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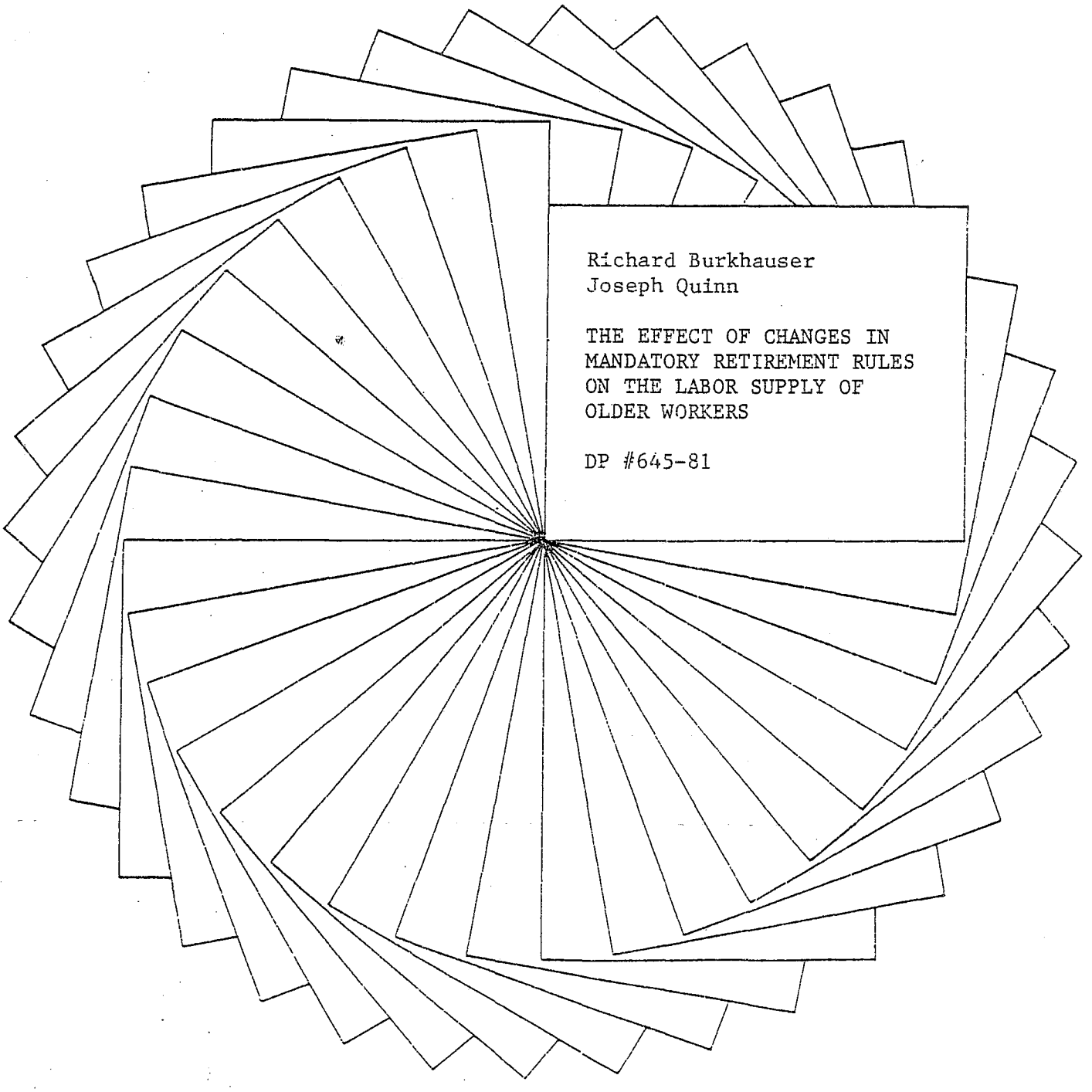

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THE EFFECT OF CHANGES IN MANDATORY RETIREMENT RULES ON THE LABOR SUPPLY OF OLDER WORKERS

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The Effect of Changes in Mandatory Retirement Rules on the Labor Supply of Older Workers

