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REWARDS TO CONTINUED WORK: THE ECONOMIC INCENTIVES FOR POSTPONING RETIREMENT

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ABSTRACT

Using a new data file on pay and pensions, this paper presents and discusses new empirical evidence on how older workers' income opportunities change as they age. It also develops a detailed description of private pension structures and the ways in which pensions reward deferred retirement. The data imply that the present discounted value of total lifetime income rises when people postpone retirement, but the size of the income increment varies with age. The data also show that some pension plans encourage early retirement while others penalize it.

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REWARDS TO CONTINUED WORK:

THE ECONOMIC INCENTIVES FOR POSTPONING RETIREMENT

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This paper develops empirical measures of the economic incentives for deferred retirement among older workers. Using a new data file on pay and pensions, we construct intertemporal budget sets reflecting the income available to workers at alternative retirement ages. The analysis explores how continued labor force attachment is rewarded in terms of net earnings, Social Security benefits, and private pension income.

Two motivations guide the research. First, it is important to understand how workers' income opportunities change with age. Studies of retirement patterns including our own[1] and others[2] have demonstrated that these economic rewards influence older workers' decisions to leave the labor force. Savings decisions, consumption paths, and other economic outcomes are also responsive to the budget set at older ages. Unfortunately, data limitations have made it difficult for previous authors to explore the range of income opportunities available to older individuals. This paper presents and discusses new empirical evidence on how older workers' income opportunities change as they age.

It is also important to explore how companies differ in the compensation packages they offer to older workers. Some authors[3] have suggested that firms use their pension plans to encourage early retirement, though data on this phenomenon are difficult to obtain.

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[1] Mitchell and Fields (1983), Fields and Mitchell (1982).

[2] Boskin and Hurd (1978), Burkhander and Quinn (1983), Burtless and Hausman (1982), Gordon and Blinder (1980), Gustman and Steinmeier (1981).

[3] Lazear (1982).

The present paper develops a detailed description of private pension structures and the ways in which they treat prolonged job attachment.

Two main conclusions arise from the analysis. First, the data show that total net income rises as people defer retirement, but the size of the income increment varies with age. Second, the data show that some pension plans encourage early retirement among older workers but others penalize it. Thus differences in private pension structures prove to be an important source of variation in income opportunities across older workers. Our results have implications for researchers interested in older workers' income patterns and for policymakers who propose mandating actuarial neutrality in private pension plans.

Section I of the paper views briefly the most important theoretical features of older workers' income opportunities, and discusses some general considerations when building an empirical counterpart of the theoretical budget set. Section II presents our methodology and data, and Section III presents the findings. Conclusions are collected in Section IV.

I. Theoretical Considerations

We consider the rewards to continued work in the context of older persons' retirement decisions. Previous theoretical studies of retirement behavior[1] have identified the individual's problem as selecting the optimal amount of work to do over the remaining lifetime, subject to income and time constraints. "Optimal" is defined as the labor supply path which maximizes intertemporal utility; accordingly, the goal is to select that retirement age which provides a worker with his most preferred combination of leisure time and income from among

[1] For a review see Mitchell and Fields (1982).

available options. The worker's income constraints are determined by net earnings available from market work, and net Social Security and private pension benefits available during retirement. His time constraint consists of time remaining until death, which may be allocated between work and leisure.[1]

More formally, the worker is postulated to select that retirement age (R) which maximizes intertemporal utility, the arguments of which are lifetime consumption (C) and lifetime leisure (RET):

$$U = U(C,RET);\ U \text{ concave}$$

subject to intertemporal budget constraint with the following structure:

$$C = PDVY(R) + W_o - B_o.$$

In other words, planned consumption equals the present value of discounted income over the remainder of the individual's life (PDVY), plus wealth at the time of the retirement decision (W_o), minus planned bequests (B_o). Survival probabilities and pure time preference are incorporated via a discount factor (r). Both the lifetime utility function and the income constraint are viewed as stationary over time.

