Volume Title: Frontiers in the Economics of Aging

Volume Author/Editor: David A. Wise, editor

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-90304-4

Volume URL: http://www.nber.org/books/wise98-1

Publication Date: January 1998

Chapter Title: The Taxation of Pensions: A Shelter Can Become a Trap

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Chapter URL: http://www.nber.org/chapters/c7299

Chapter pages in book: (p. 173 - 212)

3 The Taxation of Pensions: A Shelter Can Become a Trap

John B. Shoven and David A. Wise

3.1 Introduction and Motivation

The recent legislation that raised the minimum wage was accompanied by the Small Business Job Protection Act of 1996, which, among other things, temporarily (for years 1997–99) suspends the 15 percent excise tax on "excess distributions" from qualified pension plans. Surely few people know about the excise tax in the first place, let alone its suspension. In fact, while people are keenly aware that pensions allow them to save before-tax dollars and compound their investment returns without current taxation, it is our impression that very few people know how pension assets are taxed on withdrawal or on the death of the owner of the pension. In this paper we present a comprehensive examination of the taxation of pensions, with particular emphasis on large pension accumulations. The analysis answers a number of questions: (1) How do the excess distribution excise tax and its companion excess accumulation excise tax work? How do these taxes interact with the personal income tax systems and the estate tax? (2) Should only high-income individuals be concerned about these taxes or might they be imposed on people with relatively modest incomes? (3) Are pension plans still attractive saving vehicles once these excise taxes are applicable? For example, should someone whose base pension plan is likely to trigger either the excess distribution tax or the excess accumu-

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The authors are grateful to Henry Aaron, Joel Dickson, John Freidenrich, Steven Lockwood, Tom MaCurdy, Jim Poterba, and Seth Weingram for helpful comments and discussions. Jon Rork provided superb research assistance. The authors acknowledge the support of Charles Schwab and BZW Barclays Global Investors (Shoven), the National Institute on Aging and the Hoover Institution (Wise), and the National Bureau of Economic Research.

Table 3.1 **Average and Marginal Tax Rates Faced on a $1.9 Million Estate (in 1996 dollars)**

Date of Death	Average Combined Estate and Excise Tax Rate (%)	Marginal Combined Estate and Excise Tax Rate on Supplemental Plan (%)	Marginal Combined Estate, Excise, and Income Tax Rate on Supplemental Plan (%)
1982	4.17	0	39.23
1984	28.31	43	69.75
1988	22.62	43	69.75
1996	29.16	53.25	85.40

lation tax participate in a supplemental 401(k) plan? (4) Are pensions equally advantageous for stock investments and bond investments? If not, which assets should be held inside a pension plan and which should be held outside the plan? (5) Does it always make sense to delay distributions from pension plans as long as possible, thereby maximizing the tax deferral advantage that they offer? (6) How are pension accumulations treated when they are part of an estate? We focus on these microeconomic issues without discussing the social desirability of current tax policy. However, we should acknowledge at the outset that we see little economic merit in a penalty excise tax applying to people who save "too much" through the pension system. Most observers of the U.S. economy agree that the country's saving rate is too low. Since we know that savers only capture a fraction of the social return on their investments, it is unclear why the biggest savers in the economy should be penalized.

The Small Business Job Protection Act of 1996 is just the latest in a series of bills over the past 15 years that has changed the way pensions are taxed. To illustrate how radically the rules have changed, consider four different individuals with exactly the same wealth (and composition of wealth) at the time of their deaths, each of whom died at age 70. The four cases differ only in the date of death. The estates, all valued at $1.9 million in 1996 dollars, were composed of $600,000 in nonpension assets including a house, $1.2 million in a defined contribution pension plan, and $100,000 in a supplemental plan such as an individual retirement account (IRA) or a Keogh plan. Table 3.1 shows the tax rates faced by estates processed in 1982, 1984, 1988, and 1996. The estates of these individuals faced radically different tax laws. We cannot present all of the details in this introduction, but one important difference is that before 1983 pension accumulations were completely exempt from the estate tax. In addition, beneficiaries could take advantage of 10-year forward averaging on their income tax if the inherited pension plan funds were withdrawn in a lump sum. The result is that in 1982 the heir was able to consume more than 60 percent of the value of the inherited supplemental pension plan; the combined tax rate was less than 40 percent.

In contrast, consider the inheritance of the beneficiary in 1996. Because the

estate tax exclusion of pensions assets was limited to $100,000 as of 1983 and eliminated in 1985, and because the excess accumulation tax became effective in 1987 (and 10-year averaging was replaced with 5-year averaging), the 1996 heir can spend less than 15 percent of the value of the inherited supplemental plan. This case is far from extreme. We will describe cases in which the total marginal tax rate on assets in qualified pension plans passing through an estate ranges from 92 to 96.5 percent. The highest such rate we have seen exceeds 99 percent. The numbers in table 3.1 immediately suggest at least two things. First, any pension saving strategy adopted more than a few years ago needs to be reviewed, given how drastically the rules have changed. And second, large pension accumulations are taxed very heavily when they pass through estates. So heavily, in fact, that withdrawing pension assets before death, if at all possible, needs to be considered.

The next section of the paper outlines the various tax systems that affect pensions, including the excess distribution tax, the federal and state income tax systems, and the estate tax system. Most important, it describes how these tax systems interact to determine the effective combined marginal tax rates. Section 3.3 explores the combinations of pension plan generosity, career length, investment returns, and income levels that can lead to pension accumulations subject to the excess distribution tax or excess accumulation tax. It becomes clear that people with relatively modest incomes (e.g., $30,000 to $40,000 at age 50) can face these taxes if they have long careers and relatively generous contribution rates. These taxes are certainly not limited to the "rich." In fact, due to the power of compound interest rates, the group that is the most likely to face the penalty taxes are long-term, lifetime savers.

In section 3.4 we present analysis of the relative attractiveness of saving through the pension system versus conventional saving in a taxable account. We consider whether the pension laws continue to encourage saving once the excess distribution and excess accumulation taxes are taken into account. We also evaluate lifetime supplemental participation and one-time extra contributions. Bond and stock investments are considered separately. In addition, we examine the outcomes of saving with and without pensions in terms of both retirement resources and net assets left to beneficiaries.

In section 3.5 we consider the choices available to someone who has already accumulated more than enough to trigger the penalty excise taxes. The question is whether a person in such a situation should take distributions sufficiently large to require the payment of the excess distribution tax or should leave the money in the pension and risk the excess accumulation tax. We demonstrate that the taxation of large pension accumulations is much more burdensome when they pass through an estate—so much so, that it is almost always better to incur the excess distribution tax and avoid the excess accumulation levy.

In section 3.6 we examine the efficient allocation of assets between pension accounts and taxable accounts. This is important because the returns on assets

held outside a pension plan are taxed very differently. However, all asset returns are taxed identically inside a pension account. We show that extremely large efficiency gains are possible simply by locating different assets optimally. Our conclusions are summarized in section 3.7.

3.2 The Tax Systems and How They Interact for Pensions

Pensions are almost universally thought to be attractive tax shelters. Indeed, since the 1986 tax reform, pensions along with owner-occupied housing and municipal bonds are sometimes thought to be the only significant tax shelters remaining. As emphasized above, however, large pension withdrawals or large pension accumulations at death are hardly sheltered from taxes—in fact the tax rates they face are among the highest in our society. To understand the taxation of large pension distributions and accumulations, one needs to have a basic knowledge of the various tax systems operating in the United States. This section presents some essential facts about the major tax systems that impinge on pension assets: the excess distribution tax and the excess accumulation tax, the federal and state income tax systems, and estate taxes. We discuss how they can interact to generate total marginal rates over 95 percent.

3.2.1 The Excess Distribution and the Excess Accumulation Taxes

The excess distribution and the excess accumulation taxes were enacted as part of the Tax Reform Act of 1986 (TRA86). Their purpose was to penalize people who use the favorable tax treatment of pensions to accumulate wealth beyond what is reasonably required for a comfortable retirement. Effectively, beginning in 1987, any withdrawals from qualified pension plans exceeding $150,000 per year face a 15 percent additional income tax. The $150,000 figure was left unchanged between 1987 and 1995 but was raised to $155,000 for 1996 and now is effectively indexed for inflation. It will be increased from time to time in minimum increments of $5,000 to reflect inflation. The 15 percent surtax is not deductible against either federal or state income taxes, so it simply adds 15 points to a household's marginal income tax rate on pension withdrawals. It is often referred to as the "success tax" since it can be triggered by particularly successful investment returns or by career earnings success.

A companion 15 percent excess accumulation tax was also part of TRA86. It applies to the estates of people who die with pension accumulations deemed excessive. Excessive accumulation is defined as assets that exceed the value of a single life annuity paying out $155,000 per year,[1] for someone with the life expectancy of a person the same age as the deceased. Assets in qualified plans over this amount face the extra 15 percent tax. The government gives guidelines regarding the permissible rate of interest to use in determining the value

1. This number will be adjusted for inflation in the future in exactly the same manner as the withdrawal number for the excess distribution tax.

Table 3.2 **Federal Marginal Income Tax Rates for 1996**

Marginal Tax Rate (%)	Range of Taxable Income ($)	
	Single	Married
15	0–24,000	0–40,100
28	24,000–58,150	40,100–96,900
31	58,150–121,300	96,900–147,700
36	121,300–263,750	147,700–263,750
39.6	263,750+	263,750+

of a single life annuity and also provides a table of life expectancies. The borderline between "allowable" and "excessive" accumulations depends on age. Using the currently allowed life expectancy tables and the permissible 8.2 percent interest rate gives the following limits: $1,243,612 at age 65, $1,165,166 at age 70, $955,358 at age 75, and $794,158 at age 80. The excess accumulation tax can be deferred if assets are transferred to a surviving spouse, so it only affects single people, widows and widowers, and married individuals who name a nonspouse as a beneficiary.

3.2.2 The Federal Income Tax

A potential advantage of pension saving relative to conventional saving is that the marginal income tax rate in retirement may be lower than the rate when contributions are made. However, this advantage almost certainly does not apply to someone facing the excess distribution tax. Since the excess distribution tax only applies if the individual is withdrawing more than $155,000 of taxable funds from qualified pension plans and since such a person would also almost always face income taxes on 85 percent of social security income, the person would be in one of the top two federal income tax brackets.

The 1996 federal income tax brackets are shown in table 3.2. The actual marginal tax rates can be higher than shown, however, especially for high-income households. The $2,550 per person personal exemptions are phased out between adjusted gross incomes (AGIs) of $117,950 and $240,450 for singles and between $176,950 and $299,450 for married couples filing jointly. In these income ranges, the effective marginal rate is increased by approximately 0.72 percent for each personal exemption, meaning that a family of four in the published 36 percent rate category actually would face a 38.88 percent marginal tax rate. Further, when AGI exceeds $117,950 ($58,975 for singles), there is a partial phaseout of itemized deductions. The total of itemized deductions is reduced by 3 percent of the amount by which the taxpayer's AGI exceeds $117,950, with the limit of the reduction being 80 percent of itemized deductions. Since the vast majority of taxpayers with incomes above $117,950 are itemizers (property taxes and state and local income taxes alone make this advantageous), this partial phaseout of itemized deductions raises

the effective marginal tax rates. The phaseout of itemized deductions alone raises the 36 percent bracket to 37.08 percent and the 39.6 percent bracket to approximately 41 percent. In conjunction with the phaseout of personal exemptions, the 36 percent bracket can effectively involve a 40 percent marginal tax rate for a family of four. The final factor raising effective marginal tax rates is the 2.9 percent Medicare tax that applies to labor income. This tax is shared 50–50 between employer and employee, with a self-employed person paying the full 2.9 percent. A high-income individual can face a marginal federal tax rate on self-employment income of nearly 44 percent (taking only the treatment of itemized deductions and the Medicare tax into account), even though 39.6 percent is listed as the highest tax bracket. As recently as 1992 the top effective marginal tax rate was 31 percent. It is clear that the 1993 Deficit Reduction Act, which introduced the 36 and 39.6 percent brackets and the phaseout of personal exemptions and itemized deductions, significantly raised the marginal tax rates on high-income taxpayers.