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ABSTRACT

The 1978 Amendment to the Age Discrimination and Employment Act raised to 70 the minimum age at which most workers can be forced to retire from their job solely because of age. In this paper we estimate the potential effect of this new amendment on the labor force participation of older workers. While there is little question that a mandatory retirement age influences the labor supply decision, it is only one aspect of a much broader retirement system which continues to influence this decision. Therefore we look at changes in mandatory retirement rules within a model which separates this effect from the economic incentives also present in the current pension system. We find that although changes in the law may have some effect on the labor supply patterns of older workers, that effect will be smaller than a simple comparison with those not subject to mandatory retirement would imply.

The Effect of Changes in Mandatory Retirement Rules on the Labor Supply of Older Workers

The 1978 Amendments to the Age Discrimination in Employment Act (ADEA) raise from 65 to 70 the minimum age at which most workers can be forced to retire from their jobs solely because of age. This restriction on an employer's use of age as the only criterion of employment is an attempt by Congress to reduce the incidence of age discrimination and thereby reverse a labor force trend which has resulted in the participation rates of men aged 65 and older falling from one in two to nearly one in five over the last 35 years. In this paper, we estimate the potential impact of this new amendment on the labor force participation rates of older workers.

Although there is little question that a mandatory retirement age influences the labor supply decisions of older workers, it is only one aspect of a much broader pension policy which will continue to influence this decision despite the mandatory retirement age change. Thus, our analysis of the potential impact of changes in these rules is contained within a model which allows us to measure the effect of each aspect of the present pension and social security system on the retirement decision of older workers.

In section 1, we show the incidence of mandatory retirement rules and the relationship between this particular form of labor supply constraint and other aspects of pension plans and social security on a population of workers approaching retirement age.

In section 2, we develop an economic model of labor supply behavior which shows more formally the potential effect of the institutional arrangements of our current pension system on job separation. This model allows us to look at each aspect of the job separation choice, including the effect of mandatory retirement rules.

In section 3, we estimate an equation based on this model which predicts job exit for workers not subject to mandatory retirement. We then use these results to estimate the effect of raising the minimum retirement age from 65 to 70 on the labor supply behavior of workers who were subject to such a constraint.

In section 4 we review our principal findings and use the results of the estimated equations to predict the number of workers in an age cohort on the verge of retirement who would have continued in their jobs over a two-year transition period if the 1978 Amendments had been in effect.

1. PENSION PLANS AND THEIR RELATIONSHIP TO MANDATORY RETIREMENT RULES

The principal objection to mandatory retirement rules is their curtailment of the individual worker's ability to choose when to leave a job. The lifting of such rules will ensure a worker's rights to continue at the same job at older ages but will not ensure that he will actually do so. The timing of retirement from a single job or from all market work will vary among individuals. Such variation may be caused

by different tastes and attitudes about work, as well as by differing health conditions and family responsibilities. But it also depends on economic variables which make the choices between continued work or retirement more or less appealing.

Pension plans can and do exert economic pressure on individuals to leave a job or even leave the labor force. The very existence of a pension which can be taken at a given age will, of course, provide workers with the option of leaving their job and accepting benefits at that age. For workers who do not fully anticipate these benefits or who face imperfect capital markets, the income or wealth impact of such a pension increases the likelihood of pension acceptance and job separation at that age. Few would object to this impact of pension plans on work. Furthermore, if those who continued working were rewarded with increased yearly benefits which fully compensated them for not immediately taking a pension, only individual tastes and preferences would enter into such a choice. This type of pension system would be neutral with respect to the timing of benefits. It would encourage or discourage the acceptance of these benefits and subsequent job separation at any particular age only to the extent that any asset affects such a decision.

However, a pension system is not neutral when the value of either pensions or social security changes with the timing of benefit acceptance. As will be seen, most pension plans require a worker to leave the job in order to collect benefits. In addition, the lifetime expected value

of total benefits usually falls when postponed past some age. Even for those not facing mandatory retirement, such plans encourage retirement at that age. Social Security Old Age and Survivors Insurance (OASI) puts no restrictions on work at a given job, but decreases the benefits of those whose earnings exceed some exempt amount. Moreover, for most workers, the present value of the lifetime stream of OASI benefits also falls if acceptance is postponed past a given age. For this reason, OASI also encourages lower work effort than would be the case in the absence of such work disincentives.

