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TAXING RETIREMENT INCOME: NONQUALIFIED ANNUITIES AND DISTRIBUTIONS FROM QUALIFIED ACCOUNTS

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ABSTRACT

This paper explores the current tax treatment of non-qualified immediate annuities and distributions from tax-qualified retirement plans in the United States. First, we describe how immediate annuities held outside retirement accounts are taxed. We conclude that the current income tax treatment of annuities does not substantially alter the incentive to purchase an annuity rather than a taxable bond. We nevertheless find differences across different individuals in the effective tax burden on annuity contracts. Second, we examine an alternative method of taxing annuities that would avoid changing the fraction of the annuity payment that is included in taxable income as the annuitant ages, but would still raise the same expected present discounted value of revenues as the current income tax rule. We find that a shift to a constant inclusion ratio increases the utility of annuitants, and that this increase is greater for more risk averse individuals. Third, we examine how payouts from qualified accounts are taxed, focusing on both annuity payouts and minimum distribution requirements that constrain the feasible time path of nonannuitized payouts. We describe briefly the origins and workings of the minimum distribution rules and we also provide evidence on the fraction of retirement assets potentially affected by these rules.

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Die early and avoid the fate.
Or, if predestined to die late,
Make up your mind to die in state.
- Robert Frost in "Provide, Provide"

The taxation of retirement saving is an important and growing policy issue. Income tax exclusions for contributions to qualified retirement plans and for the income that accrues on the assets held in such plans have an important impact on the structure of retirement saving for many households. A substantial fraction of those reaching retirement age in recent years have accumulated very few financial assets outside retirement saving plans. Mitchell and Moore (1997) and Poterba, Venti, and Wise (1998a) show that Social Security wealth, employer-provided pensions, and owner-occupied housing equity were the most substantial components of household net worth for all but the wealthiest one fifth of retirees in the 1990s.

For households that do accumulate substantial assets during their working lives -- both inside and outside qualified retirement plans -- reaching retirement raises questions about how to draw down these assets. Someone who has no interest in leaving a bequest, and who does not know how long he will live, faces the problem of choosing a level of consumption that will take advantage of his accumulated assets, without incurring too great a risk of outliving his resources. One way to avoid this risk is to purchase an immediate life annuity contract. Annuities, which are sold by life insurance companies, typically promise a fixed stream of nominal payouts for as long as the policyholder is alive.

Payouts from retirement assets can be stratified along two dimensions: whether or not the payouts are structured as a life annuity, and whether or not the accumulation took place in a qualified retirement plan.[1] This typology gives rise to four types of withdrawals from retirement asset stocks. The first category, income from non-annuitized non-qualified asset accumulation, is simply taxable saving. We do not consider this type of retirement saving in the present analysis, because it is the subject of essentially all textbook analyses of how taxation affects saving behavior. The second category is annuitized payouts resulting from non-qualified asset accumulation. The tax treatment of annuities purchased with after-tax

[1] The most common type of qualified retirement plan is offered to employees by an employer and meets Internal Revenue code criteria permitting the plan to accumulate tax-protected assets. The employer's contributions to such plans are deductible and they are not considered taxable income to the employee. The investment earnings on assets in

dollars is complex. The fraction of annuity payouts that is included in the recipient's taxable income depends on how long the annuity has been paying benefits. Annuitants who have been lucky enough to live a long time and to receive annuity benefits for a long period are taxed on a higher fraction of their annuity income than are those who have recently purchased their annuity. This complexity arises from the fact that part of each payout on an annuity policy is treated as a return of the policyholder's principal, and part is treated as a payment from the capital income that has accrued on the policyholders' initial premium.

The third payout option consists of annuities purchased with assets in qualified retirement accounts. The tax treatment in this case hinges on the presence or absence of after-tax contributions to the qualified account. For annuities purchased with funds in qualified accounts that were partially funded with after-tax dollars, the tax treatment is more complex than for annuities purchased from accounts that were funded only with pre-tax contributions.

Finally, there is a fourth category of payouts: non-annuitized payouts from qualified retirement plans. These payouts are subject to a complex set of tax rules, in particular, minimum distribution requirements that affect the permissable time path of non-annuitized distributions. These rules have the potential to affect the time path along which many elderly households draw down their assets.

This paper focuses on two of the four types of withdrawals from retirement savings: annuities purchased using assets that are held in non-qualified accounts, and non-annuitized withdrawals from qualified accounts. It is divided into seven sections. The first summarizes the current federal income tax rules that apply to non-qualified immediate annuities. Our analysis focuses on the payout phase of annuity products, and we do not consider the important issues concerning asset accumulation that are raised by the rapid recent growth of variable annuity products. Section two describes our framework for calculating the expected present discounted value of pre-tax and after-tax payouts on annuity policies. It also explains how we can apply a standard model of consumer behavior to estimate the utility consequences of various tax rules for annuity products. The third section presents our basic findings on how the current income tax

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the account are tax exempt at the time they are earned. Individual retirement accounts, tax-deferred annuities, and 401(k) and 403(b) plans funded exclusively by employee contributions are also qualified retirement plans.

system affects the after-tax value of annuity purchases. We find that the current income tax rules do not substantially affect the incentives to purchase annuities rather than taxable bonds. We nevertheless find some differences across categories of individuals in the effective tax burden on annuity contracts.

Section four develops an alternative tax scheme for non-qualified annuities that would include a constant fraction of annuity payouts in taxable income, regardless of how long the annuity had been paying benefits. We calibrate this tax scheme by finding the inclusion rate at which it would raise the same expected present discounted value of revenues as the current tax system, and we also ask how such a tax system would affect the incentives for annuity purchase.

The fifth section moves beyond the discussion of non-qualified annuity products to an overview of tax issues that arise in connection with qualified accounts. First we consider annuitized payouts funded with after-tax contributions. We describe the minimum distribution requirements associated with non-annuitized payouts from qualified retirement accounts. Our discussion focuses on how these requirements constrain the feasible time path of payouts. We examine detailed provisions such as assumptions about mortality tables and allowable distribution methods.

Section six presents evidence on the amount of retirement assets and the fraction of retiree households that are potentially affected by minimum distribution rules. We report the value of assets in qualified pension plans that are held by individuals who are approaching the age at which minimum distributions must begin. The conclusion raises several issues that warrant further research attention, and an appendix presents estimates of the revenue consequences of changing the current minimum distribution rules.

1. The Current Tax Treatment of Non-Qualified Annuities

The current U.S. federal income tax system taxes both the income from annuity contracts and the capital income that a potential annuitant might earn on his alternative investment options. Throughout this paper, we consider an investment in a taxable bond as the alternative to purchasing an annuity contract. The U.S. General Accounting Office (1990) provides an introduction to the tax rules that govern non-qualified annuities. First, the Internal Revenue Service specifies the time period over which the annuitant can expect to receive benefits. We denote this expected payout period T'. IRS regulations refer to it as the "Expected Return Multiple," and it is currently based on the Unisex IRS Annuity Mortality Table as well as the annuitant's age at the time when the annuity begins paying benefits. The current tax rules apply the same mortality rates, and hence expected payout periods, to annuity payouts received by men and by women, even though the actual mortality rates facing men and women are substantially different.

Second, the tax law prescribes an <u>inclusion ratio</u> (λ), which determines the share of each annuity payment that must be included in the recipient's taxable income. The inclusion ratio is related to the fraction of each annuity payout that results from capital income on the accumulating value of the annuity premium rather than from a return of the annuitant's principal. This method of taxing annuity payments, known as the "General Rule," is required for all non-qualified annuity payments starting after July 1, 1986. A second approach, known as the "Simplified Method," applies to certain qualified annuities purchased after November 19, 1996. It specifies different values of the inclusion ratio than the general rule, but otherwise operates in a similar fashion.

For an annuity policy with a purchase price of Q, and an annual payout of A, the inclusion ratio during the first T' years of payouts is defined by:

$$(1) \qquad \lambda = 1 - \frac{Q}{A*T'}.$$

After T' years, all payouts from the annuity policy are included in taxable income (thus $\lambda = 1$ after T' years).[2] If the annuitant faces a combined federal and state marginal income tax rate of τ, then the after-tax annuity payment in each year is $(1-\lambda\tau)A$. If an equivalently-risky taxable bond yields a pretax nominal return of i, its after-tax return is $(1-\tau)i$. The expected return multiple, T', is equal to the

[2] Adney <u>et al</u>. (1998) discuss the estate tax treatment of annuity contracts where payments continue after death. These issues are beyond the scope of this paper. It is worth noting, however, that, according to most interpretations of the current law and regulations, payouts from a deferred annuity contract must be taxed either as a lump sum

annuitant's life expectancy as of the starting date of the annuity, calculated using the IRS's unisex annuitant life table.

2. Comparing Annuities with Alternative Assets

We use two approaches to analyze how the current tax treatment of annuities versus taxable bonds. The first emphasizes the expected present discounted value of after-tax annuity payments, and the comparison between this value and the purchase cost of the annuity. The second, which uses an explicit utility function, asks how much wealth a stylized consumer would need if he could not buy an annuity in order to be as well off as he would be if he could invest his actual current wealth in a nominal annuity contract. We now describe each of these approaches in turn.

2.1 The Expected Discounted Present Value of Annuity Payouts

The expected present discounted value (EPDV) of the payouts from an immediate annuity depends on the amount of the annuity payout (A), the discount rate that applies to future annuity payouts, and the mortality rates that determine the annuitant's chances of surviving to receive the promised future payouts. We denote the probability of surviving for j months after purchasing the annuity as P_j. We focus on months as the basic time unit because annuities typically pay monthly benefits. If there were no taxes, the expected present discounted value of annuity payouts ($EPDV_{notax}$) for someone at age 65, and who was certain to die before age 115 (600 months into the future), would be:

$$(2) \qquad EPDV_{notax} = \sum_{j=1}^{600} \frac{A * P_j}{\prod_{k=1}^{j}(1 + i_k)}$$

where i_k denotes the nominal one-period interest rate k periods into the future. Expressions like $EPDV_{notax}$ have been used in a number of earlier studies, including Warshawsky (1988), Friedman and Warshawsky (1988, 1990), and Mitchell, Poterba, Warshawsky, and Brown (hereafter MPWB) (1999).

