NBER WORKING PAPER SERIES

THE ROLE OF PENSIONS IN THE LABOR MARKET

Alan L. Gustman

Olivia S. Mitchell

Thomas L. Steinmeier

Working Paper No. 4295

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
March 1993

 Without implicating them, we would like to thank John Pencavel, Robert Hutchens, Richard Ippolito, Andrew Oswald, John Turner and Steven Venti for their helpful comments, as well as participants in a seminar presented to the NBER Aging Group at the 1992 Summer Institute. This paper is part of NBER's research programs in Labor Studies and Aging.

NBER Working Paper #4295
March 1993

THE ROLE OF PENSIONS IN THE LABOR MARKET

ABSTRACT

Employer-sponsored group pension plans offer an unusual window into long-term employment relationships. This is because the pension promise is documented in a set of explicit statements regarding future payment and employment agreements between workers and their employers. In this paper, we show that recent research on pensions in the labor market offers considerable insight into long-term labor market arrangements. Most importantly, we explore how pensions influence employee compensation, retirement, turnover, and other matters central to the determination of labors' price and quantity over time. A number of unanswered questions, and difficult-to-reconcile empirical findings, are also outlined.

Alan L. Gustman
Department of Economics
Dartmouth College
Hanover, NH 03755
Tel: (603) 646-2641
and NBER

Thomas L. Steinmeier
Department of Economics
Texas Tech University
Lubbock, TX 70409
(806) 742-2201

Olivia S. Mitchell
Department of Labor Economics - ILR
266 Ives Hall - Cornell University
Ithaca, NY 14853
Tel: (607) 255-2743
and NBER

The Role of Pensions in the Labor Market

Employer-sponsored group pension plans offer an unusual window into long-term employment relationships. This is because the pension promise involves an explicit, relatively well-documented, set of statements regarding future contingent payment and employment agreements between workers and their employers. Hence an understanding of what pensions do in the labor market is important for two reasons: it offers insight into an important element of compensation in its own right, and it also furthers our understanding of labor markets in which long-term institutional arrangements govern the price and quantity of labor.

This paper critically evaluates recent economic research on pensions as labor market institutions. Specifically, we focus on what pensions tell us about workers' demand for, and firms' supply of, particular forms of employee compensation and employment arrangements over time. Several distinct behavioral explanations for pensions are examined, and developed to evaluate their empirical implications. Implications are also drawn for policy analysis.

I. Introduction

The pension promise is inherently a long term compensation arrangement. Under this agreement, a worker earns ("accrues") a right to an eventual pension benefit, payable after the employee attains certain eligibility criteria, with benefits frequently commencing at retirement and continuing until death. Pension rules, generally detailed in a firm's written pension plan description, determine both worker and company property rights over the pension promise, and specify how these property rights evolve over time. Pension wealth values, by which we

mean the present value of a worker's expected pension promise, turn out to be quite substantial. Average projected pension wealth in a nationally representative data set of workers with defined benefit plans came to $180,000 (in 1992 dollars), or 14 percent of the cumulative discounted value of earnings from the worker's hire date to his normal retirement age. For workers in a defined contribution plan environment, projected pension wealth is readily assessed by valuing the worker's pension portfolio at retirement. Benefit levels in DC plans tended to be less generous than in DB plans, in that employees with primary defined contribution plans had projected pension wealth values of $100,000 on average (in 1992 dollars), which amounted to 7.5% of total earnings from hire date to retirement age (Gustman and Steinmeier 1989).

A number of behavioral motivations have been proposed in the pension literature to explain the adoption and structure of company-sponsored pension plans.[1] These rationales differ according to whether they emphasize why workers sometimes desire company-sponsored pension plans, or rather why some firms offer group pensions. Table 1 summarizes these explanations for why pensions exist and what they accomplish in the labor market. Below, we will discuss the theoretical rationale for and empirical evidence on each of these hypotheses in more detail.

The top panel indicates that many workers in the United States want pensions because

---

[1]Our focus is on employer-provided pensions in the United States. We do not systematically analyze the role of the social security system; it is a sufficiently important and complex topic that it warrants a separate survey (c.f. Thompson 1983). Nevertheless, in certain parts of our pensions discussion, some consideration will be given to the influence of social security.

they afford a tax-preferred and convenient means to save for retirement. Additionally, the fact that pension plans offer scale economies in investment and record-keeping means that people can save for retirement more cheaply in a pension than on their own. Pension plans often offer workers another important feature: they provide a form of retirement insurance not readily available to purchasers of individual private annuities. This includes insurance against disability, and frequently some degree of inflation protection. A final worker-side motivation for pensions is that some plans offer a measure of across-generational risk sharing, spreading the chances of low profitability across different employee cohorts.

In many cases, the sponsoring firm acts merely as a well situated financial intermediary, making a pension plan available to meet worker preferences, but perhaps not reaping any additional rewards from offering a pension. In other cases, however, employers may benefit along a number of other dimensions by offering a pension. Some of these rationales are enumerated in the second panel of Table 1. In general, all employer motivations for supplying a pension rely on the notion that companies can use pensions as a human resource tool. In turn, pensions have been seen as a device for attracting workers with certain traits, for eliciting greater work effort, for achieving desired turnover patterns, and sometimes for prompting retirement at particular ages.

The third panel of Table 1 summarizes the most important labor market outcomes which appear to be influenced by pensions. Some of these outcomes pertain to the type and features of the pension plan itself, and the ways in which benefit promises accrue. Other outcomes are more pertinent to the employment relationship, including pay, mobility, retirement, worker quality and effort, and firm profitability. As we shall demonstrate, existing

theoretical and empirical studies have thus far integrated only a subset of the many rationales for pensions in their models. Hence pension research to date offers a wealth of descriptive insights, but as yet has not separately identified the most important rationales for pensions in employees' compensation packages.

II. The Worker-Side Issues: Why Do Employees Want Company Pensions?

Why do some workers have company-sponsored pensions, while others do not? Many economists would find it sensible to answer this question by positing an intertemporal model where a worker maximizes lifetime utility by choosing a path of labor supply and savings. In this context, savings from earnings as well as pension savings would jointly determine the intertemporal flow of after-tax income; to the extent permitted by financial markets, income flows would be modified via private saving and borrowing, creating a consumption stream that best meets the worker's preferences.

Explaining Worker Demand for Pensions: There are several important institutional features distinguishing the standard intertemporal consumption/labor supply scenario just described, from a world in which employer-provided pensions play a role. One key difference is attributable to the special institutional characteristics of pension savings. Under current US tax law, pension contributions are tax-favored, as are earnings on pension assets. Hence pension plans' after-tax rate of return can be superior to that earned in non-tax-favored savings vehicles (Ippolito 1986a).

Despite their tax-sheltered status, people cannot always accommodate all their retirement savings needs in a company pension plan. This is because pension plan parameters

are generally not tailored to any single individual's savings plan, but instead usually are determined by employers and/or unions, along with increasingly stringent legal restrictions on benefits and contributions. Also pension benefit payouts frequently depend on factors outside both the worker's and the firm's control. For example, pension payments are often integrated with social security payments, and are partially adjusted for inflation, making the pension received contingent on a variety of macroeconomic and political outcomes not known in advance (Mitchell 1992; Gustman and Steinmeier 1993). These factors imply that many people will need to save for retirement outside their pension plan, and analysts examining workers' demands for pensions should, strictly speaking, consider interactions between pension and other retirement income programs as well.

A related feature of pensions is that the sponsoring employer will frequently design the pension plan to maximize some worker-weighted average of individual utilities from the compensation package, rather than to maximize each employee's individual utility. For example, many pension plans have been designed to generate relatively more pension savings for the company founder, with proportionally less for rank and file employees. Despite the fact that the parameters of the pension plan may not be designed to provide the ideal amount of pension savings for each individual worker, the pension will be determined with the preferences of the covered work force in mind. For this reason, analysts focusing on workers' desires for pensions should, in a general model, recognize the joint determination, and thus the potential for simultaneity, between pay and pension promises.

For all of these institutional reasons, it is clear that a simple life-cycle model must be substantially embellished before it can adequately capture the key institutional features

relevant to a world with employer-sponsored group pensions. Theoretical efforts to build appropriately complex life-cycle models of the demand for pensions have thus far addressed themselves to four main worker-side explanations for pensions. We examine each in turn.

1. Pensions As Tax Favored Retirement Savings:

When an employer in the United States contributes directly to a company provided group pension plan, those monies are sheltered from income and payroll tax (generally the retiree will pay income taxes on pension payments only when retired, and will pay no payroll tax on benefits). Investment earnings in the pension plans also accrue on a tax-sheltered basis. Both tax shields mean that pension saving is less expensive than are many nonpension retirement savings vehicles (Blinder 1981; Munnell and Yohn 1992). Clearly higher income workers will demand pensions as a means of saving for retirement in a tax-favored manner. The tax benefits of pensions savings are probably substantial, though the precise advantage depends on specific rates of return, tax and earnings rates; in general, the tax savings will vary with lifetime earnings profile and tax progressivity.[2] It should be noted, of course, that the tax deferral is not equivalent to making pension savings tax-free; more will be said on the empirical testing of this formulation below.

2. Pensions as Retirement Income Insurance:

Another reason workers want pensions is because they provide several different types of retirement insurance (Bodie 1990). In theory retirement insurance is needed to the extent

---

[2]Ippolito (1986a, 1990a) suggests that the pension tax shield can lower lifetime income taxes by 15 percent or more for middle income workers; this figure averages smaller proportionate gains for low income workers and larger gains for higher paid workers.

that employees worry about longevity risk (that they will outlive their assets); they are concerned about replacement rate risk (that benefits will be too low to maintain their standard of living after retirement); they are concerned about risk from potential social security benefit cuts; they are exposed to investment risk (that returns will be reduced due to poor investment performance); and they are at risk of having their benefits eroded by inflation.[3]

It appears that certain pension plan features can partially offset many of these risks. For example, longevity risk is mitigated by taking pension benefits as an annuity instead of in the form of a lump sum amount, offsetting the otherwise widespread tendency of older people's consumption to fall with age (Hurd 1990).[4] Replacement rate risk can be moderated

---

[3]An alternative motivation for why some workers use pensions as a retirement savings vehicle is that pensions reduce the need for "self control" without having to make explicit savings decisions each period; see Thaler and Shefrin (1981).

