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Volume Title: Issues in Pension Economics

Volume Author/Editor: Zvi Bodie, John B. Shoven, and David A. Wise, eds.

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-06284-8

Volume URL: <http://www.nber.org/books/bodi87-1>

Publication Date: 1987

Chapter Title: Introduction to "Issues in Pension Economics"

Chapter Author: Zvi Bodie, John B. Shoven, David A. Wise

Chapter URL: <http://www.nber.org/chapters/c6850>

Chapter pages in book: (p. 1 - 12)

1 Introduction

Zvi Bodie, John B. Shoven, and David A. Wise

1.1 Introduction

For the past three decades the rapid growth of pension plans has been one of the most significant institutional influences in United States labor and financial markets. Furthermore, the past growth trend seems likely to continue into the future indefinitely. In order to study the economic effects of this development, the NBER embarked on a major research project which began in 1980.

This book represents the third in a series of four conference volumes reporting the findings of that study. The first volume, *Financial Aspects of the United States Pension System* (1983), included analysis of the financial soundness of the private pension system, the rights and obligations of plan sponsors and beneficiaries, the impact of inflation and cost-of-living adjustments of pension benefits, and the financial status of the elderly. The second volume, *Pensions, Labor, and Individual Choice* (1985), dealt with the incentive effects of pension plans and the labor market and distributional impacts of social security. The present volume covers a broader range of pension issues than the previous two, and makes use of new and richer data sources that have subsequently become available. The papers were originally presented at a conference held in San Diego, California, on April 13–14, 1984. We have included the discussants' comments for each paper.

In this introduction we intend to give the reader an overview of the issues discussed and the findings reported in the papers. We have grouped

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the papers into four parts: (1) Pensions and Corporate Finance; (2) Pensions and Retirement Income Adequacy; (3) Pensions and Savings Behavior; and (4) Pensions and the Labor Market.

1.2 Pensions and Corporate Finance

There is a presumption on the part of the public and their elected representatives that pension plans sponsored by private corporations should be managed exclusively in the best interests of the beneficiaries of those plans. This presumption has always been the cornerstone of public policy toward pensions in the United States and was codified by Congress in the Employee Retirement Income Security Act of 1974 (ERISA). It is also the rationale for the tax-exempt status conferred on pension funds by Congress and for the provision of pension insurance through the Pension Benefit Guaranty Corporation (PBGC).

There is a justifiable concern that the use of pension fund assets for corporate purposes might violate the primary purpose of insuring retirement income adequacy for employees. Recently, such topics as corporations' right to terminate overfunded plans and retrieve surplus assets, the contribution of corporate securities and leaseholds to pension funds in lieu of cash, and the burden of unfunded liabilities on the PBGC have, therefore, become matters of intense debate and public scrutiny.

There is, of course, no necessary conflict between the interests of a corporation's shareholders and the interests of its employees in the pension plans sponsored by the corporation. Indeed, in the case of defined contribution pension plans (i.e., those in which the sponsor discharges his obligation by making contributions to the fund in the employee's name) the employer simply acts as a steward for the pension assets, which are held in trust for the employees. Such plans are not covered by PBGC insurance, but for defined benefit plans (i.e., those in which the employer is obliged to pay a retirement benefit determined according to a formula based on the employee's years of service and earnings history) the situation is more complex. In a defined benefit plan the employee has a claim on the employer equal in value to the present value of his or her vested accrued benefits under the plan's benefit formula. The plan's assets, in effect, serve as collateral for this claim.

In a number of papers, some of which were included in the first NBER pension volume in this project (Bodie and Shoven 1983), NBER researchers have explored the theoretical consequences of corporate pension policy under the assumption that management acts exclusively in the best interests of shareholders with regard to funding its pension plan and managing the pension assets. From this perspective, defined

benefit liabilities are just one more set of fixed financial liabilities of the firm. Pension assets, while collateral for these liabilities, are really just assets of the firm in that the surplus/deficit belongs to the firm's shareholders.

This view explicitly ignores the interests of the beneficiaries, in part because their defined benefits are insured by the PBGC anyway. From the corporate financial perspective, then, the beneficiaries are protected by the government, and the corporate pension decisions become what amounts to a game between the corporation and various government agencies and interests, a game that can be thought of as an integral part of corporate financial policy.