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payment or, under the General Rule, as a life annuity. This forces an either/or payout choice on contract holders and thus denies them the possibility of using both payout options in a single contract.

In the current income tax environment, this expression must be modified to recognize both the income tax treatment of annuity payments, and the taxation of the returns on the alternative asset that determines the discount rate for the annuity cash flows. The modified expression in an income tax world, $EPDV_y$, is:

$$(3) \qquad EPDV_y = \sum_{j=1}^{12*T'} \frac{(1-\lambda*\tau)*A*P_j}{\prod_{k=1}^{j}(1+(1-\tau)*i_k)} + \sum_{j=12*T'+1}^{600} \frac{(1-\tau)*A*P_j}{\prod_{k=1}^{j}(1+(1-\tau)*i_k)}$$

with T' and λ defined as above. The difference between $EPDV_{notax}$ and $EPDV_y$ provides a direct measure of the extent to which the current income tax structure affects the attractiveness of annuities rather than taxable bonds, relative to a world in which capital income is untaxed. If the two EPDV values are similar, then the current income tax code does not substantially affect the incentive to purchase annuities rather than taxable bonds. It is the *relative* tax treatment of annuities and bonds that determines the effective tax burden on annuities.

2.2 Data Inputs to EPDV Calculations

We apply this framework to evaluate the expected discounted value of annuity payouts for annuity products that were available in the U.S. marketplace in 1998. We focus on individual non-participating, single-premium-immediate life annuities offered by commercial life insurance companies. These are annuity policies for which individuals make an initial premium payment, and then usually begin receiving fixed annuity payouts in the month after their purchase.

Payments on life annuities (variable A in equations (2) and (3)) are reported each year in the August issue of A. M. Best's publication <u>Best's Review: Life and Health</u>. We analyze data from the August 1998 issue, which reports the results of an annuity market survey conducted at the beginning of June 1998. The Best's data corresponds to single-premium annuities with a $100,000 premium. Ninety-nine companies responded to the survey, reporting information on the current monthly payouts on individual annuities sold to men and women at ages 55, 60, 65, 70, 75, and 80. We restrict our current analysis to annuities available for 65-year-old men and women. Poterba and Warshawsky (1999) summarize the average annuity payouts at different ages. The computations below focus on a hypothetical individual who purchases an annuity that offers the average payout across all companies. We recognize, and document in MPWB (1999), that there is substantial variation in annuity payouts across insurers.

To evaluate the rate of return that potential annuitants might receive on alternative assets, we assume that annuity payouts are riskless. We then use the term structure of yields for zero-coupon Treasury "strips" to estimate the pattern of future monthly short-term interest rates. These data are published in the Wall Street Journal, and we use the reports from the first week of June 1998 to coincide with the timing of Best's annuity price survey.

Our EPDV calculations are sensitive to our marginal tax rate assumptions. Because there is very little publicly available information on the household incomes, and even less on the marginal tax rates, of annuity purchasers, we consider two different marginal tax rate assumptions. In the first case we assume that the annuity buyer faces a 15% federal marginal tax rate, and in the second case the annuity recipient is assumed to be in the 36% federal tax bracket. The first case corresponds to a married couple filing jointly with total taxable income of less than $42,350, while the second would correspond, in 1998, to taxable income between $155,950 and $278,450. We also report EPDV calculations for the no-tax case.

We evaluate equations (2) and (3) using projected survival probabilities for people purchasing annuities in 1998. One difficulty in evaluating the effective cost of purchasing an annuity, however, is that the pool of actual annuity purchasers has a lower risk of dying at any given age than the population at large. Insurance companies use an annuitant mortality table to determine the relationship between premium income and the expected present discounted value of payouts. We use the MPWB (1999) approach to projecting future annuitant mortality rates by combining information from the Annuity 2000 mortality table, the older 1983 Individual Annuitant Mortality table, and the projected rate of mortality improvement in the Social Security Administration's population mortality tables from the 1995 Social Security Trustee's Report.

The choice of a mortality table is a key issue in the taxation of annuity payouts. In this respect, the current IRS use of the 1983 Individual Annuitants Mortality (IAM) table has important consequences.

The 1983 IAM was based on actual annuitants' mortality experience in a large group of companies over the period 1971-76, updated to reflect 1983 conditions. The Society of Actuaries' Individual Annuity Experience Committee (1991-92) studied the annuity experience of a small group of companies over the period 1976-86, and concluded that the 1983 table was adequate for the 1980s.

More recently however, Johansen (1996) – one of the actuaries involved in the earlier studies – has called for a new individual annuity table, after evaluating population mortality statistics from the Social Security Administration and the National Center for Health Statistics and evolving conditions in the group annuity market. Unfortunately there are no recent studies of industry-wide annuitant mortality experience. A Society of Actuaries committee therefore suggested using the basic 1983 annuity table projected forward to the year 2000, with mortality improvement factors consistent with the recent experience of the general population as well as that of one company with substantial annuity business. This is the Annuity 2000 table. We construct a 1998 annuitant mortality table by interpolating between the 1983 IAM and the Annuity 2000 tables, and then applying forward looking mortality improvement factors to create a 1998 annuitant cohort table. The age and gender-specific mortality rates in the 1998 table are substantially lower than those in the 1983 IAM tables, due to significant mortality improvements.

Table 1 shows selected mortality rates from five sets of mortality tables. The first column corresponds to our estimate of the 1998 annuitant mortality table for men. The second column reports male annuitant mortality rates taken from the 1983 Individual Annuitant Mortality table. These rates are substantially greater than those in the 1998 annuitant table. For most ages, the mortality rate for men according to the 1983 IAM table is approximately 30% higher than the mortality rate in the 1998 annuitant table. The third column shows the 1983 Unisex Individual Annuitant Mortality table, which is what the IRS currently uses to determine the inclusion ratio and other tax parameters associated with annuity taxation. The last two columns show the 1998 and 1983 annuitant mortality rates for women.

The 1983 Unisex mortality table that the IRS uses is a weighted average of the 1983 IAM basic mortality tables for men and women, with different weights on the two tables at different ages. We have "reverse engineered" these weights, and have found them to vary with age and to place heavier emphasis on female than male mortality. For example, at age 65, the unisex table places a weight of 0.74 on the female mortality rate, and 0.26 on the male rate. This weight on the female mortality rates decreases to 0.65 at age 70, and then increases every 5 years until it peaks at 0.825 for age 95 and above. We have been unable to learn the motivation for this particular choice of weights. The U.S. Treasury Department has recently revised the mortality tables that are used to value the benefits of group life insurance and several other insurance products, but there have been no changes since 1986 in the mortality table that is used to compute T' in single premium annuity markets.

For men, the fact that the Unisex IRS Mortality Table overstates mortality rates by using an old mortality table is almost exactly offset by the heavier weighting on the lower female mortality rates. Therefore, the unisex IRS table does not substantially differ from the 1998 male annuitant mortality table. For women, however, the differences between the two tables are large. Both the weighting scheme and the outdated table result in IRS mortality rates for women that are substantially larger than the mortality rates from the 1998 annuitant table. These differences are especially large at the younger ages. At age 65, for example, a woman's mortality rate is 40% greater in the IRS table than in the 1998 annuitant table.

The use of a unisex mortality table implies that there are differences in the effective tax burdens on annuities for men and women. According to the IRS unisex table, the life expectancy of a 65 year old individual is 20 years. This is the value used for T' in the construction of the inclusion ratio. The actual life expectancy of a 65 year old man, according to the 1998 annuitant table, is 19.8 years, while that for a 65 year old woman is 22.7 years.

The fact that T' for women is less than their actual life expectancy has two effects on the lifetime tax burden on annuities. First, using the IRS table results in a smaller inclusion ratio (λ) than a woman would face if her actual life expectancy were used. In the early years of an annuity payout, a lower inclusion ratio implies that a smaller fraction of the annuity payment is subject to taxation. This effect therefore reduces the tax burden on annuities.

For example, in 1998, a 65 year old woman purchasing the average single premium immediate annuity offered in the private market could expect to receive approximately $662 per month for a $100,000 policy. Under current IRS rules, the value of T' is 20 years, which implies an inclusion ratio (λ) for this woman of 0.37. This means that $245 of the $662 annuity payment is included in taxable income, while the remainder is considered a return of basis and is tax free. If instead of using the 20 year life expectancy implied by the unisex 1983 table, the IRS used the 1998 female annuitant mortality table, this would increase the value of T' to be equal to her actual life expectancy of 22.7 years. This in turn raises the inclusion ratio to $\lambda = 0.445$, which would result in $295 of the $662 monthly annuity payment being included in taxable income. Therefore, by using the 20 year life expectancy of the 1983 unisex mortality table instead of the life expectancy from the 1998 female annuitant table, the 65 year old female annuitant's taxable income is reduced by $50 per month, or $600 per year.

The second effect of using a lower value of T, and one that offsets the first effect to small degree, is the fact that using the IRS unisex table also reduces the number of years for which part of the annuity payment is excluded from taxes. Under current law, after 20 years (when the woman reaches age 85) the after-tax annuity payment falls from $(1-\lambda\tau)A$ to $(1-\tau)A$. (Taxes rise from $\lambda\tau A$ to τA.) Using actual life expectancy, this drop would occur after 22.7 years. Therefore, the woman would not have to report the full $662 as taxable income until she was age 87.7.

The net effect of using the 1983 unisex life table rather than the current annuitant mortality table is a positive effect on the EPDV of annuity purchase for women. Specifically, a 65 year old woman with a marginal income tax rate of 28 percent would have an after tax EPDV of 0.968 using T=20 from the unisex 1983 table, versus 0.956 using T=22.7 from the 1998 female annuitant table. The first effect discussed above, the lower inclusion ratio when part of the annuity income can be excluded from taxable income, is quantitatively more important than the second effect, the change in the length of the time period over which some annuity income can be excluded.

2.3 A Utility-Based Approach to Valuing Annuity Products

In addition to our analysis of the expected present discounted value of annuity payouts, we also compare annuities and alternative assets in terms of the expected utility that they would generate for a potential annuitant. Because annuities offer individuals insurance against the risk of outliving their assets, they generate benefits that are not captured in a simple present discounted value framework. Calculating the expected utility of annuitization recognizes these benefits, and it provides an explicit framework for evaluating the welfare effects of age-dependent taxation of annuity payouts.