[4]Annuities reduce the cost of providing for consumption at older ages, in terms of foregone consumption while employed. Without an annuity, a dollar's worth of old-age consumption requires the worker to set aside an amount d_t of assets when young, where d_t is the real discount factor. In contrast, an actuarially fair annuity makes it possible to obtain a dollar's worth of old-age consumption at a much lower price, namely $s_t d_t$. Here, s_t is the survival probability. Because old-age consumption costs less with a pension, this will induce the individual to purchase more of it, increasing his welfare and leaving him less susceptible to impoverishment in later life. In practice, private annuities are not always actuarially neutral because those who expect to live longer than average are more likely to purchase them. This adverse selection problem makes private non-pension annuities expensive: a recent study found that expected yields on individual life annuities were at least 4 percentage points lower than yields on alternative long-term fixed-income investments, and almost half of this difference was attributable to adverse selection (Friedman and Warshawsky 1987). In contrast, employer-provided pensions offer retirement annuities while at the same time requiring precommitment (which reduces adverse selection). Because most pensions do not allow workers to opt out based on life expectancy, firm-provided pension annuities are available at substantially lower rates than in the private annuity market. Other solutions to the adverse selection problem are available; for example, Kotlikoff and Spivak (1981) argue that the family can substitute for retirement annuities.

by relating pension benefits to preretirement pay; social security risk is lessened by integrating pension benefits with social security payments; investment risk can be shifted to the employer in the case of a defined benefit plan;[5] and concern over inflation is often met, at least partially, by plans which offer partial cost of living adjustments.[6]

In addition to these risks, pensions can also provide insurance against risks associated with promotion or demotion, disability, and/or layoff. In general, such insurance is accomplished by designing the pension so it transfers income from states in which the marginal utility of income is relatively low, to states in which it is higher. For instance, a pension plan can help disabled retirees by providing a subsidized early retirement benefit; this transfers compensation to the period when the marginal utility of income is likely to be high. Alternatively, explicit disability pension benefits may be introduced, coupled with eligibility restrictions to reduce moral hazard. More generally, pensions can provide subsidized retirement during a "window" rather than one specific retirement date.[7]

---

[5]Thus pensions may offer insurance against macroeconomic risk; see Summers (1983), Feldstein (1983), and Ippolito (1987b, 1989). By specifying the pension benefit amount *ex ante*, a defined benefit plan provides risk-averse workers with some protection against capital market variation over the business cycle, and against cohort-specific shocks. In contrast, workers with defined contribution plans will face fluctuations in pension assets as portfolio values change, and these fluctuations can dramatically alter benefit payouts (only in a few cases have defined contribution plans been offered with minimum benefits; see Bodie 1990).

[6]Hedges against contingencies such as inflation may be costly, inducing even risk averse individuals to choose less than full inflation insurance (Feldstein 1983). Inflation protection after retirement in employer-sponsored pension plans is discussed in Allen, Clark and Sumner (1986), Allen, Clark and McDermed (1991), and Gustman and Steinmeier (1993).

[7]Models which treat pensions as transferring income from young healthy states to states of disability include Nalebuff and Zeckhauser (1985), Ippolito (1986a), and Carmichael (1989).

Existing models of pensions as insurance against such risk at different stages of the life cycle have in common the theme that defined benefit pension plans are likely to be offered by risk-neutral firms. Defined benefit plans, where benefit formulas are prespecified as a function of pay and years of service, can help risk-averse workers spread diversifiable risk across employees and over time. This is achieved by requiring advance commitment to the pension plan, thus reducing adverse selection, and by risk pooling across the workforce and possibly across several work cohorts. (In contrast the defined contribution pension plan, which is more similar to a savings plan, could be designed to smooth risks, but this appears uncommon in practice.[8])

Many analysts have sought to model pension insurance features, though the models differ greatly from one to another in terms of their focus on particular segments of the worklife and risks specific to these segments.[9] Also, some models entertain the possibility of firm bankruptcy as one potential risk against which employees (and retirees) wish protection. In an underfunded pension plan, benefits can be paid only as long as the sponsoring employer remains a going concern. In bankruptcy, the defined benefit pension promise is turned over to the federal pension insurance agency (the Pension Benefit Guaranty Corporation) which

---

[8]The higher education retirement fund, TIAA, is one plan which formerly smoothed returns across cohorts, until the fund recently adopted a policy of vintaging contributions.

[9]For instance, some focus on risks to workers just before and just after vesting (c.f. Diamond and Mirrlees, 1985; Ippolito, 1991 and 1992), while others examine the periods around eligibility for retirement (Feldstein 1983; Robb and Burbidge, 1989). Still others pay special attention to the period between the early and normal retirement age, in order to examine a period when modest disability might cause retirement (Nalebuff and Zeckhauser, 1985).

insures only a portion of the defined benefit promise.[10] Even without bankruptcy, the promise is still a risky one, since the firm can always terminate the pension plan, alter benefit and contribution formulas, and change cost of living adjustments. Nevertheless, over a range of normal business conditions, defined benefit pensions do appear to provide a measure of retirement income insurance.

3. Pension Scale Economies

The factors noted above can make pension savings attractive to many employees; in addition, some analysts have suggested that pensions are desired because group saving is more cost-effective than is individual saving. For example, administrative costs associated with operating a pension plan with 10,000 members are about 14 times lower per participant, as compared to a plan with 15 employees (Hay Huggins 1990). While these scale economies in investment can also be captured using other pooled savings mechanisms such as mutual funds (Berkowitz and Logue 1986), the administrative record-keeping and marketing costs remain less expensive in a company setting.[11]

4. Pensions And Compensation in Union Firms

An additional extension of the simple life-cycle savings model sketched above has

---

[10]If the job is terminated, the salary level used in computing pension benefits will be frozen at the then-current nominal level; see Green (1985).

[11]It has also been found that administrative costs are one-third higher in defined benefit as compared to defined contribution plans. Other evidence of scale economics appears in Mitchell and Andrews (1981) and Gustman and Mitchell (1992). Despite these economies, it should be noted that recent research suggests that pension fund yields are lower than those earned by similarly constituted mutual funds, which may offset a portion of the scale economies; see Lakonishok et al. (1992).

been recommended by analysts who argue that pension promises change the character of compensation in unionized firms. Underlying this model is the presumption that unionized employers pay more than nonunion firms because of the existence of rents (or quasi-rents). Given these rents, unionized firms will tend to distribute compensation according to the (usually middle-aged) median employee's preferences, rather than according to the preferences of the last-hired worker. This explains why union employees are more likely to have pensions than are nonunion workers (Freeman 1985). Also there is the suggestion that pensions can help redistribute rents toward older union members and away from younger employees, by operating the pension plan on an underfunded or pay-as-you-go basis.[12] Similar intergenerational transfers can be attained by making promised benefits depend on past service, or by periodically boosting retirement benefits associated with past service.[13]

Extending the Model of Workers' Demands for Pensions: No theoretical research has yet incorporated all of these institutional features of pensions into a model of intertemporal savings and consumption. On the other hand an approach to the problem can be readily sketched. Let each period's potential consumption and leisure terms enter the individual's utility function, where outcomes will depend on the individual's stochastic state. Each of the utility terms must be weighted according to the probability that the individual experiences that

---

[12]Thus pension underfunding may encourage unions to admit additional junior members, increasing employment levels; see Weiss (1985).

[13]There is a remaining mystery in the union pension/pay literature. Many have shown that unions reduce wage differentials between younger and older workers, flattening the wage profile (e.g. Freeman, 1985). What has not yet been explained is why unions appear to raise older workers' relative compensation via the pension, while at the same time reducing their relative wage advantage.

state:

$$U = \sum p_{it} \left[u_{it}(C_{it}) + v_{it}(L_{it}) \right]$$

where C and L are consumption and leisure, i is an index over states, t is an index over time, and p is the probability that the individual will experience state i at time t.

A general model must of course posit that a worker's choices will be limited by a profitability constraint, so that his employer's total compensation is consistent with a competitive outcome. In general, the worker will borrow, save, and obtain insurance on the private market, subject to prices and limitations which the market determines. Each worker's employer can also set up a pension plan, and if the firm selects pension benefit formulas, contribution requirements, and eligibility criteria consistent with the worker's preferences, it will make it possible for him to borrow, save, and insure at rates better than those available to the individual. In the limiting case of a single employee who is his own employer, the firm acts solely as the worker's agent. The individual chooses contingent consumption and labor supply paths subject to the constraint that current consumption plus assets must not exceed last period's assets (adjusted for interest), labor income, and any pension receipts, all adjusted for taxes. The firm chooses wages and pension parameters so that labor costs are minimized subject to some reservation level of the individual's utility, and subject to the requirement that the expected value of wages and pension compensation not exceed the value of the individual's productivity, less the expenses of administering the pension.

In the case where the firm and the worker are not identical, pension plans may be only imperfectly tailored to meet each individual worker's preferences. This is particularly an issue when workers have heterogeneous tastes (Blinder 1981; Nalebuff and Zeckhauser 1985).

One obvious constraint is that within classes of workers, the same pension rules must apply. In addition, the federal government limits uneven pension accumulations by pay status within the firm by imposing "nondiscrimination" rules. These regulations create pressures either to reduce the heterogeneity among the firm's employees, or to adopt a pension which is more flexible in catering to a work force with diverse preferences. For instance it has been argued that increasingly popular 401(k) plans may better meet the needs of today's heterogeneous workforce, as compared to more traditional defined benefit pension plans where benefits are more similar across all workers.[14]

The framework just outlined is general enough that it encompasses each of the worker-side pension rationales listed above:

- The tax advantage for pensions is incorporated, since workers prefer tax-shielded pension saving over nonpension, non-tax shielded retirement savings. However, workers still may want to save s assets outside pensions even though those assets may not accumulate tax-free.
- The insurance aspect of pensions is also reflected in the framework because the sponsoring firm permitted to offer cost-effective annuities through the pension by pooling risk and offering scale economies. Employees may also be able to persuade the sponsoring corporation to offer a higher pension in states of the world when the marginal utility of income is high. (For instance, when t return on assets is unexpectedly low, a defined benefit pension may offer benefits which are high than could be justified by the firm's short-term return on its asset figures).
- Cross-cohort transfers may occur in a unionized setting, when pension parameters are set in a

[14]For a discussion of other reasons why firms may choose to adopt 401(k) plans, see Ippolito (1991, 1992).

collectively bargained process so as to specifically reward long-tenure and senior workers.