The tax effects are the first, and for most companies the most important, part of this game. Because firms can effectively earn a pretax rate of return on any assets held in the pension fund and pass these returns through to shareholders much as if the pension fund were an Individual Retirement Account (IRA) or Keogh plan, the comparative advantage of a pension fund lies in its ability to be invested in the most heavily taxed assets.

Presumably this means that pension funds should be invested entirely in taxable bonds, as opposed to common stock, real estate, or other assets that are in effect taxed at lower marginal tax rates for most shareholders. Furthermore, the corporation should fund its pension plan to the maximum extent allowed by the Internal Revenue Service so as to maximize the value of this tax shelter to shareholders. The tax effects of pensions should therefore induce corporations to follow extreme policies—fully funded (indeed overfunded) pension plans with the pension assets invested entirely in taxable bonds.

A second effect results from government insurance of the firm's pension liabilities. Briefly, the PBGC's insurance of pension benefits gives the firm a put option—it can shed its pension liabilities by giving the PBGC the assets in the pension plan plus 30% of the market value of its net worth. As with any option, the value of this put increases with the risk of the underlying asset. Thus, as long as the PBGC neither regulates pension fund risk nor accelerates its own claim at the first sign of financial distress, the firm has an incentive to undermine the PBGC's claim. It can do so and maximize the value of its put option by funding its pension plan only to the minimum permissible extent and investing the pension assets in the riskiest possible securities. These policies are, of course, exactly opposite those suggested by the tax effects described above.

Combining these two effects, the tax effect and the PBGC put, the firm can be viewed as facing a trade-off. By overfunding and investing in bonds it maximizes tax benefits, but by underfunding and investing in risky assets it maximizes the value of the pension put. This trade-

off does not produce a set of unique interior optimal policies, but rather implies that each firm should be following one of two very different extreme policies. If the firm is profitable and relatively safe, the pension put will probably have negligible value. Hence the firm should fully fund its pension plan and invest entirely in the most heavily taxed securities. On the other hand, if the firm is both unprofitable and risky, the tax shelter may be superfluous, and the pension put may be quite valuable. In order to maximize its value, the firm should underfund its plan to the greatest extent possible and invest entirely in the riskiest securities.

A third effect has emphasized the pension fund's usefulness as a source of corporate liquidity or as a store of temporarily excess corporate funds. The view that firms will maintain some financial slack has a long informal history based on the notion that they do not wish to be caught having to rely on external financing at "unfavorable" times.

Such slack could be kept in the form of either liquid assets and unused debt capacity or pension assets. The latter is advantageous from a tax standpoint, but liquid assets and unused debt capacity are presumably substantially more accessible, particularly in the short run. While firms have increasingly attempted to tap their excess pension assets in recent years, the legality and regulatory status of these attempts has yet to be clearly defined. One might, therefore, expect firms to trade tax benefits against accessibility in deciding how much of their financial slack to keep in the pension fund. The stronger are a firm's earnings and the greater its need for tax shelter, the greater will be its tendency to build financial slack in the form of additional pension assets, and vice versa.

Together, these different aspects of corporate pensions (the tax shelter, the PBGC put, and the accessibility of financial slack) form a corporate financial perspective on pension policy, which can be contrasted with the more traditional perspective which views the pension plan as entirely separate from the corporation's other assets and liabilities and managed strictly in the interests of the covered employees. Is the corporate financial perspective supported or confirmed by the data we have on corporate pension funding and asset allocation?

Previous attempts to test the theory empirically have been hampered by lack of appropriate data. In particular, information was lacking on the discount rate used by firms in computing the present value of their pension liabilities. Reported pension liabilities are very sensitive to this discount rate. The higher the rate, the lower the reported liability. Thus, different firms having the same funding status in reality might appear to have very different pension liabilities simply because they choose different discount rates.

The empirical research reported in the paper, "Funding and Asset Allocation in Corporate Pension Plans: An Empirical Investigation," by Zvi Bodie, Jay O. Light, Randall Mørck, and Robert A. Taggart, Jr., which uses a new data set containing this variable, indicates that the discount rate chosen by a firm is systematically related to its financial condition and therefore, unless all firms' liabilities are adjusted to a uniform rate, the true cross-sectional relationship between financial condition and funding status is obscured. In particular it shows that less profitable firms tend to choose higher discount rates and thus to report lower pension liabilities.

