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PRIVATE PENSIONS AS CORPORATE DEBT

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Working Paper No. 703

NATIONAL BUREAU OF ECONOMIC RESEARCH  
1050 Massachusetts Avenue  
Cambridge MA 02138

June 1981

This paper was prepared for the National Bureau of Economic Research Conference on the Changing Roles of Debt and Equity in Financing U.S. Capital Formation, April 2-3, 1981, Williamsburg, Virginia. The research reported here is part of the NBER's research program in Financial Markets and Monetary Economics and project on the Changing Roles of Debt and Equity Finances in the United States, which is being financed by a grant from the American Council of Life Insurance. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

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IN FINANCING U.S. CAPITAL FORMATION

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These papers have been submitted to the University of Chicago Press to be considered for publication in a volume tentatively titled, The Changing Roles of Debt and Equity in Financing U.S. Capital Formation, edited by Benjamin Friedman.

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THE CHANGING ROLES OF DEBT AND EQUITY  
IN FINANCING U.S. CAPITAL FORMATION

Williamsburg, Virginia

April 2 and 3, 1981

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Summary

Private Pensions as Corporate Debt

This paper begins by examining the ways in which pension liabilities are and are not like corporate bonds. Some conceptual issues involved in valuing future pension obligations are then discussed.

The second section considers the advantage to firms of fully funding their pension obligations and the reasons why many firms nevertheless choose to have unfunded obligations. The third section then summarizes the results of research on the effect of unfunded pension liabilities on the equity value of firms.

The first three sections thus consider the role of pensions at the level of the individual firm. The two sections that follow focus on the current and future role of pensions in the national economy. More specifically, section 4 examines the effect of private pensions on the nation's saving rate, paying special attention to the implication of unfunded pension obligations. The fifth section then discusses the impact of inflation on the private pension system and the likely future for indexed and unindexed private pensions.

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## Private Pensions as Corporate Debt

Martin Feldstein\*

Private pensions are now a central feature of the asset and liability structure of the American economy. More than half of all employees have some form of pension coverage. The value to employees of their prospective pension benefits is a major part of their total financial wealth and generally represents the only way in which these individuals hold the debt of American corporations. Indeed, since the great majority of American households have little or no other financial assets,<sup>1</sup> the substitution of future pension benefits for current wages is their only contribution to financing the accumulation of non-residential capital.

Similarly, the promised pension benefits represent major liabilities of corporations. For many corporations, the present actuarial value of these future benefits constitutes a greater liability than the conventional debts in the form of bonds, commercial paper, and bank loans. By the end of 1981, the aggregate value of just the vested pension liabilities of non-financial corporations will probably exceed the corresponding value of all of their other net liabilities.

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\*President, National Bureau of Economic Research, Professor of Economics, Harvard University. This paper was prepared for the NBER Conference on Debt and Equity, April 2 and 3, 1981. The paper is in part a summary of two earlier technical studies that were done in the current project and presented in Feldstein (1980) and Feldstein and Seligman (1980). The paper also draws on Feldstein (1978).

<sup>1</sup> In 1972, nearly half of personal tax returns reported no interest and dividend income and more than 75% reported interest and dividend income of less than \$500. These figures are quite consistent with survey data that indicate that in that year more than half of the households with a head under the age of 65 held no financial assets and 80% held financial assets of less than \$5000. See Feldstein and Feenberg (1981).

It is worthwhile therefore, as part of the NBER general study of the changing character and role of debt and equity in the American economy, to examine the private pension as a form of corporate debt. This paper begins with an analysis of the ways in which the pension liabilities are and are not like corporate bonds and then considers some of the conceptual issues involved in valuing future pension benefits. In the second section, I discuss the advantage to firms of fully funding their pension obligations and reasons why many firms nevertheless choose to have unfunded obligations. The third section summarizes the results of research on the effect of unfunded pension liabilities on the equity value of firms.

The first three sections thus consider the role of pensions at the level of the individual firm. In the two sections that follow, I focus on the current and future role of pensions in the national economy. More specifically, section 4 examines the effect of private pensions on the nation's saving rate, paying special attention to the implications of unfunded pension obligations. The fifth section then discusses the impact of inflation on the private pension system and the likely future for indexed and unindexed private pensions.

I should emphasize that the ideas presented in this paper are more in the nature of a progress report than a finished body of research. The final section of the paper comments briefly on a number of questions that remain to be investigated.