It is important to distinguish the economic incentives to leave a job that are contained in the pension system from those related to mandatory retirement provisions. This is especially true because of the strong correlation between the mandatory retirement age and the age at which both pension and social security benefits can be received.

Table 1 shows this relationship for a sample of workers from the Longitudinal Retirement History Study (RHS). Among workers, aged 62 to 64 in 1973, who would reach a mandatory retirement age over the next two years, 77 percent were also able to receive pension benefits from their jobs during that period. Of the remaining 23 percent, 17 percent will receive pension benefits later, and only 6 percent were never eligible to receive benefits. Contrast these with workers never subject to a mandatory retirement age on their jobs: only 22 percent will be able to collect pension benefits over the next two years, 25 percent later, and 53 percent never. Further, of the 37 percent of workers ever subject to a mandatory retirement age on their

Table 1

Relation Between Mandatory Retirement and Eligibility for Employer Pension Benefits, Men Aged 62-64 in 1973

Mandatory Retirement	% Workers Eligible to Collect Pension Benefits			% Population in Each Category
	During Next Two Years	Later	Never	
During next two years	77	17	6	15
Late	54	35	11	22
Never	22	25	53	63
% Population in each category	37	26	37	100

Source: RHS 1973-1975.

current jobs (i.e., sum of row one and two), fewer than 10 percent are never eligible for a pension; in contrast, 53 percent of those with no mandatory retirement age have no pension.

2. LABOR SUPPLY IMPACT OF PENSION SYSTEMS

The 1978 Amendments to the Age Discrimination in Employment Act abolished the right of a firm to impose mandatory retirement on its employees, solely on the basis of age, before age 70. But as was shown in the last section, mandatory retirement rules are strongly correlated with pension plans and, as we will show in this section, the terms of these plans can have an important impact on the decision of workers either to leave a job or to exit from the labor force completely. Because mandatory retirement is only one part of a broader pension system, it is a constraint upon employment only to the degree that workers would have continued at that job in its absence. Therefore, a full model of work behavior is necessary to isolate the marginal impact of changes in mandatory retirement rules.

The ideal method of measuring the impact of such a change would be through a controlled social experiment in which a representative sample of workers would be divided randomly between a "treatment" group and a "control" group. Since no such data exist, we utilize the best alternative, the Logitudinal Retirement History Study (RHS). We develop a model which predicts the probability of job separation and movement out of the labor force for workers not subject to a mandatory retirement

rule during the sample period, and then use the estimated equation to predict this labor supply behavior for workers who are subject to mandatory retirement during the same period.

Mandatory retirement rules and employer pensions most directly affect job separation and only indirectly affect hours of work. For this reason, our labor supply model will concentrate on predicting discrete changes in a worker's behavior--i.e., the probability that a worker will remain on his job, take a new job, or leave the labor force in a given period. Such a model misses the indirect impact that pensions or mandatory retirement rules have on changes in actual hours worked, either on a current job or in a new job, but it does capture their major direct effects. Although acceptance of pensions is almost always contingent on job separation, this is not the case with social security benefits. Yet we will argue that for most workers wishing to reduce wage earnings in an attempt to increase social security benefits, job separation is the most likely route.

Asset-Choice Nature of Pensions

Emphasizing the nature of the asset choice posed by both pension plans and social security clarifies the relationship between the timing of job separation and the actuarial value of these plans at different ages. At any moment in time, the asset value of a pension is the present discounted value of all future pension payments:

$$A(s) = \sum_{i=s}^{n} \frac{p_i B(s)}{(1+r)^i} \qquad (1)$$

where s is the period in which pension benefits actually begin. A(s) is a vector of asset values of a pension initially taken at different s periods all evaluated in present value terms adjusted to period 0. P is the probability of living through the i^{th} period. B(s) is the yearly benefit associated with a pension accepted in the s period and r is the interest rate. Like any asset, ownership of a pension right should have the usual negative impact on labor supply. But more important to our model, a pension may take on a different value over a given period, depending on the labor supply behavior of a worker. It is this change in the asset value of a pension which we emphasize. As will be seen, mandatory retirement rules are only one aspect of the pension system used by employers to ensure job separation. Structuring pensions so that their value falls when postponed may have the same effect.

