An Economic Appraisal of Pension Tax Policy in the United States

Richard A. Ippolito
Chief Economist
Pension Benefit Guaranty Corporation

Published for the
Pension Research Council
Wharton School
University of Pennsylvania
by

IRWIN

Homewood, IL 60430
Boston, MA 02116

Sponsoring editor: Michael W. Junior
Project editor: Margaret A. Schmidt
Production manager: Ann Cassady
Compositor: Compset, Inc.
Typeface: 10/12 Melior
Printer: Arcata Graphics/Kingsport

Library of Congress Cataloging-in-Publication Data

Ippolito, Richard A.
An economic appraisal of pension tax policy in the United States / Richard A. Ippolito.
p. cm.
"Published for the Pension Research Council, Wharton School, University of Pennsylvania."
Includes bibliographical references.
ISBN 0-256-08544-7
1. Pensions—Taxation—United States. 2. Old age pensions—Taxation—United States. I. Wharton School. Pension Research Council. II. Title.
HJ4653.P5I66 1990
336.24'2—dc20 89–26875
CIP

Printed in the United States of America
1 2 3 4 5 6 7 8 9 0 K 7 6 5 4 3 2 1 0

CHAPTER 1

Introductory Issues

OVERVIEW

This monograph is concerned with tax policy and private pensions. The relationship between these two subjects is old and deep. Basic tax rules pertaining to pensions were established in the Internal Revenue Act of 1926. The Act provides that if firms set aside monies to provide employees' pensions, their contributions are tax deductible at the corporate level and may accumulate in tax-exempt trust funds. Contributions are taxed to workers when taken as pension benefits during retirement.

In effect, pension savings are subject to a consumption tax of sorts. This treatment is not "special" compared to the tax treatment of earnings used to support immediate consumption: these earnings also are taxed once. But it is special compared to ordinary savings, which are subject to a double tax: they are assessed an income tax at the time wages are earned and again as workers essentially try to maintain the purchasing power[1] of their savings over time.

Without special treatment in the tax code, it is doubtful that pensions would be an important institution in the United States today. It is almost certain that, without pensions, workers now and in the future would not retire at current retirement ages and could not maintain existing standards of living during retirement.

This treatise is not intended to challenge the notion that pensions matter; they matter a lot. But rather, this book examines whether or not existing tax policy is the "right" social policy and, if so, why. In attempting to answer the question, I presume that the proper role of government is not to determine for workers when they will retire and how much consumption they will enjoy during retirement, but precisely the

opposite. Subject to the overall need to raise tax revenue and to prevent "spenders" from free riding on "savers," the government's role is to create an environment in which individuals are free to choose when they will stop work from their main jobs and how much they will save for retirement. I will show that this approach works in the direction of maximizing the overall benefits of workers over their lifetimes. These benefits include higher productivity and, thus, higher wages; a redistribution of consumption from work years to retirement; a better allocation of leisure time over workers' lifetimes; and in particular, longer retirement in place of shorter work weeks.

A timely question is whether current pension tax policy is appropriate. During the 1980s, mostly in response to large federal budget deficits, Congress began to evaluate whether the nation can "afford" the institution of tax-exempt pension trust funds. For example, the U.S. Joint Committee on Taxation estimates that special tax policy towards pensions reduced potential federal tax revenues by $49 billion in 1988, a time when the federal budget deficit was approximately $150 billion.[2] Indeed, Congress has taken unprecedented steps in recent years to reduce the revenue losses from pension tax policy.[3] Now is an opportune time to evaluate the economic implications of any changes in public policy towards pensions before proceeding further down this path.

In this chapter, I begin by providing some basic building blocks that are important to understanding and evaluating pension tax policy. These include how pension plans work (and how to differentiate between the basic types of pension plans); how these plans are financed (and how they might affect labor productivity); and how a tax policy that gives tax-exempt status to pension savings accounts is important in qualitative terms. Within this framework, the ensuing chapters begin the task of evaluating federal tax policy towards pensions.

It is somewhat of a misnomer to label federal tax rules towards pensions as "tax expenditure." In reality, federal rules merely represent a means of enforcing statutory marginal income tax rates in the Internal Revenue Code. Without "special" tax treatment of pension trust funds, marginal income tax rates would increase by an order of magnitude for earnings set aside for retirement consumption. This increase would greatly add to the "price" of consumption during retirement compared to work years, with the predictable consequences being later retirement and lower consumption during retirement.

It will be shown below that existing pension tax policy works to get the government out of the business of influencing retirement decisions. Doing so is consistent with recent legislation altering the nature of the social security system. Overall, current trends suggest an emerging national retirement policy that leaves most retirement decisions to the private market. Much of this book evaluates other government rules towards pensions in light of this policy, recognizing the implicit con-

straint that Congress will not permit pension trust funds to be used for nonpension purposes.

Much of the pension regulatory apparatus was erected to prevent "overuse" of pension trust funds and to encourage transfers from high-income workers to (or forced savings by) low-wage individuals. But this regulation has largely become outmoded owing to new tax-monitoring technology, new laws to directly control maximum tax-preferred pension income, and a nearly universal social security system that provides dramatically higher wage replacement rates to nearly all workers earning low wages over their lifetimes. Eliminating the now redundant regulations on pension plans can lift a large burden from workers and firms. The results will be lower costs of production and less interference with individuals and firms choosing the best contractual pension arrangements to suit their individual and corporate needs.

A centerpiece of the less-regulated environment is the availability of unlimited individual retirement accounts (IRAs), subject to the same payout limits on tax-favored pension benefits during retirement as those now in place. Availability of IRAs creates competition between financial intermediaries and corporations to devise the best pension savings vehicles for workers. Once freed of unnecessary and costly regulation, firm-offered pension plans will survive only if they effect large productivity gains over alternative forms of compensation.

Pursuit of a neutral government policy towards pensions and retirement is not necessarily at odds with the need to raise tax revenue. A policy designed to reduce government influence over savings and retirement decisions will likely increase federal tax revenues—by significant amounts. In other words, some tax provisions impose economic costs on society and reduce revenue. Instead of interfering in arbitrary ways with pension funding decisions—which imposes additional layers of distortion—Congress could alter existing tax provisions that currently distort individual choice and, at the same time, raise large amounts of tax revenue. Pension funding at the corporate level still can be controlled by using methods that are more neutral in their impact on firms' and workers' choices of pensions and asset allocation in the pension trust.