The PDVY component of the older worker's budget constraint depends on the retirement age chosen. This is because PDVY is composed of three elements, each of which is a function of R. The present value of earnings (PDVE) is computed from the age at which the worker begins planning for retirement (normalized to 0) until R:

$$PDVE = \int_0^R E_t\, e^{-rt}\, dt\ .$$

The other two components of PDVY, the discounted value of Social Security and pension benefits, also depend on R since they are computed

[1] We abstract here from retirement options involving part-time work or gradual withdrawal from the labor force; Gustman and Steinmeier (1981) and Burtless and Moffitt (1982) consider these alternatives in some detail. For the sample of older workers described below, retirement may be best described as accepting the pension and leaving the firm since only a tiny minority ever worked after becoming pensioners.

from R to the end of the planning horizon (T):

$$PDVSS = \int_{R}^{T} SS_t \; e^{-rt} dt$$

and

$$PDVPP = \int_{R}^{T} PP_t \; e^{-rt} dt \; .$$

Annual retirement benefits are fairly complex functions of several factors including the worker's retirement age:

$$SS_t = f(R,t,F)$$

$$PP_t = g(R,t,F).$$

Many firms raise annual pension benefits when the worker defers retirement to acknowledge the shorter period over which benefits will be paid; when benefits are just sufficiently larger to offset increased mortality, the pension structure is termed actuarially neutral.[1] As with private pension formulas, Social Security rules also provide a positive credit as R increases. Social Security and private pension benefits also depend upon two other variables. The year itself, t, enters the annual benefit computation because benefits often vary with time. This would occur in the case of negotiated benefit improvements in bargained plans, or legislated Social Security formula changes. Finally, the pension factor (F) is included to allow for interactions between benefits and other variables; for example in some pension plans, pre-retirement earnings are used in the benefit formula.

In addition to the income constraint, an older worker also faces a total time constraints. By definition, years of retirement leisure (RET) are equal to the difference between expected lifetime (N) and the

[1] In the empirical analysis below, we focus on defined benefit plans, i.e., those in which benefit amounts are functions of years of service and/or pay rather than pension contributions. Benefits in such plans need not be actuarially neutral.

age at which retirement occurs:

$$RET = N - R.$$

Understanding the income-leisure tradeoff facing older workers is facilitated by means of Figure 1. This graphs the present value of income available to the older individual and the expected retirement period for all possible retirement ages; the diagram indicates that for this hypothetical worker at least, income is lowest if he chose to retire as early as possible, while income would rise substantially if he remained additional years at his firm. The figure presumes that deferring retirement is rewarded by ever more income; below we show empirically that the intertemporal budget set indeed has such a shape.

Presenting the older worker's decision in this way highlights the similarities between this model and the conventional labor economics approach to the hours of work decision. Figure 1 also indicates that the optimal retirement date (R*) is determined in a familiar way: R* is the age at which the marginal utility of an additional increment to lifetime income is just offset by the loss in utility from leisure foregone. While we do not develop comparative dynamics for R* here, they may be derived in much the same manner as in the cross-sectional framework.[1]

Some features of the intertemporal budget set should be underscored. First, the older worker's budget set is defined over all possible retirement dates rather than at just one moment in time. A complete understanding of the rewards for continued work therefore investigate not just one or two points on the budget surface, but all alternatives. Second, to be able to compute PDVY at each age, it is necessary to

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[1] Fields and Mitchell (1982).

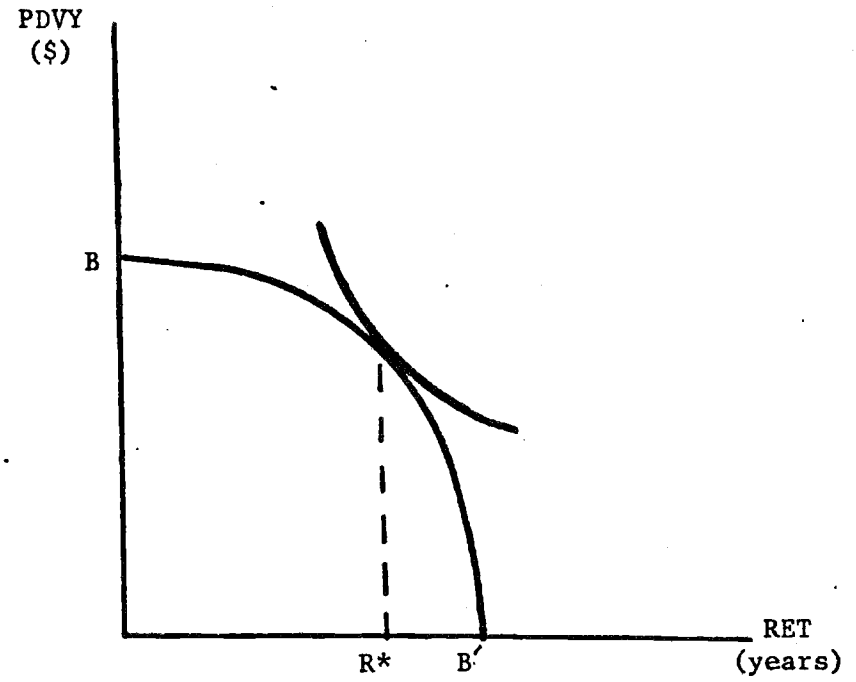

FIGURE 1.

