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The enormous growth in both Social Security and private pension plans has stimulated much interest in the impact of these retirement programs on individual saving behavior and the level of national saving. The first issue is the extent to which employees covered by pension plans reduce their own direct saving in response to expected retirement benefits; the response of individuals to guaranteed retirement income will determine, to a large extent, their well-being in retirement. For a nation concerned about saving and capital formation, the second issue is the impact of collectivized retirement saving plans on the national saving rate. This impact will depend not only on individual responses to promised pension benefits, but also on the extent to which firms undertake direct saving, and, if they do not, the extent to which shareholders recognize and compensate for unfunded pension liabilities. The effect of pensions on national saving also requires determining the degree to which increased saving induced by favorable tax provisions exceeds the loss of government revenues.

This paper will lay out the questions that need to be answered in order to determine the impact of private pension plans on saving, highlight those aspects of pensions that may complicate the analysis, summarize the results of empirical research in this area, and finally make recommendations for improvements in the data.

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[*]Senior Vice President and Director of Research, Federal Reserve Bank of Boston; and Economist, Aetna Investment Management, respectively. June 1990. This paper will also appear in the forthcoming volume Pensions and the Economy: Sources, Uses, and Limitations of Data, Zvi Bodie and Alicia H. Munnell, editors.

I. Pensions and Life-Cycle Saving

Many people who favor increased reliance on private as opposed to public provision of retirement benefits rest a large portion of their case on the rapid increase in private pension fund assets. Indeed, the growth has been extraordinary, from $5 billion at the end of 1945 to over $1.7 trillion by the end of 1989.[1] Proponents of private plans imply that the buildup of pension reserves represents a net increase in saving for the economy. Economic theory suggests, however, that it may simply reflect a shift in the form of saving. The life-cycle model predicts that, in an ideal world characterized by perfect labor and capital markets, no taxes and no uncertainty, people would simply substitute the increase in their expected pension benefits for their own saving.[2] As will become evident, the level of assets in pension funds tells little about either the well-being of individuals or the impact of private plans on aggregate saving.

A simple model may help clarify the issues. Suppose the population consists of individuals who expect to live exactly T years. People begin work at birth, earn E dollars of compensation per year while at work, and retire at age R. This leaves workers T-R years in retirement, during which time they earn no wages. Ignoring interest, an individual's lifetime income is

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[1]In focusing on the distinction between the public pay-as-you-go social security program and private funded pensions, the discussion omits any mention of plans sponsored by state and local governments. These public plans look very much like those in the private sector and are fairly well funded with assets in excess of $600 billion at the end of 1989.

[2]The life-cycle theory has come under criticism in recent years, primarily because of the alleged importance of intergenerational transfers as a saving motive and the apparent lack of asset decumulation on the part of the elderly. Despite the furor, this model provides the most useful framework for analyzing the impact of pensions on saving. For a brief description of the controversy, see Kotlikoff (1988) and Modigliani (1988).

$$(1) \qquad Y = RE$$

or the product of years at work and earnings per year.

Workers wishing to avoid starvation during their retirement will save during their working years.[3] According to the life-cycle model, they will save and dissave exactly enough so their annual consumption, C, is identical in each year of their life, including periods of work and retirement:

$$(2) \qquad C = \frac{RE}{T}$$

This consumption pattern implies that annual savings while at work will be

$$(3) \qquad S = E - \frac{RE}{T} = \frac{T-R}{T} E.$$

Assume that people live exactly 50 years and typically retire when they reach age 40 (that is, T=50 and R=40). If they earn $10,000 a year at work, in the absence of a pension plan, they will save on their own $2,000 a year while working in order to maintain a constant consumption level of $8,000 throughout their lives.

Now suppose the employer provides a compensation package that consists of cash wages, W, and a pension promise, P; that is,

$$(4) \qquad E = W + P.$$

In this case, an individual's annual saving, S, will consist of the promised future benefit from his employer, P, and other saving (OS) done on his own,

$$(5) \qquad S = P + OS.$$

The first step in sorting out the effect of the introduction of the pension plan on saving is to determine whether individuals reduce their own saving, OS, in response to the promised pension benefit. In order to isolate

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[3]The following discussion assumes no saving for bequests.

the relationship between pension and non-pension saving, equation 5 can be rewritten in terms of other saving,

$$(6) \qquad OS = S - P = \frac{T-R}{T} E - P = \frac{T-R}{T} (W+P) - P$$
$$= \frac{T-R}{T} W - \frac{R}{T} P.$$

Individuals committed to life-cycle saving will fully offset their own saving to account for employer-provided pension promises. Using the numerical assumptions identified above, people receiving pension promises of $2,000 will save nothing on their own. Similarly, persons receiving $9,000 in wages and $1,000 in pension promises will save $1,000 in order to bring their total up to the $2,000 required to maintain a constant level of consumption. (Note that fully offsetting behavior does not imply a coefficient of -1 on the pension variable.)

What happens in this simple example if people for some reason do not reduce their saving to offset fully promised pension benefits? Say, for example, the employer provides a $2,000 pension, and the employee reduces his own saving by only $1,000. In this case, the employee's consumption during his worklife falls from $8,000 to $7,000, and consumption during retirement rises from $8,000 to $12,000. Thus, the response of the employee to promised pension benefits has significant implications for the well-being of the individual and, in a growing economy, for the amount of aggregate national saving.