A central theme of this book is that tax policy cannot be viewed in a vacuum; it is part of an overall national policy towards retirement income. A centerpiece of tax policy has always been the award of "special" treatment of savings for retirement consumption. This policy of special treatment recognizes the importance of not artificially increasing the cost of retirement through the tax system. But the tax code also has been congested with auxiliary regulatory provisions either to control the amount of revenue lost through the pension provisions or to effect other national retirement goals directed towards income redistri-

bution and forced savings. As a result, a rather large regulatory framework has become intertwined with the tax policy itself.

Since the establishment of this regulatory framework, a generous and nearly universal social security system has emerged, which satisfies many of these goals; and modern computer technology makes it possible to directly control the size of pension incomes on an individual basis. These changes provide the opportunity for public policymakers to concentrate more on freeing individual decisions from unnecessary influence on both the public and private pension retirement systems, and to do so without reducing federal tax revenue or compromising the social goals embedded in the original set of rules.

THE ECONOMICS OF PENSIONS

As a prelude to evaluating tax policy, we need understand how pension plans work, how tax policy is translated into pension savings vehicles in the firm, and how these vehicles affect long-term relations between workers and firms. Later in the chapter, I will illustrate the impact of pension tax policy on the "price" of retirement and give some idea of the magnitude of the implications of altering this policy. These subjects will provide the framework for understanding and evaluating national pension and retirement policies that will be discussed in later chapters.

Defined Benefit versus Defined Contribution Plans

There are two basic types of pension plans: defined contribution and defined benefit. In a *defined contribution plan*, the firm deposits a fixed amount (often a percent of pay) into individual accounts for workers. By law, the worker usually vests in the account after no more than five years of participation.[4] After vesting, the workers own the accounts even if they quit the firm. If the workers stay until retirement, the entire value of the account is available to them, frequently as a lump sum.[5]

In a defined contribution plan, the firm is responsible for making required contributions, but is not responsible for ultimate benefit levels. For any given level of contributions, the pension benefit depends on investment experience in the fund. Investment risk is borne by participants. Subject to maximum contribution limits ($30,000 per year), all contributions by the firm are tax-deductible at the corporate level; and earnings are tax exempt during the accumulation period.

Defined contribution plans are the primary coverage for approximately 30 percent of pension-covered workers. In addition, more than half of all participants in defined benefit plans have a secondary defined contribution plan.

Most pension-covered workers are participants in a *defined benefit plan*. This type of plan promises an annuity commencing at retirement, usually based on final wages and service with the firm. The firm is responsible for delivering the stated benefit and for making contributions that reflect these promises. Contributions are tax deductible at the corporate level, and earnings are tax exempt during the accumulation period.

In defined benefit plans, workers do not have claims against individual accounts. Though, by law, accrued benefits vest after five years, workers may forgo a large proportion of their accrued benefits in real terms either if they leave the firm or if the firm fails prior to the attainment of normal retirement age.[6]

Since there is not an obvious one-to-one relationship between the pension promise and contributions as in defined contribution plans, the Internal Revenue Code sets rules to constrain the amount of contributions to defined benefit plans to prevent firms from abusing the tax-free accumulation vehicle.[7] As I will show below, the tax rules surrounding these pensions are more complex than those for defined contribution plans. Yet, at some fundamental level, the funding processes share great similarity.

In the next two sections, I will first demonstrate the similarities and differences in the funding procedures in both types of plans. Second, I will discuss the economic roles that distinguish defined benefit plans from defined contribution plans.

Funding Pension Plans

Consider two similar pension plans, one defined contribution, the other defined benefit. Both have the same retirement age, entail the same expected contribution levels, pay identical benefits at the same retirement age, and invest entirely in essentially risk-free Treasury bills (T-bills).

To illustrate simply, suppose there is only one worker in each plan, and he or she starts work at age 40. The chances of this worker quitting, being laid off, or dying prior to age 65 (retirement age) are presumed to be zero. The worker's cash wage is $10 per year. Assume that the inflation, interest, and expected wage growth rate are each 10 percent per year; thus, the real interest rate and real wage growth rate each is zero.

Defined contribution plan. In a defined contribution plan, suppose the firm promises to contribute 10 percent of the worker's wage to the defined contribution account. In our example, since real wages are $10 each year, 10 percent amounts to a contribution equal to one dollar per year in real terms (in nominal terms, contributions will increase because they are expressed as a percentage of nominal wages).

Each contribution will accumulate at a tax-free rate of return until retirement. Since the pension account invests solely in T-bills, which earn a zero real rate of return, the balance at the end of 25 years will be $25 in real terms.

Defined benefit plan. Now consider how this same benefit is provided in a defined benefit plan. First, I will discuss the funding rules that prevailed prior to the Omnibus Budget Reconciliation Act of 1987 (OBRA). This discussion will make the illustration of the basic funding pattern of defined benefit plans easier and will postpone, until a later chapter, the question of how and why OBRA increased the cost of providing defined benefit plans compared to the defined contribution alternative.

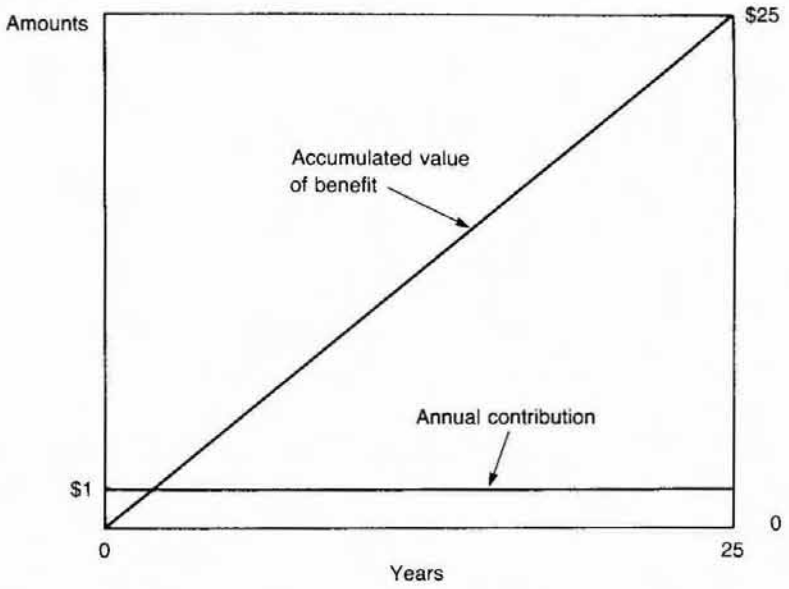
The firm starts by recognizing that it has promised the worker some defined benefit at retirement age. Even though defined benefit plans usually pay benefits in the form of an annuity, I will suppose for simplicity that the defined benefit plan in my example promises to pay the worker a lump sum equal to 10 percent, times final wage, times years of service. The expected present value of this benefit evaluated at the worker's current age (40) is $25, the same as in the defined contribution plan.