Our analysis assumes that a hypothetical individual compares investing in a riskless taxable bond and investing in an actuarially fair annuity contract. This is different than our approach in analyzing the EPDV of annuity products, where we use the actual annuity payouts available in the marketplace rather than hypothetical actuarially fair annuities. We find the actuarially fair payout per premium dollar, a_f, for a 65-year-old, by solving the equation:

$$(4) \qquad 1 = \sum_{j=1}^{600} \frac{a_f * P_j}{\prod_{k=1}^{j}(1+i_k)}.$$

This expression assumes that the insurance company providing the annuity is not taxed, since it uses the pretax riskless rate of return to discount annuity payouts. Allowing for insurance company taxes and other administrative costs of providing annuities would reduce the actuarially fair payout, while allowing the hypothetical insurance company to hold riskier, higher return assets would increase the actuarially fair payout.

We consider an individual who purchases a fixed nominal annuity at age 65. To simplify our calculations, we now assume that the annuity pays annual benefits. The individual will receive an annuity payment in each year that he remains alive, and his optimal consumption path will be related to this payout. The after-tax annuity payout that the individual receives at age a (A_a) depends on his wealth at the beginning of retirement (W_{ret}), the annual annuity payout per dollar of premium payment (a_f), and the tax rules that govern annuity income:

(5) $$A_a(W_{ret}) = [1 - \lambda * \tau * I_{a<65+T'} - \tau * I_{a\geq 65+T'}] * a_f * W_{ret}.$$

The variable $I_{a<65+T'}$ is an indicator variable set equal to one for ages less than the date at which all annuity income is included in taxable income, and zero otherwise.

We compute the expected discounted utility associated with the consumption stream generated by the annuity contract by assuming that individuals have additively-separable utility functions of the form:

(6) $$U = \sum_{j=1}^{50} P_j * \frac{C_j^{1-\beta} - 1}{(1-\beta)*(1+\rho)^j}.$$

The parameter β determines the individual's risk aversion and also the degree of intertemporal substitution in consumption. The variable C_j denotes the real consumption that the annuity contract provides j periods after payouts begin. As MPWB (1999) explain, this does not necessarily equal the real value of the annuity payout, because the recipient may decide to follow a consumption profile that differs from the stream of real annuity payments. Saving a fraction of early annuity payouts, for example, permits higher consumption in later life.

Our utility analysis begins by finding the optimal consumption path for someone with assets of W_{ret} at age 65 who uses all of these assets to purchase an actuarially fair nominal annuity. The budget constraint that governs the evolution of consumption at age a (C_a) in this case is

(7) $$W_{a+1} = (W_a + A_a(W_{ret}) - C_a)*[1 + i(1 - \tau)]$$

where $A_a(W_{ret})$ is the annuity payout stream that can be purchased with an initial wealth of W_{ret}. Because we assume that all of the retiree's wealth is used to purchase an annuity, at the beginning of the retirement period non-annuity wealth is zero. This implies that $W_0 = 0$, along with (7), describes the household budget constraint. We find the optimal consumption path $\{C_a\}$ using stochastic dynamic programming, where the stochastic component of the problem arises from uncertainty regarding date of death. We normalize the value of individual wealth by setting $W_{ret} = 1$ and we find the resulting value of expected utility U* that the individual can achieve by purchasing a nominal annuity.

To compare annuitization with the alternative of investing in taxable bonds, we specify the budget constraint for an individual who follows such a portfolio strategy. We search for the amount of "annuity equivalent wealth," W_{aew}, that is required to make an individual as well off without annuities as that individual would be if he were able to purchase actuarially fair annuities with his initial retirement wealth, W_{ret}. In this case, if the individual has retirement wealth of W_{aew}, he maximizes the utility function in (6) by choosing a consumption path $\{C_a\}$ subject to the constraint that $W_0 = W_{aew}$ and the budget constraint

(8) $$W_{a+1} = (W_a - C_a)*[1 + i(1 - \tau)].$$

The resulting value of the expected utility function is $U^{**}(W_{aew})$. We use a numerical search algorithm to find the value of W_{aew} that yields $U^{**}(W_{aew}) = U^*$. Since the longevity insurance provided by the annuity market makes the individual better off, W_{aew} is greater than W_{ret}. Given our earlier normalization of $W_{ret} = 1$, we are able to define the proportionate increase in wealth that an individual would require to compensate him for the absence of an actuarially fair annuity market as $W_{aew}/W_{ret} = W_{aew}$. This is analogous to the calculations for various types of annuity products that we report in Brown, Mitchell, and Poterba (1999).

We compute annuity-equivalent wealth in both the current income tax environment, and in a case with no taxes, i.e. $\tau = 0$ in (5), (7), and (8). The difference between the annuity-equivalent wealth calculations in the cases with and without income taxation provides information on the incentive effects of the current income tax treatment of annuities.

3. Taxation and the Valuation of Annuities

This section reports our basic findings on how current income tax rules affect the valuation of annuity products, using both the EPDV and expected utility framework. Table 2 reports the expected present discounted value of annuity payouts. The first row reports the EPDV under the assumption that there are no income taxes, while the second and third rows report the EPDV results for income taxes at 15 percent and 36 percent respectively. The columns in Table 2 show results for men and women separately for ages 55, 65, and 75. These calculations use individual survival probabilities from the 1998 annuitant mortality table, but they use life expectancy from the IRS unisex table to calculate the inclusion ratio. This approach ensures that these calculations represent current tax treatment for the typical annuity purchaser in 1998. To place these results in perspective, note that if the discount rate that the annuitant is using is equal to the discount rate being used by the insurance company offering the annuity product, and if the annuity is actuarially fair, then the EPDV of the potential annuity will be 1.0.

The results in the first column, for a 55 year old man, show that varying the marginal tax rate from 0 to 15 percent to 36 percent has only a modest effect on the EPDV. The EPDV is actually increased by a percentage point, from 0.970 in the no tax regime to 0.980 in an income tax regime with a 36 percent marginal rate. At older ages, the effect of an income tax on men is to reduce the EPDV slightly, from 0.970 to 0.959 for a 65 year old, and from 0.966 to 0.930 for a 75 year old. Overall, the effects are quite modest, indicating that variations in marginal tax rates have relatively little impact on the relative attractiveness of annuities and taxable bonds.

The tax rules affect men and women differentially. This is because of the choice of T' in equation (1). For men, the value of T' used by the IRS is approximately equal to the actual life expectancy of a male annuitant in 1998. For women, however, the value of T' used by the IRS is lower than actual annuitant life expectancy by several years. As discussed earlier, using a value of T' that is smaller than actual life expectancy can improve the EPDV, as is the case for women in Table 2. When the income tax rate is zero, we find that the EPDV for men is higher than that for women at all ages by approximately two percentage points. This is due to differences in the pricing of annuities for men, and for women, in the private market. As the marginal income tax rate rises, we find that the EPDV rises more quickly for women than for men. In fact, for an income tax rate of 36 percent, the EPDV for women is actually higher than that for men at any age.

Table 3 reports our findings on the expected utility effects of annuity purchases. It shows the annuity equivalent wealth for typical 65 year old male and female annuitants. Because we want to understand the impact of the tax rules on the population that actually annuitizes, we construct our measure of the annuity equivalent wealth using the 1998 annuitant mortality table. We assume that the individual receives an annuity that is actuarially fair, based on the 1998 gender-specific annuitant mortality table. This stands in contrast to previous studies, such as MPWB (1999) and Brown, Mitchell, & Poterba (1999), in which we investigated how an average individual in the population would benefit from gaining access to an annuity market. In those calculations we used population mortality tables, rather than annuitant tables, to construct actuarially fair annuities. Because mortality rates are lower for annuitants than for the population as a whole, the actuarially fair annuity payment for an annuitant is less than that for a random individual facing the population life table. This makes the annuity equivalent wealth measures reported here lower than those in previous studies.

When the marginal income tax rate is zero, we find that the annuity equivalent wealth for a 65-year-old male annuitant is 1.355. Such an individual would be indifferent between $1 invested in a nominal annuity and $1.35 invested in riskless government bonds. This value rises slightly, to 1.372 with a 15 percent marginal tax rate, and to 1.382 with a 36 percent marginal tax rate.

It is important to recognize that these results, as well as our EPDV calculations, focus on the relative tax burdens on annuities and taxable bonds. As the tax rate rises, the return to investors holding either annuities or taxable bonds declines. Thus the individual's utility level, with or without an annuity, declines as the tax rate rises. Our annuity equivalent wealth calculations, however, are driven by the relative declines in utility with, and without, an annuity.

Holding the income tax rate constant, Table 3 shows that a higher level of risk aversion is associated with a higher annuity equivalent wealth. As discussed in MPWB (1999), this is because more risk averse individuals value the insurance aspect of annuities more highly. We also see, however, that the impact of risk aversion is greater in a high income tax regime. For example, increasing risk aversion from 1 to 3 increases the annuity equivalent wealth from 1.355 to 1.458 when the marginal tax rate is zero, an increase of 0.103, while with a 36% marginal tax rate, the annuity equivalent wealth rises from 1.382 to 1.569, an increase of 0.187.

The second column of Table 3 reports the same results for a 65 year old woman. Overall, a female annuitant's annuity equivalent wealth for an actuarially fair annuity is lower than for a man. This difference arises due to women experiencing lower mortality rates than men. The rate of return on an annuity can be viewed as being the sum of the risk free interest rate, r, plus a mortality premium that is an increasing function of individual's mortality rate q. For an infinitely lived individual, the mortality premium is zero, and an annuity is identical to a riskless bond. For a person facing a constant probability q of dying each period, the gross return on an actuarially fair annuity is $(1+r)/(1-q)$ each period. For small values of r and q, the net return is approximately equal to $r+q/(1-q)$. The second term reflects the probability that other annuity buyers in the individual's annuity cohort die during the period, scaled up by a $1/(1-q)$ factor that reflects the division of the principal of those annuitants who die among the fraction, 1-q, who remain alive. Since mortality is higher for men than women, their mortality premium, $q/(1-q)$, is also higher.