At the risk of some overstatement, one could argue that it is irrelevant whether the employer funds or does not fund the plan. Suppose that employers were required only to recognize the cost of pension promises as they accrue, which would be similar to the proposals currently under consideration for post-retirement health benefits. In this situation, the employer's income

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statement would show compensation expenses of $10,000, $8,000 in wages and $2,000 in increased promises of future pension benefits. After paying wages to the employee, the employer ends up with $2,000 in cash, which can be added to balance sheet assets offsetting the increase in accrued pension liability.

The employer can then do one of three things with this money: make a contribution to its pension fund, invest the money in the firm, or pay it out as dividends. In this simple model, none of these transactions should have any impact on aggregate saving. The first option will involve debiting corporate assets by $2,000 and crediting the pension fund with the same amount; the pension fund will hold the money until the employee retires, at which time it will pay it out in benefits. Under the second option the firm can either hold the $2,000 in its vault and pay out the benefits when the employee retires or it can use the money to buy a machine and sell the machine when benefits need to be paid. Again, neither of these transactions would affect saving.

The trickier issue is the effect on aggregate saving if the firm pays out the entire $2,000 in dividends. The immediate impact would be a $2,000 increase in the income of shareholders. Without any further adjustments, this would lead to a $1,600 increase in their consumption and lower national saving. But, assuming the pension payment were an inescapable commitment, shareholders would also experience a $2,000 decline in the net worth of their firm as a result of the creation of a $2,000 unfunded pension liability. Assuming perfect knowledge about the firm's future commitments, shareholders would not increase their consumption, but rather would increase their direct saving by $2,000 to offset the failure of the firm to save for future pension expenditures. Through this mechanism, even paying out the recognized cost of

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future pension liabilities in dividends does not alter the conclusion that pensions need have no effect on national saving.

To summarize. Aggregate saving will be unchanged by the introduction of pension plans if 1) employees and employers correctly perceive the increase in future income encompassed by pension promises and reduce wages by an equivalent amount; 2) employees reduce their direct personal saving by the increased value of future pension benefits; and 3) the firm transfers to the pension fund or some other firm investment an amount equal to the pension promise. Alternatively, if the firm chooses not to fund, the "no-effect" conclusion can still hold if the shareholders recognize that the dividend payments they receive are offset by the decline in the value of the net worth of the firm due to the increase in unfunded pension liabilities.[4]

Gauging the impact of pensions in the real world requires assessing the extent to which the behavior of markets and of individuals conforms to the predictions of this simple model. This means answering three questions. First, by how much do employees receiving part of their compensation in pension promises reduce their other saving? Second, to what extent do employers carry out the direct saving by investing either in a pension fund or in their company assets? And third, to the extent that the company fails to invest, do shareholders alter their direct saving to compensate for the increase in unfunded liability?

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[4]No comparable mechanism is available in the case of pension plans sponsored by state and local governments. As a result, any shortfall or funding is likely to lead to lower national saving.

II. How Does the Real World Differ from the Simple Model?

Before looking at the existing evidence about the impact of pensions on saving, it is useful to consider ways in which the real world and pensions differ from the simple notions described above. Obvious factors omitted from the discussion so far are taxes, interest rates, inflation, and uncertainty. Even expanding the model to include these factors would be insufficient, however, because pensions themselves have some unique attributes that make analyzing their impact on saving particularly difficult.

Uncertainty about Benefits

Pensions are extremely complicated; in the past this complexity has made it difficult for employees to have a realistic assessment of the value of future pension benefits. Insofar as employees are unaware of or underestimate future retirement benefits, they will not reduce their own saving to offset their share of pension asset accumulation. On the other hand, an inflationary environment makes it difficult for people who change jobs frequently and others to have an accurate assessment of unindexed pension benefits and workers could just as easily overestimate future real pension benefits. Thus, uncertainty about pension provisions could induce employees to reduce other saving by either more or less than the increase in their promised future benefits.

Illiquidity of Pension Promises

The neutrality of pensions in the simplified life-cycle model hinges on the ability of workers for whom pension saving exceeds their desired level of saving to borrow at market rates against excessive future benefits. Imperfect capital markets, however, often prevent people from borrowing freely, thereby forcing them to save more than they otherwise would. Such forced saving is

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most likely to occur among lower-paid workers, who have little saving to reduce in order to offset excessive pension accumulation. Because these lower-paid workers cannot borrow against future benefits, they end up saving more than they would have on their own. In this case pension plans may increase national saving and capital accumulation.

Even those workers whose desired levels of saving equal pension levels may not wish to do all their saving through pension plans. Since the illiquidity of a future pension benefit reduces the substitutability of pensions for other private saving, people may reduce their own saving by less than one dollar for each dollar of increase in promised future benefits, and so contribute to a net increase in aggregate saving.

Induced Retirement

The retirement provisions accompanying private plans also may have stimulated aggregate saving. The introduction of pension plans has allowed many workers to retire earlier than they otherwise would. This early retirement would be expected to increase saving, since people who retire early are forced to save at a higher rate over a shorter working life in order to finance a longer period in retirement. Even if each individual were a perfect life-cycle saver with zero net saving over his lifetime, with a growing population aggregate saving would increase because the number of savers would outnumber the dissavers. Similarly, if incomes were rising, the amount saved by workers would exceed that dissaved by retirees. Since historically both the population and real per capita income have tended to increase each year, the trend toward earlier retirement that has accompanied the growth of private pension plans would be expected to have increased the rate of saving in the economy.