One aspect of the income tax law that does not apply to pension assets but that does affect investments outside the pension system is the treatment of capital appreciation. Increases in the value of assets are not taxed until the gains are realized. Realized gains resulting from the sale of assets are taxed at ordinary income tax rates (although realized gains can be offset with realized losses on the sale of other assets in the same year) with one important exception: the maximum rate applying to capital gains is 28 percent. Finally, the cost basis for inherited assets is reset to the value of the assets at the time of their transfer, implying that the appreciation of these assets completely escapes income taxation.

3.2.3 State Income Taxes

It is hard to generalize about state income taxes. Forty-three of the 50 states impose state income taxes of varying design and with marginal rates as high as 12 percent. State income taxes are deductible from federal income taxes. In the examples in this paper, we often use the 1996 California top marginal income tax rate of 9.3 percent (it had been 11 percent before 1996), which applies to taxable income over $31,700 for singles and $63,400 for married couples filing a joint return. For a Californian facing the 39.6 percent federal rate, the total federal and state marginal tax rate is 46.41 percent, taking into account the partial phaseout of itemized deductions. If this individual withdrew more than $155,000 from qualified pension plans, and thus faced the 15 percent excess distribution tax, then the total marginal tax rate on withdrawals above the $155,000 would be 61.41 percent. These 46.41 and 61.41 percent marginal rates appear in a number of our later examples.

3.2.4 Federal and State Estate Taxes

The federal schedule of estate taxes is shown in table 3.3. This schedule actually applies to cumulative lifetime taxable gifts as well as to assets trans-

Table 3.3 **Federal Marginal Estate Tax Rates for 1996**

Marginal Tax Rate (%)	Fair Market Value of Estate at Time of Transfer ($)
37	600,000–750,000
39	750,000–1,000,000
41	1,000,000–1,250,000
43	1,250,000–1,500,000
45	1,500,000–2,000,000
49	2,000,000–2,500,000
53	2,500,000–3,000,000
55	3,000,000–10,000,000
60	10,000,000–21,040,000
55	21,040,000+

ferred at death. The table reflects both the unified credit that basically exempts lifetime transfers of $600,000 or less and the phaseout of the graduated rates and unified credit that occurs between taxable transfers of $10 million and $21 million. This phaseout of the benefit of the graduated rates is what causes the effective marginal rate to be 60 percent in this range. Because of this phaseout, both the *average* and the marginal tax rates are 55 percent for estates above $21.04 million. One extremely important feature of the federal estate tax is that there is an unlimited marital deduction, which basically means that the tax does not apply to transfers between spouses.

The federal estate tax allows a limited credit for state estate and inheritance taxes. The amount of the allowed credit depends on the size of the estate. For instance, for estates valued between $2,040,000 and $2,540,000 the allowable credit for state death taxes is $106,800 plus 8 percent of the amount by which the estate exceeds $2,040,000. This means that a state could levy estate taxes of this amount without increasing the total taxation of the estate. Many states design their death duties with this in mind and charge precisely the amount that the federal government will credit against the federal tax. Such state estate taxes are referred to as "soak up" taxes. The "soak up" refers to the allowed credits (and not the wealth of the estate!). Some states (New York, e.g.) have estate taxes that exceed the amount that can be credited against the federal estate tax. We do not consider such cases in this paper, but it should be clear that this would simply make the high marginal tax rates we compute even higher.

The estate tax treatment of pension accumulations changed dramatically with the passage of the Tax Equity and Fiscal Responsibility Act of 1982. Before this aspect of the 1982 law became effective in 1983, benefits payable to a beneficiary from qualified accounts (both defined benefit and defined contribution plans, IRAs, Keoghs, etc.) were completely excluded from the taxable estate. The 1982 act limited the exclusion of pension assets from taxable estates to $100,000. Even that limited exclusion was repealed with the Deficit

Reduction Act of 1984. The effect of the 1982 and 1984 law changes is that pension wealth, which was completely sheltered from the estate tax for people who died before 1983, was completely taxable for deaths occurring after 1984.

3.2.5 The Interaction of the Taxes on Pensions

We have already discussed the taxation of distributions from qualified retirement plans in retirement. All distributions are subject to full ordinary income taxation at both federal and state levels. Distributions over $155,000 are subject to the additive 15 percent excess distribution tax. Since the excess distribution tax is not deductible with respect to federal and state income taxes, it is equivalent to an additional state income tax (which would be deductible from the federal income tax) of approximately 25 percent. The combined excess distribution tax and federal income tax rates go up to about 56 percent, and the total marginal rate (including state-level taxation) can be roughly 61.5 percent.

The taxation at death is more complicated. First, the excess accumulation tax is calculated on the amount by which total wealth in qualified plans exceeds the value of a single life annuity as previously described. Federal and state estate taxes are then computed, deducting the amount of the excess accumulation tax from the taxable estate. If the estate exceeds $3 million, for instance, and is therefore in the 55 percent federal estate tax category and state estate taxes do not exceed the amount creditable against the federal tax, then the combined marginal rate of an estate facing the 15 percent excess accumulation tax is 61.75 percent (note that .15 + (.85)(.55) = .6175).

This is not the end of the story, however. Keep in mind that personal income taxes have never been paid on the qualified assets being transferred through the estate. The beneficiary is still liable for these taxes, and much of the 61.75 percent estate and excess accumulation tax is not deductible in calculating the amounts. The excess accumulation tax is not deductible from either the state or the federal income tax. Generally, only the state portion of the estate tax is deductible in determining state income taxes. For example, a Californian who was the beneficiary of a qualified plan that was part of a $3 million estate and who faced a state income tax rate of 9.3 percent would have to pay state income taxes on 91.84 percent of the value of the inherited qualified plans, even though these plans may have already triggered estate and excess accumulation taxes amounting to 61.75 percent of the value of the plans. This adds another 8.54 percent to the 61.75 percent, bringing the total tax bill to 70.29 percent. But there is more. We still have to calculate the federal income tax on the inherited money. Only the federal portion of the estate tax and the state income tax are deductible for federal income tax purposes; this means that the beneficiary will have to pay federal income tax on 52.87 percent of the value of the inherited qualified plans even though previous taxes amounting to 70.29 percent of the value of the qualified plans have already been paid. An effective federal marginal tax rate of 41 percent on this 52.87 percent requires us to add another 21.67 percentage points to our calculation, bringing the total marginal tax trig-

gered by each incremental dollar in qualified plans to 91.97 percent. This is not even an extreme case. The tax rate would be several points higher if the estate were in the 60 percent estate tax bracket; the rate would also be higher in New York or any other state that has an estate tax exceeding the amount the federal government will allow as a credit against the federal obligation. The most extreme case we have examined involves a total marginal tax rate of 99.73 percent. This case involves a resident of New York with excess accumulations in qualified plans, a total estate between $10 and $21 million, and heirs in the top income tax bracket.

3.3 How Rich or Successful Do You Have to Be in Order to Face the "Success" Tax?

Are the extraordinarily high marginal tax rates that can result from "excessively large" pensions only a problem for the extremely rich or for those with unusually good fortune in terms of financial returns? The answer is no. These tax rates are not limited to those with very high incomes or with large windfall gains. Rather they are imposed on people who save systematically through pensions over long periods of their work lives. Even savers of modest income may find that they are penalized for their thrift.

The wealth that accrues in a defined contribution pension plan is easy to compute. There are two key determinants—the contributions that are made at each age and the rate of return earned on those contributions. If we let $C(t)$ be the contributions at age t and r be the real rate of return earned on those contributions, then accumulated wealth at age A, $W(A)$, is simply given by

$$W(A) = \sum_{t=a}^{A} C(t)(1 + r)^{A-t}, \tag{1}$$

where a is the age at which contributions commence. If contributions are a fixed fraction f of labor income and if real labor income grows at rate g per year, then

$$C(t) = fY(a)(1 + g)^{t-a} \qquad \text{for all } t \geq a, \tag{2}$$

and therefore

$$W(A) = fY(a) \sum_{t=a}^{A} (1 + g)^{t-a}(1 + r)^{A-t}. \tag{3}$$

The continuous compounding version of equation (3) is simply

$$W(A) = fY(a) \int_a^A e^{g(t-a)} e^{r(A-t)}\, dt = fY(a) e^{rA-ga} \left[\frac{e^{(g-r)A} - e^{(g-r)a}}{g - r} \right]. \tag{4}$$

With these simple compound interest equations, we can determine what combinations of initial income, contribution rate, rate of salary increase, real

Table 3.4 **Examples of Pension Plans**

Variable	Example 1	Example 2	Example 3
Age of initial contribution a	25	40	25
Initial salary $Y(a)$	$50,000	$100,000	$25,000
Salary increases g	.02	.02	.02
Salary at age 50 $Y(50)$	$82,030	$121,899	$41,015
Contribution rate f	.10	.15	.10
Asset allocation	S&P 500[a]	S&P 500[a]	Growth stocks[a]
Rate of return r	.08	.08	.10

[a]The assumed rates of return are conservative relative to actual realized rates of return between 1926 and 1995. Ibbotson Associates (1996) reports that the arithmetic average of real returns on the S&P 500 was 9.2 percent, while the geometric mean was 7.2 percent. The arithmetic mean is appropriate for estimating the expected or average future outcome, whereas the geometric mean of the distribution gives the median future outcome. For small company stocks, the arithmetic mean of real returns was 14.1 percent, whereas the geometric mean was 9.1 percent.

Table 3.5 **Pension Accumulations for Examples 1, 2, and 3**

Accumulation	Example 1	Example 2	Example 3
Wealth at 50 $W(50)$	$476,911	$272,066	$320,149
Wealth at 55 $W(55)$	$751,673	$513,289	$542,086
Wealth at 60 $W(60)$	$1,160,690	$879,542	$902,275
Wealth at 65 $W(65)$	$1,767,524	$1,424,334	$1,485,406
Wealth at 70 $W(70)$	$2,665,623	$2,224,813	$2,427,904

rate of return, and career length can generate sufficient pension accumulations to require the payment of the excess distribution or excess accumulation tax. Table 3.4 summarizes three examples that will be discussed. The wealth accumulations in these pension plans at various ages, $W(A)$, are shown in table 3.5. The numbers in the table are generated using the discrete annual compounding of equation (3).

Consider first example 1, someone who is starting a job at age 25, having just completed an MBA. The initial salary is $50,000. The basic employer-provided pension plan is a defined contribution plan involving a contribution of 10 percent of salary (perhaps funded partly by the employer and partly by the employee). The employee expects to continue to work with this employer, or for an employer with an equivalent plan, for his or her entire career. Future salary increases are expected to be 2 percent above inflation, implying that the salary will reach $82,030 by age 50 in real dollars. The employee is allowed to choose how to allocate the investments, and this person chooses to invest in the Standard and Poor's (S&P) 500. We have assumed an 8 percent real rate of return for the S&P 500, which is well below its 1926–95 average of 9.2 percent.

