

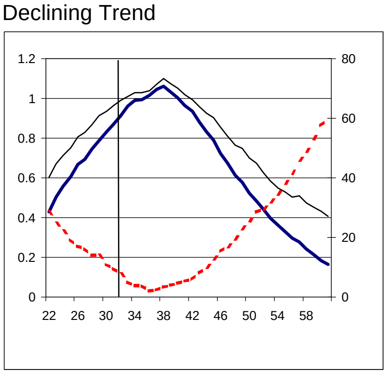


Rising Trend

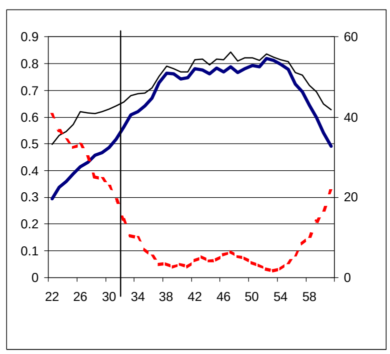


Middle Income

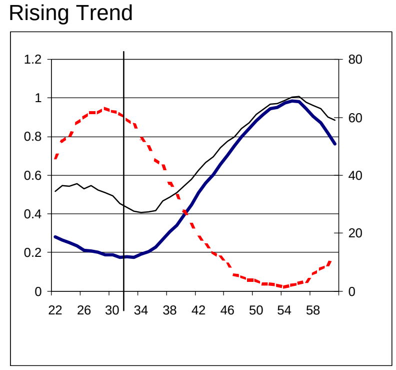
Declining Trend



Level Trend

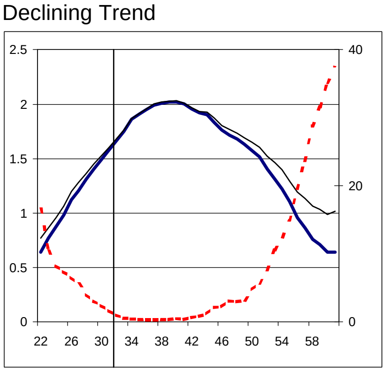


Rising Trend

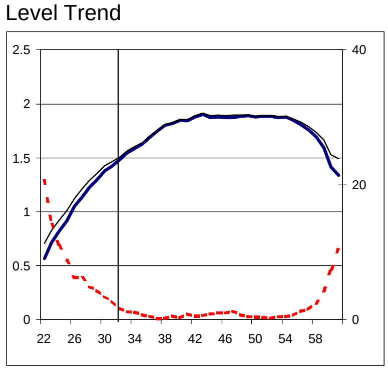


High Income

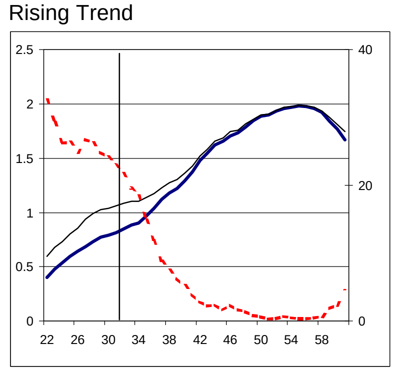
Declining Trend



Level Trend



Rising Trend



Average earnings are measured on the left scale.
The percent of the category with zero earnings in each year is measured on the right scale.

Figure 8-2b
Earnings Profiles With and Without Zero Earnings Years, Men

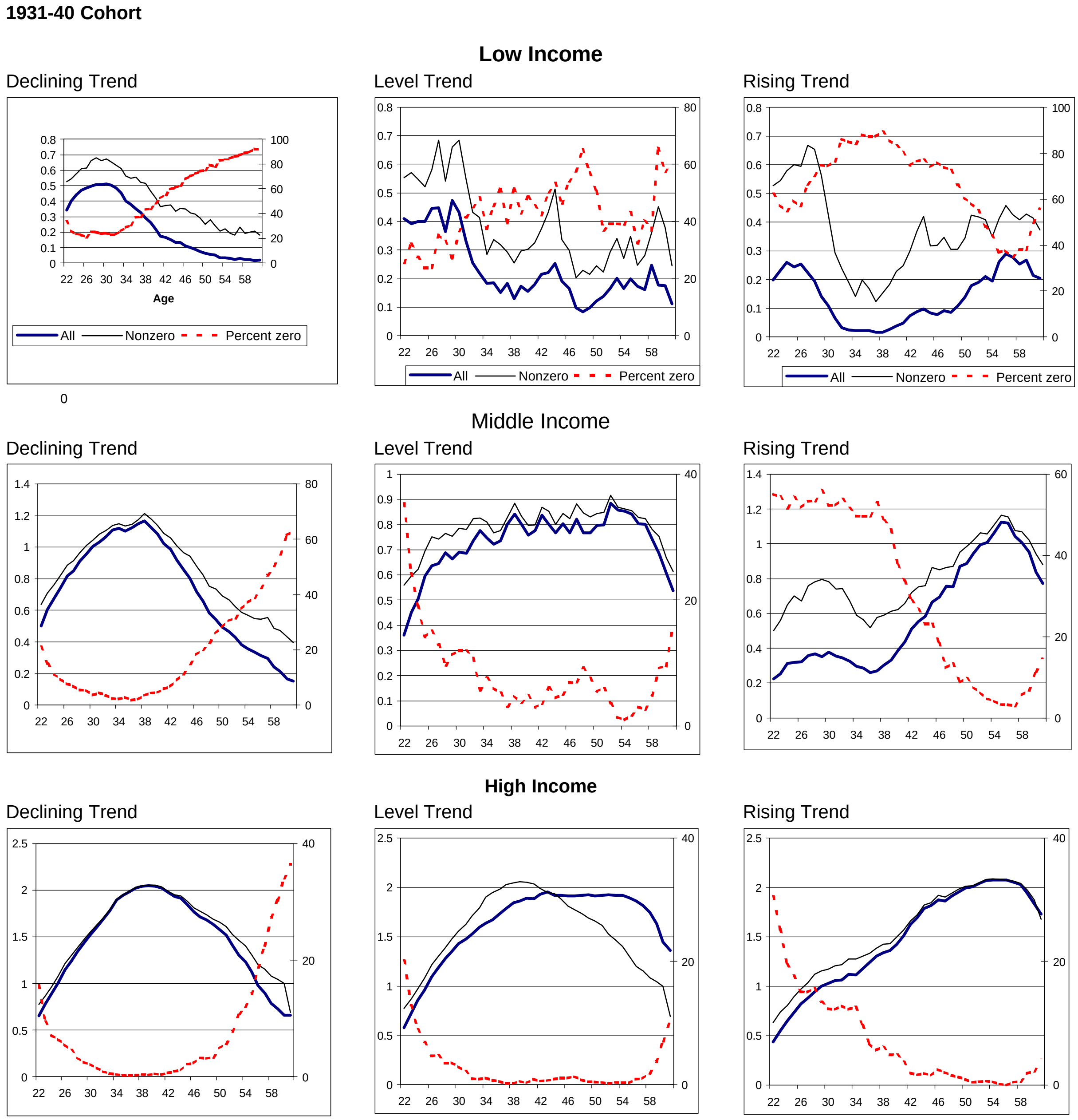
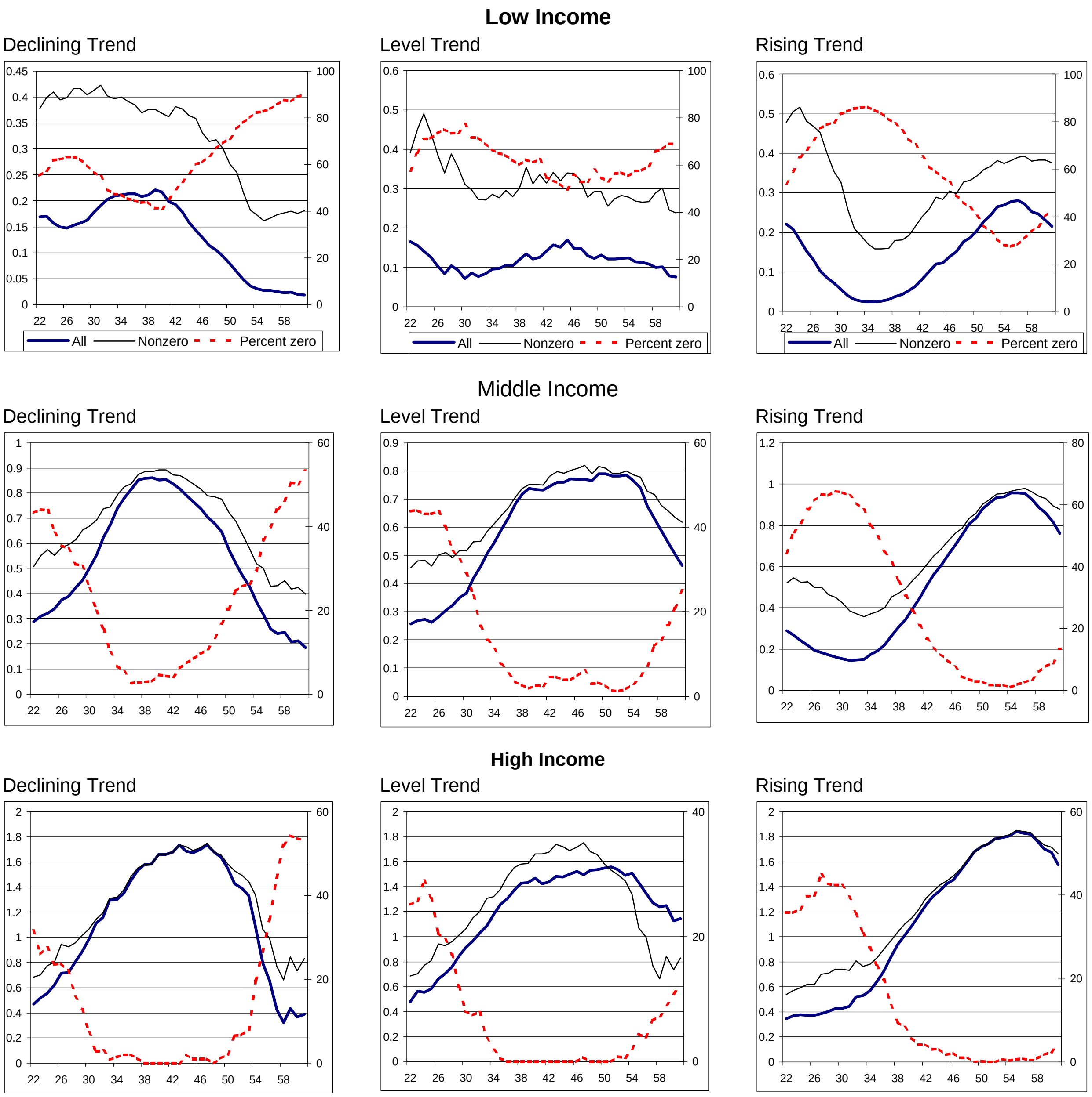


Figure 8-2c
Earnings Profiles With and Without Zero Earnings Years, Women

1931-40 Cohort



There is a very large difference in the frequency of zero earnings years, however, between the low and high-income categories. For the low-income groups, the proportion with zero earnings in a specific year ranged as high as 80 percent and averages near 60 percent, while the high-income earners are distinguished by the stability of their employment rates, with average nonparticipation rates of less than 10 percent. Furthermore, women are twice as likely as men to have years of zero earnings between ages 32 and 61, but the rates of non-participation are very comparable within earnings groups. Because years of zero earnings are more common at the beginning and end of the work life, they have a significant, but not a dominant, impact on the trend in earnings.

Since we only have annual information on earnings, it is possible that earnings are depressed in the year prior to and in the year after a zero-earnings year. Thus, we also experimented with a tabulation that excluded those years as well; but the general shape of each profile was largely unaffected.

Finally, we calculated standard deviations for the annual average of the relative wage in each pattern. Those standard deviations ranged from 0.2 - 0.3 of the economy-wide average wage in the three low-wage groups to 0.5 - 0.7 for the three high-wage patterns. Thus, this measure of variation rises with income, but much less than proportionately. There is also no particular tendency for the standard errors to rise or fall with increases in age, nor are there significant differences by sex.

IV. STYLIZED EARNINGS, 1931-60 BIRTH COHORTS, USING PROJECTED EARNINGS

We applied the methodology described above for earning patterns for the 1931-40 birth cohorts to later cohorts by using the earnings projections presented in Chapter 2 for the years after 1996. The methodology used to classify individuals into specific pattern groups is identical to that used for the 1931-40 cohorts in Section III of this chapter, but some characteristics of the projected individual earnings after 1996 suggests that the basic results should be aggregated to about 9 categories.

1. Classification Into 27 Earnings Patterns

We have calculated the distributions of workers among the 27 categories described above together with the average earnings pattern within each group for ages 22 to 61, the age pattern of non-zero earnings, and the percent of individuals in each group with zero earnings in each year.[4] The distribution of individuals among the earnings patterns, for all individuals and for men and women separately, are summarized in Tables 8-3a through 8-3c and Tables 8-4a through 8-4c.