The change in the asset value of a pension from period 0 to period 1 is seen in equation (2).

$$\text{DELTA} = A(0) - A(1) = \sum_{i=0}^{n} \frac{p_i B(0)}{(1+r)^i} + C(0) - \sum_{i=1}^{n} \frac{p_i B(1)}{(1+r)^i} \qquad (2)$$

where DELTA is the net difference in the asset value of the pension plan and C(0) are contributions to the pension system during the period. The DELTA value depends on the change in benefit amounts from one time period to another. There are two possible sources of a change in B: the benefit calculation formula, and the postponed benefit adjustment formula. In a defined contribution pension system, yearly benefits are based on contributions paid into the pension system. A worker continuing on his job through period 0 would increase B(s) in the next period due to an

increase in C. Most pension systems are defined benefit plans, however, in which there is no direct relationship between yearly contributions and benefits. In such a case, B(s) will increase on the basis of some other criteria (e.g., seniority, average earnings, age). In such a case C(0) is assumed to be zero. Actuarial adjustments are changes in B(s) which compensate workers for postponing acceptance. B(s) increases by some percentage for each year benefits are postponed. Thus, the asset value of a pension is sensitive to the method in which benefits are adjusted, either directly by increased contributions, or by some defined benefit rule, or because of a postponed actuarial supplement.[1]

It is important to recognize the difference between a change in the asset value of a pension vs. pension income available in a single year. Two workers both eligible to receive $5,000 in pension benefits if they leave their job today are likely to act quite differently if the first worker, by delaying acceptance, receives a substantially larger yearly pension next year and in all subsequent years, while the second worker receives no increase in future benefits. In the first case, the increase in future benefits offsets the loss in pension benefits this year, while in the latter case, postponed benefits are lost forever.

The Model

We argue that it is the asset value (WEALTH) and the change in the asset value (DELTA) of pensions which are the theoretically and empirically important determinants of labor supply decisions. For this reason we

concentrate on these aspects of a pension rather than its value in a single year.[2] When the increase in yearly benefits associated with the new B(s) just offsets the loss of benefits during the postponed period plus any additional contributions paid into the pension plan during the period, the pension is neutral and DELTA is zero. In such a case a pension, like any other asset, will have only an income effect on labor supply; that effect will be captured by the WEALTH term. Only when DELTA is positive or negative does the timing of pension acceptance have this additional effect on job separation. More formally, given equation (2), the period in which a worker decides to leave the job and collect a pension can be shown by using the indirect utility function of equation (3):

$$\mu = f(w(s), A(s)) \tag{3}$$

In this model, an individual's well-being is solely a function of his/her wage earnings w(s) over each period of life and the asset value of pension benefits A(s). Both these variables can be affected by the age (s) at which pension benefits are accepted.

Equation (4) states that

$$\frac{d\mu}{dw} > 0; \quad \frac{\partial \mu}{\partial A} > 0. \tag{4}$$

That is, increases in wages or in the asset value of a pension increase well-being. Equation (5) shows the effect on well-being of a change in the age at which pension benefits are accepted:

$$\frac{d\mu}{d(s)} = \frac{d\mu}{dA(s)} \frac{dA(s)}{d(s)} + \frac{d\mu}{dw(s)} \frac{dw(s)}{d(s)} \tag{5}$$

In a pension system that is actuarially fair with respect to age of acceptance, the asset value of the pension does not change with (s) and the first term in equation (5) is zero. But if the present value of lifetime benefits falls when acceptance of benefits is delayed, the first term in equation (5) is negative. If the alternative wage, either in another job or in home work (leisure), is less than the wage in the current job, delaying acceptance permits continuation of the job for another period, and the second term in equation (5) is positive.

$$\mu(s^*) - \mu(s) \geq \text{ for all other } s \qquad (6)$$

Equation 6 states that workers will attempt to maximize their well-being by choosing a work path such that pension acceptance and job separation occur at s^*, an age at which utility is maximized. As equation (5) shows, the trade-off between potential wages and potential changes in the asset value of the pension is the crucial financial factor in the decision to separate from a job.