While the hypothetical person in example 1 enjoys a relatively high income, most people would not classify this individual as rich. Nonetheless, by age 70

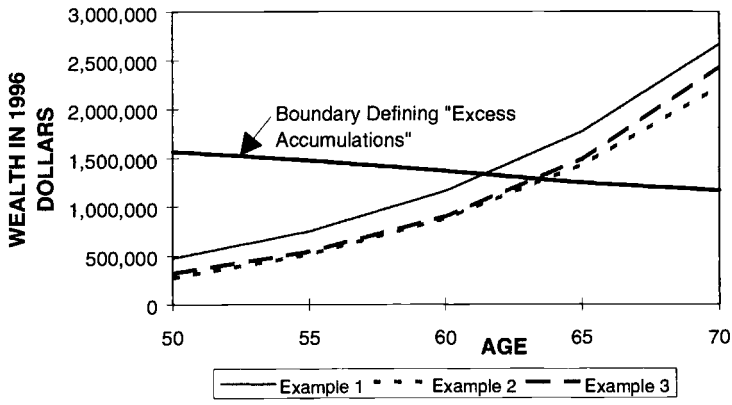

Fig. 3.1 Pension accumulations in examples 1, 2, and 3

this person would accumulate pension wealth in excess of $2.6 million and would almost certainly face the excess distribution or excess accumulation tax. If he or she should die at age 70 with this accumulation, the marginal rate faced by the estate and heirs would exceed 90 percent.

Example 1 is a person who began pension saving at the relatively young age of 25. Example 2 is an individual who does not begin saving until age 40 but then has a relatively generous plan (with 15 percent contributions) and a high salary ($100,000). This person also invests in the S&P 500 and accumulates more than $2.2 million in pension wealth by age 70.

Example 3 is a person who earns much less, earning $41,000 at age 50. This person contributes 10 percent of income to a pension plan and places the money in growth stocks that earn 10 percent over inflation. This is well below the 14.1 percent average real return earned on small company stocks over the 1926–95 period. This person would also accumulate almost $2.5 million in the pension plan by age 70. If the person in example 3 had earned an 8 percent rate of return (as assumed in examples 1 and 2), the accumulation at age 70 would have been $1.33 million, still enough to trigger the success tax.

The wealth accumulations of examples 1, 2, and 3, together with the amount above which accumulations are considered to be excessive, are shown in figure 3.1. As can be seen, all three of these individuals have excessive assets before age 65 and have over $1 million in the excessive category by age 70.

Each of the above examples uses hypothetical returns and assumes only stock investments. We now turn to a fourth individual and consider the outcomes under three alternative asset allocations: all stocks (S&P 500), all bonds, and a 50–50 allocation between stocks and bonds. This person is a leading-edge baby boomer, who was born in 1946 and entered the workforce in 1971. We refer to this person as "the software engineer." His salary in 1971 was $15,000 (in nominal terms), and he has always contributed 10 percent of salary

Table 3.6 **Example 4 with Alternative Asset Allocations**

	Example 4A	Example 4B	Example 4C
Initial nominal salary in 1971 at 25	$15,000	$15,000	$15,000
Salary in 1996 at 50	$102,579	$102,579	$102,579
Future real raises	1%	1%	1%
Contribution rate	10%	10%	10%
Asset allocation	100% S&P 500	100% Corporate bonds	50–50
Rates of return	Actual 1971–95, 8% thereafter	Actual 1971–95, 4% thereafter	Actual 1971–95, 8% stocks and 4% bonds thereafter
Wealth at 50 $W(50)$	$675,672	$440,045	$557,858
Wealth at 55 $W(55)$	$1,054,698	$592,586	$823,642
Wealth at 60 $W(60)$	$1,614,769	$781,095	$1,197,932
Wealth at 65 $W(65)$	$2,441,017	$1,013,510	$1,727,244
Wealth at 70 $W(70)$	$3,658,535	$1,299,503	$2,479,019

to his pension plan. His real salary grew at 2.5 percent per year between 1971 and 1995. In 1996 our software engineer is age 50 and has a salary of $102,579. His pay is projected to grow in real terms at 1 percent per year thereafter. The rates of return earned between 1971 and 1995 (ages 25–49) are the actual returns earned by the S&P 500 and by a diversified portfolio of high-grade long-term corporate bonds. The returns are taken from Ibbotson Associates (1996). The assumed real returns from age 50 onward are 8 percent for the stock portfolio and 4 percent for the bonds. Thus, in these examples, at least half of the returns are, not hypothetical, but actual returns realized in the market since 1971. Table 3.6 shows the specifics of examples 4A, 4B, and 4C, including the wealth accumulation at various ages.

The same wealth accumulation information is plotted in figure 3.2. There it is clear that our software engineer can face the success tax with any of the three asset allocations. With 100 percent stocks, the assets are too large at roughly age 58, with a 50–50 allocation at age 61, and the all-bond investor qualifies as an excess accumulator at age 68. There is nothing extreme about any of these examples. All pertain to diversified portfolios (not, e.g., to a single stock that appreciated 1,000-fold). All of the salaries are well under the $150,000 that can be used to compute pension benefits in employer-provided defined contribution pension plans. None of the examples assume a supplemental plan (e.g., 401(k) plan) in addition to the basic pension plan, and reasonable contribution rates are assumed in each case.

Equation (3) clarifies that the wealth accumulated at any particular age depends on five variables (salary levels, contribution rates, starting age, rate of salary growth, and rate of return on investments). The examples have shown that sufficient wealth can be accumulated to trigger the excess accumulation tax without extreme parameter values. Figures 3.3 and 3.4 further clarify the

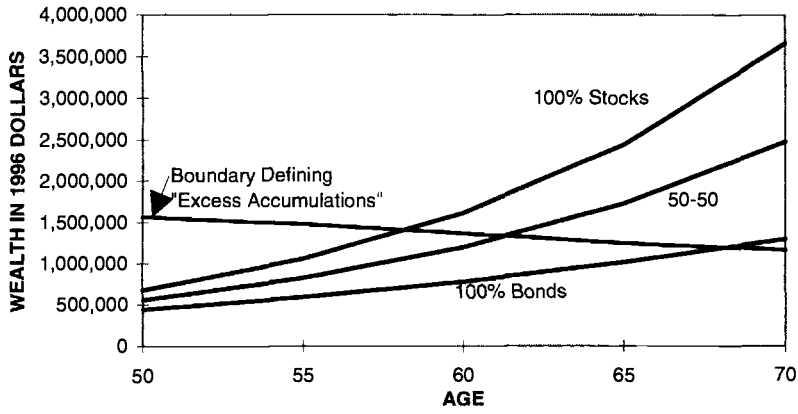

Fig. 3.2 Software engineer's pension accumulations (example 4)

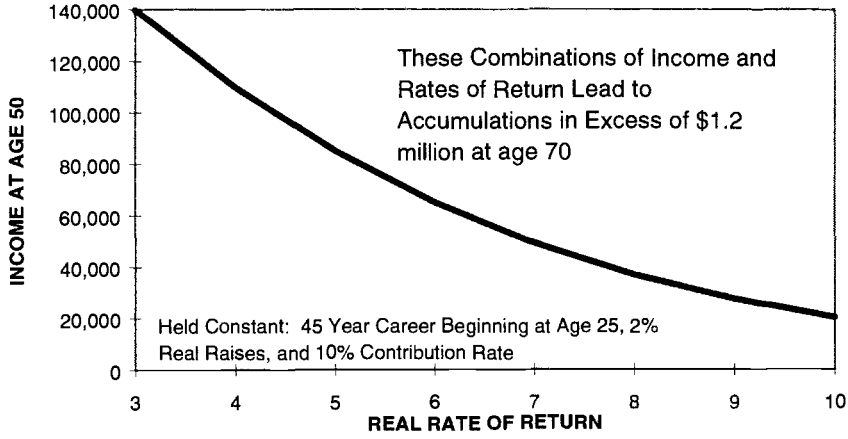

Fig. 3.3 Rates of return and income levels generating "excess accumulations"

range of parameter values that can lead to the imposition of the 15 percent tax.

Any combination of parameters above the curves in figures 3.3 and 3.4 leads to the accumulation of more than $1.2 million at age 70, which is roughly the dividing line between allowable and excess accumulations. It is not difficult or unusual to face these situations. Figure 3.3 pertains to a person who begins work at age 25, experiences annual salary increases of 2 percent above inflation, contributes 10 percent to a pension plan, and works until age 70. The figure shows the combinations of income at age 50 and realized rates of return that would yield excessive accumulations at age 70 under these assumptions. For instance, a person who earns $85,000 at age 50 and who realizes a 5 percent real rate of return on pension investments would accumulate $1.2 million

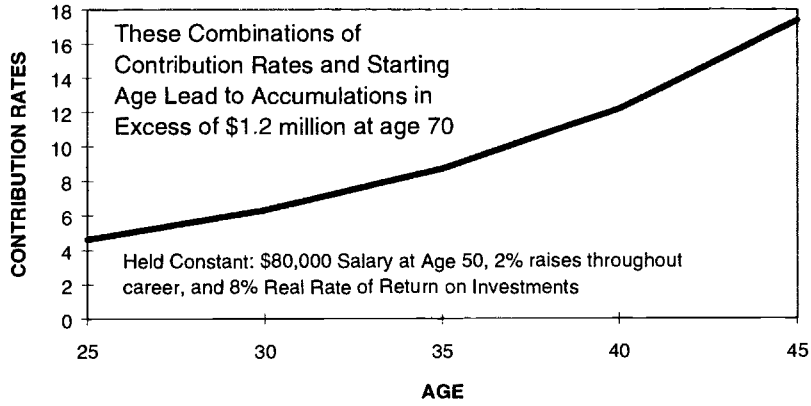

Fig. 3.4 Ages at which contributions commence and contribution rates generating "excess accumulations"

by age 70 and would face the excess accumulation tax. Any salary trajectory that is higher or rate of return that is better will land this person in excess accumulation territory.

Figure 3.4 pertains to a person who earns $80,000 at age 50, experiences 2 percent real salary increases throughout his or her career, and realizes an 8 percent return on pension investments. Under these assumptions, the figure shows the combinations of contribution rates and ages at which contributions begin that lead to excess accumulations. For example, under these assumptions a person who begins contributing 8.7 percent of salary to a pension plan at age 35 will attain the excess accumulation boundary by age 70. On the other hand, someone with these circumstances who waits until age 40 to begin pension saving would have to contribute about 12 percent to reach the excess accumulation range by age 70. Any combination of contribution rate and age of contribution commencement lying above the curve in figure 3.4 will lead to asset accumulations facing the success tax.

The rates of return assumed in this section have all been real rates (above inflation). The $1.2 million boundary between excessive and allowable accumulations is in 1996 dollars. Implicitly, our calculations recognize that the amounts that trigger the success tax are indexed for inflation. Nonetheless, we find that the success tax is not only a problem for those with extremely high incomes. It is a consideration for large numbers of lifetime savers, even those with incomes near the median of the society. The real income profile of example 3, for instance, is roughly at the 70th percentile of earnings, meaning that about 30 percent of all American workers earn more. Even our higher income examples, which are certainly in the top 5 percent of U.S. workers, are relevant to millions of individuals. We are presently doing research to further

clarify how many people need to pay attention to the considerations of this paper. Even at this stage, however, we know that it is a large number of people who account for a very large fraction of the total personal saving in the United States.

3.4 When Are Pensions a Tax Shelter? When a Tax Trap?

Whether it pays to save through a pension plan depends on the retirement consumption that could be supported through wealth accumulated in this way compared to the retirement consumption that would be provided by "conventional" saving—outside a pension plan. Of course, people presumably realize that they face some mortality risk and may also care how their heirs would fare under the two saving alternatives. In this section we consider the relative performance of pensions and conventional saving in providing retirement resources and in transferring wealth to heirs. We consider separately cases in which bonds and stocks are purchased. We also examine both systematic lifetime saving and one-time supplemental saving. The potential impact of the excess distribution tax and the excess accumulation tax on the relative advantage of pension saving is examined.