The Intertemporal Budget Set (BB')

and the Optimal Retirement Date (R*)

understand the private pension and Social Security benefit formulas facing a given worker, since these institutional rules impart structure to the intertemporal budget set. Third, the income leisure tradeoff embodies expectations about future income streams and formulas, inflation rates, mortality rates, and a host of other variables. These must also be modeled in empirical work.

II. Building the Empirical Intertemporal Budget Set

To construct an intertemporal budget set, we require complete data on each worker's earnings, private pension benefits, and Social Security benefits. The data set used in empirical analysis is a subsample of the Benefit Amounts Survey (BAS) developed in 1978 by the U.S. Department of Labor's Pension and Welfare Benefits Program. The survey consists of a random stratified sample of private sector pension plans filing reports with the Labor Department as required under the Employee Retirement Income Security Act of 1974 (ERISA). The pension plans selected for analysis were asked to provide a limited amount of information on their beneficiaries; data collected at the firm included birth year, year of retirement, and tenure with the firm for each sample worker. Individual records were then merged with administrative data from the Social Security Administration, so that each worker's file also contained his earnings history from 1951 on.

The sample of workers available for analysis consists of 8,733 men born in 1909 or 1910. This limited age cohort is selected because by the survey date (1978) virtually all would have been retired, yet relatively few would have died and therefore been excluded from the sample.

For the analysis at hand, we must know the rules determining pension benefits. We constructed such information from union contracts

and/or summary plan descriptions on file with the U.S. Department of Labor for 14 defined benefit plans. No larger data set with information on both pensions and their beneficiaries is now available; our pension analysis is therefore an extension of our own previous efforts as well as those of other analysts, who have generally been limited to an examination of a single pension plan.[1] On the other hand, the sample of pension plans is still small, and therefore our findings must be viewed as exploratory rather than representative of pension plans as a whole.

The plans represented here cannot be identified individually for confidentiality reasons. We may say, though, that our sample includes several blue collar plans negotiated with the United Auto Workers, several other plans in the manufacturing sector, a craft union plan, and one in the trade sector.

An example of the benefit rules used in a United Auto Workers plan is given in Table 1 for illustrative purposes. It is evident that even this apparently simple "years of service" formula turns out to be quite complex in practice.

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[1] See, for instance, the work of Burkhauser (1979) and Fields and Mitchell (1982) on the United Auto Workers and Burtless and Hansman (1982) on Federal government workers.

TABLE 1.

THE PRIVATE PENSION STRUCTURE IN COMPANY X

The pension structure in Company X is negotiated every three years and written into a contract with the United Automobile Workers union (UAW). The plan is non-contributory. The benefit formula negotiated in the early 1970s, when the workers in our sample were about 60 years of age and were presumably deciding when to retire, varied depending on age and/or years of service. To illustrate, the following rules applied to an individual who started work at Company X at age 30:

i. If he retires after age 60, but before age 62: his pension benefit is $4,800 per year until age 62 and $5,400 per year from 62 to 64; thereafter, it is [$90 x yrs. of service less (.04 x the difference between the retirement age and 62)] + $63.60.

ii. If he retires after age 62, but before age 65: his pension benefit is $5,400 per year until age 65; thereafter, it is [$90 x yrs. of service] + $63.60.

iii. If he retires at age 65 or later: his pension benefit is [$90 x yrs. of service] + $63.60.

Benefits in i and ii are available only after completing 10 years of service.

The formula given in Table 1 describes pension benefit rules in effect around 1970, at which time our sample workers were about 60 years of age. But the rules in 1970 would not necessarily have been appropriate for a worker who waited to retire until, say, 1975. In this company, and in the other companies in our study, the pension formula had been made more generous during the 1960s. In anticipating what future retirement benefits might be, workers in that company might reasonably have expected that benefits would be raised in the future as much as they had been in the past. We look back at union contracts, the Bureau of Labor Statistics Pension Digest, and other documents to determine what had been happening. Empirical analysis of changes in pension benefits over time, for newly retiring workers as well as for previously retired individuals, revealed that pension plans typically raised benefits in line with inflation for workers not yet retired, but not for those already retired. Therefore, we assume that the prospective retiree would have figured on pre-retirement increases just short of the inflation rate, but zero post-retirement increases.

