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**Actuarial Nonequivalence in Early and Delayed
Social Security Benefit Claims
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by

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Abstract

Actuarial Nonequivalence in Early and Delayed Social Security Benefit Claims

Age-related adjustments to Social Security benefits are intended to be actuarially equivalent, on average, rendering lifetime benefits invariant to the timing of first receipt. This paper analyzes actuarial equivalence with respect to early and delayed Social Security benefit claims using a large sample of current and former retired-worker beneficiaries. We find substantial deviations from actuarial equivalence that have resulted in “actuarial premiums” for males, particularly low-income males, and “actuarial losses” for females who accept benefits early. Gender-neutral actuarial adjustments partially offset the female life expectancy advantage in Social Security. For delayed claims, the eight percent credit scheduled in current law is too low for actuarial equivalence. The patterns of actuarial nonequivalence should be considered in analyses of claiming behavior or in simulations of Social Security reform proposals that may affect claiming behavior.

I. Introduction

Since 1956 women have had the option of claiming Social Security retired-worker benefits as early as age 62. The same option was offered to men in 1961. For individuals who postpone receipt, initial benefits are increased for each month of delay, creating a schedule of benefits that potential recipients can choose from. This schedule is intended to be actuarially equivalent, on average, which means that lifetime benefits should be invariant to the timing of first receipt.

Benefit adjustments that are actuarially equivalent on average will nevertheless vary among demographic and socioeconomic groups that exhibit systematic differences in life expectancy. Actuarially nonequivalent benefit adjustments may have unintended consequences. They alter claiming incentives and thereby may distort benefit acceptance decisions. If adjustments are not actuarially equivalent then policy decisions that affect claiming behavior will affect long-run program costs. Nonequivalent actuarial adjustments may also affect retirement decisions and studies that ignore this effect will misstate the incentives to continued work. Finally, benefit adjustments that deviate systematically from actuarial equivalence create some (perhaps unintended) redistribution of benefits.

There is little empirical evidence that bears directly on the accuracy of statutory benefit adjustments (i. e., those prescribed in Social Security law). Blinder, *et al* (1980), Myers and Schobel (1990), and Mirer (1998) are exceptions but those studies are limited to one or two birth or retirement cohorts and are based on life tables that are not specific to the relevant population (retired workers) and that do not vary by earnings. New and more extensive evidence on this important topic is needed, a need that is underscored by the fact that the same statutory adjustments for early benefit claims have been in place since 1956, notwithstanding improvements in life expectancy.

This paper analyzes actuarial equivalence with respect to early and delayed Social Security benefit claims using a large sample of current and former retired-worker beneficiaries. Our primary purpose is to investigate differences by gender and lifetime

earnings in statutory and actuarial benefit adjustments that could give rise to the incentive and distributional consequences described above. The differences are captured in *relative lifetime benefit profiles*, the ratios of lifetime Social Security benefits based on statutory benefit adjustments to those based on actuarially-equivalent adjustments. Our empirical results reveal substantial deviations from actuarial equivalence and relative benefit profiles that differ systematically by earnings and gender. Generally, with an age-65 normal retirement age, the profiles imply an actuarial premium for males, particularly low-earnings males, who accept benefits early and an actuarial loss for most females who accept benefits early. One consequence is that gender-neutral statutory adjustments tend to offset a portion of the female life expectancy advantage in Social Security. We also find that an eight percent per year delayed retirement credit (scheduled in current law but not yet effective) is far from actuarially equivalent for most beneficiaries, particularly those with lower earnings. As the normal retirement age rises, as scheduled under current law, statutory adjustments move further off an actuarial equivalence target for some groups, though this could change with future improvements in life expectancy.

We begin by estimating mortality profiles, allowing the profiles to vary by age, gender, race, birth year, and lifetime earnings. We then compute actuarially equivalent and statutory lifetime Social Security benefits for each month that a benefit claim might be taken after exact age 62. Because the mortality profiles estimated here are endogenous to the population of beneficiaries that have actually confronted Social Security's benefit schedule they provide the relevant basis for evaluating actuarial equivalence with respect to an age-65 normal retirement age. In contrast, most available life tables are based on populations that include disabled persons. Disabled persons, whose benefits are not subject to age-related statutory benefit adjustments, have far higher mortality than the general population and should be excluded when evaluating actuarial equivalence for retired workers.

The next section provides a brief description of the history of actuarial adjustment factors, summarizes the relevant empirical evidence, and describes the calculation of

actuarially equivalent benefit adjustments. The third section describes our data and methods, the fourth section presents our basic results on actuarial equivalence, and the fifth section has implications and conclusions.

