Pensions, Economics and Public Policy

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PART THREE

Economic Implications of Pensions

CHAPTER 8

The Impact of Pensions on the Labor Market

Considerable space has now been devoted to the nature of the pension contract and its rapid and extensive growth during the last 40 years. What is known is that pensions are pervasive and important to the vast bulk of workers in the United States: two thirds of workers in the private work force will retire with a pension and that pension (in 1984 dollars) will be $6,300, approximately 25 percent of their final wage. One third of these will also collect a benefit from a second defined contribution plan from the same firm (see Table 6–7). Moreover, all available data suggest that the pension institution will continue to prosper into the indefinite future.

What is not so easily known is the effect pensions have on the American economy. The purpose of this chapter is to address the impact of pensions on individuals in the workplace. How have pensions changed workers' lives? And how has it changed their relationship with the firms they do business with? The next chapter will deal directly with the impact of pensions on the capital market.

At their face value, one would suspect that pensions have conferred large amounts of income on this nation's elderly, that they have improved Americans' standard of living, that they have permitted workers to enjoy longer retirement. To a large extent, much of this is true. But this discussion should be framed around two simple facts. First, pensions are not free. They represent a particular method by which workers collect a portion of their compensation. Pensions as such did not increase compensation levels. They merely transformed the way in which workers accepted the wage. The question is how different would the economy have been had tax laws not been altered to make the existence of pensions, and indeed their prosperity, possible? Put another way,

what would be the effect of the federal government announcing immediately that compensation devoted to pension savings would be taxed identically to income diverted to (and interest earned from) any other savings vehicle?

These questions bring us to the second simple point. The evaluation of the impact of pensions requires a reference point. It is not as if high marginal tax policies had been operative for, say, three decades, when suddenly Congress enacted special pension laws to make it efficient to save for retirement, this announcement followed by a dramatic shift in savings and retirement patterns. In fact, pension law had already been enacted long before tax rates exploded during World War II. Thus, it is more accurate to say that the availability of tax-preferred pension law prevented wholesale and dramatic alterations of the way workers in America did business with their employers. In short, to evaluate pensions, we must ask a counter-factual question: What would have happened to worker and worker-firm behavior had pensions never been the subject of tax-favored status?

IMPACT OF PENSION TAX LAW ON RETIREMENT AGE

Given the tax structure in the United States, pensions are an efficient way to save income to support retirement during retirement years. Retirement does not usually occur because workers are no longer a productive part of the work force. Most workers—who typically have much better health and longer life expectancies than their ancestors who retired much later in their lives[1]—could work productively for many years beyond their age of retirement (which most typically occurs in workers' early 60s).[2] Viewed broadly, retirement is a "sort-of choice" variable for wokers. Retirement is a great deal of leisure compacted at the end of life. If wages were sufficiently low, workers simply could not afford to take this amount of leisure. Similarly, if government policy made it prohibitively costly to save for retirement, workers would choose less of it. In this sense, federal tax policy toward the accumulation of worker savings for retirement will undoubtedly influence the broad scheme of retirement practices observed in this country. Within this framework, it is interesting to try to predict the likely impact that pensions and the tax advantages they embody have on the labor market compared to an economic system that did not have pensions.

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[1]The male worker participation rate after age 65 is only one half of its value in 1940. See, for example, the *Statistical Abstract*, 1984.

[2]For example, in the U.S. Department of Labor's *Survey of Pension Benefit Amounts* the average age of pension-covered workers (excluding disability and other "special" early retirement) is 62.5; only 4 percent of the retirees in the sample retired after normal retirement age, usually age 65.

The Efficiency of Savings

Without pensions, savings for retirement would be "costly," and hence workers would generally retire later and enjoy lower standards of living during retirement. The best way to illustrate this point is to consider a simple example. Since the "cost" of retirement is derived from the tax treatment of interest on savings, it will suffice to suppose that there is no income tax on wage earnings and that Uncle Sam assesses a tax on interest earnings only. And we can suppose (for simplicity) that even this tax would stop once the worker retired. We can ask how much consumption workers must forgo during their work lives to support consumption during retirement. For example, if bread remained fresh indefinitely, saving one loaf of bread now would mean one loaf of consumption during retirement. But if Uncle Sam took 25 percent of the loaf when it was set aside for later consumption, workers would lose one fourth of a loaf each time they saved a loaf for retirement. If they consume everything now, they enjoy *every* loaf they produce. If they save, they end up getting only three fourths of each loaf they set aside; the government takes the remaining one fourth. Should they take less retirement and should they eat less during their retirement? The answer to both questions is yes.

Pensions, in effect, restore the full loaf to the worker who saved it in the first place. To put a number on this, suppose the real rate of interest is 2 percent; also suppose that the expected inflation rate is 5.5 percent, so that the nominal long-term interest rate is 7.5 percent; also suppose for convenience that the prevailing tax rate is precisely 26.6 percent (there is no progressivity). In this case, the worker's after-tax real interest rate is precisely zero [i.e., one minus the tax rate (1 − .266) times the nominal interest rate (.075) less the inflation rate (.055) is zero].