#### 1. Evaluating Pension Liabilities

The typical pension plan is a corporate promise to pay retirement benefits based on the retiree's number of years of employment and his level of earnings during his immediate pre-retirement years. Although an employee generally

forfeits any claim to benefits if he leaves the company after only a few years of employment, the benefits of an employee who stays with the firm for some minimum number of years become "vested," i.e., the employee becomes entitled to benefits even if he subsequently leaves the company before retirement age. Firms can set aside tax deductible funds to meet these vested future benefits obligations and the income on these assets is not taxed to either the corporation or the pension plan itself. Some firms fund all of their vested pension obligations, but many do not.

Because the promise to pay future pension benefits is like the promise to pay interest and principal, a pension obligation is similar in many ways to an outstanding corporate bond. This is particularly true when the promised benefit is fixed in nominal terms, as it generally is when an employee is already retired. For an employee who is still working, the level of future pension benefits is not fixed but depends on future earnings. But even for such current employees, the level of vested benefits is fixed in nominal terms.

There are, however, a number of significant differences. First, pension obligations are less visible. Unlike corporate bonds, the pension obligations are not recorded on the corporate balance sheet. Present accounting rules require only that firms indicate the extent of their unfunded pension benefits in the notes that accompany the balance sheet. Although this information must be provided in the annual 10-K report that is filed with the Securities and Exchange Commission and that is available to the public, there is no requirement to include any information about pension obligations in the firm's annual report to its shareholders.

Second, pension obligations are more flexible. Although the ERISA (Employee Retirement Income Security Act) rules require firms to follow a policy of funding all new pension obligations within 30 years (and all previous pension obligations in 40 years), firms have considerable discretion about timing in the choice of a specific funding plan. Moreover, if a firm experiences temporary financial difficulties, getting permission to delay funding is both easier than postponing debt service and likely to have fewer serious consequences for the firm.

Third, the consequences for the firm of not being able to meet its pension obligations are also limited by government guarantee. If the pension plan or the company becomes bankrupt, the pension obligations become the responsibility of the federally financed Pension Benefits Guarantee Corporation (PBGC) which has recourse to the firm only to the extent of 30% of the firm's equity.

The flexibility of timing and the PBGC guarantee reduce the value of the pension obligation relative to a bond with the same potential annual cash outlay. How much the flexibility and guarantee are worth depends upon the circumstances of the particular firm, with a greater effect the less sound the firm's financial position. In the remainder of this section, I shall ignore both of these features, implicitly assuming that the firm's position is so strong that they are irrelevant.

There is a fundamental difference in the tax treatment of bonds and pension obligations that has an important quantitative effect on the valuation of pension obligations although it does not imply a qualitative difference between bonds and pensions: all the payments made to a pension fund are tax deductible while the principal repayments on a bond are not tax deductible. If

the corporation pays a marginal tax rate of 50% (including both federal and state taxes) a \$1 payment of pension benefits by the firm reduces the firm's after tax profit by only fifty cents. Similarly, a \$1 contribution to the pension fund to meet future benefit obligations also reduces the firm's tax by fifty cents and therefore only reduces its after tax earnings or assets by fifty cents. In contrast, repaying \$1 of corporate debt involves no tax reduction and therefore reduces assets by a full dollar. It is wrong therefore to regard pension liabilities as equivalent to bonds or loan balances. Indeed, it may be more accurate to treat each dollar of ordinary debt obligations as equal to \$2 of net pension obligations. Equivalently, it is important to measure pension obligations in terms of their net-of-tax cost.<sup>2</sup>

Going beyond the comparison of pension liabilities and bonds, it is important to recognize that the tax deductibility of pension contributions is logically different from the non-taxability of the earnings of pension fund assets. The fact that these earnings are not taxed has important implications for calculating the present value of future benefit obligations. In general, the present value of future benefit obligations cannot be calculated by discounting future benefits in the customary way by either the pre-tax or after tax rate of interest but depends on the extent to which (or the speed with which) those benefit obligations are funded.

An example will clarify why this is so.<sup>3</sup> Consider a firm with an obligation to pay a single pension benefit of \$100 ten years from now. The firm can

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<sup>2</sup> Note also that a debt repayment reduces gross assets without changing earnings while the payment of a pension obligation reduces both earning and assets according to accounting conventions.