3.4.1 Lifetime Saving: Investment in Bonds

The formulas that describe asset accumulation through pension and conventional saving for retirement are straightforward. To be precise about the basic calculations and variants of them, we set out the formulas here. First, some notation:

a	Age at which retirement saving starts
A	Retirement age
$C(t)$	Pension contributions at age t
$W_P(A)$	Wealth accumulation using pensions at retirement age A
$S(t)$	Saving outside of pensions, set to equal the after-tax cost of $C(t)$ so that the same consumption pattern can be enjoyed while working
$W_S(A)$	Wealth accumulation using nonpension saving at retirement age A
B_P	After-tax benefit stream enjoyed in retirement from pension saving
B_S	After-tax benefit stream enjoyed in retirement from nonpension saving
f	Fraction of wages contributed to pensions
$Y(t)$	Labor income at age t
g	Nominal rate of wage growth
r	Nominal rate of return on investments
L	Length of benefit payouts in retirement (could be life expectancy)
T_Y	Combined state and federal marginal tax rate on labor income
T_R	Combined state and federal marginal tax rate on pension payouts
T_I	Combined state and federal marginal tax rate on dividends or interest
T_C	Combined state and federal marginal tax rate on realized capital gains

Using this notation we consider first the net-of-tax retirement income stream, B_P, that can be supported through pretax contributions $C(t)$ under a pension plan. The equations are easier to manipulate if we use the continuous time formulation and therefore continuous compounding. The pension contribution as a function of time is given by

$$C(t) = fY(t) = fY(a)e^{g(t-a)}, \tag{5}$$

where we assume that labor income grows at rate g. The accumulated pension wealth at retirement age A is then

$$W_P(A) = \int_a^A C(t)e^{r(A-t)}\,dt. \tag{6}$$

Assuming a constant nominal payment over L years, the (fair) after-tax annuity payment that this wealth could finance is given by

$$\begin{aligned} B_P &= (1 - T_R)\frac{r}{1 - e^{-rL}} W_P(A) \\ &= (1 - T_R)\frac{r}{1 - e^{-rL}} fY(a)e^{rA-ga}\int_a^A e^{(g-r)t}\,dt, \end{aligned} \tag{7}$$

where the $r/(1 - e^{-rL})$ term is the annuity payment that \$1 of wealth can support for L years. The alternative strategy is to save for retirement outside the pension system. In this case the saving has to be done with after-tax dollars. Leaving consumption unchanged, the amount of saving that can be done as a function of time is therefore

$$S(t) = (1 - T_Y)fY(a)e^{g(t-a)}. \tag{8}$$

The wealth accumulated by retirement in this case is given by

$$W_S(A) = \int_a^A S(t)e^{r(1-T_I)(A-t)}\,dt. \tag{9}$$

The annuity payment that this wealth can finance is

$$\begin{aligned} B_S &= \frac{r(1 - T_I)}{1 - e^{-r(1-T_I)L}} W_S(A) \\ &= \frac{r(1 - T_I)}{1 - e^{-r(1-T_I)L}}(1 - T_Y)fY(a)e^{r(1-T_I)A-ga}\int_a^A e^{(g-r(1-T_I))t}\,dt. \end{aligned} \tag{10}$$

The advantage of pension plan saving versus conventional saving for retirement is given by the ratio of B_P to B_S. Although there are many parameters in equations (7) and (10), the formulas are easily evaluated for any particular set of values. Table 3.7 presents several different parameter combinations that describe the circumstances of different savers. Note that f and $Y(a)$ are not included in the parameters describing each case. They appear in both equations (7) and (10) in such a way as to drop out of the expression for B_P/B_S. Note also

Table 3.7 **Advantage of Using Pensions for Retirement Saving: Eight Cases with Bond Investments**

Parameter	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8
a	30	30	30	30	30	40	40	40
A	70	70	70	70	70	70	70	70
r	.08	.08	.08	.08	.08	.08	.08	.08
g	.06	.06	.06	.06	.06	.06	.06	.06
L	15	15	15	15	1	15	1	15
T_Y	.4641	.4641	.4641	.383	.383	.383	.383	.4641
T_R	.4641	.4641	.6141	.586	.586	.586	.586	.6141
T_I	.4641	.28	.28	.28	.28	.28	.28	.28
B_P/B_S	2.680	1.847	1.330	1.240	1.090	1.096	0.963	1.176

that equations (7) through (10) apply a single tax rate to particular kinds of income, rather than the progressive rates in the tax code. Thus the equations and the results in table 3.7—as well as those in table 3.8 below—are best interpreted as relevant for a particular marginal calculation. Rather than indicating whether a person should have a pension at all, the results are better interpreted as indicating whether additional lifetime saving should be done through a pension plan (such as a supplemental 401(k) plan) or whether supplemental saving should be done outside of the pension system. Or the calculations can be interpreted as indicating whether to contribute an additional amount to a pension plan (say increase the contribution rate from 10 to 11 percent) or to save the marginal 1 percent outside the pension system.

Under case 1 there is a tremendous advantage to saving even incremental amounts through a tax-sheltered pension plan. It is probably such an example that most financial advisers have in mind when they recommend participating in qualified pension plans to the maximum extent possible. Case 1 is a person who is participating in a defined contribution pension plan (or possibly a supplemental 401(k) plan) between ages 30 and 70 and who is investing the contributions in corporate bonds that yield an 8 percent return. This person receives a 6 percent nominal wage increase each year. The analysis in this section is in nominal terms because it is nominal income that is taxed. After retirement, an equal nominal amount of money is withdrawn each year between ages 70 and 85. This person faces a combined federal and state income tax rate of 46.41 percent, before and after retirement, on both labor income and interest income. Under these assumptions, the 2.680 number at the bottom of the case 1 column indicates that the person who saves in pension plans will be able to spend 168 percent more from retirement savings than the person who accumulated taxable bonds outside the pension system. This is an enormous advantage to pension saving, particularly when the consumption that was forgone to save while working is the same under both saving modes.

This case, however, is not very realistic, particularly for high-income indi-

viduals with high marginal tax rates. For this group, taxable corporate bonds are a poor investment outside a pension plan. Instead, they could invest in tax-free municipal bonds with an implicit tax rate of approximately 28 percent (which is the approximate difference between the rate of return on corporate vs. municipal bonds). Under case 2 the tax rate on bond investments outside the pension is lowered to 28 percent, reflecting the fact that municipal bonds dominate corporate bonds for high-tax-rate investors. Now, the net advantage of pension saving is reduced to 85 percent, still very large. But what if this person will face the excess distribution tax on retirement benefits? In this case, the marginal tax rate on money withdrawn from pension accumulations can be 61.41 percent. This is case 3, under which the advantage of pension corporate bond saving is only 33 percent over municipal bond saving.[2]

The first three cases are for very high income individuals who are in top tax brackets both while working and in retirement. However, the previous section of the paper showed that one need not have an income nearly so high to face the excess distribution tax on marginal pension contributions. Cases 4 through 7 are for someone in the 31 percent federal marginal tax bracket during his or her work career and in the 36 percent federal marginal tax bracket in retirement. In these cases the individual faces the 15 percent success tax and a 9.3 percent state income tax. The advantage of saving with pensions is reduced relative to cases 1, 2, and 3 because cases 4 through 7 face higher basic tax rates in retirement than while working. Case 4 shows someone who spends incremental retirement accumulation over 15 years. This person gains 24 percent from using pensions for retirement saving. Case 5 shows that if he or she took the money out in the first year of retirement, the advantage of using pensions would fall to only 9 percent. Case 6 returns to withdrawing the money over 15 years, but the extra contributions do not begin until age 40. In this case, the benefit of using pensions is 9.6 percent. Case 7 shows that even a long-term bond accumulator can be worse off for having used the pension system. This individual takes the money out in the first year of retirement and actually has 3.7 percent less to spend than if he or she had been accumulating municipal bonds yielding 5.76 percent.

The last case in table 3.7 is a very high income individual (like those in cases 1, 2, and 3), who starts saving at age 40 and faces the excess distribution

2. Mankiw and Poterba (1996) report an implicit tax rate for municipal bonds well below the 28 percent figure here. They compare the yields on 20-year Treasury bonds with the yield on high-quality municipals of the same maturity. The implicit tax rate in 1987–94 averaged 17.21 percent. The interest on Treasury bonds is not subject to taxation at the state level, however, and therefore they are not an ideal instrument to hold in pension accounts. The Mankiw-Poterba evidence, however, might indicate that the correct implicit tax rate to apply for municipal bonds vs. corporate bonds is about 20 percent. A 20 percent implicit tax rate on municipals, rather than the 28 percent that we assumed, would make using pensions for retirement saving less attractive. E.g., the B_P/B_S figures for cases 2, 3, and 4 would have been 1.559, 1.123, and 1.046, respectively.

tax. In fact, cases 3 and 8 are identical except that the person in case 3 saves for 40 years whereas the person in case 8 saves for 30 years. The net advantage of using the pension system to buy corporate bonds versus accumulating municipal bonds amounts to 17.6 percent.

The general message of table 3.7 is that once the option of investing in municipal bonds is recognized and also once the fact that extra pension saving is likely to face the excess distribution tax is taken into account, the advantage of using pensions for retirement saving is much more modest than the 168 percent of case 1. In fact, the advantage may be positive or negative, but it is unlikely to exceed the 33 percent of case 3. Most of these cases assume that the individuals receive pension benefits until age 85. We have so far not examined what happens to these accounts if the individual dies before they are depleted below the amount that would trigger the excess accumulation tax. We examine that case a little later.

3.4.2 Lifetime Saving: Investment in Stocks

We now turn to accumulating incremental wealth with stocks. The pension accumulation formulas (5) through (7) are unchanged because all money taken from pension accumulations is taxed the same regardless of how it was generated. However, outside savers face different tax rates depending on how investment returns are paid (e.g., dividends, capital gains, municipal bond interest). Equations (8) through (10) assumed that all of the return on the bond investments took the form of interest payments. With stock investments, we need to treat accrued capital gains, realized capital gains, and dividends separately.

Consider a stock portfolio or mutual fund portfolio whose total return r is divided into three components

$$r = r_d + r_c + r_a, \tag{11}$$

where r_d is the dividend yield, r_c represents the rate of realized capital gains, and r_a represents accrued or deferred capital gains. Dividends are taxable as ordinary income, realized capital gains are taxed at preferential rates (with a maximum rate of 28 percent), and the taxes on accrued gains can be deferred and possibly escaped (such gains are never taxed if the asset passes through an estate). If we let

$$R = r_d(1 - T_I) + r_c(1 - T_C) + r_a \tag{12}$$

be the after-tax rate at which equities compound, then equation (9) can be modified to

$$W_S(A) = \int_a^A S(t)e^{R(A-t)}\,dt \tag{13}$$

and equation (10) can be modified to

$$B_S = \frac{(1 - T_K)RW_S(A)}{1 - e^{-RL}}, \tag{14}$$

where T_K is the effective capital gains tax rate payable as the money is spent in retirement. That is, T_K is given by

$$T_K = \frac{T_C(W_S(A) - C_S(A))}{W_S(A)}, \tag{15}$$

where $C_S(A)$ is the cost basis of the stock portfolio when the saver is age A. If we let $\hat{R}$ be the currently taxable part of the portfolio's return, that is,

$$\hat{R} = r_d(1 - T_I) + r_c(1 - T_C), \tag{16}$$

then at the time of retirement the cost basis of the portfolio would be

$$C_S(A) = \int_a^A S(t)e^{\hat{R}(A-t)}\,dt. \tag{17}$$

With these equations we can look once again at the ratio of B_P to B_S. Several cases are described in table 3.8.