Pensions as Annuities

Because pensions are usually paid in the form of annuities - guaranteed benefit payments for the remainder of the employee's life - total saving may be less than if each worker saved for his own retirement. Without pension annuities, most people would be forced to accumulate sufficient assets to finance an extended retirement. By pooling risks, gearing retirement saving to the average life expectancy, and offering annuities, pension plans reduce the total saving required to ensure workers a continuous stream of benefits during their retirements.

Favorable Tax Provisions

Compensation in the form of deferred pension benefits is treated favorably under the U.S. personal income tax. By allowing the deferral of taxes on promised pension benefits until after retirement, compensation in the form of pension contributions offers three advantages over compensation in the form of wages. First, the full dollar of contribution without any reduction for income tax is available for investment during the employee's working years - in contrast to the situation in which a dollar is paid in wages and the employee has only the after-tax dollar to invest. Second, no tax is currently paid on the investment income from accumulated assets, whereas interest earned by the employee on ordinary saving is subject to tax as income accrues. Finally, when benefits are distributed in retirement, they are likely to be taxed at a lower marginal rate than if they had been taxed as they accrued.[5] As a result, those workers who receive a portion of their compensation in

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[5]This phenomenon was considerably more important before the Tax Reform Act of 1986, which significantly reduced the progressivity of the rate schedule.

promised pension benefits pay less tax over their lifetime than those who receive all their compensation in wages.

These tax advantages, in effect, raise the net return on saving through deferred pension arrangements. Although higher returns create both an income effect that encourages greater consumption, and a substitution effect that encourages greater saving, the most common finding among studies on the effect of interest rates on saving seems to be that the substitution effect somewhat outweighs the income effect, leading to a small net increase in saving.[6] Hence, the favorable tax provisions associated with pensions would be expected to increase national saving. This intuitive conclusion, however, may not necessarily be correct. Two factors are particularly relevant in determining the outcome - the extent to which the higher rate of return enters into people's saving decisions and the extent to which the tax advantages simply result in less saving by the government.

Workers for whom pension saving is inframarginal - that is, their desired levels of saving exceed that provided by social security and private plans - will experience no change in the rate of return on saving at the margin. For them the favorable tax provisions for pension saving induces an income effect but no offsetting substitution effect, so they will reduce their current saving. On the other hand, employees who want to save less than their social security and pension will receive an increased return at the margin, and, assuming the substitution effect dominates, will increase their saving. In other words, favorable tax provisions for pension plans will lead to a net increase in saving when pension levels exceed the amount of saving workers

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[6]The best known study finding significant positive interest rate effects is Boskin (1978).

would have done on their own and will lead to a reduction in saving when pension levels are less than workers' desired level of saving.

In the United States, pension contributions and benefits tend to be small. According to data from the 1986 Current Population Survey, the median annual private pension benefit received by married couples and single individuals aged 62 to 64 was only $4,930; moreover, only 20 percent of these beneficiaries received an annual payment in excess of $10,000 (Grad 1988, table 33, p. 72). Hence, it is highly likely that desired saving exceeds pension saving for most middle-income and high-income people, and they experience no change in the rate of return at the margin. Thus, the favorable tax provisions probably have had little effect on aggregate saving.

At the same time, the tax-deferred status of supplementary pension benefits causes a loss to the Treasury of significant revenues; this loss is equivalent to a reduction in government saving or an increase in government dissaving. Although the precise amount of forgone revenues is subject to considerable controversy, the total is undoubtedly large. For example, the U.S. Office of Management and Budget (OMB) estimates that the revenue loss for 1991 (on a cash basis and hence not directly relevant for the current discussion) will be roughly $47 billion (table C-1, p. A-73). On balance, then, the favorable tax provisions accorded compensation in the form of deferred pension benefits may not encourage individuals to save more and almost certainly cause the government to save less, resulting in lower national saving than if individuals saved on their own.

In short, a variety of complicating factors make it impossible to determine a priori the effect of pensions on saving. The illiquidity of pension promises and uncertainty about the value of future benefits raise a

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question as to whether individuals reduce their other saving dollar for dollar in response to promised future benefits. On the other hand, even if individuals do undertake fully offsetting behavior, the link between pensions and retirement behavior may increase aggregate saving in a growing economy and, in a world of uncertain lifetimes, the fact that pensions are paid as annuities may reduce national saving. Finally, the introduction of taxes and particularly favorable tax provisions for compensation in the form of deferred pension benefits further complicates the analysis; does the higher net rate of return for pension saving cause employees to increase their total saving? And to the extent that increased saving occurs, does it compensate fully for the loss in government revenues from the favorable provisions?

III. What Evidence Do We Have to Date?

The addition of taxes means that four, rather than three, questions need to be answered in order to determine the effect of pensions on saving. First, to what extent do employees reduce their own direct saving in response to promised pension benefits? Second, to what extent do employers carry out the direct saving by investing either in a pension fund or in their company assets? Third, to the extent that companies fail to invest, do equity prices decline to reflect the increase in unfunded liability and do shareholders alter their direct saving to compensate? Finally, do the favorable tax provisions stimulate enough additional private saving to compensate for the reduction in government saving? This section describes the work that has been done to date addressing each of these questions.

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To What Extent Do Individuals Reduce Their Own Saving?

Most of the empirical work on the issue of pensions and saving has been geared toward determining whether employees reduce their direct saving in response to an increase in promised future benefits. The total number of studies, however, are relatively few and almost none incorporate all the desired data.