<sup>3</sup> A more formal analysis is presented in section one of Feldstein and Seligman (1980).

borrow at an interest rate of 12% on its high quality bonds. Alternatively it can buy the high quality (i.e., virtually riskless) bonds of other firms for its pension fund and receive a yield of 12% on those bonds. Its combined federal and state marginal tax rate is 50%. These figures imply that the net cost of borrowed funds to the firm is 6%<sup>4</sup> and this is the rate that it should use to calculate the present value of any future pension benefit contributions. However, once a dollar has been contributed, it accumulates at 12% inside the pension fund.

Thus if the firm chooses to fund its future obligation immediately, it needs only contribute \$32.20 since, at 12%, this will accumulate to \$100 at the end of ten years. Moreover, since the current contribution would be tax deductible, the net cost to the firm would be only \$16.10; equivalently, the existence of the \$100 promised benefit reduces the current equity value of the firm below what it would otherwise be by \$16.10. In contrast, if the firm does no funding of the benefit, it must pay \$100 at the end of 10 years. This will have a net-of-tax cost to its shareholders at that time of \$50. Like other future costs and benefits that are known with (virtual) certainty, this \$50 can be discounted to a present value of the firm's net interest rate of 6%. The present value calculated in this way is \$27.92.

The decision to postpone funding the benefit or to fund it gradually over the ten years implies a present value that depends on both the pre-tax interest rate (12%) and the net-of-tax interest rate (6%). For example, if the firm decides to wait 5 years and then to fund fully at that time, it must make

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<sup>4</sup> This assumes that a small increase in borrowing does not change the interest rate that the firm must pay.

a contribution then of \$56.74 for a net-of-tax cost of \$28.37; i.e., \$56.74 accumulates at 12% to \$100 at the end of 5 years. The present value of the \$28.37, discounting at 6%, is \$21.20.

Note that, as these calculations suggest, immediate funding is cheaper than any postponement. This implies that firms should in principle fund their obligation as soon as possible. I will return to this subject in the next section.

In practice, firms typically calculate the present value of the vested pension obligation by discounting the future actuarially expected invested pension obligations by an estimate of the yield that they will obtain on their pension portfolio.<sup>5</sup> The value of the unfunded vested pension obligation is then calculated by subtracting the value of their pension assets from this measure of the pension obligation. For the funded portion of the benefits, this is an appropriate comparison; the discount rate is conceptually correct, there is no need to adjust the funded obligation for its tax deductibility since no further tax deduction will be allowed. But for the unfunded benefits, the usual method of calculation typically overstates the true value. To see this, note that the \$100 promise benefit would conventionally be valued at \$32.20 instead of \$27.92. Only if the benefit obligation is very far in the future (or growing very rapidly) does the conventional procedure of using a discount rate that is too high more than offset the error of not reflecting the tax deductibility of the contribution or of the direct pension payment by the firm.

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<sup>5</sup> In many cases, this is not even a realistic estimate of the risk-free return but only a conventional assumption designed to be conservative.

In addition to the issues of tax deductibility and of the choice of the discount rate for funded and unfunded obligations, there is the very basic question of whether the obligation should be defined to include only vested benefits or a broader measure of actuarially expected benefits. The narrow focus on vested benefits may understate the true value of a firm's obligation. The accounting requirements focus on the vested benefits because a future benefit does not become a legal liability of the firm until it is vested, i.e., until the employee is entitled to the benefits even if he quits the firm or is fired. The typical plan might provide that an employee with 10 years or more of employment has vested benefits of 2% of his final year's earnings per year of service; e.g., a 20-year employee gets 40% of his final year's earnings. In this case, the vested pension obligation completely ignores the employee with nine years of service even though he is very likely to stay long enough to become vested. Similarly, the vested benefits of the 64 year old employee makes no allowance for the fact that he is very likely to wait until he is 65 before retiring. The calculation of vested benefits is intentionally myopic. Should it be?