Table 8-3a
Distribution of Individuals by 27 Earnings Patterns

Percent Distribution by Income level, trend, and profile category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1P1	10.8	10.0	10.7	9.7	5.0	3.7
Q1T1P2	2.0	2.0	2.3	2.2	2.9	3.2
Q1T1P3	5.6	5.3	3.7	3.4	6.1	8.4
Q1T2P1	0.8	0.5	0.3	0.4	0.5	0.3
Q1T2P2	0.2	0.2	0.6	0.6	1.4	1.9
Q1T2P3	1.8	1.7	1.4	2.2	3.8	3.5
Q1T3P1	8.2	6.6	3.8	1.5	0.4	0.3
Q1T3P2	1.8	1.9	1.7	1.7	1.5	1.4
Q1T3P3	5.3	4.8	8.3	9.5	10.2	9.2
Q2T1P1	3.1	4.5	4.0	4.3	1.6	1.0
Q2T1P2	3.8	5.1	6.0	6.0	8.0	9.5
Q2T1P3	5.5	5.5	4.3	4.3	6.8	7.6
Q2T2P1	0.7	0.6	0.3	0.4	0.6	0.4
Q2T2P2	2.1	2.3	3.8	4.9	8.9	11.3
Q2T2P3	1.7	1.5	1.5	2.3	2.4	2.2
Q2T3P1	2.4	2.0	0.3	0.1	0.3	0.3
Q2T3P2	4.9	4.6	2.8	1.6	1.9	2.1
Q2T3P3	6.2	6.6	9.3	8.2	2.8	1.2
Q3T1P1	1.1	1.3	1.0	1.2	0.3	0.1
Q3T1P2	4.2	5.8	6.9	6.2	7.3	8.9
Q3T1P3	7.1	5.9	2.1	1.8	2.2	2.0
Q3T2P1	0.4	0.5	0.1	0.2	0.3	0.2
Q3T2P2	9.2	11.2	15.6	18.4	21.8	20.1
Q3T2P3	3.0	1.7	1.7	2.2	1.5	0.5
Q3T3P1	0.4	0.4	0.0	0.0	0.0	0.0
Q3T3P2	5.7	5.2	3.4	2.4	1.0	0.4
Q3T3P3	2.1	2.5	4.0	4.3	0.7	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level	T = Income Tend	P = Profile
Low = 1	Declining = 1	P = 1 slumped
Average = 2	Level = 2	P = 2 linear
High = 3	Rising = 3	P = 3 humped

Table 8-3b
Distribution of Individuals by 27 Earnings Patterns, Men

Percent Distribution by Income level, trend, and profile category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1P1	7.0	6.7	8.4	8.4	6.0	5.6
Q1T1P2	1.3	1.2	1.5	1.5	3.4	4.3
Q1T1P3	2.0	2.1	2.2	3.3	6.7	9.2
Q1T2P1	0.3	0.1	0.1	0.0	0.1	0.2
Q1T2P2	0.0	0.0	0.1	0.0	0.1	0.2
Q1T2P3	0.2	0.2	0.9	1.6	2.1	0.7
Q1T3P1	3.0	2.1	1.2	0.2	0.0	0.1
Q1T3P2	0.1	0.5	0.3	0.1	0.1	0.2
Q1T3P3	1.0	1.0	2.1	1.7	0.6	0.7
Q2T1P1	4.8	7.4	5.6	5.4	2.2	1.6
Q2T1P2	5.5	7.0	8.8	9.8	15.0	17.8
Q2T1P3	6.6	6.2	5.2	6.1	10.3	11.1
Q2T2P1	0.7	0.6	0.1	0.2	0.3	0.2
Q2T2P2	1.9	1.6	1.5	1.0	1.6	1.9
Q2T2P3	1.1	0.9	1.8	3.0	1.7	1.1
Q2T3P1	1.0	1.4	0.1	0.0	0.0	0.0
Q2T3P2	1.0	1.0	0.7	0.3	0.2	0.3
Q2T3P3	2.1	1.8	3.2	3.0	0.4	0.4
Q3T1P1	2.3	2.7	1.9	2.0	0.5	0.2
Q3T1P2	8.6	11.7	13.9	12.6	15.2	18.6
Q3T1P3	13.6	10.8	4.0	3.2	3.8	3.3
Q3T2P1	0.7	0.9	0.2	0.2	0.2	0.2
Q3T2P2	17.7	20.8	27.2	27.4	26.9	21.3
Q3T2P3	5.3	2.8	3.0	4.2	2.0	0.6
Q3T3P1	0.6	0.6	0.0	0.0	0.0	0.0
Q3T3P2	8.8	5.6	2.5	0.7	0.1	0.1
Q3T3P3	2.6	2.2	3.7	4.1	0.5	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level
Low = 1
Average = 2
High = 3

T = Income Tend
Declining = 1
Level = 2
Rising = 3

P = Profile
P = 1 slumped
P = 2 linear
P = 3 humped

Table 8-3c
Distribution of Individuals by 27 Earnings Patterns, Women

Percent Distribution by Income level, trend, and profile category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1P1	14.3	13.1	12.7	10.8	4.0	2.1
Q1T1P2	2.6	2.8	3.1	2.8	2.5	2.3
Q1T1P3	8.9	8.2	5.1	3.5	5.5	7.7
Q1T2P1	1.3	0.8	0.6	0.8	0.8	0.4
Q1T2P2	0.4	0.4	1.0	1.1	2.6	3.3
Q1T2P3	3.3	3.0	1.9	2.7	5.2	5.8
Q1T3P1	13.0	10.7	6.1	2.6	0.7	0.6
Q1T3P2	3.4	3.2	2.9	3.1	2.7	2.3
Q1T3P3	9.5	8.4	13.7	16.3	18.5	16.6
Q2T1P1	1.4	1.9	2.5	3.3	1.0	0.5
Q2T1P2	2.3	3.2	3.6	2.6	1.9	2.3
Q2T1P3	4.5	4.8	3.4	2.8	3.9	4.6
Q2T2P1	0.6	0.6	0.6	0.6	0.9	0.6
Q2T2P2	2.4	3.0	5.8	8.3	15.1	19.4
Q2T2P3	2.3	2.0	1.2	1.7	3.1	3.1
Q2T3P1	3.6	2.6	0.5	0.1	0.5	0.6
Q2T3P2	8.5	7.9	4.6	2.8	3.4	3.7
Q2T3P3	10.0	11.1	14.8	12.7	4.8	2.0
Q3T1P1	0.0	0.0	0.2	0.5	0.1	0.1
Q3T1P2	0.1	0.3	0.8	0.6	0.4	0.6
Q3T1P3	1.1	1.3	0.5	0.6	0.9	0.8
Q3T2P1	0.0	0.2	0.0	0.2	0.4	0.2
Q3T2P2	1.1	2.2	5.3	10.6	17.3	19.1
Q3T2P3	0.8	0.7	0.6	0.4	1.0	0.4
Q3T3P1	0.1	0.2	0.0	0.1	0.0	0.1
Q3T3P2	2.7	4.8	4.1	3.8	1.8	0.6
Q3T3P3	1.7	2.7	4.2	4.5	0.8	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level	T = Income Tend	P = Profile
Low = 1	Declining = 1	P = 1 slumped
Average = 2	Level = 2	P = 2 linear
High = 3	Rising = 3	P = 3 humped

Table 8-4a
Summary Distributions by Earnings Patterns, All Persons

Percent Distribution by Income level and trend category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1	18.3	17.3	16.7	15.4	14.0	15.3
Q1T2	2.8	2.3	2.3	3.3	5.7	5.7
Q1T3	15.3	13.2	13.8	12.7	12.0	10.9
Q2T1	12.4	15.1	14.3	14.6	16.4	18.2
Q2T2	4.5	4.4	5.6	7.6	11.9	13.9
Q2T3	13.4	13.1	12.5	9.9	5.0	3.7
Q3T1	12.5	13.1	10.1	9.2	9.8	11.0
Q3T2	12.5	13.4	17.4	20.8	23.5	20.8
Q3T3	8.2	8.0	7.3	6.7	1.6	0.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Income Level - Thirds

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1	36.5	32.9	32.8	31.3	31.7	31.9
Q2	30.3	32.6	32.3	32.1	33.3	35.8
Q3	33.2	34.5	34.8	36.7	35.0	32.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Trend Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
T1	43.2	45.4	41.1	39.1	40.2	44.5
T2	19.9	20.1	25.4	31.6	41.2	40.4
T3	36.9	34.4	33.6	29.2	18.6	15.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Profile Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
P1	27.6	26.4	20.6	17.7	8.9	6.5
P2	33.9	38.2	43.0	44.0	54.7	58.8
P3	38.4	35.3	36.4	38.3	36.4	34.7
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level	T = Income Tend	P = Profile
Low = 1	Declining = 1	P = 1 slumped
Average = 2	Level = 2	P = 2 linear
High = 3	Rising = 3	P = 3 humped

Table 8-4b
Summary Distributions by Earnings Patterns, Men

Percent Distribution by Income level and trend category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1	10.3	10.0	12.0	13.3	16.1	19.1
Q1T2	0.6	0.3	1.0	1.7	2.3	1.1
Q1T3	4.1	3.6	3.6	1.9	0.6	1.0
Q2T1	16.9	20.6	19.6	21.3	27.6	30.6
Q2T2	3.7	3.2	3.5	4.2	3.6	3.2
Q2T3	4.2	4.2	4.0	3.4	0.6	0.7
Q3T1	24.5	25.2	19.8	17.7	19.5	22.0
Q3T2	23.7	24.5	30.4	31.8	29.1	22.0
Q3T3	12.0	8.3	6.1	4.7	0.6	0.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Income Level - Thirds

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1	15.0	14.0	16.7	16.9	19.1	21.3
Q2	24.8	28.0	27.0	28.9	31.8	34.5
Q3	60.2	58.0	56.3	54.3	49.1	44.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Trend Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
T1	51.7	55.9	51.4	52.3	63.2	71.7
T2	27.9	28.0	34.9	37.7	35.1	26.4
T3	20.3	16.1	13.7	10.0	1.8	1.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Profile Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
P1	20.5	22.6	17.5	16.4	9.4	8.1
P2	45.0	49.4	56.3	53.4	62.6	64.7
P3	34.5	28.0	26.2	30.2	28.0	27.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level	T = Income Tend	P = Profile
Low = 1	Declining = 1	P = 1 slumped
Average = 2	Level = 2	P = 2 linear
High = 3	Rising = 3	P = 3 humped

Table 8-4c
Summary Distributions by Earnings Patterns, Women

Percent Distribution by Income level and trend category

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1T1	25.9	24.1	20.8	17.2	12.1	12.1
Q1T2	5.0	4.2	3.5	4.6	8.6	9.6
Q1T3	26.0	22.3	22.8	22.0	21.8	19.5
Q2T1	8.1	9.9	9.6	8.7	6.7	7.4
Q2T2	5.3	5.5	7.5	10.6	19.1	23.1
Q2T3	22.1	21.5	19.9	15.6	8.8	6.3
Q3T1	1.2	1.7	1.5	1.7	1.5	1.5
Q3T2	1.9	3.1	6.0	11.1	18.7	19.7
Q3T3	4.5	7.8	8.4	8.4	2.6	0.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Income Level - Thirds

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
Q1	56.8	50.6	47.1	43.8	42.6	41.2
Q2	35.6	36.9	37.0	34.9	34.6	36.8
Q3	7.6	12.5	15.9	21.3	22.8	22.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Trend Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
T1	35.2	35.6	32.0	27.6	20.3	20.9
T2	12.2	12.8	16.9	26.4	46.4	52.4
T3	52.6	51.6	51.1	46.0	33.2	26.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Percent Distribution by Profile Characteristic

	Birth cohort					
Group	1931-35	1936-40	1941-45	1946-50	1951-55	1956-60
P1	34.4	30.0	23.3	18.9	8.5	5.1
P2	23.5	27.7	31.3	35.8	47.8	53.7
P3	42.1	42.2	45.4	45.3	43.7	41.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Q = Income Level	T = Income Tend	P = Profile
Low = 1	Declining = 1	P = 1 slumped
Average = 2	Level = 2	P = 2 linear
High = 3	Rising = 3	P = 3 humped

As is evident in Tables 8-3a through 8-3c, the number of individuals in some categories is too small to provide useful estimates. Tables 8-4a through 8-4c aggregate the earnings patterns across each of the three characteristics that define an earnings pattern (average earnings, trend and profile) for all individuals, men, and women. The distributions by average earnings remain relatively stable across the six birth cohorts, but there are significant changes in the distributions by trend and profile. In particular, it is evident from the distributions by profile at the bottom of Tables 8-4a through 8-4c that the methodology of projecting earnings in Chapter 2 is not able to predict individuals with a sag in earnings during the middle work years. The proportion of all individuals with a sag pattern (Table 8-4a) falls from 27.6 percent for the 1931-35 birth cohort, where all of the earnings are actual values, to 6.5 percent in the 1956-60 cohort, where earnings are projected after age 40. At the same time the proportion of men with a level earnings pattern (Table 8-4b) rises to over 60 percent in the 1956-60 birth cohort. There is also a substantial decline in the proportion of men and women with rising earnings patterns as the analysis shifts toward cohorts with a large proportion of projected earnings. We will return to that issue below.

After consultation with SSA personnel, we have concentrated the remaining portions of the analysis on an aggregation of the earnings patterns to nine categories for each sex, which distinguish the average level of income and the trend. Spreadsheets that we are supplying to SSA contain sufficient data to aggregate the basic 27 categories in a variety of alternative ways. For example, it is a straightforward process to recreate the 11 patterns that were used in earlier letter reports.

2. Classification Into Nine Earnings Patterns of Level and Trend

The nine earning patterns for men and women are shown for the six birth cohorts in Figures 8-3a through 8-3f. Even with a reduction in the number of groups from 27 to nine, some of the cells are too small to yield stable results. The sample size is provided in Tables 8-4a through 8-4c. For some male cohorts, groups #2, #3, #6, and #9 are 1 percent of the population or less. For women the small groups are #7 and #9. Thus, for some purposes, the nine groups will require further aggregation.

Some important characteristics of the projections of the earnings projections are highlighted by focusing on the results for the 1931-35 and 1956-60 cohorts. First, as shown in Table 8-4b, there is a sharp decline in the proportion of men with patterns of rising earnings (categories #3, #6, and #9) between the earliest and latest cohort. Similarly, the number of men with low and level earnings (#2) is small in both cohorts.

Second, comparison of Figures 8-3a and 8-3f shows a substantial compression of the range of the change in earnings over the work life as the analysis moves from the 1931-35 cohort to the 1956-60 cohort. While the average age-earnings patterns for those with level earnings trends are similar between the two cohorts, within the three categories with declining earnings patterns, the magnitude of the drop in earnings over the work life is significantly less for the 1956-

60 cohort than for the 1931-35 cohort.[5] Similarly, the rise in average earnings is smaller for the three categories with a rising trend.

Likewise, the compression of the range of trend change in earnings and some skewing of the distribution of the patterns is evident in Tables 8-4a through 8-4c. As mentioned in the prior section, there is little net change in the distribution by level of average work life earnings for men and women combined. But there is a sharp rise in the proportion of women in the top third of the distribution, from 7.6 percent in the 1931-35 cohort to 22 percent for the 1956-60 cohort. The opposite is true for men where the proportion in the top third of the distribution falls from 60.2 to 44.3 percent.

The changes in the distribution of individuals among the categories of trend earnings, shown in the third panel of Tables 8-4a through 8-4c, are also substantial for both men and women. For both, there is a sharp falloff in the number with rising earnings pattens, albeit from much different proportions in the 1931-35 cohort. For the 1956-60 cohort, only 1.8 percent of men and 26.6 percent of women have rising relative earnings over their work life. These compare with 20.3 and 52.6 percent respectively in the 1931-35 birth cohort. For women, there is also a sharp decline in the number with declining relative earnings, a general pattern of compression of the distribution of trend changes. In the case of men, however, the sharp fall in the proportion with a rising trend pattern is matched by an equally large increase in the proportion with declining relative earnings over their work life.