This amount is calculated as follows. Salary is assumed to increase with inflation, which, in the example, is assumed to be 10 percent per year; thus, the expected nominal wage at retirement will be $121.80 per year, not $10 as it is at age 40. The worker will also have 25 years of service at retirement. Thus, the lump-sum benefit is expected to be $304.56 (121.80 × 25 years service × 10%). Discounting this amount to the worker's current age (i.e., 40) at the 10 percent interest rate[8] amounts to $25. The pre-OBRA rules permitted the firm to contribute amounts to the pension trust in proportion to service accrued under the plan. In the example, the firm could deposit one dollar per year (in real terms) during each of the 25 years of service.[9,10]

Figure 1–1 depicts the growth of the trust fund in real dollars. Under the pre-OBRA funding rules, assuming a risk-free portfolio that yields a zero real rate of return, the fund is a linear schedule starting at zero, reaching $25 in 25 years; it increases at the rate of one dollar per year (also shown in the figure). These amounts are the same as those in a parallel defined contribution plan that makes the same $1 contribution (in real terms) during each of 25 years, amounting to $25 at age 65.

This simple example illustrates that, mechanically, defined benefit and defined contribution plans work in very different ways, but the essential economics of the funding procedures are similar. In reality, the defined benefit plan becomes more complex. For example, if the plan invests in stocks instead of T-bills, it may experience large invest-

FIGURE 1–1 Accumulation of Pension Benefits



ment gains or losses. If so, this experience must be *amortized* in the form of lower or higher contributions over some period. I will delve further into these matters in a later chapter.

Advantages of Defined Benefit Plans

We need to recognize that defined contribution and defined benefit plans are not perfect substitutes. Some special value may be attached to defined benefit plans by workers and firms. Thus, if the government distorts the choice between these plans, an economic consequence will result. In this next section, as a prelude to policy discussions later in this book, I will discuss some of the special attributes of defined benefit plans.

Annuities. One advantage of defined benefit plans to *workers* is that these plans usually promise annuities, not lump sums. Often, defined contribution plans provide lump sums as the basic benefit form and almost always provide lump sums as an election.[11] Workers trying to convert a lump sum from a defined contribution plan into an annuity contract at retirement encounter unfavorable conditions. First, workers often face higher cost factors because they are assessed load factors based on individual rather than group contracts. Second, they encoun-

ter so-called selection problems. Older individuals who purchase annuities typically have longer life expectancy than average. This self selection makes it more expensive for individuals with average life expectancies to purchase annuities. These problems translate to lower benefits for the same stream of contributions and returns available in defined benefit plans.

Sharing investment risk. Another advantage of defined benefit plans to *workers* is that, despite investment experience, benefit levels are set in proportion to service and wage levels at retirement age. In effect, the pension promise at retirement is indexed to wages. If workers stay with the firm until retirement age, and the firm remains financially viable, workers receive their indexed retirement benefit as promised.

Sponsors of defined contribution plans can protect participants against investment risks by investing in short-term Treasury bills. Unlike stocks, T-bills exhibit little volatility of real returns; and unlike long-term bonds, T-bills are not affected in any important way by changing inflationary expectations. The problem is that workers must accept low rates of return in these portfolios compared to, say, all stock portfolios.

For example, from 1925 to 1987, the average annualized real rate of return on one-year T-bills was only .4 percent. An all stock portfolio, though riskier, exhibited a real return of 6.3 percent per annum over the same period.[12] Thus, expressed in real terms, a one-dollar investment in T-bills each year over this period would have yielded a balance of $26.30 at the end of the period; the same stream of contributions to an all stock portfolio would have yielded a balance of $60.80. Pension benefits can be more than twice as high in an all stock portfolio.

In a defined benefit plan, the firm (i.e., the stockholders) can facilitate risk-sharing among worker cohorts. For example, suppose benefits are set on the assumption that an all stock portfolio will return 6.3 percent per year over all worker cohorts' careers with the firm. Then, for one particular retiree cohort, the actual return during his or her lifetime might be 4.3 percent; for another, 8.3 percent. As long as the average is 6.3 percent over a relatively short period, workers can effectively insure each other against some uncertainty in pension benefits. If investment returns for a series of retiree cohorts do not match expectations, then, to the extent that stockholders have longer horizons than workers, stockholders might be willing to finance the shortfall for some worker cohorts at minimal cost.[13] In contrast, in defined contribution plans, various cohorts of retirees that had the same stream of real contributions can receive dramatically different retirement benefits, depending on the rate of return experienced over their particular tenure.

Quit costs. Defined benefit plans also have advantages to *firms*. One advantage is that, in order to claim the full value of the promised

TABLE 1–1 Quit Costs From a Defined Benefit Plan

Age	Service	Interest Rates		
		$i = 5\%$	$i = 10\%$	$i = 15\%$
		As a Percent of Annual Wage		
45	5	31.6	43.2	47.5
50	10	52.7	77.6	89.4
55	15	59.0	94.8	116.5
60	20	44.2	78.6	105.5

NOTE: Retirement age is 65. Wage growth equals the interest rate.

benefit, a worker must stay with the firm until retirement age. Therefore, the retirement benefit becomes a means by which the firm can encourage long tenure with the firm. Though vested, workers who quit the firm are entitled to a benefit proportional to their wage level *at the time they quit*, not to their wage at retirement.