The purpose of evaluating pension liabilities is to assess the firm's future expenses in excess of the value of the services it will receive for those payments. The clearest case to consider is the vested benefits of a retired worker. Since the worker is already retired he will provide no further services; the present actuarial value of his pension rights is a net liability of the firm. Consider next a 64-year-old worker with 20 years of experience who will get 40% of his final wage if he retires at age 64 and 42% if he waits another year. Jeremy Bulow (1979) has noted, in a very provocative paper, that the

employee's opportunity to obtain higher pension benefits by waiting an extra year is irrelevant if the firm and the worker take the extra benefits into account in setting the wage for the extra year of work. More specifically, if the wage for that year is set so that the wage plus the increased value of pension benefits equals the value of the employee's services for that year, there is no excess cost to the firm associated with the employee's postponed retirement. The same argument applies to the individual who has had 9 years with the firm and is just about to become vested. If his wage during the tenth year of employment is set so that the sum of the wage and the initial value of the vested pension are equal to the value of the tenth year's services, there is no excess compensation in the prospective benefits.

Although Bulow's analysis is logically sound, it is not clear how relevant it is in practice. I know of no evidence that wages are adjusted to offset unusually large accruals of benefits. But the relationship between wages and pension benefits accrual is an empirical question that remains to be investigated. Moreover even if there is not a perfect offset with the implied large jumps in a few particular years, there may be a general tendency for the relationship between earnings and seniority to reflect the accruing pension benefits. If empirical work establishes that there is less than a full wage offset of the accruing benefits, then the evaluation of pension obligations must go beyond vested benefits in order to give an accurate picture of the firm's net obligation.

## 2. The Pension Funding Puzzle

As I noted in the previous section, the firm can reduce the real net cost of its pension obligations by funding them as fully as possible. This can be shown even more explicitly as follows. Recall that, in the example in the previous section, the firm has a pension benefit of \$100 to pay in 10 years, with a constant 12% interest rate on its own debt and on the obligations that it can hold in its pension fund, and has a marginal tax rate of 50%. Funding the benefit immediately would involve the net cost of \$16.10.

Assume now that the firm does not wish to fund the future benefits out of its current earnings since it wishes to use those funds for internal investment and dividends. It therefore borrows the \$16.10 and uses the borrowed money to fund the future benefit. At the end of one year, it owes interest of 12% on the loan of \$16.10 or \$1.93. Since this interest is a deductible expense, the net cost of the interest is 97 cents (or 6% of the loan). Assume that the firm borrows the 97 cents and thus increases its loan to \$17.07. The loan grows in this way at 6% a year until, at the end of the tenth year, it has grown to \$28.83. The firm can repay this loan in the tenth year and use the accumulated pension fund of \$50 to discharge its pension obligation. In this example, there is no change in the firm's cash flow under either method except in the tenth year at which time the immediate funding method saves more than 40% of the cost that would be incurred with no advance funding.

The implications of the example are perfectly general. The firm can borrow at a net-of-tax interest rate and then use the funds to earn a pre-tax interest rate within the pension fund. Since borrowing and holding debt do not

change the total debt position of the firm and pension fund combined, it is essentially an arbitrage opportunity.<sup>6</sup> The puzzle then is why many firms are not fully funded.<sup>7</sup>

Some firms may not fund more rapidly because the tax law limits the speed with which unfunded benefit obligations can be funded with tax deductible contributions. I suspect that this can account for at most a small fraction of the firms, although evidence on this point remains to be collected.

One potential explanation of the apparently irrational behavior of firms is that the management of those firms believes that the securities market is irrational, i.e., that portfolio investors would recognize the additional debt that appears on a firm's balance sheet but not the unfunded pension liability or the asset that it holds in its pension fund. If that were true, it would be in the interest of current share holders to leave the pension liability unfunded. Although the evidence summarized in the next section of this paper indicates that securities investors do not make this mistake, some firms may still be attributing that error to them.

A closely related explanation is that firms may be reluctant to fund more rapidly because the pension contribution would reduce the year's reported earnings (even if financed by borrowing) and this in turn might reduce the firm's market value if securities investors do not understand the reasons for the lower reported earnings. Firms should in principle be able to avoid this problem by

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<sup>6</sup> There is a separate issue of the type of asset in which the firm should invest its pension fund. Black (1980) and Tepper (1980) have argued that firms should hold only debts in their pension funds since equity investments (if any) are best made on the corporations' own accounts.

<sup>7</sup> In a sample of large manufacturing firms, Seligman and I (1980) found that about 25% of vested benefits were unfunded.

providing such information to shareholders and to the market if it decided to accelerate the funding of pension liabilities.