II. Actuarial Adjustments

History. The original Social Security Act established age 65 as the minimum age for males and females to qualify for retirement benefits.¹ In 1956, the minimum age was reduced to 62 for women in order to be coincident with the same reduction for wives' benefits made in that year.² This provision was to be structured in a manner that would make benefits at age 62 actuarially equivalent to benefits at age 65, the "normal retirement age."³

Early analysis of this issue was based on available life tables for females and a range of discount rates, though a three-percent rate was considered to be the most reasonable at the time. The analysis led to the conclusion that the appropriate age-62 benefit adjustment factor was 0.80, that is, a benefit claim at exact age 62 would be 80 percent of the age-65 benefit. For administrative convenience, monthly adjustments between ages 62 and 65 would be strictly proportional C that is, 5/9 of one percent of the age-65 benefit for each month above age 62. When males became eligible for early benefits in 1961 the same adjustment factors were applied, despite differences in life expectancy between the sexes. The early benefit adjustment factors that were adopted in 1956 remain in effect today.

In the 1983 Social Security Amendments, Congress provided for a gradual increase in the normal retirement age (NRA) to 67, leaving at 62 the earliest age at which benefits can be claimed. When the higher NRA is fully phased in (2022) an age-62 benefit claim will be

¹A thorough treatment of the development of early and delayed adjustment factors is contained in Myers (1980) which forms the basis for much of the discussion in this subsection.

²Wives' benefits were reduced because wives were, on average, three years younger than their husbands, and couples might otherwise have to wait to retire together.

³Actuarial equivalence was developed in the context of retired workers -- that is, without consideration to

seventy-percent of the age-67 benefit and a new set of monthly adjustment factors will be in place. For the first twenty-four months after age 62, the statutory benefit adjustment will be 5/12 of one percent and, for the subsequent thirty-six months, the adjustment will be 5/9 of one percent.

For benefit claims made prior to the NRA, Congress originally intended that benefit adjustments would be actuarially equivalent on average. For claims made above the NRA, the actuarial equivalence objective was adopted later and implemented more gradually. The first delayed retirement credit (DRC) was introduced in 1972 at 1 percent per year (.083 percent per month above age 65) up to age 72 (later reduced to age 70). The DRC was increased to 3 percent by the 1977 Amendments and scheduled by the 1983 Amendments to increase gradually to 8 percent per year.

Actuarial Equivalence. An actuarially equivalent benefit adjustment equates the present value of benefits that begin at a certain age with the present value of benefits that begin at the normal retirement age. The benefit streams can be compared using standard annuity calculations. To illustrate, let a_{62} represent the present value of a one-dollar annuity at age 62:

$$(1) \quad a_{62} = \sum_{t=0}^{\infty} {}_tS_{62} \rho^t$$

where ${}_tS_{62} = \prod_{x=0}^{t-1} s_{62+x}$ are survival probabilities and ρ^t the inverse of the real discount rate at time t . The value of an annuity issued at age 62 but deferred for three years until age 65 (the NRA annuity) can be expressed as

$$(2) \quad {}_3a_{62} = {}_3S_{62} \rho^3 a_{65}.$$

the lifetime of auxiliary beneficiaries (spouses/widows, for example). That is also the context of this paper.

The present value of the age-62 annuity (1) is clearly larger than that of the age-65 annuity (2) though the exact relationship depends upon mortality and discount rates. The multiplier that reduces the age-62 annuity to *exactly* equal the deferred age-65 annuity is referred to as the age-62 actuarial adjustment factor, $AAF_{62:3}$ ($AAF_{62:5}$ if the NRA is 67).⁴ That is, the product of the actuarial adjustment factor and the immediate annuity is actuarially-equivalent to the age-65 annuity:

$$(3) \quad AAF_{62:3} * a_{62} = {}_3a_{62}.$$

The actuarial adjustment factor is simply the ratio of equation (2) to equation (1):

$$(4) \quad AAF_{62:3} = {}_3a_{62}/a_{62}.$$

If the $AAF_{62:3}$ were 0.83, for example, then beneficiaries who claim benefits at age 62 would receive, on average, lifetime benefits that are nearly 3 percentage points lower than the normal retirement age benefit.

For any path of survivor and discount rates, a different AAF applies to each period away from the normal retirement age. Higher survivor rates (or lower discount rates) result in larger AAFs and therefore larger actuarially equivalent benefits.⁵ Thus, for groups that

⁴ The term adjustment factor is adopted here to be consistent with the terminology used in prior studies on this topic (Myers, 1980-81; Myers and Schobel, 1990). The key distinction is between statutory and actuarial adjustment factors. The former are prescribed in law; the latter are based on actual or assumed mortality and discount rates.

⁵The basic relationship between length-of-life and AAFs can be captured with a very simple example. Suppose person 1 and person 2 are eligible for the same real benefit X at age 65 and they differ only in that person 1 will live until age 67 and person 2 until age 70. Person 1's lifetime benefit is 2*X and person 2's lifetime benefit is 5*X. If they are permitted to take benefits at age 62 then person 1's benefit life is five years and person 2's benefit life is eight years. If lifetime benefits are to be the same whether they begin at age 62 or age 65 then person 1's annual benefit will have to be reduced proportionately more (3*X/5) than

are expected to live longer, such as females and high-income persons, the actuarially equivalent benefit at age 62 will be *higher* (i.e., their AAF is larger) than for those with lower life expectancies, such as males and low-income persons. The differences in survivor profiles among these groups account for the differences reported below in statutory and actuarial adjustments.

