



____ An Economic Appraisal of Pension ____
____ Tax Policy in the United States ____

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Controlling Pension Plan

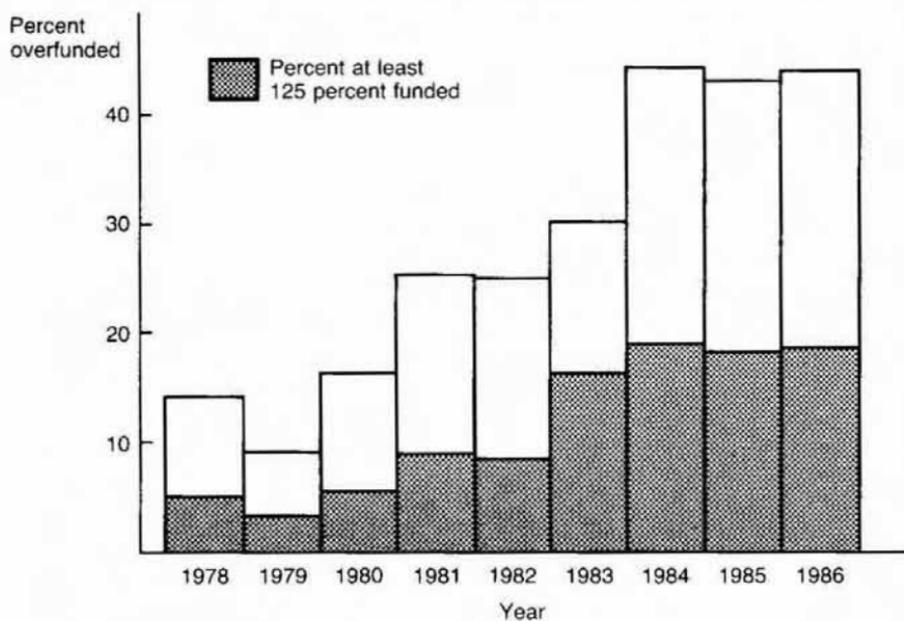
Overfunding

Since consumption tax principles have been extended to savings for retirement through pension plans, but not to other savings vehicles, it is predictable that taxpayers will try to "overuse" the pension vehicle. As discussed in Chapter 3, payout limits during retirement, established in the Tax Reform Act of 1986, limit the "overuse" of pensions by high-income workers. These limits do not, however, address the problem of stockholders overfunding their defined benefit plans: that is, retaining trust benefits in excess of amounts required to fund promised benefits.

In defined contribution plans, there is little opportunity to "overuse" the tax policy granted pensions. After short vesting periods, contributions made to these plans belong to workers. Thus, it is difficult for stockholders to use these accounts for purposes other than paying pensions. In defined benefit plans, however, though they theoretically follow the same funding logic as defined contribution plans (see Chapter 1), the one-to-one relationship between contributions (and workers' forgone wages) and benefits is lost. This separation creates the opportunity for stockholders to use the pension plan, in part, as a corporate savings account.

The extension of the tax-exempt principle to all savings accounts could be justified on the same efficiency grounds as pension tax policy. It would eliminate bias in the tax code against all savings, not just against savings for retirement. For the sake of avoiding the problems raised by the loss of tax revenue and to keep the discussion on pensions, I will avoid this issue. I accept as a constraint, that Congress, for whatever reason, has decided not to extend the consumption tax principle to nonretirement savings vehicles. If Congress cannot control the tax revenue implications of this policy directly, it will do so indirectly by distorting the operation of private pension plans or conceivably by

FIGURE 4-1 Funding Levels, 1978-1986



NOTES: Plans weighted by participants. Liabilities calculated using a 2% interest rate.
SOURCE: Form 5500 Annual Pension Plan Reports

limiting tax-exempt status to defined contribution plan trusts. Thus, the problem becomes one of effectively restricting the pension plan trust fund as a vehicle to accumulate only implicit worker savings for pensions at retirement and to effect the restrictions without imposing undue cost on plan sponsors.

The data in Figure 4-1 make it apparent that overfunding is routine in a large proportion of defined benefit plans. The figure shows the proportion of these plans (weighted by participants) that are overfunded in an ongoing sense during the period 1978-1986.¹ The funding ratios are understated in relation to maximum funding rules as set out in the Internal Revenue Code because my calculation of liabilities permits recognition of ad hoc inflation adjustments during retirement.² Technically, prefunding these increases is not permitted by the Internal Revenue Code (unless the adjustments are guaranteed as a part of the pension benefit). The figure shows that even during the late 1970s, following the large reductions in stock market values from 1972 to 1974,³ approximately one in six plans was overfunded. In 1981, one in four plans was overfunded, and from 1984 to 1986, almost one in two.

TABLE 4-1 Overfunding in Relation to Ongoing Benefits, 1984

<i>Funding Ratio</i>	<i>Plans</i>	<i>Participants</i>
100-124	22.3	20.9
125-149	17.3	23.4
150 or more	22.1	17.6
Total	61.7	61.9

NOTE: Numbers in the table are percents. Liabilities do not reflect future ad hoc inflation adjustments during retirement. See note 4 in text.

SOURCE: Form 5500, *Annual Pension Plan Reports*; excludes plans with fewer than 100 participants.

To give an idea of the amount of understatement in these results, I recalculated the funding distribution for 1984 using liabilities that did not reflect anticipated ad hoc inflation adjustments for retirees. This calculation follows more closely the rules actually set out in the Code for permissible funding.⁴ The results are shown in Table 4-1. Approximately three out of five plans (weighted by participants) were overfunded in terms of supposedly maximum funding limits intended by the code; one in four was at least 50 percent overfunded. Total overfunding amounted to \$103 billion or over 16 percent of all assets held by defined benefit pension plans.⁵

This funding equilibrium was upset in 1987 when the Congress enacted new funding rules. Although the rules apparently were intended merely to reduce overfunding problems and thus control the tax revenue implications of pension tax policy,⁶ I will show below that they are unlikely to be fully successful in accomplishing this purpose. Instead, the rules create a hidden tax on defined benefit plans and on low-risk pension portfolios. An alternative funding policy is developed that arguably is more successful in controlling overfunding and yet is free of distortion on the firm's choice of plan type and portfolio.

TAX BIAS AGAINST DEFINED BENEFIT PLANS

Impact of the New Funding Rules

As a way of illustrating the problems that have developed from the new rules, I will start by considering a firm that has no intentions of overusing the pension plan for the benefit of stockholders. The firm wishes to create a defined benefit plan and to invest funds exclusively in essentially risk-free Treasury bills. To illustrate the essence of the problem, I will start by reconsidering the same simple plan discussed in Chapter 1.