Note that in the model, the firm acting as the worker's agent chooses whether or not to include pensions in the compensation package, as well as the form of pension plans offered. In turn, the individual chooses his consumption, work effort and non-pension savings given these constraints. Hence all of these variables (in particular, pension coverage and the amount of pension savings) can be expressed as a function of parameters and variables which influence the shape of the utility function (u_{it} and v_{it} above) as well as the worker's constraint set.

Empirical Evidence Regarding Workers' Demand for Pensions: The model just sketched helps clarify workers' motives for wanting pensions, but it has been difficult to implement empirically.[15] Several simplifying assumptions are usually made in real-world contexts, in order to make some headway. One approach has been to linearize and simplify the general utility function and intertemporal budget constraint, even though these are intrinsically nonlinear. For instance, older workers nearing retirement confront very uneven marginal payoffs to working additional years, and sometimes face a convex as well as nonlinear budget set (Fields and Mitchell 1984). These highly complex payoff functions are often captured in empirical work by very simple summary statistics, even though this opens such studies to the danger of mis-identifying preferences versus budget constraints (Mitchell and Fields 1982). Another example arises when empirical analysts cast workers' utility as depending on the cash wage and pension accrual, assuming that pension savings is the only form of retirement

[15]While some researchers (e.g. Rust 1990) have made good efforts to specify stochastic dynamic life cycle models in which both labor supply and consumption are endogenously determined, data problems have held up estimation and prevented the inclusion of employees covered by company pensions.

accumulation (e.g., Woodbury and Huang, 1991). Thus far researchers have not assessed the cost of making the models simpler by ignoring non-pension savings instruments.

An additional simplifying assumption adopted in much empirical pension research is that either the pension or the wage can be taken as exogenous. Above, however, we argued that many pension outcomes and wages are jointly determined, and ignoring this simultaneity in single equation models may bias estimates of more complex relationships. A related concern arises when earnings and pension accruals are related in single-equation models which do not recognize that both reflect employers' expectations of their effects on productivity and labor costs. Nevertheless, it is common to find the worker's wage rate appearing on one side of an OLS equation and the pension on the other (e.g., Ippolito, 1985b). Similarly, many empirical pension studies suffer from omitted variable problems. For example, studies of worker demand for pensions typically include control variables for workers' marginal tax rates, but do not usually control directly on other worker motivations for wanting pensions such as the insurance motives described earlier. As a result, most empirical pension studies have focused narrowly on only one motive for pensions at a time. Future research should seek to endogenize both pay and pension patterns, as well as other savings and labor supply outcomes.

Despite these caveats, it is important to summarize lessons from empirical studies to date on employees' demand for pensions, and to highlight questions remaining on the research agenda. To this end, several of the better recent studies are worthy of special focus. On the tax shield rationale for pensions, for instance, at least three research teams have offered estimates of the tax price elasticity of demand for pensions. In Woodbury's work (1983; and

Huang 1991), he estimates the demand for pension savings assuming that the worker's underlying (indirect) utility function depends on yearly earnings, employer pension contributions, and in the latter paper, on employer health insurance expenditures. Each component of the compensation package is modeled as a function of total before-tax pay, as well as the relative price for each type of compensation (with marginal tax rates differing for cash and employee benefits). Because the data set employed includes workers with and without a pension, tax price elasticities reflect both the demand for pension coverage as well as for pension savings conditional on coverage. The results from this study indicate that tax price elasticities of demand for pensions range between -1.6 and -3.1.[16]

Are these results robust? Thus far, the answer seems to be not very. Using a similar approach but a different data set, Long and Scott (1982) report an elasticity half that size (-.81). A coefficient estimate of the wrong sign is obtained by Montgomery et al's (1992) study of the demand for pensions, though here the empirical data set included only workers with pensions. None of these models was able to allow for the fact that many workers save in non-pension formats as well as via pensions.

A different approach to the demand for pensions has been taken by researchers seeking

---

[16]This study also assumes that the tax benefits of pensions are akin to a tax exemption for pension income, rather than the result of tax deferral: the after tax price of pensions is therefore defined to be one minus the worker's marginal tax rate. However the worker's current marginal tax rate is not a correct measure of the tax benefit since eventually one to two-thirds of the tax break will be repaid in taxes during retirement. A further complexity is that workers' tax savings vary with income level, a point that has not yet been appropriately modeled, and workers' marginal tax rates vary with their pay levels. As a result, workers' marginal tax rates should be treated as endogenously determined. A great deal of analysis remains to be done on this point.

to understand compensating differentials for pensions. Many such studies use a hedonic pension-earnings equation to separately identify worker pension demands and profit functions of heterogeneous firms. The dependent variable in such models is typically an earnings measure, with pension accruals or promised benefits on the right-hand side of the equation. Such studies commonly report a positive correlation between earnings and pensions: for example, pension coverage is higher by 10-15% for each standard deviation increase in the wage rate (Dorsey 1982); and retiree pension amounts rise 8% for each 10% increase in retirees' final earnings (Ippolito 1985b). However these results are also subject to question: for instance, Montgomery et al. (1992) relate expected pension amounts to expected earnings over the worker's lifetime with his employer, and find both positive and a negative correlations between pension and pay depending on which other variables are controlled.

A related issue is that pensions must provide retirement savings and income insurance that the worker values, in order to generate compensating differentials in the hedonic equation. This, in turn, requires that workers understand the risks they face, and value the insurance the pension provides. Perhaps not surprisingly, there is little evidence on this point. Some workers appear to be relatively well informed about aspects of their pensions, but they find it quite difficult to accurately describe the details of their plans (especially plan type), their contribution levels, and certain key plan provisions (Gustman and Steinmeier 1989; Mitchell 1988). There is no reason for imperfect information to affect systematically the compensating differential if workers symmetrically mis-value their pension. However inaccurate expectations about retirement income, age of retirement and the kinds of insurance that a complex pension benefit formula provides undermines the theory that workers value

pensions insurance against risks that are difficult to understand (such as those occurring at various phases of the life cycle, and those associated with various types of financial risk, and social security risk). This evidence also raises a new question: what effect will pensions have on life cycle savings and work behavior, if they are not fully understood? It must be concluded that there is currently no consensus about the right way to separately identify worker and firm-side factors when computing the determinants of pension demand.

Evidence is also mixed with regard to the other theories of why workers want pensions. In some single-equation models of pension demand, firm-size controls tend to be statistically not significant, suggesting that scale economies may be relatively unimportant determinants of pension value (Woodbury and Huang, 1991), but other models do suggest modest economies of scale (Mitchell and Andrews 1981). In any event the implied effects do not increase uniformly with firm size. For example, firms with 10-25,000 employees appear to have lower pension costs than do larger firms (Even and Macpherson 1991). Union effects are likewise uneven: typically, union workers do not seem to have higher pension values conditional on having a pension plan, though retired union workers do appear to receive much higher pension benefits (Allen and Clark 1986; Freeman 1985; Gustman and Steinmeier 1989).

To summarize this section, we conclude that some progress has been made over the last decade in analyzing why workers want company-sponsored pension plans. A life cycle framework appears to be a useful paradigm for organizing and analyzing studies of workers' demand for pensions. Existing empirical studies have not always incorporated the key features of this framework. Better empirical models of pension demand require more accurate

recognition of the intertemporal setting, and the complexities this brings. To better understand the value of pension insurance, the course of events over the life cycle must also be more carefully specified.

III. The Firm-Side Issues: Why Do Some Companies Supply Pensions?

Why do some firms offer pensions, and others do not? On the one hand, companies offering pension plans may do so simply because workers desire them, and no other entity can offer comparable tax-qualified retirement savings under current law. Increasingly, however, labor economists and others have begun to believe that pensions are sometimes supplied by firms because they have additional effects which cut labor costs and raise worker productivity. Pensions can help employers meet these goals in three ways: by reducing turnover, by providing incentives for the worker not to shirk, and by regulating retirement behavior. In this section we outline and evaluate the evidence for these three firm-side motivations for supplying pensions.[17]

Why Firms Offer Pensions: In a simple spot labor market, employees are hired until labor costs P_L are equal to the workers' marginal product in each period. Thus the objective function for a profit maximizing firm is

$$\theta = PQ - P_L L - P_K K + \lambda(Q - f(K,L)),$$

[17]Some have gone beyond these three rationales to argue that pensions may be used by firms as a risk-sharing device, encouraging employees to behave more like stockholders, forcing them to take account of the implications of their behavior for the long-run future of the firm; see Ippolito (1985a and b). It also has been suggested that pensions can be used to attract and keep workers with unmeasured but desirable dimensions of labor quality (Ippolito 1991, 1992).

where P, P_L and P_K refer to prices of output, labor and capital, and Q, L and K refer to the relevant quantities. By way of contrast, a world with long-term implicit work agreements including pensions can produce compensation profiles which differ substantially from the spot market wage profile.[18] In particular, compensation in a pension regime often becomes sharply discontinous at various points in the worker's career (see Figure 1). For instance, pension compensation spikes upward when the worker vests in his pension (usually at 5 years of service), when he attains the firm's early retirement age, and sometimes at normal retirement. These pension spikes are not, in general, offset by precipitous drops in earnings, implying that the firm is actually structuring compensation awards over a period of time rather than at each moment in time (Kotlikoff and Wise 1985, 1987). Thus compensation and productivity need not match in each period; rather pay must be discounted and summed intertemporally so as to maximize profits. This provides the firm with the opportunity to tilt the compensation profile, and more generally to provide for a deferred compensation contract that includes deferred payments such as pensions.