The literature is split on the topic of the appropriate rate for discounting. Many researchers believe the government-guaranteed, tax-preferred, inflation-indexed nature of the Social Security benefit warrants a low discount rate. Inasmuch as the program also provides protection against longevity, earnings, disability and intergenerational risks, a low discount rate seems further justified. On the other hand, some authors argue that the political risk inherent in the program outweighs the insurance considerations, and thus a *premium* above the risk-free rate is proper. In addition, because Social Security benefits cannot be used as collateral, liquidity-constraints at retirement age would rationalize a higher rate. In view of the lack of consensus in the literature on the correct discount rate, we present results for a range of rates that span those most commonly used.⁶

III. Data and Survivor Profiles

Data. Our primary data sources are the Social Security Administration's (SSA) 1996 one-percent Continuous Work History Sample (CWHS) and Master Beneficiary Record (MBR). The "active" portion of the CWHS is an historical record of Social Security earnings for about 2.9 million current or former workers in covered employment spanning the period 1937 to 1996. Each record also has date of birth, and race and sex indicators. If a worker attains beneficiary status and subsequently dies, the date of death is recorded in the MBR,

person 2's benefit ($3 \times X/8$).

⁶See Leimer (1995) for a discussion of issues related to choice of discount rate.

the principal official record of historical benefit payments. Death information in the MBR is considered to be of very high quality (Aziz and Buckler, 1992).

For empirical analysis we selected from the one-percent sample current or former retired-worker beneficiaries born during the years 1900 to 1933. All individuals in our sample survived until at least age 62 and first became eligible for benefits between 1962 and 1995. Because our benefit/death information extends through 1998, the oldest observed age in our working sample is 98. Accounting for edits described in the next paragraph and deletions for anomalous cases, our working sample has over 400,000 observations.

Earned income in the CWHS consists of lump-sum taxable earnings for 1937 to 1950, annual taxable earnings from 1951 to 1977, and total (uncapped) earnings from 1978 to 1996. We use these earnings data to develop a summary measure of real lifetime earnings following three adjustments to the data: (1) we prorated the 1937 to 1950 lump-sum under the assumption that, between the reported first and last years of employment prior to 1951, earnings grew at one percent per year of age beyond the economy-wide growth in wages for males and at one-half percent for females;⁷ (2) for individuals who earned the taxable maximum during years 1937-1980, we imputed earnings above the maximum using a Tobit model of earnings under the assumption that earnings are lognormally distributed; (3) earnings (actual or imputed) in each year were indexed to 1999 using the Consumer Price Index. The summary measure of earnings is the average of the log of indexed earnings over ages 35 to 60 where the average is taken only over years of nonzero earnings.⁸ We restricted our sample to include only beneficiaries with some earnings between the ages of 35 and 60. Table 1 has summary statistics for our working sample.

Survival Profiles. We first estimate mortality probability models separately for males and females in which the unit of observation is a person-year and the dependent variable is

⁷ The 1937-1950 average earnings series is from Myers (1993).

⁸ For birth years 1900 and 1901, the average is over ages 37 to 60 and 36 to 60, respectively.

the discrete mortality hazard, indicating whether or not death took place in that year, given that the individual was alive at the end of the previous year. The hazard was estimated directly using the logit probability model so that variables with positive coefficients are associated with higher death rates and shorter expected remaining lifetimes. Explanatory variables include real lifetime earnings (measured as described above), age, birth year, race, and dual beneficiary status. Dual status indicates benefit receipt from another beneficiary's account (in addition to a benefit from their own account) and relates primarily to females entitled to spousal or widow benefits. The dual variable accounts for the fact that dual beneficiaries generally live longer than nonduals. The earnings variable was specified as a cubic polynomial in each equation in order to allow flexibility in the way earnings affects mortality. The estimated parameters, shown in Table 2, are generally highly significant and generally have the expected effect on mortality.⁹ In both equations, the earnings variables as a group are highly significant as indicated by the chi-square statistic in the last line of the table.

Hazard rate profiles for each individual were computed by evaluating the empirical functions in Table 2 at each age beginning with age 62. Survival profiles are derived directly from the hazard rates. Thus, if \hat{h}_{62} is the estimated probability of dying at age 62, given survival to age 61, \hat{h}_{63} is the estimated probability of dying at age 63, given survival to age 62, and so on, then the probability that a 62-year old beneficiary survives until age 62+x is

$$(5) \quad {}_x\hat{s}_{62} = (1 - \hat{h}_{62}) * (1 - \hat{h}_{63}) * \dots * (1 - \hat{h}_{62+x}).$$

⁹ The estimated mortality models result in a marginal effect of earnings on mortality that changes sign at the very low end of the lifetime earnings distribution. For males, this occurs below the sixth percentile of the male earnings distribution and, for females, below the second percentile of the female earnings distribution. For individuals in the lowest portion of the distribution, lifetime earnings may be a relatively unimportant determinant of life expectancy.