Men find actuarially fair annuities more attractive than women do, provided that annuities are priced in this gender-specific manner. While the annuity equivalent wealth differs, we find that the effect of different tax regimes is quite similar for men and women. Specifically, the annuity equivalent wealth rises with the marginal income tax rate, and this difference is rising with risk aversion, for both groups.

Our numerical analysis focuses on the relative tax burden on annuities and taxable bonds, but it does not consider the question of how annuities would be taxed in an ideal income tax setting. This is a difficult question, and one for which our decomposition of the annuity return into interest on the invested principal, and a payout based on the invested principal of those annuitants who have already died, proves helpful. The fixed nominal annuity payouts offered by the annuity contracts we consider in fact combine these two sources of return with a partial return of principal in each period. In general, the relative importance of each of these components will vary over the annuity's lifetime. Right after the annuitant purchases his or her annuity, a relatively large fraction of the annuity payout will represent a return on principal, while a relatively small share will represent a return of principal. (It may be helpful in this context to think of a level payment, self-amortizing mortgage, in which the fraction of each mortgage payment that represents a repayment of principal rises over the life of the contract.) This consideration alone would suggest that the share of each annuity payout treated as taxable income would rise over time under an ideal income tax.

However, there is another potentially offsetting effect, due to variation over time in the share of the annuity payouts that is due to mortality within the annuity pool. Because mortality rates rise with age, the mortality premium q/(1-q) described above is also increasing with age. Because most annuity contracts provide a fixed nominal stream of payments, however, this mortality premium is smoothed over the potential life of the annuitant. This complicates the decomposition of the annuity payment into its component parts.

Furthermore, it is not clear how such payouts should be taxed under an ideal income tax. If they were taxed in the same way as other insurance products, such as life insurance, they would be excluded from the tax base. Life insurance is currently purchased with after-tax dollars, and the payouts from life insurance policies are usually untaxed. If the return of principal invested by other annuitants is treated instead as a lottery winning, it would be included in the income tax base. Recognizing this important and potentially time-varying source of annuity payouts, and its ambiguous tax treatment, makes it difficult to make any simple yet general statement regarding the fraction of annuity payouts that would be taxed under an ideal income tax.

4. Alternatives to the Current Approach to Taxing Annuities

The use of a time-varying inclusion ratio, with a single step change when the annuitant has received benefits for the expected return multiple (T'), is a key feature of the current income tax treatment of annuity payouts. This tax provision has the effect of raising the tax burden, and reducing the after-tax income from an annuity, for those individuals who have received the largest total payouts from their annuity contracts. A difficulty with this approach is that it results in a significant drop in the level of benefits at a discrete point in time, after which the after-tax benefit stays at this lower level for the duration of the annuitant's life.

For example, a 65 year old woman purchasing an average priced annuity in 1998 will, under current tax rules, face an inclusion ratio (λ) of approximately 0.43. If she faces a 36 percent marginal tax rate (τ), this means that at the start of her annuity contract, for every $1 of nominal annuity income received on a before tax basis, she will be able to consume ($1-\lambda\tau$) dollars, or $0.845. Twenty years after the annuity payouts begin, at age 85, her tax rate on annuity income rises from $\lambda\tau$=15.5% to τ=36%. This reduces her after-tax consumption stream to $0.64. This discontinuous drop in the after-tax nominal annuity exacerbates the decline in the real value of a fixed nominal annuity that occurs as a result of inflation. If the inflation rate is a fixed 3% per year, over a 20 year period the real value of the annuity income declines to 55% of its initial value on a before tax basis. Combining this with the increase in the inclusion ratio means that the after-tax, real income available for consumption at age 85 is only $0.354 per dollar of real annuity income at the beginning of the annuity contract. This represents nearly a 60% decline in the after-tax real value of the annuity over a 20-year period.

One alternative to the current income tax structure is a system in which the inclusion ratio is fixed for the life of the annuity contract. The modified inclusion ratio λ' that would raise the same expected present discounted value of revenue as the current tax rules would satisfy

$$(9) \qquad \sum_{j=1}^{600} \frac{\lambda' * \tau * A * P_j}{\prod_{k=1}^{j}(1+i_k)} = \sum_{j=1}^{12*T'} \frac{\lambda * \tau * A * P_j}{\prod_{k=1}^{j}(1+i_k)} + \sum_{j=12*T'+1}^{600} \frac{\tau * A * P_j}{\prod_{k=1}^{j}(1+i_k)}$$

The after-tax annuity payout in this setting would be ($1-\lambda'*\tau$)*A regardless of the number of years over which the annuity had been paying benefits. The effect of this rule is to increase the fraction of the annuity income that is taxable in the first T' years, while decreasing the amount that is taxable in years T' and beyond. While this alternative exclusion ratio does not address the decline in the real value of the annuity that results from inflation, it does prevent the additional discrete drop in after tax income that occurs at the end of the IRS life expectancy (20 years for a 65 year old).

To find λ', we assume that future tax flows are discounted using the pretax nominal interest rate on government bonds. This seems like the natural choice when the federal government is the discounting agent. We can repeat both the EPDV and equivalent wealth gain calculations using this modified income tax rule. While we have held the expected discounted value of revenue constant across regimes with different inclusion ratios, the revenue is discounted at the before-tax rather than the after-tax Treasury rate. This means that there can be differences in the EPDV of after-tax annuity payouts in the different inclusion ratio regimes, because the EPDV calculation is done from the perspective of the individual annuitant using after-tax interest rates.

Table 4 compares the value of λ and the resulting EPDV of annuity payout streams for the current income tax with time varying inclusion ratio to the case in which individuals are faced with a constant inclusion ratio. The second row shows the value of the current inclusion ratio (λ) for the first T' periods of the annuity contract, and the constant inclusion ratio (λ') that we calculate. In the case of a 65-year-old man, the current inclusion ratio is 0.431. It would rise to 0.477 under our modified tax regime. For 65-year-old women, the change would be from 0.370 to 0.435. The changes would be larger at older ages. For a 75-year-old man purchasing an annuity, the inclusion ratio would rise from 0.326 to 0.417.

Table 4 shows that for the case of a 15 percent marginal tax rate, the EPDV values under the time-invariant inclusion ratio regime are virtually identical to those under the current tax regime (Table 2). At a higher tax rate of 36 percent, the constant inclusion ratio leads to a slight increase in the EPDV of the annuity from the perspective of the individual. Therefore, the alternative rule has the advantage of increasing the EPDV of payouts to an individual while keeping the present value of government tax receipts fixed. This result arises from the fact that the government discounts using the pre-tax interest rate, while the individual EPDV calculation makes use of an after tax rate.

Table 5 examines the effect of adopting a constant inclusion ratio on lifetime utility. It shows that utility is higher in this setting than with the current time-varying inclusion ratio. The annuity-equivalent wealth for a 65-year-old male facing a 36 percent marginal tax rate is 1.400 under the constant inclusion ratio, up from 1.382 in the time-varying case. At higher levels of risk aversion, the differences are even greater. A 65-year-old male facing a 36 percent tax rate sees his annuity equivalent wealth rise from

1.569 under the current method to 1.639 under the constant inclusion ratio method. In other words, the change to a constant inclusion ratio for this individual is worth an additional 7 percent of initial non-annuitized retirement wealth.

This increase in utility comes from two sources. First, the change in the inclusion ratio method increases the EPDV of the annuity income, as seen in Table 4. Second, risk averse individuals gain utility from the elimination of the discontinuous income change at year T'. This is because the risk aversion coefficient β also controls the willingness to engage in intertemporal substitution in consumption. Higher β individuals are more interested in smoothing their consumption, and this is more difficult when the after-tax income flow changes abruptly at a point in time. Thus the shift to a constant inclusion ratio increases utility more for more risk averse individuals.

5. Tax Treatment of Payouts from Qualified Accounts

Employee contributions to tax-qualified retirement plans are not subject to income tax and investment earnings within the plan are tax exempt at the time these are earned.[3] But at the point that benefits are paid out, beneficiaries are responsible for income taxes on any outflows generated by previously non-taxed contributions. This follows the general principle that benefits received by plan participants are taxable when received, as long as they have not previously been incorporated in taxable income. This section discusses several issues that arise in the tax treatment of payouts from qualified accounts. It also considers the minimum distribution rules that the tax system specifies for the time path of payouts for qualified plans. In discussing these tax rules, it is helpful to distinguish between annuitized and other forms of payouts.

5.1 Tax Treatment of Annuitized Payouts

Consider first the simple case of a traditional pension plan in which the employer makes all contributions. Under a corporate defined benefit pension plan where retirees are provided with old-age benefits from retirement until death, the benefit stream – which may be either a single or joint and survivor annuity – is taxed as ordinary income.[4] In the case of a company-sponsored defined contribution pension, the taxation of payouts is also simple when the employer has directly financed the entire contribution, or when the plan participant pays into the pension using only pre-tax income, as is common under 401(k) pension plans. In these situations, retirement benefit streams are again fully taxable at the recipient's marginal tax rate.

The taxation of qualified plans becomes more complicated when employees are required to contribute to their qualified retirement accounts using *after-tax* income. In the private defined benefit arena this is uncommon, but the practice is widespread among state and local pensions. Mitchell and McCarthy (1999) find that almost three quarters of all full-time public sector plan participants are required to contribute to their defined benefit pensions, while only five percent of private sector workers make such contributions. When a worker must contribute after-tax dollars to a plan, the plan participant is generally permitted to recover his contribution – called the "basis" – tax-free. If benefits are then paid out as an annuity, then the income tax treatment is similar to that for non-qualified annuities. The inclusion ratio from equation (1) is again used, although the value of T' differs.

Prior to November 1996, qualified annuities with a starting date after July 1, 1986 were taxed according to the same General Rule, and thus used the same value for T' in equation (1), that currently applies to non-qualified annuities. A new "Simplified Method" for recapturing basis in qualified plans, which results in a different value of T', was implemented in November 1996.[5] Under the General Rule,

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[3] Achieving tax-qualified status for a retirement plan requires that the plan be approved by the Internal Revenue Service; for further discussion of these conditions see McGill et al. (1996).