In this pension, the firm has one participant who just started work at age 40. Retirement age is 65, and the annual wage in real terms is

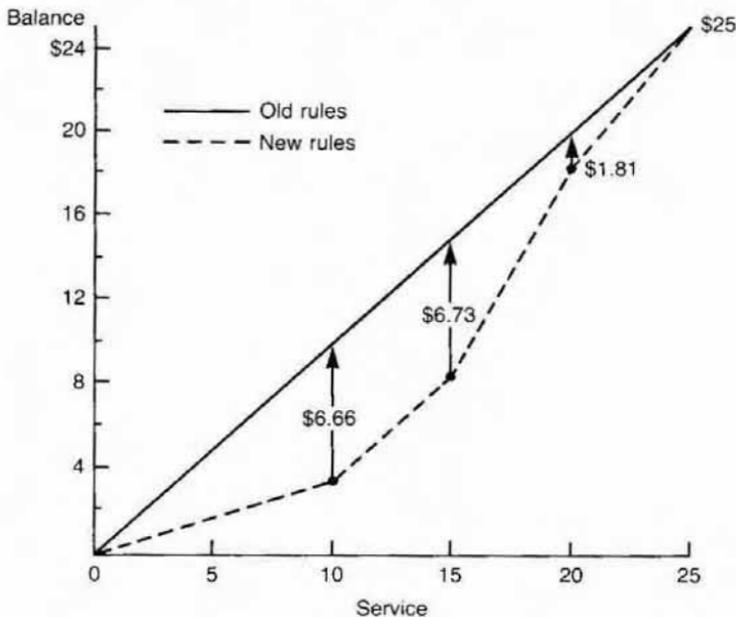
\$10. Expected wage growth and the long-term nominal interest rate are 10 percent. To facilitate discussion in terms of real dollars, I will assume that the inflation rate is also 10 percent, which assumes that the real interest rate and real wage growth rates are zero. The terminology would change somewhat, but the results would be the same if the inflation rate were assumed to be, say 8 percent, and real wage growth and the real interest rate were each 2 percent. Also, recall that under the funding rules that prevailed prior to 1987, the firm could fund in proportion to the ongoing liabilities it accrued each year.

Since the pension in the example paid a lump sum equal to 10 percent, times years of service, times final wage, then in real terms, a total of \$25 (10%, times 25 years of service, times final real wage \$10) needed to be funded over the worker's 25 years with the firm, or \$1 per annum in real terms. In actuarial terminology, an ongoing liability in the amount of one dollar is accrued each year. Prior to 1987, this was the permissible "normal" contribution to the plan.⁷ This funding scenario is depicted in Figure 4-2 by the linear schedule beginning at zero and ending at \$25 at the end of 25 years.

In 1987, Congress enacted the Omnibus Budget Reconciliation Act (OBRA), which imposed new maximum funding rules on defined benefit plans. Under the old rules, the firm was permitted to hold assets equal to ongoing benefits.⁸ The new law constrains pension assets to be no more than 150 percent of termination benefits.⁹ Termination benefits are different from ongoing benefits because termination benefits assume that the plan will be terminated immediately, while ongoing liabilities assume that the firm will continue and thus pay benefits in proportion to wage levels at retirement. When plans terminate, the pension obligation is determined using existing wages in the benefit formula. These benefits are frozen in nominal terms even though they are payable many years in the future at retirement age. Thus, unlike ongoing liabilities, termination benefits do not recognize that pension benefits are tied to wage at retirement, but instead assume that benefits are proportional to current wages.

The difference in calculations can be dramatic because inflation alone is expected to create a large wedge between current wages and wages at retirement.¹⁰ To partly make up for the difference, the new tax rules permit firms to fund up to 150 percent of termination liabilities (but not more than 100 percent of ongoing liabilities). From the perspective of controlling funding, the new rules have appeal because, though the above simple example does not bring this out, ongoing liabilities involve numerous assumptions, permitting actuaries the opportunity to generate overfunding through use of assumptions that may not accurately portray the pension plan's circumstances.¹¹ In the termination calculation, the only assumption, besides mortality, is the interest

FIGURE 4-2 Trust Funding: Old and New Funding Rules



rate used to discount liabilities; and OBRA requires that this rate be determined by the U.S. Treasury.¹² In this section, I will discuss the tax bias introduced by the new rules.

The problem with the rules is that 150 percent of termination liabilities is often less than ongoing liabilities. The easiest way to illustrate this point is to calculate the value of termination benefits (PVT) for the 40-year-old worker in the example. In Chapter 1, it was shown that in year one ongoing liabilities equaled \$1, and permissible contributions also were \$1. However, 150 percent of termination benefits in year one is not \$1, but only 12.3 cents.¹³ Termination benefits are lower than ongoing benefits because termination benefits calculations do not project wages and thus discount benefits based on current wages, payable in the future. For a 40-year-old worker, one dollar in *nominal* terms payable in 25 years has a present value of only eight cents. An eight cent contribution will generate one dollar in *nominal* benefits in 25 years, not one dollar in *real* terms.

In contrast, the ongoing benefit reflects a 10 percent wage growth factor which offsets the 10 percent discount term. In other words, the ongoing calculation shows that a one-dollar contribution is required to

TABLE 4-2 Tax Cost of New Funding Rules

Category	Years of Service				
	0	10	15	20	25
Trust Balance (\$real)					
1. Old rules	\$0.00	10.00	15.00	20.00	25.00
2. New rules	0.00	3.34	8.27	18.19	25.00
3. Difference	0.00	6.66	6.73	1.81	0.00
4. Avg. diff. during interval	—	3.33	6.69	4.27	.90
Taxable Interest					
5. Avg. per year during interval	—	.33	.67	.42	.09
Tax During Interval					
6. 33% per year	—	.11	.22	.14	.03
7. Total for interval	—	1.10	1.10	.70	.15
8. Cumulative tax	—	1.10	2.20	2.90	3.05

NOTE: See text for assumptions.

pay for a *real* one-dollar benefit payable in 25 years. This is why, even allowing for multiplication by 150 percent, the termination funding limit is only approximately 12 percent of the ongoing liability limit in year one.

Recall from Chapter 1 that economic reality requires that workers pay for their pensions through forgone wages. Moreover, as long as workers commit themselves to the firm over the long run (which is presumably what the firm wants them to do), they will expect to receive real benefits at retirement, not termination benefits midstream. As such, competitive equilibrium requires—and the empirical evidence confirms—that workers will forgo wages in amounts sufficient to pay for ongoing benefits.¹⁴ But, under the new funding rules, the firm can contribute only 12 percent of the worker's implicit one dollar contribution to the pension (in the form of forgone wages). Implicitly, 88 percent must be saved outside the trust. If the firm pays a tax rate of 33 percent, 88 percent of the implicit contribution accumulates at the after-tax 6.67 percent interest rate (10 percent, minus the 33 percent tax, times 10 percent).

Similar calculations apply to subsequent years. For example, in year 15 the trust fund is restricted to hold \$8.27 in real terms.¹⁵ Under the old funding rules, the pension trust could hold \$15 in real terms in year 15. Thus, at the 15-year service level, the firm is accumulating \$8.27 inside the pension trust at the before-tax interest rate and \$6.73 outside the pension fund at the after-tax interest rate (\$15 in real contributions minus \$8.27 in the trust fund).

The maximum amount of assets in the trust fund under the new rules is shown by the nonlinear schedule in Figure 4-2 and the second row of Table 4-2. Row one in the table depicts the permissible amount

in the trust when the firm was able to fund for ongoing benefits. The difference between the two rows in the table and the two schedules in the figure is the amount of accumulated savings that must be held outside the pension fund (row three of the table, also depicted in the figure).

