THE EFFECTS OF PRIVATE PENSION PLANS
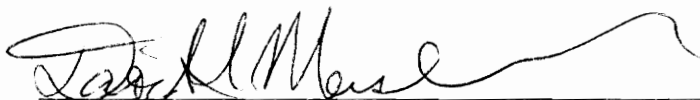ON PERSONAL AND AGGREGATE SAVING

by

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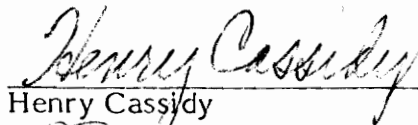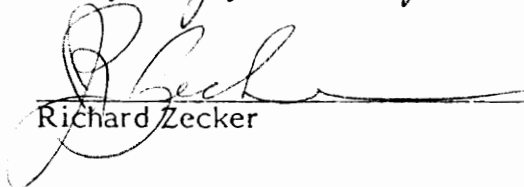
MASTER OF ARTS

in

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TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

I.   Introduction: Scope of the Study

Financial innovation in the U.S. economy has proceeded at a dynamic rate throughout this century. The number and variety of financial institutions which have evolved and thrived testify to our inventiveness. Whether the expanding role of these specialized intermediaries have contributed to the nation's economic growth is a long-standing and much debated question, even today. As financial institutions go, pension plans are not young, nor are they peculiar to the United States; factors impelling their growth and development were common to most industrial countries. Only relatively recently, however, have the effects on private saving of the growth of pension systems, with their particular attributes, been recognized as singularly important in comparison with other financial institutions conceived in the past.

Prior to 1940, participation in private pension plans was limited, in most instances, to the largest industrial corporations or to the managerial employees of small to medium sized firms. With the wage stabilization policies of World War II and the Korean War and the increasing exposure of wage and salary income to income tax, their growth intensified to a pace which is often characterized in the literature as "explosive." So while formal, private industry arrangements for retirement income saving have existed for over sixty years, the present configuration and size of the private pension system is new in its very real economic significance.

1

Indicative of the expansion of the private pension system is the fact that in 1940 only 4.1 million employees participated in private pension plans, but by 1973, the number had increased more than eightfold to 33 million employees, approximately half of all private nonagricultural employment. Employer and employee contributions to these plans increased even more rapidly, from $2.1 billion in 1950 to $22.1 billion in 1973; thus, contributions to private plans as a fraction of total compensation more than doubled, to 3.4 percent, in just over two decades. Retirement benefits paid to pension annuitants rose over this same period to $11.2 billion, approximately thirty times the $370 million paid in 1940. This extremely large jump in aggregate benefit payments reflects a substantial rate of increase in pension plan annuitants, as a consequence of such factors as the rising average age of the labor force, longer life expectancies, and a decreasing average retirement age.

Despite the differential growth in the number of retirees, net savings through pension funds, that is, contributions plus fund earnings less benefit payments, increased steadily since 1950. Unlike public retirement plans such as social security, which operate as tax-transfer schemes, most private pension plans are funded, with accumulated reserves invested in income-producing assets. In 1974, the total assets of insured and noninsured pension funds had a market value of $178.5 billion. Their expanding role as allocators of personal saving is evidenced by the fact that these institutions supplied $16.8 of the

$176.2 billion total funds advanced that year to nonfinancial sectors in the credit markets.

With this enormous increase in the size and influence of private and public retirement-saving systems in the U.S., questions pertaining to these institutions' impact on individual saving behavior and, by extension, on the volume of total private saving and rate of capital formation in the economy have become more pressing and demanding of resolution.

The private pension system's growth, while not inconsequential by any measure, was not atypical for this period of substantial financial innovation; many other recently conceived financial institutions, for example, employee credit unions, grew at an equally rapid pace. What imbues with significance the question of these intermediaries' impact on private saving is the fact that pension fund saving is considered, for several reasons, an imperfect substitute for other forms of personal saving.

In the literature, retirement plan saving, through both the public and private systems, is referred to as non-discretionary. Participation in the Social Security system is, of course, compulsory for approximately 95 percent of the civilian labor force; while participation in state and local, railroad retirement, and, in some instances, private pension plans is a condition of employment, there is no analogy to the legislated, compulsory nature of the OASI system. A large fraction of private, especially trusteed, pension plans cover

unionized workers, whose spokesmen have increasingly emphasized non-wage benefits, particularly pension benefits, during wage contract negotiations. Obviously, these labor union constituencies must have preferred this to other forms of remuneration. The fact that the number of insured pension plans, covering very small groups of employees or even individual entrepreneurs, has increased so substantially over the past fifteen years is further indication that individuals choose, and are not compelled, to allocate some portion of their income to retirement saving through private pension plans.

Two other characteristics of pension plan saving are frequently cited as reasons for differentiating between it and other forms of saving. Its contractual nature, in contrast to the sponteneity involved in decisions to save in other ways, and the fact that these claims can not be sold or transferred render pension plan claims a relatively illiquid asset. Also, vesting -- the individual's ownership right -- does not occur until he has fulfilled a length-of-service requirement. Workers need not be disadvantaged by these characteristics of pension plan saving. In principle, the latter attribute would be fully "priced" in the cost of purchasing the retirement annuity when the cost per employee is based on an actuarially determined life expectancy and expectation of duration of employment. The former characteristic of private plans should be compensated for by the relatively higher yields obtainable on a large, stable investment fund, compared to those available on other forms of individual saving.

Two aspects of pension fund net saving do, however, distinguish it from other private saving vehicles. Pension plan saving is accorded tax deferment, on both the annual contributions and the earnings thereon, and the funds (or groups of funds) are managed at costs measureably lower than would be incurred through alternative diversification schemes available to individual participants. Assuming employer and employee cost calculations, based on probable length-of-service and life expectancy, were substantially in accord, pension plan participants realized higher net yields on pension than on other forms of personal saving, higher than might be attributed to the difference in liquidity or other measures of risk. It has been suggested that the higher than average yields available to this form of saving were the principal impetus to these institutions' growth. $\underline{1}/$

The second aspect derives from the fact that pension plan specifics -- for example, the percentage of workers' pay contributed annually by employers -- are not easily or costlessly changed, in any case, but are frequently also encumbered by regulation and the tax law. Participant responses to perceived changes in the relative costs of pension fund and other forms of saving have been lagged and damped as a consequence. These institutional rigidities have thus limited the amount of personal saving channelled though pension funds during periods when they have afforded higher risk-adjusted yields and, conversely, have acted perversely to restrict compositional shifts in personal saving when other forms of saving appeared more attractive.

So while pension fund net saving has increased in absolute magnitude during the post World War II years, it has been a relatively stable fraction of total compensation over short periods.

Researchers and laymen have long speculated on the probable effects on total private saving of the combined influence of the institutional rigidities inherent in and the potential efficiencies available to private and public pension plan saving. A review of the popular and academic literature reveals a proliferation of articles and formal research on the subject, particularly over the past 15 years during which pension systems have grown most rapidly. While these vary considerably in analytical content, from casual empiricism to more sophisticated applications of multiperiod consumption-saving models, there emerges a strong consensus that private pension plans have affected positively the rate of private saving.

Parts II and III of this study survey selectively the professional literature on the private pension system and finds that none of the research to date satisfactorily explains why these institutions should have stimulated private saving any more than other financial intermediaries.

Part III singles out for more intensive analysis studies by Alica H. Munnell [2] and Norman B. Ture and Barbara Fields. [3] These are selected both because they are the most recently published and because they characterize the analytical arguments, either explicit or implicit, in many earlier studies.

Munnell uses a modified version of the Ando-Modigliani life-cycle saving model to estimate the magnitude of the private pension system's impact on the saving behavior of men in their pre-retirement years. Since the data source used in her empirical tests of the life-cycle model is insufficient, providing input which violates the requirements of that theoretical construct, the empirical results will neither support nor disprove her initial speculation that, contrary to earlier findings, pension fund saving actually displaces other personal saving dollar for dollar.

Ture and Fields rely on the permanent-income hypothesis [4/] to explain the impact of pension plans on covered workers' saving-consumption decisions. They attribute these plans' rapid growth to their relative cost-effectiveness as saving vehicles. The authors measure "efficiency gains" to pension fund saving both from the economics usually available to large scale investment funds and from its preferred status under Federal tax law. Of all the analyses reviewed, this study is the most analytically persuasive. However, the authors' misconception of the theoretical implications of the permanent income hypothesis introduces a subtle contradiction into their analysis.

Part IV of this study demonstrates, within the context of the permanent-income hypothesis, the limited conditions under which the private pension system would have exerted an influence on the volume of private saving differentially greater than other financial

intermediaries. It argues that any real difference in the accumulation rate achieved by pension plans as a consequence of scale-economies could only have been sustained because of the rigidities inherent in the system. The benefits from tax deferment fully account for the increase in pension plan saving relative to other forms of private saving. But this effect has been the consequence not merely of increasing overall effective tax rates but also of the valuation of the mix of Federal expenditures by savers in the aggregate. If this interpretation is accurate, the very characteristics of private pension plans which have contributed in the past to their positive influence on aggregate saving may in the future exert the opposite influence, given provisions of the Employee Retirement Income Security Act of 1974.

II. Review of the Literature

In the early 1960's, the National Bureau of Economic Research sponsored and subsequently published a series of studies on the private pension system. While not the first attempt to explain the impact of these institutions, it represents a landmark because it was the first systematic and comprehensive examination of the economic aspects of their growth and development, past and prospective. These studies were conceived as a logical extension of the NBER's post-war study of capital formation, financial institutions, and the nation's capital markets, and, in fact, their depth of analysis could not have been achieved without the wealth of statistical material compiled in the earlier studies.

This particular group of studies on the private pension system sought answers to such questions as: What factors impelled the past growth of private pension plans? What will be the future economic implications for the distribution of income and efficiency of the capital markets of their continued rapid growth? Conversely, what will be the consequence of the system's ultimate maturation and at what point in time is that likely to occur? Finally, have these funds exerted a differential effect on saving, that is, in what proportion have net accumulations through pension plans represented increments to and not merely a shift in the form of private saving?