The empirical results on funding and asset allocation lend some support to the corporate financial perspective. First, there is a significant positive relationship between firm profitability and the degree of pension funding. Second, there is also some evidence that firms facing higher risk and lower tax liabilities are less inclined to fund their pension plans fully. Third, a significant fraction of firms invest their pension assets entirely in fixed income securities, and the proportion of assets allocated to fixed income securities is positively related to the level of funding. The results also indicate that the traditional and corporate financial perspectives on pension decisions are far from mutually exclusive. Across firms, the asset allocation findings suggest that the corporate financial perspective may be more appropriate in describing small pension plans, while larger plans appear to take on some of the characteristics of the traditional perspective. Moreover, even within the same firm, different plans may be more appropriately viewed from one perspective or the other depending on their level of PBGC insurance coverage.

The rules of the game regarding PBGC insurance of corporate defined benefit plans may be changing, however. Both the rate structure and the rules for voluntary termination of underfunded plans are being examined by Congress. The possibility of a graduated premium rate schedule based on risk is being considered, as is the elimination of voluntary terminations of underfunded plans.

The paper in this volume by Alan J. Marcus, "Corporate Pension Policy and the Value of PBGC Insurance," develops an analytical model which can give quantitative consideration to these issues. As noted before, PBGC insurance can be viewed as a put option provided by the government to the firm's shareholders. Marcus applies modern options pricing methodology to derive the value of this put under two scenarios. The first allows for voluntary termination of an underfunded plan, which is still legal under current statutes. In practice, however, virtually all terminations of underfunded pension plans occur as a by-product of corporate bankruptcy, and there is good reason to believe that the law will be changed to eliminate the voluntary termination of

underfunded plans altogether. In the second scenario Marcus examines the effect of such a prohibition.

Under each scenario Marcus presents empirical estimates of the “fair market value” of the insurance provided by the PBGC for a sample of Fortune 100 firms. The results indicate that the magnitudes of the put values can differ substantially from the common measure, which is accrued benefits less the sum of fund assets plus 30% of firm net worth. Taking these estimated values as the measure of the PBGC’s liability, a small number of firms appear to account for the bulk of these liabilities. Presumably, a risk-related premium structure based on the computed put values would result in drastic differences from the current structure of a flat amount per covered employee regardless of the firm’s or its pension plan’s financial status.

Prohibiting voluntary termination of underfunded plans drastically reduces the calculated value of the PBGC put. But, probably the main contribution of Marcus’s paper is that it offers a starting point for devising a fair, operational risk-related premium structure for PBGC insurance.

In the final paper in the area of pensions and corporate finance, “How Does the Market Value Unfunded Pension Liabilities?” Jeremy I. Bulow, Randall Mørck, and Lawrence Summers confirm earlier analyses by Feldstein and others suggesting that the stock market valuation of firms reasonably accurately reflects their pension funding status. Their new contribution is in the methodology and broader data set they employ. Instead of using a straight cross-section test, they use a combination of time series and cross section.

1.3 Pensions and Retirement Income Adequacy

The two papers in this section deal with the role of pensions in providing an adequate and secure retirement income.

In the first, “Concepts and Measures of Earnings Replacement during Retirement,” Michael J. Boskin and John B. Shoven present an examination of some of the issues surrounding the measurement of the well-being of the elderly relative to their previous standard of living, or so-called replacement rates. Among the issues they raise are the treatment of taxes, expenses of raising children, health and health care costs, income uncertainty, and uncertainty about the date of death. They actually adjust their data for three of these.

Taxes are adjusted to reflect the special provisions of the tax code affecting the elderly. For example, until 1984 social security benefits have been completely tax free, and even now such benefits are tax preferred relative to earnings in the working years. The elderly also have extra personal exemptions. Next a correction is made for family

size. During the working life, typically there are children to care for, while in retirement there are only one or two individuals who do not need as much money as they did before. The third adjustment deals with uncertainty of income, and the argument is as follows. When a person is young there is substantial uncertainty surrounding the value of his future earnings, whereas by the time of retirement, social security benefits in particular are relatively certain. Boskin and Shoven, therefore, adjust the value of social security benefits to reflect their lower risk.

The paper then computes two measures of replacement adjusted in these three ways. The first is social security benefits relative to pre-retirement earnings and the second includes other sources of income including private pensions in the numerator.