Once again, the first case shows a very big advantage to saving for retirement, or incremental saving for retirement, through a pension plan. Case 1 is a person saving for retirement between ages 30 and 70, investing in a stock portfolio with an annual dividend yield of 2 percent, and realizing capital gains of 2 percent per year. The remaining 7 percent of the return takes the form of unrealized or accrued capital gains. Again, the retirement accumulation is spent over the 15 years between ages 70 and 85. This individual has very high income while working and in retirement and always faces top tax rates. Case 1 does not take into account the excess distribution tax, however. It shows that the net advantage of saving with pensions is 101.2 percent.

This large benefit to pensions is eroded considerably if the success tax is applicable, as in case 2 where the advantage of pensions is reduced to 44.9 percent. Examining cases 2, 3, and 4 reveals the advantage of investing in stock portfolios that minimize taxable distributions when equities are held outside of a pension. The only difference between the three cases is the composition of returns between dividends, realized capital gains, and unrealized capital gains. The portfolio held in case 3 is more tax efficient than that held in case 2, and hence the advantage of using pensions is much smaller, 18.5 percent instead of 44.9 percent. The portfolio in case 4 generates only unrealized capital gains, and it actually provides more retirement income if assets are accumulated outside the pension system. The reason is that the rate of compounding is identical inside and outside a pension in this case, but the total tax burden is less for outside saving. Cases 5, 6, and 7 again reveal the advantage of tax-efficient stock portfolios, although this time for a lower income saver (someone in the 31 percent federal marginal tax bracket before retirement and in the 36 percent bracket after retirement). Pensions are less advantageous for someone

Table 3.8 **Advantage of Using Pensions for Retirement Saving: Nine Cases with Stock Investments**

Parameter	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
a	30	30	30	30	30	30	30	30	40
A	70	70	70	70	70	70	70	70	70
r	.11	.11	.11	.11	.11	.11	.11	.11	.11
r_d	.02	.02	.01	0	.02	.01	0	.02	.01
r_c	.02	.02	.01	0	.02	.01	0	.02	.01
r_a	.07	.07	.09	.11	.07	.09	.11	.07	.09
g	.06	.06	.06	.06	.06	.06	.06	.06	.06
L	15	15	15	15	15	15	15	15	1
T_Y	.4641	.4641	.4641	.4641	.383	.383	.383	.383	.383
T_R	.4641	.6141	.6141	.6141	.586	.586	.586	.586	.586
T_I	.4641	.4641	.4641	.4641	.383	.383	.383	.383	.383
T_C	.28	.28	.28	.28	.28	.28	.28	.14	.28
B_P/B_S	2.012	1.449	1.185	0.956	1.287	1.078	0.891	1.042	0.958

with this pattern of tax rates. The case 7 person ends up with 11 percent less if he or she acquires stocks inside a pension rather than simply buying stocks or equity mutual funds outside the pension system. Case 8 is the same as case 5, except that the maximum capital gains tax rate has been lowered to 14 percent before the retirement saving is withdrawn. This significantly reduces the advantage of saving within a pension, since only assets held outside a pension can take advantage of the lower capital gains tax rate. This example is a reminder that all of these calculations are vulnerable to changes in the basic tax structure. Pension saving, which is taxed only upon distribution is particularly vulnerable to future changes in the tax rules. Case 9 is the same as case 6, with two exceptions: first, saving is not begun until age 40, and second, the money is withdrawn in 1 year instead of 15. This person still saves for retirement for 30 years. The final column of the table indicates that this person would be approximately 4 percent worse off with pension rather than conventional saving.

The lesson of tables 3.7 and 3.8 is that the advantage of systematically contributing more to a pension plan over an entire career depends crucially on the investment chosen, the length of the career, and the precise tax rate that will be applied when benefits are withdrawn. If the 15 percent tax on excess distributions is triggered, then the net advantage of pensions is greatly reduced and may be negative.

3.4.3 One-Time Contribution, One-Time Withdrawal: Investment in Bonds

We now turn to a somewhat different margin and a simpler set of cases. Instead of considering a slightly higher contribution rate over the entire career, consider someone who is debating whether to make a one-time supplementary pension contribution. The opportunity to make this contribution may come from temporarily taking a second job or from self-employment. For simplicity, we assume that the saver will withdraw the proceeds from the contribution at a known age. If the potential contribution would be made at age a_1 and withdrawn at age a_2, which is more than 59 ½, then each dollar contributed would permit retirement consumption of

$$(1 - T_R)e^{r(a_2 - a_1)}. \tag{18}$$

If the investment is a bond and if the person in question faces a combined federal and state marginal income tax rate in excess of 28 percent, then the reasonable alternative for an outside investor is municipal bonds yielding approximately $.72r$. In this case, each before-tax dollar would permit retirement consumption of

$$(1 - T_Y)e^{.72r(a_2 - a_1)}. \tag{19}$$

Clearly, one difference between expressions (18) and (19) is that (18) depends

on the future income tax rate while retired, whereas (19) depends on the current income tax rate on labor income. If $T_R \leq T_Y$, then clearly expression (18) exceeds expression (19) and using the pension vehicle is advantageous, more so for longer periods of time $(a_2 - a_1)$ between contribution and distribution. However, if $T_R \geq T_Y$ either because tax rates are increased or because of the excess distribution tax, then by equating expressions (18) and (19) we can solve for the break-even period of time $a_2 - a_1$.

$$a_2 - a_1 = \frac{1}{.28r} \ln\left(\frac{1 - T_Y}{1 - T_R}\right). \tag{20}$$

For reasonable parameters for a high-income person facing the success tax (i.e., $T_Y = .4641$, $T_R = .6141$, and $r = .08$), the break-even holding period is 14.7 years. For periods greater than that, using the pension system will provide more retirement consumption.[3] After 25 years, for instance, the pension system will produce 26 percent more money than municipal bonds held outside the pension system, even accounting for the excess distribution tax. The advantage of using municipal bonds rather than taxable corporate bonds outside of a pension is shown by this result: the break-even period of time is only 8.85 years if both the inside and the outside investments are made in corporate bonds.

3.4.4 One-Time Contribution, One-Time Withdrawal: Investment in Stocks

For stocks, we once again must use the R and $\hat{R}$ previously defined. Equation (19) must be replaced with

$$(1 - T_K)(1 - T_Y)e^{R(a_2 - a_1)}, \tag{21}$$

where

$$T_K = T_C \frac{e^{R(a_2 - a_1)} - e^{\hat{R}(a_2 - a_1)}}{e^{R(a_2 - a_1)}}. \tag{22}$$

Table 3.9 evaluates the break-even holding period, $a_2 - a_1$, as a function of the tax and return parameters. A comparison of equations (18) and (21) shows that using pensions for this saving dominates conventional saving if $T_R \leq T_Y$, so we do not report such cases. The interesting circumstances occur when the excess distribution tax is part of T_R. Once again, we are reminded that even though all investments are treated the same in a qualified pension account, they are taxed quite differently if they are held outside. Case 1 shows a stock or stock mutual fund with a total nominal return of 11 percent, split between a 2 percent dividend yield, a 2 percent return of realized capital gains, and a 7

3. If the implicit tax rate on municipal bonds is 20 percent instead of 28 percent, the break-even period would be 20.5 years instead of 14.7 years.

Table 3.9 **Break-Even Holding Period for Using Pensions for Investments in Stocks**

Parameter	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
r	.11	.11	.11	.11	.11	.11
r_d	.02	.01	0	.02	.01	.01
r_c	.02	.01	0	.02	.01	.01
r_a	.07	.09	.11	.07	.09	.09
T_R	.6141	.6141	.6141	.586	.586	.586
T_Y	.4641	.4641	.4641	.383	.383	.383
T_C	.28	.28	.28	.28	.28	.14
Break-even period (years)	11	14	Never	15	20	48

percent return of unrealized capital gains. With the tax parameters shown, including a 28 percent tax rate on realized capital gains and a 15 percent excess distribution tax, the break-even holding period is 11 years. Case 3 shows just how sensitive this result is to the payout characteristics of the stock portfolio. With the same tax rates, it never makes sense to hold a stock portfolio that yields only unrealized capital gains inside a pension plan. The reason is that the tax deferral feature of the pension plan is completely redundant and the total taxes are actually slightly less if the asset is not put in a pension. In terms of the notation that we have developed, notice that for case 3, $R = r$ and at $T_Y = .4641$, $T_C = .28$, and $T_R = .6141$, $(1 - T_C)(1 - T_Y) > (1 - T_R)$. Cases 4 and 5 pertain to someone with somewhat more modest income levels. Once again, we see that the pension system is less attractive for this person than for the richer persons in cases 1 and 2, with the break-even periods being considerably longer. Case 6 is the same as case 5, except that the capital gains rate has been reduced, making pensions far less attractive, with the break-even period being an extraordinarily long 48 years.

3.4.5 Pension Accumulations that Pass through an Estate

We now turn to the situation in which the supplemental saver dies before spending the money. Take the example of someone who saves some money at age a_1 over and above base pension plan contributions and is considering whether to use a supplemental pension vehicle such as a 401(k) account. Assume that the person anticipates facing either the excess distribution tax when withdrawals are made or realizes that the estate would face the excess accumulation tax if he or she dies before spending the money. The person cares about his or her beneficiaries in the event that death occurs before the money is spent. Since it is quite simple to transfer wealth including qualified accounts to one's spouse without tax, we consider a single person or someone who will ultimately be the surviving spouse.

In order to calculate what the heirs would inherit in the two cases (pension

saving vs. outside saving) we need to introduce yet more notation. The following definitions are useful:

T_X	Tax rate on excess distributions and excess accumulations
T_E	Marginal estate tax rate
T_E^f	Federal marginal estate tax rate
T_E^s	State marginal estate tax rate
T_Y^f	Federal marginal income tax rate of beneficiary
T_Y^s	State marginal income tax rate of beneficiary
$H_P(t)$	Net-of-tax amount received by the beneficiary from pension saving that took place t years before death
$H_S(t)$	Net-of-tax amount received by the beneficiary from conventional saving that took place t years before death

Consider someone contemplating an extra \$1 contribution to a 401(k) plan at age a_1. If that person dies at age a_2, the extra money that the beneficiary can spend because of this saving is given by

$$(23) \quad e^{r(a_2-a_1)}[(1 - T_X)(1 - T_E) - \Pi_S - (1 - (1 - T_X)T_E^r)(1 - \Pi_S)T_Y^f],$$

where Π_S is the state income tax owed and is given by

$$(24) \quad \Pi_S = (1 - (1 - T_X)T_E^s)T_Y^s.$$

Note that the excess distribution tax is not deductible against state and federal income taxes and that only some of the regular estate taxes are deductible. Only the state portion of the estate tax is deductible from the base of the state income tax, and only the federal portion is deductible against the base of the federal income tax. If the extra saving had not been invested in the 401(k) but an equivalent before-tax amount had been used to purchase municipal bonds, then the beneficiary would have netted

$$(25) \quad e^{.72r(a_2-a_1)}(1 - T_Y)(1 - T_E),$$

where T_Y is still the combined federal and state marginal income tax rate of the saver and we are assuming that municipal bonds have an implicit tax rate of 28 percent. On the other hand, had the money been used to purchase a stock portfolio held outside of the pension system, the beneficiary would have received (after all taxes)

$$(26) \quad e^{R(a_2-a_1)}(1 - T_Y)(1 - T_E),$$

where

$$R = r_d(1 - T_Y) + r_c(1 - T_C) + r_a.$$

Equations (23), (25), and (26) illustrate that the advantage of using pensions is that, in general, the money compounds at a faster rate. However, the complicated string of taxes that are applied to pension accumulations passing through

Table 3.10 **Supplemental Saving with Bonds: Three Cases Where the Money Passes through an Estate**

Parameter	Case 1	Case 2	Case 3
Total estate (million $)	3.1	1.6	10.1
r	.08	.08	.08
T_A	.15	.15	.15
T_E	.55	.45	.60
T_E^S	.096	.072	.16
T_E^f	.454	.378	.440
T_Y^S	.093	.093	.093
T_Y^f	.41	.37	.41
T_Y	.4641	.429	.4641
Total tax rate on incremental 401(k) dollar (%)	91.97	83.86	96.41
$H_P(30)/H_S(30)$	.653	1.005	.329
Break-even period (years)	49	30	80

an estate may more than offset this advantage. Tables 3.10 and 3.11 show the net advantage to the beneficiary of using pensions for bonds and stocks, respectively.