For example, a worker who quits after 15 years is entitled to a benefit value equal to 10 percent, times 15 years of service, times the nominal wage at year 15 of his tenure ($44.81). This benefit equals $67.22, payable at age 65. If the worker instead stays with the firm, the $67.22 essentially is indexed to 10 percent expected wage growth, or $182.72 at age 65. Thus, by quitting midway in the career, the worker gives up his claim to two thirds of the real pension benefit based on service accumulated to date.

The amount of the benefit loss from quitting depends upon the interest rate and the age and service level of the worker who quits. Table 1–1 lists these costs for the example illustrated above for different points in the worker's tenure, using different interest-rate assumptions. The losses are expressed as a percentage of the annual wage.[14] Table 1–1 shows that the cost of quitting can be large. For example, if the worker in the example quits after 10 years of service, he or she forgos at least the equivalent of a half year of wages, with amounts ranging over 100 percent of the annual age for higher interest rates.[15]

The imposition of these losses helps explain why quit rates for workers covered by defined benefit plans typically are much lower than those not covered by pension plans.[16] In contrast, since all interest and earnings in defined contributions plans belong to the worker after vesting, there are no quit costs in these plans once vesting occurs.

Retirement incentives. In defined benefit plans, the firm can also encourage retirement among older workers in two ways. First, it can make pensions actuarially unfair after normal retirement. Consider our example again. When our hypothetical worker reaches age 65, he has 25 years of service, entitling him to a benefit of $25 (in real terms). This amount equals 10 percent, times 25 years service, times $10 in wages.

Instead of receiving a lump-sum benefit, suppose the retiree receives an annuity indexed to prices until death. If we assume death is certain at age 80, the generosity level in the example translates to an annuity of $.067 (in real terms) per year of service. Thus, if the worker retires at age 64, he is entitled to an annuity equal to $1.60, which is actuarially reduced to $1.50 to accommodate one more year of annuity collection.

If the individual works his 64th year, two things happen: First, the $1.50 annuity is actuarially adjusted to $1.60, so that the present value of the annuity is the same $24. That is, when the interest rate is zero, the present value of $1.60 per year over 15 years of retirement is $24. Second, the worker receives one more year of credited service in the formula, which increases the annuity by the factor 25/24; the total annuity based on 25 years of service is $1.67, which has a present value of $25 at retirement age 65.

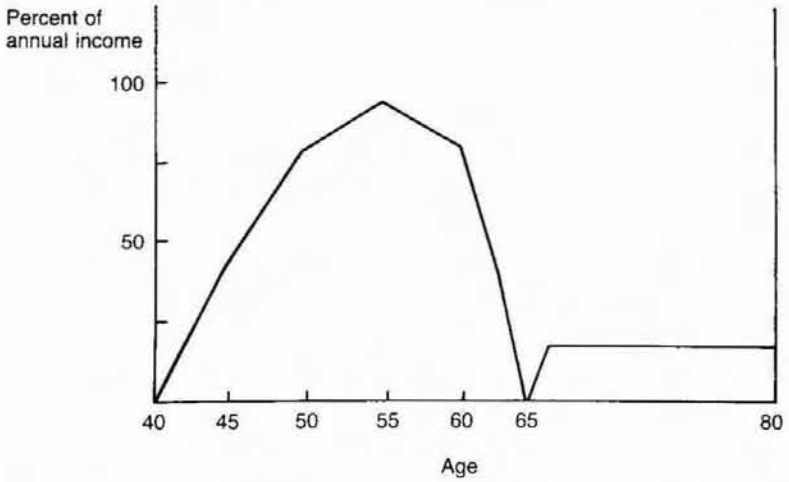
In contrast, if the same worker retires past the "normal" retirement age (65 in this example), he still receives the additional service benefit. But the $1.67 annuity based on 25 years of service is *not* actuarially adjusted. The worker loses $1.67 of "free" pension income or 16.7 percent of the annual $10 wage, by working his 65th year.

In contrast, in defined contribution plans, since the lump-sum value of the account belongs to the worker, it cannot be eroded by the worker's decision to work past normal retirement age. Thus, defined contribution plans generally have no retirement incentives.[17]

The incentives provided by defined benefit plans to encourage workers to stay with the firm until normal retirement age, but to retire after reaching normal retirement age, presumably are important tools to help firms maintain productive work forces. If these controls were not important, firms would not impose arbitrary penalties on workers who leave the firm "too soon" or stay "too late." If pension rules constrain worker preferences, the firm must pay higher wages to compensate workers for their loss of freedom. Thus, a firm that imposed unnecessary restrictions on workers would be unable to compete in the labor market with other firms that offered contracts with lower wages and fewer constraints.

Figure 1–2 demonstrates the incentive effects in defined benefit plans to leave the firm "on time." The numbers replicate the so-called quit costs in the second column of Table 1–1 (the nominal interest rate is set at 10 percent). The incentive to leave the firm after age 65 (the assumed "normal" retirement age) corresponds to the numbers used in the previous paragraphs. In reality, firms often provide a range of ages for the worker to retire without imposing any important penalties. This range often includes ages 62 through 65 and sometimes ages 55 through 65.[18]

FIGURE 1–2 Pension Benefits Forfeited by Leaving Firm "Too Early" or "Too Late"



NOTES: Interest rate: 10%. Pension value: 10% of wage for each year of service.

Overall labor productivity. The incentive effects inherent in defined benefit plans can go beyond providing incentives to individual workers, particularly when workers are unionized. Where labor forces are unionized, there is a threat that the union could use its power to increase wages beyond competitive levels. Unions might exercise this power even if it ultimately leads to the financial failure of the firm, particularly if the work force is relatively old.

In these cases, defined benefit plans provide incentives for the union to help the firm remain financially viable over the long run. In these plans, if the firm fails, workers are entitled to *termination* benefits, not *ongoing* benefits. Termination benefits are exactly like benefits given to workers who quit the firm, and thus, to workers, entail large losses like those shown in the Table 1–1.[19] Thus, defined benefit plans provide unions with incentives to help the firm stay viable over the long run. Empirically, union workers are almost always covered by defined benefit plans, and have a much larger portion of wages in the form of pensions, which ensures large losses in the event of firm failure.[20]

In short, the advantages of defined benefit plans may work in both directions. Many firms and workers presumably attach significant value to these types of plans compared to defined contribution plans.