We set the maximum value of x to 53 (beneficiaries do not live past age 115). With $\rho=(1/(1+r))$, r the real discount rate and an NRA of 65, the estimated AAF for an age-62 benefit claim is

$$(6) \quad \hat{A}AF_{62:3} = \sum_{x=3}^{53} x \hat{s}_{62} \rho^x / \sum_{x=0}^{53} \hat{s}_{62} \rho^x.$$

Similarly, with an NRA of 67 the summation in the numerator of equation (6) would have $x=5$. Note that, for a given age, the AAF falls as the NRA rises, that is, $AAF_{62:5} < AAF_{62:3}$. For a given NRA (constant numerator), a later age when the initial benefit is claimed results in a higher AAF.

IV. Empirical Results

Normal Retirement Age=65

Table 3 displays average AAFs at exact retirement ages 62 through 70 corresponding to three different discount rates that generally bracket rates used in previous related literature. The top panel displays AAFs with respect to an NRA of 65; the bottom panel is discussed in the next subsection.¹⁰ Statutory adjustment factors are displayed in column 2.¹¹ An AAF that is higher than the statutory factor means the latter results in a benefit that is smaller than the actuarially-equivalent benefit, and conversely. For example, at a discount rate of one percent, males who claim benefits at age 62 would receive a benefit that is two and a half percentage points less than the actuarially equivalent benefit; males who wait until age 70

¹⁰For beneficiaries born prior to 1938 the NRA is 65 and therefore applies to all birth cohorts under study here.

¹¹The statutory factors above the NRA are based on an annual DRC of 8 percent that will affect only beneficiaries born after January 1, 1943. We use the higher credit in order to evaluate its relationship to actuarial equivalence.

to claim benefits would receive a benefit that is almost six percentage points less than the actuarially equivalent amount.

The table illustrates the quantitative importance of the discount rate: a two percentage point higher rate results in more than a three percentage point lower AAF at age 62 and about a ten percentage point higher AAF for an age-70 benefit claim. Thus, choice of discount rate matters and no single rate will equate statutory and actuarial adjustment factors for all demographic groups.

Consider further the results at a three percent discount rate that nearly equilibrates AAFs and statutory factors for females at age 62 and in this sense corresponds to the original basis for establishing statutory factors (see section II). Particularly for males, the eight percent annual credit for benefit claims past the NRA appears to be woefully inadequate, falling short of the age-70 AAF by almost seventeen percentage points.¹² Because the actual DRCs facing the cohorts in this study were lower than eight percent (5.0 percent for the 1933 birth cohort and lower for prior cohorts), the post-age-65 AAF-statutory gaps in Table 3 understate actual differences. Historically, retired-worker beneficiaries faced a large actuarial disincentive to delay claims past age 65.

Relative Benefit Profiles

The means in Table 3 make clear that the ratio of statutory to actuarially equivalent lifetime benefits is not generally equal to one. The underlying monthly patterns provide additional insight. We expect those patterns to vary directly with lifetime earnings, given the link between earnings and life expectancy; that is, higher AAFs for higher earning beneficiaries. To illustrate this, we computed *relative monthly benefit profiles* for each beneficiary: the ratio of statutory to actuarially equivalent benefits at each month between ages 62 and 70. We then sorted our sample into lifetime earnings quintiles. Figure 1 shows

¹²According to Myers (1993, p. 99) “The eventual value of the DRC (8 per year) is not much less than the

these relative benefit profiles for males and females in quintiles one and five using a three percent discount rate. For males in the highest earnings class the ratio is less than one in the first month of delay, rises steadily for the first twenty-two months, and then declines slightly before reaching one at the end of month thirty-six. Beyond age 65, the eight percent statutory credit results in a slightly increasing ratio for the first six months, remains above one for another six months while continuing a steady decline. For males in the lowest earnings quintile, however, the ratios decline for every subsequent month beyond age 62 and four months. For high-earning females the relative benefit profile begins below one and rises fairly steadily for fifty-six months. Note that the eight percent annual DRC is below the AAF for most beneficiaries for most months between ages 65 and 70. The credit is close to actuarial equivalence during age 65 for high-earning beneficiaries, particularly females, but falls below the AAF for most beneficiaries and the difference grows past the NRA.

The results displayed in Figure 1 suggest that current-law statutory benefit adjustments can produce financial incentives relative to actuarial equivalent outcomes that may affect claiming (and retirement) behavior.¹³ Particularly for high-earning females and, to a lesser extent, high-earning males, rising relative benefit profiles mean higher lifetime Social Security benefits when the initial claim is delayed. On the other hand, falling relative benefit profiles means that low-earning males have an incentive to accept benefits at the earliest possible date.

Table 4 provides additional detail by gender and earnings on the nature of those incentives using a three-percent discount rate. The table focuses on months between ages 62 and 65. The first lines of the female and male panels show for each earnings quintile the month (beyond age 62) of the peak statutory/actuarial equivalence ratio and second lines

true actuarial equivalent (about 9 percent)...”