Case 1 of table 3.10 shows someone who has a total estate of $3.1 million, with sufficient accumulations in qualified plans to face the excess accumulation tax, and whose beneficiary is in top federal and state income tax brackets. If the money were saved in 8 percent bonds and held for 30 years before the saver died, then the beneficiary would net only 65.3 percent as much as if the original saver had invested in 5.76 percent municipal bonds. So, in this case, the use of a 401(k) plan would significantly reduce the net inheritance. The total tax rate faced by the money in the incremental 401(k) account is 92 percent. The break-even period for the two strategies (401(k) vs. municipal bonds) is 49 years. Case 2 is someone whose estate consists primarily of an "overstuffed" set of qualified plans but who is not as wealthy as the person in case 1. The heir is also in a lower federal income tax bracket. In this case the total tax rate faced by the incremental pension accumulation is 84 percent. The beneficiary only gains from the pension saving strategy over the municipal bond strategy if the holding period is 30 years or longer. The individual depicted in case 3 is much wealthier and faces the federally imposed estate tax rate of 60 percent. Some states (such as New York) impose state death duties that exceed the amount that can be credited against the federal estate tax and hence impose higher tax rates than in case 3. Even so, the combined effective tax rate on the case 3 incremental 401(k) account is 96.41 percent. The beneficiary gets only 3.5 percent of the accumulation, with the government taking 96.5 percent. This person was going to face high estate taxes and income taxes with any strategy, but the pension saving choice provides the beneficiary with less than one-third as much as the municipal bond strategy, even after 30 years.

Table 3.11 **Supplemental Saving with Stocks: Six Cases Where the Money Passes through an Estate**

Parameter	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Total estate (million $)	3.1	3.1	1.6	1.6	10.1	10.1
r	.11	.11	.11	.11	.11	.11
r_d	.02	0	.02	0	.02	0
r_c	.02	0	.02	0	.02	0
r_u	.07	.11	.07	.11	.07	.11
T_X	.15	.15	.15	.15	.15	.15
T_E	.55	.55	.45	.45	.60	.60
T_E^s	.096	.096	.072	.072	.16	.16
T_E^f	.454	.454	.378	.378	.44	.44
T_Y^s	.093	.093	.093	.093	.093	.093
T_Y^f	.41	.41	.37	.37	.41	.41
T_C	.28	.28	.28	.28	.28	.28
Total tax rate on incremental 401(k) dollar ($)	91.97	91.97	83.86	83.86	96.41	96.41
$H_P(30)/H_S(30)$	.522	.334	.803	.513	.262	.168
Break-even period (years)	74	Never	45	Never	120	Never

Turning now to the cases involving stock investments shown in table 3.11, one can see that using pensions for supplemental saving is never a good choice for beneficiaries, at least not for the cases shown involving the excess accumulation tax being added to the estate tax. The first two cases refer to the same individual as in case 1 of table 3.10. The only difference between case 1 and case 2 of table 3.11 is that case 2 involves a stock portfolio generating only unrealized capital gains, whereas case 1 has some current dividends and realized capital gains. In case 1, with a 30-year holding period, the heir ends up with almost twice as much money if pensions are avoided, and in case 2, three times as much.

Cases 3 through 6 show other possible circumstances. Case 6 is the most extreme, with the beneficiary receiving only one-sixth as much money via the supplemental pension accumulation as he or she would have if the stock portfolio had been kept outside the pension system.

One feature of cases 2, 4, and 6 that may not be obvious is that the ratio $H_P(t)/H_S(t)$ is independent of t. In cases where the investment itself offers complete tax deferral, the advantage or disadvantage of using pensions for saving (at least in terms of how much money your heirs will receive) is independent of how many years before death the saving takes place. This implies, for instance, that if a 70-year-old with the wealth and tax circumstances of case 2 makes an extra contribution to a pension plan and then dies, the heir would receive only one-third as much as if the money had been kept out of the pension system. This same one-third figure applies after 30 years or 50 years if the investment is in land or growth stocks whose return comes completely in the

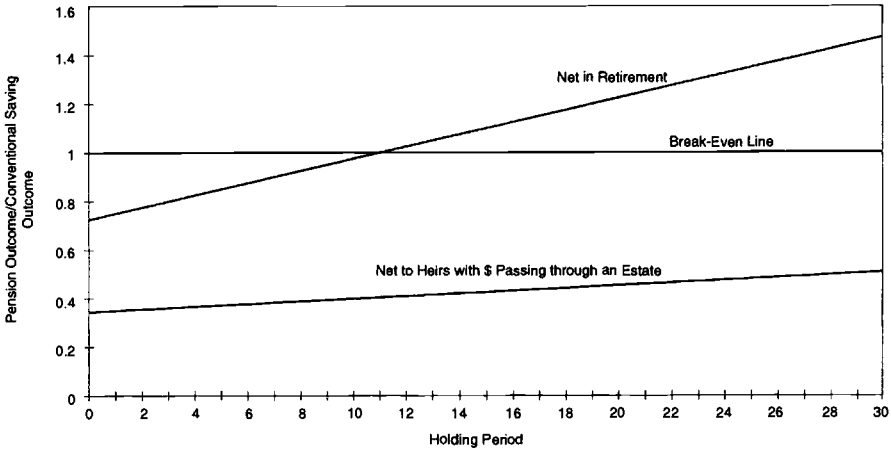

Fig. 3.5 Pensions vs. conventional saving: net proceeds in retirement and to heirs

Note: Assumptions: 15 percent excess distribution tax and excess accumulation tax, 55 percent estate tax, 41 percent federal income tax, 9.3 percent state income tax, 28 percent capital gains tax, 11 percent nominal return on stocks, including 2 percent dividends and 2 percent realized capital gains.

form of unrealized capital gains. For case 6, pension saving results in a net inheritance of one-sixth as much as conventional saving.

The lesson from the analysis of this section of the paper is that once one faces the excess distribution tax or excess accumulation tax, the gain from pensions in providing for retirement is modest at best and the loss in terms of the amount that one's beneficiaries will receive can be very significant. This is graphically illustrated in figures 3.5 and 3.6. Note that figure 3.5 pertains to someone with the same wealth and tax parameters as case 1 in both tables 3.9 and 3.11. That is, this is someone facing the success tax and high income and estate tax rates. The action being considered is a supplemental investment in a conventional stock mutual fund with an 11 percent nominal return composed of 2 percent dividends, 2 percent realized capital gains, and 7 percent unrealized capital gains. For holding periods up to 11 years, pension saving provides less retirement income than conventional saving; for longer holding periods pension saving provides more. For all holding periods, the inheritance of heirs is less with pension than with conventional saving. Even with holding periods of greater than 11 years, the gain in retirement income is less than the loss in the inheritance of the heirs.

The contrast between figure 3.5 and figure 3.6 illustrates the importance of the tax efficiency of stock portfolios held outside of pension accounts. The only difference is that the investment vehicle is now an asset that generates only unrealized capital gains. Now, for all periods of 30 years or less, conven-

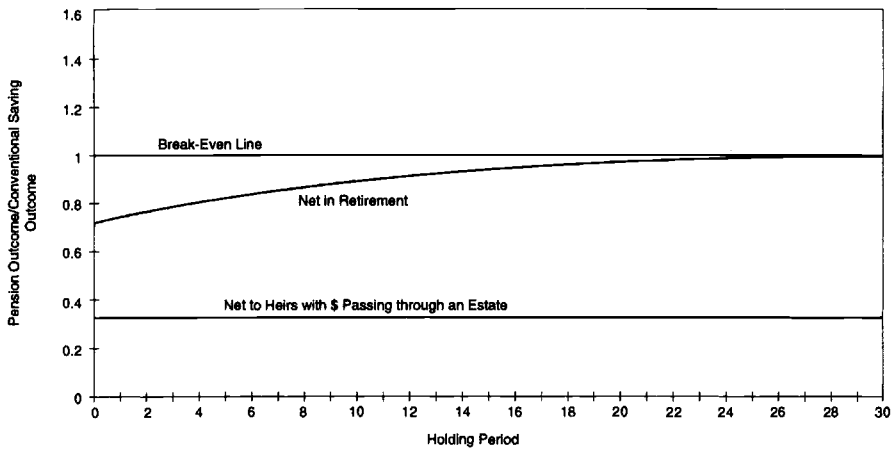

Fig. 3.6 Pensions vs. conventional saving: net proceeds in retirement and to heirs with non-dividend-paying growth stocks

Note: Assumptions: 15 percent excess distribution tax and excess accumulation tax, 55 percent estate tax, 41 percent federal income tax, 9.3 percent state income tax, 28 percent capital gains tax, 11 percent nominal rate of return on stocks, all in the form of unrealized capital gains.

tional (supplemental) saving dominates pension saving; if the money is withdrawn in retirement, there is more net money to spend if conventional saving is chosen, although the outcome is very nearly the same for periods of 20 years or more. If the individual dies before spending the money, the heirs receive three times as much if conventional saving is used than if a supplemental qualified pension plan is used. The reason that the outcome ratio shown in figure 3.6 is flat for the case when the money passes through an estate is that the compounding effect is the same whether or not the money is put in a pension (even conventional saving has complete tax deferral), so the ratio of outcomes is completely determined by the alternative tax burdens.

Figure 3.6 makes clear that it would not make economic sense for someone facing the success tax to make supplementary contributions to pension plans and invest the money in non-dividend-paying growth stocks. Better outcomes can be achieved with conventional saving. In this sense, the pension system does not offer this person any extra incentive to save. While figure 3.5 is not as unambiguous, it still indicates that it makes no sense to use pension saving for that particular type of stock portfolio, for holding periods of less than 11 years, and probably not for much longer periods if the saver cares about what heirs will receive in the event that he or she dies before depleting this account. Our conclusion is that once a person is on a trajectory that will trigger the success tax, there is little or no economic incentive to save additional money in pension plans.

3.5 The Incentives to Take Distributions

The previous section demonstrated that the tax system, particularly the excess distribution tax and the excess accumulation tax, effectively removes the incentive to save supplemental amounts via the pension system for people who already anticipate pension accumulations that will be deemed excessive. In this section we consider a separate question: should someone who has already accumulated more than enough to trigger the success tax accelerate distributions, perhaps incurring the excess distribution tax, or should he or she leave the money in the pension system as long as possible and defer the payment of taxes?

We consider first a person who retires at age 65 and who has pension assets exceeding $2 million. The software engineer in example 4A (table 3.6) would have been in such a position by age 65. Should such a person begin withdrawals immediately and reduce the funds subject to the excess distribution tax (and potentially the excess accumulation tax) or should this person maximize the deferral advantage of pensions by waiting until age 70½ to begin withdrawals and then distribute only the minimum amounts required by the IRS? In analyzing this question we follow the method of analysis of Lockwood (1993).

Consider two alternative strategies for someone with large pension accumulations at age 65: strategy 1, withdraw $155,000 per year between ages 65 and 69, and strategy 2, roll over $155,000 per year between ages 65 and 69 from existing defined contribution pension plans into a new, separate IRA. We assume that the individual has a combined marginal state and federal income tax rate of 46.41 percent. We also assume that the minimum distributions from the IRA beginning at age 70½ under strategy 2 face the excess distribution tax and hence a combined marginal tax rate of 61.41 percent. The IRA is invested in corporate bonds earning an 8 percent nominal return. In order to keep track of which strategy is the more advantageous, we assume that the after-tax distributions of strategy 1 are invested in a municipal bond fund earning 5.76 percent. The results are shown in table 3.12.