At the same time, while these plans are different, they share similar characteristics as devices to save monies for the purpose of providing pension benefits to workers when they reach retirement age.

Who Pays for the Pension?

Little progress can be made in developing a proper tax policy for pensions unless a fundamental aspect of pensions is understood. Pensions are not provided free: Workers must sacrifice cash wages in exchange for pension benefits. The easiest way to see this is to consider a defined contribution plan.

Suppose many identical firms compete in the same product and labor markets. Assume that all workers are equally productive and that there are no fringe benefits other than pensions. One firm pays a cash wage equal to $10 per year, plus a $1 contribution to a defined contribution plan. All other firms pay $10 in cash wages and give no pension. In this case, the first firm is paying compensation levels 10 percent higher than its competitors. Clearly, this situation is not stable.

Similarly, suppose all firms, except one, pay the wage plus pension described above. One firm, however, tries to reduce costs by paying only the $10 cash wage and providing no pension. This firm will have difficulty hiring workers because it pays a below-market level of compensation. Equilibrium occurs when all firms pay the same total compensation.

Though it is not as readily observable, the same principle applies to defined benefit plans. Here too, workers must pay for their pensions through forgone cash wages. The principle is easiest to see when workers are covered by unions (as are, roughly, one third of all workers in defined benefit plans). In these plans, unions usually negotiate a benefits package that explicitly represents trade-offs between cash wages and fringe benefits. Often, specific contribution rates are negotiated for the pension plans in lieu of some portion of cash wage.[21]

Even where the pension-wage trade off is not explicitly negotiated, the same economic logic makes the compelling argument that pensions are not provided gratis by firms: workers must pay for their pensions through lower cash wages. Otherwise, pension firms will not be able to compete effectively with nonpension firms.[22] The argument is not merely theoretical. A wealth of empirical evidence shows that workers pay for their fringe benefits through lower cash wages.[23]

Further, the evidence is consistent with the notion that implicit contributions through forgone wages for workers covered by defined benefit plans can be expressed as a constant percent of wages over all years with the firm.[24] In other words, the evidence suggests that workers covered by a defined benefit plan contribute in a pattern like that shown in Figure 1–1.

VALUE OF A TAX-EXEMPT TRUST ACCOUNT

The above discussion reminds us that, apart from some of the residual benefits of some types of pension plans, in essence, pension plans are vehicles that permit workers to save part of their earnings to support consumption during later years of their lifetimes, when their productive capacity is diminished and less certain. This simple fact would be more obvious if the federal government permitted individuals to have direct access to special trust-fund tax treatment to save for their own retirement.

Although individual retirement accounts (IRAs) are available, their contributions are limited to $2,000 per year, as compared with $30,000 in firm-offered defined contribution plans.[25] That the government essentially has mandated an intervening agent between workers and their retirement savings, however, does not alter the fundamental economics that lie behind pension plan accumulations: they represent worker savings for retirement. Obviously, the availability of special tax rules to pension savings is valuable.

Illustration of Tax Effects

In this section, I will construct some simple examples to illustrate the power of the tax-exempt status of pension trust funds. Except for limited concessions made to owner-occupied housing, the tax code does not offer tax-free accumulation vehicles for retirement savings outside the pension system.[26] For the sake of discussion, I will simply assume that on the margin, if pensions were not treated specially in the tax code, the alternative would be to save in tax-exposed vehicles.

Consider the simple case of a defined contribution plan. In lieu of some portion of cash wages, the firm contributes a fixed percent of the worker's earnings into a trust account; upon retirement, the worker receives a lump-sum amount. Compare this method of saving for retirement to one in which the individual saves for retirement outside the pension plan. In particular, consider a worker who faces a proportional income tax rate of 28 percent. Suppose this individual can choose whether the firm will either add $1 to the cash wage per year, which the worker will save outside the pension for retirement, or contribute $1 to a defined contribution plan.

Saving outside the pension plan. If the worker does not use the pension plan, the $1 "extra" wage is assessed a 28 percent personal income tax, leaving $0.72 free to save. Suppose the interest rate is 10 percent and the worker's tenure is 10 years prior to retirement. The $0.72 will not grow at the rate of 10 percent because savings outside the pension program are subject to the personal income tax. Thus, the after-tax interest rate is 7.2 percent (10 percent, minus the 28 percent

TABLE 1–2 Benefits of Tax-Free Accumulation

	Marginal Tax Rate	
Interest Rate	*15%*	*28%*
5	8.3	15.6
10	16.6	28.0
15	23.5	38.0

NOTE: Numbers in table denote the portion of after-tax pension income attributable to special pension tax policy. The example assumes a contribution rate equal to $1 (in real terms) per year for 25 years, with continuous compounding.

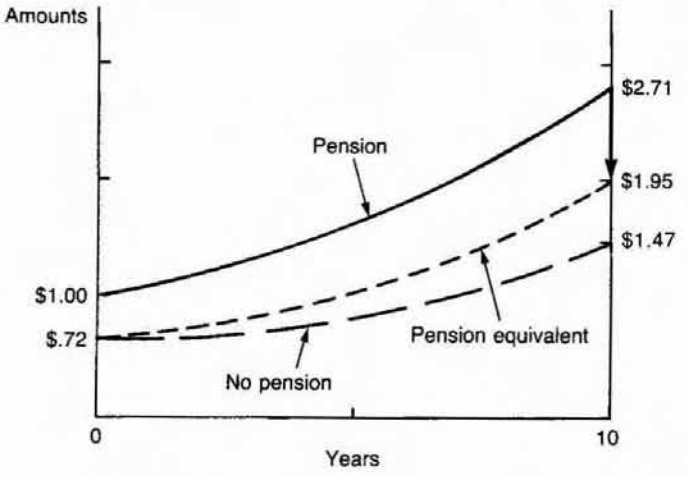
tax assessment). After 10 years, the $0.72 savings are worth $1.47 in after-tax income. This case is denoted in Figure 1–3 by the schedule labeled "no pension," which originates at $0.72 and ends at $1.47 after 10 years.