Firms may be reluctant to borrow in order to finance pension contributions because of the irrational rules of credit rating organizations, bank regulators, and the like. In an irrational world, it is optimal to behave irrationally -- or at least in a way that by logical standards appears to be irrational. Credit ratings, for example, depend on the amount of conventional debt that a firm has, on the ratio of earnings to assumed debt service obligations, and the like. An increase in conventional debt used to finance a pension contribution would appear incorrectly to increase the leverage of the firm and this might result in a lower quality rating for the firm's debt obligations. Because certain classes of portfolio investors cannot invest in securities with a low rating, reduction in the credit rating would raise the firm's cost of capital even if informed portfolio investors recognized the error in the lower rating. Similarly bank loan officers may be judged by regulators and by their superiors on the basis of the conventional balance sheet characteristics of the firms to which they make loans. A firm that weakens its conventional balance sheet may lose more through higher costs of borrowing or reduced credit availability than it gained by earlier funding of its pension obligation. Again, we lack evidence on the actual or presumed importance of these effects. Moreover, the entire argument of this paragraph assumes that there are not other investors and lenders who are prepared to arbitrage away such "irrational" credit-rating yield differences. With sufficient arbitrage, the arguments of this paragraph are not valid.

The existence of the Pension Benefits Guarantee Corporation may encourage firms to remain less than fully funded in order to increase the expected value of that compulsory insurance. Since the P.B.G.C. guarantees the benefits to the employees, it removes the natural concern of the employees or their unions to keep pensions more fully funded.

Finally, there is the possibility that managers whose salaries or bonuses are based on performance may want to see accounting profits and assets increased even if that means lower real net-of-tax profits to shareholders. Again, such behavior should not be necessary to satisfy the self interest of management since the company's board of directors could modify the rules at the suggestion of management to make the interest of shareholders and management coincide.

In short, the pension funding puzzle -- or, more accurately, the non-funding puzzle -- remains to be solved.

### 3. Pension Obligations and Share Prices

As part of the NBER Project on the Changing Role of Debt and Equity, Stephanie Seligman and I studied the effect of unfunded pension obligations on the equity value of a sample of manufacturing firms. The analysis used the inflation-adjusted income and assets that large firms have been required to provide for 1976 and subsequent years.

The basic approach of the study was to relate the market value of a firm's equity to the replacement value of its physical assets, its earnings and history of earnings growth, and the value of its debt. The firm's expenditure

on research and development and the "beta" coefficient relating movements in the firm's share price to movements of an aggregate share price index were also included in the basic specifications of the statistical valuation equation. By taking these determinants of the market value of the firm into account, we could estimate whether there was an additional statistical effect on the equity value of the unfunded vested pension liabilities reported by the firm.

The evidence for our sample of nearly 200 manufacturing firms was consistent with the conclusion that share prices fully reflect the value of unfunded pension obligations. Since the conventional accounting measure of the unfunded pension liability has so many problems, it would undoubtedly be more accurate to say that the data are consistent with the conclusion that the securities market appears to accept the conventional measure as the best available information and causes share prices to be reduced by a corresponding amount.

Of course, not all shareholders need be aware of unfunded pension liabilities for this to be true. If a sufficient number of securities analysts and investors representing a significant amount of assets take these liabilities into account, they can make it unnecessary for others to do so.

For nearly 200 major manufacturing firms in the sample, unfunded pension liabilities averaged 4.9% of the replacement value of physical assets in 1977. Since the pension assets themselves averaged 13.5% of the replacement value of physical assets, these firms had funded approximately 75% of their vested pension liabilities. These figures also imply that the value of vested liabilities are extremely large, 18.4% of the total value of plant, equipment and inventory.

It is of course possible that the statistical estimates are spurious. For example, firms that do not fully fund their liabilities may have other characteristics that also depress share values and that were not taken into account in our analysis. For example, firms in very strong financial positions may choose to fund fully while firms with weak earnings may seek to increase reported earnings by not funding as much. The bias could however go in the opposite direction. The firm that expects to have more cash flow in the future may postpone funding. Similarly, the firm with cash that it does not know how to invest may choose to fund more at present. Further analysis of the reasons that firms do not fully fund would help to resolve this statistical issue.