Tax Assessment

It is easy to obtain an estimate of the tax impact of the new rules. Over each segment of the schedule in the figure, the average difference between the two trust accounts is calculated (row four in the table). Taxable interest is 10 percent times these differences (row five). The tax rate on these interest amounts is assumed to be 33 percent. Annual tax assessments on interest earned outside the trust are shown in row six.

Row seven lists the total tax assessment during each interval; for example, during the first 10 years, 11 cents in taxes are paid each year, amounting to \$1.10 over 10 years. The last row accumulates these amounts. These numbers show that over 25 years an additional tax is paid on savings outside the pension under the new rules, amounting to approximately \$3 in real terms, or 12 percent of the value of the pension, \$25.

If, instead, the firm offers a defined contribution plan, it is entitled to deposit the full amount of the implicit pension contributions (forgone wages) into the pension trust fund, all of which accumulates at the pretax rate of interest. Because of OBRA's differential treatment of defined benefit and defined contribution plans, *a tax bias is created by the new full funding limits in favor of defined contributions plans.* Given the potential advantages of defined benefit plans to workers and firms (see discussion in Chapter 1), this tax distortion is expected to impose economic costs on workers and firms.

More General Results

Balanced work force. The use of a one-worker plan mimics the impact of the new law on new, growing firms with predominantly young workers, but it overstates the impact of the new rule in more mature firms. For older workers, 150 percent of termination liabilities can exceed ongoing liabilities. Since the rules are applied in the aggregate, the "surplus" amounts for older workers can be applied to the "deficit" amounts for younger workers. The new permissible trust balance is thus higher than depicted above for firms with a mix of younger and older workers. The tax effect, however, still is significant.

To illustrate, suppose in our sample firm that many workers, instead of one, are employed. Each worker starts at age 40 and retires at age 65. Workers never quit and are never fired. The firm is neither grow-

ing nor contracting; thus, employment is constant. For simplicity, assume that there are 25 workers in the firm. One worker joins each year, and one retires each year. These assumptions generate a work force comprised of one worker at each service level from one to 25.

Liabilities for the plan are obtained by adding the liability for each of 25 workers in the firm, each with a service level varying from zero to 25 years. Using the same assumptions as above, ongoing liabilities amount to \$312.¹⁶

The termination value of benefits multiplied by 150 percent turns out to be \$237,¹⁷ or \$75 less than ongoing liabilities. Thus, in the more general model, using a 10 percent interest rate, the new 150 percent full funding limit permits 75 percent ($\$237/\312) of ongoing liabilities to be funded; the remaining 25 percent must be saved in a tax-exposed vehicle. Thus, interest earnings on the \$75 are subject to the corporate tax.

If the tax rate is 33 percent, and interest earnings are \$7.50 (10 percent interest rate times \$75), the effective tax levied against pension savings is \$2.50 per year (33% tax times \$7.50 in interest earnings). This tax amounts to approximately 10 percent of annual benefit payouts (recall that in the example, one retiree per year receives a \$25 lump-sum payout).

Workers and retirees. Finally, I recalculated the tax for a plan that had three participants retired and receiving annuities for every 10 active workers. This example conforms to a typical defined benefit plan that is mature but is sponsored by a growing firm. I incorporated retirees in the model by converting the \$25 lump sum in the above multi-person firm into an indexed annuity payable until death at age eighty.¹⁸

The inclusion of retirees works to reduce the impact of the new limit because retiree annuities, whether flat nominal amounts or contractually indexed to inflation (as in my model), are counted as both ongoing and termination benefits in the Internal Revenue Code. Thus, the 50 percent cushion applied to retiree liabilities can be used to help "cushion" deficiencies in the permissible funding amounts for younger workers.

I assumed there was one retiree at each age from 65 to age 80 and two workers at each age from age 40 to 65. This distribution corresponds to the assumption of the 3:10 ratio of retirees to workers. As shown in the last column of Table 4-3, the inclusion of retirees in the model reduces the tax rate. For example, when the interest is 10 percent, the effective tax rate on defined benefit plans is 3.8 percent compared to 9.9 percent when there are no retirees.¹⁹

Unindexed annuities. It is important to understand that the above calculations are lower-bound estimates of the impact of the new funding rules. The reason is that, in my model, the annuity was set equal to \$1.67 per year at age 65 and was contractually indexed to inflation until

TABLE 4-3 Differential Tax on Selected Defined Benefit Plans

Interest Rate*	One-Person Plan	Multiperson Plans	
		No Retirees	25% Retirees
5.0	1.8	0.0	0.0
7.5	5.9	3.7	0.0
10.0	12.2	9.9	3.8
12.5	19.8	17.2	9.4
15.0	28.1	25.2	15.9

*Numbers in table are percents.

NOTE: See text for description of plan assumptions.

age 80. Recalling a real interest rate of zero, this annuity corresponds to an age-65 lump-sum equivalent value of \$25. Because it was contractually guaranteed, the cost of living adjustments (COLAs) can be counted as termination benefits under the new rules.

In reality, firms almost always adjust postretirement benefits for inflation, but they do not do so contractually.²⁰ Instead, they award these increases on an ad hoc basis, a feature presumably related to the uncertain nature of investment returns in portfolios comprised of stocks, long-term bonds, and the like. In short, the flexibility of inflation adjustments after retirement is presumably a mechanism by which workers can share in the investment risk that characterizes the pension portfolio (see Chapter 1).

Under the old funding rules, ad hoc COLAs, even though anticipated, could not be prefunded as such. But as a practical matter, as long as the pension plan was not dominated by retirees, actuaries could effectively prefund these anticipated benefit increases by adjusting other assumptions in the funding calculation. For example, they would increase their wage growth assumption so as to increase the level of permissible funding by a sufficient amount to accommodate the plan's anticipated (though not contractual) COLA awards.

Under the new funding limits, it is not generally possible for actuaries to effectively fund for ad hoc COLA policies. The constraint is effective because most assumptions have been made irrelevant by use of a termination concept in the new rules. Thus, if the promised annuity was \$1.67 starting at age 65, the old rules permitted actuaries in most plans to effectively set contribution rates that reflected ad hoc policies to provide for some COLA adjustments to retiree benefits. Under the new rules, the termination benefit is assumed to be \$1.67 from age 65 to age 80 in *nominal* terms. Thus, at age 65, the present value of the annuity is valued at \$12.97 (the value of a stream of nominal annuity payments of \$1.67 for 15 years, discounted at 10%), not \$25.

If I recalculated the above excise tax rates imposed by the new rules

on defined benefit plans under the assumption that annuities are effectively but not contractually indexed to prices, all effective tax rates would be higher. For example, when the interest rate is 10 percent, the effective tax rate on defined benefit plans increases from 3.8 percent to 10.3 percent.

The only way to circumvent this constraint is to contractually promise postretirement benefits. This change would qualify the anticipated adjustments for prefunding. For all intents and purposes, however, a contractual COLA eliminates any possibility of risk-sharing in investment returns by workers. Presumably, shareholders would be willing to promise this degree of certainty only if the portfolio was invested intensely in short-term bills which exhibit little volatility in real returns.²¹ The less risky portfolio, of course, would come at the expense of lower expected pension benefits.