The first study to be published in the NBER series was The Effect of Pension Plans on Aggregate Saving: Evidence from a Sample Survey. [5]

Addressing the last question, Cagan employs cross-sectional analysis of saving behavior by covered and non-covered households reported through a survey of Consumer Union subscribers. His analysis suggests that,

> ...when households come under a pension plan, offsetting
> reductions in other saving do not occur. The net addition
> to aggregate personal saving apparently equals the full
> amount of employees' and employers' contributions. ...
> business and government saving is probably reduced at
> most by 10-20 percent of the growth in pension funds. Though
> there is no direct evidence for this conclusion, general
> considerations support it. Hence 80-90 percent of pension
> growth constitutes a net addition to national saving. We
> found no evidence that this addition will be temporary;
> at least it was not lower for older persons, or for those
> covered a longer period of time, who would be more aware
> and more sensitive to provisions for retirement, as the rest
> of the population will be in time. 6/

This conclusion was based on the measured change in covered and noncovered workers' net worth between two time periods. Saving of covered households tended to be 1/2 to 1 percent higher than that of non-covered households. Most of this was reported in bank accounts and government bonds, tending to support Cagan's assertion that the nonportibility of pension fund saving was not a significant factor in explaining the results. He also found that, within age cohorts, the ratio of wealth to income for covered workers rose relative to those not covered as the formers' length of participation increased, but current saving was unrelated to job tenure or age. Hence, he concluded, the saving to income ratio must be higher for covered workers. For example, he found that the average ratio of wealth, excluding equity in group pension plans, to income for individuals age 50-54 was 3.0 for

those covered by a pension plan for 5-9 years but averaged only 2.7 for individuals not covered. Cagan used regression analysis to further substantiate the presumed net increase in saving. He determined that discretionary and other forms of nonpension contractual saving increased 21 and 28 cents for each dollar of pension contribution per household.

Cagan termed the net increase in saving he found among participants in employer pension plans the "recognition" effect, implying that the effect of pension funds has been to draw individuals' attention to their future retirement income needs and to stimulate their personal saving. To the extent this "recognition" effect has held across households, national saving has increased even more than the 80-90 percent of contributions he actually attributed above to pension plan growth. The effect, however, was found to depend on the degree of households' vested rights in pension benefits and on the fraction of their pay required in contributory pension plans.

Tabulations of the survey data revealed that individuals with partially vested benefits had a higher saving to income ratio than did those with none or total vesting. Cagan hypothesized that the "recognition" effect accounted for the rise in saving ratios up to some percentage of vesting which appeared to assure disbursement of an income flow after retirement and that the substitution effect operated thereafter. Then, segregating participants into two groups by type of plan, contributory or noncontributory, he fitted the following quadratic

regression equation to the data on discretionary saving, vesting and amount of employees' contribution:

$$S/Y = .93 \ C/P - 14.1 \ (C/P)^2$$

$$+ \quad \begin{array}{l} 7.8 \ \% \text{ if no vesting} \\ 9.3 \ \% \text{ if some vesting} \\ 7.2 \ \% \text{ if full vesting,} \end{array}$$

where S/Y = the ratio of discretionary saving to family income and

C/P = the ratio of employee contributions to pay.

The coefficients of the equation exhibited extreme standard errors, hence their value varied little from 0.

The substitution effect was thus found to exert an opposing influence on individual saving only when the household's contribution exceeded a certain fraction of its pay, 3 to 4 percent on average. The elasticity of substitution of pension fund for other saving was reported to rise from 0, at an employee contribution rate (to contributory plans) of 4 percent of income, to .5 when contributions reached 5 percent of pay.

If these were accurate measures of pension fund effects, a staggering proportion of the increase in national saving over the years must have been the result of the development of these plans; moreover, the implications for private saving of recent pension legislation are far more onerous than heretofore allowed. The Employee Retirement Security Act of 1974 not only increased the mandatory degree of vesting required to secure tax exempt status in employer pension plans, it also created individual retirement

accounts. Employees are more likely in the future than in the past to be fully aware of their payment toward retirement income and to own outright a larger fraction of their total accumulations. On Cagan's conclusions, the total personal saving rate is apt to decline relative to earlier years until there is a dollar for dollar trade-off between pension fund and other saving.

As Cagan recognized, the analysis rests on rather tenuous data. The Consumer Union survey was admittedly a large sample, 15,873 members responded. But these individuals were decidedly unrepresentative of the population as a whole, having higher incomes and a disproportionate number of college graduates and individuals engaged in relatively "safe" employment, such as teaching and government service. Moreover, tabulations were all made on the basis of reported current income instead of each household's expected or permanent income level. Since saving and income were reported for the recession year, 1958, the permanent income hypothesis [7/] might better explain the observed differences in saving propensities.

If individuals in the survey were better educated, on average, than the total population, they would have been cognizant of the recession-induced higher rate of unemployment and of the altered real growth potential of the economy and would have adjusted their income expectations as a consequence. The permanent income hypothesis would argue that individuals employed in cyclical industries or for a shorter period with their current employer would automatically reevaluate their permanent income expectations and consume less of current income than in the year before. Cagan's finding that the

younger age coherts and those with only fractional vesting increased saving during the period appears to substantiate the hypothesis. The lower saving income ratio of older workers with full vesting can also be explained by the fact that this group's permanent income prospects would not have been affected to the same degree.

Of course, survey data is always suspect. There is no assurance that a few or perhaps a large proportion of respondents interpreted critical questions correctly. For example, the researcher cannot be certain that all individuals supplied information on the net change in saving rather than total assets or on the actual average contribution rate for contributory plans, as needed in the study, instead of the rate on the top dollar for their income bracket.

Cagan also failed to take account of the fact that workers with different degrees of vesting or in different income classes might assess the cost of pension saving relative to alternative assets in quite opposing ways. The individual with no vested rights and uncertain expectations about duration of employment is contributing some fraction of his current income just as are individuals who have attained vested rights and attach some certain value to their pension plan participation. The way in which these valuations affect different individuals' perception of their permanent income potential may well explain the observed data.

Cagan himself cautioned against extrapolating these conclusions to the entire population, believing that these findings might have been an accident

15

of the particular sample. But while the augmented saving/income ratios of the Consumer Union group covered by pension plans were presented on a tentative basis, he pointed out that no other findings contradicted what he believed to be plausible results.

Almost simultaneously, George Katona was involved in conducting another cross-sectional study [8] of saving behavior which appeared to corroborate Cagan's findings. Katona also found, based on personal interviews with a randomly selected sample of the total U.S. population, that pension coverage was generally associated with higher personal saving in other forms. He explained these results by hypothesizing a "goal feasibility" effect where individuals intensify their savings efforts the closer they approach some retirement income goal. This study was of little significance for two reasons: the sample was extremely small, 2,000 compared with Cagan's 15,000 respondents, and Katona merely questioned whether individuals were covered or not-covered by a pension plan rather than attempting to determine their perception of the costs involved in participation.

When the NBER study was conceived, it was recognized that the size and operational characteristics of pension funds might have important effects on the stability and growth of the economy. Millions of individuals depended on these funds' continued successful earnings record for income after retirement. If it were found that pension plans had indeed augmented personal saving, they would have influenced not only the aggregate amount of funds to the capital markets but would also have altered the characteristics

market participants and possibly the market's efficiency as well. Whatever the direction of these effects, however, knowing the prospective magnitude of pension fund net accumulations would be equally important in assessing their long-run impact on the economy.

The second study $\underline{9/}$ in the series attempted to project the growth of pension funds through 1981, based on alternative assumptions and economic scenarios. Both industrial pension plans and those for state and local government employees were examined. Given the constraints of time and resources, Holland projected each of the "fiscal operations" associated with pension plans -- two "real" variables, number of beneficiaries and participants, and two "monetary" variables, benefits per beneficiary and contributions per covered worker -- rather than examining the factors underlying these operations, for example, the rate of growth in real earnings, employment, or interest rates.

The number of covered workers was projected as a fraction of employees on nonagricultural payrolls, excluding those in government, and as a fraction of that group who were expected to be over 25 years of age, using very subjective estimates of the rate of growth in coverage toward some "feasible ceiling" in alternative future years. Estimates were also made by industrial sectors. Employment in benchmark years was obtained from the Department of Labor and linear interpolation filled in the remainder.

The number of beneficiaries were projected, by applying

Table I

Comparison of Holland's Projections of the Characteristics of Private Pension Funds with Their Actual Growth, Selected Years, 1961-1981

	Holland's Projections				Actual Magnitudes			
	1961 [e/]	1966	1971	1981	1961	1966	1971	1981
Covered Workers [1/] (millions)	22.6	28.4	33.6	42.2	22.2	26.4	30.7	
Beneficiaries [2/] (millions)	1.9	2.9	4.5	9.0	1.9	3.1	5.2	
Benefit Payments [3/] (billions of $)	1.9	3.1	5.3	12.1	2.0	4.2	8.6	
Pension Fund Assets [4/] (billions of $)	55.3	87.5	124.5	200.5	65.6	102.3	173.3	
Net Saving through [5/] Pension Funds (billions of $)	5.3	7.0	7.6	7.4	6.4	9.9	16.3	

[e/] Estimate of actual totals, revised in subsequent years as data sources became more accurate.

[1/] Holland's most probable projection based on projections by industrial sector.

[2/] High estimate.

[3/] High estimate.

[4/] Average of the full range of estimates.

[5/] Average of the full range of estimates.

Source: Compiled from data tabulated in Holland Private Pension Funds: Projected Growth, pp.138-145.

18

actuarial techniques to the projected pension population, and distributed among age groups in the same proportion as given in Bureau of the Census data on all employees by age cohort. Several different projections were made and compared to Social Security Administration data and projections to check for reasonableness.

Finally, Holland projects pension fund accumulations based on the above estimates of covered workers and beneficiaries and some assumptions on contributions per worker and benefits per beneficiary.

Given the methodology employed, the number of projections grew exponentially; the most probable sets of projections were presented in separate tables too numerous to be reproduced. It is interesting, however, to compare the two "most probable" projection sets with current data on the characteristics of pension plans as they actually grew. With the benefit of over fifteen years hindsight, Table I, below, illuminates the accuracy of Holland's projection techniques, how useful they might have been to policy-makers and other potentially interested users of such information.

As the table clearly shows, all variables grew at a faster rate than anticipated in Holland's study, with the sole exception of the number of workers covered by private plans. He projected a leveling-off of pension fund growth, both in participation and in the rate of fund accumulations around the beginning of the next decade. At that time he foresaw contributions and benefit payments approximately

cancelling. Whether or not this "steady state" occurs would require pure conjecture at this point, as it did in 1962. One observation is warrented, however: Despite enormous increases in the number of beneficiaries and a fairly modest rate of increase in the value of their annuities, net saving has actually increased at a rapid pace over the decade shown in this comparison. Given the total assets of all funds today, pension funds generally have been managed more efficiently and realized far higher rates of return on assets or have become more costly forms of saving for current contributors than was projected at the earlier date.

This type of study may be superficially appealing, particularly to the less informed. Regrettably it more often than not yields misleading information since so much of the findings rest on "judgment" or pure speculation. Moreover, many relevant, but unpredictable, factors are completely ignored as a consequence. In Holland's study, for example, no consideration is given to changes in relative costs among alternative forms of saving or to shifts in real income as potential explanations for the past growth in private pension plans, the base of his extrapolations of the future.

Two other studies [10] documented the special characteristics and growth of union and multiemployer plans and those of nonprofit organizations. Since the economics of these plans parallels that of any other private pension plan, this jointly authored report will not be reviewed here.

The final study [11/] in the NBER series Murray summarized the findings of the earlier research by Cagen, Holland, Bartell and Simpson, and additionally, 1) traced the growth of all pension systems, 2) delineated the factors which impelled that growth, and 3) outlined the implications for public policy of his assessments of all public and private pension systems. He considers their impact on total saving and economic growth, their potential as economic stabilizers, their implications for capital market conditions, and the effects of further expansion of these plans on other financial institutions.