Consider a worker who saves for retirement without a pension. This person earns $10 per year from age 35 until age 65, retires at age 65, and dies at age 80. Also suppose that the worker intends to split his income over his 45-year life after age 35. Thus, the worker would like to consume $6.66 (real) per year (= $10 × 30 years of work ÷ 45 years of consumption). This means $100 is needed to support retirement after age 65 (i.e., $100/15 = $6.66). How much must the worker save out of the $10 (real) annual wage to support consumption during retirement? Since the after-tax interest rate is zero, the answer is simple: to save $100 over 30 years of work, the worker must save $3.33 (real) per year. Thus, to support retirement, this person must sacrifice $3.33 (real) of consumption each year during the work life.

This situation changes with a pension. Since pension earnings are tax-exempt, the worker can earn 2 percent (the real interest rate) on the savings made each year to support retirement. How much must this

worker now save each year to support the identical $6.66 (real) retirement consumption level for 15 years? The answer is $2.43 (real) per year.[3] Thus, by using the pension, the individual consumes $.90 (= $3.33 − $2.43), or 9 percent more income during work years without reducing retirement consumption targeted at $6.66 per year. The pension—because of its tax-exempt status—makes it much less "costly" for the individual to retire because savings can earn real returns while, in this example, no return is available on nonpension savings for retirement. In effect, in nonpension savings vehicles, the real rate of return is expropriated by the government.

If the worker who did not use the pension wished to save the same $2.43 (real) per year—that is, the worker was not willing to forgo the extra 9 percent of consumption to maintain a 15-year retirement at the level $6.66 (real) of consumption per year—this could be accomplished by reducing the retirement period from 15 years to 12 years, that is, by retiring at age 68 instead of age 65.[4] Thus, one way the individual can reduce the impact of taxation on interest income is simply to take less retirement—hence reducing the need to transfer moneys through savings, the trigger for tax assessments. An equally effective way to reduce the tax burden—one which allows the worker to maintain a savings rate of $2.43 (real) per year—is to leave the retirement age at 65, and instead reduce the level of consumption during retirement. In this case, this is accomplished by reducing retirement consumption per year from $6.66 (real) to $4.86 (real).[5]

In short, if the savings efficiency of pensions were eliminated (their tax-exempt status canceled), it is likely that two effects would result: workers would retire at later ages and they would enjoy lower standards of living during retirement. They would react in these ways to reduce the tax burden imposed by government on retirement and retirement consumption.

These examples are reproduced in Table 8–1. The last two columns tell the story. In every case, the lifetime wage income of the individual is evaluated at age 65 using a 2 percent discount rate; this comes to $411 at age 65. The first row depicts the case described above when the worker makes use of pensions. In this case, the worker pays no taxes, consumes $6.66 worth of goods during each retirement year, and consumes $7.57 per year during work years. All told, the worker con-

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[3] That is, since

$$S \int_{j=0}^{30} e^{(30j)\cdot r} dj = \$100,$$

where S is the annual savings and r is the real rate of interest, then if $r = .02$, $S = \$2.43$.

[4] That is, the solution to $(45 - Y) \cdot \$2.43 = Y \cdot \$6.66$, where Y is the number of retirement years, is $Y = 12$.

[5] That is, the solution to $30 \cdot \$2.43 = 15X$, where X is retirement consumption, is $X = \$4.86$.

TABLE 8–1 The "Cost" of Retirement with and without Pensions

	Annual Consumption during Retirement	*Annual Savings during Work Years*	*Annual Consumption during Work Years*	*Age of Retirement*	*Annual Wages*	*Present Value of Lifetime Wages Evaluated at Age 65*	*Present Value of Consumption during Work plus Savings at Age 65*	*Tax Assessment*
Pension	$6.66	$2.43	$7.57	65	$10.00	$411	$411	0
No pension								
Replicate retirement income generated with pensions	6.66	3.33	6.66	65	10.00	411	373	$38
Replicates savings rate generated with pensions by:								
Postponing retirement age	6.66	2.43	7.57	68*	10.00	411	384	27
Reducing retirement consumption	4.86	2.43	7.57	65	10.00	411	384	27
Replicates zero tax solution generated by pensions	—	—	6.66	80*	6.66	411	411	0

*An asterisk denotes the variable that is altered vis-à-vis the pension equilibrium.

sumes his entire wage income plus interest on savings. When the pension-equivalent retirement income ($6.66) is replicated with no pension (see row two), the individual ends up with only $373 in lifetime consumption, not $411. The missing $38 is tax money collected by the government. The worker reduces tax liabilities to $27 by either retiring later in life (row three) or reducing retirement consumption (row four). (The last row in the table is referred to below.)