Saving inside the pension plan. Now, suppose the pension plan is used. If the $1 is deposited in the pension plan, no immediate tax is assessed; instead the money is treated as taxable income at retirement. This deferment is *not* what affects the present value tax liability. The key pension tax provision is that during the accumulation period, interest earned on pension plan assets is tax exempt. Thus, the $1 increases at the gross-of-tax rate of 10 percent per year, not the after-tax rate of 7.2 percent. After 10 years, the $1 contribution is worth $2.71. This growth is depicted by the schedule labeled "pension" in Figure 1–3. When the worker retires, his lump sum is subject to the 28 percent tax. After the tax, $1.95 in after-tax income is available to the worker.

This tax treatment is equivalent to one that assessed a 28 percent tax on the $1 in wages at the time it was saved and exempted interest earnings on this amount from further taxation. This alternative is shown by the schedule labeled "pension equivalent" in the figure which yields the same $1.95 after-tax income as the pension vehicle. That is, $.72 invested at 10 percent is worth $1.95 after 10 years. Viewing the pension tax advantage in this way, we can see that the value of the pension does not arise because the income tax is escaped or deferred, but rather because earnings on these savings are exempt from the so-called second tax during the accumulation period.[27]

Comparison of results. Compare the two results. With a pension, the $1 "extra" wage at age 55 is worth $1.95 after tax at age 65; without a pension, the same $1 is worth $1.47 after tax. The difference of $.48 is attributable to the tax-exempt status afforded earnings in the pension plan. In this example, fully 24 percent ($.48/$1.95) of the after-tax

FIGURE 1–3 Tax Benefits of a Tax-Exempt Trust



NOTE: Marginal tax rate: 28%; interest rate: 10%.

lump-sum pension will not be available to the worker if pension earnings do not have tax-exempt status.

The example can easily be generalized to the full work life. Reconsider the above example where workers maintain a constant pension savings rate over a 25-year period. The tax benefits attributable to tax-exempt accumulations for several interest rates and tax rates are reported in Table 1–2.[28]

The results show that the value of the tax exemption is substantial. In the case of the 15 percent tax rate and a 10 percent interest rate, 16.6 percent of after-tax pension income is attributable to the tax-exempt feature of pension earnings. The value increases with the interest rate and the marginal tax rate. For example, for an interest rate equal to 15 percent, the portion of after-tax pension income attributable to pension tax policy is 23.5 percent. At the 28 percent tax rate, these percentages are at least 50 percent higher.

In addition to the benefits attributable to tax-exempt accumulation in the pension trust, there also are some tax-smoothing advantages afforded pensions. I will consider this issue in the next chapter. For present purposes, it is sufficient to appreciate that even at the lower marginal tax rates enacted in the Tax Reform Act of 1986 (which are reflected in Table 1–2), the advantages of special income tax policy towards pension trust funds are substantial.

TABLE 1–3 Marginal Tax Rates and Pension Assets, 1920–1980

Year	*Personal Tax Rate (median taxpayer)*	*Income Tax Paid per 100 Workers*	*Pension Assets per Worker ($1980)*	*Corporate Tax Rate*
1920	4.0	13.3	$ 5	10.0
1930	1.1	4.2	69	12.0
1940	4.4	13.2	147	24.0
1950	17.4	59.7	349	42.0
1960	20.0	67.3	1,290	52.0
1970	19.0	69.8	2,423	49.2
1980	21.0	68.1	2,367	46.0

NOTE: Numbers in table are percents except where noted.

SOURCE: Richard Ippolito, *Pensions, Economics, and Public Policy* (Homewood IL: Dow Jones-Irwin, 1986), p. 25.

Implications for Pensions

The evidence suggests that the tax treatment of pensions is responsible for much of their growth. The data in Table 1–3 demonstrate this point. The data show the average marginal tax rates paid by taxpayers and the proportion of tax returns on which any tax was paid (see first two columns). In 1940, only 13 percent of income earners paid taxes, and these paid a median marginal tax rate equal to 4.4 percent. By 1950, 59.7 percent of income earners paid a tax with a median marginal tax rate equal to 17.4 percent. The dramatic increase in tax coverage and tax rates that took place during World War II were never reduced thereafter.

The data show that the ensuing decade marked a period of substantial growth for the U.S. pension system: per worker pension assets (in 1980 dollars) increased from $349 in 1950 to $1,290 in 1960 and to $2,423 in 1970. Pension asset growth after 1970 largely reflects a natural maturing process of pensions.[29] The time series data are therefore broadly consistent with the notion that income taxes could be substantially responsible for the growth of pensions as measured by per capita pension trust assets.[30]

The data in Table 1–4 summarize the current importance of pensions. In 1987, approximately nine million retirees were receiving benefits from private pension plans, amounting to $101 billion per year. Approximately two thirds of all private-sector workers are expected to retire with a pension worth on average about 23 percent of their final wage. In 1987, private pension funds held $1.6 trillion in assets and, together with state and local government pension funds, held over one fifth of all corporate equity securities and almost 40 percent of all corporate bonds. Clearly, pensions have grown to be an important institution in the United States.

TABLE 1–4 Pension Facts, 1987

Category	*Estimate*
Active participants (millions)	
Primary defined benefit	28.9
Primary defined contribution	11.6
Secondary plans	16.1
Total (includes double counts)	56.6
Coverage rate	
All ages	50%
Ages 50–54	65%
Pension amounts	
Initial annuity (annual)	$6,950
Replacement rate	23%
Total benefits paid (billions)	$101
Pension annuitants (millions)	
All retirees	9.0
First year retirees	515,000
Defined benefit plans	
Over 100 participants	25,000
Fewer than 100	200,000
Total	225,000
Defined contribution plans	
Over 100 participants	24,000
Fewer than 100	581,000
Total	605,000
Grand total	830,000
Pension assets (billions)*	
Defined benefit plans	$1,000
Defined contribution	600
Total	1,600
Share ownership*	
Corporate equity	23%
Corporate bonds	37%

NOTE: All data for private plans only except where denoted by an asterisk (*); these data include state and municipal public pension plans.

SOURCE: R. Ippolito, *Pensions, Economics and Public Policy*; and D. Beller and John Turner, *Trends in Pensions*, 1989.

SUMMARY

This chapter presents some of the basic economic issues surrounding pensions and pension tax policy. There are two types of pension plans: defined contribution and defined benefit. The former plans, which are the primary plans for approximately three out of ten workers covered by pensions, are straightforward tax-preferred savings accounts. Defined benefit plans tend to be more complex, perhaps providing important contributions to firms' productivity and important special benefits to workers.