The specific pension formula outlined in Table 1 depends only on age and years of service. To compute pension benefits in other pension plans, it is also necessary to know what the worker would have earned had he remained on this job. Earnings information is, of course, needed directly in considering the intertemporal budget set.

Earnings until retirement are obtained from Social Security earnings history data. Earnings in excess of the Social Security taxable maximum are imputed using a variant of a routine described in Fox (1976). Earnings after retirement are imputed from previous years' earnings. Gross earnings are then reduced by income taxes and payroll taxes to obtain net earnings.

The other element of the intertemporal budget set is Social Security benefits. These are computed based on the Social Security rules in effect in 1972. We use 1972 benefit rules for retirement decisions being made around 1970, because future changes had been legislated two years in advance. The algorithm incorporates what the worker might have anticipated had he retired earlier and filed for benefits when first eligible at age 62, and what he would have received if he had postponed retiring and filing for benefits until later ages. As with the projection of future private pension benefits, this requires an assumption about how benefits would have been expected to change over time. The algorithm incorporates the real growth rate in Social Security benefits experienced during the 1960s as the best estimate of how real benefits might have been expected to change during the 1970s.

One limitation of the Social Security computation should be noted. It is possible to estimate only the male's Social Security benefits, not the spouse's benefits, since marital status information is not available.

In moving from the annual budget set components (all of which are in nominal dollars) to present discounted values (which are much more informative if expressed in real dollars), several additional assumptions must be made. Standard practice is followed by discounting each year's benefits by the probability of mortality at each age, based on survival rate information for the cohort in question. In addition, future benefits are deflated by two factors: inflation, and a real discount rate. Estimated future benefit streams assume continuation of the rate of price increases prevailing in the early 1970s; to discount benefits accruing in the future, the same nominal rate is used. In addition, a 2% real discount rate is used to reflect time preference. Confirmatory analysis with other discount rates produces results virtually identical to those reported below.

The foregoing describes the construction of the budget set for each individual in our BAS file. In the balance of this paper, we summarize this information by calculating the overall budget set and its components for a specific "illustrative worker."[1] We do this for purposes of comparison, since it is useful to derive benefits using the same basic earnings and job tenure characteristics holding constant other factors which might vary across plans. Nonetheless, this illustrative individual should also be relatively similar to actual workers in the pension plan, since benefit structures are generally constructed with a relevant salary range in mind. The "illustrative worker" used below is assigned the mean net earnings and job tenure derived from the underlying sample described above. The average tenure figure, 26 years, is compatible with Hall's (1982) recent discussion of lifetime jobs among males in the U.S. labor force. Others who have computed pension benefits (e.g., Lazear, 1982, Kotlikoff and Smith, 1982) did not have such information, and were thus required to use several different tenure and salary options to cover most of the possibilities.

III. The Economic Rewards to Deferring Retirement

It will be recalled that two empirical questions guide our empirical explorations: (1) How do total income profiles change as workers age?, and (2) How do pension plans reward continued work effort? Each question is investigated in turn in this section.

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[1] Readers of our earlier papers should be alerted to the fact that those other papers use the actual workers in that company, not the illustrative worker used here.

A. The Shape of the Total Income Path

Table 2 displays the elements of the illustrative worker's intertemporal budget set, expressed in annual terms in the top panel and in present discounted value terms in the lower panel.[1]

Of most interest for the present discussion are the last two lines on Table 2 (lines II.D and E), which report total PDVY and marginal changes as retirement is deferred. The following features of the PDVY stream are noteworthy:

(1) PDVY rises monotonically as retirement is deferred. This is because at each age earnings plus (or minus) pension and Social Security accruals exceed the pension and Social Security benefits foregone. In real terms, a worker postponing retirement from age 60 to 65 would roughly double his real income stream.

(2) PDVY rises nonlinearly with age of retirement. The payoff to working one additional year is highest in both dollar and percentage terms between ages 60 and 61; if the same worker deferred retiring between 64 and 65, his dollar gain would be about $1,400 less, for a marginal percentage change of 9% instead of 18%.

Therefore the data show that the economic rewards for postponing retirement are increasing but the gains vary across ages. Previous studies have not discerned these patterns because they used data containing less detail on the components of PDVY.

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[1] Income amounts are reported here only to age 65 since retirement was mandatory in some plans. Below, benefits for other ages are given in plans where work beyond age 65 was permitted.

TABLE 2.