Interest rate sensitivity. To illustrate the sensitivity of the effective excise tax levied against defined benefit plans by the new funding limits, I calculated the tax under 5 interest rates for the one-person and the multiperson plans discussed above (with contractual COLAs). The results are depicted in Table 4-3.

The results show that at a relatively low interest rate, 5 percent, the excise tax rates on all plans are negligible. At this interest rate, 150 percent times termination liabilities is almost equal to ongoing benefits at most age and service levels. For a 7.5 percent interest rate, the tax rates increase to roughly 6 and 4 percent for the one-person plan and multiperson plan with active workers of all ages but with no retirees. The implicit tax at this interest rate is still negligible for a 3:10 retiree-to-worker ratio. At a 12.5 percent interest rate, however, the tax rate in all plans becomes significant. For the relatively young plans, the effective excise tax approaches 20 percent; for the more mature plan, the tax rate is 9.4 percent. Again, if an annuity was promised that was implicitly tied to prices (but not contractually promised) and had the same lump-sum value at age 65, all these tax rates would be several percentage points higher.

Summary. In short, the new full funding limits promise to impose a tax bias against defined benefit plans. The burden is highest for plans heavily populated by active workers and for plans that award ad hoc inflation adjustments, as is the case in most plans. At relatively high interest rates, but certainly within the range of rates that have occurred in recent history, the new limits may make defined benefit plans for new firms prohibitively expensive relative to equally generous defined contribution plans.²²

The rules also impose a bias in favor of plans that offer contractual COLAs because contractual COLAs can be funded under the new rules, but ad hoc COLA policies cannot.²³ Contractual COLAs, together with a benefit promise indexed to final wages, however, essentially imply a

risk-free promise from the perspective of workers. But if workers expect a no-risk pension, they also cannot expect to share in the risk premia affiliated with a riskier portfolio and hence presumably will expect lower benefit levels. If firms, in fact, invest in risky portfolios—and I will show in the next section why they have an incentive to do so—stockholders take the gains from the higher expected returns, and workers receive a benefit that reflects the equivalent of zero-risk returns.

One public policy solution to the low-risk, low-benefit bias created by OBRA is to permit actuaries to fund for expected retirement COLAs based on experience in the plan. As long as appropriate amortization rules for incorrect assumptions are specified (see below), this rule change would not permit systematic overfunding.

SOURCES OF OVERFUNDING

The two elements that pose a conflict for pension tax policy now have been introduced. The first problem is deliberate overfunding of pension plan trust funds. The second is the distortion on behavior caused by rules designed to control overfunding. As an empirical matter, many, if not most, defined benefit pension plans are overfunded in relation to ongoing liabilities. This means that assets exceed those required to pay for pension promises based on service-to-date, accounting for indexing of benefits to final wages and at least partially to prices beyond retirement. Since, by construction, defined contribution plans cannot be overfunded, there has been an implicit tax bias in permissive funding rules in favor of defined benefit plans. Unless carefully designed, however, constraints on funding of defined benefit plans may create a tax bias in the opposite direction in favor of defined contribution plans.

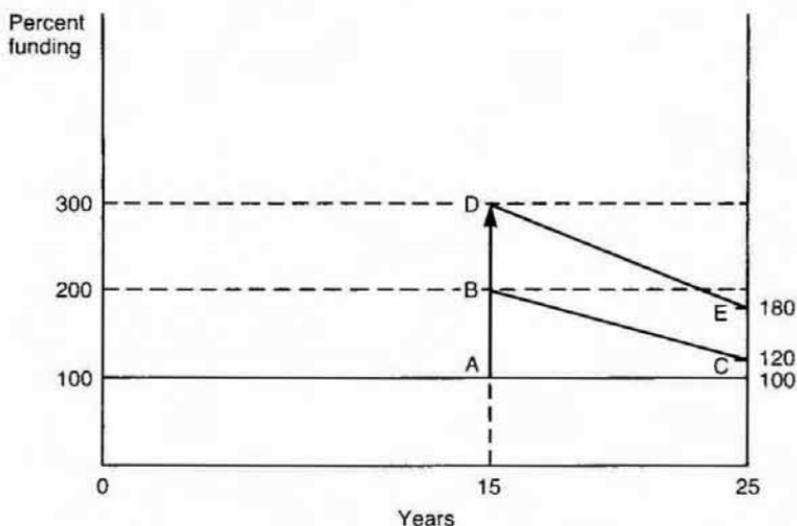
To find a resolution to these problems, it is necessary to devise rules that prevent overfunding. At the same time, the rules should not bias firms' choices of either pension plan type, or asset allocation in the pension portfolio.

Illustration of Overfunding

Prior to the enactment of new funding rules in the Omnibus Budget Reconciliation Act in 1987 (OBRA), the intent of the then-existing funding rules was that plans would not have assets in excess of ongoing liabilities. However, the way in which the limit was enforced permitted systematic overfunding for long periods.

To illustrate, consider the one-person example above, in which the plan accumulated funds over 25 years, adding one dollar each year in real terms to accommodate one more year of service accruals. This scenario is depicted in Figure 4-3 by the solid horizontal line. The funded

FIGURE 4-3 Scenario for Overfunding: Pre-OBRA Rules



ratio is 100 percent in every year from zero to 25. In year 15, for example, assets in real terms amounted to \$15; new contributions in year 16 were \$1 in real terms.

Suppose that instead of holding essentially riskless assets (T-bills, in the example), the plan held securities with more volatile returns, like stocks. Suppose that in year 15 the value of the stocks doubled from \$15 to \$30. The plan would become 100 percent overfunded. For simplicity, assume that following the capital gain, the portfolio was switched back to all T-bills, and thus yielded a zero real rate of return over the next 10 years.

The old funding rules did not require the plan to return the extra \$15 in overfunding to the plan sponsor, nor did it require the firm to pay taxes on earnings on the extra \$15. Instead, the firm was required to amortize the experience gain (in this case \$15) over 15 years. That is, when the firm was to make its annual "normal cost" contribution of \$1 in year 16 to account for one more year of service accrual, it would be required to deduct from this the amortized value of its investment gain. In the example, the experience credit would be \$1: that is, \$15 in gains amortized over 15 years is \$1 per year.²⁴ Thus, in year 16, no net contribution would be made, and the plan still would be overfunded: compare \$30 in assets to \$16 in liabilities.

If we follow this logic through year 25, the pension still would have \$30 in assets and \$25 in liabilities; the plan would be 20 percent overfunded.²⁵ Over the entire 10-year period following the capital gain,

overfunding would have averaged 60 percent of liabilities. The funded ratio under this scenario is depicted by the schedule labelled ABC in Figure 4-3.