To some extent, these changes in the distribution of workers among the earnings patterns reflect trends that we know have been important recently. Women's earnings are rising faster that those for men. However, the tendency toward a compression of the distribution arises from the use of a limited number of equations to project the central tendency of earnings in Chapter 2. The age distribution of relative earnings for men and women, implied by the regression coefficients in the earnings equation from Chapter 2, are shown in Figure 8-4. There are separate earnings patterns for five educational groups and they have been aggregated to the 10-year periods used to compute the earnings patterns. For men, the earnings patterns are downward sloping over the relevant ages, except for those with some graduate education where the pattern is flat. For women, the opposite is true, earnings rise with age except for the very lowest education group.

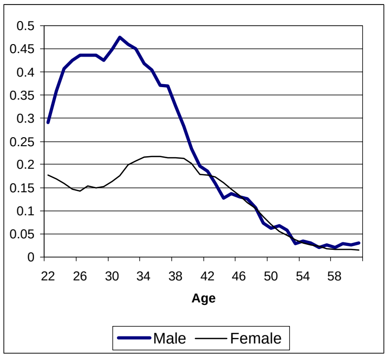
While an error term is included in the projections for each individual and year, there will still be a tendency for the earnings of any subgroup to revert towards the central tendency as expressed by the regression line. The only identified characteristic that distinguishes individuals with rising earnings patterns from those with falling earnings is their sex. Thus, the group means are unlikely to display the full range of variation in the trend element, even if the underlying distribution of individuals' earnings does so.

Figure 8-3a
Basic Earnings Patterns, Male and Female

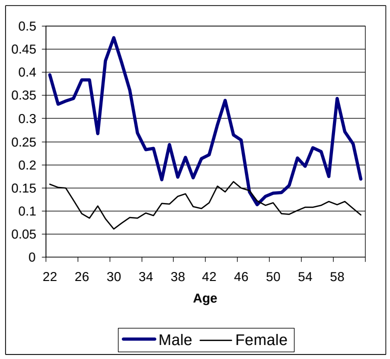
1931-35 Cohort

Low Income

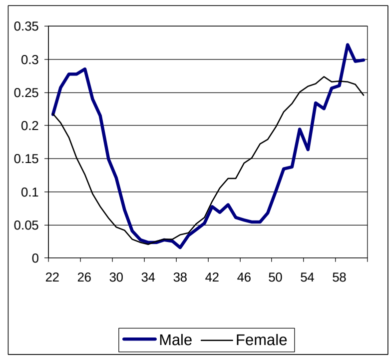
Declining Trend



Level Trend

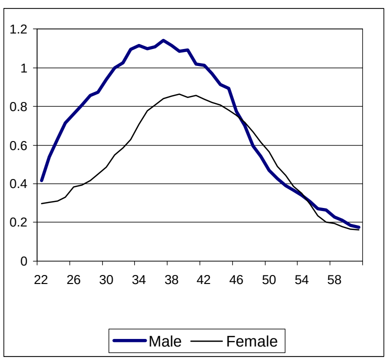


Rising Trend



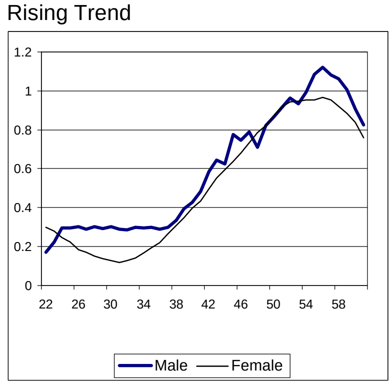
Middle Income

Declining Trend



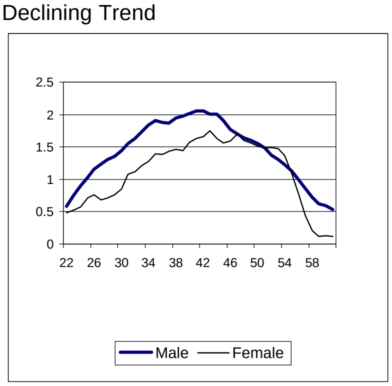
Level Trend

Rising Trend

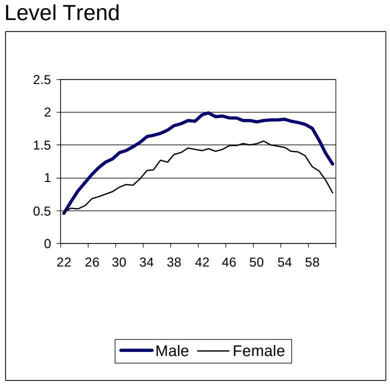


High Income

Declining Trend



Level Trend



Rising Trend

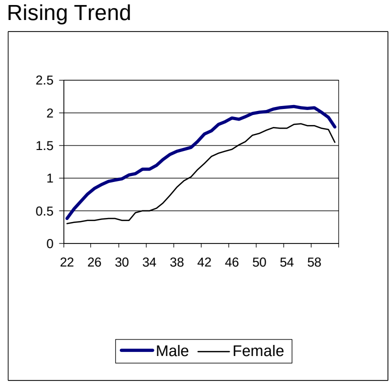
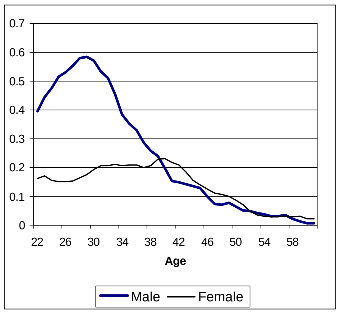


Figure 8-3b
Basic Earnings Patterns, Male and Female

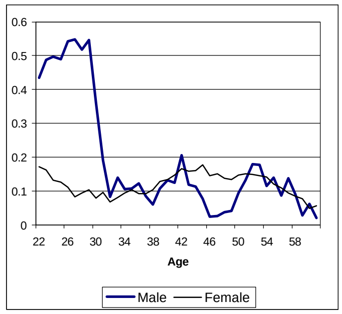
1936-40 Cohort

Low Income

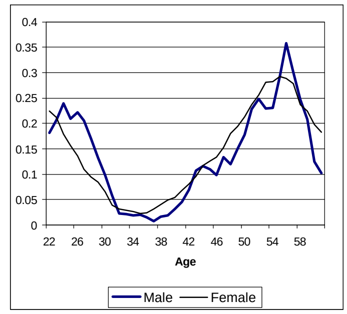
Declining Trend



Level Trend

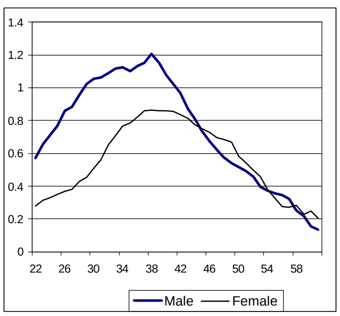


Rising Trend

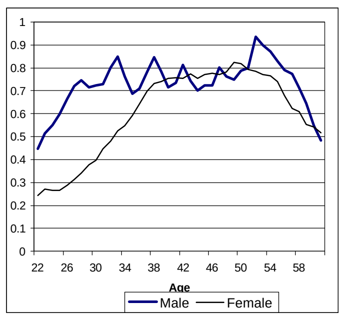


Middle Income

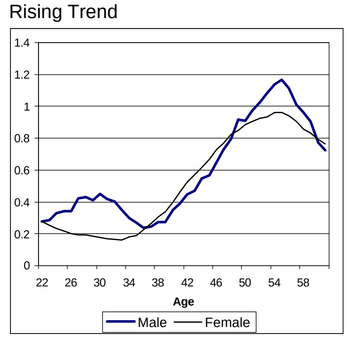
Declining Trend



Level Trend

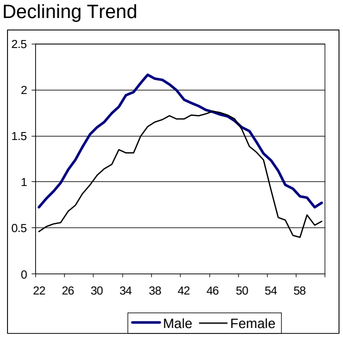


Rising Trend

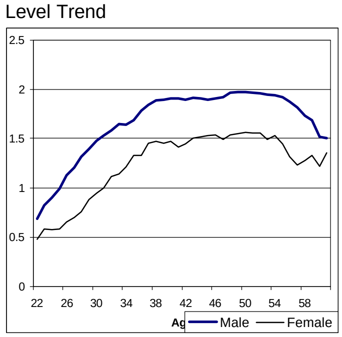


High Income

Declining Trend



Level Trend



Rising Trend

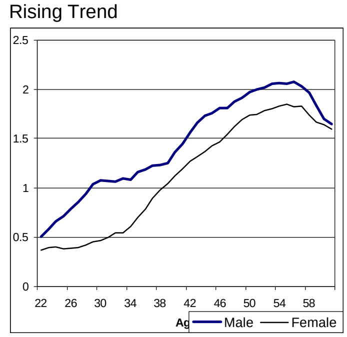
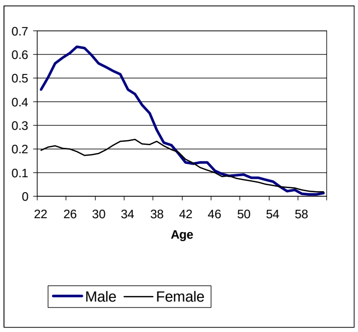