Most of Murray's arguments are relatively conventional and uncontroversial and have borne the test of time. One central theme, however, warrents some discussion. He raises the question of whether there is a natural limit to the amount of retirement income the economy can "afford." This notion has become the mainstay of those who would limit the combined income from public and private pension systems to some "commonsense" [12/] rule such as 80 percent of gross pay during the final years of active employment. Murray appears not to restrict this limitation to public tax-transfer schemes; rather, he extends the reservation to the observed trend in workers' preference for accepting part of their real income gains in the form of future retirement income from private plans. He explicitly ties pension plan participants' ability to make this trade-off to the willingness of future generations to forgo current

consumption (to save) in order to pay those anticipated benefits. In other words, all pension plans are seen as pass-through financial schemes. This is clearly no more the case for private pensions than in the situation where individuals save in any other form in order to change the allocation of consumption over time.

The last two studies, [13/] analyzed in depth in Part III, examine the growth and development of the pension system within the theoretical framework of the life-cycle savings hypothesis and the permanent income hypothesis. Each of these theoretical constructs is analytically sophisticated and widely recognized. It will be shown, however, that to date they have not been appropriately applied to the question of private pension plan's effects on total saving and the economy, either because the hypothesis was tested with inappropriate data or because their implications were misunderstood, or both.

III.   The Life-Cycle and Permanent-Income Hypotheses as Predictors of the
Impact of Private Pension Plans

An Empirical Test of the Life-Cycle Theory

In her article, "Private Pensions and Saving: New Evidence," Alica
Munnell attempts to show that "...contrary to earlier work by Cagan and
Katona, pension coverage reduces saving in other forms." [14] / She asserts
that either of two views might explain the effect of pension coverage on
saving behavior: Traditional theory indicates that private saving should
decline in response to the additional security afforded by pension coverage.
A more popular view, stemming from cross-sectional studies by Cagan and
Katona, holds that pension benefits stimulate saving by providing a secure
base for building retirement income. Recent evidence from studies by
Feldstein and herself [15] / indicate, in support of traditional theory, that the
Social Security system has depressed personal saving, but the earlier
retirement age induced by the system has produced a secondary effect, a
longer retirement span. This, in turn, has tended to increase personal saving
toward maintaining some desired level of retirement income. Munnell
suggests that it was this "retirement effect" which contributed to the
"surprising" results of earlier studies on private pensions. She hypothesizes
that pension plan saving, in fact, reduces other saving, evidence to the
contrary must be attributed to the impact of longer retirement spans.

Data for Munnell's study were derived from a series of surveys
conducted by the Bureau of the Census, under contract with the Department
of Labor. 5030 individuals were surveyed in each of the 6 years, 1966-71, to

22

explain labor force participation, employment status and mobility; in addition, data on income, financial assets and expectations of pension benefits -- public and private -- were collected. In her study, a subsample of approximately 2600 cases was used, which included employed male heads-of-households who were between 45 and 59 years of age in 1966. This particular age cohort was chosen because their primary saving "motive" is retirement, hence saving behavior was supposed most sensitive to pension coverage. $\underline{16}$ /

The framework for her empirical tests was the Ando-Modigliani life-cycle saving model $\underline{17}$ / wherein consumption is specified as a function of lifetime resources:

$$C_t = 1/LE \ Y_t + (D - T) \ Y^e + A_{t-1}$$

where,

D	=	age at death = $(T + LE)$,
T	=	age in period t,
Y	=	actual income in period t,
Y^e	=	expected income in subsequent periods
A_{t-1}	=	asset holdings at beginning of period, and
LE	=	life expectancy.

Munnell respecifies the model to allow for differences in expected retirement age between employees covered by pension plans and those who are not. She rewrites the expected future income expression as the sum of future earned income plus expected pension benefits, where the former is assumed equal to current income, or equivalently, that the rate of increase in earnings is equal to the discount rate:

$$(D - T) Y^e = (R - T) Y_t + (D - R) \text{ PEN},$$

where

R = expected retirement age and

PEN = expected pension benefits.

The consumption function can then be respecified as:

$$C_t = 1/LE \quad Y_t (1 + R - T) + (D - R) \text{ PEN}.$$

Since saving, as a residual, is equal to $Y_t - C_t$, the savings function -- modified several times by the addition of variables to standardize for differences in socio-economic characteristics -- used to test her hypothesis was:

$$S_t = Y_t - 1/LE \quad Y_t (1 + R - T) + (D - R) \text{ PEN} + A_{t-1}$$

$$= \frac{(D - R - 1)}{LE} Y_t - \frac{D-R}{LE} \text{ PEN} - \frac{A_{t-1}}{LE}$$

where

S_t = savings in period t.

Munnell's empirical analysis proceeds in two phases: First, she reorganized and interpreted the financial and income data from the Department of Labor survey. Second, the life-cycle saving model was tested empirically; these results were then substantiated by reference to the tabulated data. The results of both efforts she asserts "...consistently support the hypothesis that pension coverage reduces saving in other forms." [18] /

Respondents were classified by age and income; then, in order to compare the wealth positions of covered and noncovered workers, individuals were further regrouped by size of net worth and net financial (or liquid)

assets in each of three years, 1966, 1969, and 1971, asset data were available. The example table for 1969 is reproduced below. Munnell claims these tabulations reveal that, except for very low income classes, individuals reporting no private pension plan coverage "...consistently had greater wealth than those expecting benefits." [19] / The implication, of course, is that those expecting retirement benefits save less.

On cursory inspection, Table II appears to substantiate the author's assertion. It is interesting to note, however, that while the differences in net wealth are frequently quite large, those for liquid assets are not and, in fact, individuals in higher income classes who were expecting benefits, in many cases, showed higher liquid reserves. It should also be noted that these measures of wealth exclude any estimate of the expected value of the pension benefits accruing to those expecting these payments. (Since over 96 percent of the sample were eligible for social security, exclusion of its present value does not introduce a serious bias.)

A completely different interpretation of this data is possible if some interesting, but neglected, statistics and other findings of the Department of Labor's survey-study are considered and if the value of expected pension benefits are recognized. The original source data [20] / shows that self-employed individuals comprised fully 20 percent of the original sample and may well have accounted for a higher proportion of Munnell's subsample. Recall that the difference between the net liquid assets of the two groups, for any age or income class, is considerably less than the difference in total net wealth and that Munnell defines the former as equal to net worth less the

Table II. 1969 Example Tabulations of Net Worth and Net Financial Assets
of Individuals Expecting and Not Expecting Benefits

	Expecting Benefits				Not Expecting Benefits			
	Respondents		Average Net Worth ($)	Average Net Liquid Assets ($)	Respondents		Average Net Worth ($)	Average Net Liquid Assets ($)
	N	%Total			N	%Total		
Joint Income Bracket ($)								
Age 48-52:								
Under 2,500	16	2.3	27,373	1,577	56	10.4	4,469	-378
2,500 under 5,000	30	4.3	4,065	45	112	20.9	8,690	801
5,000 under 7,500	90	13.0	8,705	808	116	21.6	11,803	373
7,500 under 10,000	125	18.0	11,417	1,512	100	18.7	17,322	2,348
10,000 under 15,000	231	33.4	19,988	3,625	111	20.7	26,397	1,926
15,000 and over	201	29.9	46,276	+5,508	41	7.6	101,429	19,171
Total	693	100.0	24,083	6,122	536	100.0	21.294	2,512
Age 53-57:								
Under 2,500	8	1.5	3,586	- 573	103	18.3	7,003	622
2,500 under 5,000	27	4.9	7,823	847	128	22.7	11,561	441
5,000 under 7,500	101	18.2	11,531	1,211	114	20.2	15,805	1,995
7,500 under 10,000	113	20.4	20,354	2,756	92	16.3	18,000	3,689
10,000 under 15,000	179	32.3	22,619	5,287	81	14.4	36,051	7,180
15,000 and over	126	22.7	74,823	19,319	45	8.0	112,627	19,567
Total	554	100.0	31,013	6,918	563	100.0	24,240	3,818
Age 58-62:								
Under 2,500	14	3.6	12,337	2,047	121	24.6	12,556	1,346
2,500 under 5,000	33	8.6	10,014	2,287	129	26.2	9,116	1,027
5,000 under 7,500	70	18.2	11,984	2,026	88	17.9	16,234	2,687
7,500 under 10,000	94	24.4	20,389	6,804	48	9.8	20,334	3,245
10,000 under 15,000	94	24.4	33,586	9,724	65	13.2	24,364	6,151
15,000 and above	80	20.8	83,927	30,200	41	8.3	141,283	40,224
Total	385	100.0	34,104	10,956	492	100.0	25,358	5,562
Age 48-62:								
Under 2,500	38	2.3	16,826	1,297	280	17.6	8,896	735
2,500 under 5,000	90	5.5	7,374	1,108	369	23.2	9,835	755
5,000 under 7,500	261	16.0	10,678	1,300	318	20.0	14,464	1,595
7,500 under 10,000	332	20.3	16,099	3,434	240	15.1	18,185	3,041
10,000 under 15,000	504	30.9	23,459	5,353	257	16.2	28,925	4,650
15,000 and above	407	24.9	62,513	19,576	127	8.0	118,263	26,108
Total	1,632	100.0	28,799	7,533	1,591	100.0	23,593	3,917

Average net worth includes the value of residential and business assets less mortgage debt, savings accounts, stocks, bonds, loans to others less other debts. Automotive asset and liabilities are excluded.

Net liquid assets is equal to average net worth less value of assets and liabilities associated with residence and business.

Since totals are weighted averages, those for persons expecting benefits will exceed those for persons not expecting benefits because pension coverage is positively related to income.

Source: Munnell, "Private Pensions and Saving: New Evidence," Table 2, pp. 1021-2.

value of assets and liabilities associated with business or residence. It seems reasonable to assume that, since only 4 percent of all individuals in the subsample owned individually purchased private annuities, most of the self-employed are included in the group "not expecting benefits." For these individuals, the tangible and intangible (for example, goodwill) assets of their businesses probably substitute for pension saving. It is not surprising, therefore, to find that, for over half of all age and income classes, net liquid assets of those expecting benefits exceeds that of those not expecting benefits. In other words, the former group frequently showed larger accumulations in savings accounts, stocks, and bonds.

It is not at all clear, either from a reading of the Munnell study or the Manpower Research Monograph, that the majority of respondents would have clearly distinguished between 1) being covered by a private plan and expecting or not yet expecting benefits and 2) not being a participant in a pension plan at all, hence not expecting benefits. It is, therefore, impossible to determine whether the two categories, as shown in the table, reflect anything at all about the saving decisions of covered and non-covered employees.