[4] This presumes that the retirement benefit does not exceed ERISA limits spelled out in Section 415 of the Internal Revenue Code and its amendments (McGill et al, 1996). These rules limit the straight life annuity payable under a defined benefit pension to 100 percent of a worker's average compensation over the highest three years prior to retirement, or $90,000 (indexed) at the Social Security normal retirement age. The cap is reduced for earlier retirement and/or for less than ten of service. Other ceilings apply if an employer offers two or more pension plans. A 15 percent excise tax was levied on individuals who receive defined contribution distributions in excess of the ERISA limits but this limit was suspended for tax years after 1997; see Adney et al. (1998).

[5] The Simplified Method must be used if either the annuity starting date is after November 18, 1996 and the payments are from a qualified plan, or if the annuitant was at least 75 years old when the annuity payments began,

T' is the age-specific life expectancy as determined by the 1983 unisex IRS mortality table. Under the Simplified Method, T' is constant over various age ranges. Thus the simplification from the "Simple Rule" comes from a reduction in the number of possible values of T'. The values of T' under the two methods are quite similar for the age in the middle of each age interval, but can differ by several years the endpoints.

Table 6 shows the value of T', in months, for both the General Rule and the Simplified Method. The first column of Table 6 is the age of the annuitant when annuity payouts begin. The second column is the value of T' under the General Rule. The third column is the value of T' for the Simplified Method for those annuities starting after November 18, 1996. This is the column that will apply to most qualified annuities from today forward. The fourth column is the value of T' for the Simplified Method for those annuities subject to the Simplified Method, but with starting dates before November 19, 1996.

As discussed earlier, raising the value of T' has two offsetting effects on the after-tax value of an annuity relative to a taxable bond. We have evaluated the sensitivity of our EPDV findings to changes in T', and in general find relatively modest effects. For example, for a 65-year-old male facing a marginal tax rate of 36%, a shift from a T' value of 20 years to a value of 21 years raises the inclusion ratio from .431 to .458. This change reduces the EPDV of an annuity from .959 to .953, or by 0.6 cents per dollar of annuity premium.

One potentially significant effect of the Simplified Method, rather than the General Rule, is that it makes the tax treatment of an annuity a function of when the individual begins receiving payouts. Individuals who are near an "end-point" age under the Simplified Method can, through the choice of their annuity starting date, affect the time path of taxes on their annuity income. If an individual turns 66 on June 15, then whether he chooses June 1 or July 1 as his annuity starting date will have important consequences for the tax treatment of the annuity. If he chooses June 1, he will face a T' of 260 months, whereas waiting until July 1 will reduce T' to 210 months. This is over a 4 year difference in the period

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payments were from a qualified plan, and payments were guaranteed for fewer than five years. All other payments, such as those from non-qualified annuities, must continue to use the General Rule.

over which basis recapture is spread. The discontinuous changes in T' associated with the Simplified Method may therefore affect the behavior of annuity buyers.

5.2 Taxation of Nonannuitized Payouts

Qualified plans can pay out non-annuitized benefits before, or after, the plan participant's retirement date. When such benefits are paid *prior to the participant's retirement date*, they are typically either a lump sum distribution or a rollover.[6] If an individual takes his pension in the form of a lump sum, this generally triggers the payment of income tax on the amount distributed. Adney *et al.* (1998) note that there is a 10 percent additional penalty levied if the retiree is under age 59 1/2, and a 25 percent tax for certain distributions under SIMPLE plans. For tax purposes, the benefit amount is divided into the portion due to employee contributions out of after-tax income, and the portion due to contributions from pre-tax income. Special circumstances permit a retiree taking a lump sum to opt for a one-time option to smooth the sum using a five-year averaging period.

Moving a lump sum to a rollover Individual Retirement Account does not trigger immediate tax payments. An employer must withhold 20 percent of a rollover, however, unless the recipient chooses to have the funds transferred directly to a tax qualified retirement plan. In the case of a successful tax-free rollover, at some point, the retiree would be required to begin receiving the rollover funds in accordance with minimum distribution rules described below.

With respect to nonannuitized benefits paid *to retirees*, it is worth emphasizing that historically, most qualified pension plans offered only annuity benefits and prohibited all other payout alternatives. Today, however, many pension plan participants have some choice about the form of their pension payout. The U.S. Bureau of Labor Statistics (1998) reports that 85 percent of private defined contribution pensions currently offer lump sums to retirees, and 15 percent of private defined benefit pensions do so as well. In fact annuity payouts are apparently available to only 17 percent of private sector defined contribution pension participants, underscoring the importance of non-annuity payout options.

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[6] Poterba, Venti, and Wise (1998b) present summary information on the importance of lump sum distributions and on how these distributions are used by their recipients.

5.3 Minimum Distribution Rules

The expanding set of options for taking distributions from qualified accounts means that a qualified pension plan participant who does not want to take a lump sum or rollover, and who chooses not to purchase an annuity, must, and increasingly does, turn to a non-annuitized payout formula. Tax law holds that these benefits must be paid out under "minimum distribution requirements." Retirement plan payouts must start at least by a specified time and may continue periodically, at least annually, over the relevant lives or life expectancies of the plan participant and his or her designated beneficiary.[7] These requirements were first adopted in 1962 when there were no limits on contributions to retirement plans and plan assets were not counted in taxable estate. Their goal was mainly to prevent Keogh plans, used frequently by professionals, from becoming vehicles for income and estate tax avoidance. Coverage by the requirements was expanded to all types of retirement plans in 1984 and 1986.

The date at which minimum distributions must begin, relative to life expectancy of those receiving such distributions, has declined significantly since these regulations were introduced. Bell, Wade, and Goss (1992) report that life expectancy for the average 30-year old man in 1960 was 70.45 years. Hence, the age of 70 ½ might have been deemed a reasonable age by which to expect retirees to begin taking distributions. Today, however, the life expectancy of a 30-year old man is 74.5 years. Life expectancy for a 30-year-old woman is 80.8 years, and the labor force today includes a much higher fraction of women than it did in 1960. Thus minimum distribution requirements today apply to many more years of retirement, on average, than they did when they were introduced.

Current federal minimum distribution requirements indicate the minimum amount that must be distributed each year to a plan participant and when payments must begin, regardless of whether the

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[7] Federal minimum distribution requirements include basic and incidental benefit rules appearing in section 401(a)(9) of the Internal Revenue Code as well as the very detailed proposed Treasury Regulations 1.401(a)(9)-1 and 2. The requirements currently apply to all types of tax-advantaged retirement arrangements, including 401(a) plans (defined benefit and money purchase pension plans and profit-sharing and stock purchase plans (including 401(k) plans)), 403(b) plans (defined contribution plans available to workers in nonprofit institutions and public schools), 457 plans (non-qualified deferred compensation plans available to workers in governmental bodies), and individual retirement arrangements (Keogh plans and IRAs). The regulations constrain, in variuos ways,plan design for the annuity payout form. In this paper, however, we concentrate on the impact of the minimum distribution requirements on non-annuitized payouts. Warshawsky (1998) describes other issues in some detail.

payments are made as a lump-sum withdrawal, a series of systematic payments over a period of time, or a life annuity. For example, if the retiree turned 70 ½ on October 1, 1997, he would have to begin receiving minimum distributions from the pension no later than April 1, 1998. If a plan participant fails to receive qualified plan benefits at a rate at least equal to the minimum required amount during the year, he would be liable for an excise tax equal to 50 percent of the difference between the required payments and the actual payments. If the amount distributed exceeds the minimum required in any calendar year, *no* credit may be recognized in subsequent years for such excess distribution.[8]

A plan participant may elect to receive benefit payouts over his life expectancy. In this event, the minimum required payment is determined every year by dividing the accumulation by the applicable life expectancy factor. One other person's life expectancy can also be included in the factor, and the calculation is then based on the joint life expectancy of the participant and that other person, subject to certain limitations. If such a "designated beneficiary," in the language of the regulations, is not selected, payments are based on the single life expectancy of the participant, calculated using the IRS Unisex mortality table that we described above.

A plan participant may choose both primary and contingent beneficiaries. Primary beneficiaries receive the accumulation remaining upon the death of the participant, and contingent beneficiaries receive benefits only if there are no primary beneficiaries remaining alive and a residual accumulation exists. If a plan participant names several primary beneficiaries, only the oldest one can be the calculation beneficiary. If a trust satisfies certain conditions, its oldest beneficiary can serve as a calculation beneficiary. Anyone may be designated as the calculation beneficiary, but if he or she is not the

[8] These rules apply when payments were begun prior to the death of the plan participant. If, however, the participant dies before minimum distributions have begun, the entire accumulation must generally be distributed by the end of the fifth year from the date of the participant's death. An exception to this general rule allows for the accumulation to be paid over the life or period of life expectancy of the designated beneficiary if elected by December 31 of the year after the year of death of the plan participant. For spouses, distributions under the exception must commence before the later of (a) the last day of the year following the participant's death or (b) the last day of the year the participant would have attained age 70-1/2 (regardless of the spouse's age). Either the recalculation or one-year-less methods (described below) may be used. Again, rollover to an IRA is allowed. For other beneficiaries, the benefits must commence by the last day of the year following the participant's death. Only the one-year-less method may be used by non-spouse beneficiaries.

participant's spouse, the "incidental benefit rule" limits the maximum age difference to 10 years in calculating the joint life expectancy.

If a retiree holds assets in an individual account plan such as a 401(k) plan or Individual Retirement Account, the participant may choose, at the time of the first distribution, between two methods of calculating his life expectancy and that of his designated beneficiary. (The designated beneficiary is also known as the calculation beneficiary.) Under the *recalculation* method, which is available to a participant and to his spouse if the spouse is the calculation beneficiary, the actual age-appropriate life expectancy factor is used each year. For example, for an individual with no calculation beneficiary, the life expectancy factor is 15.3 at age 71, 14.6 at age 72, 13.9 at age 73, and so on. In contrast, under the *one-year-less* method, which is available to a participant and to any type of calculation beneficiary, one year is subtracted from the original life expectancy factor as he ages. For example, for a recipient with no calculation beneficiary, the factor is 15.3 at age 71, 14.3 at age 72, 13.3 at age 73, and so on. The life expectancy factors under either the recalculation or one-year-less method are applied to the account balance as of the last valuation date in the prior calendar year, adjusted for any contributions, allocated forfeitures, and distributions made in the prior year after the last valuation date. Under the one-year-less method, the goal is to distribute the entire retirement asset by the age of (joint) life expectancy, whereas under the recalculation method, payments can continue, albeit in dwindling amounts, until the last age in the IRS mortality table.