Figure 8-3c
Basic Earnings Patterns, Male and Female

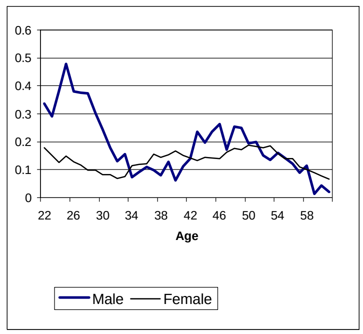
1941-45 Cohort

Low Income

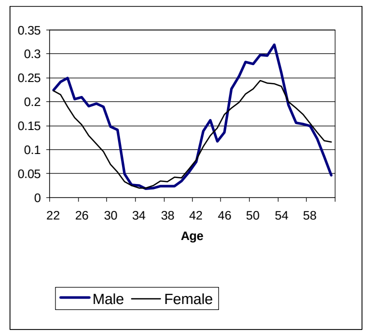
Declining Trend



Level Trend

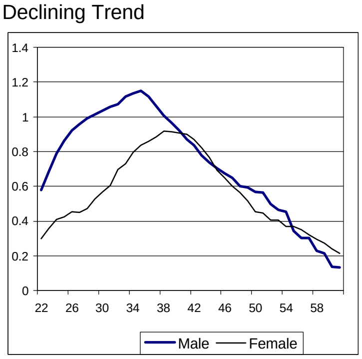


Rising Trend

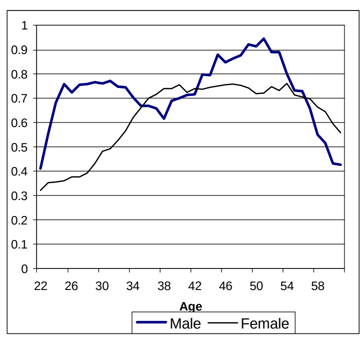


Middle Income

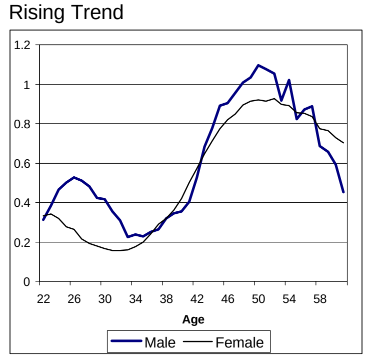
Declining Trend



Level Trend

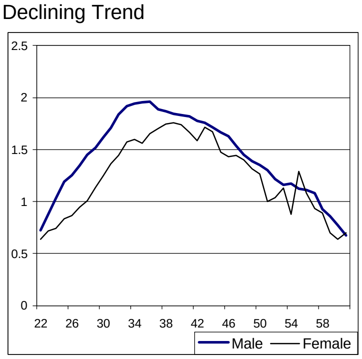


Rising Trend

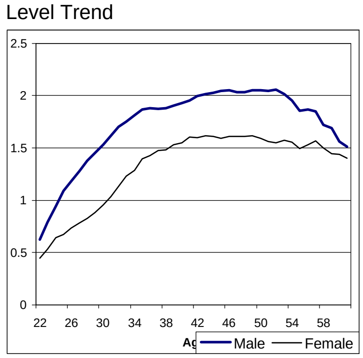


High Income

Declining Trend



Level Trend



Rising Trend

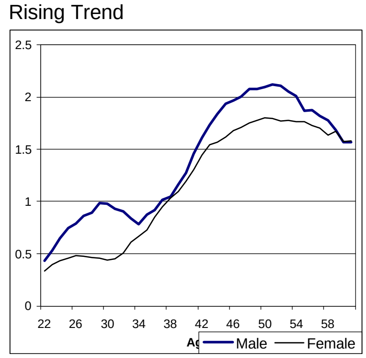


Figure 8-3d
Basic Earnings Patterns, Male and Female

1946-50 Cohort

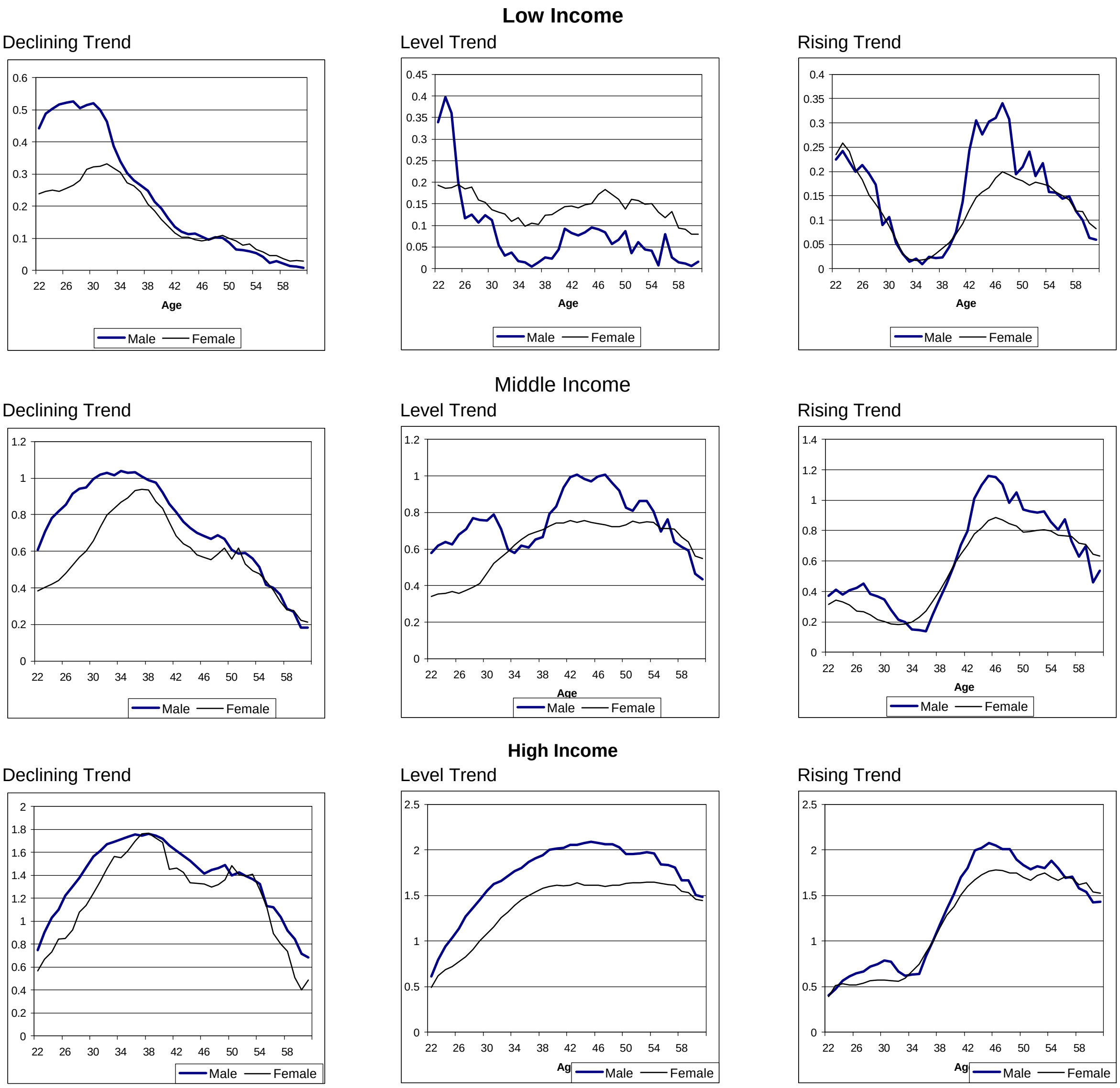
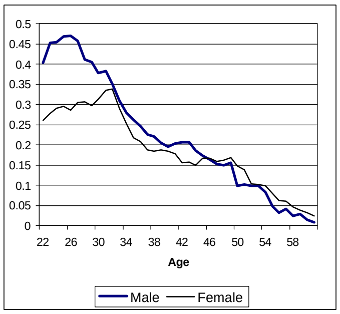


Figure 8-3e
Basic Earnings Patterns, Male and Female

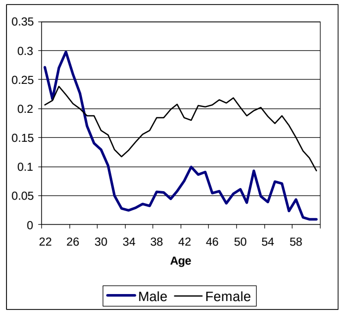
1951-55 Cohort

Low Income

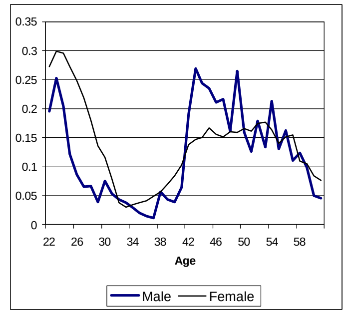
Declining Trend



Level Trend

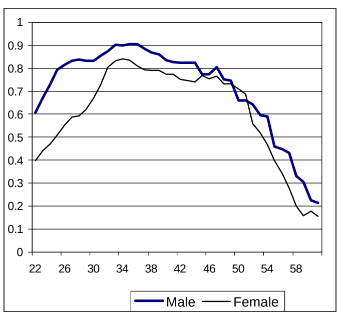


Rising Trend



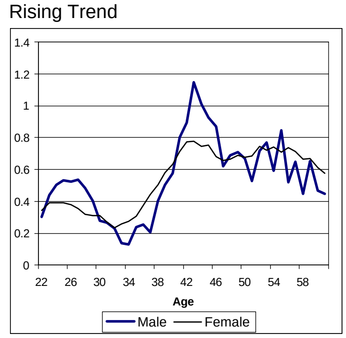
Middle Income

Declining Trend



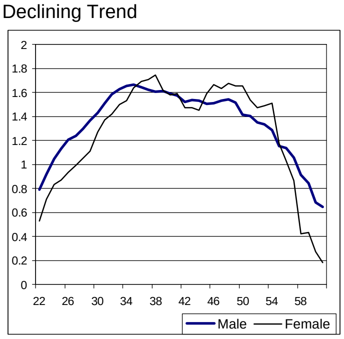
Level Trend

Rising Trend

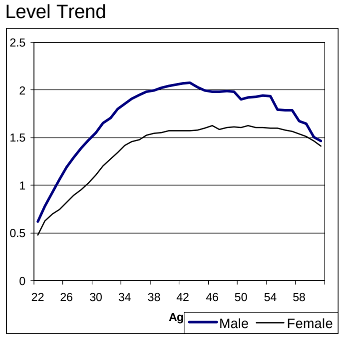


High Income

Declining Trend



Level Trend



Rising Trend

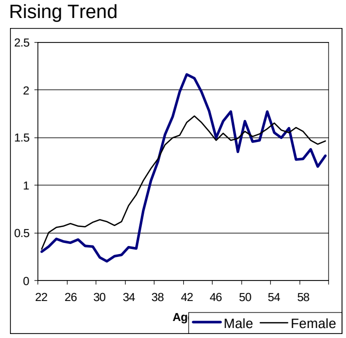


Figure 8-3f
Basic Earnings Patterns, Male and Female

1956-60 Cohort

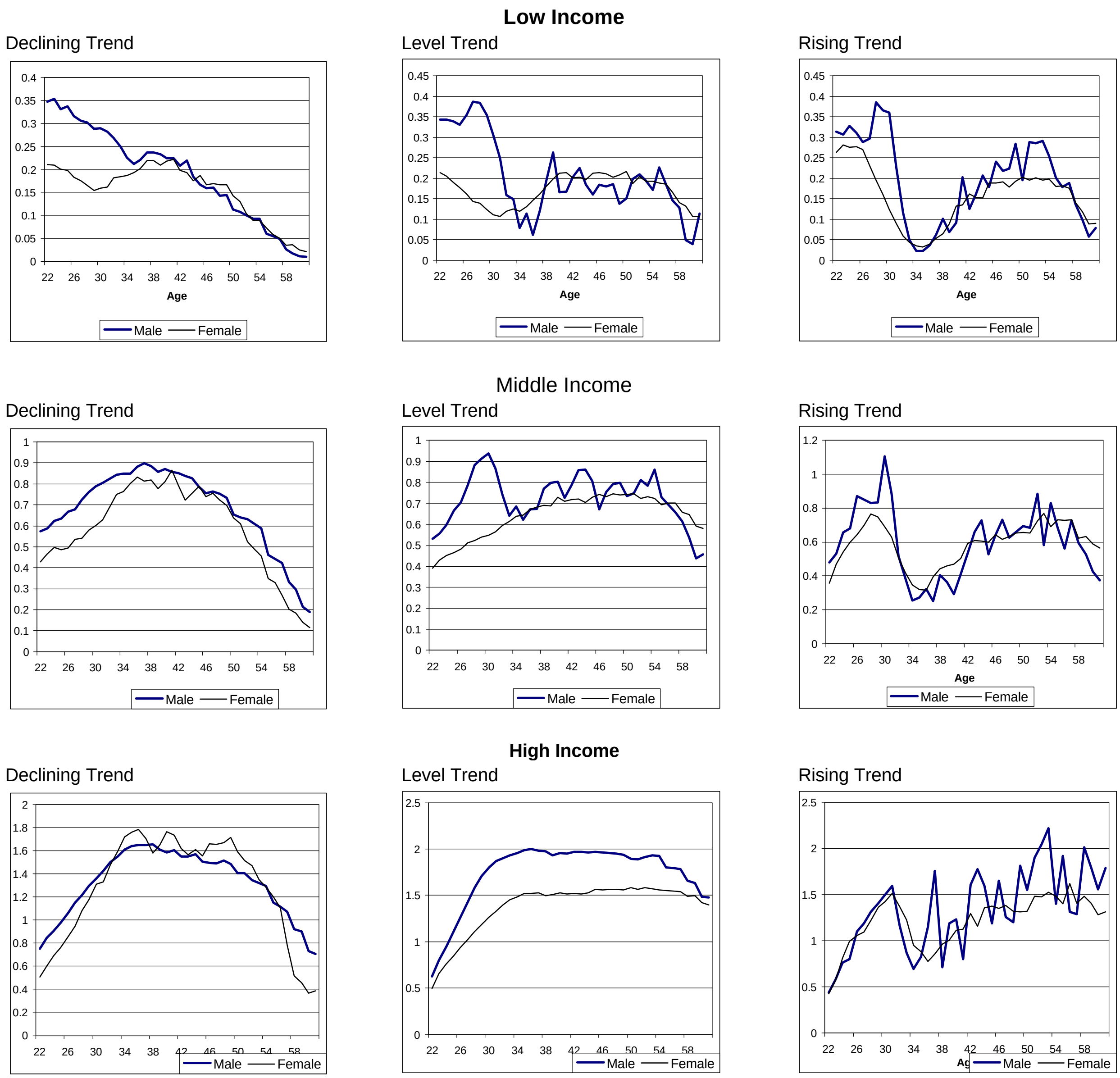
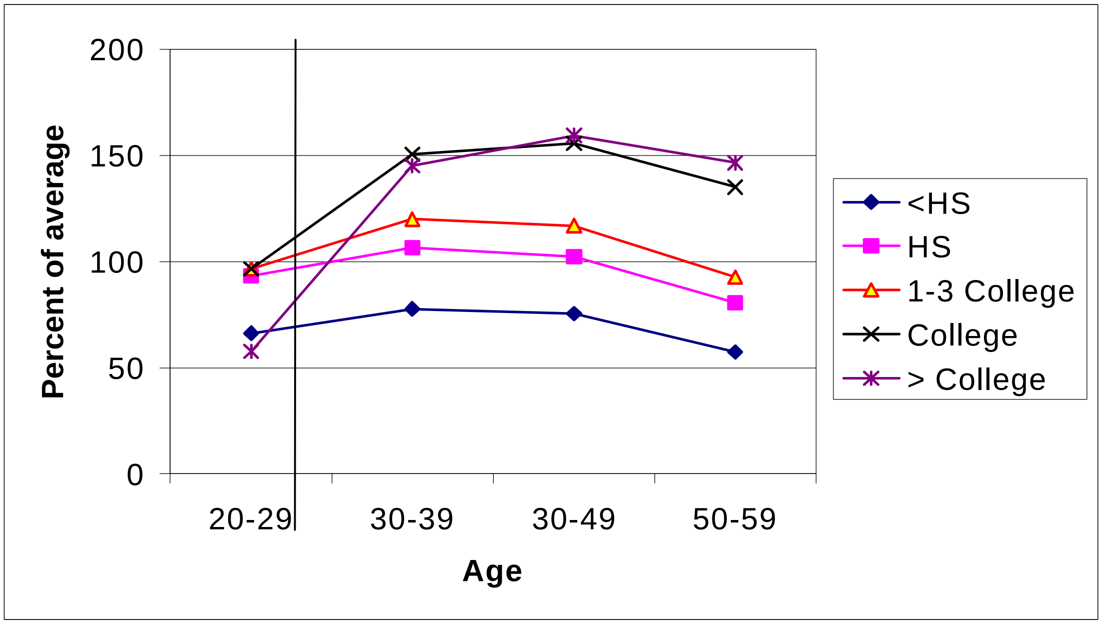
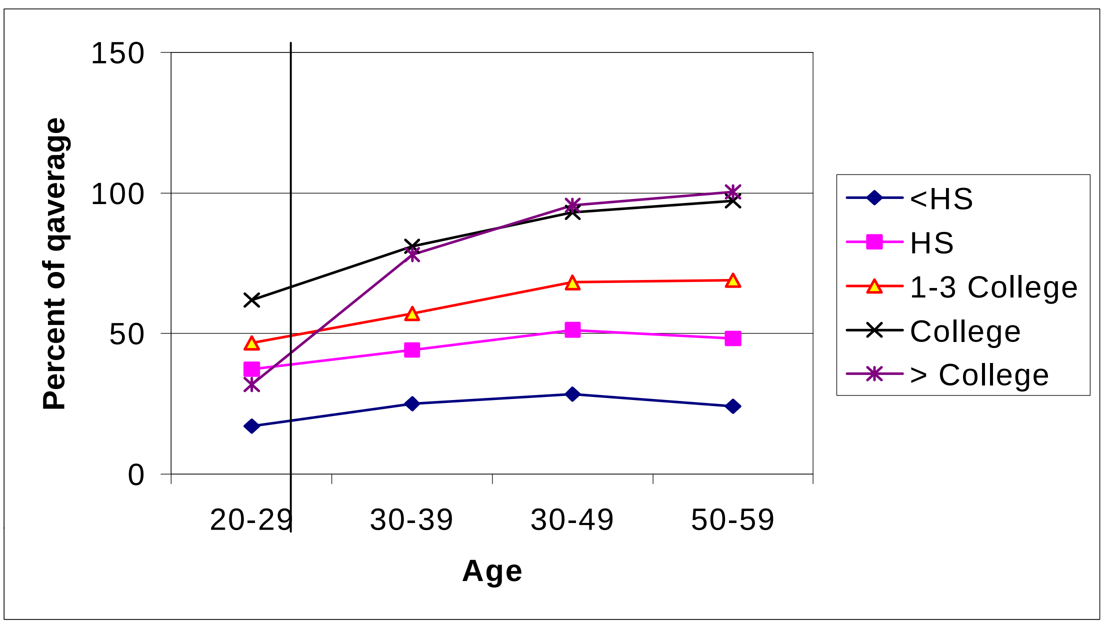


Figure 8-4
Estimated Age-Earnings Patterns by Sex and Educational Level

Men



Women



Source: Regression estimates of Task 5. Sum_9.xls

However, there also appears to be an element of bias in the projections because we would expect a substantial number of women to continue to have a rising age-earnings pattern. Instead the pace of decline in the number of both men and women in the rising trend categories of Tables 8-4b and 8-4c accelerates with the 1951-55 birth cohort. One possible reason for this is that the earnings regressions reported in Chapter 2 were originally developed with historical data that included the earnings of the disabled. The projections are based on those regressions. However, in a later stage of the projections the earnings of those who are predicted to become disabled are converted to zero with the onset of disability. This results in a downward bias in the mean rate of earnings growth for the population as a whole, because the disabled are included in the sample that predicts earnings of the non-disabled. As discussed in Chapter 2, however, the bias may be modest to the extent that the disabled workers whose earnings are zeroed out had below average projected earnings.