Switching Leisure Time during Retirement to Leisure during Work Years

The above illustration was made under the assumption that the hours during each work year are fixed. While individuals usually cannot set their rate of work within a firm, viewed from a broad perspective, if the tax implications are sufficiently large, firms' hours policies will be structured in ways that reduce overall tax burden on workers. It turns out that another subtle aspect of the U.S. tax structure induces workers to retire later in their lives and instead to work less intensely during work years.

To show how this works, we need only deal with the progressive nature of the U.S. tax structure (though we will show later that even the tax-exempt status of pensions alone, without progressivity, would lead to the same result). Recall the tax structure described in Figure 2–1. For each dollar of income earned, the marginal tax rate is increased by three percentage points. Thus, the 1st dollar is taxed at 3 percent, the 10th dollar at 30 percent. Suppose again that the worker initially earns $10 per year. Also, for simplicity, assume the real and nominal interest rates are zero (ensuring that the tax-exempt status of pensions does not play a role here).

First consider a no-pension solution. Consider the example used above. The worker starts at age 35, retires at age 65, and dies at age 80. If the worker earns $10 per year, the total tax is $1.65 per year.[8] Thus, the average tax rate is 16.5 percent on wages earned. The solution with a pension is easy. If the worker desires to consume $6.66 each year in his life, he will save $3.33 during each work year. Using the pension, a tax is paid on $6.66 during every year of life (not just work years): a tax is paid on the $6.66 cash wage during work years ($10 gross minus $3.33 in tax-deductible pension contributions) and on the pension annuity $6.66 ($3.33 savings times 30 years of work divided by 15 retirement years). Using the tax schedule described above, the tax on $6.66 each year is $.78, which amounts to an 11.6 percent tax on wage earnings ($.78 tax times 45 years, divided by lifetime income, $10 times 30

[8]That is, the tax on the first dollar is 3 cents; the second dollar, 6 cents; etc., which totals $1.65 for $10.00.

TABLE 8–2 Tax Savings from Earlier Retirement

	Annual Taxable Income	*Number of Years Tax Paid*	*Average Tax Rate (Percent × 100)*	*Annual Earnings*	*Age of Retirement*	*Total Income*
Pension	$ 6.66	45	11.6	$10.00	65	$300
No Pension						
Replicated work rate and retirement age generated by pensions	10.00	30	16.5	10.00	65	300
Switch part of retirement to less work during life	7.44	40.5	12.7	7.44	75.5	300
Switch all of retirement to less work during life	6.66	45	11.6	6.66	80	300

Numbers in the table reflect the assumption that the real and nominal interest rates are zero. The tax schedule is described in Figure 2–1.

years). Thus, by using the pension to smooth income, this worker's average tax is 11.6 percent instead of 16.5 percent without the pension. The tax savings is entirely attributable to the smoothing benefits of the pension in the face of a progressive tax structure.

Without a pension, however, what would workers do to try to reduce the burden of progressivity? The answer is simple: they would reduce their hours of work and instead work more periods in their life. Take the extreme case. Let the worker never retire and instead spread 15 years of leisure throughout the lifetime. That is, let the worker work one third fewer hours each period but work over the entire life. Total income and leisure time remain the same:[7] the totals merely have been rearranged over the workers lifetime. What is the worker's tax burden now? It is exactly the same as it would be using a pension! A tax is assessed on $6.66 during each period of the 45-year life, the same scenario encountered by the pension-covered worker.

In actuality, workers would not go to such extremes because other costs would begin to mount as more switching occurred.[8] The point is that by retiring later, workers' lifetime tax burden would be substantially reduced. For example, if the worker postpones retirement to age 75.5 (switching hours appropriately), the tax rate falls from 16.5 percent to 12.7 percent. All of these numbers are summarized in Table 8–2. In short, work rearrangement is a substitute for pensions as a way of reducing the impact of income taxation under a progressive scale.

[7] It is implicitly assumed that the wage rate would not be affected by fewer hours worked per period.

[8] For example, as hours of work are reduced, the wage rate might fall (because of fixed cost to employment); or retirement would be pushed to the point where significant health problems are encountered.

This simple illustration suggests that, in the absence of pensions, individuals would retire at older ages but work fewer hours. We might see a 35-hour week and a normal retirement age of, say, 67 compared to 65, or 64 compared to 62. National income, however, would not necessarily be affected. The same total hours might well be worked by individuals over their lifetimes; they would just be rearranged. Two points are worth noting. First, the hours-retirement switching solution reinforces the savings efficiency argument made in the preceding section: in the absence of pensions, workers would retire at older ages.

Second, though the hours-retirement switching solution was derived using the income-smoothing benefits of pensions, a similar solution could be rationalized using the earnings-exempt tax argument. Consider that in the example in the preceding section (where wage income itself was untaxed, just interest earnings), the worker could reduce the tax burden without a pension by simply working fewer hours and never retiring. In this solution, the worker saves nothing and therefore incurs no taxes. This case is illustrated in the last row of Table 8–1. The hours-retirement switching phenomenon, and in particular the role played by pensions, has found empirical support in studies of lifetime work allocation.[8]

DIRECT EFFECTS OF PENSION RULES

The tax aspects of pensions are expected to exert a widespread and important impact on economic behavior. Tax aspects of pensions represent a large order of magnitude and there is no escape from their influence. All firms are significantly (if not equally) affected by tax law and all have similar incentives to react in ways that reduce the ultimate tax burden on stockholders and workers. It is also possible, however, that the rules of pensions themselves can exert important influences on market equilibrium, especially in labor markets.