¹³ A full analysis of the claiming decision is beyond the scope of the current study. Coile, et al (1999) provide some empirical evidence on claiming for males who claimed benefits in 1980-81.

show the potential gain in lifetime benefits if the initial claim were delayed until then.¹⁴ The gain is greatest for high-earning females who, by delaying until almost age 65, can increase lifetime benefits by almost \$5,000, on average. Though there are relatively few high-earning females, as shown in the last line of the panels, nontrivial gains are also available to females in the lower quintiles. Males, on the other hand, particularly low-earning males, have very little incentive to delay their initial benefit acceptance.

Finally, the last panel in Table 4 reveals how a single-sex statutory adjustment factor affects the gender differential in lifetime benefits. Note that because the data are sorted by lifetime earnings the differences between males and females in the first lines of the panels reflect primarily differences in life expectancies. Thus, females in the first earnings quintile could receive over \$7,600 more in lifetime benefits than males due largely to a longer life expectancy. But after the same statutory age-62 benefit adjustment is applied to both genders the differential narrows to just over \$5,700, a twenty-five percent reduction. Across the five earnings quintiles, the age-62 gender differential in lifetime benefits is reduced by about twenty percent due to a single-sex statutory reduction. This result suggests a somewhat modified view of the role of life expectancy in Social Security. In any pension program with a defined benefit structure that is designed to be gender- and income-neutral, a longer life means, *ceteris paribus*, larger lifetime benefits. Yet, as the data in Table 4 show, for early female claimers, statutory benefit adjustments offset some of the pure life expectancy advantage.

Actual Actuarial Premiums and Losses

Realized actuarial gains and losses are the consequence of the timing and size of the initial benefit claim. Timing depends on a number of factors including the financial

¹⁴ For each individual we computed an initial Social Security retirement benefit using individual earnings histories and relevant benefit formulas that differ primarily by whether year of birth occurs by or after 1916. The initial benefit was then converted to 1999 dollars using the CPI.

incentives in actuarial benefit adjustments. The median and mean actual months of delay for our cohorts are shown in Table 5 by earnings quintile.¹⁵ Non-dually entitled females, which comprise about half of the female sample, are shown separately since their claiming delays are more comparable to those of males who are predominantly non-dually entitled beneficiaries.¹⁶ Generally, delays rise with lifetime earnings consistent with the results in Table 4, but not monotonically – they decline between the fourth and fifth quintiles as many high-earning beneficiaries claim benefits early.¹⁷ From Figure 1, we saw that high-earning males who claim early will have a relative benefit ratio that is below one, on average, implying an actuarial loss whereas most males in the first quintile will experience an actuarial premium until age 65. Figure 1 also indicates that most females will experience an actuarial loss regardless of when they claim, though the loss can be minimized if the delay decision is made optimally.

Figure 2 shows for our beneficiary sample the distribution of total lifetime actuarial premiums by gender and earnings quintile and Figure 3 shows the distribution of total lifetime actuarial losses (using a three-percent discount rate). Males experience ninety-five percent of actuarial premiums (over seventy-percent in the middle three quintiles) and less than thirty-percent of actuarial losses, the latter primarily from high-earning males. Females experience over seventy-percent of actuarial losses, most of which occurs in the first four earnings quintiles, but only five percent of actuarial gains. Clearly, males gain the most from actuarial nonequivalence.

¹⁵ Months of delay are measured between exact age 62 and the date of initial benefit claim. Some workers with relatively high earnings may delay their initial claim in order to avoid having benefits withheld due to the earnings test.

¹⁶ Social security benefit rules make it more likely that dual beneficiaries will claim benefits as early as possible.

¹⁷ In cross sectional analysis, Coile, *et al* (1999) find some evidence of an inverted u-shaped relationship between wealth and delays in claiming.

Normal Retirement Age=67

At a given age, AAFs vary inversely with the NRA, as seen section III and in the lower panel of Table 3, and a higher NRA means larger discount rate differences for early benefit claims and smaller differences for claims made past the NRA.¹⁸ Raising the NRA has a larger effect on male AAFs due to men's shorter life expectancy. For example, with a three-percent discount rate, age-62 AAFs fall 15.5 and 13.6 percent for males and females, respectively, between the age-65 and age-67 NRAs. The analogous statutory adjustment factor (column 2 of Table 3) declines from 80 percent to 70 percent, a 12.5 percent change.