Despite the widespread acceptance of the life-cycle theory, the view that individuals might reduce their saving in anticipation of pension benefits is relatively new. Until quite recently, most experts argued that participation in any pension plan encouraged people to save more than they would otherwise. The authors of a 1968 Brookings study on social security commented, "The available evidence suggests that, over the long run, individuals covered by government and industrial pension plans tend to save more than those who are not covered" (Pechman, Aaron, and Taussig, p. 186). This view, which was based in part on the historical stability of the savings rate, was buttressed by the results of two cross-sectional studies on the relation between private pension coverage and saving behavior.

In a 1965 study, Phillip Cagan analyzed the savings response of over 15,000 members of the Consumers Union in 1958-59 and found that those covered by private pension plans saved more than those not covered. Cagan's explanation of the surprising results was that pension coverage calls attention to retirement needs and prospects and thereby fosters a "recognition effect" that counteracts individuals' disinclination to plan for the future.

A study reported by George Katona (1965), based on personal interviews conducted by the Survey Research Center of the University of Michigan with representative samples of all U.S. families in 1962-63, also concluded that

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membership in pension plans stimulates voluntary saving. Katona added a second explanation for his results, hypothesizing a "goal feasibility" effect, wherein people intensify their saving efforts the closer they get to their retirement goal. Katona's results must be interpreted cautiously, however, since he focused on a very narrow concept of saving - namely, changes in financial assets. Since the self-employed and farmers, who accounted for 25 percent of the nonmember sample compared to 4 percent of members, would typically save through investment in their own businesses, this narrow definition of saving biases the results.

As part of a larger study, Munnell (1974) re-analyzed a subsample of Cagan's Consumers Union survey and found results that contradicted Cagan's earlier conclusions. Separate equations explaining total non-pension saving as a function of income, wealth, a variety of socioeconomic variables, and pension coverage were estimated for three age groups (30-39, 40-54 and 55-64). The pension variable consistently entered with a negative sign, and the size and significance of the coefficient increased with the age of the group. Additional equations were estimated replacing the simple pension coverage variable with values for expected annual pension benefits; again the pension variables entered with negative signs. The main reason for the difference between these results and those found by Cagan was the ability to use regression analysis to standardize simultaneously for a large number of other characteristics such as education, family size, income, age and other factors, and thereby isolate the impact of pensions.

A second study by Munnell (1976) examined the relationship between private pension coverage and saving using a sample of men in their pre-retirement years over the period 1966-71, based on a series of surveys

conducted by the U.S. Department of Labor. A major advantage of the Labor Department data was the inclusion of information on expected retirement age. The surprising results in the Cagan and Katona studies may have been, in part, due to the phenomenon mentioned earlier - namely, pension coverage is usually accompanied by earlier retirement; covered employees may simply have increased their saving in anticipation of earlier withdrawal from the labor force. A fully specified life-cycle model can make allowances for differences in expected retirement age between those covered and those not covered by pension plans. The results of the 1976 Munnell study showed that coverage by private pension plans discourages saving in other forms, at least for the older men included in that survey, for whom retirement is the primary saving motivation.

Precise estimates of the substitution effect were impossible, however, since the value of the increase in the promised pension benefits was not available. A rough estimate was made on the assumption that the increase in the present discounted value of future benefits was proportional to income for those covered by a private plan. This reduction was then compared to pension plan contributions. The implicit, and clearly imprecise, assumption was that the increase in pension contributions approximates the increase in pension promises for a given year. Using these assumptions and extrapolating the behavior of the sample to the entire population, Munnell concluded that employees reduce their direct saving by 62 cents for every dollar of increased pension promises. (Looking back, the precision is somewhat embarrassing in light of the herculean assumptions.)

Several studies have focused on the relationship between stocks of pension and non-pension wealth instead of examining annual saving flows; the results have been mixed. For example, Blinder, Gordon and Wise (1981)

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examined the pattern of asset-holding by age for a sample of 4,130 white men from the 1969, 1971, 1973, and 1975 waves of the Longitudinal Retirement History Survey. Despite good asset and income data and a careful application of the theory, they were not able either to find support for the life-cycle model or to discern any trade-off between pension wealth and other assets.

Diamond and Hausman (1980), on the other hand, using data from the Labor Department Survey of Mature Men, did find results consistent with the life-cycle theory and identified substantial substitution between individual asset accumulation and pension benefits provided through organized savings programs. Their results indicated that family wealth was decreased by $5.84 for each dollar of annual pension benefits a family expected to receive after retirement. To use these results as a basis for calculating the actual offset between the increase in pension promises and individual direct saving requires information about the cost of an equivalent annuity. However, a rough estimate might be that individuals reduce their own saving by 58 cents for each dollar increase in future promised pension benefits.

Avery, Elliehausen, and Gustafson (1986) examined the relationship between non-pension net worth and pension wealth using the 1983 Survey of Consumer Finances, which includes detailed earnings, asset, and pension information for 3,800 families. They found that for a subsample of families headed by a married person age 50 or older each dollar of pension wealth reduced non-pension net worth by 66 cents. For families with unmarried heads, however, the regression results indicated only modest substitution (22 cents reduction in net worth for each dollar increase in pension wealth) and the coefficient was only marginally statistically different from zero.

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The hypothesis that individuals reduce their own saving in anticipation of promised pension benefits also found support from studies that explored the relationship between private wealth accumulation and social security benefits. With data from the Federal Reserve Board's 1963 Survey of Financial Characteristics of Consumers, Feldstein and Pellechio (1979) related household net worth to various measures of income and each household's net social security wealth. For employed males between 55 and 64, they found a strong substitution effect of social security wealth for private wealth. Diamond and Hausman (1984) found that for each dollar of annual social security benefits people reduced their saving in other forms by roughly 69 cents. On the other hand, Blinder, Gordon and Wise (1981) found somewhat less substitution of social security for private wealth among their sample of men from the Retirement History Survey. Their estimates indicated that one dollar of social security wealth displaced approximately 39 cents of other assets, but their results were not statistically significant. Finally, Kotlikoff (1979) determined that individuals reduced their other saving by 67 cents for each dollar of combined employer-employee payroll tax contributions.