Minimum distribution rules can affect many aspects of asset draw-down by retirees. These effects are discussed in detail in Warshawsky (1998), but we summarize them here. First, for the significant minority of elderly individuals who are still working at age 70 1/2, the current rules require them to begin taking distributions from IRA and prior-employer's plans, even though they may still be contributing to their current pension plans.

Second, these rules create awkward situations when a spouse, who survived a plan participant who had not yet received distributions from the plan, must initiate payments no later than the date the participant would have turned 70-1/2, regardless of the surviving spouse's age or labor force status.

Spouses in this setting could roll over pension accumulations into an IRA and postpone distributions until they reach age 70 ½, but it is not clear how many spouses are aware of this option and pursue it.

Third, one consequence of using a unisex life table in the calculation of minimum required distributions is that women, who have longer life expectancies as a group, must receive higher distributions than would be consistent with a female-only life table. For example, at age 71, the life expectancy factor for a woman is 17.2 under the Annuity 2000 table, nearly two years more than under the IRS table.

Finally, minimum distribution rules may affect retirees' patterns of consumption spending in retirement. It is difficult to evaluate such linkages, because we are not aware of any direct evidence on the relationship between payouts from retirement plans and the level of household expenditures for those who are subject to minimum distribution rules. If a couple chooses to consume their minimum distributions as they are paid out, however, there is a nontrivial risk that at least one spouse will outlive their retirement assets. Minimum distribution requirements may also reduce the amount held in tax-deferred accounts faster than an account beneficiary might otherwise desire. If someone wishes to consume more in the later years of retirement than in the early years, he or she will want to hold a large balance of assets in tax-deferred (and therefore high return) form at the beginning of retirement. The minimum distribution rules may reduce the level of consumption late in retirement for such an individual by lowering their tax-deferred asset balance early in retirement. This effect is particularly powerful in inflationary times when minimum distribution rules are specified in nominal terms, as they are at present.[9]

6. The Quantitative Importance of Minimum Distribution Rules

A number of current legislative proposals call for modifying minimum distribution rules by raising the age of mandatory distribution, updating the mortality table used in the distribution methods to

[9]Defined benefit plans may adjust periodic payments upward to reflect price inflation, and variable annuities are allowed to adjust payments to reflect changes in the asset values underlying the annuity. Warshawsky (1998) argues that optimal consumption rules would produce distributions that dissipated assets at a slower rate than under the current one-year-less method, and along a different path than under the current recalculation method.

recognize recent mortality improvements, and/or exempting from the requirements individuals with accounts below certain amounts. These proposals would reduce the number of retirees who are affected by the current minimum distribution rules. In the short run, this could lead to a reduction in the amount of distributions from qualified accounts, in turn reducing income tax collections on qualified account distributions. The longer-term effect on revenues is more difficult to evaluate, because some of the assets that are not distributed from qualified plans in the near term will need to be distributed in the future.

To evaluate the economic significance of changing the minimum distribution requirements, and to begin the process of estimating the revenue effects of such changes, we need to explore the number of individuals who are affected by these rules and the value of their qualified account balances. Unfortunately, there is no nationally representative database on the extent of forced distributions that are due to the minimum distribution rules. Estimating the potential revenue effects of reforming the minimum distribution requirements therefore requires drawing on data from a variety of different sources to project future retirement assets by age of household, by household marginal tax rate, and by account balance. These data must also be used to predict which individuals will be constrained by the current requirements. The Appendix presents calculations on the revenue consequences of eliminating minimum distribution rules entirely, excluding a threshold amount such as $100,000 or $300,000 per person in retirement plan assets from these rules, or raising the age at which minimum distribution requirements apply.

A starting point for the revenue estimates is information on the distribution of retirement plan assets across households. This information is drawn from the 1995 Survey of Consumer Finances (SCF). The survey is a nationally representative survey of households, stratified to over-sample households with high income and high net worth. It is the premier source of information on asset holdings and wealth accumulation by households in the United States.

Table 7 presents one type of data that is relevant for evaluating these revenue effects. This is information from the Survey of Consumer Finances on retirement plan balances of households in which the head of household or the spouse was over the age of 59. When we expand the set of households in the SCF to mirror national totals, we find that 8.6 million households with at least one member over age 59 held just over $700 billion in qualified retirement accounts, including pension accounts as well as IRAs and Keogh plans. The information from the SCF is unfortunately not ideal for our purposes, because questions about account balances were not asked for pension accounts if the account was already in distribution. For respondents over the age of 71, this essentially eliminates information on pension accounts, since the minimum distribution rules require payouts from these accounts. The table nevertheless shows that households in which the oldest member was between the ages of 66 and 70 held $233.3 billion in assets in 1995. This is the pool of assets that are most likely to be affected by the minimum distribution requirements.

7. Conclusions and Future Directions

This study has assessed the current tax treatment of payouts from retirement assets, focusing on non-qualified annuity products and qualified retirement plans. We explore the economic effects of current tax rules, and we find that the current system does not substantially alter the relative attractiveness of taxable bonds and annuity products. We also show how a simpler method of taxing annuities would avoid changing the tax rules as an annuitant aged, while still raising the same expected present discounted value of revenues as the current tax rules. With respect to qualified plan payouts, we first consider annuitized payouts, and then outline the minimum distribution requirements associated with non-annuitized payouts. We note that minimum distribution rules were initially implemented in an economic and demographic environment that was different from the current setting, and that such rules may have a number of initially unintended effects on current retirees.

Our current analysis suggests several directions for further work. One is to move beyond the present discussion of income tax issues to consider estate tax issues as well. While Poterba (1997) reports that the estate tax currently applies to less than two percent of all decedents, estate tax rates are higher than the income tax rates facing most households. The estate tax could therefore have substantial effects on the behavior of those high net worth households who may be subject to it.

A second direction for further work concerns the utility consequences of minimum distribution rules. We have described the operation of these rules, but we have not tried to link these rules to the consumption flow available to retirees. While our analysis of annuities uses an explicit utility function to compare a representative household's lifetime expected utility under various annuity tax regimes, we have not tried to apply such a framework to minimum distribution rules. This extension is not straightforward, because it requires assumptions about the link between required distributions and household consumption. Future work could usefully explore both this link and the corresponding impact of minimum distribution rules on household welfare.

A third limitation of our current analysis is our focus on the choice between taxable bonds and taxable annuities. Households in practice face a much wider menu of investment choices, many of which are taxed less heavily than taxable bonds. The comparison between annuities and corporate stock, which generate part of their return in the form of capital gains, would be particularly interesting. This is especially true for high-income households, facing a marginal tax rate of 36 percent or 39.6 percent on interest and annuity income. For these households, the top marginal tax rate of 20 percent on long-term capital gains could have an important impact on the choice between annuities and capital assets that are expected to appreciate.

A final direction for further analysis concerns potential changes in the mortality tables that the Internal Revenue Service uses for annuity valuation. Changes to these mortality tables affect the after tax payouts from annuities through changes in the expected return multiple, T'. We noted that such changes have two effects: they change the fraction of annuity payouts that are included in taxable income when the inclusion ratio is not 100 percent, and they change the number of months or years over which the inclusion ratio is less than 100 percent. A quantitative framework like the one we have developed is very helpful in evaluating the net impact of such changes on the relative attractiveness of annuities and other taxable investments.

REFERENCES

Adney, John T., Joseph F. McKeever, and Barbara N. Seymon-Hirsch. The Annuities Answer Book. 1998. Davis and Harman. New York: Panel Publishers.

American Council on Life Insurance. 1996 Life Insurance Fact Book. Washington, D.C.: ACLI, 1996.

Bell, Felicitie, A. Wade, and S. Goss, "Life Tables for the United States Social Security Area 1900 - 2080," Actuarial Study No. 107, Social Security Administration, Office of the Actuary, 1992.

Brown, Jeffrey, Olivia Mitchell, and James Poterba, "The Role of Real Annuities and Indexed Bonds in an Individual Accounts Retirement Program," NBER Working Paper, 1999.

Bureau of Labor Statistics . Employee Benefits in Medium and Large Private Establishments, 1995. US Department of Labor, Bulletin 2496. April 1998.

Committee to Recommend a New Mortality Basis for Individual Annuity Valuation, "Report (Derivation of the 1983 Table a)," Transactions of the Society of Actuaries, 1981, 33, pp. 675 - 751.

Friedman, Benjamin, and Mark Warshawsky. “Annuity Prices and Saving Behavior in the United States”. In Z. Bodie, J. Shoven, and D. Wise, eds., Pensions in the US Economy. Chicago: University of Chicago Press, 1988, pp. 53-77.

Friedman, Benjamin, and Mark Warshawsky. “The Cost of Annuities: Implications for Saving Behavior and Bequests," Quarterly Journal of Economics, February 1990, 105 (1), pp. 135-154.

Individual Annuity Experience Committee, "Report: Mortality Under Individual Immediate Annuities, Life Income Settlements, & Matured Deferred Annuities Between 1976 & 1986 Anniversaries," Transactions of the Society of Actuaries: 1991-2 Reports, 65-116.

Johansen, R. “Review of Adequacy of 1983 Individual Annuity Mortality Table," Transactions of the Society of Actuaries, 1996, 47, pp. 101 - 23.

McGill, Dan, John Haley, Kyle Brown, and Sylvester Schieber. Fundamentals of Private Pensions 7e. Philadelphia: University of Pennsylvania Press, 1996.

Mitchell, Olivia S. and David McCarthy. “The Structure and Performance of State and Local Pension Plans”. The Wharton School. Pension Research Council Working Paper, April 1999.

Mitchell, Olivia S., James Poterba, Mark Warshawsky and Jeffrey Brown. "New Evidence on the Money's Worth of Individual Annuities". American Economic Review. *forthcoming.*

Moore, James and Olivia S. Mitchell. "Projected Retirement Wealth and Saving Adequacy in the Health & Retirement Study". In Forecasting Retirement Needs and Retirement Wealth. Eds. O.S. Mitchell, B. Hammond, and A. Rappaport. Pension Research Council. Philadelphia, PA: University of Pennsylvania Press, *forthcoming.*

Poterba, James, "The Estate Tax and After-Tax Investment Returns," NBER Working Paper 6337, 1997.