The results in general indicate that fully adjusted replacement rates are very high for most people. They suggest that, for many of the elderly, earnings are virtually fully replaced by social security alone; for many more, social security replaces a large fraction of earnings; and total post-retirement income usually exceeds pre-retirement earnings.

In their paper, "Pension Plan Integration as Insurance against Social Security Risk," Robert C. Merton, Zvi Bodie, and Alan J. Marcus focus on a hitherto unexplored aspect of the integration of pension plans with social security. The manifest purposes of integrating an employer-provided pension plan with social security are (1) to insure adequate retirement income for all covered employees, and (2) to insure equity in retirement income defined as total replacement rates that are equal for all employees regardless of salary level. The focus of the authors' paper is on an equally important consequence of integration: the alteration of the risk-bearing relationships between employees, employers, and the government vis-à-vis social security benefits. The main alteration is that the employer, in effect, insures his covered employees against adverse changes in their social security (retirement) benefits. Using the option-pricing methodology of modern contingent claims analysis, the authors develop a formal model to explore the quantitative aspects of this change.

While the focus of the analysis is on full integration, the authors explicitly deal with various degrees of partial integration as is currently practiced. The authors analyze the effects of a switch from a non-integrated to an equivalent-cost integrated plan when private benefits are fixed in nominal terms and when they are indexed. They also consider the effects of ad hoc post-retirement benefit increases and the incentive effects on worker mobility of the adoption of integrated plans.

The most important finding is that for a common type of integrated plan (i.e., an offset plan) covered employees at the high end of the

earnings spectrum in effect are selling part of their rights to social security to the plan sponsor. They are, therefore, trading a claim against the social security system for a claim against the firm. At the low end of the earnings spectrum employees are maintaining much more of their claim to social security and obtaining insurance from the firm only against drastic reductions in the starting level of benefits.

1.4 Pensions and Savings Behavior

How do pensions, including social security, affect saving? This is a question which has received much attention from economists in the last few years, probably because pensions and social security have become such large economic institutions at the same time that the U.S. saving rate was perceived to be grossly inadequate. In the literature on the effect of social security on saving, Martin S. Feldstein's paper (1974) is seminal. In that study, Feldstein investigated how social security affects aggregate consumption, saving, and the nation's capital stock. His analysis emphasized the unfunded (pay-as-you-go) nature of the system. That is, he recognized that there is no social wealth or capital stock corresponding to the apparent wealth that individuals accumulate (the right to a future stream of retirement income). In his analysis, Feldstein found that the private rate of saving would be doubled if social security did not exist. The "false" wealth substituted for real capital accumulation dollar for dollar.

Two papers in this volume address a related issue and another reason why social security may reduce private saving. "Uncertain Lifetimes, Pensions, and Individual Saving," by R. Glenn Hubbard, and "Annuity Markets, Savings, and the Capital Stock," by Laurence J. Kotlikoff, John B. Shoven, and Avia Spivak, examine the effect of annuity markets (that is, the availability of longevity insurance) on saving. Both papers examine the consumption and saving behavior of risk-averse individuals facing uncertainty about the length of their life. In the absence of longevity insurance, people save in a precautionary way to provide for the possibility of living a long life. This is accomplished by reduced consumption and, on average, results in sizable unintended bequests. If annuity markets are perfected (and, importantly, social security benefits are paid out in an inflation-adjusted annuity form), both saving and bequests are reduced. The Kotlikoff, Shoven, and Spivak paper estimates that the introduction of a fully funded actuarially fair retirement annuity program would reduce the steady-state rate of saving and capital stock from 35% to 60%. Clearly, both papers are stylized simulations, but they do indicate that the annuity form of the payout of social security (given the substantial imperfections of private

annuity markets) may depress saving as much as its unfunded pay-as-you-go nature.

The Kotlikoff, Shoven, and Spivak paper and the Hubbard paper differ in their modeling of the counterfactual non-social security state of the world. Hubbard has each family facing its longevity uncertainty alone with the resultant unintended bequests given to the children. Kotlikoff, Shoven, and Spivak, on the other hand, argue that substantial insurance-type risk pooling can be achieved within the family itself, and therefore model the non-social security state as one wherein family members pool longevity risks. In general, the existence of this inter-family contract would reduce the effect of the government or the private sector introducing actuarially fair annuity measures. The Kotlikoff, Shoven, and Spivak paper also examines the equilibrium distribution of wealth in their model, where everyone has the same earnings profile. A nondegenerate but discontinuous wealth distribution results from the model with an individual's wealth depending on the sequence of life spans of his ancestors.