In short, the bulk of the evidence to date provides some support for the prediction of the simple life-cycle saving model that individuals reduce their own saving in anticipation of benefits provided through public and private pension plans. However, with the exception of the Avery, Elliehausen and Gustafson analysis based on the 1983 Survey of Consumer Finances, none of the studies employed good measures of anticipated pension benefits. Moreover, most of the studies focused on the behavior of older men for whom retirement was the primary saving motive; little progress has been made in terms of assessing the impact of pensions on the saving of the entire population. All

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that can reasonably be said is that some offsetting behavior occurs and that it is less than dollar for dollar.

To What Extent Do Employers Carry Out Direct Saving?

Almost no progress has been made toward answering this question. The problems are twofold. First, assessing the extent to which firms are saving in advance for future pension commitments requires some measure of the annual increase in firms' pension promises or liabilities; although considerable progress has been made in the area of pension accounting, the improved measures have only recently been put in place. Second, even with accurate measures of pension liabilities, the answer to the question of whether firms are saving directly cannot be found by simply looking at the change in the pension fund accumulations; the relevant focus of analysis is the entire company and the amount by which both the pension fund and the general treasury combined have increased their saving.

Pension accounting. The number required in order to determine the impact of pensions on national saving is the present discounted value of pension promises provided by all employers. Not that long ago the only pension information provided by companies was an income-statement item indicating the amount that the company actually transferred to the pension fund. A 1956 pronouncement by the American Institute of Accountants argued that accounting for pension costs be done on an accrual basis and that past service costs be amortized over some reasonable period. This pronouncement, however, had little effect since the accrual concept was applied only to vested benefits and at that time few plans had vesting provisions.

With the growth of pensions and the confusion created by the use of numerous divergent methods of accounting, the Accounting Principles Board

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commissioned a comprehensive study which formed the basis for APB Opinion 8,
issued in 1966. The opinion officially endorsed and prescribed the accrual
basis of accounting; thereafter, firms were required to reflect on their books
a pension charge equal to the normal cost of the plan plus interest on the
firm's unfunded actuarial liability. Companies also reported the value of
unfunded accrued vested benefits in a footnote to their financial statements.

The enactment of ERISA, combined with certain perceived deficiencies in
Opinion 8, rekindled interest in accounting for pension costs. Critics
charged that pension cost was not comparably measured company to company and
often not even from period to period for the same company. In 1980 the
Financial Accounting Standards Board issued statements 35, <u>Accounting and
Reporting by Defined Benefit Pension Plans</u>, and 36, <u>Disclosure of Plan
Information</u>, as interim measures to improve the reporting and disclosure of
pension information until a major study of pension accounting could be
completed. These statements required sponsors to disclose more information
about the funding status of pension plans; specifically, they had to show the
actuarial present value of all accumulated plan benefits and the market value
of plan assets available to pay those benefits. With regard to pension
expense, the statement required sponsors to report any changes in actuarial
cost methods, actuarial assumptions or plan provisions that affected the
comparability of data from one period to the next. However, employers were
free to use any of six actuarial cost methods sanctioned by ERISA for
allocating pension cost to each period.

The most recent product from the FASB pension accounting project is
Statement 87, <u>Employers' Accounting for Pensions</u>, issued in December 1985.
This statement requires that net periodic pension costs recognize three

separate components: service cost, interest cost (interest on the projected benefit obligation), and actual return on plan assets. The service cost component represents the increase in promised benefits earned during the period and is conceptually the same for an unfunded plan, a plan with minimum funding and a fully funded plan. Moreover, Statement 87 requires that all plan sponsors use the projected unit credit method for allocating the cost of benefit accruals to each year of service. In addition to establishing uniformity, this means that the service cost for final pay and career average plans will be based on future compensation levels. In addition to identifying separately the three components of net periodic pension costs, the sponsor must also disclose the projected benefit obligation, the accumulated benefit obligation, the vested benefit obligation and the market value of plan assets. These provisions of Statement 87 became effective in 1987. (Additional provisions requiring the inclusion of a measure of unfunded liability on the balance sheet became effective in 1989.)

For the first time, therefore, all companies will be providing meaningful and comparable data in a relatively accessible form on the increase in promised benefits. This information will not only offer an opportunity to properly define employee compensation and thereby saving, but also, for the issue under discussion, provide a measure against which to judge whether the firm undertakes direct saving to fund future benefit payments.

The relevance of pension funding. Even with perfect data, simply comparing the cost of new pension promises with the amount of money contributed to pension funds cannot provide a meaningful answer to this step in determining the impact of pensions on aggregate saving. The problem here is analogous to that which has arisen at the federal level in the attempt to

partially prefund the social security system. Just as it is misleading to assume that saving occurs because assets are building up in the Social Security trust funds, it is equally misleading to conclude that firms are saving simply because they are making large contributions to their pension funds.

