

SHORTER ARTICLES

Analysis of Sexual Bias and §72 Changes Affecting the Implicit Rate of Return of Certain Defined Benefit Plans

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Abstract

In 1986, the Internal Revenue Service instigated new gender neutral mortality tables. These mortality tables are used to determine the amount of certain retirement benefits to be excluded from taxation. This article demonstrates the sex bias inherent in the old gender specific tables by comparing measures of rate of return (ROR). Further, the authors show that the changes in mortality assumptions have effectively raised taxes on both men and women, thus reducing the ROR for both classes of taxpayers. Additionally, the 1986 changes eliminated the lifetime exclusion and thus raised taxes on those taxpayers who outlive their expected lives.

A significant demographic characteristic of the United States is the increasing average age of its population. In recent years, concern over the potential insolvency of the Social Security system, the increase in the wage replacement ratio from approximately 60 percent to almost 80 percent, (Palmer, 1989) and a perceived need to encourage savings have brought more attention to the importance of retirement plans. Federal taxation plays a critical role in the motivation of saving for retirement—particularly in providing for qualified pension plans. Furthermore, federal taxation may still contain elements of sexual bias even though the 1986 changes were designed, in part, to reduce the bias reflected in differing benefit 'exclusion' formulae for males and females.

After a working career of perhaps 40 years, a retiree might find that the sexual bias that affected his or her entire working career permeates his or her retirement income as well. One of the last places that a citizen should expect to find sexual bias is at the hands of the government and particularly in the exercise of its taxing authority. However, changes in tax laws always create

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new classes of winners and losers. This article presents an analysis of the effect of two tax law changes made in 1986 upon the retirement income of taxpayers due to their gender.

Background and Purpose

Retirement plans which qualify for favorable federal income tax treatment may be broadly classified as either defined contribution plans or defined benefit plans. Defined contribution plans specify the amount of employee and employer contributions, and the amount that eligible retirees receive will vary with these contributions and the return earned by the plans. In contrast, defined benefit plans specify the amount that retirees are to receive, and the amount paid into the plans will vary to provide the specified benefits. Only defined benefit plans are incorporated into the present analysis because of a need for a reasonable constraint for the scope of this study and because of "... the near universal appeal of defined benefit plans" (Ippolito, 1986, p. 7). In 1984, there were 38.5 million active participants in primary pension plans. There were 31.3 million of these enrolled in defined benefit plans while only 7.2 million were enrolled in defined contribution plans (Ippolito, 1986).

Generally, defined benefit plans are expressed in terms of a formula. A typical defined benefit formula (Jacobs and Watkins, 1984 and Ippolito, 1986) is:

$$\begin{array}{ccccccc} \text{Average} & & \text{Yearly} & & \text{Years} & & \text{Annual} \\ \text{Annual} & & \text{Benefit} & & \text{of} & & \text{Retirement} \\ \text{Salary} & \times & \text{Percentage} & \times & \text{Service} & = & \text{Benefit} \end{array}$$

The above formula shows the critical impact that the average annual salary, unit benefit percentage, and years of service have on the annual retirement benefit—e.g., the higher the salary during the years used to calculate the average, usually the last three years of employment, the higher the annual benefit. Accordingly, any growth or decline in any one of the three factors will directly increase or decrease the retiree's payout or benefit. Thus, to the extent that women have suffered diminished wages due to sexual bias, their pension benefits will suffer. This component of sex discrimination is not the subject of this article.

The purpose of this study is to measure the effect of §72 upon the internal rate of return (ROR) to a defined benefit plan participant who retires at age 65 after a 40-year career in the plan. Although many employees change jobs and may thereby participate in more than one defined benefit plan, the single, 40-year career option was selected for study because it has been identified as one of the two career options that may be potentially optimal in planning one's career (Jacobs and Watkins, 1984).

Methodology and Results

The research methodology employed is simulation. Measurement of sexual bias is made by calculating the implicit ROR of a defined benefit retirement plan. In order to evaluate the effects of the selected tax law changes, a

hypothetical case is developed for analysis. The assumptions made are as follows:

Salary at First Year of Employment = \$35,000
Annual Salary Growth Rate = 4 percent
Average Annual Salary = Average of last three years' salary
Average of Last Three Years' Salary = \$155,439
Annual Benefit Percentage = 2 percent
Years of Service = 40 years in a single defined benefit plan
Average Annual Contribution by Employee = 6 percent of salary
Total Absolute Dollars Contributed = \$199,560
Age at Retirement = 65
Employee's Marginal Tax Rate = 28 percent

These assumptions provide an annual retirement benefit of \$124,351 which is treated as a lifetime (no refund) annuity purchased with the lump-sum accumulated by investing the employee's contributions (plus taxes paid on those contributions) at an annual rate of 4 percent. The ROR is the interest rate that equates the lump-sum with the annuity payout.