Employers can affect the age of retirement by tilting pension benefits to ensure that s^* occurs at the age they desire employees to separate from the firm. Mandatory retirement rules are relevant constraints to continued job tenure only if s^* is greater than the prescribed mandatory retirement age. Whether a worker completely leaves the labor force or simply changes jobs depends on whether his opportunity wage rate in alternative employment exceeds his reservation wage.

The asset value of a pension or social security is a multi-period phenomenon, but its effect on labor supply can be shown in a single-period

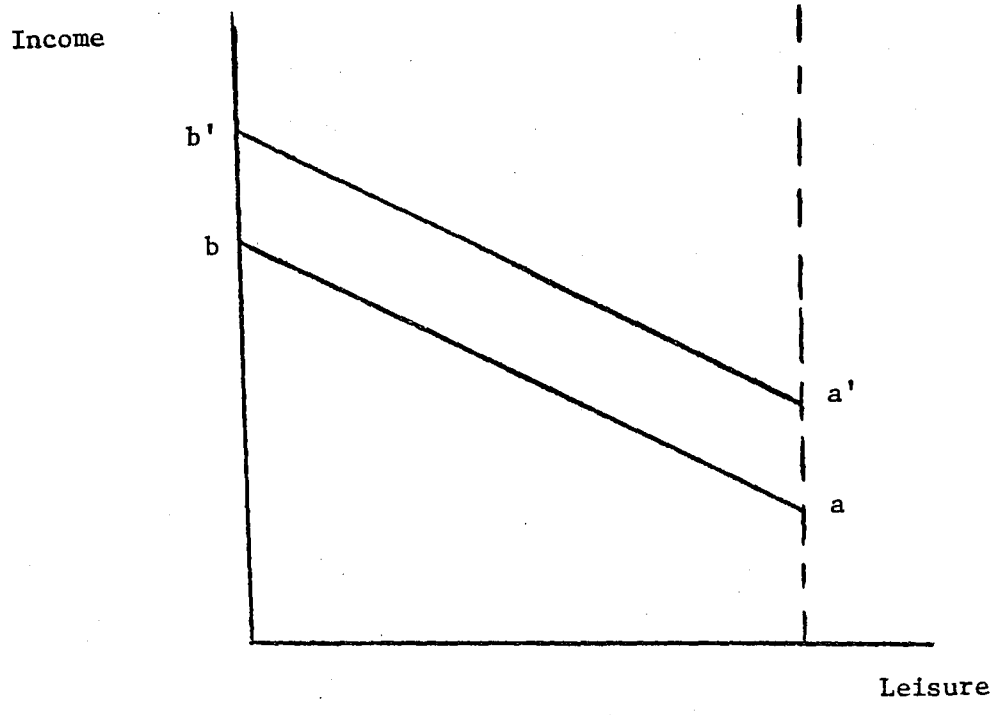

Figure 1. Effect of a Nonneutral Pension Plan on a Worker When Alternative Wage Equals Current Wage