In both cases, it is important to explore the activities of the other parts of the entity. With regard to Social Security, this requires ascertaining the extent to which the saving in the Social Security trust funds may be offset by a reduction in saving or an increase in dissaving in the non-social-security part of the budget. Similarly, when assessing the extent to which the firm is saving, it is important to look at the company as a whole to ensure that increases in pension assets are not offset by decreases in other assets or increases in liabilities. In terms of the earlier example, no saving will occur at the firm level if the company simultaneously makes a $2,000 contribution to the pension fund and uses $2,000 of existing cash to pay additional dividends.

The difficulty in assessing the behavior of both the federal government and the firm is comparing what actually occurred against a counter-factual situation. That is, it is necessary to know how much saving or dissaving would have occurred in the absence of the buildup in the Social Security trust funds and how large dividend payments would have been in the absence of the surplus created by the $2,000 deduction for pension expense. In short, progress in answering this second step in resolving the pension-saving puzzle may be difficult.

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Do Shareholders Alter Their Direct Saving?

Since shareholders have no precise way of knowing whether firms have increased their unfunded liabilities, getting a definitive answer to this question is difficult. Nevertheless, on the assumption, presumably, that the firm does not take offsetting action in the non-pension area, a series of studies have examined the relationship between unfunded liabilities and share prices; a reduction in prices is the necessary trigger for individuals to adjust their own saving behavior to compensate for the failure to save at the firm level.

To determine whether common stock values reflect pension obligations, investigators have adopted a model proposed by Modigliani and Miller (1958), which yields an equation that expresses the market value of a firm's common stock as a function of several financial variables. To this traditional equation subsequent researchers have added a variable for the firm's unfunded pension obligations.

The first empirical analysis of the effect of a firm's unfunded vested pension benefits on its share price was performed by Oldfield (1977). He found that for 166 manufacturing firms in 1974 the coefficient on unfunded vested benefits was negative, was significantly different from zero, and hovered around -1.5. His estimates indicated that each dollar of unfunded vested liability reduced share prices by $1.50, which implied that, according to the stock market, the unfunded liability for vested benefits somewhat understated the firm's true unfunded pension obligations. Nearly identical results were reported by Feldstein and Seligman (1981), who estimated a similar equation using inflation-adjusted financial data from 1976 and 1977. A 1982 study by Feldstein and Morck yielded similar results. Gersovitz (1982)

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estimated an equation like Oldfield's, but allowed for a separate estimation of the coefficient for unfunded vested benefits in excess of the amount insured by the Pension Benefit Guaranty Corporation (PGBC). His results indicated that equity values appear unaffected by the portion of unfunded vested benefits above 30 percent of the firm's net worth. With this more elaborate specification, however, the coefficient on unfunded vested benefits became even more negative (-2.3). A recent study by Bulow, Morck, and Summers (1987), based on a broader data set and a combination of cross-section and time-series analysis, further confirmed the earlier results that the stock market valuation of firms reasonably accurately reflects the status of their pension funding.

Shareholders apparently view a shortfall of pension assets relative to pension liabilities as a reason to lower the price that they are willing to pay for a company's stock. This may be a reasonable response even though theoretically it should not matter whether a firm saves in the pension fund or in the non-pension portion of the company. Given the pressure and tax advantages to funding, those firms that do not put aside adequate assets in the pension fund are probably not saving elsewhere.

The question still remains about the response of shareholders to the drop in the value of their equity holdings as a result of the increase in the firm's unfunded pension liability. That is, do they increase their direct saving to compensate for the firm's failure to save? No empirical information exists with regard to this link in the chain of questions that need to be answered in order to determine the effect of pensions on aggregate saving.

Does Increased Saving Compensate for Government Revenue Loss?

As long as income, as opposed to consumption, is the basis for personal taxation in the United States, the favorable tax treatment accorded compensation paid in the form of deferred pension benefits results in a revenue loss. This loss has a direct impact on national saving, since government saving - the difference between government receipts and outlays - is a major component of the total. The loss is large; as noted earlier, the tax expenditure associated with employer-sponsored pension plans for 1991 is estimated to be $46 billion.

The tax expenditure estimates currently published by the Treasury and the OMB are not really the appropriate numbers to consider, however, when assessing the impact of the favorable tax provisions on saving. These numbers, which are computed on a cash-flow basis, are designed to measure how much higher federal revenues would be in a given year if a particular subsidy had not been enacted. This approach is consistent with the expenditure side of the federal budget and is meaningful for permanent deductions and exclusions, but does not properly account for tax concessions in those cases where tax payments are deferred. Its limitations for qualified pension plans are seen clearly by considering a situation in which 1) annual contributions to private plans and pension fund earnings exactly equal benefit payments during the year, and 2) workers face the same marginal tax rate in retirement as they do during their working years. Under these assumptions, the revenue loss as calculated by the Treasury and OMB would be zero. Yet individuals who receive part of their compensation in deferred pension benefits would continue to enjoy the advantages of deferral and pay less tax over their lifetimes than employees who receive all their compensation in cash wages. The deferral is

equivalent to an interest-free loan from the Treasury and reduces the present value of taxes to be collected.

A direct estimate of the annual revenue loss resulting from deferral would be the difference between 1) the present discounted value of the revenue from the current taxation of pension fund contributions and earnings under defined contribution plans and accrued pension benefits under defined benefit plans, and 2) the present discounted value of the taxes collected when benefits are taxed in retirement. Such a calculation requires assumptions about the average age of covered workers, the typical retirement age, life expectancy at retirement, the appropriate interest rate, and the marginal tax rates for workers and retirees. Very crude estimates prepared by Munnell (1984) showed that, depending on the assumptions, the difference in 1984 between the present values of the two revenue streams ranged from $45 billion to $62 billion. (The Treasury tax expenditure estimate calculated at that time on a cash basis for fiscal 1984 was $50 billion.) Annual present value numbers are needed in order to have a good understanding of the revenue loss associated with the favorable tax provisions.