Had the capital gain in year 15 been \$30 instead of \$15, part of the overfunding never would have been amortized. In this case, the amortized value of the experience gain is \$2 per year (\$30 in experience gains amortized over 15 years). The firm would subtract the \$2 amortized gain from its "normal" contribution for additional service accruals—in our example, one dollar per year. But since this offset would result in a negative contribution—that is, it implies that the plan would have to return monies to the firm—the code permitted the plan to retain a lower limit on net contributions of zero. In the example, this means that only \$1 of each \$2 in amortized gains would be used; the other \$1 would never be used as a contribution offset.²⁶

Since amortized losses could always be offset by higher contributions, there was an asymmetry in the old funding rules. Thus, in year 25, assuming the firm converted its assets into T-bills after its capital gain, it still would have \$45 in assets compared to liabilities that now would amount to \$25. Over the entire ten-year period, overfunding would average 140 percent of liabilities (the average funding ratio would be 240 percent). This scenario is depicted by the schedule labelled ADE in the figure.

This example is constructed to be extreme to illustrate a point, but this does not mean that, in reality, the same rules can not generate similar amounts of overfunding. The key to generating overfunding in a defined benefit plan trust fund is to hold some risky assets in the portfolio. Because of volatility in returns, chances are good that the pension plan holding, say, stocks instead of bonds in its portfolio, can get on the upside of full funding. Then the plan sponsor can take advantage of long amortization periods and the zero bound on net contributions to remain overfunded for lengthy periods of time.

To show this, I performed some simulations elsewhere.²⁷ I portrayed a pension plan with a balanced work force like the plan used in the tax illustrations above.²⁸ Liabilities were indexed so as to equal 100 in 1950; since the plan was in steady state, its liabilities in real terms remained at 100 over the entire period from 1950 to 1986. In one case, I supposed the plan held 100 percent in one-year T-bills; in the other, I supposed the plan held all stocks (in particular, an S&P-500 index). I applied the amortization rules to these plans as specified in the Internal Revenue Code.²⁹ I assumed that, in discounting liabilities, the actuary used an interest rate equal to the 10-year Treasury rate.³⁰ The balances for selected years during the simulation are portrayed in Table 4-4.

The results show that if the pension plan held one-year T-bills over the entire period, the average asset balance in the pension plan from 1951 to 1986 would have been 101, in comparison to 100 in ongoing

TABLE 4-4 Trust Balances under Pre-OBRA Rules: Treasury Bills versus Stock Portfolios

Selected Years	Portfolio Composition	
	T-Bills	All Stock
1950	100	100
1960	100	273
1970	103	336
1980	92	178
1986	108	252
Average	101	261

NOTE: Balances are expressed in 1950 dollars.

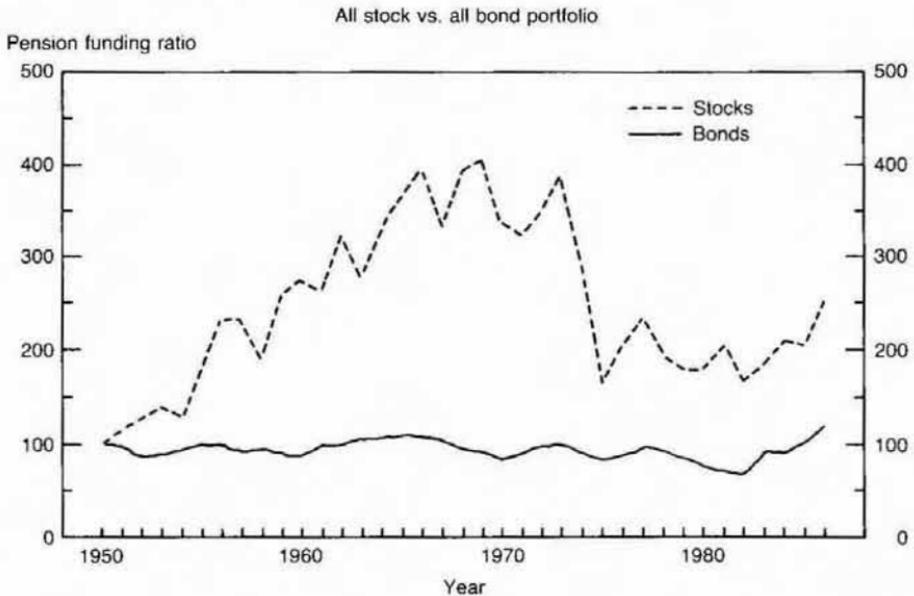
liabilities. Since one-year T-bills are not entirely riskless assets, the funded ratio showed some variance, ranging from 92 percent in 1980 to 108 percent in 1986. A portfolio comprised entirely of long-term bonds generated similar results: average funding levels were 94 percent of ongoing liabilities.

In contrast, the all-stock portfolio averaged 261 percent of liabilities. The plan was over 400 percent funded in an ongoing sense in 1969. It attained this overfunding while adhering to the old funding rules over the entire period.³¹ The differences in attained funding levels between the all bond and all stock portfolios are displayed graphically in Figure 4-4.

Omnibus Budget Reconciliation Act of 1987 (OBRA)

New full funding rules were enacted by OBRA in 1987. Two additional constraints were imposed on pension plan funding. First, the 1987 legislation reduced the amortization period for experience gains and losses from 15 to 5 years. Second, instead of permitting funding of 100 percent of ongoing pension obligations, the new law permits funding up to 150 percent of termination liabilities. Contributions to the plan must be zero as long as this constraint is binding.³² Previously, the full funding limit was defined as 100 percent of ongoing liabilities.³³

As discussed above, the problem with the rule is that the cushion is insufficient to cover real (or ongoing) pension liabilities over some range of interest rates. For example, in the model used above, as long as the interest rate is below 8 percent, the new rule permits full funding of ongoing obligations (150% percent of termination liabilities at this interest rate is equal to or exceeds ongoing liabilities). For interest rates above this, the new rules effectively legislate underfunding. Thus, in the 1980s when long-term interest rates were in the vicinity of 12 per-

FIGURE 4-4 Funding Levels before OBRA

cent or more, 150 percent of termination liabilities in the model were less than 80 percent of ongoing liabilities.

Impact of the New Rules

To show the impact of the five-year amortization schedule and the 150 percent funding limit, the balances for the portfolio strategies presented in Table 4-4 were recalculated under the new rules. For purposes of the calculations, I assumed that the new law was effective on January 1, 1951. The results of the simulations are shown in Table 4-5.

The results show that the impact of the legislation depends largely on the nature of the pension portfolio. The all T-bill portfolio exhibits only small experience gains or losses over the period and thus essentially is unaffected by faster amortization. It is affected, however, by the new 150 percent funding rules whenever the new limit falls below 100. Because the new limits were not constraining until the late 1970s (prior to this time, interest rates were sufficiently low so that 150 percent of termination liabilities exceeded ongoing liabilities), the overall portfolio balances for the entire period are not substantially affected.