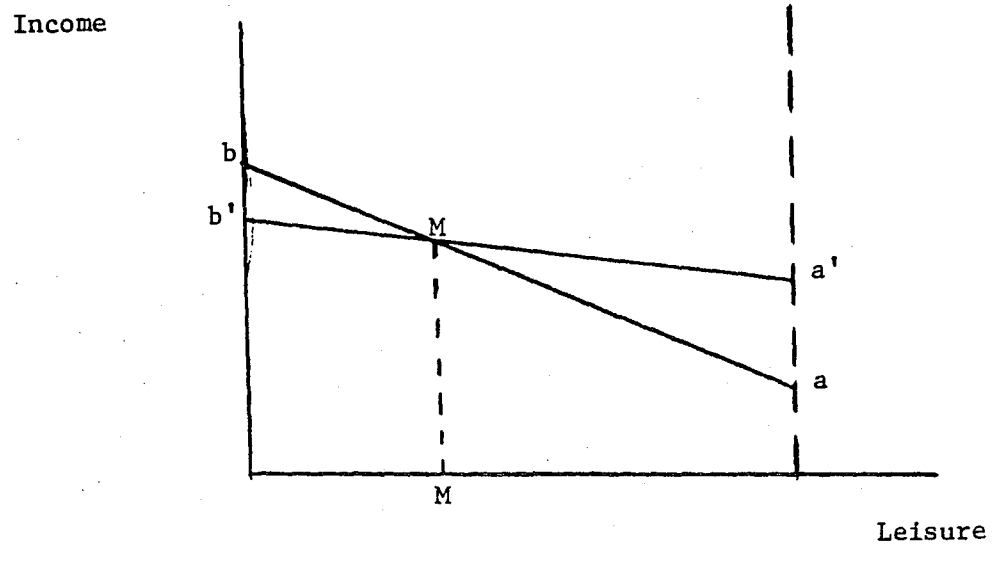

Figure 2. Effect of a Nonneutral Pension Plan on a Worker Whose Alternative Wage Is Less Than Current Wage

labor-leisure diagram. The decision to take a pension almost certainly requires quitting a current job. If alternative wages were equal to present wages on a job, then Figure 1 would predict that all workers eligible for a pension on a current job would take the pension and quit as soon as the asset value of a postponed pension begins to fall. That is, if DELTA equaled aa' and wages on both jobs were equal, all workers would be better off on the new budget constraint a'b' regardless of their initial position on ab, when a'b' is the budget constraint associated with the new job. If s^* occurs prior to the mandatory retirement age then a mandatory retirement age is not a binding constraint, and our model would predict that its elimination would not increase job tenure.

For older workers, it is more likely that alternative wages are less than wages on a current job. Thus, the choice of taking a pension, quitting and moving to another job, or exiting from the labor force depends on the size of DELTA and the slope of the new budget constraint. In Figure 2, ab is the original budget constraint and a'b' is the new budget constraint; aa' is DELTA.

Since these budget constraints intersect it is not obvious whether a worker will quit and take a pension. Clearly, any worker originally working M hours or less would increase utility by quitting and taking the pension. However, for those working greater than M hours, the decision to quit depends on the shape of that worker's utility curve. For some workers facing this trade-off between decreased wages and pension losses (DELTA), mandatory retirement is a binding constraint. The greater the

loss in earnings, the more likely workers would continue on a job if mandatory retirement rules were relaxed.

When OASI is considered, a further complication is involved. Now, in addition to aa', the change in OASI wealth must be included (a'a''). In addition, above some maximum earning level, an earning tax is imposed which further reduces wages. As drawn, Figure 3 shows that a nonneutral OASI system further increases the likelihood of job separation and acceptance of both pension and OASI benefits.[3] All those working less than N hours will now quit, while for those working more than N hours, quitting or not quitting depends on the shape of their utility curve. It is important to note that shifts in the value of aa' and a'a'' affect work both marginally, through changes in the intersection points M and N, and discretely, by increasing the possibility of skips from full-time work to little or no work. We will capture discrete changes which involve either movements to new jobs or exit from the labor force. We do not predict the changes in hours that these changes might bring.

The emphasis here is on the way that pension plans influence job exit. It should be clear that this discrete decision is very much like the discrete decision to participate in a negative income tax program. Ashenfelter (1980) points out that a family that is offered the opportunity to participate in a negative income tax program presumably will do so if the harmful effect of participating--a decrease in the wage rate that a family member faces--is outweighed by the beneficial effect--the increase in the guaranteed income level the family will receive.

The decision to leave a job to take a pension may be similarly analyzed. It will depend on whether the fall in wage earnings is compensated by the increase in DELTA from pension acceptance.