EARNINGS, SOCIAL SECURITY AND PRIVATE PENSION INCOME AT ALTERNATIVE RETIREMENT AGES, FOR THE ILLUSTRATIVE WORKER[1]

	If Retirement Occurred at Age:					
	60	61	62	63	64	65
I. Annual Amounts (Nominal Dollars)						
A. Net Earnings (E_t):	$ 0	8254	8717	9185	9563	9760
B. Social Security (SS_t)[2]:	1858	1916	1973	2333	2749	3209
C. Net Private Pension (PP_t):	2190	2350	2322	2513	2724	2634
II. Present Values of Streams (Real Dollars)						
A. Net Earnings (PDVE):	$ 0	7677	15203	22549	29618	36269
B. Social Security (PDVSS):	27887	28755	29614	31013	32288	33191
C. Net Private Pension (PDVPP):	19071	18960	19953	19493	19029	18542
D. Total PDVY:	$46958	55392	64770	73055	80935	88002
E. Marginal Increases:		8434 (18%)	9378 (17%)	8285 (13%)	7880 (11%)	7067 (9%)

Notes:

[1] Computations based on pension algorithms devised for fourteen pension plans and illustrative worker; see text.

[2] Assumes worker retires at that age and files then or at age 62, whichever is later.

The fact that the intertemporal budget set for older workers rewards deferred retirement implies that observed income for any particular retiree is a function of when he chooses to retire, rather than being exogenously given. If one wished to evaluate income opportunities actually available to an already retired worker, one would have to develop an intertemporal budget set such as that in Table 2 indicating the magnitudes of contingent income flows available at alternative retirement dates.

The pattern of the budget set also implies that the value of PDVY (or its component parts) at any one particular age will not be very informative about the overall shape of the intertemporal income path. Unfortunately, most data sets other than the BAS contain insufficient detail on earnings, Social Security, and private pension benefits, making it difficult to develop the full PDVY path.[1]

B. The Shape of Private Pension Income Paths

Understanding how firms reward continued work at older ages is facilitated by investigating private pension structures. Pension benefits constitute a fairly significant source of older workers' incomes. The top panel of Table 2 shows that annual (first year) benefits from private pensions are sizeable, equalling or exceeding Social Security payments for all ages but 65 (and are not much less at age 65). Net private pension income amounts to one-quarter to one-third of after-tax- earnings for individuals in the sample.[2]

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[1] Approximations are possible using the Longitudinal Retirement History Survey; see Fields and Mitchell (1983).

[2] Previous studies have not computed after-tax replacement rates for both private pensions and Social Security so these figures cannot be directly compared with others in the literature. We find that the overall replacement rate including both pensions and Social Security is between 50 and 60% on average, though in some cases individuals received as much as 95% of pre-retirement net earnings.

Still focusing on annual benefits, line I.C. indicates large differences in benefits depending on when the worker retires. An age-60 retiree would on average receive private pension income of about $2,200 that year. If he deferred retirement by one year, the addition to (nominal) benefits would be on the order of 7%. However, the marginal pension payoff to an additional year's work is by no means uniform across retirement ages: for example, benefits at age 62 are lower than for age 61. This unexpected benefit decline is attributable to pension plan supplements provided until a retiree attains age 62, the age of eligibility for Social Security. A reduction is again evident between the ages of 64 and 65; the pension rules thus acknowledge that workers can file for full Social Security retirement income at age 65, and provide a bridge for individuals retiring earlier. In general, the marginal pension payoff to retiring one year later varies quite a lot across retirement ages, a fact not immediately evident from a cursory review of benefit rules.

Line II.C of Table 2 converts the annual pension benefit figures into present discounted values in real dollars. Again it is evident that the reward structure built into private pensions varies for different retirement ages. The illustrative workers would receive more in lifetime benefits if he left the firm at age 60 than he would if he postponed retirement to age 61, despite the fact that annual benefits are higher at age 61 than at 60. In fact, the annual pension benefits are increased at less than actuarially neutral rates at several ages, as is evident from computed changes in the present values of lifetime benefits:

Age	60-1	61-2	62-3	63-4	64-5
Change in PDVPP	0%	+5%	-2%	-2%	-2%

Clearly the structure of lifetime pension income flows very much affects the economic rewards for continued work.

Present values in Table 2 are averages across fourteen pension plans, so they conceal potentially interesting differences in company pension structures. Table 3 splits the sample into two groups: pattern and conventional plans. Pattern plans are pensions where benefits are based almost exclusively on years of service with the firm (or occupation, if a craft union). Conventional plans, more common among non-union firms, determine benefits based on both final salary and tenure with the firm.