TABLE 4-5 Trust Balances under Post-OBRA Rules

Selected Years	Portfolio Composition	
	T-Bills	All Stock
1950	100	100
1960	101	273
1970	101	336
1980	88	178
1986	74	252
Average	94	261
Pre-OBRA	101	261

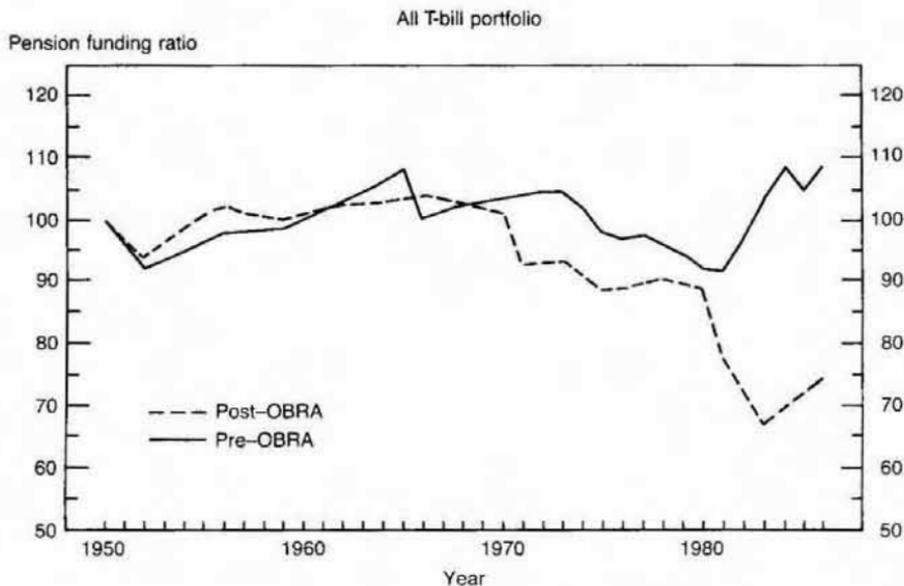
NOTE: Balances are expressed in 1950 dollars.

The impression changes if funding levels attained towards the end of the period are studied. The funding level in 1986 was 74 percent compared to 108 percent under the old funding limits (see Table 4-4). If the interest rate remained in the vicinity of 12 percent into the indefinite future (the prevailing interest rate in the simulations in the early 1980s), trust balances in these portfolios would settle to roughly 75 percent of ongoing liabilities. This merely illustrates the point made above that if the plan invests in riskless assets, it essentially is required to maintain an underfunded plan which creates a tax bias in favor of defined contribution plans. The differences in funding levels in the all T-bill portfolio using the pre- and post-OBRA funding rules are displayed graphically in Figure 4-5.

In contrast, the all stock portfolio strategy in the simulation is completely unaffected by the new legislation. The all stock portfolio balance averages 261 percent of ongoing liabilities under either the pre- or post-OBRA funding rules. The impact is zero in this case because capital gains in the stock portfolio are so substantial over the period relative to the interest rate used to discount liabilities (which is tied to bond yields), that the simulated pension plan was against the zero-contribution limit in virtually all years under the old rules. Thus, in this case, the new contribution and funding constraints are entirely redundant.

In summary, the new OBRA maximum funding rules have two effects. First, for firms and workers that wish to use low-risk assets to back the pension promise, the new rules impose a tax bias in favor of defined contribution plans. Second, the rules retain the incentive to hold risky assets in the pension fund. When expected tax benefits from overfunding are higher, more risk is undertaken by the pension fund. Whether the inclusion of more risk in the pension fund affects pension benefits depends upon whether the trust fund is viewed as entirely separate from the plan sponsor.

FIGURE 4-5 Impact of OBRA



On the one hand, if the pension promise is backed by assets in the firm (not just those in the pension trust), then as long as the overall risk level in the firm is unaffected, the firm's implicit guarantee of the pension is unaffected. The only short-term loser from the risky strategy is the U.S. Treasury. In the long run, however, as Congress works to redress persistent overfunding, more funding constraints and therefore more distortions are predictable.

On the other hand, if the firm is unwilling to guarantee all pension losses with assets in the firm, the impact of the new law potentially is more important. Suppose pension trusts are viewed as assets separate from the firm, and these assets alone implicitly back the pension promise. The new law provides a tax incentive to engage in a riskier portfolio strategy. If a low-risk strategy is adopted and long-term interest rates are 10 percent, roughly 75 percent of liabilities can accumulate in a tax-free trust. Full funding is attainable only if a riskier portfolio strategy is followed. If the downside of the riskier strategy is realized (i.e., large capital losses), the likelihood increases that some pension promises will be unfulfilled.³⁴

If Congress wishes to eliminate overfunding and retain a neutral influence over the choice of pension plan and type of portfolio, it must develop funding rules that create a reasonable relation between ongoing pension liabilities and pension assets, regardless of the composi-

tion of the pension portfolio. I have outlined an alternative approach to this problem in the next section.

AN ALTERNATE APPROACH TO ENFORCE FULL FUNDING

The intent of Congress apparently is to extend the consumption tax concept to defined benefit plans but to prevent stockholders from taking advantage of this by "oversaving" in these trusts through various portfolio risk strategies. In this section, I will consider a mechanism that permits Congress to frustrate firms' overfunding strategies without affecting their ability to fully fund their plans on an ongoing basis.

First, suppose plans were permitted to fund for ongoing benefits. Essentially, termination benefits are an irrelevancy to the economic value of pensions as viewed by workers and firms and, as such, funding limits tied to the termination concept are a formula for creating significant distortions in the pension market. Second, the five-year amortization period for experience gains and losses should be retained. Lengthy amortization periods work to generate smoother contribution flows to the plan but permit overfunding to persist for long periods of time. A five-year rule largely eliminates this potential but, at the same time, permits some smoothing of gains and losses over short periods of time.

Third, *all* investment gains (what actuaries call experience gains) should be applied in full against normal (service accrual) contributions. *If amortized experience gains exceed normal contributions, the surplus is transferred to the firm and treated as taxable income.* We can refer to this as the introduction of a *symmetry principle* into the funding rules because *all* losses and *all* gains are amortized in full.

For example, consider the one-person plan developed above. Recall the instance where in year 15, assets increased in value from 15 to 30 dollars. Under the old rules, this meant that one dollar of this gain was amortized each year, exactly offsetting the normal contribution also equal to one dollar per year. In the above proposal, the \$15 gain would be amortized over five years, or \$3 per year. Since this amount exceeds the one dollar "normal" contribution, the plan would return \$2 to the firm in each of the ensuing five years to be included in taxable income at the corporate level. If no additional capital gains or losses occurred, the plan's funding level would return to 100 percent of liabilities after five years.

To demonstrate the impact of this policy, I reran the simulation model above, imposing the proposed rules as if they were in effect on January 1, 1951. The results, demonstrated in Table 4-6, show that the rules are successful in generating trust balances that are reasonably related to ongoing liabilities. The all-stock portfolio balance is reduced from 161 percent overfunded on average under the OBRA rules to 29 percent under the alternative rules. The all T-bill portfolio averages 101

TABLE 4-6 Trust Balances under a Symmetrical Funding Rule

Selected Years	Portfolio Composition	
	T-Bills	All Stock
1950	100	100
1960	101	134
1970	101	96
1980	96	100
1986	110	140
Average	102	129
Post-OBRA	94	261
Pre-OBRA	101	261

NOTE: Balances are expressed in 1950 dollars.

percent and is within 10 percent of full funding over all years. While there is still some bias in favor of risky strategies, the bias is small compared to either the pre- or post-OBRA rules.