Once pensions are framed in terms of a long term contract, it becomes possible to explore their ultimate effects on labor productivity and production costs. Three methods by which pensions may influence firm demand for labor have been examined in the pension literature of late: pensions may be used to regulate turnover, effort on the job, and retirement flows. Much of the research on these points has been theoretical since analysts have had

---

[18]Bulow (1982) has suggested that pension promises are actually consistent with a spot labor market, when firms fund pensions on the basis of accrued rather than projected liability. However this argument ignores the option value of the pension (Lazear and Moore, 1988).

relatively little direct evidence on the mechanisms by which pensions' effects on turnover, effort, and retirement directly translate into cost savings and productivity increases. High on the research agenda is the development of evidence which could be used to directly estimate a production function incorporating worker quality and effort as inputs, with the resulting productivity outcomes in firms with and without pensions (Gustman and Mitchell 1992). Absent this perfect data set, we instead outline and evaluate the evidence offered to explain why firms offer pensions.

1. Pensions and Worker Effort

The model of deferred compensation is often invoked to explain why workers with pensions might be expected to be more productive than workers without pension coverage. The central insight is that the worker "posts a bond" by accepting cash compensation in his early years below what he could receive in alternative employment. If the worker quits or is dismissed for cause, the bond is forfeited, which provides the employee with an incentive to work up to the firm's standards (and, as will be seen shortly, not to quit). When it is difficult and/or costly for an employer to monitor continuously the worker's effort, it may be particularly efficacious to get the employee to post this bond (Lazear 1979, 1983; Hutchens 1987, 1989).

Pensions are often brought into this framework in an ancillary role, as in Lazear (1979) who motivates pensions as incentives not to shirk near the end of the labor contract. Other researchers recognize that as long as compensation is deferred, pensions are a tax-favored way for firms to design a delayed payment contract (Even and Macpherson 1992). Particularly well-suited to this task is the defined benefit pension promise, where the

incentives not to shirk are captured in a term known as the "pension capital loss". This is the (discounted) difference between a worker's accrued pension calculated using his current earnings level in the pension benefit formula, and the projected pension benefit at retirement calculated using his projected pre-retirement pay.[19] The size of pension capital losses faced by typical pension-covered employees over their work lives turns out to be reasonably substantial: terminating employment before retirement costs the average worker somewhat more than half a year's pay in lost pension (Gustman and Steinmeier, forthcoming).

Empirical studies of pensions as a mechanism for deferring compensation have not devoted much effort to the question of how much of the deferred payment should be in the form of a pension, conditional on using a deferred payment scheme. Presumably this decision is in part driven by tax concerns: sponsoring employers can deduct the projected value of promised pensions (including the pension capital loss), but cannot deduct monies to pre-fund a deferred wage promise. For this reason there may be a corporate tax advantage to deferring pay in the form of a pension promise.[20] A related, and as yet unanswered, question remains about whether workers offered a deferred payment will also obtain a compensating wage premium to offset the increased risk they face due to the capital loss possibility. The risk

---

[19]When used in the context of discussing the relation of pension backloading to incentives for mobility, the accrued pension has been called the "quit pension" and the projected pension the "stay pension"; see Ippolito (1985a, 1987b). Lazear and Moore's (1988) pension option value is a related but different measure of future pension amounts, allowing explicitly for the spikes in pension accruals.

[20]As with a deferred wage promise, if the firm does not fund, or underfunds, deferred benefit promises, it obtains an implicit loan from the worker (see Ippolito 1986a and Bodie 1990).

facing workers is small when reputation costs force employers to abide by their contract, and there is evidence that firms do not seem systematically to lay off workers vulnerable to large pension capital losses.[21] Nevertheless a few companies have apparently discharged employees deliberately, just before they became eligible to claim their pensions.[22] In addition, many companies have recently terminated their defined benefit pension plans, evidence which suggests to some that reputation costs may not act as a satisfactory deterrent to employer abrogation of the long-term pension arrangement. During the 1980's, for example, almost 2,000 plans covering 2.3 million participants filed "Intent to Terminate" notices with the federal government, generating an estimated $20 billion dollars in pension reversions.[23] On the other hand, less than 2% of the pension plan asset pool that could have been revoked was actually taken, and frequently these same firms implemented follow-up pension plans which effectively grandfathered workers' benefits, but with a more normal level of funding. The question of whether and how frequently firms renege on implicit pension contracts is still very

---

[21]In fact, Allen, Clark and McDermed (1991) and Cornwell, Dorsey and Mehrzad (1991) both conclude that workers who are covered by pensions are less likely to be discharged.

[22]Recently Continental Can Company agreed to pay $415 million in damages to former employees who alleged that the employer systematically identified and laid off workers just before they became eligible for special early retirement benefits and pension supplements. Eligibility was based on attaining certain combinations of age and service (McLendon et al. vs. The Continental Group). In general, whether it is profitable to offer a delayed payment contract in the face of worker doubts about receiving the payment, depends on the size of the risk premium demanded versus the additional productivity resulting from deferring pay this way.

[23]These statistics include only reversions in excess of $1 million by year of termination, including pending cases, and were generously furnished by Richard Ippolito from unpublished PBGC sources; see also Ippolito (1986b) and Petersen (1992).

much under debate.[24]

Few analysts have directly tested the hypothesis that deferring pay via pensions increases worker effort and productivity, lacking the necessary data. Instead, most empirical tests of deferred payment models are indirect: Hutchens (1986, 1987), for instance, finds that high pay and pensions are more prevalent in jobs that are difficult to supervise (i.e. jobs that do not involve repetitive tasks). Lazear (1979) also found that companies were more likely to offer pensions in jobs which paid above-average wages toward the end of the worklife, which was also taken to be evidence in support of the delayed payment model.

Despite these finding, it remains true that deferred payment models are difficult to distinguish empirically from human capital explanations for upwardly tilted pay profiles. Also, it can be shown that in the deferred compensation model, both the level and slope of the earnings-tenure profile are theoretically indeterminate.[25] For this reason, testing of the delayed payment model of pensions has been difficult to accomplish.[26]

---

[24] For a review of recent studies see Alderson and Vanderhei (1991) who contend that "it seems unlikely that any sponsors are motivated to conduct a plan termination for the purpose of expropriating wealth from their labor pool" (p. 43), and argue that pension terminations do not appear to have much effect on company share prices.

[25]This follows since the worker's opportunity wage is less than his marginal product in the delayed payment firm; see Carmichael (1989).

[26]Implementation of a delayed payment model also seems to require more complexity than is seen in the real world. For example, workers may join a firm at different ages yet typically are required to retire at a uniform age (this was common until recently in the U.S.). If the bond is to be repaid at the correct time, starting salaries and the slope of the compensation profile would have to vary with age of entry. Thus the contract must be designed so that the negative and positive segments balance over the worker's period of attachment to the firm. An older hire has a shorter expected term of employment, so that both the size of the bond and the repayment will have to be adjusted accordingly. This implies that the profile must be

In sum, the existence of a pension capital loss in a deferred payment world is consistent with the argument that pensions can be used to enhance worker effort, and thus their productivity. Existing evidence is not, however, sufficient to establish the primacy of the hypothesis that delayed payment schemes are adopted to reduce shirking, over competing explanations for delayed payment schemes. There are as yet no probative estimates of the effects of deferred payment schemes generally on work effort or on productivity, let alone estimates of the effects of pensions on work effort and productivity.

2. Pensions and Labor Mobility

Firms facing substantial hiring and training costs may find it in their interest to discourage turnover. This can be accomplished by deferring compensation in the spirit of the model just described, and making payment conditional on the worker remaining with the firm until retirement.

This theory appears to be supported by the finding that worker turnover is, indeed, much lower for workers covered by pension plans: turnover among workers with pension coverage is about half the rate for workers without pensions.[27] The negative relationship

---

conditioned on age at entry, and that the starting wage and/or the slope of the wage profile should also be age related. Because wage schedules do not usually vary with age at hire for a given job, this casts some doubt on the theory. On the other hand, when it is recognized that pension eligibility and payment are determined by years of service, having a pension makes it is easier to accommodate differential deferred compensation amounts to workers depending on their (different) age of entry.

[27]One-year mobility rates were about 20% for male workers with no pension, but only 6% for those with pensions in the Survey of Income and Program Participation; three-year turnover rates were 38% for non-covered workers but only 15% for pension covered workers in the Panel Study of Income Dynamics; see Gustman and Steinmeier (forthcoming). For data on the historic inverse relationship between pensions and mobility, see Ross (1958) and the U.S. Department of Labor (1964). Mobility pension models have been estimated by Ippolito

between pensions and turnover remains strong even after controlling for other factors such as pay, union membership and tenure, and reflects a negative association between pensions and layoffs (Allen, Clark and McDermed 1991). These findings have convinced many students of the pension-mobility relation that pensions, and the workings of an implicit pension contract, curtail labor mobility. There also is a complementary story, that employers who adopt pensions use them not to keep all workers, but instead to attract and keep particular employees -- those who are more likely to be "stayers" than "movers". For example, companies that invest heavily in specific training will seek to attract stayers rather than movers, and will tilt the compensation profile so that pay in the early years is lower, while pay in the later years is higher. Total lifetime compensation for stayers is thus not adversely affected, but compensation can be reduced for those who leave after a short time, making it less desirable for movers to apply in the first place. A pension can achieve this by deferring a portion of payment until late in the worklife.[28]

(1987a) and Mitchell (1982), among others.