It is evident from Table 3 that the overall means obscure some key differences between the two kinds of benefit structures. Pattern plans tend to structure their first-year benefits so that they rise more or less smoothly, reaching a peak at age 64; annual benefits typically fall for workers deferring benefits beyond that point. First year benefits in conventional plans operate quite differently, since here benefits for the age-62 retiree are lower than for the worker leaving one year earlier; it is this subgroup of plans which produces the dip in annual benefits found in the overall mean. However, after age 62, conventional plans tend to provide ever-increasing benefit amounts for workers postponing retirement up to age 65.

An examination of discounted pension values in these two types of plans suggests even sharper contrasts. Pattern plans (line IIB) actively discourage work beyond age 60.[1] An employee in a pattern plan who defers retiring until age 65 will in fact receive lifetime benefits about 18% lower than at age 60! On the other hand, present value streams in conventional plans are structured so that a worker deferring retirement

[1]This is similar to the finding reported by Lazear (1982).

until age 65 receives about 17% higher benefits than if he retired at 60. Thus between ages 60 and 65, conventional pension plans appear to improve benefits by about the same amount as pattern plans reduce them.

Clearly, the overall incentives differ between the two types of plans. To see whether marginal incentives are smooth or erratic, changes in pension present values are computed for each additional year of work:

Change in PDVPP: Age	60-1	61-2	62-3	63-4	64-5
Pattern Plans	-2%	-2%	-5%	-5%	-5%
Conventional Plans	+2%	+14%	+0%	+0%	+0%

Evidently, pattern plans actively encourage early retirement, whereas conventional plans strongly encourage work up to age 62. After age 62, conventional plans provide a rather flat payoff schedule for additional years' work; in pattern plans, the slope becomes strongly negative; see Figure 2.

Table 4 disaggregates to the level of the individual plan. This breakdown of pension plan benefit structures reveals even more variability in economic rewards for continued work. These plan-specific data permit the computation of benefit streams for ages beyond 65 in cases where continued work was permitted; forms with mandatory retirement are indicated with a dash (-). The final column for each plan summarizes findings graphically, which is helpful in determining how benefits change between early and late retirement ages.

This disaggregate investigation of pension plan rules suggests two conclusions:

(1) Pension plans reward deferred retirement differently from one company to the next. Pattern plans as a whole, and the UAW plans in particular, encouraged early retirement by structuring benefits so they attained a maximum between

TABLE 3.

NET PRIVATE PENSION AMOUNTS AT ALTERNATIVE RETIREMENT AGES IN PATTERN AND CONVENTIONAL PLANS[1]

	If Retirement Occured at Age:					
I. Annual Net Pension Benefits[2]	60	61	62	63	64	65
A. Overall Mean	$ 2190	2350	2322	2513	2742	2634
B. Pattern Plan Mean	2653	2760	2907	3059	3214	2626
C. Conventional Plan Mean	1728	1939	1883	2103	2356	2639
II. Present Value of Net Pension Benefits[3]						
A. Overall Mean	$19070	18960	19953	19493	19029	18542
B. Pattern Plan Mean	24795	24192	23787	22617	21432	20275
C. Conventional Plan Mean	14777	15036	17078	17150	17227	17243

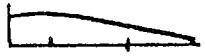
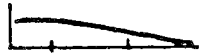
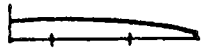
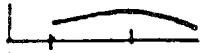
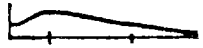
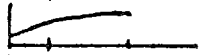
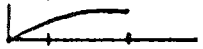
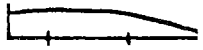
[1] Based on pension algorithms for 14 plans as applied to the illustrative worker (See text).

[2] Nominal dollars.

[3] Real dollars.

TABLE 4.

PRESENT VALUES OF NET PRIVATE PENSION BENEFITS FOR ALTERNATIVE RETIREMENT AGES: PLAN-LEVEL DATA[1]

I. Pattern Plans	If Retirement Age Occurs at Age:[2] 60	61	62	63	64	65	66	67	68	Graphical Summary of Row Pattern
UAW Plans										PDVP 62 65
Plan A.	$28181	27586	27189	25455	23787	22195	21706	21140	20500	
Plan B.	36030	36146	36599	36341	35730	34987	34081	-----	-----	
Plan C.	28176	27571	27189	25455	23787	22195	-----	-----	-----	
Plan D.	28176	27571	27189	25455	23787	22195	21706	21140	20500	
Non-UAW Plans										
Plan E.	21858	19814	17912	16147	14512	13001	11608	10328	9153	
Plan F.	6351	6464	6641	6850	6986	7079	6620	6156	5692	
II. Conventional Plans										
Plan G.	0	0	9300	10027	10087	10497	9461	8891	7951	
Plan H.	13527	14176	20471	19364	18173	16869	-----	-----	-----	
Plan I.	16410	16709	16841	16977	17028	16893	-----	-----	-----	
Plan J.	20012	20256	20270	19335	18359	17246	16190	15081	13841	
Plan K.	14851	15079	15290	15504	16318	17174	16563	15866	15109	
Plan L.	17671	19669	21594	23468	25295	26981	-----	-----	-----	
Plan M.	16256	17042	17668	18291	18810	19084	-----	-----	-----	
Plan N.	19491	17354	15193	14230	13742	13198	12605	11592	10950	