If these rules were effected, the funding limits enacted in the Omnibus Budget Reconciliation Act should be repealed. The result would be that overfunding in defined benefit plans would be substantially contained. In addition, the rules would not seriously bias firms in favor of either defined benefit or defined contribution plans and would not distort choices in favor of risky portfolios in defined benefit plans.

DISTORTIONS FROM DIFFERENT TAX TREATMENT OF STOCKS AND BONDS

As a final matter, I will address the problems created by different tax treatment of stocks and bonds. Historically, these securities effectively have been taxed differently, owing to lower tax rates on capital gains. In the past, this difference created an opportunity for stockholders to "abuse" the use of the tax-exempt pension fund without overfunding. Although this problem has been largely eliminated by removing the capital gains tax in the Tax Reform Act of 1986,³⁵ we need to understand this problem because it will be recreated if favorable tax treatment towards capital gains is reinstated at some future date.

To isolate this phenomenon, let us consider a very simple model that captures the essence of the problem but does not create unnecessary complications. I will discuss issues surrounding the optimal asset allocation in the pension under pre-1986 tax law. In particular, suppose there is no corporate income tax. The personal tax rate is 33 percent, but the tax applies only to earnings from bonds, not from stock (this mimics past preferential income tax treatment towards earnings from stock without introducing undue complications). Other things constant, suppose workers prefer a balanced portfolio in the pension be-

cause it gives them the desired trade-off between risk and required implicit contributions (see Chapter 1). Thus, the pension holds 50 in stocks and 50 in bonds. Suppose stockholders who own the firm also hold 50 in stock and 50 in bonds in their personal portfolios.

Prior to the Tax Reform Act of 1986, because of preferential tax treatment of stock, in equilibrium, the *gross-of-tax* return on bonds should have exceeded the risk-adjusted return on stock. That is, if both securities were to pay a risk-adjusted return of 10 percent, the after-tax return would be 6.7 percent on bonds and 10 percent on stock (recall that in the illustration, the assumed tax on stock earnings is zero, which serves to mimic the substantial advantage awarded to stocks relative to bonds prior to 1986). This situation would create an excess demand for stock and an excess supply of bonds. Equilibrium would be attained when the *net-of-tax* risk-adjusted returns were equal. Suppose this equilibrium occurred in a situation where the before-tax return on bonds was 12 percent; and after-tax, was 8 percent (that is, 12 percent gross return, minus the 33 percent personal tax). The before- and after-(risk-adjusted) return on stock also is 8 percent.

Total tax revenue on the 100 in stocks and 100 in bonds held by the pension plan and stockholders in the example is easy to determine. The pension trust is tax exempt, and, thus, no tax revenue is expected. Stockholders' portfolios are outside the trust and thus are exposed to taxation. Since 50 of their holdings are in stocks, the earnings of which are tax exempt in the example, no taxes are collectable on these securities. But earnings on bonds are taxable. Taxable interest from all bonds held by stockholders amounts to the 12 percent interest rate, times 50, or six units of taxable income per year. Tax revenue amounts to 33 percent of this, or two units per year.

This estimate, however, greatly overstates tax revenue to the U.S. Treasury. Stockholders effectively can make an implicit contract with workers. Stockholders will put 100 percent of the pension trust fund in bonds but pay benefits based on expected returns from a 50 to 50 stock-bond portfolio.³⁶ Stockholders will hold 100 percent stock but their long-term return implicitly will be tied to a 50 to 50 stock-bond portfolio. In effect, stockholders switch their 50 in bonds with 50 in stock from the pension fund. Pension benefits are unchanged.

The effect of this transaction is that tax revenue from these workers and stockholders is now zero. The tax-exempt trust fund would hold all the taxable securities (bonds), and taxpaying stockholders would hold all the tax-favored securities (stock). This switch is referred to as a *tax-arbitrage* transaction and is the basis for past prescriptions for pension plans to hold (but not necessarily base benefits on) all-bond portfolios.³⁷ Nothing real happens. The only loser is the U.S. Treasury. Stockholders and workers save a flow of two units of income per year to share somehow amongst themselves—an amount that otherwise would have been sent to the U.S. Treasury.

While ERISA technically requires that the pension plan trust be used for the exclusive benefit of participants, as a practical matter, there is no way the tax-arbitrage strategy could be detected, and, thus, there is no way for the Congress to contain the tax loss that would result. As a general principle, if the Congress gives tax-exempt status to pension plans and also applies different tax treatment to different types of securities, it is inevitable that firms will engage in an arbitrage scheme to increase the combined tax benefits of both tax policies.

In the Tax Reform Act of 1986, the Congress eliminated the special capital gains tax preference and thus put stock and bond returns more or less on the same tax basis.³⁸ In so doing, it eliminated the incentive for firms to distort their pension plan portfolios to engage in tax arbitrage. If this tax principle is retained and if funding rules are modified as discussed above, the government will finally be out of the business of influencing the portfolio composition of pension plans trusts.³⁹ If the special capital gains tax treatment is reintroduced, however, a mechanism will be set up that permits tax arbitrage in a way that is virtually impossible to prevent.

SUMMARY AND CONCLUSIONS

In a tax system that generally taxes capital income, the provision for special tax-free accumulation vehicles creates incentives for their overuse. Congressional intent to limit the tax exemption is frustrated by rational taxpayers. This gives rise to legislation like the Omnibus Budget Reconciliation Act that is intended to limit tax abuse.

The problem with this type of ad hoc legislation is that it may work to create even more tax bias. The law, in effect, provides a tax incentive in favor of defined contribution plans or defined benefit plans with risky portfolios. A more effective public policy—and one more consistent with a neutral government policy towards pensions—is to redress the overfunding problem without, at the same time interfering with the optimal free market choice of type of plan and portfolio composition.

One way to accomplish this is to return to the full funding limit that applied prior to 1987. This policy ensures a rational relation between funding levels and real levels of workers' savings for retirement. To prevent overfunding, relatively short amortization periods for experience gains and losses can be imposed (the new five-year period enacted in 1987 could be retained), and full application of these amounts against normal contributions can be applied, even if this means that sometimes plans will refund monies to plan sponsors (to be included in taxable corporate income).⁴⁰

These proposals, together with recent legislation to repeal the capital gains tax, would substantially reduce the government's influence on pension portfolio decisions. In combination with proposals discussed in previous chapters, the stage would be set for a more neutral

pension tax policy in the United States. The next chapter will bring all these proposals together to describe this policy in its entirety.