Finally, the methodology used to project earnings in Chapter 2 will project an appropriate number of workers with low earnings, but it does not predict zero earnings. This is not a problem for the earnings patterns themselves, but it may have some influence on the decomposition of the nine earnings patterns into an age-earnings pattern of those with positive earnings and the proportion of individuals with zero earnings at a given age. However, in constructing the average of nonzero earnings, we used a cutoff value of 0.01 of the average wage relative than absolute zero. Table 8-5 shows the average proportion of ‘zero’ earnings years in the 1956-60 cohort compared with the historical data of the 1931-35 cohort. There is a decline in the proportion of zero-earnings years, but it is concentrated among low-earning women and seems quite in keeping with their rising pattern of labor force participation.

3. Earnings Patterns of Married Couples

The nine earnings patterns for men and women have also been matched in a set of couples files. There are a total of 12 files, six cohorts for both men and women, with nine tables in each file corresponding to the nine earnings patterns. The structure of those files is shown in Table 8-6. The less-censored earnings of line 2 are the same as the age-earnings patterns reported in section B, and taxable earnings are reported on line 3. The two measures of earnings are the same after 1989 when the taxable earnings ceiling was indexed to the economy-wide average wage. The proportion of individuals with sufficient taxable earnings to qualify for the basic pension and the Primary Insurance Amount (PIA) are reported on lines 4 and 5. The PIA is the average of the individual PIAs, and it is computed on the basis of the relative earnings up to age 61; but it uses the level of earnings and the ‘bend points” of 1996.

Lines 7-12 show the distribution of the respondents by marital status, and the PIA of the spouse. The distribution of the spouses’ and their PIAs among the nine age-earnings patterns is reported on lines 14-23. Some spouses are not in the universe if their birth year was outside the range of 1926-65 or they had no taxable earnings. The percentage of individuals in the group surviving at each age from 63 to 110 is shown on line 26.

Table 8-5
Frequency of Zero Earnings Year, by Sex, Birth Cohort, and Earnings Pattern

Annual average of percentages, ages 31-61

Pattern	Total		Men		Women	
	1931-35	1956-60	1931-35	1956-60	1931-35	1956-60
Q1T1	64	47	61	53	65	39
Q1T2	61	20	37	52	64	17
QiT3	58	26	67	45	57	25
Q2T1	23	13	23	12	22	19
Q2T2	7	3	4	11	8	2
Q2T3	21	8	24	24	20	7
Q3T1	8	5	8	4	13	12
Q3T2	2	1	2	1	3	0
Q3T3	5	5	3	14	10	3
Total	28	14	25	24	29	14

based on a cuttoff of 0.01 of the economy-wide average wage

Table 8-6
Contents of the Couples Files, 1931-35 Cohort

MEN GROUP Q1T1				AGE 22	23	24	25	26	..
LESS CENSORED AVERAGE INDEXED EARNINGS				0.29105648	0.357962	0.407357	0.425066	0.436204	..
AVERAGE INDEXED TAXABLE EARNINGS				0.2856392	0.340941	0.39583	0.40325	0.413025	..
Percent with PIA	71.7								
Average PIA	$501.02								

Marital Status at Age 62	Unweighted Number of Observations	Weighted Number of Observations	Percent of Spouses with PIA	Average PIA of the Spouse
TOTAL	275	458	60.9	$578.20
MARRIED	204	337	59.6	$584.84
WIDOWED	15	26	69.9	$601.35
DIVORCED	23	41	66.1	$512.90
OTHER	13	21	(NA)	(NA)
NEVER MARRIED	20	34	(NA)	(NA)

Spouse's Stylized Group	Unweighted Number of Observations	Weighted Number of Observations	Percent of Spouses with PIA	Average PIA of the Spouse
GROUP Q1T1	69	114	51.6	$362.67
GROUP Q1T2	14	23	45.2	$440.03
GROUP Q1T3	60	99	59.3	$353.45
GROUP Q2T1	19	33	100.0	$685.40
GROUP Q2T2	8	13	100.0	$723.25
GROUP Q2T3	28	47	100.0	$761.38
GROUP Q3T1	0	0	0.0	$0.00
GROUP Q3T2	5	10	100.0	$1,155.99
GROUP Q3T3	10	15	100.0	$1,092.71
Not in Universe	62	105		
		458		

	AGE 63	64	65	66	67	..
PERCENT SURVIVING TO SPECIFIED AGE	97.322	93.984	88.466	85.377	83.100	

The 31 to 35 year cohort
Weighted observations are shown in thousands.
Average PIA of the group is based on those with nonzero aime at age 62.
Average PIA of spouse is based on those with nonzero aime at age 62.
Aime converted to 1996 dollars before computation of PIA.
Universe - Persons of Specified Sex Reaching Age 62 in their life and with nonzero earnings during the ages 31 to 62.
Not in Universe - No spouse at age 62 or spouse without earnings during the Ages 32-61.
Persons with disability onset before age 62 are included.

Table 8-7 provides a summary of the extent of marital matching by income level for the 6 birth cohorts using both men and women as the reference persons. While there is some tendency for individuals to have spouses in the same income group, it is largely overwhelmed by the differences in income levels between the two sexes. That is, while the proportion of high-income men married to high-income women rises for later birth cohorts, that is largely due to the general tendency for women to move higher in the overall income distribution relative to men.[6] However, there is a very strong tendency for women, even those in the top income group, to marry men with a higher income.

Tables 8-8a and 8-8b report the PIA for married individuals, their spouse's PIA, and the combined total for each of the 9 earnings patterns for both sexes and the six birth cohorts. PIAs are reported only for those with a nonzero AIME at age 62. Because the PIAs are estimated on the basis of 1996 economic conditions, the average PIAs of each group are relatively constant across the six cohorts. However, the combined PIAs of couples distributed by the males' income (Table 8-8a) is rising for later cohorts because the spouse is moving into the higher income groups. No such pattern is evident for women (Table 8-8b), but the combined PIA is much higher for each group when women are used as the reference group because of their tendency to have spouses with a higher work-life income and PIA. Finally, the combined values only include individual and spouses who qualify for their own pension, i.e., have a PIA.

Tables 8-9a and 8-9b report the proportions of individuals in each group at age 62 who survive to various later ages, for each sex and the six birth cohorts. They show the expected pattern of a higher proportion of women than men surviving to a given age. There is also a positive correlation between survivorship and income level. However, the correlation with average work life income is less than one might expect because of a low correlation between the measure of permanent income constructed from SIPP data and our measure of work life income which is a 30-year average of earnings. In addition, some of the cells are too small to yield reliable results.

Table 8-7
Marital Matching of Income Levels, Cohorts 1931-60

Men

Percentages of Marital Matching of Income Levels, by Age Cohort							
Man's Income Level:	Wife's Income Level	Age Cohort					
		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Low	68%	62%	60%	54%	53%	52%
Low	Middle	26%	30%	32%	30%	31%	33%
Low	High	7%	8%	8%	16%	15%	15%
Middle	Low	58%	54%	51%	47%	41%	41%
Middle	Middle	36%	37%	38%	38%	41%	44%
Middle	High	6%	10%	10%	16%	17%	16%
High	Low	57%	48%	47%	45%	42%	40%
High	Middle	33%	37%	34%	33%	34%	35%
High	High	10%	15%	19%	22%	24%	24%

Women

Percentages of Marital Matching of Income Levels, by Age Cohort							
Woman's Income Level:	Husband's Income Level	Age Cohort					
		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Low	14%	15%	17%	20%	21%	20%
Low	Middle	28%	31%	31%	28%	33%	36%
Low	High	58%	54%	52%	52%	45%	43%
Middle	Low	11%	12%	13%	14%	15%	14%
Middle	Middle	24%	28%	31%	32%	38%	28%
Middle	High	65%	60%	56%	53%	47%	58%
High	Low	10%	10%	9%	11%	12%	17%
High	Middle	17%	23%	18%	22%	26%	16%
High	High	73%	67%	72%	67%	62%	67%

Source: spousesumm.xls

Table 8-8a
Average Primary Insurance Amount, Men, 1931-60

Average PIA - Men

Income Third	Income Trend	Age Cohort 1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$501	$536	$564	$541	$513	$499
Low	Level	$498	$447	$487	$499	$456	$485
Low	Increasing	$407	$394	$417	$399	$359	$422
Middle	Declining	$829	$857	$864	$866	$847	$822
Middle	Level	$812	$812	$819	$849	$837	$842
Middle	Increasing	$729	$734	$749	$764	$712	$748
High	Declining	$1,115	$1,170	$1,184	$1,189	$1,184	$1,169
High	Level	$1,184	$1,235	$1,277	$1,294	$1,302	$1,311
High	Increasing	$1,193	$1,198	$1,199	$1,182	$1,111	$1,200

Average PIA - Wives

Income Third	Income Trend	Age Cohort 1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$578	$599	$600	$655	$623	$623
Low	Level	$625	$548	$597	$732	$667	$689
Low	Increasing	$565	$589	$614	$662	$646	$760
Middle	Declining	$605	$634	$630	$675	$677	$679
Middle	Level	$586	$607	$643	$679	$734	$739
Middle	Increasing	$581	$625	$695	$628	$777	$632
High	Declining	$595	$667	$685	$708	$715	$718
High	Level	$645	$698	$728	$742	$743	$765
High	Increasing	$612	$692	$794	$727	$627	$774

Average PIA - Total

Income Third	Income Trend	Age Cohort 1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$1,079	$1,135	$1,165	$1,196	$1,137	$1,123
Low	Level	$1,123	$994	$1,084	$1,232	$1,123	$1,174
Low	Increasing	$972	$983	$1,031	$1,061	$1,005	$1,182
Middle	Declining	$1,434	$1,492	$1,494	$1,541	$1,524	$1,500
Middle	Level	$1,397	$1,420	$1,462	$1,528	$1,571	$1,581
Middle	Increasing	$1,311	$1,359	$1,444	$1,392	$1,488	$1,380
High	Declining	$1,710	$1,837	$1,869	$1,897	$1,899	$1,887
High	Level	$1,829	$1,932	$2,005	$2,036	$2,045	$2,076
High	Increasing	$1,805	$1,890	$1,993	$1,908	$1,739	$1,974

Source: Piasum.xls

Table 8-8b
Average Primary Insurance Amount, Women, 1931-60

Average PIA - Women

Income Third	Income Trend	Age Cohort 1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$410	$422	$419	$453	$468	$435
Low	Level	$407	$402	$385	$404	$414	$377
Low	Increasing	$398	$390	$391	$384	$350	$343
Middle	Declining	$696	$718	$745	$777	$811	$797
Middle	Level	$717	$742	$748	$747	$742	$751
Middle	Increasing	$696	$698	$708	$707	$701	$729
High	Declining	$1,060	$1,110	$1,153	$1,164	$1,200	$1,205
High	Level	$1,084	$1,119	$1,157	$1,182	$1,178	$1,179
High	Increasing	$1,074	$1,102	$1,122	$1,140	$1,125	$1,136

Average PIA - Husbands

Income Third	Income Trend	Age Cohort 1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$965	$969	$1,001	$981	$955	$893
Low	Level	$945	$970	$1,007	$994	$956	$946
Low	Increasing	$999	$1,023	$1,038	$1,072	$1,059	$1,038
Middle	Declining	$995	$981	$1,014	$1,032	$1,008	$935
Middle	Level	$988	$964	$999	$1,026	$1,009	$958
Middle	Increasing	$1,014	$1,047	$1,072	$1,063	$1,064	$1,059
High	Declining	$1,044	$1,066	$1,168	$1,102	$1,117	$1,146
High	Level	$1,033	$1,050	$1,098	$1,087	$1,093	$1,064
High	Increasing	$1,070	$1,070	$1,143	$1,153	$1,073	$1,157

Average PIA - Total

Income Third	Income Trend	Age Cohort 1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Declining	$1,375	$1,391	$1,420	$1,434	$1,423	$1,329
Low	Level	$1,352	$1,373	$1,392	$1,397	$1,370	$1,323
Low	Increasing	$1,397	$1,414	$1,429	$1,456	$1,409	$1,382
Middle	Declining	$1,691	$1,699	$1,759	$1,809	$1,819	$1,731
Middle	Level	$1,705	$1,706	$1,747	$1,773	$1,751	$1,709
Middle	Increasing	$1,711	$1,744	$1,780	$1,771	$1,765	$1,788
High	Declining	$2,105	$2,176	$2,320	$2,266	$2,317	$2,351
High	Level	$2,117	$2,169	$2,255	$2,269	$2,271	$2,242
High	Increasing	$2,144	$2,172	$2,265	$2,294	$2,198	$2,293

Source: Piasum.xls

Table 8-9a
Survival After Age 62, Men, 1931-60 Cohorts

Percent of Men Surviving to Age 65

Income Level:		Age Cohort 1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	88.466	94.162	93.329	93.445	92.968	91.518
	Level	67.532	100.000	85.516	93.416	93.945	97.547
	Increasing	89.889	94.798	90.796	95.151	91.253	96.096
Middle	Decreasing	89.395	94.187	94.674	93.039	95.210	95.012
	Level	91.814	86.576	93.503	92.274	96.943	96.530
	Increasing	97.245	95.981	93.956	91.518	100.000	96.058
High	Decreasing	91.962	93.565	95.163	95.312	95.933	94.846
	Level	92.494	94.210	94.155	95.350	95.435	95.932
	Increasing	93.457	94.844	92.858	98.585	92.744	100.000

Percent of Men Surviving to Age 70

Income Level:		Age Cohort 1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	72.264	80.412	81.742	80.549	77.707	78.663
	Level	62.173	100.000	71.033	80.864	78.265	83.966
	Increasing	68.745	81.674	81.870	80.825	91.253	80.400
Middle	Decreasing	75.322	81.598	84.277	81.434	84.525	83.783
	Level	75.861	76.418	82.658	76.975	88.209	86.802
	Increasing	83.478	82.151	83.708	81.597	92.594	80.631
High	Decreasing	78.779	82.262	84.487	86.318	84.892	85.392
	Level	79.981	83.893	84.042	86.462	85.302	87.444
	Increasing	81.192	85.109	82.291	90.579	86.552	92.999