The most obvious deficiency of the financial data and, consequently, the table on which Munnell's initial speculations were based is that they exclude any estimate of the value of expected pension benefits. In the original survey, 67 percent of the Caucasians and 49 percent of all non-whites responding had private retirement coverage through employer-sponsored plans and an additional 5 percent of the former owned individual annuity policies

through life insurance companies. Moreover, over 61 percent of the entire sample population had at least ten years of service with their then current employer, hence, probably had vested rights in their benefits. The original data show, for other than self-employed individuals, a high correlation between occupational status and job tenure (longer for white-than blue-collar workers), between length-of-service and average hourly earnings and, also, between both of the former variables and total assets. More individuals with higher than average earnings and longer than average job tenure should, therefore, be clustered in the group expecting pension benefits; this is shown quite clearly in Table II. The distribution of individuals expecting benefits rises smoothly as income increases, for each age group and for the total sample; in contrast, the group not expecting benefits is clustered in the lower income classes. If some alternative estimates of the value of future income flows from pension funds are added to the net worth of the group expecting benefits, nearly all of the difference in average net worth for each age and income class disappears.

Table III shows two estimates of pension benefits for each age cohort and the top three income classes, with estimates based on alternative assumptions about the probability of their ultimate collection. An equivalent way of looking at these probabilities is to view them as the average percentage of vesting each age cohort might enjoy. These estimates were calculated using data from a Bankers Trust Co. study of corporate pension plans; the scope of this on-going study which records the changing practices of private pension plans regularly at 5-year intervals is reflected by the fact

Table III

Estimated Value of Pension Benefits

Income Class ($)	Total Benefits ($)	High Probability	$	Low Probability	$
Age 48-52					
7,500 to 9,999	23,800	.6	14,280	.25	5,950
10,000 to 14,999	38,250	.6	22,750	.25	9,560
15,000 and over	51,000	.6	30,600	.25	12,750
Age 53-57					
7,500 to 9,999	23,800	.75	17,850	.5	11,900
10,000 to 14,999	38,250	.75	28,688	.5	19,125
15,000 and over	51,000	.75	38,250	.5	25,500
Age 58-62					
7,500 to 9,999	23,800	.9	21,420	.75	17,850
10,000 to 14,999	38,250	.9	34,424	.75	28,608
15,000 and over	51,000	.9	45,900	.75	38,250

Source: Pension benefits calculated from, 1975 Study of Corporate Pension Plans: The 10th in a Series from Bankers Trust. (New York: Bankers Trust Co., 1975)

that the pension plans surveyed cover approximately 8,400,000 employees, almost one-quarter of all employees enrolled in pension plans of employers in private industry. The data in Table III were based on the following assumptions: workers expect to retire at 65; their life-expectancy after retirement is 8.5 years, as assumed in Munnell's estimates; for simplicity, survivorship benefits are ignored and the individual is assumed to be enrolled in a conventional plan paying a benefit equivalent to the median benefit reported for that type of plan. Table IV demonstrates the effect of including these alternative estimates of pension benefits in net worth; obviously, liquid assets for each group remain unchanged. [21/] Without them, net worth of individuals who were expecting benefits is consistently less than that of the other group, except in the oldest age cohort. On the other hand, when a reasonable value of expected future benefits are added, then net worth exceeds that of those not expecting benefits in all but the highest income class. And the $15,000 and over class, as noted earlier, is probably biased by the inclusion of a substantial number of self-employed in the group not-expecting benefits. Omitting pension fund assets from net worth is thus a serious deficiency.

The second phase of Munnell's empirical work involved testing several variants of the original formulation of the model for two time periods, 1966-1969 and 1969-1971. In model 1, the original equation was modified to include dummy variables for coverage under social security and private pension plans, in the absence of explicit values. Model 2 assumes that pension income will be proportional to earnings and constructs a proxy for expected

Table IV. Ratio of Net Worth, with and without Value of Pension
Benefits, of Individuals Expecting to Receive Benefits to
the Net Worth of Those Not Expecting Benefits

Income Class ($)	With Value of Pension		Without Value of Benefits
	Low Estimate	High Estimate	
Age 48-52			
7,500 to 9,999	1.0	1.5	0.7
10,000 to 14,999	1.1	1.6	0.8
15,000 and over	0.6	0.8	0.5
Age 53-57			
7,500 to 9,999	1.8	2.1	1.1
10,000 to 14,999	1.2	1.4	0.6
15,000 and over	0.9	1.0	0.7
Age 58-62			
7,500 to 9,999	1.9	2.9	1.0
10,000 to 14,999	2.6	2.8	1.4
15,000 and over	0.9	0.9	0.6

Source: Computed from Tables II and III.

benefits by multiplying the pension dummies by actual income. Other socio-economic variables were similarly modified. For both time periods, two additional equations were estimated: one which replaced current income with a simple measure of permanent income and another which adjusts the social security variable. Finally, model 3 estimates the saving relationships for 1966-69 and 1969-71 based on simple linear saving functions which "...ignore the complications of age, life expectancy, and expected retirement benefits." $\underline{22}$ / The results of the regressions for models 1, 2, and 3 are presented below in Table V. As shown by the R^2s, none of the results are very significant.

On the basis of these regression results, Munnell estimates the magnitude of the predicted negative impact on saving associated with private pension plan coverage. Based on the fully specified equation (3) of model 1, she estimates pension coverage decreased saving by $671 for the period 1966-9 and by $2431 in the later period, calculated by applying the hypothetical saving propensities (D-R)/LE to the pension coefficients: .38 x $1767 = $671; .47 x $5172 = $2431. Munnell, seeking a proxy for pension benefits, multiplies the pension and social security variables by actual income, and then proceeds to do the same for each socio-economic dummy in model 2. The fully specified equation in this case indicates a reduction in saving of $730 in 1966-9. Modification of the social security variable in equations (4) and (9) and of the income variable in equation (5) and (10), (Table V), did not improve the results.

The author gratuitously provides a check on all this with the following

Table V. Results of Munnell's Empirical Tests of the Pension Plans on Saving, 1966-1971.

Model 1

$$S_t = \alpha_1 INC - \alpha_2 COVPP - \alpha_3 COVSS - \alpha_4 ASS$$

Independent Variables

Equation #	INC	COVPP	COVSS	ASS	COLL	INHER	PACE	SEMP	R^2
#3 (1966-69)	1.03 (8.1)	-1,767 (1.3)	-3,737 (3.2)	-1.17 (8.3)	2,062 (2.3)	1,179 (2.3)	-754 (1.4)	4,542 (5.6)	.046
#6 (1969-71)	0.92 (8.4)	-5,172 (3.3)	-3,861 (3.1)	-1.02 (8.4)	1,841 (1.7)	2,169 (3.7)	-953 (1.5)	1,804 (1.8)	.044

Model 2

$$S_t = \beta_1 INC - \beta_2 COVPPY - \beta_3 COVSSY - \beta_3 ASS$$

Independent Variables

	INC	COVPPY	COVSSY	ASS	COLL Y	INHER Y	RACE Y	SEMP Y	R^2
#3 (1966-69)	1.03 (4.1)	-0.23 (1.6)	-0.59 (2.8)	-1.36 (9.6)	0.17 (3.0)	0.39 (7.9)	-0.14 (2.2)	0.42 (5.4)	.071
Modified Social Security Variable									
#4 (1966-69)	0.92 (4.7)	-0.27 (1.9)	-0.84 (3.6)	-1.40 (9.9)	0.12 (1.9)	0.40 (8.1)	-0.12 (1.8)	0.39 (5.0)	.073
Modified Social Security and Permanent Income									
#5 (1966-69)	1.19 (6.6)	-0.19 (1.4)	-1.25 (5.6)	-1.74 (12.0)	0.05 (.9)	0.35 (7.7)	-0.11 (1.8)	0.55 (7.4)	.098

33

Table V. (cont.)

	INC	COVPPY	COVSSY	ASS	COLL Y	INHER Y	RACE Y	SEMP Y	R^2
#8 (1969-71)	0.52	-0.37	-0.08	-1.18	0.26	0.33	-0.12	0.16	.058
	(2.2)	(2.3)	(0.4)	(9.4)	(4.3)	(6.4)	(1.8)	(1.7)	

Modified Social Security Variable

	INC	COVPPY	COVSSY	ASS	COLL Y	INHER Y	RACE Y	SEMP Y	R^2
#9 (1969-71)	0.90	-0.46	-0.83	-1.19	0.20	0.31	-0.11	0.13	.062
	((4.7)	(2.9)	(3.3)	(9.6)	(3.2)	(6.2)	(1.7)	(1.4)	

Modified Social Security and Permanent Income

	INC	COVPPY	COVSSY	ASS	COLL Y	INHER Y	RACE Y	SEMP Y	R^2
#10 (1969-71)	1.28	-0.68	-1.12	-1.30	0.18	0.37	-0.11	0.08	.069
	(6.0)	(3.9)	(4.3)	(10.2)	(2.6)	(6.8)	(1.5)	(0.8)	

Model 3

$$S_t = \gamma_1 + \gamma_2 Y_t - \gamma_3 PP - \gamma_4 SS - \gamma_5 A_{t-1}$$

Independent Variables

	k	Y	PP	SS	A_{t-1}	COLL	INHER	RACE	SEMP	R^2
#3 (1969-71)	-2,423	0.76	-1,594	-1,082	-0.057	312	516	-177	4,312	.073
	(1.9)	(12.7)	(2.5)	(1.0)	(8.4)	(0.3)	(0.9)	(0.3)	(5.2)	
#6 (1969-71)	358	0.66	-1,462	-3,474	-0.058	-451	1,065	-589	2,197	.057
	((0.2)	(10.3)	(1.9)	(2.6)	(8.7)	(0.4)	(1.5)	(0.8)	(2.1)	

Numbers in parentheses are τ statistics.

Source: Munnell, "Private Pension Funds and Saving: New Evidence," Tables 3,4, and 5.

34

simple example. Referring to model 1:

> Consider the average individual in 1966 with annual income of $8,350 and assets of $19,500 who expects a Social Security benefit equivalent to the existing maximum. His lifetime wealth can be estimated as follows:

Expected earned income ($8,350 x 13.5 years)	= $112,725
Expected Social Security benefits ($3,420 x 8.5 years)	= 29,070
Assets in 1966	= 19,500
Expected lifetime wealth	$161,295

> According to the life cycle hypothesis, an individual would consume 1/LE or $161,295/22 = $7,332 of this expected lifetime wealth each year...The magnitude of the effect on private pension coverage for 1966-69 of - $671 seems quite reasonable. The average benefit from private pension plans amounted to about $1,550 during this period, which would imply a reduction in saving of (D-R)/LE $1,550, or $592. The 1969-71 results, however, are out of line with the other estimates. The average private pension benefit in 1971 was $1,684 which would imply an annual reduction in saving of $789 -one-third of the amount indicated in equation (6). 23/

These comparisons are lauded in the study as "amazing" and "remarkable," yet they are in fact quite meaningless, more the result of chance, given the misspecification of the dependent and independent variables in the saving function.