Poterba, James, Steven Venti, and David Wise. "Implications of Rising Personal Retirement Saving," in Frontiers of the Economics of Aging, ed. D. Wise (Chicago, University of Chicago Press, 1998a), 125-167.

Poterba, James, Steven Venti, and David Wise. "Lump Sum Distributions from Retirement Saving Plans: Receipt and Utilization," in D. Wise, ed., Inquiries in the Economics of Aging (Chicago: University of Chicago Press, 1998b), 85-105.

Poterba, James and Mark Warshawsky, "The Costs of Annuitizing Retirement Payouts for Individual Accounts," NBER Working Paper (1999).

Sabelhaus, John, "Modeling IRA Accumulation and Withdrawals", Congressional Budget Office Working Paper, Washington, D.C. December 1998.

U.S. General Accounting Office, Tax Treatment of Life Insurance and Annuity Accrued Interest. Washington: U.S. General Accounting Office, 1990.

Warshawsky, Mark, "The Optimal Design of Minimum Distribution Requirements for Retirement Plans", Benefits Quarterly, Fourth Quarter 1998, pp. 36-53.

Warshawsky, Mark, "Private Annuity Markets in the United States," Journal of Risk and Insurance, September 1988, 55(3), pp. 518-528.

Yakoboski, Paul, "IRAs: Benchmarking for the Post-TRA '97 World", EBRI Notes, Vol. 19, No. 12, December 1998 (EBRI: Washington, D.C.).

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Table 1: Comparison of Mortality Rates, Various Mortality Tables and Genders

Age	1998 Annuitant Male Mortality	1983 IAM Male Mortality	IRS Unisex Life Table	1983 IAM Female Mortality	1998 Annuitant Female Mortality
65	0.01096	0.01425	0.00978	0.00824	0.00706
70	0.01842	0.02381	0.01683	0.01303	0.01138
75	0.03074	0.03899	0.02791	0.02238	0.01898
80	0.04983	0.06313	0.04695	0.04053	0.03285
85	0.07763	0.10126	0.07974	0.07237	0.05777
90	0.11696	0.15010	0.13150	0.12594	0.10142
95	0.16738	0.21229	0.19703	0.19380	0.15626
100	0.22782	0.30072	0.27041	0.26399	0.20762
105	0.33098	0.44071	0.38932	0.37843	0.29490
110	0.51959	0.66342	0.61283	0.60212	0.47429

Source: 1983 IAM mortality from Society of Actuaries, Transactions, Volume XXXIII. 1998 mortality based on author's calculations as explained in text. IRS unisex life table courtesy of Norman Greenberg of the Internal Revenue Service.

Table 2: Expected Discounted Value of Annuity Payouts, Various Income Tax Rates

Income Tax Rate	Age 55 Male	Age 55 Female	Age 65 Male	Age 65 Female	Age 75 Male	Age 75 Female
0	.970	.950	.970	.952	.966	.940
15%	.977	.966	.969	.962	.954	.942
36%	.980	.985	.959	.970	.930	.939

Source: Authors' calculations based on formulas described in the text. Annuity payouts are from Best's Review and reflect prices from June 1998. Term structure of interest rates calculated from treasury Strips in the Wall Street Journal for the first week of June, 1998. Mortality is based on 1998 annuitant cohort table as described in text. Calculation of the inclusion ratio for income tax purposes is based on IRS unisex life table.

Table 3: Annuity Equivalent Wealth for Different Income Tax Regimes

Parameters	Age 65 Annuitant	
	Male	Female
Risk Aversion = 1		
Tax Rate = 0	1.355	1.272
Tax Rate = 15%	1.372	1.302
Tax Rate = 36%	1.382	1.333
Risk Aversion = 2		
Tax Rate = 0	1.429	1.328
Tax Rate = 15%	1.467	1.375
Tax Rate = 36%	1.522	1.444
Risk Aversion = 3		
Tax Rate = 0	1.458	1.351
Tax Rate = 15%	1.508	1.406
Tax Rate = 36%	1.569	1.477

Source: Authors' calculations based on formulas described in the text. Mortality is based on 1998 annuitant cohort table. Calculations assume that the risk free interest rate and the utility discount rate are both equal to .03. Inclusion ratio is based on IRS unisex mortality table.

Table 4: Expected Discounted Value of Annuity Payouts for Modified Income Tax With Constant Inclusion Ratio at All Ages

	Age 55 Male	Age 55 Female	Age 65 Male	Age 65 Female	Age 75 Male	Age 75 Female
Inclusion Ratios	λ =.520 λ'=.543	λ =.482 λ'=.516	λ =.431 λ'=.477	λ =.370 λ'=.435	λ =.326 λ'=.417	λ =.223 λ'=.350
Income Tax Rate = 15%	.977	.967	.970	.963	.955	.944
Income Tax Rate = 36%	.986	.993	.966	.980	.938	.950

Source: Authors' calculations based on formulas described in the text. Annuity payouts are from Best's Review and reflect prices from June 1998. Term structure of interest rates calculated from treasury Strips in the Wall Street Journal for the first week of June, 1998. Mortality is based on 1998 annuitant cohort table as described in text. Current IRS exclusion ratio (λ) is based on current rules, and correspond to EPDVs presented in table 2. Modified inclusion ratio (λ') is constant over the life of the annuitant, as explained in the text, and is used in calculating the EPDVs in this table.

Table 5: Annuity Equivalent Wealth for Modified Income Tax With Constant Inclusion Ratio at All Ages

Parameters	Age 65 Annuitant	
	Male, Current Inclusion Ratio 0.431, Level Inclusion Ratio 0.477	Female, Current Inclusion Ratio 0.370, Level Inclusion Ratio 0.435
Risk Aversion = 1		
Tax Rate = 15%	1.377	1.309
Tax Rate = 36%	1.400	1.358
Risk Aversion = 2		
Tax Rate = 15%	1.481	1.390
Tax Rate = 36%	1.573	1.497
Risk Aversion = 3		
Tax Rate = 15%	1.528	1.423
Tax Rate = 36%	1.639	1.546

Source: Authors' calculations based on formulas described in the text. Mortality is based on 1998 annuitant cohort table. Calculations assume that the risk free interest rate and the utility discount rate are both equal to .03. Inclusion ratio is modified to be constant over the life of the annuitant, as explained in the text.

Table 6: Comparison of Expected Return Multiples (T') , in Months, General Rule & Simplified Method

Age	General Rule	Simplified Method for Annuity Starting Date after November 18, 1996	Simplified Method for Annuity Starting Date before November 19, 1996
50	397.2	360	300
51	386.4	360	300
52	375.6	360	300
53	364.8	360	300
54	354.0	360	300
55	343.2	360	300
56	332.4	310	360
57	321.6	310	360
58	310.8	310	360
59	300.0	310	360
60	290.4	310	360
61	279.6	260	240
62	270.0	260	240
63	259.2	260	240
64	249.6	260	240
65	240.0	260	240
66	230.4	210	170
67	220.8	210	170
68	211.2	210	170
69	201.6	210	170
70	192.0	210	170
71	183.6	160	120
72	175.2	160	120
73	166.8	160	120
74	158.4	160	120
75	150.0	160	120

Source: Entries represent the value of T' used in equation (1) for the calculation of the inclusion ratio. The General Rule figures are from IRS Publication 939, Table V, multiplied by 12 to convert into months. The Simplified Method figures are from IRS Publication 575, Table 1

Table 7: Assets in Qualified Accounts That Are Not In Distribution, 1995 Survey of Consumer Finances

Summary Measure	Age of Older of Head of Household or Spouse					
	60-65	66-70	71-75	76-80	80+	Total
IRA/Keogh Accounts						
Assets ($billion)	190.9	133.4	112.3	31.4	11.7	479.8
Households (million)	2.75	2.34	1.68	0.76	0.34	7.86
Non-Distributing Pension Accounts						
Assets ($ billion)	115.7	99.9	2.9	2.3	0.2	221.0
Households (million)	1.45	0.39	0.03	0.01	0.01	1.88
Total						
Assets ($billion)	306.7	233.3	115.2	33.7	11.9	700.8
Households (million)	3.36	2.50	1.68	0.76	0.34	8.64

Source: Authors' tabulations using 1995 Survey of Consumer Finances.

Appendix: Estimating the Revenue Impact of Changes in Minimum Distribution Rules

Mark Warshawsky

This appendix presents estimates of the revenue loss from changing the current minimum distribution requirements. The estimates draw on data on the distribution of retirement plan assets as reported in the 1995 Survey of Consumer Finances (SCF), but they also embody a number of assumptions about the share of assets that will be subject to various methods of distribution. The analysis in this appendix is similar in spirit, although different in scope, detail, and application, to that of Sabelhaus (1998).

Appendix Table 1 presents information on age-specific asset patterns in the 1995 SCF. Broad patterns are apparent in the data: for age groups in their early 60s, assets are still being built up, age groups in their middle 60s seem to have the peak asset accumulations, while age groups in their late 60s and beyond (who are also shrinking in numbers) have declining asset balances. As will be explained further below, the key number in the revenue estimate model is retirement assets held by households age 70. Looking at Table 7 and Appendix Table 1 together, our rough estimate is $35 billion in 1995 for this single age group. Appendix Table 2 shows retirement account assets by household adjusted gross income (AGI) in 1994. The five income groups shown delineate the federal income tax brackets in 1998 for married couples filing joint tax returns (corresponding marginal tax rates are 15%, 28%, 31%, 36%, and 39.6%). Over two-thirds of the older households with retirement accounts are in the lowest income group, holding almost one-third of the retirement assets. The next two groups, representing middle- and upper-middle class households, number more than a quarter of all older households with retirement accounts and they hold nearly half of all retirement assets. Finally, the upper-income group accounts for about one-twelfth of the population and it holds over one-sixth of the retirement assets.