Percent of Men Surviving to Age 75

Income Level:		Age Cohort 1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	58.180	65.832	63.203	63.985	66.271	62.530
	Level	51.111	90.938	44.959	63.952	66.413	74.165
	Increasing	58.177	67.955	70.469	68.590	73.523	69.688
Middle	Decreasing	61.314	65.623	68.436	68.125	69.874	70.781
	Level	65.531	63.338	66.589	62.110	67.779	72.132
	Increasing	62.204	65.449	72.891	63.555	78.691	65.524
High	Decreasing	65.945	70.298	70.513	74.527	72.157	72.063
	Level	67.879	72.166	70.494	73.575	73.723	73.423
	Increasing	68.663	75.019	68.607	79.609	75.270	92.999

Source: life3xp.xls

Table 8-9b
Survival After Age 62, Women, 1931-60 Cohorts

Percent of Women Surviving to Age 65

Income Level:		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	93.154	97.628	97.237	98.018	97.311	96.736
	Level	95.849	98.110	96.066	96.524	97.466	97.385
	Increasing	95.948	96.481	97.292	98.478	97.703	97.739
Middle	Decreasing	94.272	98.179	97.297	97.709	98.630	97.114
	Level	94.158	98.193	98.058	97.446	98.429	97.986
	Increasing	95.456	98.456	97.596	97.945	97.750	99.047
High	Decreasing	96.280	98.406	95.901	97.722	96.712	97.375
	Level	97.258	95.789	97.309	98.477	98.479	98.194
	Increasing	97.373	97.625	98.072	98.553	98.357	100.000

Percent of Women Surviving to Age 70

Income Level:		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	87.032	93.021	92.628	91.584	91.893	90.970
	Level	89.378	93.993	90.195	90.289	92.463	92.209
	Increasing	88.825	92.057	91.793	93.492	91.763	94.061
Middle	Decreasing	89.312	95.225	93.417	93.453	95.389	93.499
	Level	83.241	89.858	93.972	92.064	92.743	93.476
	Increasing	91.467	92.783	92.087	93.911	91.350	95.135
High	Decreasing	96.280	92.478	94.274	93.647	90.844	96.012
	Level	90.778	91.848	93.230	94.693	94.716	95.439
	Increasing	94.249	92.385	95.647	94.942	96.234	97.505

Percent of Women Surviving to Age 75

Income Level:		1931-1935	1936-1940	1941-1945	1946-1950	1951-1955	1956-1960
Low	Decreasing	78.358	85.176	84.636	84.877	83.241	83.271
	Level	85.074	90.363	80.900	82.551	84.927	85.887
	Increasing	80.873	85.820	86.117	87.111	85.266	88.092
Middle	Decreasing	82.474	86.945	85.848	87.284	89.092	86.665
	Level	78.587	83.846	85.304	85.405	85.730	88.191
	Increasing	83.633	86.467	84.359	87.629	84.455	91.188
High	Decreasing	86.940	85.025	88.225	90.058	81.305	93.849
	Level	80.760	89.157	84.813	91.121	89.585	90.371
	Increasing	89.102	86.160	90.546	88.328	93.636	97.505

Source: life3xp.xls

APPENDIX A
COMPARING MINT STYLIZED PROFILES WITH TRADITIONAL SOCIAL SECURITY WAGE PROFILES

I. INTRODUCTION

This Appendix presents computations comparing the present value of OASI lifetime benefits and the wealth that workers with stylized earnings patterns would accrue at retirement if they could invest employee and employer OASI contributions in defined contribution accounts with alternative assumed rates of return. It also computes the internal rate of return on OASI contributions. These calculations are performed for workers with the stylized earnings patterns reported in this chapter and the results are compared with the same calculations for workers with the traditional Social Security “Low,” “Average,” and “Maximum” wage profiles.

As a note to the reader, the terms “stylized earners,” “profiles,” and “wage earners” are used interchangeably in this appendix.

II. STYLIZED EARNINGS PATTERNS

Traditionally, Social Security has developed estimates of the returns to Social Security on the basis of three stylized earnings patterns. The maximum-income group represents those who had earnings at the maximum taxable amount in every year. The middle group is represented by someone who earns at the average taxable earnings amount in every year, and the low-income group represents those who earn at 45 percent of this average amount.

The MINT project has generated more representative stylized profiles across the population, facilitating comparison with the more traditional stylized Social Security earners on such issues as accumulated wealth and rates of return. Among the various stylized patterns, it is also possible to trace out how the pattern of earnings over time might affect the accumulation of pension wealth in a reformed system that might include individual accounts.

We use 9 stylized earnings patterns for both men and women born between 1931 and 1960 inclusive. The profiles categorize workers based on whether their lifetime earnings are low, middle, or high and whether their average earnings between ages 31-40 and 51-60 are decreasing, level, or increasing. Table 8-A-1 shows the distribution of earnings patterns for the

Table 8-A-1
Mint Wage Profile Descriptions and Sample Weights for 1935 Birth Cohort

Male Wage Profile	Description	Male Sample Size	Female Sample Size	Percent Distribution		(Two-Earner) Spouse's Profile
				Male	Female	
1	Low income, decreasing	458	1,218	10.3	25.9	1
2	Low income, level	25	235	0.6	5.0	3
3	Low income, increasing	183	1,221	4.1	26.0	3
4	Middle income, decreasing	753	382	16.9	8.1	1
5	Middle income, level	164	251	3.7	5.3	3
6	Middle income, increasing	187	1,039	4.2	22.1	6
7	High income, decreasing	1,092	55	24.5	1.2	3
8	High income, level	1,055	90	23.7	1.9	3
9	High income, increasing	536	213	12.0	4.5	3
	Totals	*4,453*	*4,704*	*100.0*	*100.0*	—

The table shows that profiles 1, 4, 7, and 8 represent 75 percent of the 1931-35 sample of male earners. (For the 1951-55 sample, these same four profiles comprise 92 percent of male earners).

Computations of the MINT and SSA wage profile characteristics discussed in this appendix are driven by the following assumptions.

- We took 5-year averages of the data so that we are modeling 6 cohorts: 1931-35, 1936-40, 1941-45, 1946-50, 1951-55, and 1956-60.

- Earnings are measured as multiples of the Social Security average wage in each year and then aligned by the age of the individual. The Social Security "Low" and "Average" profiles are constant multiples of the average wage in every year of a worker's career, while the MINT profile multiples vary from year to year. The "Average" or middle Social Security profile is always 1, corresponding to the average wage in that year; the "Low" profile is always 0.45 times the average wage; the "Maximum" profile is the ratio of the taxable maximum to the average wage in a given year.

- The actual shape of the age-earnings patterns change from cohort to cohort along with the distribution of individuals among the nine patterns, although the criteria for classifying persons among the groups remains the same. The general trend is for relative earnings to increase over time, but there is wide diversity with considerable numbers of persons whose earnings decline with age in the lower income groups.

- Workers are assumed to pay both the employee's and employer's share of Social Security taxes; that is, employers will in practice transfer the burden of such taxes to workers in the form of reduced wages.

- All persons are assumed to retire at age 65. Hence, those retiring in 2003 and later see their monthly benefits actuarially reduced based on the schedule in current law.

- Couples are assumed to be the same age and have two children, born when parents are aged 25 and 30. *This factor is important because our model includes all possible, expected streams of OASI survivors', spousal, or workers' benefits that can be received in each year of a worker's career and retirement, in its estimates of lifetime social security benefits.*

- Our computations employ 1998 OASDI Trustees economic assumptions and 1998 birth cohort life tables from the Office of the Actuary at the Social Security Administration.

III. PRINCIPAL FINDINGS

Our principal findings, using the nine stylized earnings patterns described above, are the following:

- For low and middle earners, Social Security's traditional stylized patterns generally represent workers with higher career earnings than is representative in the population as a whole. Thus, Social Security's low earner is closer to someone with between low and average career earnings, its person with average earnings is closer to someone between average and high earnings.

- Mainly because of these differences, we find that profiles of low and average earners computed in MINT have lower Social Security retirement benefits, but receive higher internal rates of return from Social Security than the traditional stylized earner in Social Security.

- The traditional measure of earnings in Social Security assumes that a worker earns the same wage, relative to the average wage in the economy, every year. That is, they start, stop, and stay at their highest and lowest wage, relative to the economy. He or she is also never out of the labor force for the year. Implicitly, then, Social Security's stylized earnings pattern takes the average wage for all earners in a given year rather than the average wage for all people who participate in Social Security, whether they work or not in a given year.

- As a consequence, given normal earnings patterns, the replacement rate defined as the percentage of peak year's earnings replaced by Social Security is much lower for the MINT representative worker than for the SSA stylized patterns with level earnings. The primary insurance amount as a percent of the economy-wide average wage is also lower for the MINT workers than the SSA workers. However, the primary insurance amount as a percent of the average earnings (indexed) is higher for the MINT workers, especially for low earners and one-earner couples, than for their SSA counterparts. The higher replacement rate for MINT workers compared with their SSA counterparts reflects the interaction of their lower earnings with the redistributive benefit formula in Social Security.

- How one fares with an individual account vis-a-vis the Social Security benefit formula depends upon the rate of return in the account and the variance in lifetime earnings patterns. At higher rates of return especially, those whose lifetime earnings come earlier in life fare relatively better under individual accounts than do those whose earnings come later in life. We see this effect in contrasting the social security stylized earners who receive their peak wage from their starting year and hence make larger contributions earlier on that accumulate more interest over time than the MINT earners, who experience more typical hump shaped earnings patterns and, in particular, have much lower earnings in the earliest years of their careers.

IV. DETAILED DISCUSSION OF RESULTS

In the tables below, we first display a comparison of earnings and social security benefits for representative MINT and SSA earners. We then compare lifetime net benefits under Social Security and a system of individual accounts for different family types and earnings profiles. The last group of tables shows internal rates of return and replacement rates under the current Social Security benefit formula for different types of workers, again using both the MINT and SSA profiles.

Table 8-A-2 shows annualized average indexed monthly earnings (AIME) for the SSA and MINT profiles in year 2000 dollars. SSA profiles enjoy significantly higher *average* earnings than their MINT counterparts. In most cases, SSA profiles receive higher wages than MINT profiles in *every year of work*.

Table 8-A-2
Average Indexed Monthly Earnings for SSA and MINT Wage Profiles for Birth Cohorts 1931-35 and 1951-55

		SSA	MINT				SSA-to-MINT	
Birth Year	Profile	Worker	Male Worker	Percent of Males	Female Worker	Percent of Females	Male Worker	Female Worker
1931-35	Low	1,031	528	15.0	348	56.9	1.95	2.96
	Middle	2,290	1,717	24.8	1,386	35.5	1.33	1.65
	High (Max.)	4,559	3,403	60.2	2,861	7.6	1.34	1.59
	Weighted Average	—	*2,555*	*100.0*	*909*	*100.0*	—	—
1951-55	Low	1,236	619	19.0	477	41.2	2.00	2.59
	Middle	2,747	2,076	31.8	1,754	36.8	1.32	1.57
	High (Max.)	6,688	4,514	49.2	4,030	22.0	1.48	1.66
	Weighted Average	—	*2,997*	*100.0*	*1,729*	*100.0*	—	—

Note: Amounts are in constant 2000 dollars. The MINT profiles “Low,” “Middle,” and “High” are weighted averages of the 3 Low, 3 Middle, and 3 High profiles. The weighted average of all 9 profiles for a given cohort is listed last.

AIMEs for SSA profiles range from 1.33 to 2.96 times as large as the AIMEs for comparable SSA profiles. As shown in the last two columns of the table, the AIME for SSA traditional earners exceeds the AIME for MINT earners in all income categories for both men and women in both the 1931-35 and 1951-55 birth cohorts. The largest difference in AIME between SSA and MINT workers is for low-earnings workers, especially for low-earning females. The gap between SSA and female MINT workers decreases to some degree between the 1931-35 and 1951-55 cohorts, but remains large.

The weighted average AIME of MINT men and women differs from the AIME of MINT middle earning men and women. The weighted average AIME of all MINT men is 12 percent *above* the middle SSA AIME, while the weighted average of AIME of all MINT women is 60 percent below the middle SSA AIME. The difference between the AIME of weighted average and middle-earning MINT men and women reflects the skewness of the earnings distribution. Sixty percent of men in the MINT sample fall into the three higher income profiles, while 57 percent of the women fall in the three lower income profiles. Within the MINT profiles, the AIME spread between high and low is roughly 6.4 to 1 for men and 8.2 to 1. For a weighted average of all workers in the MINT sample, the AIME for males is 2.8 times the AIME for females.

The primary difference between the 1931-35 and 1951-55 birth cohorts in terms of AIMEs is that women gain ground in terms of income, both relative to men and the SSA prototypical earners over the intervening years. (In fact, there are relatively fewer men in the higher income profiles in 1951-55 than in 1931-35.) While women earners are still concentrated in the lower and middle income groups, the percentage of women in the lowest income group decreases 16 percentage points between 1931-35 and 1951-55, while the percentage of women in the highest income profiles nearly triples from around 8 percent to 22 percent. The gap between both male and female MINT earners and the middle SSA worker narrows between the two birth cohorts. The weighted average of MINT women earners in 1951-55 is 37 percent lower than the SSA average worker, which is for women born in 1931-35. The weighted average MINT male earner's AIME is 9 percent above the AIME of the SSA middle earner, less than the 12 percent difference for the 1931-35 cohort.. Within the MINT profiles, the AIME spread between high and low earners in 1951-55 is roughly 7.3 to 1 for men and 8.4 to 1 for women, showing a slight increase in earnings inequality for men but no change in inequality for women. The ratio of MINT male to female weighted average AIME is 1.7, again showing that women have significantly gained ground relative to men.

Table 8-A-3 displays present value of lifetime benefits for the low, middle, and maximum (or high) earners from the SSA and MINT profiles in the 1931-35 and 1951-55 birth cohorts. The SSA stylized earners do not receive much more in social security benefits than their MINT counterparts, despite their significantly higher lifetime earnings, as shown in Table 8A.2. There are two reasons that the difference between SSA and MINT benefits is proportionately less than the difference between SSA and MINT earnings. First, MINT stylized earners benefit more from Social Security's redistributive benefit formula because of their lower earnings. Second, so the MINT profiles receive proportionately more in spousal and survivors' benefits than do the SSA profiles because the difference in wage levels between MINT spouses is higher than the difference in wages between SSA spouses.