[28]A recent extension of this theory posits that some workers have a higher time preference than do others, and low time preference workers have some characteristic which is *ex ante* unobservable but valuable to the firm, such as higher productivity or lower turnover rates (Ippolito 1991, 1992). Asymmetric information about worker traits motivates firms valuing specific characteristics to design different compensation strategies; these will then motivate complex self-selection patterns among workers according to their unobserved characteristics. In this environment, some firms will find it profitable to offer deferred payment schemes, or wage premia, or even defined contribution plans, so as to select and keep workers with the desired characteristics. Pensions providing lump-sum cash outs, particularly defined contribution plans, are depicted as a method to encourage early quits among low quality workers hired inadvertently. These models rationalize observing widely divergent deferred payment schemes across firms, and generate various combinations of turnover and compensation levels. Exact solutions depend on the precise mix of jobs and workers of different types, and on assumptions about the traits desired by employers as well as worker

There is evidence supporting both of these explanations of the negative pension/turnover fact. Regarding the first is research by Allen, Clark and McDermed (1991) who show that the size of the pension capital loss is negatively related to employee mobility. Using a 3-equation model, they investigate job change patterns in the 1975-82 PSID, with appended information on pension capital loss computed from a separate Employee Benefits Survey. In addition to the turnover equation, the authors include a selection equation relating pension coverage to the probability of turnover from the pension-covered job, as well as a measure of pension capital loss. A third equation describes turnover from jobs without pension coverage. Based on their formulation, the authors conclude that the pension capital loss accounts for two-fifths of the difference in turnover rates between those with and without pensions. However the negative relation between pensions and mobility diminishes with service, perhaps because movers inadvertently hired would quickly quit when their earnings are deferred to a greater extent than they would prefer. The authors also report that some people are more likely than others to get pension covered jobs, supportive of the view that companies with pension plans are more selective employers.

Additional research is needed before affirming that the negative relation between pension coverage and mobility is of necessity causal. This is because the pension capital loss from quitting and taking a new job could be offset on a new job by a pay increase of only 2-3% over the remaining lifetime.[29] An even more striking finding is the result that mobility

---

preferences.

[29]Allen, Clark and McDermed (1991) find that for 35-44 year olds, the average capital loss is equal to about 7 months wages, about 2.3-2.9% of the remaining working career pay.

is deterred just as potently by defined contribution pension plans, as it is by defined benefit plans (Gustman and Steinmeier, forthcoming; Even and Macpherson, 1991 and 1992). Since defined contribution plans do not entail capital losses, some other factor must account for this effect on mobility.

What matters for mobility, of course, is not just the worker's current wage and potential capital loss, but how his current compensation compares to that on alternative jobs. For this reason, a complete mobility model should include both current and alternative pay levels as well as a measure of the pension capital loss. In a recent study which takes this tack, the conclusion is that lower turnover rates of pension-covered workers appear to be explained primarily by a compensation premium paid by jobs with pension plans (Gustman and Steinmeier, forthcoming and 1987). In other words, whether a pension plan is of the defined benefit or the defined contribution variety seems to matter less for turnover, than whether there is a pension plan at all. In addition, workers covered by a pension appear to suffer a large pay loss when they do change jobs. This is also consistent with the notion that workers with pensions enjoy an efficiency wage or rent-sharing arrangement.

In sum, there are currently several potential explanations for the observed negative pension-mobility relation. More must be learned about how plan type and plan incentives affect expected turnover patterns. It would also be useful to explore in more detail how alternative compensation packages shape firm-side compensation and layoff policies. Some answers may be found by extending the methodology developed in recent studies; others must await more analysis of the role of rents and quasi-rents in labor compensation (e.g., see

Krueger and Summers, 1988).

3. Pensions And Retirement

In assessing how pensions affect retirement patterns, it is important to recall why retirement flows may need to be subject to employer control. One explanation is that worker productivity may fall in later life or after working for a given number of years (Gordon and Blinder 1980; Mitchell 1990). There might be no need to induce retirement if wages could be reduced to track this productivity decline. However earnings profiles often do not turn down later in life, even when workers approach and pass their firm's retirement age.[30] Two pressures preventing this form of recontracting are workplace custom and age discrimination legislation, both of which make wages downwardly rigid even in nonunion industries. Even in the face of downwardly rigid wages, employers might not need to use the pension to induce retirement if they could selectively lay off their less productive employees. However, this too imposes morale problems when productivity is imperfectly measured and further problems are created by age discrimination laws that circumscribe age as a criterion for layoffs. Accordingly, firms may turn to other mechanisms to reduce labor costs, and one such

[30]Defining the main job as the full-time job held at age 55, experience-wage rate profiles for full-time work on the main job do not decline with age in the United States until after 40 to 45 years of experience, and even after that point, wage offers for continued full-time work decline very slowly, by less than one percent for each year of additional experience. This relationship holds in longitudinal data even after adjustment for selection bias due to selective retirement of workers offered lower wages on their main jobs. The fact that age-wage profiles turn down in cross section data is due to the fact that older workers are more likely to change jobs as the age, and post-career jobs offer lower wages (Gustman and Steinmeier, 1985). In other countries such as Japan, older workers do appear able to recontract with employers, experiencing dramatic pay declines after the normal retirement age (Rebick, 1992).

instrument may be a pension plan which induces retirement for those whose productivity falls with age.

A companion view of pensions suggests that firms use them to encourage retirement at the end of a delayed payment contract, or in connection with mandatory retirement, to provide incentives at the end of a deferred compensation contract (Lazear 1979, 1983). In this framework, an older worker may refuse to leave his career job voluntarily because the pay exceeds his best alternative compensation rate (including the value of leisure time). Efficient retirement flows must then be induced by mandatory retirement, or by employers adopting a defined benefit pension plan, which provides a strong reward for continued work up to the point when the value of leisure just equals the value of the worker's productivity, and negative accruals for work after that date. A related theory posits that pensions can be used as an inducement to retire, when worker productivity becomes increasingly variable with age and thus becomes more difficult to monitor. In this light, specially-structured pension benefit spikes can prompt group departure at a date optimal for the firm (Parsons 1988; Oi 1983).

Testing these different firm-side rationales for pensions requires delving into the way pension retirement incentives are structured. Research shows, for instance, that a typical worker in a defined benefit pension plan confronts a very jagged pension accrual profile as the net present value of accrued benefits changes with each additional year of work. Plans often award a sharp benefit increase or spike when the worker attains early retirement age, and until recently negative pension accruals after the company's normal retirement age, as

illustrated in Figure 1.[31] This spike in pension accruals near retirement eligibility age is postulated to have two effects on labor market flows, one in the nature of a carrot, and the other a stick. An employee approaching retirement will naturally be discouraged from leaving prior to eligibility, since by waiting he gains the large pension accrual spike.[32] Once the worker is eligible for the pension, a declining benefit accrual rate can encourage retirement, particularly if the pension accruals are negative after the normal retirement age.

Only a few empirical pension studies have obtained data on pension offerings combined with longitudinal data on retirement flows.[33] Of most interest here are the few studies which have used detailed employer-side information linking retirement flows to

---

[31]In 1989 it became illegal to restrict accruals as of a given age, but in the year before this law was adopted more than one-half of participants in defined benefit plans received no credit for service after age 65. Deliberate capping of service after age 65 indicates that employers have a direct interest in fostering retirement at a particular point; a similar practice was mandatory retirement, until this was outlawed in the private sector.

[32]Lazear and Moore (1988) term this deferred pension accrual peak the "pension option value"; see also Abowd and Manaster (1982), and Stock and Wise (1990a and b). This pattern, detected initially in a single collectively bargained pension plan studied by Burkhauser (1979), was subsequently found by Fields and Mitchell (1984) to be widespread across many pension plans.

[33]For lack of good data, many theoretically and econometrically sophisticated efforts to estimate complex structural retirement models have been unable to model the effects of pensions on retirement. For instance Rust (1990) omitted pension covered workers from his sample, Berkovec and Stern (1991) excluded pension income from consideration in a retirement model, and Gustman and Steinmeier (1986a and b) utilized crude imputations of the pension accrual profile.

detailed descriptions of the pension plan offerings.[34] Taken as a group, these studies suggest the following conclusions:

- Workers with generous pensions retire earlier than those with lower pension benefits. These differences are statistically significant, but small: a 10% increase in the present value of total retirement income at age 60 is predicted to induce earlier retirement by only about one to two months.

- Employees offered more money to delay retirement tend to do so. Again the results are statistically significant but the magnitudes are not large: a ten percent income increase for deferring retirement induces later retirement by one to four months.

- Retirement models do a fairly good job tracking retirement hazard rates, given data on nonlinear pension benefit accrual patterns such as those depicted in Figure 1.

These findings may overstate the true effect of pensions on retirement, to the extent that existing models assume pensions are exogenous to workers' retirement decisions. That is, if firms design their pension benefit formulas to conform to employee retirement preferences, then retirement hazards will be related to incentives from the pension accrual profile not because the pension is driving retirement, but because retirement desires are driving pensions. This could be compounded if workers with strong tastes for leisure also sort themselves into jobs providing generous early pensions (and presumably lower wages to offset them). Hence treating the pension as exogenous could make early retirement incentives appear to cause

---

[34]Structural retirement models using employer provided descriptions of retirement outcomes and pension benefit formulas appear in Fields and Mitchell (1984) and Stock and Wise (1990a and b). These studies define retirement as exit from the firm with a pension. The retirement literature is surveyed by Mitchell and Fields (1982) and Quinn, Burkhauser and Myers (1990). Only a few studies have examined the determinants of women's retirement patterns, and the evidence suggests that their responses to economic factors may be somewhat smaller; Pozzebon and Mitchell (1989).

earlier retirement, when in fact the pension *per se* might have no effect on the retirement behavior.

Although there is merit to this concern, we nevertheless believe that self selection and worker tastes are unlikely to account fully for the robust relation observed between pension incentives and retirement. Perhaps the strongest argument is that pension plan retirement incentives are altered relatively often, especially the position and size of the spikes in the benefit accrual profile. For example, the fraction of defined benefit pension plans offering early retirement benefit eligibility at age 55 increased from 30% to 57% between 1960 and 1980. In the same time period, the prevalence of actuarially subsidized benefits for early retirement increased from 10% to 95%, and those offering full benefits for retirement younger than age 65 increased from 0% to 69%.[35] Moreover, there have been significant changes in incentives from the social security benefit structure and in mandatory retirement provisions. It hardly seems possible that workers beginning a long-term job attachment thirty years ago are still facing the pension opportunities they expected when joining the firm decades ago.