There is little dispute about the magnitude of incentives inherent in pension plans that can affect worker mobility and retirement age. But in contrast to tax law, pension rules are specific to each firm, and therefore workers can "match up" with firms that offer compensation packages (which may include mobility and retirement age implications) that are consistent with their own behavioral inclinations. Thus, it is more natural to think of firms using pensions as a tool to control work force characteristics than it is to characterize them as uniform constraints controlling worker behavior across the entire economy.

If firms have defined contribution pension plans then pensions will not influence workers' decisions to leave the firm at any time. A defined

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[8]See Richard A. Ippolito, "Income Tax Policy and Lifetime Labor Supply," *Journal of Public Economics* 26 (April 1985), pp. 327–47.

contribution plan is a tax-exempt savings account. After a short vesting period (usually 3 to 5 years), workers own the balance in the account (plus all future earnings) whether they leave the firm or not. Thus, when we talk about pensions influencing worker behavior, it is implicit that the discussion revolves around defined benefit plans only. Only 18 percent of covered workers are covered solely or primarily by defined contribution plans (see Chapter 6); thus, the impact of defined benefit rules are expected to influence most workers covered by pensions.

The discussion of pension rules can be neatly separated into two categories: those that influence the worker's decision to leave the firm prior the retirement (mobility issues), and those that directly impact the worker's decision to retire from the firm at a particular age.

Mobility

It is well known that pensions are affiliated with low turnover.[18] This relationship is not surprising: pension capital losses from premature departure from the firm can be very large. These losses are easy to demonstrate and, for the most part, characterize virtually all defined benefit plans in the United States. The capital loss is apparent in light of the earlier discussion comparing "legal" versus "real" pension liabilities (see Chapter 3). If workers expect wage-indexed pensions, they save with the firm accordingly. Thus, at any point in time, the workers' investment in their pension plans is equal to the "real" present value of their pensions. But if a particular worker decides to leave the firm prior to retirement age, the firm pays the worker a "legal" pension; that is, upon the worker's departure from the firm, the worker's wage for purposes of calculating pension benefits is frozen at the point of departure; the worker's wage is *not* indexed to the retirement-age wage as it would be if the worker stayed with the firm until retirement.

Capital losses from quitting prematurely. Recall that the formula for the present value equivalent of a pension to a worker of age and service level a is $P_a = abW_a$, where b is the pension generosity coefficient and W_a is the worker's current wage. Thus, at age and service level a, the worker's "real" pension is worth:

$$P_a = abW_a e^{(-i+g)(R-a)}, \qquad (8\text{–}1)$$

where g is the rate of growth of wages, i is the nominal interest rate, and R is the retirement age. It was shown earlier that as a first order approximation, the rate of growth in wages is expected to be approx-

[18] See, for example, Olivia S. Mitchell, "Fringe Benefits and Labor Mobility," *Journal of Human Resources* 17 (Spring 1982), pp. 286–98; and Bradley R. Schiller and R. D. Weiss, "The Impact of Private Pension Plans on Firm Attachment," *Review of Economics and Statistics* 61 (August 1979), pp. 369–80.

imately the same as the long-term interest rate (see Chapter 3), $i = g$. Thus, the real pension in equation (8–1) can be rewritten simply as:

$$P_a = abW_a. \tag{8–2}$$

The worker's legal pension wealth is not equal to his economic (or real) pension. His legal pension is tied to his current, not his retirement wage. Thus, if the worker leaves the firm at age a, the present value of the nominal pension he will collect at age R is

$$P_a^* = abW_a e^{-i(R-a)}. \tag{8–3}$$

Thus, in contrast to his real pension, his legal pension is subject to heavy discounting, not offset by comparable salary projection.

It is easy to calculate the capital loss the worker imposes on himself if he decides to leave the firm at age and service level a. It is the difference between the real accumulated pension he would receive based on a years of service if he stays and the legal accumulated pension he will receive if he quits. That is, using equations (8–2) and (8–3), the pension capital loss is calculated as:

$$CL_a = P_a - P_a^* = abW_a\,(1 - e^{-i(R-a)}). \tag{8–4}$$

This amount can represent a substantial portion of the worker's compensation level. The worker must expect to earn a sufficiently high wage at a subsequent job to offset the capital loss incurred by departing the firm prematurely.

It is useful to calculate the magnitude of these losses for a simple case. Consider a worker who earns $10,000 per year (real) over a lifetime. The worker starts with the firm at age 35; normal retirement in the firm is age 65. Assume for simplicity that the worker receives a lump sum equivalent at age 65 equal to 15 percent of the wage times years of service. It is further assumed that the interest rate equals the inflation rate (the real rate of interest is zero); and there is no early retirement.