Notwithstanding these issues, in their essence, pensions are means for workers to set aside some portion of their earnings during their more productive years to finance consumption during periods later in

their lifetimes when their productive capacities are less certain. Even though the federal tax code essentially requires workers to set aside these savings through firm-offered pension plans instead of, say, individual retirement accounts with the same maximum contribution limits as defined contribution plans, this requirement should not obfuscate the essential fact that workers pay for their pensions, regardless of which vehicles are used to accumulate their savings. While admittedly oversimplifying the process, as a first-order approximation, the evidence suggests that workers finance their pensions by sacrificing some constant fraction of their annual compensation.

There is little dispute that the tax-exempt status afforded pension plan trusts is important. If it were not for special tax treatment, it is likely that after-tax pension annuities would be 15 to 30 percent lower, depending on the individual's tax rate and the prevailing long-term interest rate. The public policy question is whether federal tax policy ought to treat these savings specially in the tax code. This is the subject of the next chapter.

ENDNOTES

1. The second tax is assessed by including interest earned on savings as ordinary income. For the most part, interest merely reflects an adjustment for expected inflation, though there usually is a real interest rate component as well.
2. See Congressional Budget Office, *Tax Policy for Pensions and Other Retirement Saving* (Washington, D.C.: G.P.O., 1987), p. 14.
3. Most recently, the Omnibus Budget Reconciliation Act of 1987 imposed lower limits on permissible funding levels in defined benefit plans. See the discussion in Chapter 4.
4. If the plan provides for gradual instead of cliff vesting, full vesting can occur no more than seven years after participation begins.
5. See note 11.
6. If the firm fails, usually pensions are guaranteed by the Pension Benefit Guaranty Corporation, though these guarantees are much less than benefits available if the plan continued. See Richard A. Ippolito, *The Economics of Pension Insurance* (Homewood IL: Richard D. Irwin, 1989).
7. The Code also requires *minimum* contribution levels to ensure that at least some portion of promised benefits are funded in the pension trust fund.
8. This is the rate that is expected to be earned in the all T-bill portfolio chosen by the firm in the example.
9. In reality, there are several funding methods available to actuaries. The one described in the text corresponds to the so-called entry age-normal method which generates proportional funding on an ongoing basis. An alternative, for example, is the unit-credit method which permits firms to underfund their plans on an ongoing basis until the worker approaches normal retirement age. See E. Allen et al., *Pension Planning* (Homewood, IL: Richard D. Irwin, 1989).
10. In year one, for example, corresponding to age 40, the worker's first year of service, the firm's ongoing liability at the end of the year is $1 (10%, times current wage of $10, times one year of service, projected at the rate of wage growth of 10

percent per year to retirement age 65, discounted back to age 40 at the interest rate of 10 percent):

$$PVO(1,0) = 10\% \times 1 \text{ year} \times \$10e^{[.10 \quad .1025} = \$1, \tag{1–1}$$

where PVO(1,0) is the present value of the ongoing pension after one year of service, evaluated in year-zero dollars. This is exactly like its equal-value, identical-portfolio defined contribution counterpart: the sponsor of a defined benefit plan is permitted to deposit the same one dollar in contributions in year one.

Now consider year 15 of the worker's service. The wage then is expected to be $44.81 ($10 accumulated at 10 percent wage growth for 10 years); service is 15 years; and there are 10 years to retirement. Thus, according to equation 1–1, the ongoing benefit liability in year-15 dollars is:

$$PVO(15,15) = 10\% \times 15 \text{ years} \times \$44.81e^{[.10 \quad .1010} = \$67.22. \tag{1–2}$$

In year-15 dollars, the present value of the accumulated benefit is $67.22. In year-zero dollars, this amount is discounted 15 years at the 10 percent interest rate:

$$PVO(15,0) = \$67.22e^{\quad [.10][15]} = \$15. \tag{1–3}$$

The firm's permitted contribution prior to the new OBRA rules equaled the difference between benefits at age 65 and current benefits, prorated over years left until retirement. Since, in real terms, the present value of benefits at age 65 is expected to be $25, the difference between this and benefits accrued at year fifteen ($15), spread over 10 years of remaining service is $1: therefore, the firm's normal contribution in year fifteen is $1 (valued in year-zero dollars).

11. While most defined contribution plans provide for the annuity option at retirement, rarely do they require participants to take the benefit in the form of annuities. An exception is TIAA-CREF. By enforcing a requirement to take the annuity-only form, a defined contribution plan can eliminate the adverse selection problem created by providing retirees a choice between a lump sum and an annuity form of payment.
12. See Ibbotson Associates, *Stocks, Bonds, Bills, and Inflation* (Chicago: Ibbotson Associates, 1988), p. 69.
13. If this return turns out to be unusually low for a succession of cohorts, or similarly, if the structural return falls from 6.3 percent to, say, 4.0 percent, it is less clear that stockholders will be willing to accept these risks without the benefit of the risk premia imbedded in stock returns. A more plausible explanation is that workers with riskier portfolios will expect high benefits on average, but will share in some of the downside risk if poor returns are experienced. While federal regulation of pensions restricts the amount of risk sharing that can occur (the firm must pay a flow equal to benefits accrued to date in nominal terms), the sharing could take other forms. For example, the firm could award lower ad hoc inflation adjustments during retirement.
14. As the worker ages and accrues more service, the portion of the accrued pension he forgoes first increases, then decreases. As the worker approaches retirement age, the amount of inflation erosion he suffers on his pension benefit if he quits is less than it would be if he quit at an earlier age. But, with more service, he accumulates more pension benefits which works in the direction of increasing quit losses at later ages. Thus, the loss function has a hill-like appearance with age.
15. In general, the pension plan illustrated is less generous than most plans. The typical lump sum equivalent for defined benefit plans has a generosity factor

closer to 15 percent, not 10 percent of final wage, times service. Thus, the quit costs in the table are roughly two thirds of the average. See David McCarthy, *Findings from the Survey of Private Pension Benefit Amounts* (Washington, D.C.: U.S. Department of Labor [G.P.O], 1985). Some pension plans can have quit costs two to three times those illustrated in the table. An example is the pension that covers most federal workers hired prior to 1983. See Richard Ippolito, "Why Federal Workers Don't Quit," *Journal of Human Resources* (Spring 1987), pp. 281–299.