As I noted in the previous section, if the conclusion that the market reflects unfunded liabilities and share prices is correct, this eliminates one reason why firms might wish to be less than fully funded. The evidence that the market recognizes unfunded liabilities also helps to explain why the stock market has not risen more in the past decade. The specific estimates derived from the current sample of firms implies that the unfunded vested pension liabilities were 7% of the market value of the firm's equity in 1977. If the equity value of the firm was reduced dollar for dollar by its unfunded liability, the recognition of these liabilities lowered the average share value by about 7%. Stating this in different words, in judging the extent to which shares are currently undervalued, the measure of the "true" equity value of the firm (i.e., the replacement value of physical assets minus net debt) should be reduced by an amount equal to about 7% of the current market value of equity.

Our investigation of the effect of unfunded pensions liabilities on share prices was motivated by the relevance of this issue in assessing the effect of private pensions on the national saving rate. Before commenting on the implications of our findings, I shall discuss the more general issue of the impact of private pensions on national saving.

#### 4. Private Pensions and National Saving<sup>8</sup>

Although private pensions represent a very substantial amount of capital accumulation, it is not at all clear from a priori considerations alone that they actually achieve any net increase in the nation's capital stock. Private pensions may only represent a change in the form in which individuals save, a substitution of pension assets for an equal amount of direct saving. Indeed, since the untaxed pension fund earns a higher rate of return than the tax-paying individual, the pension permits the same level of retirement consumption to be financed with a smaller initial volume of savings.

The existence of private pension plans increases aggregate national saving only if it induces individuals to postpone consumption, i.e., to consume more in retirement and less when they are working.<sup>9</sup> Pensions may of course induce such a shift in consumption in response to the higher rate of return.

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<sup>8</sup> For a more complete discussion of this subject, see Feldstein (1978).

<sup>9</sup> This statement implicitly assumes that the existence of the private pension does not alter the total amount of government spending in each year. The private pension plan per se involves a postponement of tax liability from the earning years to the retirement years. This in itself increases private savings. But the lower tax payments imply an equal decrease in government saving or increase in government borrowing. This change in the timing of tax payments therefore leaves national saving unchanged.

If the increase in retirement consumption is large enough, saving will rise. While this condition will not be satisfied for all taxpayers, it will be for some.

In addition to those who increase their desired saving, there is another important group for whom the private pension represents forced saving. The very substantial fraction of the population with little or no directly held financial wealth implies that forced saving may be quite important. These individuals may be myopic or may believe that their Social Security benefits will provide at least as much as they want for retirement. In any case, they are forced by their private pensions to have more retirement consumption than they would otherwise choose. Although they might in principle offset this extra pension wealth by borrowing, it is extremely difficult to borrow any substantial amount without specific collateral. Whether it is this difficulty or just an aversion to the accumulation of debt, few individuals reach retirement with enough financial liabilities to offset a significant fraction of their pension benefits.

Pensions may also increase saving by inducing individuals to retire earlier than they otherwise would. Since pensions are only paid when an individual retires, individuals have a strong financial incentive to retire as soon as they are eligible for the maximum pension. When an individual retires at an earlier age, he has more years of consumption to finance and fewer years in which to accumulate the retirement assets. Induced early retirement would therefore increase saving even among individuals who do not respond at all to the higher rate of return.

Although the empirical evidence on this issue is weak, it seems likely

on the basis of existing data that the promise of private pension benefits does not induce an equal or greater reduction in direct personal saving. But, even if direct personal saving falls by less than the amount required to fund the private pension, total private saving may fall if the pension is in fact not funded. I say "may" rather than "will" because, even with no funding, total saving may increase. What happens depends crucially on the response of shareholders.

To understand this, consider the case in which the firm trades a promise of a future pension benefit for a reduction in current wages below what they would otherwise be. Assume that the employees recognize the value of the promised pension and reduce their saving by enough to keep retirement consumption unchanged. If the firm uses the extra profits that result from the lower wages to fund the pension, there is just a substitution of one form of saving for another.<sup>10</sup>

But what if the firm does not fund the pension liability and instead adds the extra profits to retirement earnings and invests them in the firm. This too is just a substitution of one form of saving for another unless the shareholders respond to the increased earnings and assets by consuming more. This increase in consumption would occur if the firm's share price rose in response to the increased plant and equipment, i.e., if the shareholders ignored the increased pension liability in valuing their shares. The evidence (presented in the previous section) that share prices do reflect the unfunded pension liability implies that shareholders would not be misled by the increase

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<sup>10</sup> This ignores the differences in tax treatment between pensions and direct saving, a simplification that greatly facilitates discussing the current point without losing anything essential.

in assets. Instead, the change in corporate assets and the change in pension liability would offset each other and leave the share price and therefore shareholder consumption unchanged.