In this case, equation (8–2) tells us that at age 45, the worker has accumulated a real pension wealth (P_a) equal to $15,000 (= 10 years × .15 × $10,000). But if this worker leaves the firm at age 45, his pension will be frozen in nominal terms; thus, his pension is described by equation (8–3). If the inflation rate (equals the interest rate) is 2.5 percent, 39.3 percent of the real pension will erode by age 65. The pension capital loss is therefore $5,900 (= .393 × $15,000) or 59 percent of the real wage ($10,000). Thus, quitting the firm at age 45 under these circumstances means the worker must make up the capital loss in the form of higher wages elsewhere. Using the same rationale, if the worker quits at age 55 after 20 years service, real pension wealth is $30,000; quitting results in the loss of 22.1 percent of this value or $6,630.

TABLE 8–3 Implications of Mobility for Pension Wealth

Interest Rate	*Real Pension Wealth*		*Percent of Pension Lost from Quitting (percent × 100)*		*Pension Loss as a Percent of Wage (percent × 100)*	
Age	*45*	*55*	*45*	*55*	*45*	*55*
Service	*10*	*20*	*10*	*20*	*10*	*20*
.025	$15,000	$30,000	39.3	22.1	59.0	66.3
.05	15,000	30,000	63.3	39.3	94.5	117.9
.10	15,000	30,000	86.4	63.3	129.6	189.9

Assumptions embedded in calculations: normal retirement age 65; annual (real) wage $10,000 (constant over life); real interest rate zero (interest rate equals inflation rate); start age with firm 35; pension paid in lump sum at age 65 at the rate .15 percent per year of service times wage.

When the inflation rate is relatively low (e.g., 2.5 percent), the losses are significant, though not overwhelming in terms of wage levels. But when the inflation rate increases, losses become much larger. For example, with a 5 percent inflation rate, the capital loss from quitting at either age 45 or 55 is approximately $10,000 ($9,495 and $11,790); with a 10 percent inflation rate, the losses become $12,960 and $18,990 at these same ages. Thus, at relatively high inflation levels, the cost of quitting becomes very high. It is therefore not surprising that empirical studies show that pension-covered workers are more reluctant to move than uncovered workers. A summary of these calculations is shown in Table 8–3.

Issues surrounding pensions and mobility. The capital losses imposed on workers who quit the firm do not suggest that firms "take advantage" of workers who leave. It may well be that the capital losses are arranged deliberately to discourage workers from quitting after a long tenure with the firm. The pension rules in effect send a signal to recruitments that the firm wants to hire workers interested in a long-term attachment. Indeed, once workers are vested, the probability that workers in pension firms actually leave the firm is quite low,[11] and therefore most workers do not suffer the capital losses depicted above. The existence of the potential losses is presumably sufficient to discourage workers from making the decision to leave. By erecting this scheme, the firm can make appropriate investments in its labor force under the assumption that most workers will indeed stay with the firm over the long term.

[11] James H. Schulz, *Private Pension Policy Simulations.* (Waltham, Mass.: 1980) Brandeis University. The study shows that vested workers over age 30 have a quit probability less than 1 percent and even lower for higher service, older workers.

While this theory of pension-capital-loss design has some appeal, it does have two problems. First, it is reasonable to think that the incentive firms wish to establish to discourage quitting would vary across firms. For example, firms that make relatively small training investments in their work force would presumably wish to establish relatively small penalties for leaving. Otherwise, it needlessly penalizes workers who must leave for various exogenous reasons, imposing more risk on workers without conferring corresponding benefits. Firms that make large investments in their workers would presumably want to establish much larger penalties to worker quits. Yet, the penalties (capital losses) are virtually identical across all pension firms. Firms may (and do) set up pensions of different magnitudes and this may be sufficient to set the levels of capital losses differently across different firms. In addition, given IRS and ERISA rules, there are severe constraints imposed on how much backloading (generosity parameters that themselves depend on service levels) that the firm can establish within its pension plan.

Second, and perhaps more troubling is the simple fact that the penalties for leaving the firm change with the level of inflation over which the firm has no control. Thus, a worker who joined the firm in 1950 perhaps anticipated and in fact experienced relatively low inflation levels through his first 15 years of tenure. In terms of Table 8–3, the first row of calculations may have been made by the worker and the firm. Yet when actual (and expected) inflation increased to double digits in the 1970s, the capital losses imposed by quitting changed to numbers not unlike those in row three of Table 8–3. The penalty from early departure more than doubled. Yet, by all indications, firms made no observable attempts to offset these increased penalties or to realign them to levels that existed prior to the onset of significant inflation. Certainly, IRS and ERISA rules do not preclude firms from enhancing legal pensions for workers who quit the firm. If the pension is deliberately being used to impose penalties on workers who depart early, the historical evidence appears to suggest that the penalty is not a particularly well-tuned one; "optimal" capital losses apparently lie within a range that represents at least a 100 percent spread.