Sexual Bias Due to Reg. §1.72

For years prior to 1986, sexual bias was incorporated into the tax law by the mortality tables provided by Internal Revenue Regulation (hereafter Reg.) §.72-9. For example, pension plan benefits and contributions are sex neutral because everyone similarly situated in terms of salary and years of service contributes the same amount and gets the same payout whether the participant is male or female. In an environment where the contributions are made on a before-tax basis, all of the benefits are taxed upon receipt at the ordinary income tax rates of the receiving individual without regard to gender (see columns 4 and 5 of Table 1). If females on the average live longer than males, their ROR will be higher than their male counterparts due solely to longevity. For instance, if a given female lives 16 years, her ROR is 27.44 percent as compared with 27.26 percent for a male counterpart who lives his full life expectancy of 15 years.

If the contributions paid into the plan are on an after-tax basis, the funds previously taxed will not be taxed a second time upon receipt. The formula, prior to 1986, for determining the portion of the payout that is excludable from tax was not sex neutral. The portion of the payout received that was excludable from taxation was a fraction whose denominator was the product of life expectancy times the annual benefit. The numerator of the fraction, which may be called the employee's investment, represented the retiree's after-tax contribution to the plan. Therefore, for any given investment, taxpayers with greater life expectancies had a larger denominator with a resulting smaller fraction and thus were entitled to exclude less of the payout from taxation, thereby paying more in taxes. This result had an adverse effect upon these taxpayers' ROR. Prior to December 17, 1986, Reg. §1.72-9 provided a life expectancy at age 65 of 15 years for males and 18.2 years for

females. Thus, the annual amount excludable for males was larger than for females, and during the first 15 post-retirement years, women received fewer absolute dollars of benefit on an after-tax basis. If a given female died prematurely, her ROR might not equal that for men (see columns 2 and 3 of Table 1). However, should any female retiree live beyond the 15-year life expectancy of men, her ROR would be higher due to longevity despite the bias inherent in the benefit exclusion formula prior to the 1986 changes.

Table 1 columns 2 and 3 show that the ROR for men and women differ during the first 15 years after retirement with women lagging behind men. However, as soon as a particular female outlives her male counterpart, her ROR begins to exceed that of the male. Thus the benefits to females of living 3.2 years longer than men more than offsets the bias in the tax law against women in the early years of retirement. If women do in fact live an average of

Table 1
Implied ROR at the End of Each Post-Retirement Year*

Post-Retirement Year (1)	How Contributions to Plan are Taxed			
	When Earned		When Benefits Received	
	Male (2)	Female (3)	Male (4)	Female (5)
1	-78.99	-79.14	-71.99	-71.99
2	-42.47	-42.72	-31.24	-31.24
3	-19.95	-20.22	- 8.21	- 8.21
4	- 6.61	- 6.86	4.71	4.71
5	1.66	1.42	12.40	12.40
6	7.05	6.82	17.21	17.21
7	10.69	10.47	20.36	20.36
8	13.24	13.03	22.48	22.48
9	15.07	14.87	23.96	23.96
10	16.41	16.22	25.01	25.01
11	17.42	17.23	25.76	25.76
12	18.18	18.00	26.32	26.32
13	18.76	18.59	26.73	26.73
14	19.22	19.04	27.03	27.03
15	19.57	19.40	27.26	27.26
16		19.69		27.44
17		19.91		27.57
18		20.09		27.67
18.2		20.11		27.68

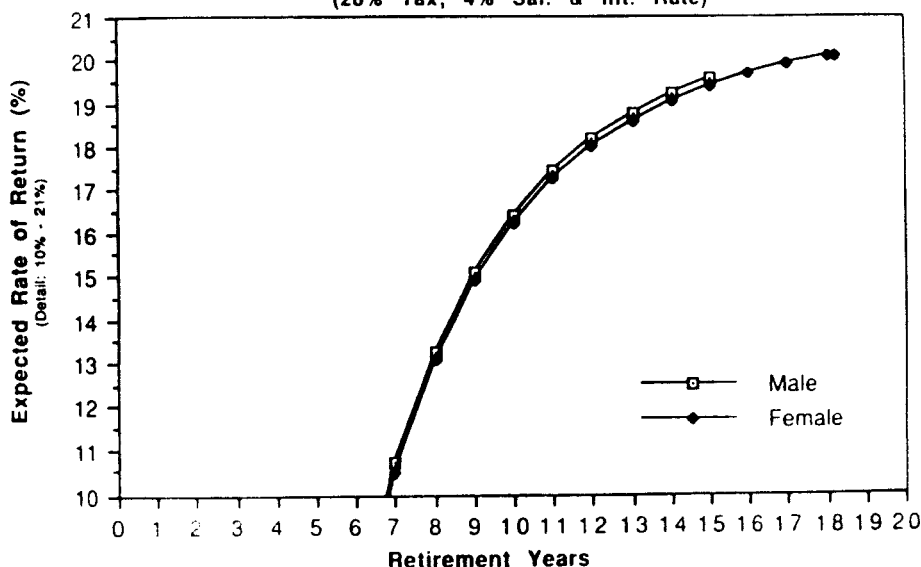
* Assumptions:

- 4 percent Salary Growth Rate
- 4 percent Interest Rate
- 28 percent Marginal Tax Rate
- Prior to 1986 amendments to IRC §72 Reg. §172-9

18.2 years and men 15 years, the expected value of the ROR for females is 20.11 percent and for men 19.57 percent—Figure 1 shows this divergence. Table 1 depicts these RORs for both sexes at the end of each of the post-retirement years, from 1 to 15 years for men and 1 to 18.2 years for women, assuming men and women live their respective life expectancies under the old table.

Figure 1

Implied ROR at End of Each Retirement Year
(28% Tax; 4% Sal. & Int. Rate)



Shortly after the enactment of the Tax Reform Act (TRA) of 1986, the Internal Revenue Service amended Reg. §1.72-9 to provide gender neutral tables of life expectancy. Table 2 compares the impact of the pre- and post-mortality assumptions on the ROR for the participants, assuming participants live exactly their life expectancies. Columns 2 through 5 describe the new gender neutral assumption of a 20-year expected life at age 65. Thus, a male or female living exactly 20 years to age 85 would experience a ROR of 20.29 percent. However, as columns 7 and 8 show, the prior mortality assumption of 15 years and 18.2 years for males and females, respectively, provides a higher ROR—i.e., at 15 years, the gender neutral ROR is 19.35 percent for both males and females (column 5), while the old gender specific assumptions produce a ROR of 19.57 percent for men (column 7) and 19.40 percent for women (column 8). The impact of substituting gender neutral tables is to raise taxes on this class of taxpayers. Thus men and women are worse off as individual groups of taxpayers. However, the extent to which these changes in mortality assumptions affect individual taxpayers is often difficult to determine because of the complexity of the transition rules discussed below.

Table 2
ROR Comparisons of Pre-and Post-1986 Tax Changes

Post-Retirement Year	Post-1986 Gender Neutral Assumptions					Pre-1986 Gender ^a Specific Assumptions	
	Annual Pension Benefit ^b	Amount Excluded From Tax ^c	Net of Tax Benefit ^d	Rate of Return ^e	Rate of Return(%) (\$72b changes) ^f	Rate of Return(%) ^g	
	(\$)	(\$)	(\$)	(%)		Males	Females
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0							
1	124,351	9,978	92,327	-79.20	-67.24	-78.99	-79.14
2	124,351	9,978	92,327	-42.92	-31.97	-42.47	-42.72
3	124,351	9,978	92,327	-20.33	-13.30	-19.95	-20.22
4	124,351	9,978	92,327	- 6.97	- 2.57	- 6.61	- 6.86
5	124,351	9,978	92,327	1.32	4.12	1.66	1.42
6	124,351	9,978	92,327	6.72	8.54	7.05	6.82
7	124,351	9,978	92,327	10.39	11.58	10.69	10.47
8	124,351	9,978	92,327	12.95	13.75	13.24	13.03
9	124,351	9,978	92,327	14.79	15.33	15.07	14.87
10	124,351	9,978	92,327	16.14	16.51	16.41	16.22
11	124,351	9,978	92,327	17.16	17.41	17.42	17.23
12	124,351	9,978	92,327	17.92	18.10	18.18	18.00
13	124,351	9,978	92,327	18.51	18.63	18.76	18.59
14	124,351	9,978	92,327	18.97	19.05	19.22	19.04
15	124,351	9,978	92,327	19.35	19.38	19.57	19.40
16	124,351	9,978	92,327	19.62	19.65		19.69
17	124,351	9,978	92,327	19.84	19.86		19.91
18	124,351	9,978	92,327	20.02	20.04		20.09
18.2				NA	NA		20.11
19	124,351	9,978	92,327	20.17	20.17		
20	124,351	9,978	92,327	20.29	20.28		

^a Case Assumptions are presented in text.

^b See text.

^c $[\$199,560 \div (\$124,351 \times 20)] \times \$124,351 = \$9,978$.

^d $[(\$124,351 - \$9,978) \times .72] + \$9,978 = \$92,327$.

^e Assumes retiree is living at the end of each retirement year.

^f Assumes retiree dies at the end of any given retirement year with unrecovered basis producing a tax savings.

^g Brought forward from Table 1 to facilitate comparison of before & after tax change effects.