Perhaps more persuasive is recent evidence on the effects of unanticipated early retirement windows offered by a large Fortune 500 firm. In an interesting study, Lumsdaine

---

[35]These results, from Ippolito (1990c), apply to so-called "conventional" pension plans, or pensions which cover the nonunion sector. For other evidence on the rapid changes in plan provisions among medium and large firms nationally see Mitchell (1992), and in the collectively bargained sector see Luzadis and Mitchell (1988). In an attempt to determine whether simultaneity between the pension and retirement behavior was a serious problem, Fields and Mitchell (1984) examined the residuals in the retirement outcomes for signs of systematic patterns in the error term that would be associated with simultaneity. They found no evidence of endogeneity due to employee selection or to endogenously determined plan features.

et al. (1990) fit a retirement model using data from a period before a firm adopted a retirement window, and used the resulting parameter estimates to predict the response to the firm's adopting the unanticipated retirement window plan. The authors conclude that their retirement hazard model predicted large increases in early retirement, matching actual workers' responses fairly well: "[t]he firm's plan -- providing bonus payment of 3 to 12 months salary -- increased retirement rates by up to two fold. Such a plan would increase by fifty percent the proportion of workers employed at 52 that had retired by age 60." (p. 24). While there may be some residual simultaneity bias, these results probably reflect causality running from pension incentives to retirement patterns, rather than the reverse.

On the basis of the best available evidence, we judge that pensions are attractive to employers because they help regulate retirement flows. This can also account for pension sweeteners offered at early retirement, and account for the spike at early retirement as well as negative pension accruals after normal retirement (see Figure 1). Of course, this evidence still does not prove that the primary purpose of company pensions is to influence retirement, or even how important this motivation is, compared to others such as providing retirement income insurance.

IV. Conclusions and Policy Issues

We have argued that employer-sponsored group pension plans offer an unusual window into long-term employment relationships. This is because the pension promise involves a relatively well-documented agreement between workers and their employers regarding future payment and employment contingencies. Recent research on pensions in the

labor market offers insight into these long-term institutional arrangements, as well as their influence on employee effort, turnover patterns, retirement flows, and other matters central to the determination of the price and quantity of labor over time. Economic theories of worker and firm behavior have been enriched by the study of pensions, because pensions force attention to intertemporal consumption and labor demand patterns critical to large segments of the labor market.

Though this subject has seen a productive balance of theoretical and empirical work in the last decade, a number of unanswered questions must first be addressed before pension policy suggestions can be considered well-grounded. On the workers' side of the market, it is important to more clearly specify the worker's intertemporal savings and consumption problem, in order to determine how the employee values a tax-shielded pension promise in an uncertain world. It would be useful to estimate an intertemporal utility model with both pension and nonpension savings, in which the pension promise as well as the earnings stream are jointly determined. On the employer side of the market, researchers have yet to establish precisely the extent to which pensions influence worker effort, employee quality, and turnover. To better understand how labor demand works in the pension context, it will be important to develop and test models in which workers are attached to the firm for prolonged periods, and in which fixed hiring costs, supervision costs and work effort are important dimensions of labor input. Finally, most empirical work in the pension arena has been unable to incorporate fully the influence of both sides of the labor market.[36]

---

[36]Better pension research will also require new kinds of data (Gustman and Mitchell 1992). Some of the outcomes are inherently difficult to measure, like effort; in other cases data are observable in principle but difficult to obtain at the firm level (as in the case of

Given the work remaining to be done in the pension area, it is probably difficult to predict with any certainty how pension laws and policies affect labor market outcomes. Nevertheless it would be most useful to be able to evaluate the effects of important pension policies. For instance, tax preferences for pensions amount to more than $50 billion each year, and are the largest of all tax expenditures (Congressional Budget Office 1987; Goodfellow and Schieber 1992). With budget deficits leading many to think of tax increases, analysts need to know what effect changes in tax laws would have on pensions and labor market outcomes. Other government policy has also changed the rules of the pension game: for example, the Employee Retirement Income Security Act (ERISA) of 1974 set off a series of pension reforms which quickened during the 1980's. Many laws also have spillover effects on pensions including social security reforms, the abolition of mandatory retirement, and age discrimination prohibitions. Pensions are one of the few remaining personnel tools which employers can use to legally influence effort, turnover, and retirement behavior, but here too regulations are limiting the ways in which they can be deployed.[37]

Other important pension questions also remain to be answered. Evidence is beginning to accumulate that the decade of the 1980s may have witnessed a decline in private pension

---

productivity, labor costs, and compensation) . Data problems remain troubling for economists studying financial links between workers, firms, and the pension plan, though some of the required information is public.

[37]Although Congress required defined benefit pensions to continue crediting years of service toward the pension for workers beyond the plan's normal retirement age, employers are still permitted to cap total years of service counted in the benefit plan, but benefit accrual must otherwise continue after normal retirement age. Defined contribution plans must continue pension contributions as long as the employee remains on the job. Early retirement window plans have also been restricted by Congress as of 1991.

coverage, though the verdict is still out.[38] The mix of plan type is also apparently changing over time, with coverage patterns indicating a move away from defined benefit plans and toward defined contribution plans.[39] Explaining these trends, and determining what they will mean for employment, pay, and retirement well-being requires a clearer understanding of what pensions do in the labor market. The research agenda is certainly full.

---

[38]Several authors have reported declining pension coverage over the 1980's including Bloom and Freeman (1992), Parsons (1991) and Beller and Lawrence (1992). However this conclusion is still tenuous since analysts examining other data sources have found a slight increase in pension coverage (Beller and Lawrence 1992; EBRI 1992). See also Turner and Beller (1989, 1992) and Andrews (1985).

[39]Primary defined contribution plan coverage doubled during the 1980's. Even more spectacular has been the growth of DC pensions as secondary plans: in 1975, only about one-quarter of all pension participants with a primary plan also had a secondary DC plan, but by 1987 the percentage rose to one half. This tremendous growth in secondary plans came despite stagnation primary plan coverage, and had much to do with the legalization of 401(k) plans. Participation in 401(k) plans grew from 5 percent of private wage and salary workers to 14 percent between 1983 and 1987. See Beller and Lawrence (1992), Clark and McDermed (1990), Ippolito (1992b), Gustman and Steinmeier (1992), and Kruse (1991).

References

Abowd, John M. and Manaster, Steven. "A General Model of Employment Contracting: An Application of Option Theory." University of Chicago, 1982.

Alderson, Michael and Vanderhei, Jack. "Disturbing the Balance in Corporate Pension Policy: The Case of Excess Asset Reversion Legislation", *Benefits Quarterly*, Third Quarter, 1991.

Allen, Steven G. and Clark, Robert L. "Unions, Pension Wealth and Age-Compensation Profiles", *Industrial and Labor Relations Review*, July 1986, 39(4), pp. 502-517.

Allen, Steven G.; Clark, Robert L. and McDermed, Ann A. "Pension Bonding and Lifetime Jobs". National Bureau of Economic Research, Working Paper 3688, April 1991.

Allen, Steven G.; Clark, Robert L. and Sumner, Daniel. "Post Retirement Adjustments of Pensions", *Journal of Human Resources*, Winter 1986, 21(1), pp. 118-137.

Andrews, Emily. *The Changing Profile Of Pensions In America*. Washington, D.C.: Employee Benefit Research Institute, 1985.

Beller, Daniel J. and Lawrence, Helen H. "Trends in Private Pension Coverage", in *Trends In Pensions*, 1992. Eds: John Turner and Daniel J. Beller, Washington, DC: U.S. Government Printing Office, 1992.

Berkovec, James C. and Stern, Steven. "Job Exit Behavior of Older Men", *Econometrica*, January 1991, 59 (1), pp. 189-210.

Berkowitz, Stephen A. and Logue, Dennis E. "Investment Performance of Corporate Pension Plans". Washington, D.C.: Report submitted to the U.S. Department of Labor, 1986.

Blinder, Alan S. *Private Pensions And Public Pensions: Theory And Fact*, W.S. Woytinsky Lecture No. 5. Ann Arbor: University of Michigan, December, 1981.

Bloom, David E. and Freeman, Richard B. "The Fall In Private Pension Coverage In The U.S.". *American Economic Review, Papers and Proceedings*, May, 1992, 82(2), pp. 539-545.

Bodie, Zvi. "Pensions As Retirement Income Insurance," *Journal of Economic Literature*, March, 1990, 28(1), pp. 28-49.

Bulow, Jeremy I. "Early Retirement Pension Benefits." National Bureau of Economic Research, Working Paper 654, April 1981.

_____. "What Are Corporate Pension Liabilities?" *Quarterly Journal of Economics*,

August, 1982, 97(3), pp. 435-52.

Burkhauser, Richard V. "The Pension Acceptance Decision of Older Workers," *Journal of Human Resources*, Winter, 1979, 14(1), pp. 63-75.

Carmichael, H. Lorne. "Self-Enforcing Contracts, Shirking, and Life Cycle Incentives". *Journal of Economic Perspectives*, Fall 1989, 3(4), pp. 65-84.

Clark, Robert L. and McDermed, Ann A. *The Choice of Pension Plans In A Changing Regulatory Environment*. Washington, D.C.: American Enterprise Institute, 1990.

Congressional Budget Office. *Tax Policy For Pensions And Retirement Savings*. Washington, D.C.: U.S. Government Printing Office, April, 1987.

Cornwell, Christopher; Dorsey, Stuart, and Mehrzad, Nasser. "Opportunistic Behavior of Firms in Implicit Pension Contracts", *Journal of Human Resources*, Fall, 1991, 26(4), pp. 704-725.

Diamond, Peter A. and Mirrlees, James A. "Insurance Aspects of Pensions", in *Pensions, Labor, and Individual Choice*. Ed. David A. Wise. Chicago: The University of Chicago Press, 1985, pp. 317-356.

Dorsey, Stuart. "A Model and Empirical Estimates of Worker Pension Coverage in the U.S.", *Southern Economic Journal*, October, 1982, 49(2), pp. 506-520.

Employee Benefit Research Institute. "New Findings from the March 1991 CPS on Pension Coverage and Participation". *Employee Benefit Notes*, March 1992.