The life-cycle model specifically requires that the income variable equal current measured and "expected" nonproperty income, where expected income may be approximated by an exponentially weighted average of past income or quite simply by current income if its rate of growth is assumed equal to the discount rate. Munnell elects the latter approximation, but the original data source provided total net family income, including dividends, interest and to an unknown extent net gains and losses on

the sale of property, securities or business assets. Since a fairly substantial fraction of the group "not expecting benefits" from pension plans were self-employed and since a large proportion of both groups had relatively high incomes and financial assets, there appears to be considerable redundancy in including a total income term and asset variable.

Saving was measured in two different ways; both definitions were tested. The first set of data were constructed by finding the annual change in net assets for the periods 1966-69 and 1969-71. This saving data was probably quite reliable because of the extensive work by the Labor Department to assure consistency in the survey data from year to year. Since Munnell considered this saving series faulty because it included capital gains, the results of the tests in which this definition was employed were not reported. Instead, the empirical work was based on an alternative saving variable which was tediously constructed by approximating the change in original (1966) components of family asset data. Aside from the fact that the probability of measurement error was increased, excluding from the asset variable capital gains, which represent the present value of future income from real capital, clearly defeats the point of the analysis. Using the change in net financial assets would have been the more desirable choice, although this variable does not capture saving through durable asset purchases. And if the surveyed households purchased durables on

credit terms, this saving was further discounted in reducing net worth by consumer debt. [24/]

As noted earlier, the asset term and consequently the saving variable, measured as the change in net assets, does not include any valuation of pension plan participants' expected benefits -- either from private or public plans. This deficiency would, in any case, constitute a serious error of observation. Given the particular characteristics of Munnell's subsample of households, a life-cycle model so specified is irrelevant to a test of the hypothesis that persons covered by pensions save less than those not covered. The data show that approximately 60 percent of the total sample of men aged 48-62 were covered by a pension plan and expected to receive benefits in 1966. Whatever degree of vesting these individuals possessed in 1966, they would have realized a higher level by 1969 or 1971, unless they changed jobs, were laid-off or dismissed. While there is no evidence about the rate of job turnover among surveyed households, Munnell specifically excluded any observation which lacked continuous income statistics and, therefore, reduced the possibility that individual observations might have switched from one to the other group. Assuming, then, that a large proportion of individuals in the "expecting" benefits category were permanent members of that group, the valuation of pension rights must have increased each year. This net increase in value should have been included in the change in net assets, period

to period. It would have been far more pertinent to the analysis to ascertain the reaction of individuals to this change in net worth than to provide tenuous conclusions on the effects of other socio-economic variables.

Ideally, pension saving would enter the life-cycle model as a measure of "perceived" changes in the present value of future benefits, adjusted by some probability factor weighted to reflect age and length-of-service, where individuals' valuations were known or approximated by the experience of recent retirees. Short of this, some measure of total contributions, both employer's and employee's, made on an individual's behalf might be summed to account fairly accurately for the present value of his expected benefits. Since the whole purpose of the study was to measure the impact of individuals' pension plan saving on total personal saving, exclusion of an estimate -- even if crude -- of the latter is difficult to excuse.

The empirical tests fared much more poorly than the reader realizes. Actual saving, excluding pension fund saving, for households included in the subsample amounted to $1904 in 1966-69 and $2275 in 1969-71; but on the basis of Munnell's "simple" example, saving from income in the respective periods would have been approximately $1,018 and $1,629, or half of the actual value. The fact that the empirical test results produced in some instances estimates of a reduction in personal saving within 10 percent or less of the value anticipated by the "simple" example must be attributed to the way in which the data were manipulated. It is possible that the coefficients

in each equation are simply picking up the composition of the sample with respect to each of the socio-economic and pension dummies, weighted by the "hypothetical" saving propensities and constrained by actual income. The inaccessability of the full range of original data impedes checking this speculation.

This type of so-called "highly sophisticated" empirical analysis is usually superficially appealing to the lay reader. So while he gets lost in the specialized jargon and notational expressions used to report the results, too frequently lost sight of is the fact that the results themselves may be meaningless or inaccurate representations of real economic behavior. To extrapolate these results to the entire population and then derive macroeconomic implications intended to influence public policy is inconceivable. It is unfortunate that this and several similar studies on social security have gained wide acceptance and approval by the public and policy-makers.

The question still remains whether, assuming all variables of the saving function were perfectly specified, the life-cycle saving model would have adequately explained the effects of pension plans on aggregate saving over the period in question. The 1966-1971 period embraced the (then) most severe post-World War II recession and generally high and erratic rates of inflation; in short, these years were characterized by a degree of uncertainty unparalleled for many years. The fact is that this and other multi-period consumption-saving models are poorly equipped to explain accurately any of the behavioral

relationships explicit in the hypotheses they were developed to test when economic conditions are rapidly changing. The life-cycle theory presumes either a stable or predictable relationship between current and expected or permanent income and a constant real rate of return or, equivalently, a constant relationship between the cost of current and future consumption. Over the long-run and particularly during periods such as 1966-71, these requirements are not likely to be met, and the models need to be conscientiously re-examined if the results are not to be suspect.

An Application of the Permanent Income Hypothesis

The Future of Private Pension Plans presents an altogether different approach to the question of private pension plans' impact on individual saving behavior and on total private saving. For one thing, the analysis is more heuristic than empiric in nature; for another, the framework for analysis is the permanent income hypothesis of consumption and saving, which differs slightly from the life-cycle hypothesis in its behavioral predictions; finally, the study's conclusion appears to contradict Munnell's finding on private pension plans' influence on saving.

The study begins by detailing the past growth and development of the private pension, state and local government employees', and Social Security systems over the past thirty-five years. Each system's rate of growth, relative maturity and funding characteristics are examined. In the course of this retrospect, the broad consensus concerning the principal factors contributing to the private pension system's growth is detailed and analyzed.

Most of the factors seen as impelling the system's growth, for example, structural economic changes, demographis shifts, wage stabilization programs during the war years, are found to have been necessary preconditions for the development and growth of private pension plans, but of themselves did little more than constrain or delimit their progress. These plans' near explosive growth between 1950 and 1965 is "...ascribed to the attributes which have made them cost-advantageous compared to other saving vehicles." [25/]

The cost-advantages, or "efficiency gains," afforded participants in private pension plans derive from two sources: 1) the more favorable income tax treatment of pension saving and 2) the economies associated with large-scale portfolio management -- information and transaction cost savings, lower per unit management costs and a greater degree of diversification. The latter efficiency gains are admittedly not unique to pension plans. There are available several alternative forms of institutionalized saving, for example, open-end investment companies (mutual funds) and closed-end investment trusts, which permit the individual saver substantially the equivalent degree of diversification. The exclusion of employer contributions and annual earnings on pension fund assets from current taxable income until distribution after retirement affords a substantial saving in the present value tax cost of this form of saving. The value of this tax deferral privilege is obviously highly sensitive to individual workers' marginal tax rate. Nonetheless, since in general workers anticipate substantially

lower tax rates during retirement than the marginal rate imposed on current income, even those near the bottom of the marginal rate schedule benefit from a much higher accumulation rate than attainable when both current saving and the returns thereto are taxed as is other private saving.

In order to demonstrate the potential magnitude of these efficiency gains, an example was constructed to approximate a hypothetical worker's experience while saving both in a pension fund and in the more widely-used saving instrument, a savings and loan account. This form of saving, which entails virtually no information, transaction or management costs, was chosen to provide a rough measure of the efficiency gain attributable to pension fund diversification. To divorce the efficiency gain or loss associated with diversification from that of the deferral provisions of the tax law, the savings and loan account -- the annual deposit and interest accumulation — was calculated twice: once as if free from tax and the other as if taxed at the marginal rate applicable to the wage and salary income of the average worker. Comparison of actual average pension contribution per worker and the untaxed savings deposits required to realize an equivalent accumulation yielded a measure of the efficiency gain or loss associated with a diversified portfolio. Conversely, substituting the taxed savings deposit in the comparison with pension plan performance provided an approximation of the estimated combined efficiency gains. The

results of this exercise are tabulated below. Table VI shows the
author's estimate of the average participant's noninsured pension
fund accumulations, (A); columns (B) and (C) represent,
straightforwardly, the amount of this worker's annual pre-tax
income needed to achieve the pension accumulation when saving,
not subject to tax, is made through the pension plan or a savings
institution, given effective yields for each intermediary; column
(D) is the savings deposit augmented to allow for tax on interest
earnings; and column (E) shows the pre-tax income required to
deposit, after tax, the amount shown in (D). The tax free savings
deposit (C) and the pre-tax income term (E) fluctuate quite widely
as a consequence of the greater variability in the pension fund
accumulation rate, reflecting the greater sensitivity to market
changes of a highly diversified portfolio. On the basis of this
example, it appears that the individual could have saved
substantially less than was required through the pension plan in
several years but would have needed to save, on average over the
period, a larger amount of his pre-tax income to realize the
equivalent accumulation by 1972.

The estimated differences in the amount of required savings
deposits may be seen more clearly in Table VII. The efficiency gain (or
loss) afforded pension fund saving is measured as the percentage
increase in saving above the average annual pension contribution,
needed to maintain a total accumulation equivalent to that estimated

Table VI. Pension Accumulation and Individual Saving Flows,
1953-1972, Calculated in The Future of Private Pension Plans

Year	Pension & Savings Accumulation (A)	Pension Contri. (B)	Savings Deposit (tax free) (C)	Savings Deposit (taxable) (D)	Pretax Income Required to Make Taxed Deposit (E)
1953	245.11	225.00	238.41	239.86	307.51
1954	494.65	208.96	235.74	238.42	298.02
1955	769.89	212.07	253.25	257.56	321.95
1956	1,079.29	220.70	276.32	283.90	354.87
1957	1,341.75	233.58	220.10	228.33	285.11
1958	1,797.33	227.97	396.82	408.33	510.41
1959	2,169.19	245.03	297.90	312.37	390.46
1960	2,569.12	245.10	304.45	322.92	403.65
1961	3,238.54	242.11	547.86	571.43	714.29
1962	3,394.62	250.28	23.01	48.91	61.14
1963	4,064.33	257.07	507.01	538.35	672.94
1964	4,858.44	293.01	599.18	637.08	796.35
1965	5,643.14	328.27	554.64	590.18	702.60
1966	5,701.18	364.43	-186.42	-148.56	-172.33
1967	6,840.42	395.45	833.42	880.58	1,048.31
1968	7,820.13	427.36	627.95	681.83	811.70
1969	7,815.69	467.98	-363.12	-297.81	-354.39
1970	8,828.60	528.92	581.30	656.24	800.29
1971	11,973.40	606.83	2,542.15	2,640.17	3,180.93
1972	13,661.73	673.43	992.08	1,105.03	1,331.36

Source: Ture and Fields: The Future of Private Pension Plans, Tables 12 & 13.