16. See for example, Steven Allen et al., "Job Mobility, Older Workers, and the Role of Pensions" (Final Report submitted to the U.S. Department of Labor, 1986); Ann Bartel and George Borjas, "Middle-Age Job Mobility: Its Determinants and Consequences," in *Men in Their Pre-Retirement Years* (Philadelphia: Temple University School of Business Administration, 1977); Olivia Mitchell, "Fringe Benefits and Labor Mobility," *Journal of Human Resources* (Spring 1982), pp. 286–298; and Bradley Shiller and R. Weiss, "The Impact of Private Pensions on Firm Attachments,"*Review of Economics and Statistics* (1980), pp. 360–380.
17. The plan can, however, impose a limit on the number of years during which a contribution will be made; thus, contributions can stop after 25 or 30 years of service.
18. Sometimes, the formulas are skewed to offer some subsidy to early retirement—that is, the actuarial adjustment is less than complete. The Internal Revenue Code does not permit formulas to be less than actuarially fair for early retirees. It is important to understand, however, that actuarially equivalent pensions are not always economically equivalent. See Richard A. Ippolito, "Towards Explaining Earlier Retirement After 1970," *Industrial & Labor Relations Review* (1990), forthcoming.
19. If the failed firm has insufficient assets to pay termination benefits, most of these benefits are guaranteed by the government pension insurance company.
20. Even though defined contribution plans can take the form of profit-sharing plans or stock-bonus plans, neither can replicate the loss function imparted by a terminated defined benefit plan. See Richard A. Ippolito, *Pensions, Economics, and Public Policy* (Homewood, IL: Dow Jones-Irwin, 1986), Chapter 10.
21. This is the case, for example, in so-called multiemployer plans.
22. Even if pensions increase productivity, this does not imply that workers receive all the benefits: workers will receive higher wages only to the extent that a higher wage is necessary to compensate them for some constraints on their freedom that might be imposed by defined benefit plans. There is only one competitive wage level (adjusting for labor skills). Firms must pay this wage regardless of productivity levels in the firm. If firms pay too little, they are unable to retain labor. If they pay too much, they are unable to compete in product markets. If pensions increase productivity, competition among firms ensure that, for the most part, these improvements in productivity translate into lower prices, not higher wages in the firm. If these gains are important across lots of firms, workers as a whole receive the benefits through higher real wages.
23. See Ronald Ehrenberg, "Retirement System Characteristics and Compensating Wage Differentials in the Public Sector," *Industrial & Labor Relations Review* (1980), pp. 470–483; Bradley Schiller and R. Weiss, "Pensions and Wages: A Test for Equalizing Differences," *Review of Economics and Statistics* (1980), pp. 529–538; and Robert S. Smith, "Compensating Differentials for Pensions and Underfunding in the Public Sector," *Review of Economics and Statistics* (1981), pp. 463–468. A good textbook on the issues of compensating differentials in wages is Ronald Ehrenberg and Robert Smith, *Modern Labor Economics* (Glendale, IL: Scott Foresman, 1985).

24. See Robert Clark and Ann McDermed, "Life Cycle Patterns of Earnings, Pension Wealth, and Total Compensation," *Quarterly Journal of Economics* (1986), pp. 341–362, and also their paper "Earnings Response to Pension Coverage and Eligibility" (Paper presented at the American Economic Association Meetings, New York, 1985); Christopher Cornwell et al., "Opportunistic Behavior by Firms in Implicit Pension Contracts" (Mimeograph, West Virginia University, 1988); Richard A. Ippolito, "The Labor Contract and True Economic Pension Liabilities," *American Economic Review* (December 1985), pp. 1031–1043; and Olivia Mitchell and S. Pozzenbon, "Wages, Pensions, and the Wage-Pension Trade-off" (Paper presented at the American Economic Association Meetings, New Orleans, 1986).
25. Self-employed individuals are entitled to set up so-called Keough plans, but these plans limit contributions to $7,000 per year.
26. Most tax consessions in the code are arbitraged. Thus, investors in tax-exempt municipal bonds do not generally expect a yield in excess of the after-tax yield available on taxable bonds. The same arbitrage would occur in housing except for the stipulation in the tax code that the exemption from taxation on sales proceeds of owner-occupied housing for homeowners after age 55 is limited to $125,000 per household. Up to this amount, tax treatment of earnings devoted to purchasing a house is the same as pensions in the sense that they are taxed only once. The difference is in timing of the tax assessment: pension contributions are exempt from taxation and, instead, are taxed as benefits at retirement. Housing investments are taxed as ordinary income, but proceeds up to $125,000 are exempt from taxation for homeowners after age 55. The present value tax liabilities are the same up to this amount. To the extent that pension-covered workers do not fully exploit the housing-tax loophole then part of the tax advantage afforded pensions can be preserved by investing more in the form of housing.
27. When the tax rate is not the same during retirement and work years, an additional tax effect occurs. I will deal with this issue in Chapter 2.
28. Suppose contributions to the pension plan are $1 in the first year of tenure and increase at the rate of g percent (reflecting inflation and real wage growth). If this savings flow is deposited in conventional vehicles, the savings is subject to normal income taxation before it is deposited, then is assessed on the interest earned in each period. Hence, the after-tax balance after R years of accumulation is

$$B = (1 - t)\int_{j=0}^{R} e^{[i(1-t)]j} dj,$$

where i is the interest rate and t is the proportional tax rate. If the pension is used instead, the tax rate t inside the integral is set equal to zero. The tax factor $(1 - t)$ outside the integral remains because pension payouts are subject to taxation. Denote this solution by the variable P. The portion of after-tax pension income attributable to the tax-exempt status of pensions is $(P - B)/P$.
29. It takes upwards of 50 years for all retiree ages to become filled with succeeding cohorts of retirees and for retiring workers to benefit from an entire career under a pension plan. See R. Ippolito, *Pensions, Economics, and Public Policy*, Chapter 5.
30. This does not imply that pension plans were nonexistent prior to 1940. See Murray Latimar, *Industrial Pension Systems* (New York: Industrial Relations Counselors, 1932).