It is necessary to know how retirement assets are distributed, and how household adjusted gross incomes and hence effective tax rates vary, in order to estimate potential revenue losses from changes in the minimum distribution requirements. The analysis continues by examining how retirement account assets vary by level and income. Appendix Tables 3 and 4 report this information. Roughly 40 percent of the relevant older population holds only one-tenth of all retirement assets, totaling under $25,000 per household. By contrast, the top 5 percent of the population holds almost half the assets, amounting to over $300,000 per household. When IRA, Keogh, and pension assets are cross-tabulated by household AGI, two findings stand out. First, as expected, higher income groups have larger accounts; and second, even low-income households have some retirement assets.

To estimate federal income taxes collected because of the minimum distribution requirements, it is necessary to forecast the aggregate sum of retirement assets into the future. First, beginning with the age 70 cohort, asset values from the 1995 SCF are projected to 2000 using an annual growth rate of 20 percent, reflecting actual increases in defined contribution pensions in 1997, 20 percent for 1998, and 10 percent for 1999 and 2000. This relies on increases reported in Table L.119.c of the Flow of Funds Accounts, and actual increases in IRAs reported by Yakoboski (1998). This produces an estimate of $73 billion for assets held in retirement accounts by households age 71 in the year 2000. Similar forecasts are computed for aggregate retirement assets in the year 2000 for households age 71, 72, 73, 74, 75, and 76 and older. While SCF retirement assets decline with age, sample sizes are too small to provide a precise estimate of wealth drawdowns by age group. Instead, these drawdowns are estimated by taking the age 70 retirement assets in the year 2000, and assume that balances will decline by 5 percent per year between ages 71 and 75. Retirement assets for households age 76 and older are based on the IRA, Keogh, and pension account assets reported earlier for that age group, then incremented by 66 percent (the share of pension assets in total retirement assets for the under-70 groups) to reflect unreported pension accounts being distributed. The 66 percent increment for unreported pension accounts probably is an over-correction because many plan participants transfer their pension account to an IRA at, or soon after, retirement. Forecasts of the retirement assets of households in the years 2001 and beyond assume that the assets of households initially age 70 and younger will grow from the year 2000 base at an annual rate of 9 ¼ percent, reflecting a 4 ½ percent real investment return, a 1 ½ inflation rate, growth of contributions to retirement accounts of 2 ¼ percent, and an increase in the number of households with retirement accounts of 1 percent. Assets of households initially age 71 and older are also assumed to grow from their respective bases at a 9 ¼ percent annual rate.

A crucial next step is evaluating the level of retirement account distributions produced by the current minimum distribution requirements, so as to be able to assess the counterfactuals of interest. There are no nationally representative data on this statistic, so the calculations are based on information from TIAA-CREF showing that about 20 percent of the retirement accumulations are subject to minimum distribution requirements each year; the other 80 percent are distributed as life annuities, lump-sum withdrawals, and systematic withdrawals. It seems reasonable to assume that a quarter of the accounts currently being distributed according to the minimum rules will not be held until the death of the plan participant and spouse, but instead will be distributed in some fashion over the retirement years. Furthermore, some proportion of the assets in the accounts will be distributed upon the death of the couples holding the accounts. Lacking better empirical information, the calculations assume that 15 percent of IRA, Keogh, and pension accumulations are forced distributions that are due to the federal requirements. Also we make a reasonable assumption in the revenue estimation procedure that forced distributions are more likely as income increases; in particular we assume that 10, 12.5, 15, 20, and 30 percent of retirement account assets are distributed currently because of the minimum distribution requirements currently in effect. Applying these percentages to the proportion of retirement assets held by each income group shown in Table 7 yields a share of about 15 percent of assets that would be inferred to be distributed as a result of the federal requirements. These forced distributions are then multiplied by effective tax rates assumed for each of the five income groups identified above, assumed to be 10, 20, 25, 30, and 35 percent, respectively. Finally, potential tax revenue generated by the current minimum distribution rules is estimated by summing across the projected populations by age and income. This is also summed over the 10-year period beginning in 2000.

If the minimum distribution rules were repealed, the estimated revenue loss is estimated to be approximately $21 billion over ten years. Since retirement assets are assumed to grow over time, the annual foregone revenue also grows. Lost revenues are estimated at about $13 billion over ten years if the minimum distribution rules were changed to exclude the first $300,000 in peoples' retirement plans. This proposal is similar in spirit to a pension reform bill previously proposed by Representatives Portman and Cardin (H.R. 3788); such a rule change would protect nearly 8 million older households from having to comply with the minimum distribution regulations. Households holding over $300,000 in their accounts would still pay tax on about 58 percent of retirement assets (=(321.7-(448*.3))/321.7) of retirement assets for the households in the category labeled "$300,000+" mainly including the top four income groups). These estimates assume that the exclusion amounts are indexed to expected returns.

Revenue losses would be about $8 billion over 10 years if the minimum distribution rules applied only to assets over $100,000 in retirement accounts; this would enable almost 6 million households to avoid the computations associated with minimum distribution rules. (This is similar to the pension reform bill introduced by Representatives Portman and Cardin in the current Congress, but we abstract from the actual language of current bills (e.g. H.R. 1102) inasmuch as they set a cap of $100,000 on exclusions for IRAs and pension accounts separately.) However older households would still have to determine which part of their retirement assets were subject to the minimum distribution rules, if any. Further, it is unclear whether households whose account balances were just below the exclusion amount when they turned age 70 ½, but whose account balances later rose above the exclusion due to superior investment returns, would later become subject to the minimum distribution requirements. Revenue losses would be only $8.5 billion over ten years if the minimum distribution requirements were delayed to households age 75, as proposed in a bill introduced in the current Congress by Senators Grassley and Gramm.. The model assumes that the law change would apply to those currently receiving distributions between the ages of 70 ½ and 75; that is, these older individuals would not be forced to continue to take distributions until they turned age 75.

Appendix Table 1
Assets in IRA/Keoghs and in pension accounts not being distributed, by age of older of spouse or respondent

Age	IRA/Keogh and pension accounts		
	Sum (million $)	Mean ($)	HHlds (000)
60	45,489	75,146	605
61	40,706	92,447	440
62	49,276	90,442	545
63	64,118	99,256	646
64	40,573	69,001	588
65	66,502	123,450	539
66	51,835	99,508	521
67	63,934	125,729	509
68	51,317	81,356	631
69	32,136	81,006	397
70	34,112	77,640	439
71	18,021	67,291	268
72	16,048	40,322	398
73	25,809	80,641	320
74	10,859	36,633	296
75	44,447	111,403	399
76	3,270	39,650	82
77	6,472	45,185	143
78	11,903	39,381	302
79	7,246	77,474	94
80	4,844	36,136	134
81+	11,883	34,792	342
All ages	700,802	81,132	8,638

Source: Author's calculations based on data from the 1995 Survey of Consumer Finances.
Notes: Calculations use the SCF survey weights.

Appendix Table 2
Assets in IRA/Keoghs and in pension accounts not being distributed, by 1994 household AGI

1994 household AGI	IRA/Keoghs			Pension accounts			IRA/Keogh and pension accounts		
	Sum (million $)	Mean ($)	HHlds (000)	Sum (million $)	Mean ($)	HHlds (000)	Sum (million $)	Mean ($)	HHlds (000)
$42,350 or less	187,496	36,421	5,148	26,889	28,875	931	214,385	37,582	5,705
$42,351-$102,300	151,458	76,824	1,971	83,627	132,151	633	235,085	107,769	2,181
$102,301-$155,950	60,309	167,403	360	31,187	231,601	135	91,496	250,496	365
$155,951-$278,450	54,232	217,572	249	33,751	315,819	107	87,983	350,994	251
Over $278,450	26,316	194,957	135	45,536	577,688	79	71,852	528,326	136
All incomes	479,811	61,014	7,864	220,990	117,274	1,884	700,802	81,132	8,638

Source: Author's calculations based on data from the 1995 Survey of Consumer Finances.
Notes: Calculations use the SCF survey weights. AGI is reported AGI amount on 1994 tax return. If household files separate returns, AGI is sum of AGIs on the separate returns. If household did not file, household is included in lowest income category.

Appendix Table 3
Assets in IRA/Keoghs and in pension accounts not being distributed, by amount in accounts

Amount in account	IRA/Keoghs			Pension accounts			Total		
	Sum (million $)	Mean ($)	HHlds (000)	Sum (million $)	Mean ($)	HHlds (000)	Sum (million $)	Mean ($)	HHlds (000)
Under $25,000	40,368	10,609	3,805	8,033	10,398	773	41,522	10,741	3,866
$25,000-$49,999	60,012	35,225	1,704	12,729	35,587	358	63,119	35,755	1,765
$50,000-$99,999	95,853	68,311	1,403	19,865	68,600	290	106,449	68,158	1,562
$100,000-$199,999	73,219	138,582	528	22,923	128,727	178	103,505	144,668	715
$200,000-$299,999	43,548	236,203	184	21,670	224,776	96	64,526	228,864	282
$300,000+	166,811	697,417	239	135,770	714,450	190	321,681	718,758	448
All amounts	479,811	61,014	7,864	220,990	117,274	1,884	700,802	81,132	8,638

Source: Author's calculations based on data from the 1995 Survey of Consumer Finances.
Notes: Calculations use the SCF survey weights. Amount categories are specific to each column.

Appendix Table 4
Assets in IRA/Keoghs and in pension accounts not being distributed, by amount in accounts and 1994 household AGI

	1994 household AGI					
Amount in account	$42,350 or less	$42,351-$102,300	$102,301-$155,950	$155,951-$278,450	Over $278,450	All Incomes
	(Total assets, million $)					
Under $25,000	31,478	8,132	1,512	317	83	41,522
$25,000-$49,999	45,132	15,507	1,607	358	515	63,119
$50,000-$99,999	67,723	31,897	1,452	3,698	1,679	106,449
$100,000-$199,999	35,303	44,580	8,203	8,747	6,671	103,505
$200,000-$299,999	16,652	38,067	3,102	5,667	1,038	64,526
$300,000+	18,098	96,901	75,621	69,195	61,866	321,681
All amounts	214,385	235,085	91,496	87,983	71,852	700,802

Source: Author's calculations based on data from the 1995 Survey of Consumer Finances.
Notes: Calculations use the SCF survey weights. AGI is reported AGI amount on 1994 tax return. If household files separate returns, AGI is sum of AGIs on the separate returns. If household did not file, household is included in lowest income category.