The after-tax accumulation in the municipal bond fund reaches $466,004 with the final distribution from the primary pension plan at age 69. If these funds were left untouched and continued to earn 5.76 percent, they would total $1,350,507 by age 88. Contrast that with the outcome under strategy 2. By age 70½, the separate IRA would have grown to $982,069, and minimum distributions would have to commence. We have used an 18-year-term-certain payout in calculating the minimum distributions, following the example in Lockwood (1993). The 18 years is the joint life expectancy of the owner of the IRA and his or her spouse. The initial distribution at age 70 is $51,687. The minimum payouts continue to grow each year until the IRA is exhausted with the final payout of $206,538 at age 88. The net after-tax proceeds of these distributions are again invested in a municipal bond fund paying 5.76 percent. After the final distribution is added to the fund, the balance stands at $1,262,351. The

Table 3.12 Early Distribution vs. Maximum Deferral

Strategy 1: Early Distribution			Strategy 2: Maximum Deferral		
Age	Taxable Distribution	After-Tax Accumulation	IRA Account	Minimum Distribution	After-Tax Accumulation
65	155,000	83,065	155,000		
66	155,000	170,914	322,400		
67	155,000	263,823	503,192		
68	155,000	362,083	698,447		
69	155,000	466,004	909,323		
70		492,846	982,069	51,687	19,946
71		521,234	1,004,812	55,823	42,637
72		551,257	1,024,909	60,289	68,358
73		583,009	1,041,789	65,112	97,423
74		616,590	1,054,811	70,321	130,171
75		652,106	1,063,249	75,975	166,988
76		689,667	1,066,257	82,020	208,258
77		729,392	1,062,975	88,581	254,437
78		771,405	1,052,345	95,668	306,011
79		815,838	1,033,211	103,322	363,509
80		862,830	1,004,281	111,587	427,509
81		912,529	964,109	120,514	498,640
82		965,091	911,082	130,155	577,588
83		1,020,680	843,401	140,567	665,102
84		1,079,471	759,061	151,813	761,996
85		1,141,649	655,828	163,957	869,158
86		1,207,408	531,221	177,073	987,554
87		1,276,955	382,480	191,240	1,118,237
88		1,350,507	206,538	206,538	1,262,351

difference between the fund balances of strategy 1 and strategy 2 at age 88 is $88,156, which represents the net advantage of the early withdrawal choice. So the message from table 3.12 is that the early withdrawal strategy (where the five $155,000 distributions avoid the excess distribution tax) is more advantageous than the strategy of postponing distributions to the maximum extent possible in order to take advantage of the deferral feature of pensions. This conclusion depends on the age of the pension owner and on the rates of return that can be earned both inside and outside the pension plan. However, it clearly indicates that withdrawing money before age 70½ can be advantageous for someone facing the success tax. It would be worthwhile for any such person to do a calculation like the one illustrated in table 3.12.

So far, we have seen that the early withdrawal choice is in the interest of this particular couple should the surviving spouse live to age 88. It is even more advantageous if the widow or widower should die before that age. For instance, at age 75 strategy 1 has a municipal bond fund worth $652,106 whereas strategy 2 has an IRA with a balance of $1,063,249 and a municipal bond fund of $166,988. If the owner and spouse died at this age, the net inherited funds for

the beneficiaries would be significantly greater with strategy 1. Depending on the precise size of the total estate, the tax rate of the beneficiaries, and their state of residence, the difference could easily exceed $100,000. We conclude, then, that people over age 59½ who have very large pension accumulations face strong incentives to withdraw the money early. If, in contrast to these examples, they do not reinvest the money outside the pension, this incentive for early distributions may translate to an incentive to consume rather than save.

The example of table 3.12 does not take into account the recently legislated three-year (1997–99) moratorium on the excess distribution tax mentioned in section 3.1. In this period, distributions can be taken in any amount from qualified plans without triggering the excess distribution tax. This obviously significantly enhances the advantage of taking large distributions during this time window. In fact, the optimal policy for the person in the above example would be to distribute more than $155,000 per year during 1997–99 so as to minimize or eliminate the possibility that the pension funds will face either the excess distribution tax or the excess accumulation tax. The legislation did not suspend the excess accumulation tax applying to large pension accumulations passing through estates. This magnifies the incentive to get funds out of the pension.

We now turn to a different case, someone who is considerably older and who still has pension assets that the government classifies as excessively large. Consider, for example, a single person who has $2 million in pension assets at age 75, roughly $1.05 million beyond the amount that would trigger the excess accumulation tax. If this person dies without withdrawing the $1.05 million, the heirs may receive a net benefit of $84,300 from its existence. Even this is not the extreme case, as earlier in the paper we have shown cases where this money would face tax rates of over 96 percent rather than the 91.97 percent rate assumed here. However, if the money were withdrawn (and the individual died before spending any of it) the beneficiaries would receive at least $182,300 even if all of the money withdrawn faced the excess distribution tax. If the $1.05 million were withdrawn during the 1997–99 window, the heirs would receive more than $310,000 after all taxes due to the moratorium on the excess distribution tax. In either case (with or without the moratorium), the tax system is not neutral with respect to the distribution decision: in fact, it favors taking distributions in retirement and strongly penalizes those dying with large pension assets.

We conclude from the two examples just discussed that pension tax law is not only antisaving with respect to additional contributions for people with substantial pension assets, it also is antisaving in that it gives such people a strong incentive to withdraw their funds in retirement (even if such withdrawals trigger the excess distribution tax) rather than leave them in the pension plan and let them pass through an estate. Thus the consistent saver has an incentive to withdraw funds from the saving pool even in the absence of any need or desire to use the proceeds for consumption. The combination of the taxes triggered by withdrawals (even excess distributions) with the estate tax later

applying to the unspent money held outside the pension system is considerably less than the taxes faced by excessively large pension accumulations passing through an estate.

Throughout the paper, we have been calculating the outcomes for nonspouse beneficiaries as if they withdrew the inherited accumulations immediately. In some circumstances the plan can be set up so that the heirs are permitted to take distributions from the inherited plans over their own life expectancies,[4] thus extending the tax deferral nature of the account. The excess accumulation tax and the estate taxes cannot be deferred, but the income taxes of the heirs would not be payable immediately, but rather payable as the distributions are taken from the account. The government requires that the beneficiary begin distributions immediately, but in some cases they can be extended over the entire life expectancies of the heirs. If this option is available, it may be very advantageous. Of course, if the heirs are to use the inherited IRA over their own lifetimes, then they must find a source for the estate tax and excess accumulation tax other than the pension money itself. These options involve detailed financial planning and depend on specific circumstances that we cannot describe exhaustively in this paper.

3.6 Asset Allocation: Which Assets Should Be Held inside a Pension Plan?

In this section we deal with a related question concerning the often ignored issue of asset allocation. The previous sections have indicated that lifetime savers are likely to face either the excess distribution or the excess accumulation tax and therefore may want to hold some investments outside of the pension system. Now we address the issue of which assets should be held where. Where should one hold corporate bonds or growth stocks? Does it make a difference? The tax system operates in such a way that it can make a big difference.

The intuition regarding this kind of asset allocation goes as follows. Recall that the tax treatment of pensions is completely independent of the type of assets in the account. Before-tax money can be saved, but all withdrawals are taxed as ordinary income. While it is true that there is the success tax to worry about, even that and the estate tax do not differentiate between the type of income that was generated inside the account (capital gains, interest, dividends, rents, etc.). The reason that it makes a difference which assets are held inside the pension account and which are held outside is not that they are taxed differently inside of a pension account but that different types of income are

4. If the owner of an IRA had begun distributions before his or her death, a nonspouse beneficiary (or a spouse who elects not to roll over the account into his or her own name) inheriting the IRA must take distributions at least as rapidly as under the method being used at the owner's death. However, if the owner had not begun distributions, and if the plan is explicitly set up to allow it, the beneficiary may be able to take distributions extended over his or her lifetime.

taxed very differently when the assets are held outside, in taxable accounts. For instance, municipal bonds can be free of state and federal income taxation but carry an implicit tax (or lower interest yield) of about 28 percent. Realized capital gains are taxed more lightly than ordinary income; currently, the maximum rate on realized capital gains is 28 percent, and there have been many proposals to lower this rate further. Accrued capital gains (perhaps resulting from retained earnings) are tax deferred (i.e., they face no taxes until the gain is realized). Further, the cost basis of appreciated assets held outside of pensions is reset when they pass through an estate, so these capital gains can completely escape taxation. This resetting of the basis occurs, whether or not the estate is large enough to pay estate taxes.

The basic answer to the question of how to allocate one's assets between those held inside a pension and those held outside is to hold inside those assets that would be taxed most harshly on the outside. For instance, if you want to hold a total portfolio consisting of zero- or low-dividend growth stocks, high-dividend utility stocks, and long-term corporate bonds, it makes sense to place all of the corporate bonds and utility stocks inside the plan before any of the relatively lightly taxed growth stocks are placed inside. Further, the outside taxation of the growth stock portfolio depends on how one manages the realization of capital gains. This does not say that it is irrational to have all stocks or even all growth stocks both inside the pension and outside. What it does say is *if* you are going to have some highly taxed assets such as corporate bonds or utility stocks, *then* they first belong inside the qualified plan. They are the assets that gain the most from the tax deferral feature of the plan. Growth stocks, to the extent that they yield unrealized capital gains, already have that feature.

A person who is making investments both in a currently taxable environment and through pension accumulations may not only want to allocate the assets of a given portfolio in terms of where they are held but may also find it profitable to change the composition of the portfolio itself. For instance, someone who wants the risk-return trade-off of large-capitalization stocks (such as offered by the S&P 500) may be able to achieve that position or something very close to it with a portfolio consisting of high-grade corporate bonds and low-dividend small-capitalization growth stocks. By appropriately positioning the bonds and growth stocks (bonds first in the pension fund and growth stocks first outside of the pension fund) the net-of-tax return can be enhanced relative to holding the S&P 500 in both environments.

There is a second asset allocation effect that generally reinforces the one just discussed. The second consideration involves risk allocation. Because of the excess distribution tax and the excess accumulation tax, the marginal tax rates faced by assets in pensions are more progressive than those faced by outside investments. This extra progressivity differentially reduces the expected return on riskier assets relative to safer ones. The success tax discour-

Table 3.13 **Comparing "Balanced Portfolios" inside the Pension Plan and outside of It with a Tax-Efficient Asset Allocation**

	Inefficient Saving	Efficient Saving
Pension account	50% Growth stocks 50% Corporate bonds	100% Corporate bonds
Nonpension saving	50% Growth stocks 50% Municipal bonds	100% Growth stocks
Retirement advantage without excess distribution tax		2.6%
Retirement advantage with excess distribution tax		12.7%
Beneficiary's advantage without excess accumulation tax		15.2%
Beneficiary's advantage with excess accumulation tax		25.5%

Note: Assumptions: Corporate bonds yield 8 percent, municipal bonds yield 5.76 percent, stocks earn 13 percent, with 1 percent dividend yield and 1 percent realized capital gains. Individual has a combined federal and state marginal income tax rate of 46.41 percent and saves between ages 25 and 70. Saving is proportional to labor income, which grows at 6 percent per year.

ages one from taking risks that might lead to "success," at least within the pension environment. The optimal response is to hold riskier assets outside of the pension system and safer ones within it.