A similar argument applies if the firm uses the extra profits to finance higher dividends. Since the higher dividend does not reflect higher real earnings or greater assets, the share price would remain unchanged and shareholders should not increase their consumption response to the higher level of dividends. Unlike the analysis of retained earnings, this argument requires both that the share price does not rise and that shareholders base their consumption on the value of their wealth and not on dividends per se. Since some macroeconomic evidence does suggest that dividends are important as a determinant of consumption, unfunded pension liabilities may induce some additional consumption on the part of shareholders.

The effect on the nation's savings of an increase in private pensions is thus quite complex. It seems likely that there is some increase in retirement consumption and that employees do not reduce their direct savings by the present value of the pension obligation. To the extent that these obligations are funded or used to increase retained earnings, aggregate savings increase. To the extent that the extra cash flow that results from unfunded benefits goes into dividends, the net effect is more ambiguous.

In concluding this discussion, it is worthwhile to emphasize the difference between unfunded private pension benefits and unfunded Social Security benefits. Because the promise of future pension benefits is an obligation of corporate shareholders, it is reflected in a market price that reduces the net wealth of current shareholders. Because the promise of private pension benefits makes current shareholders poorer, they have an incentive to save more

either directly or through corporate retained earnings. The same is not true for Social Security. The promise to pay future benefits implies a higher tax on future employees but involves no incentive for current employees to save more.<sup>11</sup> Thus whatever the depressing effect of either type of pension on the direct savings of employees, private pensions will result in a larger increase in national savings (or smaller decrease) than would result from an equal amount of Social Security.

#### 5. Private Pensions and Inflation<sup>12</sup>

Much of the recent discussion about the relation between private pensions and inflation has emphasized the adverse impact that the unexpected rise in inflation during the past 15 years has had on pension recipients and on the performance of pension funds. Some of those who have commented on the problem have even concluded that the private pension system cannot survive in an inflationary economy. It is important, however, not to confuse the unfortunate consequences that followed when inflation caught pensioners and pension fund managers by surprise with the inability to adjust to future conditions, even uncertain future conditions.

In a previous study, I concluded that a steady rate of inflation, far from destroying the pension system, would actually increase the share of total savings that goes into private pensions. The reason for this conclusion is that the advantage that the private pension has in exempting its portfolio income from

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<sup>11</sup> This ignores the observation of Robert Barro (1976) that current individuals may wish to save more in order to increase their bequest to compensate their children for the higher taxes that those children will face as a result of increased Social Security benefits.

<sup>12</sup> This section summarizes conclusions developed in Feldstein (1980).

taxation becomes greater when there is inflation. This in turn reflects the fact that individuals pay tax on the full nominal interest income that they earn on direct saving and therefore pay a tax per unit of capital that rises with the rate of inflation; in contrast, of course, since pensions pay no tax on their interest income, the tax differential per unit of capital rises with inflation. Similarly, individuals pay tax on nominal capital gains on stock (as well as on dividends) and this capital gains tax also implies a tax per unit of capital that rises with the rate of inflation. Thus on both debt and equity, inflation increases the yield differential between household and pension funds in favor of pensions.

The relative yields on debt and equity are likely to move in opposite directions for households and pensions. If the real pre-tax interest rate remains unchanged, the pensions have a constant real yield on debt while the yield on equity falls slightly because of the extra taxes paid at the corporate level. For households, the real net-of-tax yield on debt falls sharply while the real yield on equity falls by less. Households would thus be induced to sell debt to pension funds and hold more equity directly.

The uncertainty of inflation influences the optimal extent of pension indexing and the likely composition of pension assets. Without indexing, the vested pension obligations are nominal long-term liabilities of the firm. The firm can hedge these liabilities by holding long-term bonds. Of course, firms may nevertheless invest in equities because they believe that the equity yield is high enough to compensate for the reduced hedging. But, since the extra risk of equity investment is borne by the firm's shareholders, the employees who par-

ticipate in the pension plan should earn an implicit nominal return on their foregone wages that is only equal to the nominal return on riskless bonds.