In addition to the economic variables (wage earnings, DELTA and WEALTH), demographic and health variables will be included in the empirical analysis. Sex, class of worker, and age are used to disaggregate the sample, to isolate more homogeneous groups for analysis. The sample used in this paper is of non-self-employed men aged 62 to 64 in 1973. Marital status is an independent variable.

Health status has always been found to be an important variable in retirement research. When retired people are asked why they retired or left their last job, health is a frequent response. (See Barfield and Morgan, 1969; Reno, 1971; or Schwab, 1974.) In addition, when actual retirement behavior is analyzed in a multivariate (regression or logit) framework, health emerges as a significant explanatory variable (see Blinder, Gordon and Wise, 1978; Boskin and Hurd, 1978; and Quinn, 1977). The RHS does not include clinical diagnostic data on respondents' health problems. It does, fortunately, contain a number of subjective questions concerning work limitations, health status (relative to peers), and the changes in health status since the previous interview. Although these indices are subjective, they have been used successfully in previous research and are used here. We concentrate on the existence of health limitations in the base period, and on deterioration in health during the transition period. We have intentionally stayed away from responses

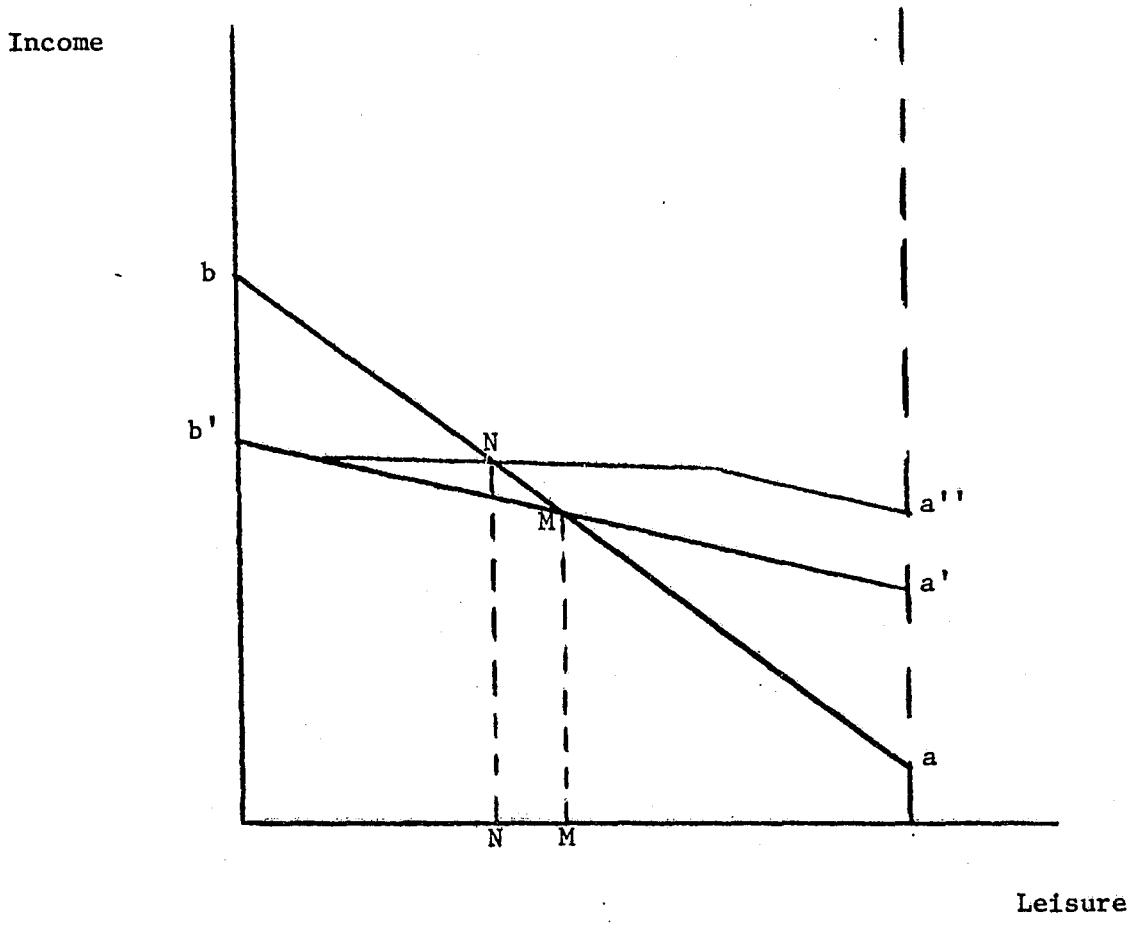

Figure 3. Effect of A Nonneutral Pension Plan Together with OASI on Job Separation When Alternative Wages Are Less than Current Wages