Retirement

The same principle that penalizes premature departure from the firm also works to penalize "delayed" retirement in the same firm. It is as if the firm wants the worker to stay a "full term" but at the same time does not want him to overstay his welcome. In pension nomenclature, "normal" retirement refers to an age the worker can leave the firm with full pension benefits, payable as an annuity starting immediately. In approximately half of all firms, normal retirement occurs at age 65. In

addition, the firm usually provides a window that covers a span of ages prior to normal retirement age—say, age 55 through 65 or age 60 through 65—during which the worker can retire "early"; that is, the worker may retire with an immediate pension, but one which is actuarially adjusted to reflect more years over which the worker will collect the pension.

Capital losses from late retirement. Suppose the pension formula pays an annuity equal to 1.0 percent per year of service times final wage ($10,000). Assume a zero real rate of interest; also assume that wages and pension annuities are indexed to inflation, that death occurs at age 80, and that "normal" retirement occurs at age 65. In this example, a worker with 30 years service at age 65 would receive a "full" annuity of $3,000 per year (= .01 × 30 years × $10,000) for 15 years, or a present value pension at age 65 equal to $45,000. If a 30-year worker retires at age 55—where it is supposed that "early" retirement can occur during the interval age 55 to age 65—the annuity will be reduced to reflect the extra 10 years the annuity will be collected but the present value pension still equals $45,000. In particular, the worker will collect a pension annuity equal to $1,800 per annum. The point is that "early" retirement—to be distinguished from premature quitting, or departing the firm prior to "early" retirement age eligibility—does not impose an actuarial penalty on workers: they can retire either at "early" or "normal" retirement and still collect their full present value real pension benefits.

Thus far, then, we have established two age zones over which pension wealth has been calculated: premature quit ages and early-to-normal retirement ages. In the first zone, workers are given incentives to stay with the firm; in the second, workers are permitted to leave the firm without incurring pension penalties. A third age zone is also pertinent: "late" retirement that is, retirement after normal retirement age. In pension nomenclature, if retirement at age 65 is "normal," retirement at age 66 is "late." Late retirement virtually always imposes substantial pension penalties on workers.

Consider a typical case where a worker does not receive service credits after age 65 but is permitted to retain the current wage in the pension formula. Consider the case of the 30-year worker above who retired at age 65 with a pension annuity equal to $3,000. The real pension annuity is still $3,000 per year if retirement occurs "late" at age 68; that is, the annuity is not actuarially increased to reflect fewer years of pension collection. Thus, the present value of the pension at age 68 is not $45,000 but rather $36,000 (= $3,000 × 12 years of retirement). The decision to retire late at age 68 costs the worker $9,000 in accumulated pension benefits. If the worker waits until age 72 to retire, $21,000 in benefits are lost. These calculations are shown in Table 8–4.

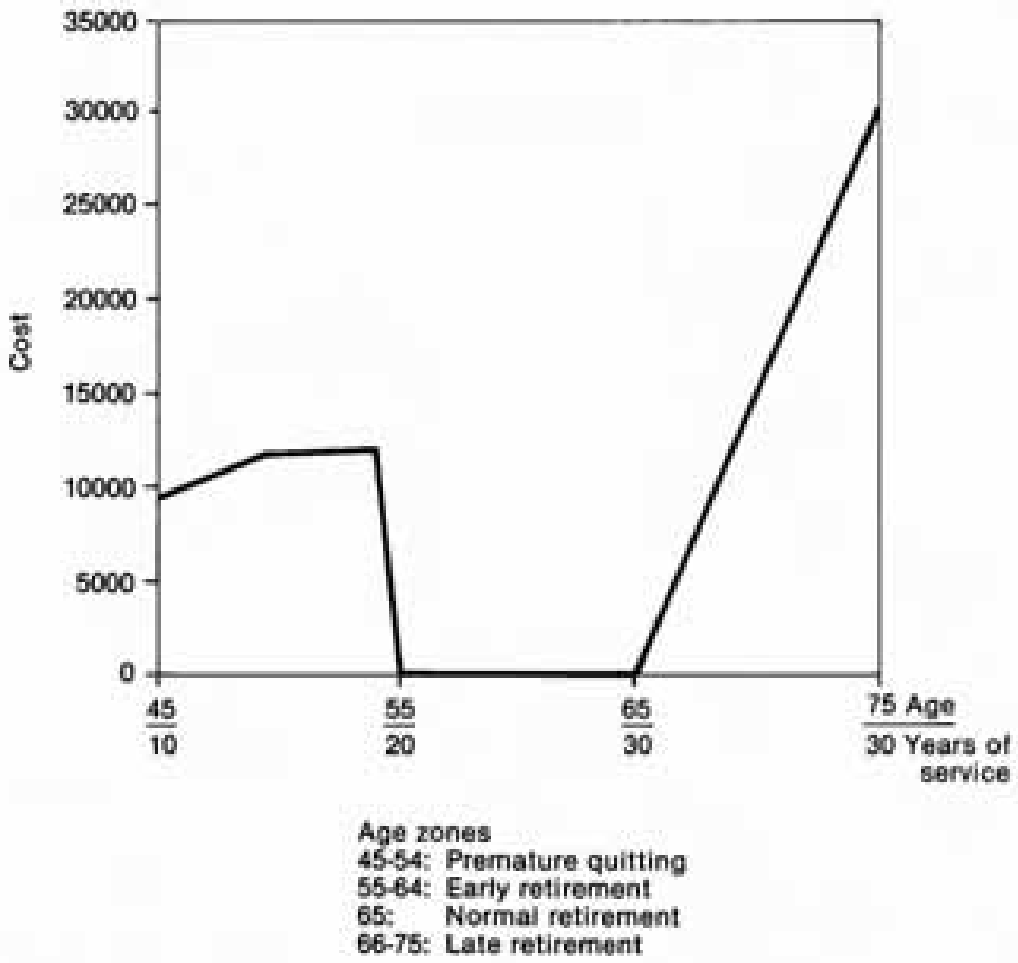
The cost of leaving the firm at various ages from 45 to 80 in terms of lost pension benefits are summarized in Figure 8–1. This figure shows