Notes:

[1]Based on pension algorithms as applied to illustrative worker; see text.

[2]Underlined numbers are row maxima. Dashes indicate retirement is mandatory in that plan at that age.

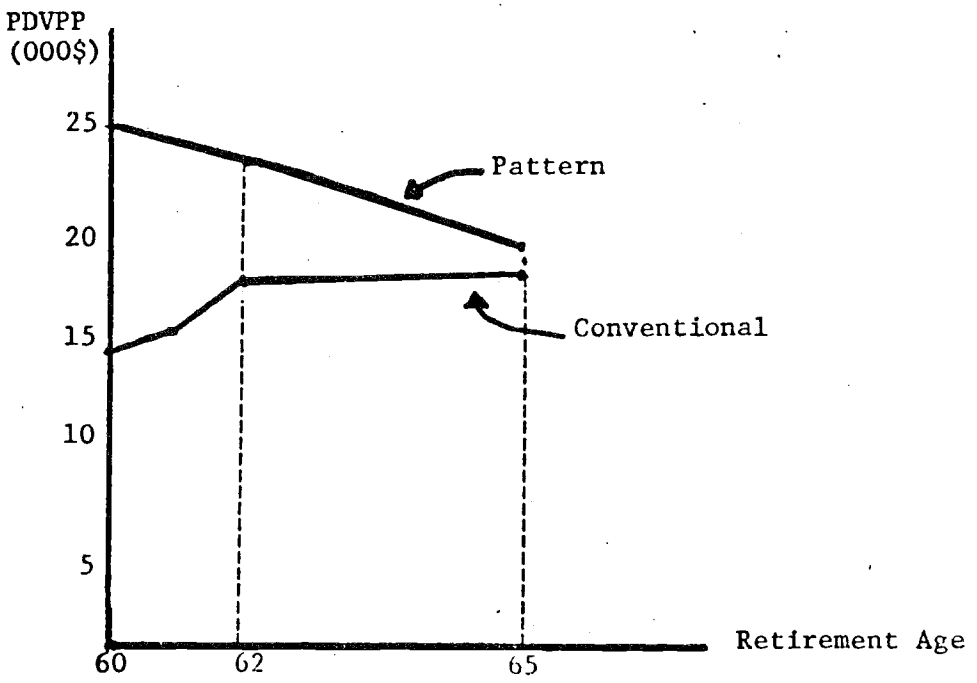


Figure 2.

Present Value of Private Pension Benefits in Pattern Plans and Conventional Plans

ages 60 and 62. Conventional plans are more complex, but as a rule structured their benefit flows so as to reward continued work well beyond age 60.

(2) Marginal payoffs to deferred retirement are uneven; actuarial neutrality across retirement ages is rare. In our sample, a worker deferring retirement by one year could have increased his lifetime pension income flow by as much as 14%, or reduced it by 5%, depending on the pension plan in which he worked.

In overview, then, some private pensions reward prolonged work and others penalize it both in overall and in marginal terms. It is not true that pensions always discourage work beyond age 60.

IV. Conclusion

The notion of an intertemporal budget set facing older workers flows from an economic model of choice of retirement age subject to income and time constraints. Measuring the budget set empirically requires computing total discounted income for each available retirement age. In so doing, it is important to model Social Security and private pension rules defining benefits available at each age, and in addition to determine how workers would have expected these rules to change in the future.

Using a unique new data set known as the Benefit Amounts Survey, we develop empirical answers to questions: (1) How do workers' total incomes change as they defer retirement?, and (2) Do private pension structures reward or penalize continued work at older ages?

The data suggest two important features of the discounted total income streams (PDVY) facing older workers which have not been noted

in previous studies. First, PDVY rises monotonically as retirement is deferred. Second, PDVY rises nonlinearly with age. In general, the economic rewards for postponing retirement are ever-increasing but the gains vary depending on the age in question.