A fully indexed pension would make all pension obligations real. Long-term bonds are clearly an inappropriate investment for funding such real obligations. Stocks can provide a hedge against price level uncertainties only by accepting substantial general uncertainty. Zvi Bodie (1980) has emphasized that a portfolio with a minimum-variance real return would be invested almost completely in short-term debt (with a small amount in commodity futures) and that the expected return on such a portfolio is approximately zero. If employees are so risk averse that they choose a fully indexed pension, the implicit real return that they earn on foregone wages should therefore also be approximately zero. Again, firms may invest in equities, but the shareholders rather than the pensioners should receive any extra yield in return for bearing that risk.

If employees choose a partially indexed pension, i.e., one in which benefits rise less than one-for-one with the price level or in which benefits depend on the return on the pension fund assets, the firm can invest in a way that permits giving a higher return to pension participants while compensating shareholders for any additional risk that they bear. The optimal extent of pension indexing depends on the risk aversion of employees and the cost, in terms of the reduction in the expected yield, of investing pension assets to produce a constant real return.

As Paul Samuelson (1958) noted years ago, an unfunded social security program can provide an annuity with an implicit real rate of return equal to the

real growth rate of the economy, probably about 3 percent a year over the next decade or longer. Although 3 percent is substantially less than the real return of more than 10 percent that the nation as a whole earns on additions to the stock of plant and equipment (Feldstein and Poterba, 1980), the political pressure to substitute unfunded Social Security benefits for private pensions (or vice versa) is likely to depend on the real after-tax yield that partly indexed pensions can offer and on the associated risk. If employees were completely risk averse, the low 3 percent yield on Social Security would look good in comparison to Bodie's zero yield on a minimum-variance real return portfolio. But if employees are willing to accept the risk inherent in a partially indexed pension, they can expect to receive an implicit yield that is much greater than three percent.

In summary, the form and funding of private pensions will probably change in the coming decade if inflation continues at recent levels but, unless employees become much more risk averse, private pensions are likely to continue to finance a growing share of retirement consumption.

## 6. Future Research

The substantial size and rapid growth of private pensions makes it important to understand their impact on capital markets and capital formation. From the basic problem of pension liability measurement to the more complex issue of the impact of unfunded obligations on shareholder consumption, we are only beginning to do the necessary research. This paper has indicated a number of questions on which further research should be done. How do employees' earnings reflect their accruing pension benefits? Why do firms not take advan-

tage of the tax benefits of full and immediate funding? How do financial markets and financial institutions respond to the extent of a company's pension fund? And how does the existence of partly funded private pensions influence the nation's aggregate rate of saving? As the answers to these questions become known, we will better understand the impact of private pensions on the American economy.

References

- Barro, Robert, 1974, "Are Government Bonds Net Wealth?" Journal of Political Economy 82: 1095-1117.
- Black, Fisher, August 1980, "The Tax Advantages of Pension Fund Investments in Bonds," NBER Working Paper No. 833, 1980.
- Bodie, Zvi, February 1980, "Purchasing Power Annuities: Financial Innovation for Stable Real Retirement Income in an Inflationary Environment," NBER Working Paper No. 442, 1980.
- Bulow, Jeremy, November 1979, "Analysis of Pension Funding Under ERISA," NBER Working Paper No. 402, 1979.
- Feldstein, Martin, December 1978, "Do Private Pensions Increase National Savings?" Journal of Public Economics 10: 277-293.
- Feldstein, Martin, 1980, "Private Pensions and Inflation," American Economic Review, forthcoming.
- Feldstein, Martin and Feenberg, Daniel, 1981, "Alternative Tax Rules and Personal Saving Incentives: Microeconomic Data and Behavioral Simulations," paper presented at the NBER Conference on Behavioral Simulation Methods in Tax Policy Analysis, January, 1981.
- Feldstein, Martin and Poterba, James, July 1980, "State and Local Taxes and the Rate of Return on Nonfinancial Corporate Capital," NBER Working Paper No. 508R, 1980.
- Feldstein, Martin and Seligman, Stephanie, July, 1980, "Pension Funding, Share Prices and National Saving," NBER Working Paper No. 509, Journal of Finance, forthcoming.
- Samuelson, Paul, 1958, "An Exact Consumption-Loan Model of Interest with or Without the Social Contrivance of Money," Journal of Political Economy, December 1958, 66, 467-82.
- Tepper, Irwin, "Taxation and Corporate Pension Policy," mimeo, 1980.