As amended Reg. §1.72-9 carries forward the sexually biased Tables I through IV (hereafter old) and adds new gender neutral Tables V through VIII (hereafter new). The rules which determine the circumstances in which one set of tables versus another are to be used by a given taxpayer result from a complex interplay of Reg. §1.72-6(d) and §1.72-9. Yet, some specific observations from a study of this interplay may be made.

The old tables are to be used if the investment does not include an investment after June 1986. However, a taxpayer with such an investment may make an irrevocable election to use the new tables if an annuity payment is received after June 30, 1986. Generally, the new tables are to be used if the annuity contract includes any investment after June 1986 as well as prior to July 1986 and the contract only permits a life annuity option-type of payout. The taxpayer may elect to calculate an exclusion ratio that is basically a weighted-average of the old and new tables.

If the taxpayer does not make this election, then he or she is required to use the new gender neutral tables. Also, if the taxpayer may receive a "disqualifying form of payment" (generally, other than a life annuity), then the taxpayer is required to use the new tables. From a consideration of the rules discussed above, the objective of these requirements seems to be to shift as many people as possible into using the gender neutral tables—especially telling is the rule that permits a weighted-average if the taxpayer elects it. Perhaps many taxpayers will not be aware that they are entitled to such an election and will thus use the new tables by default.

On the surface, one might conclude that the government is merely discouraging sexual bias, but another conclusion seems more likely. Logically, gender neutral tables should be a blend of the individual tables for men and women, and in such an averaging process the new factors would lie in between the old factors for men and women. Such is not the case! As may be seen above, the life expectancy factors for both men and women are longer. Therefore, under the new tables both men and women will pay more tax and be subjected to increased risk. In effect these new gender neutral tables are a tax increase.

§72(b) Change in 1986 TRA

Prior to the Tax Reform Act of 1986, the exclusion ratio provided in §72(b) was fixed for the taxpayer's remaining life. If the taxpayer died before reaching his or her life expectancy, then a tax disadvantage was suffered because there was no deduction for the unrecovered cost or basis in the annuity that was lost by the taxpayer. Thus, the values in Table 1, columns 2 through 5, Table 2, columns 7 and 8, not only reflect the ROR at the end of the respective retirement years for those who live exactly their life expectancy, but also the ROR for those who might die at the end of a given retirement year before the 1986 change in §72(b). However, if the taxpayer outlived his or her life expectancy, then the taxpayer could continue excluding the same percentage. The advantage was that after reaching one's life expectancy the

investment would have been recovered, and this provision served to exclude some income from taxation even after full recovery of investment.

Congress changed the law in the 1986 TRA §72(b)(2) to provide that the exclusion may not serve to shield any amount of payout beyond the taxpayer's unrecovered cost in the annuity contract. The effect of this change may be demonstrated by taking the amount shown in column 3 of Table 2 (\$9,978) and multiplying it by the marginal tax rate (28 percent) to obtain the amount of extra tax (\$2,794) to be paid for each year of life beyond 20 years. If the taxpayer dies before recovering all of his or her cost, free of taxation, then §72(b)(3) as provided in the 1986 TRA allows the taxpayer a deduction for the unrecovered amount in the final tax return. This provides a tax benefit to those who die prior to reaching their life expectancy and increases the ROR as shown by the values in columns 6 of Table 2. A comparison of column 6 with columns 5, 7, and 8 shows that the increase in ROR from §72(b)(3) more than offsets the tax increase of Reg. §1.72-9 for those who die soon after retiring, but those who are fortunate enough to realize their life expectancy pay a tax penalty for surviving.

Summary and Conclusions

Certain retirement benefits and lifetime annuities have historically been taxed differently based on the gender of the recipient. Gender specific mortality tables allowed the recovery of basis over a shorter period for males than for females. This resulted in a lower rate of return being earned by females during the first 15 years of retirement as compared to males, assuming retirement at age 65 and after-tax employee contributions.

All of the changes in tax law in 1986 discussed in this article have not been addressed in the press, in other popular media, nor in academic journals. The authors show that these changes produced negative effects on the rates of return earned on some retirement benefits and lifetime annuities. The impact on any single individual must be determined by the specific set of facts related to the individual, and this article provides an approach to evaluating these individual circumstances.

In 1986, the IRS instigated new gender neutral mortality tables. However, transition rules insure that many retirees will continue to be affected by the sex bias inherent in the gender specific mortality tables. The new life expectancies for men and women are longer than either of those under the prior mortality assumptions. Thus, the new law results in higher taxes for both men and women even though they are equally high for both genders. This results in a lower rate of return on certain retirement benefits and lifetime annuities for both sexes.

The 1986 changes also included the elimination of the lifetime exclusion. This results in higher taxes and lower rates of return on certain retirement benefits and lifetime annuities for all who outlive their life expectancies. Thus, an additional burden is placed on the elderly very late in life, when they seem the most vulnerable.

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