Table VII.   Summary of Efficienty Gains, 1953-72, Derived in
The Future of Private Pension Plans

| Year | Pension Fund Efficiency Gains | |
	Gains from Scale-Economies a) (percent)	Gains from Tax Treatment b) (percent)
1953	6.0	36.7
1954	12.8	42.6
1955	19.4	51.8
1956	25.2	60.8
1957	-5.8	22.2
1958	74.1	123.9
1959	21.6	59.4
1960	24.2	64.7
1961	126.3	195.0
1962	-90.8	-75.6
1963	97.2	161.8
1964	104.5	171.8
1965	69.0	114.0
1966	-151.2	-147.3
1967	110.8	165.1
1968	46.9	89.9
1969	-177.6	-175.7
1970	9.9	51.3
1971	318.9	424.2
1972	47.3	97.9

a) Equal to column (C) divided by (B) in Table VI, above.

b) Equal to column (E) divided by (B) in Table VI, above.

Source: Ture and Fields, The Future of Private Pension Plans, p. 53.

for the average individual enrolled in a noninsured private fund. So, for example, the individual is assumed to have realized in 1968 a net gain from the diversification of his pension portfolio of 46.9 percent and when tax benefits are included he would have enjoyed an 89.9 percent total cost advantage by saving in a qualified pension plan rather than in a conventional savings account. In comparison with the $332.69 average annual pension contribution, the individual would have needed to save annually $474.10 in a tax free savings account [26]/ to accumulate the $13,662 pension fund; he would have required an additional $620.02 pre-tax earnings in order to save, after tax, an amount sufficient to achieve the accumulation. The authors point out that while these efficiency gains were highly variable, they show no tendency to decline over time.

The tables, however, demonstrate that the more significant gains are those derived from the more favorable tax treatment afforded pension fund saving. With respect to the remaining gains derived from the greater diversification of pension funds assets, it is not clear that all, or even part, of these should be considered net reductions in the cost of saving. Even if it is assumed these estimates are accurate measures, few individuals, with the exception of the self-employed or owner-employee of closely-held corporations, enjoy 100 percent vesting until they have accumulated many years of continuous service with the employer who sponsored the pension plan. Unless the actual contribution for

each and every private plan participant were actuarially determined based on length-of-service and life expectations, the value of the pension fund accumulation would differ from that shown. Suppose that this "average" worker had attained a 75 percent vested right in the plan mid-way through the twenty-year period. Instead of having to deposit an average of $474.10, as calculated, he would have needed to save only approximately $340 to realize $10,246.50 ($13,662 x .75), compared to the $332 pension contribution. Only when the employee had obtained full vesting would he attach full value to the estimated accumulation, hence realized the measured efficiency gain. Of course, if the cost of purchasing retirement income through these plans has been actuarially determined, it fully discounts the probability that any given employee may not realize full or even partial vesting. In this case such an exercise would not err substantially.

Another factor which should have entered the calculation is the absolute illiquidity of pension fund saving, which would yield a premium in the normal adjustment of the market. The amount of premium any one or all individuals would have required to be totally indifferent between any other saving vehicle with characteristics of pension plans and, say, saving account deposits is really indeterminate. Workers did not bargain for a given employer contribution and guaranteed rate of return over the period studies but rather for a specific benefit payment at retirement. Any such premium can not be

readily segregated from other factors influencing the pension fund accumulation rate, but it will be interesting to observe the future rates paid on IRA savings accounts and annuities, which are restricted under the tax law, to determine whether the liquidity premium has been substantial. Twenty years hence an analysis of the saving behavior of individuals enrolled in pension plans and in individual retirement accounts may produce evidence which contradicts these findings on the relative cost-effectiveness of pension plans.

The principal conclusion of The Future of Private Pension Plans is that these efficiency gains to participants' saving were the principal impetus to the growth of the private pension system. It is argued that, assuming workers' saving behavior was responsive to differences in the cost of purchasing alternative future income streams and if individuals perceived the cost advantages to participation in private pension funds, then:

> ...it must be concluded that the volume of such saving which workers want to undertake is a function of the efficiency gains and of the elasticity of demand for future income provided by pension funds, given the cost of alternative future income streams. In other words, given the other principal arguments in the demand for future income (level of permanent income or wealth, age, amount of publicly provided retirement benefits and their cost, anticipated period of retirement, et cetera), the amount of future income workers want to obtain from private pension plans will be greater the greater the efficiency gain afforded by the plans and the higher the cross-elasticity of demand for alternative future income streams. 27/

To measure this substitution effect between pension fund and other saving, the trend rate of increase in the measured efficiency

gains was found by regressing the observations (shown in Table VII) on time. Using this trend rate of 3.5 percent a year and an assumed cross-elasticity of 10, it was estimated that each year's average decrease in the relative cost of pension fund saving would have caused workers to attempt increasing the amount of this saving by 3.5 percent. It seems highly unlikely, however, that such a high cross-elasticity is reasonable, given the illiquidity and uncertainty associated with this form of saving. It would most likely never be observed in any case since substantial institutional rigidities -- imposed by legislation and inherent in the cumbersome mechanics of the plans -- would preclude rapid adjustments to perceived cost differentials.

There remains the collateral question concerning the direction and magnitude of the impact of pension plans on total personal saving. No quantitative estimation was attempted; however, the study argues, somewhat ambiguously, that the extent of the impact on total saving would depend on whether the decrease in pension fund saving reflected an increase in the cost of other saving, the cost of pension fund saving unchanged, or a decrease in the absolute cost of pension saving. Presumably, the former would occur as a consequence of tax law changes which increased the tax bias against saving uses of income or because of unanticipated changes in the rate of inflation, to the extent pension plan saving was partially protected, in real terms, by contractual agreements. The analysis implies that the effect of any such decrease in the cost of pension saving would result in a

substitution of it for other discretionary saving, but not in an increase in total saving. The latter effect, a change in the absolute cost of pension fund saving, would impact on the volume of total private saving.

The absolute cost of private pension fund saving was seen to decline if, in fact, these plans afforded not only tax cost savings, but also the efficiency gains deriving from diversification and other scale economies, for example, lower management costs. In this case, the authors argued that the overall cost of saving would have fallen and

> ...the new equilibrium cost for all saving relative to
> consumption uses of current income would be lower.
> Total private saving would increase unless the cross-
> elasticity of consumption with respect to the cost of
> saving were zero. [28]

For a "...given level of permanent income, (such) a reduction in the relative cost of saving results in an increase in the proportion of income currently saved." [29]

IV.   The Effects of Pension Funds on the Volume of Total Private
       Saving ·

Part III examined critically two studies -- "Private Pensions and
Savings: New Evidence," and The Future of Private Pension Plans --
which applied respectively the life-cycle and permanent- income
hypotheses to the question of private, pension plans' effect on
individual saving behavior and on total private saving. But while a
singular, if tentative, conclusion emerges from these as from earlier
studies, there is considerable disagreement over why this should have
been so. In other words, the application of neither theory has yielded
an unambiguous explanation of the effects of private pension plans on
individual saving behavior or on total saving.

The   life-cycle   and   permanent - income   hypotheses   are
substantially equivalent in their behavioral predictions and rest on a
common analytical foundation. Each makes the following assumptions:
consumers (or consumer units) allocate present and expected future
income to achieve an optimal life-time consumption pattern and each
has a utility function which is homothetic about the origin. With these
assumptions and any given value of the parameters which determine
the shape of the utility function, including a given set of prices for
consumption and saving uses of income, the elasticity of consumption
with respect to permanent income is unity. Since saving and
consumption exhaust income, the elasticity of saving with respect to
income is also unity. Both theories predict that, ceteris paribus, if

permanent or. expected income increases (or decreases) by a certain percentage, consumption and saving will vary by exactly the same proportion. Thus the ratio of either saving or consumption to income will remain constant through time.

This theoretical proposition has found popular expression in the notion of a target replacement ratio. This concept refers to the general belief that individuals save for retirement with the view of replacing a given fraction of their current income. While superficially appealing, the target replacement ratio can be shown to be inconsistent with observed saving behavior unless it is specified in either real or nominal terms. Moreover, neither of these specifications would accurately reflect the analytical argument that the elasticity of saving with respect to income is unity unless it were assumed that the economy would realize zero productivity gains over time. On this improbable assumption, an aggregate target replacement ratio specified in real terms would be equivalent to the marginal propensity to save from permanent income since the time paths of both real current and permanent income would be equal. Some of the conceptual deficiencies of Alica Munnell's and the Ture-Fields' studies can be traced directly to this misunderstanding.

Apart from the errors of measurement in Munnell's study, her empirical tests assume that the real and nominal rate of interest, hence the relative costs of consumption and saving, remained constant over the period, 1966-1969; only on this assumption does the life-cycle

theory predict a stable rate of consumption or saving over time. Both her methodology and initial hypothesis indicate that the analysis rests on the "popularized" target replacement ratio concept rather than a literal interpretation of the theory used as a framework for her empirical tests. The Ture-Fields analysis appears, on hindsight, also to have misconstrued the implications of this theoretical assumption. The authors argue that including a target replacement ratio in the saving function artificially fixes the relationship between current and future income and precludes the response of saving to changes in its relative cost. In criticizing the unitary income elasticities implicit in life-cycle theories, they appear to argue that acceptance of this analytical proposition is tantamount to accepting the widely-held belief that the price elasticity of saving is zero. This conclusion simply does not hold. By challenging the conceptual foundation of these theories, the authors introduce into their analysis an unnecessary contradiction.

Since if the somewhat more restrictive assumptions of the life-cycle hypothesis are relaxed its behavioral predictions approximate those of the permanent income hypothesis, the remainder of this discussion will focus on the latter to ensure expositional clarity. Initially the analytical properties of the theory will be delineated. Then, within this framework, the impact of the private pension system on the volume of total saving will be analyzed heuristically. Finally, empirical evidence in substantiation of the hypothesized effects of the

system's growth and development will be presented.

The permanent-income hypothesis rests on the basic assumption that consumers' utility functions, which describe their preferences for current and future consumption, are characteristically homothetic about the origin. This means that the marginal rate of substitution between current and future consumption at any point on an indifference map is exactly the same as at any other point where their proportion to total wealth (or permanent income) is the same. This condition holds at all points on any given straight line through the origin. The shape of one indifference curve is thus exactly the same as all others, and if we know one, the others can be constructed systematically by taking the marginal rate of substitution at each ray from the origin and integrating. Figure 1 illustrates a general homothetic indifference map. The marginal rate of substitution of x_2 for x_1 and the ratio of their prices are equal at A and B, C and D, and E and F. Since the marginal rate of substitution, equal to the price ratio, can not be the same at more than one point on any such indifference curve, points on these straight lines are the only points which belong to the respective goods' Engle curves. Since each Engle curve has a constant slope, the goods will be purchased in fixed proportion as income varies so long as their relative prices remain the same. A given percentage change in income will produce an equivalent percentage change in the purchase of each good; hence all income elasticities are equal to unity.

If the general case is extended to the relationship between current consumption and saving (deferred consumption), exactly the same principal holds. In this case x_1 equals consumption in the current period and x_2 equals the sum of consumption potential in all future periods. As before, the income elasticities of both current and future consumption with respect to permanent income are unity.