Even, William E. and Macpherson, David A. "Employer Size And Pension Coverage". Ms. Oxford, Ohio, January, 1991.

_____. "Pensions, Labor Turnover and Employer Size". Ms. Oxford, Ohio, May, 1992.

Feldstein, Martin. "Should Private Pensions Be Indexed?," in *Financial Aspects of the United States Pension System*. Eds.: Zvi Bodie and John B. Shoven. Chicago: The University of Chicago Press, 1983, pp. 211-230.

Fields, Gary S. and Mitchell, Olivia S. *Retirement, Pensions and Social Security*. Cambridge: MIT Press, 1984.

Freeman, Richard B. "Unions, Pensions and Union Pension Funds", in *Pensions, Labor, and Individual Choice*. Ed. David A. Wise. Chicago: The University of Chicago Press, 1985, pp. 89-121.

Friedman, Benjamin and Warshawsky, Mark. "Annuity Prices and Savings Behavior In the United States", in *Pensions In The U.S. Economy*. Eds: Zvi Bodie, John Shoven and David Wise. Chicago: University of Chicago Press, 1987, pp. 53-84.

Goodfellow, Gordon P. and Schieber, Sylvester J. "Death and Taxes: Can We Fund For Retirement Between?". Paper presented at Symposium On The Future Of Pensions In The United States, Pension Research Council, Philadelphia, May, 1992.

Gordon, Roger H. and Blinder, Alan S. "Market Wages, Reservation Wages and Retirement," *Journal Of Public Economics*, October 1980, 14(2), pp. 277- 308.

Green, Jerry. "The Riskiness Of Private Pensions," in *Pensions, Labor, and Individual Choice*. Edited by David A. Wise. National Bureau of Economic Research. Chicago: The University of Chicago Press, 1985, pp. 357-375.

Gustman, Alan L. and Mitchell, Olivia S. "Pensions and the Labor Market: Behavior and Data Requirements", in *Pensions and the U.S. Economy: The Need for Good Data*. Edited by Zvi Bodie and Alicia Munnell. Philadelphia, Pa: Pension Research Council, 1992, pp. 39-87.

Gustman, Alan. L. and Steinmeier, Thomas L. "The Effects of Partial Retirement on Wage Profiles of Older Workers", *Industrial Relations*, Spring, 1985, 24(2), pp. 257-265.

_____. "A Structural Retirement Model," *Econometrica*, May, 1986a, 54(3), pp. 555-584.

_____. "A Disaggregated Structural Analysis of Retirement By Race, Difficulty of Work and Health," *Review of Economics And Statistics*, 67(3), August, 1986b, pp. 509-513.

_____. "An Analysis of Pension Benefit Formulas, Pension Wealth and Incentives From Pensions," in *Research In Labor Economics*, 10. Edited by Ronald Ehrenberg. Greenwich, Ct: JAI Press, 1989. pp. 33-106.

_____. "The Stampede Toward Defined Contribution Pension Plans: Fact or Fiction?," *Industrial Relations*, Spring, 1992, 31(2), 361-369.

_____. "Pension COLAs", in *New Jobs In An Aging Economy: Costs, Benefits And Policy Challenges*. Ed. Olivia S. Mitchell. Ithaca: Cornell University Press, 1993.

_____. "Pension Portability And Labor Mobility: Evidence From The Survey Of Income And Program Participation", *Journal of Public Economics*, forthcoming.

Hay/Huggins Company, Inc. *Pension Plan Cost Study*. Washington D.C., Pension Benefit Guaranty Corporation, 1990.

Hurd, Michael D. "The Joint Retirement Decision Of Husbands And Wives", in *Issues In The Economics of Aging*. Ed. David A.Wise. Chicago: University of Chicago Press, 1990, pp. 231-254.

_____. "Research On The Elderly: Economic Status, Retirement, and Consumption and Saving", *Journal of Economic Literature*, June 1990, 28(2), pp. 565-637.

Hutchens, Robert. "Delayed Payment Contracts and a Firm's Propensity to Hire Older Workers," *Journal Of Labor Economics*, October, 1986, 4(4), pp. 439-457.

_____. "A Test of Lazear's Theory of Delayed Payment Contract", *Journal of Labor Economics*, October, 1987, 5(4), Part 2, pp. S153-170.

_____. "Seniority, Wages, and Productivity: A Turbulent Decade", *Journal of Economic Perspectives*, Fall, 1989, 3(4), pp. 49-64.

Ippolito, Richard. "The Labor Contract and True Economic Pension Liabilities", *American Economic Review*, December 1985a, 75(5), pp. 1031-1043.

_____. "The Economic Function of Underfunded Pension Plans," *The Journal of Law and Economics*, October, 1985b, 28(3), pp. 611-651.

_____. *Pensions, Economics and Public Policy*. Pension Research Council. Homewood, Illinois: Dow Jones-Irwin, 1986a.

_____. "Pension Terminations for Reversion," *Journal of Pension Planning and Compliance*, Fall 1986b, 12(3), pp. 221-242.

_____. "Why Federal Workers Don't Quit", *Journal of Human Resources*, Spring 1987a, 22(2), pp. 281-293.

_____. "The Implicit Pension Contract: Developments and New Directions." *Journal of Human Resources*, Summer 1987b, 22(3), pp. 441-464.

_____. *The Economics of Pension Insurance*. Pension Research Council. Homewood, Illinois: Dow Jones-Irwin, 1989.

_____. *An Economic Appraisal of Pension Tax Policy*. Pension Research Council. Homewood, Illinois: Dow Jones-Irwin, 1990a

_____. "Toward Explaining Earlier Retirement After 1970", *Industrial and Labor Relations Review*, July, 1990b, 43(5), pp. 556-569.

_____. "Pensions, Sorting and Indenture Premia". Ms. November, 1991.

_____. "Selecting Out High Discounters: A Theory of Defined Contribution Pensions". Ms., January, 1992a.

Kotlikoff, Laurence J. and Spivak, Avia. "The Family as an Incomplete Annuities Market," *Journal of Political Economy*, April, 1981, 89(2), pp. 372-91.

Kotlikoff, Laurence J. and Wise, David A. "Labor Compensation and The Structure of Private Pension Plans: Evidence For Contractual vs. Spot Labor Markets", in *Pensions, Labor, and Individual Choice*. Ed. David A. Wise. Chicago: The University of Chicago Press, 1985, pp. 55-85.

_____. "The Incentive Effects of Private Pension Plans," in *Issues in Pension Economics*. Edited by Zvi Bodie, John Shoven and David Wise. Chicago: University of Chicago Press, 1987, pp. 283-336.

Krueger, Alan B., and Summers, Lawrence. "Efficiency Wages and the Interindustry Wage Structure", *Econometrica*, March, 1988, 56(2), pp. 259-93.

Kruse, Douglas L. "Pension Substitution In The 1980's: Why The Shift Toward Defined Contribution Pension Plans?" NBER Working Paper No. 3882, October, 1991.

Lakonishok, J., A. Shleifer, and R.W. Vishny. "The Structure and Performance of the Money Management Industry". Brookings Papers on Economic Activity: Microeconomics 1992.

Lazear, Edward P. "Why Is There Mandatory Retirement," *Journal of Political Economy*, December 1979, 87(6), pp. 1261-1284.

_____. "Pensions as Severance Pay," in *Financial Aspects of the United States Pension System*. Edited by Zvi Bodie and John Shoven. National Bureau of Economic Research. Chicago: The University of Chicago Press, 1983, pp. 57-85.

Lazear, Edward P. and Moore, Robert L. "Pensions and Mobility," in *Pensions In The U.S. Economy*. Edited by Zvi Bodie, John Shoven and David Wise. National Bureau of Economic Research. Chicago: The University Of Chicago Press, 1988, pp. 163-188.

Long, James E. and Scott, Frank A. "The Income Tax and Nonwage Compensation", *Review of Economics and Statistics*, May, 1982, 64(2), pp. 211-219.

Lumsdaine, Robin; Stock, James and Wise, David. "Efficient Windows And Labor Force Reduction", National Bureau of Economic Research, Working Paper 3669, May, 1990.

Luzadis, Rebecca A. and Mitchell, Olivia S. "Explaining Pension Dynamics," *Journal of Human Resources*, Fall 1991, 26(4), pp. 679-703.

Merton, Robert; Bodie, Zvi and Marcus, Alan J. "Pension Plan Integration As Insurance Against Social Security Risk", in *Issues In Pension Economics*. Editors, John Shoven and David A. Wise. Chicago: University of Chicago Press, 1987, pp. 147-169.

Mitchell, Olivia S. "Fringe Benefits and Labor Mobility," *Journal of Human Resources*, Spring, 1982, 17(2), pp. 286-298.

_____. "Worker Knowledge of Pension Provisions," *Journal of Labor Economics*, January, 1988, 6(1), pp. 28-39.

_____. "Aging, Job Satisfaction and Job Performance", in *An Aging Workforce*. Eds.: I. Bluestone, R. Montgomery, and J. Owen. Detroit, MI: Wayne State University Press, 1990, pp. 242-272.

_____. "Trends in Retirement Provisions," in *Trends in Pensions, 1992*. Edited by J. Turner and D. Beller. Washington, D.C.: US GPO, 1992.

Mitchell, Olivia S. and Andrews, Emily. "Scale Economies in Private Multi-Employer Pension Systems," *Industrial and Labor Relations Review*, July, 1981, 34(4), pp. 522-530.

Mitchell, Olivia S. and Fields, Gary S. "The Effects of Pensions and Earnings On Retirement: A Review Essay," in *Research In Labor Economics* 5. Edited by R. Ehrenberg. Greenwich, CT: JAI Press, 1982. pp. 115-156.

Mitchell, Olivia S. and Luzadis, Rebecca A. "Changes In Pension Incentives Through Time", *Industrial and Labor Relations Review*, October, 1988, 42(1), pp. 100-108.

Montgomery, Edward, Shaw, Kathryn and Benedict, Mary Ellen. "Pensions And Wages: an Hedonic Price Theory Approach", *International Economic Review*, 33(1), 1992, pp. 111-128.