Relative Benefit Profiles

When the age-67 NRA becomes effective, monthly statutory benefit reductions will be five-ninths of one percent for each month of claim delay between ages 64 and 67 and five-twelfths of one percent for ages 62 and 63. Thus, effective monthly reduction rates will be smaller than the rates used with the age-65 NRA. For our male beneficiary sample, the effect on their relative benefit profiles is predictable. From Figure 1 we saw that the age-65 NRA monthly statutory adjustment factors are smaller than AAFs for low-earning males.¹⁹ The smaller statutory reductions for claims from age 62 to age 64 under the higher NRA means relative benefit profiles will lie above the profiles under the age-65 NRA, moving them further from an actuarial-equivalence target. Figure 4 illustrates for high- and low-earning males the difference in relative benefit profiles between the two NRAs (using a three percent discount rate). Compared to the age-65 NRA, male benefit profiles are steeper.²⁰

¹⁸The NRA begins to increase for the 1938 birth cohort and will eventually reach age 67 for all cohorts born after 1959. The first beneficiaries affected were those newly-eligible in January, 2000.

¹⁹73 percent of males have an exact age-62 AAF less than .80.

²⁰For our female sample the effects on relative benefit profiles of the higher NRA are much smaller with profile lines that are only slightly different from those in Figure 1.

An important caveat to these observations is that the higher NRA will apply to future beneficiaries with longer life expectancies than the cohorts in our sample. Advances in life expectancy cause benefit profiles, *ceteris paribus*, to rotate counterclockwise around the NRA. We can therefore expect future male benefit profiles to be flatter than the profiles for NRA=67 shown in Figure 4 and future female profiles to be steeper or somewhat further from actuarial equivalence for early claimers.

V. Implications and Conclusion

The actuarial nonequivalence of benefit adjustments results in systematic differences in lifetime benefit patterns between males and females and between low- and high-earning beneficiaries. The differences are due to differences in their survivor rates. Under our mid-range discount rate assumption, most male beneficiaries face actuarial premiums that decline with benefit acceptance after age 62 and most females face actuarial losses that also decline with delayed acceptance. Thus, males have little actuarial incentive to delay their initial benefit claim and the disincentive is strongest for low-earning males. In contrast, most female beneficiaries have little actuarial incentive to accept benefits early. These gender differences in relative benefit profiles can translate into substantial lifetime actuarial premiums for males who claim early, and actuarial losses for early-claiming females. One consequence is that the pure life expectancy advantage of females is partially offset by actuarially nonequivalence. More generally, the trend toward early (below NRA) claims combined with continuing improvements in life expectancy that cause counterclockwise rotations of relative benefit profiles imply that statutory actuarial adjustments have operated to partially offset the inherent lifetime benefit advantage of those with relatively long life expectancies.

The patterns of actuarial nonequivalence found here should be considered when analyzing the claiming or retirement behavior of Social Security beneficiaries or when simulating the cost of Social Security reform proposals that may affect claiming behavior.

A good example of the latter arises in the context of proposals for complete elimination of the retirement earnings test (now relevant only for beneficiaries below the NRA). Policy simulations often assume that enactment of such a proposal would lead beneficiaries to advance their initial claim to the earliest eligibility date. In that case, our results show that such a response would likely mean higher lifetime benefits for males, particularly low-earning males, and lower lifetime benefits for females, particularly high-earning females. But the underlying assumption implies that those beneficiaries who had initially delayed their claim date did so because of the earnings test. An alternative hypothesis is that claiming delays are a response to actuarial nonequivalence, a topic to be pursued in future research.

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Table 1
Sample Characteristics
(n=401,448)

Group	Sample Proportion/Means
<i>Males</i>	
Percent of Sample	57.6%
Average Lifetime Earnings	\$27,151
Age of Death	78.5
<i>Females</i>	
Percent of Sample	42.4%
Average Lifetime Earnings	\$12,333
Age of Death	81.9

Table 2
Estimated Mortality Hazard Models

Variables	Males	Females
<i>Intercept</i>	-4.8157 (.6230)	-11.1857 (.7411)
<i>Age</i>	.0872 (.0004)	.1075 (.0006)
<i>Birth Year</i>	-.0127 (.0004)	-.0042 (.0006)
<i>Race (white=1)</i>	-.0913 (.0109)	-.0569 (.0139)
<i>Dual</i>	-.5228 (.0247)	-.3955 (.0086)
<i>Earnings</i>	-2.0126 (.2249)	-.1828 (.2789)
<i>Earnings²</i>	.2972 (.0269)	.0543 (.0349)
<i>Earnings³</i>	-.0140 (.0011)	-.0039 (.0014)
$-\Delta 2\log\lambda$ with and without earnings variables	1,537	712

Estimated standard errors are shown in parentheses.

Table 3
Actuarial Adjustment Factors for Ages 62 to 70 Benefit Claims
By Gender and Discount Rates