An indifference map with these qualities is the basis of Friedman's specification of the consumption function:
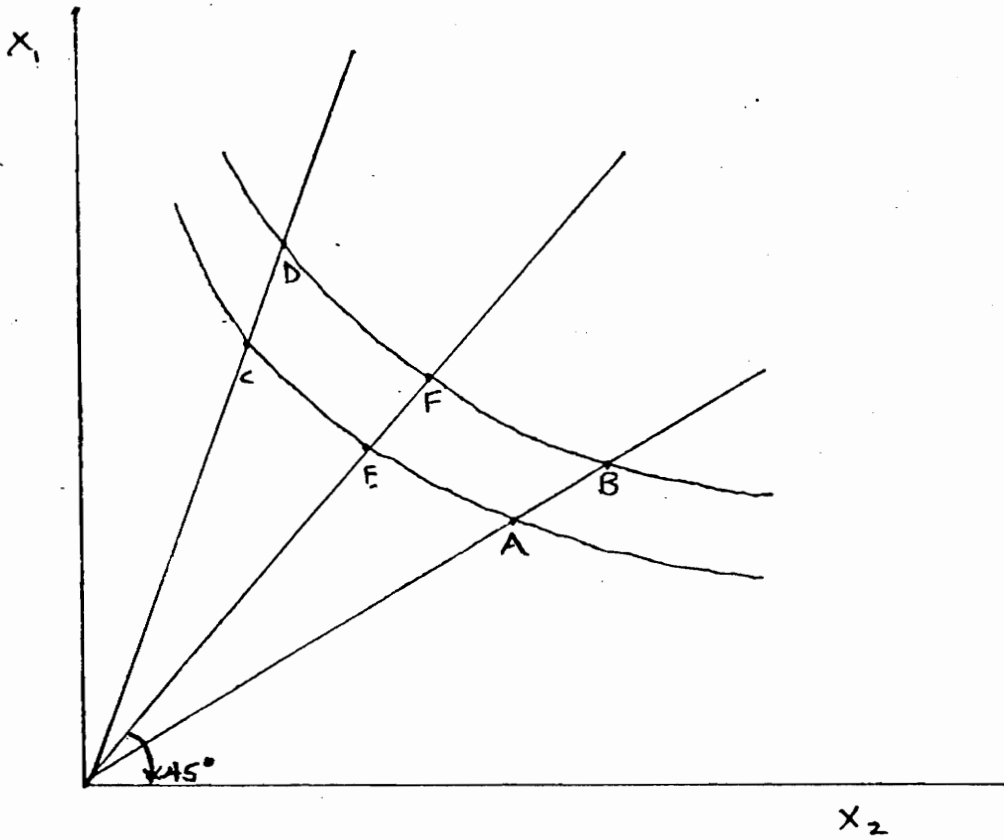
$$Cp = K(i, w, u) Yp = K(i, w, u) iW,$$

where i, w, u and Yp (i , w) equal the interest rate, the ratio of nonhuman wealth to permanent income, utility factors which determine the shape of the indifference curves, and permanent income, respectively, and all are determinents of K, the ratio of consumption to permanent income. (All variables, of course, refer to the same point in time.) Without completely reiterating the theory itself, its principal implication is that, for any given values of i, w, and u, consumption will be some fixed proportion of income. Since consumption and saving exhaust current income, saving will also be a fixed proportion of permanent income. The income elasticities of both, therefore, are exactly unity.

The validity of this analytical proposition does not depend, as suggested by some researchers, on an extremely restricted view of economic behavior. Allowing for accumulation for reasons other than to consume more in the future, it is sometimes argued, would

Figure 1

Homothetic Indifference Map

invalidate the permanent-income (and the life-cycle) hypothesis. This argument is fallacious, however, because the hypothesis accounts fully for any and all motives for saving, including amassing wealth for no other reason than to satisfy "snobbish" behavior. It also recognizes that individuals may internalize to their saving functions the welfare of future generations. The fact that accumulated wealth increases more than proportionately with age may reflect either of the above motives for saving or may reflect a less precipitous fall in permanent income (from human and nonhuman physical capital combined) than is sometimes postulated. In any case, such empirical evidence does not in any way disprove the assumed constant, unitary elasticity of consumption with respect to income.

This is not to argue that the fraction of permanent income saved, K, is invariant over time. If either the individual's tastes or his perception of the probable uncertainty of economic events in the future should change, the amount of current consumption he would be willing to forgo, to increase his wealth holdings, at any given set of relative prices for consumption and saving, will change as well. That is, the marginal propensity to save from permanent income may change even if there is no change in the relative costs of current and future consumption. Conversely, for any given set of values for the parameters determining K, other than the interest rate -- u, utility factors, and w, the desired ratio of nonhuman to total wealth or permanent income -- one might measure an infinite number of saving

propensities as the marginal productivity of capital changed over time.

Moreover, the analytical proposition that the elasticities of saving and of consumption with respect to permanent income are unity does not imply anything at all about the ratio of different types of consumption expenditures to the absolute level of income or the composition of wealth holdings and increments thereto. Nor does it suggest a constant relationship between consumption or saving and current income.

The permanent-income hypothesis has been subjected to innumerable empirical tests and has proven to be consistent with budget studies and time series data. Accepting it as a fairly accurate representation of consumption-saving behavior, what can be inferred about the impact of the private pension system on individuals' saving behavior, hence the total volume of private saving?

Assume for the moment that the annual "efficiency gains" measured in The Future of Private Pension Plans were fairly accurate approximations of the cost differential between pension fund and alternative forms of saving. The study found that cost savings attributable to more favorable tax provisions for pension fund saving consistently and substantially exceeded those derived from the lower investment costs and more effective diversification achievable in large-scale portfolio management. The authors concluded that, while smaller in total magnitude, only the latter "efficiency gains" would have accounted for any positive impact the pension system may have

exerted on the volume of total private saving.

Assume, initially, that individuals' current and permanent income are equal and that the market is in equilibrium, in other words, all market participatants have fully adjusted their portfolios to achieve equivalence, at the margin, in the yield on their total assets. We know that under these conditions individuals' marginal rate of substitution between current and future goods is just equal to the price ratio. If for some reason the absolute cost of pension fund saving were to decline relative to the cost of other forms of private saving, individuals would respond to this perceived opportunity to obtain future income at a cost less than they are willing to pay by increasing the fraction of current income saved. Unless this hypothesized decrease in the cost of, or equivalently, increase in the yield on pension fund saving reflected a change in the real resource capability of the economy, however, permanent income, or aggregate wealth, would not increase. [30/] Instead, there would be a reallocation of a given level of total wealth such that the new rate of consumption over time would equate individuals' preferences with the new price ratio.

If, as seems most plausible, the increase in yield on pension fund saving and consequent apparent reduction in the cost of future consumption represents a disequilibrium condition, any increase in the total amount of saving from current income or any reallocation of wealth among alternative assets would tend to narrow the yield differential between pension fund and other private saving, hence to

force the overall cost of saving back to its equilibrium price. When, in fact, an observed deviation in the risk-adjusted rate of return on one or another form of saving is arbitrary and not the result of change in the real productivity of the economy, the higher the cross-elasticity of saving among alternative uses, the closer to zero will be the measured price elasticity of total saving. In markets substantially free from institutional and other constraints, cost advantages of pension fund saving would be short-lived and quickly adjusted by the reallocation of individual saving.

Of course, the financial markets are not perfect; regulation, custom, and institutional constraints frequently preclude instantaneous adjustment of individual portfolios. The fact that individuals must usually borrow and lend at different rates and typically have committed, in advance through contractual agreement, a substantial fraction of each year's current income to expenditures tends to impede generally the saving-consumption adjustment process. When, as in the case of pension plan arrangements, institutional rigidities further constrain the saving response, a differential in risk-adjusted yields might persist temporarily, resulting in a slight increase in the fraction of both current and permanent income saved. No change in saving would occur, however, if an observed yield differential merely represented compensation for greater risks involved in pension fund saving.

As was noted earlier, the relative illiquidity and

nontransferability of pension fund saving probably command a fairly substantial risk premium. Moreover, calculating the cost advantages afforded by pension plans on the basis of aggregate data necessarily requires that the actuarial calculations of all participants matched those of their employers; if any differences in valuation were not corrected, measured yields would deviate from those perceived and responded to by individual savers. The very fact that these funds tend to be extremely stable since contributions and benefit payments are highly predictable, if rising, would have permitted these funds to realize an above average rate of return despite the fact that they participate in the same markets as any other institution or individual. But there is no concrete evidence that observed yield differentials between pension fund and other forms of saving represented anything more than risk premiums compensating for these characteristics; if indeed they existed, this analysis suggests that they would have persisted only as a consequence of the institutional rigidities inherent in pension plan saving. However, the same institutional impediments which resulted in some years in an increase in total saving by maintaining an artificially high yield would have decreased private saving in periods when the risk-adjusted yield on pension funds was below that obtainable on alternative assets. Given the highly erratic nature of the diversification gains calculated in the Ture-Fields study (and this is the only simulation of which I am aware), it is questionable whether yield differentials derived from this source would have altered

the aggregate saving to income ratio.

Now consider the impact of the cost advantages to pension fund saving deriving from more favorable tax provisions. The existing tax law is believed to be heavily biased toward consumption and against saving uses of current income because both the amounts currently saved and the future earnings thereon are subject to tax while income devoted to current consumption is taxed only once. Provisions which afford pension fund saving tax deferral until retirement, on both the initial amount saved and future earnings thereon, thus increase substantially the rate of return to this form of saving relative to alternative assets. Initiation of the U.S. income tax system probably affected a substantial reallocation of total resources; over the past several decades numerous changes in the tax law have augmented its effect in increasing the relative cost of future consumption.

Tax-deferred saving has become more cost-advantageous as the net of tax yield on other forms of private saving is reduced either explicitly by legislated changes in the tax law or implicitly by inflation-induced increases in tax rates on a given level of real income. In the absence of these tax provisions, the aggregate amount of private saving would undoubtedly have been far less than actually realized. Thus, in contrast to the yield differentials derived from scale economies and other characteristics of pension funds, those attributable to tax preferences may actually produce sustainable net yield differentials among alternative forms of private saving.

Other shifts in the composition of private saving, while less obvious, may also reflect the response of saving to the bias against saving in the present tax system. Individuals have willingly internalized corporate saving to their saving functions. For most production activities, the corporate form of organization is most efficient, providing a degree of risk-sharing and of access to credit markets, among other things, unavailable to noncorporate business. As individual marginal tax rates have risen, owners have found indirect saving through corporate retentions and expansion a more efficient and less costly way to save. Realization of the present value of the net increase in future earnings at some future date is taxed at more favorable capital gain rates. The increasing propensity of households to finance the purchase of consumer durables (another form of saving) is a further manifestation of this phenomenon. Since interest is a deductible expense against adjusted gross income, the net cost of holding the asset against future consumption needs, versus renting those services, is substantially reduced. These trends would probably not have been so pronounced if there were no differences in the tax treatment of consumption and saving uses of income and of income from different forms of investment.