The data also point to two new conclusions about the incentive structures of private pension plans. First, pension plans reward deferred retirement differently across companies. Second, marginal payoffs to deferred retirement are uneven; actuarial neutrality across retirement ages is uncommon. Some private pensions reward prolonged work but others penalize it.

The patterns just noted have implications for both researchers and policymakers. Analysts interested in modeling and estimating the determinants of retirement, savings and other economic behavior among older workers must build and examine the intertemporal budget sets confronting these individuals as they age. Similarly, income distribution studies should recognize that actual retirement income among retirees is determined to a significant degree by workers' retirement behavior. These considerations highlight the importance of developing new data sets containing more complete information on workers, their earnings histories, and their company records including pension system rules.

The observed differences in pension patterns also have an interesting policy implication. One proposal that has received some attention in policy circles of late is the idea that the federal government should mandate pension benefit neutrality. This proposal is motivated by the belief that pension structures currently encourage early retirement. It is thought that mandatory pension neutrality

would result in higher benefits for those continuing to work beyond age 60, thereby encouraging longer workforce commitment. However, our analysis shows that the actual result depends on the benefit structure presently available to the covered employee. In pattern plans, the effect of mandatory neutrality would probably be to cut early benefits rather than to increase later ones. Though this would affect retirement ages in the anticipated direction, retirement benefits would be lower than at present, not higher.

In conventional plans, on the other hand, mandatory neutrality could conceivably remove the desired incentives currently in place to defer retirement; such a result would not be consistent with federal efforts to encourage later retirement. Altering pension reward structures currently in place could produce other undesirable results as well. If the current pension benefit patterns are structured in accordance with firms' perceptions of the relative efficiency of older workers compared to younger ones, imposing regulatory restrictions would be expected to increase firms' costs, some part of which would probably be passed on to workers in the form of lower wages and/or lower pension benefits. Both the welfare and the efficiency costs of mandating pension neutrality should be analyzed much more carefully before concluding that such a policy is desirable.

REFERENCES

Boskin, Michael J., and Hurd, M.D. "The Effect of Social Security on Early Retirement." Journal of Public Economics, December 1978, pp. 261-277

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

Burkhauser, Richard and Quinn, Joseph. "Is Mandatory Retirement Overrated? Evidence From the 1970's", Journal of Human Resources, Summer 1983.

Burtless, Gary and Hausman, Jerry. "Individual Retirement Decisions Under an Employer-Provided Pension Plan and Social Security." Journal of Public Economics, 1982.

Burtless, Gary and Moffit, Robert. "The Effect of Social Security on Labor Supply of the Aged: The Joint Choice of Retirement Date and Post-Retirement Hours of Work," Paper presented at the American Economic Association meetings, New York, December, 1982.

Fields, Gary S., and Mitchell, Olivia S. "Economic Determinants of the Optimal Retirement Age: An Empirical Investigation." Working Paper No. 876, National Bureau of Economic Research, 1982.

Fields, Gary S. and Mitchell, Olivia S. "Estimating the Effects of Social Security Reforms on Retirement Ages and Retirement Income", Dept. of Labor Economics Working Paper, Cornell University, April 1983.

Fox, Alan. "Alternative Means of Earnings Replacement Rates for Social Security Benefits." in Reaching Retirement Age, ORS, Social Security Administration Report No. 47, 1976.

Gordon, Roger H., and Blinder, Alan S. "Market Wages, Reservation Wages, and Retirement Decisions." Journal of Public Economics, October 1980.

Gustman, Alan L. and Steinmeier, Thomas L. "Partial Retirement and the Analysis of Retirement Behavior." NBER Working Paper No. 763, September, 1981.

Hall, R. "The Importance of Lifetime Jobs in the U.S. Economy." American Economic Review, September, 1982.

Kotlikoff, Larry and Smith, Daniel. Pensions and the American Economy, University of Chicago Press, 1983.

Lazear, Edward P. "Severence Pay, Pensions, Mobility, and the Efficiency of Work Incentives." NBER Working Paper No. 854, February, 1982.

Mitchell, Olivia S. and Fields, Gary S. "The Economics of Retirement Behavior," Journal of Labor Economics, 1983 (forthcoming).

Mitchell, Olivia S., and Fields, Gary S. "The Effects of Pensions and Earnings on Retirement: A Review Essay." in Ehrenberg, Ronald G. ed., Research in Labor Economics, Vol. 5, JAI Press, 1982.

Quinn, Joseph E. "Micro-Economic Determinants of Early Retirement: A Cross-Sectional View of White Married Men." Journal of Human Resources 12(Summer 1977), pp. 329-345.