Age	Statutory	<u>discount rate=1.0</u>		<u>discount rate=3.0</u>		<u>discount rate=5.0</u>	
		Males	Females	Males	Females	Males	Females
<i>NRA=65</i>							
62	0.800	0.825	0.848	0.791	0.815	0.757	0.782
63	0.867	0.877	0.894	0.853	0.871	0.829	0.847
64	0.933	0.935	0.945	0.923	0.932	0.909	0.919
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000
66	1.080	1.072	1.061	1.087	1.075	1.103	1.090
67	1.160	1.152	1.128	1.185	1.158	1.220	1.192
68	1.240	1.242	1.203	1.296	1.252	1.354	1.306
69	1.320	1.344	1.286	1.421	1.356	1.507	1.435
70	1.400	1.459	1.379	1.565	1.474	1.684	1.581
<i>NRA=67</i>							
62	0.700	0.716	0.752	0.668	0.704	0.621	0.656
63	0.750	0.762	0.793	0.721	0.752	0.680	0.711
64	0.800	0.812	0.837	0.779	0.805	0.746	0.772
65	0.867	0.868	0.886	0.844	0.863	0.822	0.839
66	0.933	0.930	0.940	0.917	0.928	0.904	0.915
67	1.000	1.000	1.000	1.000	1.000	1.000	1.000
68	1.080	1.078	1.066	1.093	1.080	1.109	1.096
69	1.160	1.166	1.140	1.199	1.170	1.235	1.204
70	1.240	1.264	1.222	1.320	1.273	1.379	1.327

Myers and Schobel (1990) results for a 3 percent real discount rate:

NRA=65. Age-62 retirement: males=.786, females=.818; Age-70 retirement: males=1.600, females=1.464.

NRA=67. Age-62 retirement: males=.680, females=.722; Age-70 retirement: males=1.307, females=1.245.

Table 4
Actuarial Differences in Lifetime Benefits by Gender and Earnings
(Discount Rate=3%)

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
<i>Female</i>					
<i>Months to Peak</i>	25	27	28	30	34
<i>Lifetime Benefit Gain by Delaying to Peak</i>	764	1,414	2,126	3,167	4,844
<i>Actuarial Equivalent Lifetime Benefits</i>	43,564	73,846	102,430	134,298	172,050
<i>Percent of Quintile</i>	71	65	48	22	6
<i>Male</i>					
<i>Months to Peak</i>	4	4	7	12	22
<i>Lifetime Benefit Gain by Delaying to Peak</i>	47	30	186	534	2,149
<i>Actuarial Equivalent Lifetime Benefits</i>	35,899	58,525	82,090	107,810	155,739
<i>Percent of Quintile</i>	29	35	52	78	94
<i>Female-Male</i>					
<i>Female-Male Actuarial Equivalent Benefit Difference</i>	7,665	15,321	20,340	26,488	16,313
<i>Female-Male Age-62 Statutory Benefit Difference</i>	5,748	12,162	16,502	22,220	12,735

Table 5
Actual Median and Mean Number of Months of Delay

Group	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
<i>Males</i>					
<i>Median</i>	1	8	16	21	12
<i>Mean</i>	11.4	14.7	17.3	18.7	16.6
<i>Females</i>					
<i>Median</i>	1	1	8	9	7
<i>Mean</i>	8.3	11.9	15.1	15.6	15.5
<i>Nondual Females</i>					
<i>Median</i>	1	6	13	12	8
<i>Mean</i>	11.0	14.8	16.9	16.6	15.8

Figure 1
Relative Benefit Profiles
Males and Females by Lifetime Earnings, NRA=65