The weight of the existing tax bias against saving and the extent to which tax changes impact on aggregate saving will differ with the composition of government expenditures. The most obvious distinction is that between public investment expenditures and transfer payments.

The former has been a steadily declining fraction of total expenditures for two decades. Recent evidence indicates that government investment may be internalized to the private sector's saving function in much the same way as households substitute corporate for personal saving,[31/] but transfer payments are believed to be traded-off for consumption. To the extent that individuals do substitute some portion of the governments' expenditures for private saving, the actual increase in net yield on saving required to compensate for the differential tax on saving uses of income would be less than otherwise. To the extent the latter type of expenditures effectively alter private sector incentives and reduce labor's productivity, they may be assumed to diminish the economy's potential growth rate.

Over the past two decades, income maintenance has doubled as a fraction of total Federal expenditures, increasing from 22.5 percent in 1950 to over 43 percent in 1974. If, as seems likely, this use of tax receipts has diminished the production potential of the economy, the initial adjustment in the saving propensities of individual tax-payers would have been altered even if the overall tax rate on capital income had not changed. While increases in tax rates, with the composition of expenditures unchanged, induce a substitution of consumption for saving uses of income from a given level of permanent income, changes in the uses of tax receipts, with or without changes in tax rates, may alter the growth rate in permanent income as well. Under these conditions, even though no change may have occurred in the

relative cost of saving, aggregate saving would decline. This is so first because permanent income declined. But if the marginal propensity to save is also diminished as a consequence of individuals' reaction to an undesired change in the composition of Federal expenditures, saving would decline even further.

To reiterate, individuals would have responded to any perceived differences in the returns to pension fund saving relative to those available on alternative assets by attempting to shift their current saving into pension funds. The institutional rigidities inherent in pension arrangements, however, would have precluded the rapid substitution of and incremental additions to total current saving which in their absence probably would have effectively minimized yield differentials in any case. However, given the erratic nature of these cost differentials, it is not likely that they exerted any consistent impetus to the growth of the private pension system. The present-value tax savings to pension fund saving, on the other hand, resulted in sustained differentials in the overall net-of-tax yield which, in turn, affected the allocation of permanent income between consumption and saving. Total saving has been higher than otherwise would have occurred.

Many researchers maintain that the real marginal productivity of capital has shown no statistically significant long-run trend over the past thirty years. If this is true, for whatever reasons, and assuming that other determinants of individual utility functions have remained

unchanged, the permanent income hypothesis would argue that the fraction of the nation's total income saved would have been fairly constant throughout the period. Regressions of the ratio of gross private saving (as measured in the National Income and Product Accounts) and gross national product confirm this; the coefficient on time was insignificant, .000729. Findings of other researchers, notably David and Scadding in the study cited above, substantiate that there has been no significant change in this relationship except over the World War I period when durable goods expenditures increased in importance.

The equilibrium rate of interest consistent with the economy's total production capability has no observable market counterpart; instead, there exists a myriad of risk-adjusted nominal rates of return. It is the response of individuals to perceived changes in their opportunity to adjust the time pattern of consumption from total permanent income which assures that differentials in yields among alternative assets just compensate for differences in risk. The more nearly perfect are the nation's capital markets, the more rapid and complete will be the adjustment process. When government tax policies impact more heavily on one or another form of investment, substitutions in individual portfolios will continue until all risk-adjusted yields are again equal at the margin.

If pension funds, by virtue of their particular characteristics and the tax deferral privileges they enjoy, have provided a less costly form

of saving, pension fund saving should have represented an increasing fraction of gross private saving. The ratio of the logarithms of pension fund saving and gross private saving were regressed on time; the results indicate that pension fund saving has been growing as a proportion of gross saving at approximately 5 percent per year over the period 1950 to 1973. This fact does not clarify whether the relatively more rapid rate of growth in pension fund saving is attributable solely to net yield differentials or to efficiency gains these institutions have realized as a consequence of more nearly complete diversification.

Multiple regression analysis was employed to determine the extent to which a series of logically relevant variables might explain the rising pension fund to total private saving ratio. With this ratio as the dependent variable, the rates of growth in nominal and real income, diversification "efficiency gains" calculated in the Ture-Fields study, and the average tax on total personal income, were used separately and in several equation sets as independent variables. Only the following specification yielded significant results:

$$\frac{PFS}{GPS} = -.02085 + .7637 \frac{PTR}{PY} + .0035\, DG$$
$$(5.666) \qquad\qquad (1.95)$$

where, $\frac{PFS}{GPS}$ = the pension fund to gross private saving ratio,

$\frac{PTR}{PY}$ = the total personal tax receipts to personal income ratio,

and DG = the diversification efficiency gains.

The regression statistics are respectable: R^2 = .652, F-value = 19.705 and standard error of the estimate = .0081. The Durbin-Watson statistic, 1.255, falls well with the critical values. Given the low coefficient and t-statistic attached to the efficiency gain variable, it appears superfluous. Tax gains, in fact, dominate as predicted.

These empirical findings argue positively in support of the conclusions derived analytically above. Positive yield differentials, over and above those derived from tax benefits, between pension fund and other forms of saving must be assumed to have represented premiums which compensated participants for the illiquidity and nontransferability of this asset. Tax deferral privileges appear to explain the growth and acceptance of this form of personal saving.

If these conclusions are accurate, the rate of growth in formal pension plans is likely to be retarded in future years. The Employee Retirement Income Security Act of 1974 created individual retirement accounts which enjoy equivalent tax benefits but none of the less desirable characteristics of conventional pension plans. Since considerable latitude in the types of assets and complete portability are allowed IRA's, this newly conceived saving vehicle is likely to displace a substantial flow of saving to the private pension system.

FOOTNOTES

1/Norman B. Ture and Barbara A. Fields, The Future of Private Pension Plans, (Washington, D.C. : American Enterprise Institute for Public Policy Research, 1976)

2/Alica H. Munnell, "Private Pensions and Saving: New Evidence," Journal of Political Economy, vol. 84, no. 5, (September/October 1976) pp. 1013-1032.

3/Ture and Fields, The Future of Private Pension Plans.

4/Milton Friedman, A Theory of the Consumption Function, (Princeton University Press: for National Bureau of Economic Research, 1957).

5/Phillip Cagan, The Effects of Pension Plans on Aggregate Saving: Evidence from a Sample Survey, (New York: National Bureau of Economic Research, 1965).

6/Ibid. p. 82.

7/Milton Friedman, A Theory of the Consumption Function.

8/George Katona, Private Pensions and Individual Saving, Monograph No. 40 (Ann Arbor: Survey Research, 1965).

9/Daniel M. Holland, Private Pension Funds: Projected Growth (New York: National Bureau of Economic Research, 1966).

10/H. Robert Bartell, Jr. and Elizabeth T. Simpson, Pension Funds of Multi-employer Industrial Groups, Unions, and Nonprofit Organizations (New York: National Bureau of Economic Research, 1968).

11/Roger F. Murray, Economic Aspects of Pensions: A Summary Report (New York: National Bureau of Economic Research, 1968).

12/Geoffrey N. Calvert, "New Realistic Projections of Social Security Benefits and Taxes: Their Impact on the Economy and on Future Private Pensions," an address before the American Pension Conference, New York, December 4, 1973.

[13]/ Munnell, "Private Pensions and Saving: New Evidence," and Ture and Fields, The Future of Private Pension Plans.

[14]/ Munnell, "Private Pensions and Saving: New Evidence," p. 1013.

[15]/ See Martin Feldstein, "Social Security, Induced Retirement, and Aggregate Capital Accumulation," Journal of Political Economy, vol 82, no. 5 (September/October, 1974), pp. 905-926; and Alica H. Munnell, "The Impact of Social Security on Personal Savings," National Tax Journal, vol. 27, no. 4 (December 1974), pp. 553-567.

[16]/ Munnell, "The Impact of Social Security on Personal Savings."

[17]/ Albert Ando and Franco Modigliani, "The 'Life-Cycle' Hypothesis of Saving: Aggregate Implications and Tests," American Economic Review vol. 53 (March 1963), pp. 55-84.

[18]/ Munnell, "Private Pensions and Saving: New Evidence," p. 1019.

[19]/ Ibid.

[20]/ Center for Human Resource Research, Ohio State University, The Pre-Retirement Years: A Longitudinal Study of the Labor Market Experience of Men, Manpower Research Monograph No. 15 (Washington, D.C.: Department of Labor, 1970).

[21]/ Pension benefits were not discounted for two reasons: both income and expected benefits were likely to increase through time and, since Munnell specifies expected future income as equal to current income, this data will better serve later comparisons.

[22]/ Munnell, "Private Pensions and Saving: New Evidence," p. 1030.

[23]/ Ibid. pp. 1023-4.

[24]/ Current saving would, of course, be overstated by an amount equal to the rental value of the stock of service-yielding consumer durable goods; the net effect of failing fully to specify the asset variable, given that this adjustment is not made to the consumption equation, depends on whether current outlays represent net additions to the flow of future services from households' stocks of durable goods.

25/ Ture and Fields, The Future of Private Pension Plans, p. 43.

26/ This saving privilege is now permitted individuals who are not covered under employer-sponsored plans. The Employee Retirement Income Security Act of 1974 created individual retirement accounts, allowing tax free accumulation for retirement and for giving income tax on annual saving up to $1500 and all returns on the accumulated assets. IRA's, however, may be invested in one of several institutionalized saving arrangements, some of which afford substantially the equivalent diversification as do pension plans. These instruments are likely to have a significant impact on workers' preferences for pension plan participation in the future.

27/ Ibid., pp. 54-55.

28/ Ibid., p. 57.

29/ Ibid., p. 79.

30/ This argument is developed in Martin J. Baily, National Income and the Price Level, (New York: McGraw-Hill, 1962). This study reaches slightly different conclusions.

31/ See Paul A. David and John L. Scadding, "Private Savings: Ultra-rationality, Aggregation, and 'Dennison's' Law," Journal of Political Economy, vol. 82., no. 2., (March/April, 1974), pp. 225-249.

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THE EFFECTS OF PRIVATE PENSION FUNDS
ON PERSONAL AND PRIVATE AGGREGATE SAVING

by

Barbara A. Fields

(ABSTRACT) *

The private pension system, its growth, development, and atypical
characteristics, was analyzed. Among the many reasons frequently
cited as having impelled this institution's rapid growth, Federal
tax provisions which allow deferral of income tax on pension fund
saving were found to be singularly important.

Results of an empirical analysis support this initial speculation.
Not only has pension fund saving become an increasingly larger fraction
of gross private saving over time, the rate of increase in this ratio
has been highly correlated to the increasing average tax burden levied
on personal income. The study concluded that, in light of the newly
conceived individual retirement accounts which remedy several undesirable
qualities of retirement income saving through conventional pension
plans while realizing equivalent tax savings, private pension plans
are likely to increase in size much less rapidly in the future than
in the past two decades.