The paper "Dissaving after Retirement: Testing the Pure Life Cycle Hypothesis," by B. Douglas Bernheim, involves a more empirical examination of saving and dissaving after retirement. The first question investigated is simply whether the elderly dissave or save during retirement. Bernheim provides new answers to this question looking at both bequeathable wealth and total wealth (that is, including the value of retirement annuities). The data set is the Retirement History Survey, so he is able to follow households longitudinally.

The advantage of this approach is that it does not require the strong assumption necessary to address the question with cross-sectional data. He finds some dissaving during retirement, particularly among single individuals and early retirees.

Bernheim investigates whether the observed patterns of saving and dissaving are consistent with the testable hypothesis following from the pure life cycle theory. He discovers that the empirical findings, in general, reject the implications of that model.

1.5 Pensions and the Labor Market

The two papers in this section employ data on characteristics of actual defined benefit plans to infer the incentive effects of these plans on labor market behavior and the implications of the plans for different demographic groups.

In their paper, "The Incentive Effects of Private Pension Plans," Laurence J. Kotlikoff and David A. Wise find that there is a strikingly wide variation in the incentive effects of pension plans. Typical plan

designs provide a strong incentive for retirement at the plan's normal retirement age, and several plan types provide a strong incentive to retire at the age of early retirement.

For example, many plans have both early and normal retirement at age 55. For these plans, the average decline in the rate of pension accrual at age 55 is equivalent to about 30% of salary. If a person under these plans continued to work to age 65, pension accrual would be negative and equivalent to approximately 30% of earnings. Thus, between the ages of 54 and 65, the fall in the rate of pension accrual is approximately equivalent to a 60% salary reduction. The more common plans, with early retirement at age 55 and normal retirement at age 65, call, on average, for increasing rates of pension benefit accrual up to age 55 with a decline thereafter. However, the decline in accrual rates between the ages of 55 and 65 is not nearly as dramatic as the decline ascribed to plans that have both early and normal retirement at age 55. Under the more common plans, at age 65 pension wealth declines substantially.

Only under plans with both early and normal retirement at age 65 does pension wealth continue to increase until age 65. But even under plans with these provisions, the rate of pension accrual after age 65 drops precipitously. In this case, the average loss in pension wealth from working an additional year would be approximately equivalent to 40% of salary. In short, typical plans provide a strong incentive to work up to the age of early retirement, then an incentive to leave the labor force that gets stronger every year until the age of normal retirement, when the incentive increases dramatically.

Even among plans with the same early and normal retirement ages, there is a wide range in plan provisions. While the typical plan may provide positive pension accrual rates at some age—say 62—the accrual rate may be substantially negative for some plans. But even a small proportion of plans that provide a strong incentive to retire at a given age could have a substantial effect on aggregate labor force participation rates.

For some employees, vesting could be a very important determinant of labor force participation. The accrual rate at the age of vesting can range from as low as 2% of wage earnings to as high as 100%, depending on the plan type and the age of initial employment. Given normal and early retirement ages, there is little difference in plan accrual profiles by industry or by occupation. Differences in pension benefits by industry depend more on the type of plan than on variations among plans with the same basic provision. Because women typically live longer than men, accrued pension benefits at any age are higher for women than for men, about 13% on average at age 65, for example. The authors conclude that the rapid increase in pension plan coverage over the past

two or three decades may well have contributed substantially to the reduction in labor force participation of older workers during this period. The plans may also have an important effect on labor mobility.

In their paper, "Pension Inequality," Edward P. Lazear and Sherwin Rosen focus on how the size of a pension tends to vary with the sex and race of the individual, conditional on the individual's having a pension. Using data from the May 1979 Current Population Survey, they first try to determine the average tenure, age, and salary of the typical retiree by sex and race. They then use the 1980 Bankers Trust *Corporate Pension Plan Study* to derive data on pension plan characteristics. Their computations suggest that pension plans may exacerbate black-white compensation inequality while reducing male-female compensation inequality. Even though females are less likely than males to work in jobs entitling them to pensions, females who are eligible for pensions do receive relatively generous ones. The average pension that the typical retiring female receives is well below that of the typical male retiree, but the difference is not as pronounced as male-female differences in salary.

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