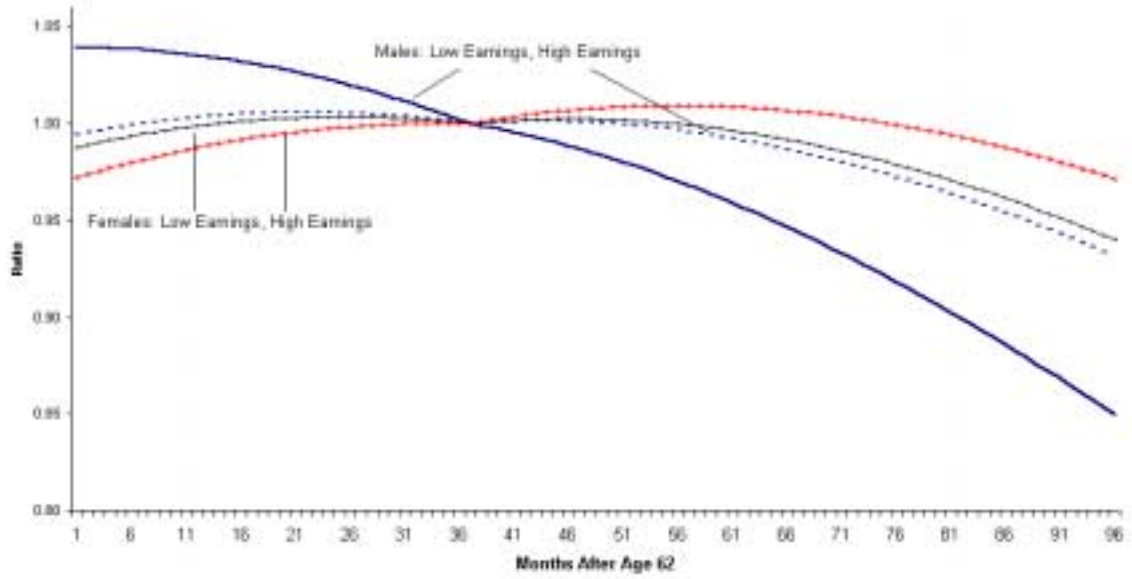


Figure 2
Distribution of Lifetime Actuarial Premiums

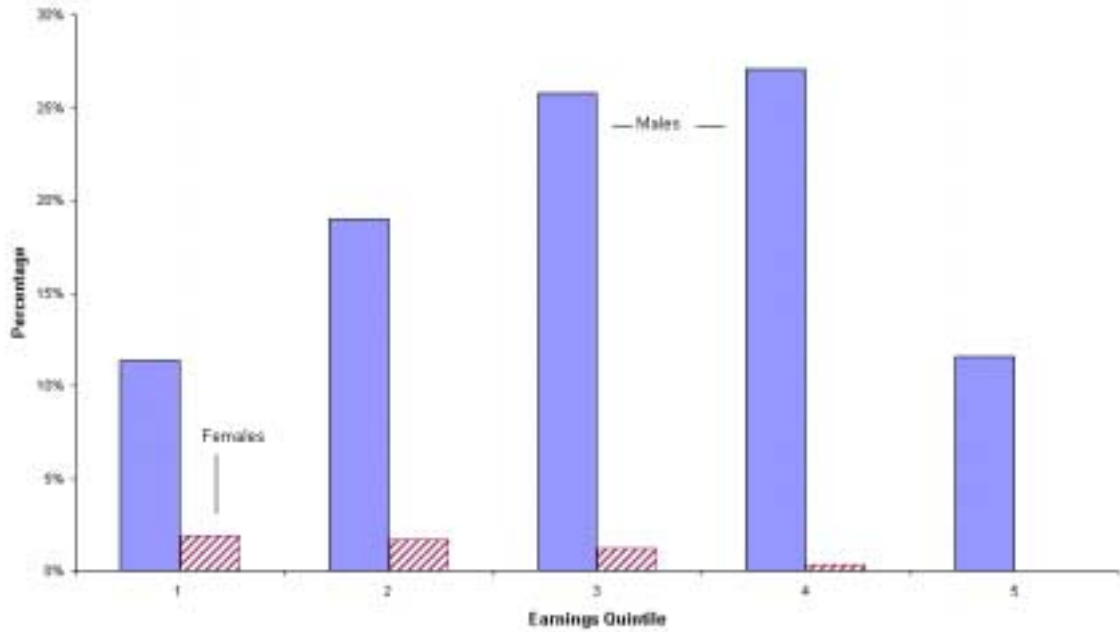


Figure 3
Distribution of Lifetime Actuarial Losses

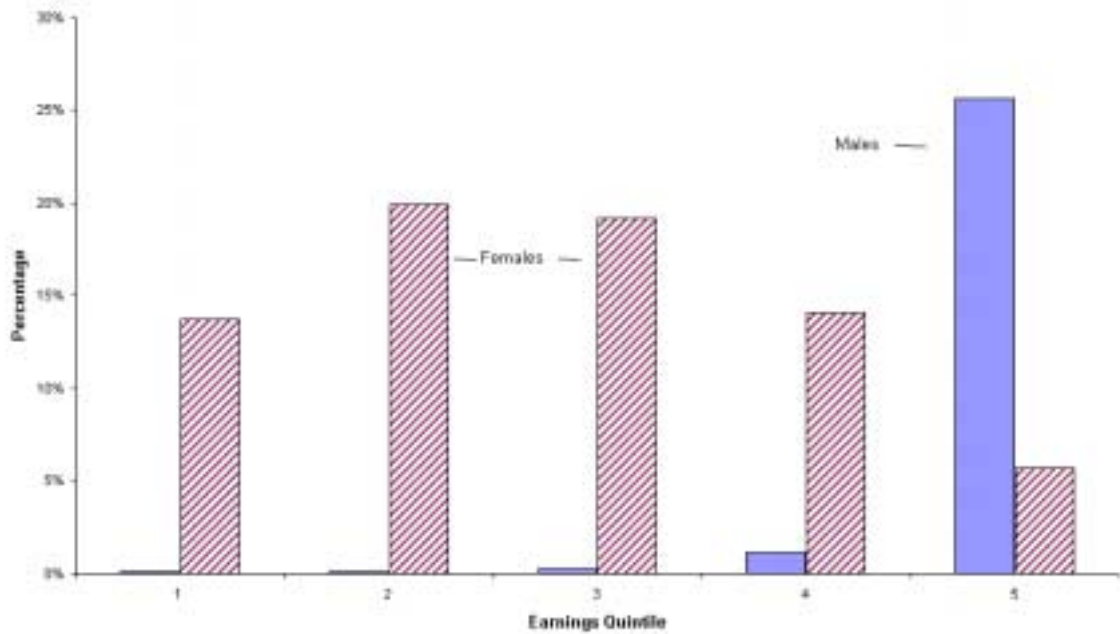


Figure 4
Relative Benefit Profiles for Low- and High-Earning Males
NRA=65 or 67