Once the revenue loss is established, the next step is pinning down the response of individuals to changes in the rate of return to saving created by the favorable provisions. Although economists agree on the direction of the response to higher returns, they have not reached a consensus on the magnitude of this response. An average of extreme estimates (Boskin 1978 and Howrey and Hymans 1978) would indicate that a 10 percent increase in returns (say from 7 percent to 7.7 percent) would increase the private saving rate by 2 percent (say from 9.8 percent to 10.0 percent). At today's levels such a change is equal to roughly $15 billion. If the relative size of the revenue loss and

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the increased saving persists upon closer scrutiny, the favorable tax provisions may well contribute to lower national saving. Much work remains to be done on this issue.

Summary

This review of the evidence on the impact of pensions on saving highlights how little is known beyond the fact that individuals tend to reduce their own saving in response to anticipated pension benefits and the offset tends to be less than dollar for dollar. The lack of good information about the value of expected pension benefits - at least until the advent of the 1983 and 1986 Surveys of Consumer Finances - has made it impossible to put a precise number on the size of the offset.

The individual response is only the first step in determining the impact of pensions on national saving. For this, it is necessary to know whether the reduction in individual saving is matched by direct saving by the company, and, if not, whether shareholders increase their own saving. Finally, the question of the extent to which the tax expenditure for pensions acts as an effective stimulus for saving needs to be resolved. In short, we know less about the impact of pensions on saving than we think; a lot more empirical research is required. In the past, the research has been driven by the available data; the next section will discuss the data that are needed to answer the questions.

IV. How Do the Data We Have Compare to the Data We Need?

Given the advances in the collection of pension data and the inclusion of retirement expectations at the survey level, this section will focus primarily on the treatment of pensions in the national accounts. In accounting for

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pension transactions in the national accounts, three major considerations emerge from the preceding discussion about the potential impact of pensions on saving. The first is the need to distinguish between defined benefit (DB) plans and defined contribution (DC) plans. The second issue is the need to use consistent, accrual-based accounting for the measurement of pension wealth. The current period increment in this wealth outstanding is the relevant component of national saving rather than the flow of benefit payments from these plans or the employer contributions and investment income inflows to these plans. Finally, the accounting of the current and capital accounts must be integrated.

Distinction between Plan Types

Currently, no separate information is provided for defined benefit and defined contribution plans in either the National Income and Product Accounts (NIPA) or their capital account counterpart, the Flow-of-Funds Accounts (FFA). Several important differences between these plans argue for their separate treatment in the national accounts. The most significant distinction is the residual liability of DB plan sponsors with respect to investment risk. Defined contributions plans - by definition - entail no such liability for the employer.

Differentiation between types of plans is particularly important in the NIPA accounts. Whereas the increment to pension wealth for DC plans can be measured by employer and employee contributions, plus investment income earned on plan assets, this is not the case for DB plans. For a variety of reasons, employer contributions under defined benefit plans may differ significantly from the pension rights accrued in a given year. Beginning in 1980, for example, employers significantly slowed their contributions to defined benefit

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plans, as substantial capital gains on pension fund assets raised funding ratios. Since benefit accruals did not slow, this phenomenon caused NIPA-measured personal income and saving to understate the increment to individuals' pension wealth. Without the boom in the stock market and the strong bond market, contributions to private pension plans in 1986 would have been nearly $30 billion higher than reported (Munnell and Ernsberger 1987). Adding this amount in personal income and saving raises the 1986 saving rate from 4.3 to 5.3 percent. Accrual-based accounting for DB plans in the NIPA would avoid such distortions.

Under current Flow-of-Funds accounting, differentiation of plan types is less necessary, since the accounts refer only to the assets funding each plan type. The separate treatment of defined contribution plans, however, would help to sharpen the differences between these two broad classes of employer-sponsored plans. From the Flow-of-Funds' capital account perspective, moreover, the separate treatment of defined contribution plans would reinforce the similarities between these employer sponsored plans and "individual-sponsored" plans such as the familiar IRA and Keogh arrangements.

Accounting for Pension Benefits

The foundation for a meaningful representation of pensions in the National Income and Product and Flow-of-Funds Accounts is consistent with accrual-based accounting for pension claims. Under such an approach, benefit accruals would represent the pension component of personal income and, in turn, personal saving.

As noted earlier, for defined contribution plans the pension-related component of personal income is simply the sum of employers' contributions and the investment income of the assets currently funding these plans.

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Individual-sponsored retirement arrangements, including IRA-Keogh arrangements, can be treated in a parallel fashion. For private employer-sponsored defined contribution plans, the accounting approach outlined above is consistent with the treatment implicitly accorded these plans in the NIPA. That is, the National Income Accounts currently recognize as personal income the employer contributions to and investment income from all private sector pension plans, including both defined benefit and defined contribution arrangements. Investment income earned by IRA-Keogh type plans, as well, in effect is included in personal income since the NIPA add an estimate of income earned on these tax-deferred accounts to tax basis personal income reported by the IRS.

For defined benefit plans, the current NIPA treatment diverges markedly from the accrual-based pension wealth approach, since employers' residual liability for provision of defined benefits serves as a wedge between the cash basis contributions plus investment income flow and the accrual of these plans' benefit obligations. On an accrual basis, the personal income arising from DB pension-covered employment in the current period is the present discounted value accrual of individuals' pension claims against defined benefit plans. As illustrated above, financial markets-induced variations in plans funding levels can cause this accrual measure of pension saving for DB plans to diverge quite widely from the employer contributions plus investment income measure currently used in the NIPA.