TABLE 8–4 Implications of "Late" Retirement for Pension Wealth

Retirement Age	*Present Value of Pension*	*Percent of Pension Lost From Retiring "Late" (percent × 100)*	*Pension Loss as a Percent of Wage (percent × 100)*
65	$45,000	–0–	–0–
68	36,000	20.0	90.0
72	24,000	46.6	210.0

Assumptions embedded in calculations: pension paid as annuity equal to $3,000 per year; annuity is indexed to inflation; the real rate of interest is zero; normal retirement age is 65; death occurs at age 80; the wage is $10,000 (real) per year.

FIGURE 8–1 Cost of Leaving a Pension Firm



the three age zones of worker departures from the firm: premature quit ages, early-to-normal retirement ages, and late retirement ages. The calculations, done for a particular but plausible case, show that the firm can and usually does use the pension to induce workers to retire during a window of ages—not too late and not too early. In the case depicted in the figure, this window spans ages 55–65. Retirement outside these ages triggers substantial losses in pension benefits.[12]

The costs of departure prior to age 55 increases because the inflation erosion triggered by premature quitting takes its toll on ever bigger pension benefits. The reduction in losses to zero at age 55 occurs because pensions can be received *immediately* at the early retirement age. Departure from the firm prior to these ages requires the worker to suffer inflation erosion for years prior to actual pension receipt which in this example can start only at the normal retirement age. (If the firm permits premature quits to begin collecting the pension at age 55, the loss curve would fall to zero at age 55 at a more gradual rate.) The costs of late retirement increase sharply as workers who choose to stay beyond normal retirement age in effect forgo large portions of their pension benefits. The pension rules summarized in Figure 8–1 say one simple thing: retire during the ages 55–65 or incur substantial losses in pension wealth, losses ranging from 94 percent of the annual wage at age 45 to 450 percent of the wage at age 80.

Issues surrounding retirement incentives. The large penalties facing mature workers who contemplate leaving the firm outside the "retirement window" have been shown to have exerted a strong impact on workers' decisions to leave the firm "on time." In addition to the evidence cited above implicating pensions with lower mobility, many studies have amply demonstrated the power of pensions to determine retirement ages. The eligibility for an early pension has had a strong impact on retirement age, a result not surprising in light of the dramatic reduction in capital losses that occurs upon ("early") pension eligibility (see schedule in Figure 8–1 at age 55).[13] In addition, fewer than 5 percent of covered workers retire at a "late" retirement age, no small wonder

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[12]The calculations assume that the pension annuity, once started, is indexed to inflation; the generosity parameter equals 1 percent per year of service; wages are $10,000 (real) at all ages; the real rate of interest is zero; the inflation rate is 5 percent; normal retirement age is 65; early retirement is permitted to start at age 55; and death occurs at age 80. Finally, 10 years of service accrues as of age 45 and service does not accrue beyond age 65. Capital losses under these circumstances are designated in the second row of Tables 8–3 and 8–4.

[13]See, for example, Joseph F. Quinn, "Microeconomic Determinants of Early Retirement: A Cross-Sectional View of White Married Men," *Journal of Human Resources* 12 (Summer 1977), pp. 329–46. Also see Richard V. Burkhauser, "The Pension Acceptance Decision of Older Workers," *Journal of Human Resources* 14 (Winter 1979), pp. 63–75.

in light of the dramatic pension losses inherent in postponing onset of retirement (see schedule in Figure 8–1 after age 65).[14]

While it has been amply demonstrated that the rules of pension plans summarized simply in Figure 8–1 have had the effect of organizing an orderly and homogeneous withdrawal from the firm at particular ages, much less work has been done to demonstrate why firms choose to use their pension plans in this way. Why not give all departing workers at any age the present value of pensions earned to date? Why use them to produce particular retirement patterns?