Table 8-A-3
Lifetime Social Security Benefits for SSA and MINT Wage Profiles for 1931-35 and 1951-55 Birth Cohorts

Wage Profile	Description (wage level, shape)	1931-35 Birth Cohort Male Worker	1931-35 Female Worker	1931-35 One-Earner Couple	1931-35 Two-Earner Couple	1951-55 Birth Cohort Male Worker	1951-55 Female Worker	1951-55 One-Earner Couple	1951-55 Two-Earner Couple
1	Low, decreasing	56,237	45,701	128,349	140,846	68,734	77,455	147,298	190,983
2	Low, level	57,797	37,736	129,749	149,932	29,692	71,132	66,364	107,819
3	Low, increasing	40,491	54,061	88,589	109,594	40,174	57,659	85,596	116,438
4	Middle, decreasing	101,097	110,624	228,365	233,220	123,677	142,327	262,060	272,089
5	Middle, level	99,717	115,676	222,230	226,808	122,402	141,924	257,564	268,032
6	Middle, increasing	91,337	114,929	199,491	265,861	106,113	133,486	222,807	301,714
7	High, decreasing	148,894	182,032	331,414	336,518	187,345	234,732	395,259	410,920
8	High, level	158,127	185,703	350,589	355,572	207,985	242,611	437,123	453,422
9	High, increasing	161,555	189,757	356,107	360,860	180,080	232,710	371,223	382,784
10	SSA Low, level	73,233	96,338	164,232	188,106	90,466	114,354	191,043	223,054
11	SSA Average, level	120,938	159,093	270,621	296,251	149,323	188,719	315,338	350,963
12	SSA Max., level	175,575	230,968	387,471	450,694	239,205	302,313	504,336	571,024
Weighted Average (MINT)		*125,788*	*82,571*	*279,920*	*288,959*	*149,240*	*131,458*	*315,066*	*334,732*

Note: MINT profiles are numbers 1-9. MINT two-earner couples are described in Table 8A.1. We define three hypothetical two-earner SSA couples as follows: SSA Low = low wage male and low wage female; SSA Average = average wage male and low wage female; SSA Max. = maximum wage male and average wage female. Social security benefits are adjusted for the chance of death in all years after age 21.

Table 8-A-4 shows the ratio of individual account wealth to lifetime social security benefits at a 2 percent rate of return for four family types, grouped by nine different wage profiles. A value less than 1.00 means that social security provides higher benefits than an individual account does for the given household in the given wage profile.

The weighted averages in the bottom row summarize the story. For both birth cohorts, Social Security provides an equal or higher level of benefits than an individual account returning 2 percent real for all earnings profiles of single females, one-earner couples, and two-earner couples. Individual accounts provide higher benefits for high-wage single males. The ratio of individual account wealth to social security benefits for women and couples increases over time because of growth in real earnings and women's rising participation rates in the labor force. Hence, the 1951-55 birth cohort features higher weighted averages for all stylized earners. As with the 1931-35 cohort, however, only higher income single males (the majority of males) receive higher benefits from individual accounts than they would from Social Security.

The SSA profiles fare relatively better under individual accounts than Social Security than their MINT counterparts. Maximum-wage SSA earners receive a higher present values of benefits under an individual account system than under Social Security in both birth cohorts. In the 1951-55 birth cohort, average-wage, single men and women and two-earner couples also receive more in lifetime benefits from individual accounts than from Social Security.

Table 8-A-5 shows the same calculations as Table 8-A-4, but with a 5 percent real interest rate. In both cohorts, the higher interest rate makes individual accounts preferable to Social Security for most MINT single wage earners. For some single wage earners, individual accounts provide net benefits that are worth two or three times the net present value of Social Security benefits with individual accounts. Most groups of both men and women receive more wealth with individual accounts than with Social Security, but individual accounts help men relatively more than women. All SSA stylized earners receive higher benefits under an individual account system at 5 percent interest, with the exception of low-income, one-earner couples. The ratios of individual account wealth to Social Security wealth for all SSA wage earners exceed the corresponding ratios for their MINT counterparts.

Even at a 5 percent rate of return, some MINT profiles still fare better under Social Security than with individual accounts. In the 1931-35 birth cohort, most groups of lower income profiles (profiles 1-3) and the middle income group (profiles 4-6) of one-earner couples receive a higher present value of benefits under Social Security than with individual accounts. For the 1951-55 birth cohort, however, generally only lower income one-earner couples would benefit more from Social Security than individual accounts. Finally, the ratios of individual account wealth to lifetime Social Security benefits are higher in 1951-55 than in 1931-35 for all the SSA earners and most of the MINT profiles.

Table 8-A-6 shows the internal rates of return (IRR) that different worker types receive from Social Security. Within a cohort, couples receive higher returns than singles in the same earnings profile category because of Social Security's spousal and survivor's benefits. Single women receive higher rates of return than single men because they live longer and can expect to receive more years of benefits. (In addition, in the MINT profiles, women receive higher replacement rates than men because they have lower AIMEs.) One-earner couples receive the highest IRRs overall because of Social Security's generous spousal benefits. Among cohorts, earlier cohorts enjoy higher IRRs than later cohorts. Comparing SSA profiles and MINT profiles, the latter do better under Social Security for two primary reasons. First, MINT workers have lower wage levels than the corresponding SSA profiles and thus benefit more from Social

Table 8-A-4
Ratios of Individual Account Wealth to Social Security Wealth at a Two Percent Real Interest Rate

MINT Wage Profile	Description (wage level, shape)	1931-35 Birth Cohort Single Male Worker	1931-35 Birth Cohort Single Female Worker	1931-35 Birth Cohort One-Earner Couple	1931-35 Birth Cohort Two-Earner Couple	1951-55 Birth Cohort Single Male Worker	1951-55 Birth Cohort Single Female Worker	1951-55 Birth Cohort One-Earner Couple	1951-55 Birth Cohort Two-Earner Couple
1	Low, decreasing	0.54	0.39	0.24	0.34	0.66	0.50	0.31	0.44
2	Low, level	0.58	0.42	0.26	0.36	0.61	0.50	0.27	0.42
3	Low, increasing	0.45	0.37	0.21	0.35	0.56	0.47	0.26	0.43
4	Middle, decreasing	0.97	0.70	0.43	0.50	1.12	0.86	0.53	0.65
5	Middle, level	1.01	0.73	0.46	0.53	1.12	0.88	0.53	0.62
6	Middle, increasing	0.91	0.68	0.42	0.61	0.97	0.80	0.46	0.69
7	High, decreasing	1.18	0.87	0.53	0.58	1.39	1.06	0.66	0.70
8	High, level	1.32	0.92	0.60	0.64	1.59	1.14	0.76	0.79
9	High, increasing	1.33	0.87	0.60	0.65	1.15	1.01	0.56	0.61
10	SSA Low, level	0.88	0.69	0.39	0.69	1.00	0.81	0.47	0.82
11	SSA Average, level	1.18	0.93	0.53	0.70	1.34	1.09	0.64	0.84
12	SSA Max., level	1.49	1.18	0.67	0.91	1.97	1.61	0.93	1.19
	Weighted Average (MINT)	*1.08*	*0.53*	*0.48*	*0.55*	*1.22*	*0.76*	*0.58*	*0.66*

Note: MINT profiles are numbers 1-9. Contributions to worker individual accounts are made at the OASI tax rate in effect for the given year and compound at a 2 percent real annual interest rate with all amounts reinvested. Individual account wealth is thus total accumulated wealth at age 65, adjusted for the chance of death in all years after age 21. This amount is then divided by the present value at age 65 of lifetime social security benefits a worker would have received given his/her wage history and average life expectancy for his/her birth cohort and gender, also adjusted for the chance of death in each year after age 21. (Note that workers always retire at age 65 and those retiring after 2003 have their benefits actuarially reduced in line with increases in the NRA stipulated in current law). Ratios less than one indicate that the present value of lifetime social security benefits at age 65 exceed individual account wealth at age 65. MINT two-earner couples are described in Table 8A.1. We define three hypothetical two-earner SSA couples as follows: SSA Low = low wage male and low wage female; SSA Average = average wage male and low wage female; SSA Max. = maximum wage male and average wage female.

Table 8-A-5
Ratios of Individual Account Wealth to Social Security Wealth at a Five Percent Real Interest Rate

MINT Wage Profile	Description (wage level, shape)	1931-35 Birth Cohort Male Worker	1931-35 Birth Cohort Female Worker	1931-35 Birth Cohort One-Earner Couple	1931-35 Birth Cohort Two-Earner Couple	1951-55 Birth Cohort Male Worker	1951-55 Birth Cohort Female Worker	1951-55 Birth Cohort One-Earner Couple	1951-55 Birth Cohort Two-Earner Couple
1	Low, decreasing	1.33	0.89	0.58	0.82	1.71	1.21	0.80	1.11
2	Low, level	1.27	0.84	0.57	0.72	1.62	1.09	0.72	1.03
3	Low, increasing	0.87	0.64	0.40	0.64	1.18	1.09	0.55	0.95
4	Middle, decreasing	2.14	1.44	0.95	1.10	2.55	1.89	1.21	1.51
5	Middle, level	1.98	1.37	0.89	1.02	2.37	1.76	1.12	1.31
6	Middle, increasing	1.57	1.11	0.72	1.02	1.94	1.55	0.93	1.37
7	High, decreasing	2.37	1.73	1.07	1.15	3.00	2.26	1.42	1.52
8	High, level	2.49	1.72	1.12	1.20	3.25	2.23	1.54	1.63
9	High, increasing	2.40	1.45	1.09	1.17	2.10	1.89	1.02	1.15
10	SSA Low, level	1.73	1.35	0.77	1.37	2.11	1.71	1.00	1.73
11	SSA Average, level	2.33	1.82	1.04	1.39	2.84	2.30	1.35	1.77
12	SSA Max., level	2.67	2.09	1.21	1.68	4.09	3.31	1.94	2.47
Weighted Average (MINT)		*2.14*	*0.99*	*0.96*	*1.09*	*2.66*	*1.58*	*1.26*	*1.46*

Note: MINT profiles are numbers 1-9. Contributions to worker individual accounts are made at the OASI tax rate in effect for the given year and compound at a 2 percent real annual interest rate with all amounts reinvested. Individual Account wealth is thus total accumulated wealth at age 65, adjusted for the chance of death in all years after age 21. This amount is then divided by the present value at age 65 of lifetime social security benefits a worker would have received given his/her wage history and average life expectancy for his/her birth cohort and gender, also adjusted for the chance of death in each year after age 21. (Note that workers always retire at age 65 and those retiring after 2003 have their benefits actuarially reduced in line with increases in the NRA stipulated in current law). Ratios less than one indicate that the present value of lifetime social security benefits at age 65 exceed individual account wealth at age 65. MINT two-earner couples are described in Table 8A.1. We define three hypothetical two-earner SSA couples as follows: SSA Low = low wage male and low wage female; SSA Average = average wage male and low wage female; SSA Max. = maximum wage male and average wage female.

Table 8-A-6
Real Lifetime Internal Rates of Return for MINT and SSA Wage Profiles

Wage Profile	Description (wage level, shape)	1931-35 Birth Cohort				1951-55 Birth Cohort			
		Male Worker	Female Worker	One-Earner Couple	Two-Earner Couple	Male Worker	Female Worker	One-Earner Couple	Two-Earner Couple
1	Low, decreasing	3.62	4.56	6.25	5.15	3.02	3.78	5.12	4.22
2	Low, level	3.61	4.68	6.34	5.55	3.21	3.95	5.63	4.54
3	Low, increasing	4.68	5.62	7.45	5.99	3.77	4.03	6.40	4.67
4	Middle, decreasing	2.08	3.08	4.62	4.16	1.67	2.42	3.83	3.22
5	Middle, level	1.95	3.03	4.74	4.25	1.64	2.40	3.95	3.51
6	Middle, increasing	2.36	3.52	5.48	4.01	2.11	2.72	4.54	3.22
7	High, decreasing	1.46	2.45	4.12	3.85	1.02	1.83	3.26	3.09
8	High, level	1.03	2.28	3.85	3.60	0.51	1.59	2.88	2.75
9	High, increasing	0.96	2.54	3.89	3.63	1.49	1.96	4.05	3.69
10	SSA Low, level	2.44	3.20	5.30	3.30	2.01	2.61	4.34	2.64
11	SSA Average, level	1.45	2.25	4.22	3.22	1.08	1.73	3.41	2.56
12	SSA Max., level	0.49	1.41	3.49	2.36	(0.17)	0.54	2.21	1.46
	Weighted Average (MINT)	*1.82*	*4.25*	*4.56*	*4.07*	*1.47*	*2.92*	*3.72*	*3.27*

Note: MINT profiles are numbers 1-9. While we assume that both SSA Men and Women earn the same exact wages, women's longer life spans give them different IRRs. All social security contribution and benefit amounts are adjusted for the chance of death in all years after age 21. MINT two-earner couples are described in Table 8A.1. We define three hypothetical two-earner SSA couples as follows: SSA Low = low wage male and low wage female; SSA Average = average wage male and low wage female; SSA Max. = maximum wage male and average wage female.

Security's redistributive benefit formula. Second, the difference in wage levels between MINT spouses is larger than for the SSA spouses we chose to model, which increases the value of survivors' and spousal benefits for MINT retirees compared with SSA profiles.

The main pattern that emerges from the IRR comparison in Table 8A.6 is that the Social Security system provides the highest rates of return to low-income earners, women, and one-earner couples. Because an individual account system, without explicit redistribution, would provide the same IRR for everyone, these same groups would benefit the least from replacing Social Security with individual accounts.

The preceding tables have evaluated Social Security as an investment program to provide retirement income and compared the present value of wealth and rates of return for different representative wage earners and family types. Another concern of retirement policy is whether Social Security provides enough to enable people to maintain their living standards after retirement. The replacement rate, or fraction of a workers' earnings that social security replaces, is one important measure of whether social security provides adequate income for retirees, especially for low career earnings who may lack other sources of retirement income, such as private pensions or returns from non-pension saving.

Table 8-A-7 displays the fraction of annual earnings social security will replace for each worker type. There are various ways to measure this "replacement" rate. Because the MINT profiles experience rapidly declining earnings during the latter years of their careers, the first method compares the annual social security benefit received at age 65 with the worker's highest year of earnings. The second method compares benefits in the first year of retirement to a worker's career average earnings (the average of the best 35 years of worker earnings).

Under both sets of calculations, replacement rates from Social Security decrease as average incomes rise. One-earner couples can expect the highest replacement rates (we include the spousal benefit in the primary insurance amount), while single males can expect the lowest. SSA profiles enjoy higher replacement rates under the PIA-to-Peak Wage method because their peak wage equals their average wage (the determinant of AIME and therefore PIA) while, for MINT profiles, the peak wage may be 1.5 to 2.5 times the profile's average wage. The PIA-to-AIME method thus produces higher replacement rates overall (and higher rates for corresponding MINT categories than for SSA) because it measures the ratio of benefits to average instead of peak wages. Using the latter method, MINT workers receive higher replacement rates than their SSA counterparts because they have lower average lifetime earnings.