ENDNOTES

1. The data are taken from the Form 5500 Annual Pension Plan Reports submitted to the Internal Revenue Service each year. Data for 1986 are estimates based on information reported in Wyatt & Co., *Survey of Actuarial Assumptions and Funding* (Washington, D.C., 1987).
2. I use a discount rate equal to 2 percent for all liabilities including those affiliated with current retirees. This assumes substantial ad hoc indexing during retirement. For more detail on this discounting technique, see R. Ippolito, *Pensions, Economics, and Public Policy*, Chapters 3 and 4.
3. During this period, funding ratios in defined benefit plans fell on average by 34 percentage points. See R. Ippolito and W. Kolodrubetz (eds.), *The Handbook of Pension Statistics*, p. 461.
4. For this calculation, I approximated these liabilities by using the average assumed actuarial interest rate of 7.7 percent in the 1984 5500 Forms for retirees and a 3 percent net discount rate (interest rate minus wage projection) for active participants.
5. Similar results are found using the 1986 Form 5500 data.
6. The new rules also generate an extraordinary but temporary increase in tax revenue because during the few years it takes for overfunded plans to defund sufficiently to meet the new limit, tax-deductible contributions to plans will be reduced, thereby increasing taxable corporate income. The long-run impact is a lower level of assets held in tax-exempt trusts, thereby increasing the income tax base to include more capital earnings.
7. This assumes that no unanticipated events occurred over the funding period. For example, if investment returns were not zero in real terms as assumed, or if wages increased or decreased over time in real terms (compared to the zero-wage-growth assumption), the consequent changes in the liability calculations would result in amortized additions or subtractions to the so-called normal contribution.
8. Overfunding triggered gradual amortization of excess assets against normal contributions made to the plan.
9. When this constraint is violated, no additional contributions to the plan are permitted.
10. Increases in real wages, owing to more seniority in the firm and economy-wide increases in productivity, also work to increase pension benefits at retirement.
11. Some of these assumptions include the interest rate, expected wage growth, the likelihood of workers quitting before retirement, and the expected retirement age.
12. The U.S. Treasury requires use of an interest rate between 90 and 110 percent of the weighted 4-year average of 30-year Treasury bond rates.
13. That is,

$$\begin{aligned} PVT(1.0) \times 150\% &= 10\% \times 1 \text{ year} \times \$10e^{-10(25)} \times 150\% \\ &= \$0.123. \end{aligned}$$

Termination liabilities in this equation are similar to ongoing liabilities calculated in Chapter 1 (see equation in footnote 10). Both recognize that the pension liability after one year of service equals the 10 percent generosity factor, times one year of service, times current wage, \$10. But unlike the ongoing calculation, the 10 percent salary projection factor is missing in the termination calculation.

14. See discussion in Chapter 1.

15. That is,

$$\begin{aligned} PVT(15.0) \times 150\% &= 10\% \times 15 \text{ years} \times \$10e^{-10(15)} \times 150\% \\ &= \$8.27. \end{aligned}$$

16. Assuming that the interest rate and the expected wage growth rate are each 10 percent, the calculation of ongoing benefits is depicted by:

$$PVO = \int_a^{25} 10\% \times a \text{ years} \times \$10 \text{ da.}$$

The solution to this expression is \$312.

17. That is, 150 percent of termination liabilities are denoted as follows:

$$PVT \times 150\% = 150\% \times \int_a^{25} 10\% \times a \text{ years} \times \$10 \times e^{-10(25-a)} \text{ da.}$$

The solution to this expression is \$237.

18. Had I converted the \$25 lump sum into an unindexed annuity with the same present value at age 65, the results would not be altered.
19. As in the other plans, the tax rate is expressed as the extra tax assessed, divided by the lump-sum equivalent (\$25 per retiree) paid to the two annual retirees from the plan.
20. Most large pension plans make ad hoc inflation adjustments after retirement: few plans offer contractual cost-of-living adjustments. See R. Clark, "Postretirement Adjustments."
21. For an application of this principle to a guaranteed insurance contract, see R. Ippolito, *The Economics of Pension Insurance*, Chapter 10.
22. In this context, I define generosity in an ex ante sense: the flow of expected contributions to both plans is identical. After the fact, it might turn out that the defined contribution plan has higher or lower value than its defined benefit counterpart.
23. Under the old rules, funding for ad hoc COLAs technically was not allowed but was effectively done in practice through adjustments of other actuarial assumptions.
24. In reality, the amortization of the experience gain is done in flat nominal dollars over 15 years.
25. The plan also likely would have been constrained by the full funding limit in the Internal Revenue Code (Section 412). This limit precludes contributions to the plan if actuarial assets exceed actuarial liabilities plus one year of normal contributions.
26. The rules did not require that unused gains be carried forward.
27. See Richard A. Ippolito, "The Role of Risk in a Tax Arbitrage Pension Portfolio," *Financial Analysts Journal* (1990), forthcoming.
28. In particular, the plan had one worker at each age over a 25-year span of pre-retirement ages. There were no retirees. The pension benefit was given in the form

of a lump sum equal to 10 percent, times years of service, times final wage. Real wage growth and the real interest rate were zero.

29. These included both the amortization rules and full funding limit in Section 412 of the Code.
30. In the simulation, in steady state, "normal" contributions (contributions unaffected by experience gains or losses) were 10 percent of liabilities, and benefit payouts also equaled 10 percent. This is typical of pension plans in the United States.
31. The fact that plans have not usually been 400 percent funded does not mean that the model is wrong. Prior to the Tax Reform Act of 1986, it was advantageous for pensions and other tax-exempt entities to hold bonds in the portfolio. See Fisher Black, "The Tax Consequences of Long-Run Pension Policy," *Financial Analysts Journal* 36 (July–August 1980), pp. 3–10; and Irwin Tepper, "Taxation and Corporate Pension Policy," *Journal of Finance* (March 1981), pp. 1–14. The optimal policy was to hold some portion of bonds and equity to take advantage of all features of the tax code favoring pension plans. See discussion below. In addition to providing a means to exploit funding rules, stocks might also have affected overfunding if actuaries' choices of discount rates were influenced by the asset allocation on the pension. See M. Scholes and M. Wolfson, *Taxes and Business Strategy: A Global Planning Approach* (Prentice-Hall, 1989).
32. Once plans fall under the 150 percent constraint, the old funding rules prevail (except for those plans less than 100 percent funded on a termination basis; these plans are subject to a special set of accelerated funding rules).
33. See note 24.
34. ERISA does not permit firms to reduce nominal benefits accrued to date, but the firm can otherwise reduce real benefits by awarding fewer postretirement ad hoc inflation adjustments; reducing the generosity parameter for future service accruals; or in the extreme, terminating the pension plan and paying off termination benefits as required by law.
35. The bias has not been entirely eliminated because capital gains on stock are not subject to taxation until they are realized.
36. See discussion of the relation between benefits and risk in the portfolio in Chapter 1.
37. For more detail on how the pension tax-arbitrage game works, see F. Black, "The Tax Consequences," and I. Tepper, "Taxation and Corporate Pension Policy."
38. There is still some advantage imparted to stocks because tax is not assessed until the gains are realized.
39. ERISA itself does not constrain pension plan portfolios except to restrict holdings of the plan sponsor's own securities beyond 10 percent of assets (except in stock-bonus defined contribution plans) and to require diversification across many securities; certainly, an all bond or all S&P stock portfolio is permissible under the regulation.
40. While, in principle, the short amortization period and the symmetry funding principle were illustrated in the context of controlling underfunding stemming from investment gains, the same rules would protect against all sources of overfunding. For example, if actuaries assume unrealistically high wage growth or low quit rates to overstate ongoing pension liabilities, the same amortization rule and symmetry principle would also ensure that overfunding from these sources would be short-lived.