The switch to an explicit benefit liabilities measure of households' pension wealth would also remove much of the pronounced fluctuations in pension wealth currently reported in the FFA. For example, less than 30 percent of the $190 billion decline in pension wealth currently reported in

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the FFA to have occurred as a result of the October 1987 stock market plunge
would remain after conversion to accrual-based benefit claims accounting.

Integrated Treatment of the Current and Capital Accounts

From a capital account perspective, accrual-based pension accounting
represents not only households' defined benefit pension wealth but also the
pension sector's DB pension liability. This pension wealth liability claim
measure provides a much more meaningful accounting linkage between households
and the pension sector than does the funded assets measure of pension wealth
currently used in the Flow-of-Funds Accounts. Moreover, this liability
measure when combined with an estimate of the assets funding defined benefit
plans effectively links DB pension plans' capital position to the sponsoring
business sectors by showing an explicit unfunded liability of the business
sector.[7]

This approach to accounting for defined benefit pensions clarifies the
relationship between these plans' capital account and their more familiar
current account. Since only benefit accruals are relevant in these plans' net
saving, sponsors' asset funding decisions are clearly seen as a purely capital
account transaction, albeit one with a significant impact on business taxes
due to the deductibility of qualified pension contributions as a business
expense.

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[7]This unfunded pension liability measure, of course, has some serious
shortcomings for the analysis of pension policy. If summed across the population
of all defined benefit plans, overfunding of some plans will tend to mask the
more serious underfunding of other plans, implicitly assuming that overfunded
pension monies still are the asset of sponsoring firms. One partial solution is
to show separate under-and-over funding positions with the overfunded amount
treated as residual net worth of the pension sector. Largely separate pension
asset and liability calculations entail a further, potentially serious,
complication of ignoring the efficiences that can be obtained by asset-liability
immunization strategies.

This approach contrasts with the FFA's current use of pension funds' assets as a proxy for pension wealth since employer contributions are linked only to tax-basis current account reporting of qualified pension contributions. Under the current NIPA-FFA scheme, moreover, the employer contributions that are not qualified for deduction as a business expense under IRS maximum funding limitations would not be captured in NIPA employer contributions data, producing a potentially sizable discrepancy in the FFA's sources and uses of funds balance for the household sector.

Explicit recognition of DB plan overfunding in the Flow-of-Funds Accounts would help to greatly clarify the treatment of pension asset reversions in the NIPA-FFA. At present, reversion funds are completely excluded from NIPA measures of business income under the assumption that these pension-derived receipts are entirely attributable to capital gains on the assets funding the plans. Given current FFA procedures, however, these reversion inflows to the corporate sector are captured as a use of funds without a corresponding source of funds.

In addition to providing an accounting framework for the late 1980s' pension asset reversion experience, DB plans' proposed capital account treatment would help to clarify the distinction between the plan sponsor, the plan trustee, and the Pension Benefits Guaranty Corporation (PBGC). While the sponsoring corporation bears the investment risk and residual liability for provision of defined benefits for ongoing plans, it is important to adopt a capital account structure in which the PBGC can be integrated.

Current Flow-of-Funds treatment fails to incorporate the PBGC's capital account and makes no provision for transfer of plan assets when default by a sponsor occurs. Accurate benefit liability and plan asset estimates are

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especially important in these cases. Since PBGC-insured benefits typically
fall short of total plan benefits, a decline in households' pension wealth
must be recognized when default occurs. The proposed measure of the PBGC's
capital account, together with a measure of the DB pension sector's aggregate
underfunding, would be very useful in putting this federal pension insurance
operation in perspective.

Summary

The current treatment of pensions in the national accounts deviates
substantially from the conceptual ideal and much of the analysis of pensions
and pension policy has been distorted by the lack of appropriate data. Early
studies relating measured private saving to pension saving (the increase in
the book value of pension fund reserves) were based on notions of income,
saving and pension activity that differ greatly from those implied by the
theory. The intense interest in pension fund assets as an indication of the
contribution of pensions to national saving is another example where the mere
availability of the data has driven the analysis.

The significant improvements in pension accounting and reporting create a
wonderful opportunity to improve the data on pensions included in the national
accounts. Careful analysis will be needed to determine the precise measure of
pension accruals that should be adopted, but moving away from exclusive
reliance on cash concepts should greatly enhance our ability to understand the
role of pensions in the workings of the economy.

V. Conclusion

It is difficult to carry out economic analysis based primarily on accrual
concepts in a world where activity is reported on a cash basis. Particularly

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in the pension area, the personal income and saving statistics produced by the National Income Accounts differ substantially from the concepts used in most economic analyses. In the corporate sector, cash accounting tends to distort the measurement of pension commitments and thereby corporate profits. Accounts based on cash also fail to recognize the relationship between the federal government and the household and business sectors created by the Pension Benefit Guaranty Corporation insurance. Finally, tax expenditure estimates based solely on a cash flow analysis do not provide an accurate measure of the benefits of the tax-favored treatment of pensions.

The time is right for improving the data on pensions. Great strides have been made in the area of cross-sectional surveys of individuals; these improvements should permit better estimates of the extent to which employees reduce their other saving in response to guaranteed pension benefits. Comparable improvements are needed at the macro level; revising our national accounts to make use of available data should be given high priority.

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