Some rationale was introduced above to explain penalties for premature quitting. Similar kinds of arguments can be made on the late side of early-to-normal retirement ages. That is, there may be some cost to the firm of selecting particular workers to retire when their productivity becomes sufficiently low to justify forced retirement. In this sense, age discrimination laws may have made it sufficiently costly to reduce older workers' wages or to force particular workers to retire, so that pensions have become a tool to generate a legal and orderly exit of all workers from the firm at particular ages. But since "late" retirement penalties pre-date age discrimination laws, this cannot be the whole story.

It is plausible that firms operate more efficiently knowing that all workers in a particular cohort will leave within a 5- or 10-year interval. Perhaps costs of planning and hiring are sufficiently reduced by the policy that it dominates solutions that give workers more flexibility in choosing their own age of retirement. Whatever the reason, the inducements toward orderly retirement are major characteristics of the U.S. private pension system.

What is known is that "late" retirement rules vary widely across firms. Normal retirement ages are set at different ages. Some firms define normal retirement as any age a worker attains a given service level, say, after 30 years. Some accrue service in the formula after normal retirement, others do not; some freeze the benefit as of age of 65, others do not.[15] These variations suggest that, unlike mobility capital losses, firms do indeed stylize their late retirement rules as penalties, presumably to stimulate different patterns of retirement.

Can we say that these pension characteristics affect overall labor markets in the economy? Is mobility and retirement age affected on average by these rules? Not necessarily. First, it is not known whether in the absence of pensions, other devices might not be used, and were not used prior to pensions, to accomplish the same ends. For example,

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[14]This data is available from the U. S. Department of Labor *Survey of Pension Benefit Amounts, 1979.*

[15]See Urban Institute, *Financial Retirement Incentives in Private Pension Plans,* Report submitted to the U.S. Department of Labor, Washington, D.C., 1982.

setting up artificially steep wage-age profiles in the firm might reduce mobility in the absence of pensions (workers want to stay to attain high wages at older ages in the firm). Mandatory retirement could have stimulated retirement albeit with less flexibility at a particular age.[16] Second, the rules set up by pensions may serve simply to select low-mobility workers and workers who start their career with their final firm early and who prefer retirement to occur "on schedule." In this sense, pensions merely rearrange which workers work in which places: they do not affect overall behavior in the economy.

In contrast, social security rules work much like private pension rules in encouraging retirement during particular "age windows."[17] But social security rules prevail over virtually the entire private sector, and are rules determined by the government. Thus, while private pensions may not have global effects on labor markets, the same cannot be said of social security.

To the extent that a private pension represents a more efficient tool to stylize worker patterns of behavior within the firm than the predecessor tools that it may have replaced, pensions may have given firms more control over their work forces. In this sense, some overall impact of pensions would have been felt on retirement age and mobility. But their effects on the economy as a whole and labor markets in particular are expected to be small when compared to the impact of pension tax law and, for that matter, social security pension rules. Understanding the way pension rules are arranged, however, certainly helps explain work patterns observed across pension firms.

CONCLUSION

In this chapter, an attempt was made to characterize labor markets in a world in which pension tax law had never been enacted. In the presence of the high marginal tax rates that exist in the U.S. tax structure and the inclusion of earnings from nonpension savings as taxable income, the absence of pension law would very likely have resulted in later retirement ages. The tax drag on interest earnings translates into a large double tax; as such, saving for retirement is costly in the sense that more consumption during work years must be sacrificed in a nonpension world to support the same level of retirement consumption that characterizes pension equilibrium. In addition, the absence of the income-smoothing benefits from pensions would almost surely have

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[16] See Edward Lazear, "Why Is There Mandatory Retirement?" *Journal of Political Economy* 87 (December 1979), pp. 1261–84.

[17] In particular, the social security "window" occurs during ages 62–65. See, for example, Richard V. Burkhauser, "The Early Acceptance of Social Security: An Asset Maximization Approach," *Industrial and Labor Relations Review* 33 (July 1980) pp.484–92.

resulted in individuals working fewer weekly hours during their work lives and retiring at later ages than they do under current law.

The direct effects of pension rules are more problematic. That these rules are designed to penalize departures from the firm "too early" or "too late" is indisputable. Pensions create "windows" through which workers can retire "costlessly," and, the data show that covered workers do indeed retire predominantly at these ages. It is very likely that the pension is being used by firms as tools to stylize work tenures in their firm: firms apparently want workers to stay with the firm through their productive years but then to leave over some predetermined age span.

To the extent that pensions represent a more efficient tool to the firm to affect worker tenure and retirement then pensions may also have resulted in some measureable effect on worker mobility and retirement age. But on the whole, it is doubtful that these effects are anything but secondary to the direct tax effects. By setting up such rules, pension firms no doubt attract workers in the economy whose behavioral inclinations are consistent with these rules. In this sense, pensions are more likely to have resulted in a reshuffling of workers, not an alteration in overall mobility and retirement age patterns in the economy as a whole.