Table 8-A-7
Two Ways to Measure Replacement Rates for MINT and SSA Profiles from the 1935 Birth Cohort
(Figures in Percent)

Wage Profile	Description (wage level, shape)	Ratio of PIA to Peak Wage				Ratio of PIA to AIME			
		Male Worker	Female Worker	One-Earner Couple	Two-Earner Couple	Male Worker	Female Worker	One-Earner Couple	Two Earner Couple
1	Low, decreasing	37.7	50.9	56.5	41.9	78.5	86.6	117.8	81.4
2	Low, level	38.7	55.6	58.1	42.0	75.4	86.6	113.1	79.7
3	Low, increasing	40.0	47.8	60.0	43.6	86.6	86.6	129.9	86.6
4	Middle, decreasing	28.2	31.1	42.3	35.5	46.5	51.9	69.8	52.8
5	Middle, level	36.3	34.9	54.5	41.5	46.8	50.4	70.3	54.1
6	Middle, increasing	25.9	28.8	38.9	27.2	49.2	50.6	73.8	49.9
7	High, decreasing	23.0	25.2	34.5	30.5	39.6	40.9	59.4	44.9
8	High, level	25.2	28.8	37.8	33.2	35.9	40.6	53.9	40.9
9	High, increasing	24.6	25.0	36.8	32.6	34.8	40.3	52.2	39.6
10	SSA Low, level	51.8	51.8	77.7	51.8	57.8	57.8	86.6	57.8
11	SSA Average, level	38.5	38.5	57.7	42.6	42.9	42.9	64.4	47.5
12	SSA Max., level	21.9	21.9	32.9	26.6	31.3	31.3	46.9	35.2
Weighted Average (MINT)		*27.5*	*41.1*	*41.3*	*34.3*	*46.1*	*70.4*	*69.2*	*50.8*

Note: MINT profiles are numbers 1-9. SSA's profiles do not differentiate between men and women; both earn the exact same wages and therefore receive the exact same benefit in the first year of retirement (although differences in age-adjusted life expectancy will produce different *expected* annual and total lifetime benefits for the two sexes under these SSA profiles). MINT two-earner couples are described in Table 8A.1. We define three hypothetical two-earner SSA couples as follows: SSA Low = low wage male and low wage female; SSA Average = average wage male and low wage female; SSA Max. = maximum wage male and average wage female.

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1. The current wage ceiling is indexed to the economy-wide wage with a two-year lag. At various points in the analysis the revised earnings is referred to as "less-censored earnings."

2. The methodology is adapted from work by Herman Grundman and Barry Bye of the Social Security Administration as reported in *Report of the Consultant Panel on Social Security to the Congressional Research Service*, Committee on Finance of the U.S. Senate and the Committee on Ways and Means of the U.S. House of Representatives, August 1976.

3. The choice of the three class intervals is not sensitive to the choice of birth cohorts. If the intervals were based on average earnings of the 1931-40 cohort whose work life was largely completed by 1996, the middle interval would extend from 0.33 to 1.02. For the 1941-60 cohort, it is 0.38 to 1.05.

4. Thus, the vector of average earnings is equal to the vector of non-zero earnings multiplied by the proportion of individuals with non-zero earnings.

5. Note that the scales of Figure 8-3f are smaller than the scales of Figure 8-3a, so that the drop in earnings in the former is much less than in the latter even though the two appear similar.

6. To explore the extent of matching in more detail, it would be useful to compute separate distributions by sex and birth cohort.

CHAPTER 9

CONCLUSIONS

This report provides a detailed explanation of the construction of a data base for Social Security beneficiaries in the 1931-60 birth cohorts in the year 2020. For these cohorts of current and future retirees, we have projected income at retirement age and post-retirement incomes to the year 2020. Incomes in retirement from Social Security benefits, pensions, non-pension financial assets, and partial retirement earnings were calculated based on separate projections of lifetime earnings patterns (Chapter 2), pension coverage and benefit amounts (Chapter 3), other (non-pension) financial assets and housing wealth (Chapter 4), the timing of retirement (Chapter 5), and partial retirement earnings (Chapter 6). To project the population of future beneficiaries, we used projections by RAND of mortality, marriages, and divorces, and made a separate projection (in Chapter 2) of the incidence of disability. Based on projections of incomes from different sources at retirement, we then project changes in wealth and income after retirement through the year 2020 (Chapter 7).

The projections are based mostly on regression equations that explain changes in each source of income over a person's lifetime as a function of other (previously projected) income sources and demographic variables. Thus, to a large extent the projections assume that past behaviors will be repeated for later birth cohorts. The projections do not anticipate any major structural changes, such as a change in the attitutes towards retirement of more recent cohorts. Differences in retirement income between future cohorts of retirees and today's cohorts of retirees result from different early life histories (such as the level of earnings early in one's career) and differences in the demographic profile of future retirees. These latter differences include changes from earlier to later birth cohorts in education levels, the racial composition of the population, mortality rates at different ages, and marriage and divorce rates.

While characteristics of future retirees, such as their date of retirement, sources of post-retirement income, income differences by education and marital status, and overall dispersion of incomes will not differ radically from characteristics of today's retirees, some notable trends emerge from the projections:

- Lifetime earnings inequality is projected to be greater for more recent than for earlier cohorts of retirees. This reflects in part the increased inequality of earnings among younger workers today compared with earnings inequality experienced by earlier cohorts when young.

- Lifetime earnings of women will rise relative to lifetime earnings of men for younger cohorts. Again, this reflects the higher labor force participation rates and increased educational attainment of more recent, as compared with earlier, cohorts of women.

- Relative to the average wage in the economy, lifetime earnings for the early baby boomers (1946-50) will be higher than lifetime earnings for earlier (1931-45) or later cohorts (1951-60). This earnings forecast affects our projections of Social Security benefits, income from post-retirement earnings, and other sources of income for Social Security beneficiaries.

- Future workers are more likely to be covered by a defined contribution (DC) pension and less likely to be covered by a defined benefit (DB) pension than today's workers. This shift reflects an assumed increase in the proportion of newly covered workers who will have DC instead of DB coverage.

- Future cohorts of women retirees will have more pension coverage in the future than today's women beneficiaries. This occurs as a result of the increase in lifetime earnings of women. In contrast to men, the DB coverage of women is not projected to decline.

- DB benefits per beneficiary at retirement (relative to the average wage) are projected to decline for the youngest cohorts of workers. The decline in DB benefits results from the projected decline in earnings of younger cohorts of workers. Average DC balances at retirement (relative to the average wage), in contrast, are projected to increase.

- Birth cohorts after 1946-50 are projected to have lower homeownership rates and less average housing wealth at retirement (relative to the average wage) than the 1946-50 birth cohorts. This in part reflects an increase in the proportion of single people in the population.

- Wealth in other (non-pension) financial assets at retirement, relative to the average wage, is projected to be lower for each successive cohort after the 1931-35 birth cohort. This decline in non-pension wealth reflects both a fall in lifetime earnings for the last two cohorts and lower holdings of non-pension wealth of younger workers in the most recent birth cohorts than our wealth accumulation equation predicts based on wealth holdings of earlier cohorts at the same ages . Some of this decline in non-pension wealth, however, reflects the substitution of pension wealth for non-pension assets that has occurred in recent years, especially the growth in defined contribution plans.

- The determinants of when to accept Social Security benefits differ greatly between married men and married women and between couples and single individuals. Women on average choose to receive benefits earlier than men, but are also more likely to wait until age 67 before receiving benefits. Married women on average claim benefits about a year earlier than their non-married counterparts. Married men also claim benefits earlier than never-married men, but not to the same relative degrees as married compared with unmarried women.

- In spite of differences in factors predicting the timing of retirement among groups and by income, and changes in both the composition of groups and relative income levels, we project little change across cohorts in the timing of Social Security benefit receipt. This probably is the result of offsetting effects. For example, lifetime income gains of women make it more likely that they will retire early by making retirement more affordable, but increased education of women and higher earnings just before retirement age make their early retirement less likely by raising the potential rewards for continuing to work.

- More future Social Security beneficiaries will have some post-retirement earnings at ages 62 and 67 than current beneficiaries. This increase in labor force participation among Social Security beneficiaries will be greatest for married females.

- Labor force participation among 62 year old beneficiaries is projected to increase through the 1951-55 cohort, but will decline in the last cohort. The percentages working between the earliest and latest cohorts will increase for all 4 gender-marital status combinations, but participation of married males, unmarried males, and unmarried females will decline slightly after the 1951-55 birth cohort.

- For 67 year olds, participation will rise over time for all groups except married males. Overall participation stabilizes in the 1956-60 cohorts. Econometric results suggest that average earnings of those working and receiving benefits will increase as the Social Security earnings limit for 65-69 year old workers increases.

- Overall incomes at retirement mirror changes in the separate income sources. Income at year of first benefit receipt peaks for the 1946-50 cohort and then declines for later cohorts. The biggest sources of decline for cohorts born after 1946-50 are in earned income and DB pension income, reflecting the projected lower lifetime earnings for the most recent birth cohorts in MINT. Social Security and income from financial assets (including DC plans) will be a larger share of income for later than for earlier birth cohorts.

- Per-capita income of Social Security recipients at initial benefit receipt will be less evenly distributed for later cohorts of retirees. The top quintile of beneficiaries will receive 6.45 times as much income at retirement as the bottom quintile in the 1931-35 birth cohorts. In contrast, for the 1956-60 birth cohorts, the top quintile will receive 8.19 times as much income as the bottom quintile. Compared with the 1946-50 cohorts, the per capita income (relative to the average wage) of the 1956-60 cohorts will be lower for every income group except the top quintile. In the top quintile, average per capita income at retirement in 1956-60 will be higher for females, but lower for males compared with per capita income in the top quintile of the 1946-50 birth cohorts.

- Econometric analysis suggests that retirees generally reduce their holdings of financial assets as they age, but at a much slower rate than the decline in the value of an annuity with an expected value of zero at the date of death. Some groups increase their financial asset holdings in retirement. The decay rate of financial wealth varies with homeownership status, race, education level, and marital status.

- Poverty rates of the most recent birth cohorts of retirees (younger retirees) are projected to be higher than poverty rates of earlier cohorts (older retirees) in 2020, even though the older retirees will have a lower average income. This reflects the increased dispersion of the income distribution. The increase in poverty among younger compared with older retirees is concentrated among certain sub-groups of the population, including retirees with less education, blacks, and retirees who never married.

- The total poverty rate among retirees is projected to be higher in 2020 than in the early 1990s, in spite of the substantial increase in average earnings of the population that is projected to occur over the next 20 years. Changes in poverty rates reflect both changes in the composition of different groups in the population and changes in poverty rates within groups. Younger retirees will become a larger share of the population in 2020 than in the early 1990s and will have higher poverty rates. The poverty rate will increase substantially among never married retirees, who will also become a larger share of the population. The rise in the percentage of retirees who are divorced also contributes to the higher poverty rate, in spite of a projected decline in poverty among those divorced, because divorced retirees have a higher poverty rate than others.

- The projections of higher poverty rates for later birth cohorts and for the entire retired population in 2020 mainly reflects projected lower lifetime earnings for later cohorts and reduced Social Security benefits resulting from the scheduled increase in the normal retirement age. The earnings projections are based on observed earnings through 1996. We have not performed a sensitivity analysis on how projected poverty rates may change with altered assumptions and methodologies. If, however, earnings rise at the bottom end of the income distribution or if low-income workers stay in the labor force longer in response to reduced social security benefits, these increased poverty rates may not materialize. Nonetheless, the possibility that future retirees might experience higher poverty rates in spite of rising economy-wide earnings raises important policy concerns and merits further examination.

- Examination of the lifetime earnings patterns of the 1931-40 birth cohorts reveals a large diversity in patterns of earnings among workers. This diversity suggests that representation of individuals with level career earnings patterns as "typical" may be misleading for some analytical purposes.

- The methods for projecting earnings, while providing accurate forecasts of average age-earnings profiles, suppress some of the variation in earnings patterns among workers. This increases over time the share of workers who are shown to have "typical" earnings patterns.

- Use of the representative earnings profiles, both historical and projected, from the MINT project in place of the traditional SSA profiles of high/medium/low earners makes a difference in policy analysis. Using the MINT profiles instead of the traditional SSA profiles makes the present value of Social Security benefits relatively higher than the present value of benefits from a system of individual accounts. The higher relative return in the current system using the MINT profiles occurs both because MINT earnings are on average lower than earnings in the traditional profiles and because MINT earnings occur later in life, thus reducing some of the advantage of compounding under individual accounts.

Compiling the MINT data base was a complex process. Because of the sequential nature of the projections, projections of each set of variables is highly dependent on the results form projections in early stages of the project. In particular, the projection of lifetime earnings in chapter 2 substantially influences all of the subsequent projections. Any misspecification or error in one stage of the project could produce bigger errors in downstream projections. Thus, at this stage, the findings should be viewed with some caution.

The MINT project, as designed by the Social Security Administration and implemented by the Contractors, took certain shortcuts in order to make it possible to develop a workable model within time and budget constraints. Some of these shortcuts have been questioned by reviewers. In particular, we concur with the suggestion that further work on the modeling of retirement behavior, especially for workers between ages 55 and 62, would be a useful next stage of model development. This would require a substantial revision of the current earnings model, which may or may not change the main qualititative findings of in this report. But more explicit modeling of the retirement decision would result in projections that better capture the diversity of career earnings patterns and would increase confidence in the model's findings.

It would also be useful to explore the effects of alternative assumptions and parameters on the projected distribution of retirement income. These include assumptions about the mean and variance of rates of return on financial assets, trends in pension fund participation by plan type, and interactions between pension and non-pension saving. It would also be useful to incorporate in MINT an explicit response of post age-62 earnings (both the decision to accept benefits and partial retirement earnings of beneficiaries) to increases in the normal retirement age.[1] One advantage of MINT in its current form is that it is possible at a relatively modest cost to perform a wide variety of sensitivity analyses of this type.

CHAPTER 9: REFERENCES

Melissa M. Favreault, Caroline Ratcliffe, and Eric Toder. 1999. "Labor Force Participation of Older Workers: Prospective Changes and Potential Policy Responses." *National Tax Journal* LIII (3): 483-503.

CHAPTER 9: ENDNOTES

1. For an example of such an estimate, see Favreault, Ratcliffe, and Toder (1999).