One question regarding these asset allocation effects is whether they involve minor adjustments in returns or whether they amount to important considerations. The best way to answer that is to consider some examples. The issue is interesting only if someone is saving sizable amounts both inside the pension system and outside of it. Consider someone who contributes an amount to a pension fund equal to the amount saved outside of the fund, and assume this is done for the entire career. He or she might, for instance, save 5 percent of income in pensions and 5 percent conventionally. This person chooses to invest half of the total money in bonds and half in common stocks. Two strategies are depicted in table 3.13. The first, labeled "inefficient saving," involves devoting half of the saving to growth stocks and bonds, both inside the pension system and outside of it. The second strategy, which involves the same total asset allocation and therefore the same total risk, allocates all of the pension saving to bonds and all of the nonpension saving to growth stocks. This second strategy is more tax efficient because all of the relatively lightly taxed stocks are kept in the taxable environment whereas all of the more heavily taxed bonds are placed in the tax-deferred accounts. The advantage is not as great as might be expected because of the existence of municipal bonds, which, by assumption, involve an implicit tax rate of only 28 percent. Nonetheless, there is a noticeable net advantage to the more efficient asset allocation strategy, and this ad-

Table 3.14 **Efficiently Allocating Two Equity Mutual Funds between Pension Accounts and Nonpension Savings Accounts**

	Inefficient Saving	Efficient Saving
Pension account	50% Growth stock fund 50% Equity income fund	100% Equity income fund
Nonpension saving	50% Growth stock fund 50% Equity income fund	100% Growth stock fund
Retirement advantage without excess distribution tax		9.0%
Retirement advantage with excess distribution tax		15.7%
Beneficiary's advantage without excess accumulation tax		16.9%
Beneficiary's advantage with excess accumulation tax		23.8%

vantage can be obtained with little or no change in risk exposure. If, in retirement, the money is withdrawn and does not trigger the excess distribution tax, the withdrawals would be 2.6 percent higher with the efficient strategy. If the 15 percent excess distribution tax applies to these withdrawals, then the efficient saver ends up with almost 13 percent more net retirement income.

If the saving is not withdrawn in retirement but instead becomes part of an estate, the advantage to the beneficiaries of efficiently allocating assets is even greater. In this case, the advantage grows to 15.2 or 25.5 percent depending on whether the excess accumulation tax is involved or not. The reason that efficient asset allocation is even more advantageous in this case is that the unrealized capital gains on assets held outside of pension plans completely escape taxation when the assets pass through an estate. Thought of as pure efficiency gains, the numbers in table 3.13 are impressively large. Remember these are gains with little or no cost. A person might, for instance, receive 13 percent more from retirement saving simply because he or she had allocated assets in an efficient manner.

Table 3.14 illustrates that this is not just a stocks-versus-bonds phenomenon. In fact, what table 3.14 shows is another lifetime saver who saves an equal amount in pension accumulations and in a taxable environment. This person wants to invest in a balanced portfolio of equities consisting half of growth stocks and half of income-oriented stocks such as utilities. A growth stock mutual fund is once again modeled as having a nominal return of 13 percent, including a 1 percent dividend yield and 1 percent realized capital gains. This fund would have to be tax conscious in order to hold the realized capital gains to this level. The second fund is an equity income fund with a nominal yield of 11 percent, including a 6 percent dividend rate and 1 percent realized capital gains. The stocks in such a fund might include utilities and preferred issues.

The naive or inefficient policy for this saver would be to have the same 50–50 allocation between these two types of funds both inside the pension and in the outside taxable environment. The much more efficient strategy is to place the fund generating the most currently taxable income inside the pension and place the fund generating the most unrealized capital gains in the taxable environment. Table 3.14 indicates that the gain to placing these investments efficiently is even greater than in the stocks-versus-bonds case just discussed.

The reason that the gain is in general larger in this case is that the effect of taxes on the return of the equity income fund is more than the 2.24 percent difference between the yield on taxable and municipal bonds. This means that there is a larger advantage to efficiently locating the income mutual fund than there is to efficiently locating bonds in the previous example. The 9 to 16 percent improvement in retirement income reflected in table 3.14 strikes us as an extremely large potential payoff for such a simple adjustment in asset allocation.

3.7 Conclusions and Final Remarks

Pensions are thought to be one of the few remaining tax shelters providing attractive incentives for people to save for retirement. The excess distribution tax and the excess accumulation tax were included in the Tax Reform Act of 1986 to prevent people from taking advantage of the favorable tax treatment of pensions to amass wealth beyond what is thought to be reasonably necessary for a comfortable retirement. The wisdom of this policy is open to question. People who increase saving because of the tax shelter opportunity offered by pension plans, or for other reasons like the payroll deduction feature of many pension plans, do not reduce the resources available to the rest of the population. In fact, individual savers reap only a portion of the social return of the incremental capital. If the extra pension saving results in extra capital for the economy, then this extra capital pays corporation income taxes and the pension saver ultimately pays personal income taxes, which improves the overall budget picture for everyone in the economy. The social return to the capital significantly exceeds the private return received by the pension saver.

For the most part, we have refrained from evaluating current tax policy toward pensions from a social perspective and have simply analyzed how the tax system operates and how an individual might optimally respond. This analysis has led to several striking results:

- The tax rates faced by pensions deemed "too large" can be extraordinarily high. The marginal rate on distributions over $155,000 can be roughly 61.5 percent. The effective marginal tax rate faced by large pension accumulations passing through an estate can dwarf this rate, however, reaching 92 to 96.5 percent.

- These high tax rates, which include the excess distribution and excess accumulation taxes, can be faced by savers who do not have extraordinarily high incomes. The success tax is not limited to the rich, but rather primarily affects lifetime savers. For example, someone who works between ages 25 and 70, makes $40,000 at age 50, and contributes 10 percent to a pension plan invested in the S&P 500 will likely be penalized by the success tax for overusing the pension provisions.
- The advantage of pensions relative to conventional saving is greatly reduced and in many cases eliminated once accumulations exceed the amounts that will trigger the success tax. Even in cases where additional pension saving still provides more resources in retirement than conventional saving, when the plan owner dies, the heirs get less than they would have if the saving had been done outside of a pension plan.
- The advantage of pension saving is reduced by the availability of tax-advantaged investments outside of pension plans. Examples are tax-free municipal bonds and tax-efficient low-dividend stock portfolios.
- Not only is there little, if any, incentive to continue to save via pensions once the excess distribution and excess accumulation taxes become applicable, there is a strong incentive to withdraw money while living rather than risk the nearly confiscatory tax rates faced by pension assets transferred through estates. This means that there is an incentive to consume more in retirement than would otherwise be the case.
- Individuals can realize significant efficiency gains by allocating their investments appropriately between pension accounts and outside holdings. Simply locating assets in their most advantageous environment could improve the net proceeds of saving by almost 25 percent.

These findings are sufficiently important to warrant more consideration of the tax treatment of large pension accumulations on several fronts. First, we are currently engaged in further research to clarify the number of future elderly households who need to be concerned about the excess distribution and excess accumulation taxes. We know that it is a distinct minority of the population, but we are also quite sure that it is a large number of households who account for a significant portion of total personal saving. Second, further attention needs to be given to the transfer of pensions through estates. The estate taxation of pensions changed dramatically in the 1982–86 period with almost no study or evaluation. Now that it is recognized that pensions are the primary vehicle for personal saving in the economy, a careful reconsideration of the legislation of the early and mid-1980s is called for. As this paper has demonstrated, once the excess distribution and excess accumulation taxes are understood, these taxes are likely to become quite effective at discouraging pension saving and hence they will reduce economic welfare in an economy that surely has lower than optimal saving now.

References

Ibbotson Associates. 1996. *Stocks, bonds, bills, and inflation: 1996 Yearbook.* Chicago: Ibbotson Associates.

Lockwood, Steven G. 1993. Tax planning opportunities for large qualified plan and IRA balances. *ERISA and Benefits Law Journal* 2:201–9.

Mankiw, N. Gregory, and James M. Poterba. 1996. Stock market yields and the pricing of municipal bonds. NBER Working Paper no. 5607. Cambridge, Mass.: National Bureau of Economic Research, June.

Comment Alan J. Auerbach

This paper is a good illustration of the miracle of compound interest. An upper-middle-income person who saves consistently throughout his or her life in a pension plan will quite possibly be subject to very heavy taxes on withdrawal of funds in retirement or when passing assets through an estate. It will be useful to break my comments down into two areas, regarding methodology and assumptions.

Methodology

The paper's basic approach is to consider, for different portfolios, the tax implications of a variety of marginal decisions: saving for retirement in a pension plan versus outside a pension plan, saving to leave a bequest in a pension plan versus outside, withdrawing funds from a pension plan as soon as possible rather than letting them accumulate, and so forth. To illustrate the effects of these choices, the authors examine the outcomes for people in different situations with respect to age, income level, and pension plan generosity. They find that, in many cases, the individual will be subject to an excise tax on excess accumulations (if he or she dies) or excess distributions (if he or she uses the funds during retirement) and that, facing excise tax, the individual may wish not to save in a sheltered form or may wish to withdraw funds from a sheltered form as soon as it is possible to do so without additional penalty.

The basic algebra seems correct to me, although I think the intuition for some of the results could stand further development. For example, pensions look so much worse for funds passing through an estate than for those used in retirement (cf. figures 3.5 and 3.6) because of the additional benefit of the step-up in basis at death that accrues only to assets held outside pension funds.

How much do these comparisons tell us about behavioral distortions? Not as much as they might appear to do. We are learning about marginal tax rates in certain situations, not how likely these situations are to occur or, of equal

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importance, how difficult it would be to avoid them. That is, how likely is it that these outcomes will occur, for an empirically reasonable pattern of wage growth and pension accumulation? How much less must one contribute to pension accounts to avoid the penalty thresholds? How much do we need to give our children annually to avoid estate tax? And so forth.

Ideally, we would like this analysis to be placed in a model of life cycle saving that takes account of the probabilities of reaching each state being considered here and the further avoidance activity that can increase the probability of more favorable (from a tax perspective) states. This is not an easy task, and the paper's calculations provide valuable information simply by illustrating the *possibility* of very high marginal tax rates facing the decisions being studied. Ultimately, though, the seriousness of these potential distortions depends critically on what motivates saving—for example, on the extent to which estates represent the byproduct of precautionary saving as opposed to planned bequests to heirs.

Assumptions

Now let us consider the paper's underlying assumptions. I have already mentioned the need to consider the likelihood that pension accumulations will actually follow the paths for which examples are presented. It is a likely conjecture that, in the past, very few individuals accumulated enough pension assets to be very concerned about encountering the Shoven-Wise penalties. But the private pension system is evolving, and the paper's projections may be reasonable for some group of individuals. But then we must ask whether we believe that current estate tax and excise tax rules will not change.

Presumably, virtually no one now would be subject to excise tax. Similarly, at present, only a couple of percent of estates are subject to tax. This is not surprising, with the $600,000 exemption, which effectively becomes $1.2 million for a married couple. With real growth, even the indexed excise tax threshold will not be enough, and the nominal estate tax threshold looms as even more significant. But it seems implausible that these penalties will remain as they are if they catch an ever increasing share of the population over time. The issue, then, is how one should define "current policy." Current policy may, implicitly, be one that adjusts these thresholds to keep a certain share of the population subject to them, in the way that social security benefits and income tax brackets were "indexed" before being indexed explicitly by law. While the current excise tax moratorium may have more to do with the shifting of revenue into the "budget window," it does suggest legislative flexibility. The same is illustrated for the estate tax by currently pending legislation that would raise the exemption level over time.

Is this just a question of semantics? No, because what is ultimately relevant for current saving is what people believe will happen. I do not think very many people need to worry about these tax rates. Of course, such insouciance may be rational in part *because* Shoven and Wise have written this paper.