Munnell, Alicia H. and Yohn, Frederick. "What Is The Impact Of Pensions On Savings", in *Pensions and the U.S. Economy: The Need for Good Data*. Edited by Zvi Bodie and Alicia Munnell. Philadelphia, Pa: Pension Research Council, forthcoming 1992.

Nalebuff, Barry and Zeckhauser, Richard J. "Pensions And The Retirement Decision", in *Pensions, Labor, and Individual Choice*. Ed. David A. Wise. Chicago: The University of Chicago Press, 1985, pp. 283-316.

Oi, Walter. "The Durability of Worker-Firm Attachments". Ms. 1983.

Parsons, Donald O. "Aging and the Employment Contract." Ms. Revised November 1988.

_____. "The Decline In Private Pension Coverage In The United States". *Economics Letters*, 36, 1991, pp. 419-423.

Pesando, James E. and Gunderson, Morley. "Retirement Incentives Contained In Occupational Pension Plans And Their Implications For The Mandatory Retirement Debate". Ms. Toronto, 1987.

Petersen, Mitchell A. "Pension Reversions And Worker Stockholder Wealth", *Quarterly Journal of Economics*, August, 1992, 107(3), pp. 1033-1056.

Pozzebon, Silvana and Mitchell, Olivia S. "Married Women's Retirement Behavior," *Journal of Population Economics*, 2(1), 1989. pp. 301-53.

Quinn, Joseph F., Burkhauser, Richard V., and Myers, Daniel A. *Passing The Torch: The Influence of Economic Incentives on Work and Retirement.* Kalamazoo: W.E. Upjohn Institute, 1990.

Rebick, Marcus. "Finding Jobs for Older Workers: The Japanese Approach", in *As the Workforce Ages: Costs, Benefits and Policy Challenges.* Ed: O. Mitchell. Ithaca, NY: ILR Press, 1993.

Robb, A. L., and Burbidge, J.B. "Consumption, Income and Retirement," *Canadian Journal of Economics.* August, 1989, 22(3), pp. 522-542.

Ross, A. "Do We Have a New Industrial Feudalism?" *American Economic Review*, December 1958, 48(5), pp. 918-922.

Rust, John. "Behavior of Male Workers At The End Of The Life Cycle: An Empirical Analysis Of States And Controls", in *Issues in the Economics of Aging.* Ed. David A. Wise. Chicago: University of Chicago Press, 1990, pp. 317-379.

Stock, James H. and Wise, David A. "The Pension Inducement to Retire: An Option Value Analysis," in *Issues In The Economics of Aging.* Ed.: David A. Wise. Chicago: University of Chicago Press, 1990a, pp. 205-224.

_____. "Pensions, The Option Value Of Work, And Retirement", *Econometrica*, September, 1990b, 58(5), pp. 1151-1180.

Summers, Lawrence J. "Observations On The Indexation Of Old Age Pensions", in *Financial Aspects of the United States Pension System.* Eds. Zvi Bodie and John B. Shoven. Chicago: The University of Chicago Press, 1983, pp. 231-251.

Thaler, Richard and Shefrin, H.M. "Pensions, Savings and Temptation." Graduate School of Business and Public Administration Working Paper No. 81-26. Cornell University. November, 1981.

Thompson, Lawrence H. "The Social Security Reform Debate", *Journal of Economic*

Literature, December 1983, 21(4), pp. 1425-1467.

Turner, John A. and Beller, Daniel J. *Trends In Pensions, 1988*. Washington, DC: U.S. Government Printing Office, 1989.

_____. *Trends In Pensions, 1992*. Washington, DC: U.S. Government Printing Office, 1992.

U.S. Department of Labor, Bureau of Labor Statistics. *Labor Mobility And Private Pension Plans*, Bulletin No. 1407, 1964.

Weiss, Yoram. "The Effect of Labor Unions on Investment in Training: A Dynamic Model," *Journal of Political Economy*, October, 1985, 93(5), pp. 994-1007.

Woodbury, Stephen A. "Substitution Between Wage and Nonwage Benefits", *American Economic Review*, March, 1983, 73(1), pp. 166-182.

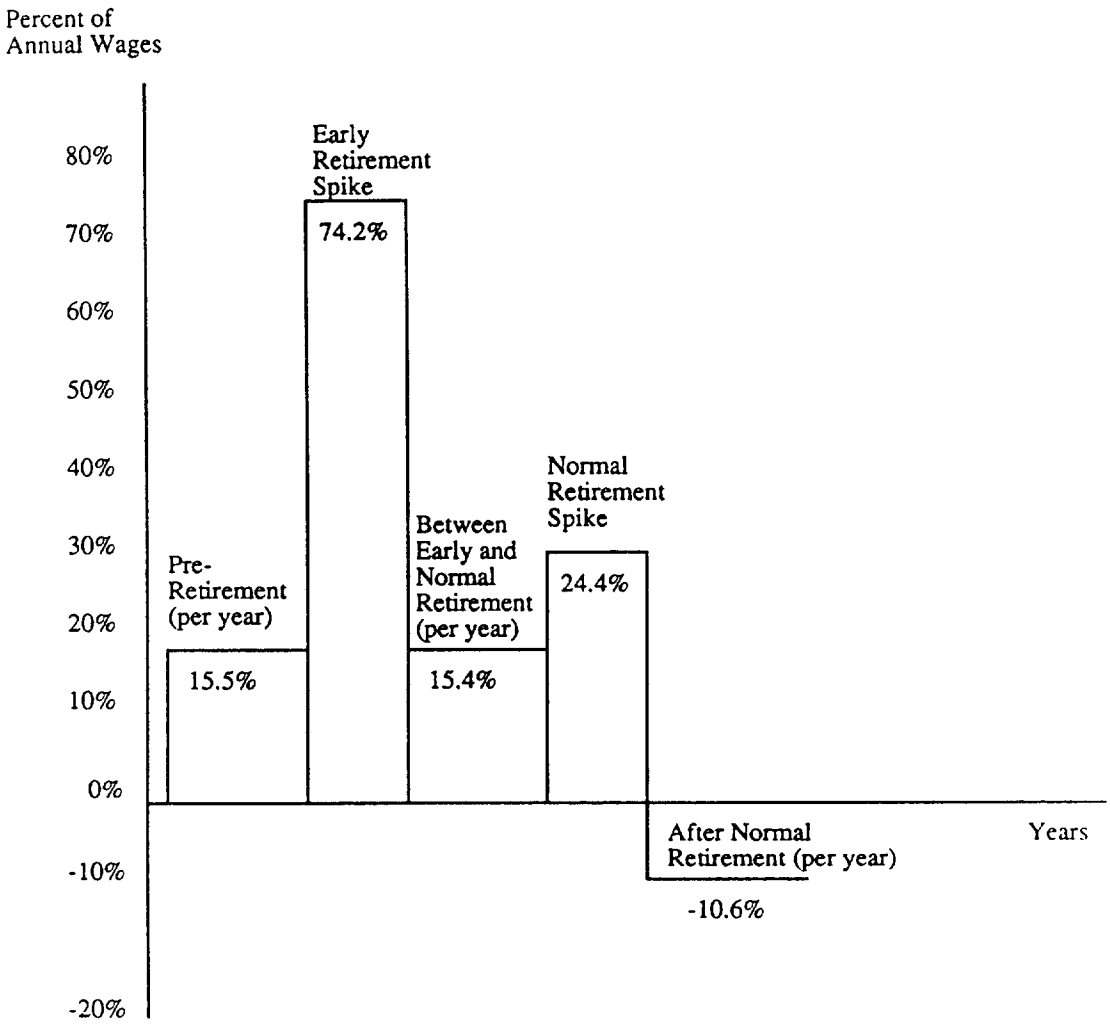
Woodbury, Stephen A. and Huang, Wei-Jang. *The Tax Treatment Of Fringe Benefits*. Kalamazoo: The Upjohn Institute, 1991.

</ref_section>

Table 1: Behavioral Motivation for Employer-Provided Pensions

Worker-Side Motivations for Pensions	_Tax Qualified, Retirement Savings _Insurance Motivations _Economies of Scale _Union Preferences
Firm-Side Motivations for Pensions	_Regulating Work Effort _Regulating Other Dimensions of Turnover _Regulating Retirement _Regulating Other Dimensions of Worker Quality
Outcomes Determined by Interaction of Supply and Demand	_Pension-Related Outcomes: Coverage, Plan Type, Plan Characteristics, Shape and Value of Accrual Pattern _Retirement _Other Employment-Related Outcomes: Worker Quantity, Including Transition Rates, Worker Quality, and Effort _Wage-Related Outcomes

Figure 1: Pension Accrual Profiles In Defined Benefit Pension Plans



Source: Gustman and Steinmeier (1989), using data from the 1983 Survey of Consumer Finances.

Notes for Figure 1

A graphical depiction of such accrual patterns appears in Figure 1, based on employer-provided descriptions for defined benefit plans in the 1983 Survey of Consumer Finances, a nationally representative data set. Pension benefits were calculated for about 500 workers covered by defined benefit plans with early retirement provisions.

In the 3 years preceding early retirement, the data show that pension accruals equal almost 16 percent of annual earnings. At the time of eligibility for early retirement, pension wealth jumps by an amount equal to 74 percent of annual earnings. An employee remaining on the job between the early and normal retirement date would earn pension accruals worth around 15 percent of earnings per year, and at the normal retirement age, his pension wealth would increase by 24 percent. Thereafter, pension accruals turn negative because annual benefit amounts rise by less than required to offset foregone benefits.These figures are taken from Gustman and Steinmeier (1989), who assume that cost of living adjustments are made after retirement in a manner consistent with the findings in Allen, Clark and Sumner (1986).

Factors which may generate pension spikes are discussed by Bulow (1981) and Pesando and Gunderson (1987). The effect of legislation requiring that most firms must credit years of service and wages toward pensions even after the worker attains age 65 will be to raise accruals in the last segment of Figure 1. In 1988, the year before this legislation took effect, 59 percent of participants in defined benefit plans were in plans that gave no credit for work after age 65.