derived from questions regarding reasons for retirement, since these may be unreliable measures of health status (see Quinn, 1977, footnote 3).

3. DATA, RESEARCH METHODOLOGY, AND FINDINGS

This study is based on the first four waves of the Retirement History Study (RHS), a ten-year longitudinal study of the retirement process undertaken by the Social Security Administration. We have extensive data on over 8,000 respondents aged 58 to 63 in 1969, from 1969, 1971, 1973 and 1975. The RHS contains information on current labor force status, job history, health status, income and assets, consumption expenditures, social activities, and labor force status and history of the spouse, if applicable. In addition, the Social Security Administration has appended its internal earnings record for each respondent, thereby permitting precise calculation of potential social security benefits.

We used the 1969-1971 transition to analyze the behavior of men and women who were 58 to 61 in the initial period, and the 1973-1975 transition for those 62 to 64 and 65 to 67.[4] In this paper, we are concentrating on the group most likely to confront a mandatory retirement constraint--men aged 62 to 64 in 1973 (and 64 to 66 in 1975). We have eliminated certain groups, such as the bedridden and housebound, the self-employed and government workers, and are left with a sample of 1,048 men, 921 who are not subject to mandatory retirement during the two-year transition period, and 127 who are.[5]

We are investigating the impact of mandatory retirement constraints on the labor market transitions of older workers. The transition we emphasize here is the decision to leave one's base year job. Even at this a e, however, a few workers who leave decide to take a new job rather than withdraw from the labor force. Empirical estimates for this second decision (new job versus no job) are not included but are discussed and used in the simulations.

The methodology involves two stages. First we isolate those employed individuals who do not face mandatory retirement during the transition period, and analyze the factors which explain these observed transitions. We then use these equations to predict the transition behavior of those with mandatory retirement, on the basis of their other explanatory variables (health, social security and pension status, etc.). We are implicitly assuming that the two subgroups differ only in mandatory retirement status and in the distributions of their other explanatory variables, but not with regard to preferences or unobserved variables. We draw conclusions concerning the impact of mandatory retirement by comparing the predicted and actual behavior of those under the constraint.

Transition Equations

The transition equations are estimated by both regression and logit techniques. The regression results are included because the coefficients are direct estimates of partial derivatives (changes in probability) and therefore easy to interpret and discuss. The logit results are also

used because they are more appropriate for estimation problems with dichotomous dependent variables. The qualitative findings and predictions are almost identical, as is shown below.

The empirical results for the decision to leave the base year job are shown in Table 2. Since the dependent variable equals 1 if one does leave, these are "quit" equations.[6] Three regression equations are shown, and they differ in their treatment of pension and social security incentives. In the first, only eligibility dummies are included. In the second, the DELTA values appear. In the third, the WEALTH terms are added and the (now insignificant) dummy terms are dropped.

Among these 921 men employed in 1973, 49 percent held the same job in 1975, 11 percent had moved to a new job, and 40 percent held no job in 1975. What explains these differences in behavior?

Health is clearly an important factor, and health deterioration during the two years appears to be more important than initial health status. Health loss lowers the probability of staying on the base year job by about 8 percentage points, and this is true in all specifications. The impact of an initial health limitation has the expected sign, but is smaller in magnitude and in significance level. This is not surprising, since those with health limitations in 1973 are more likely to have withdrawn from the labor market before then, in which case they are excluded from these equations. Eligibility for a full pension during the transition period, when measured by a dummy variable, is extremely important, and increases the probability of leaving by over

Table 2

Job Exit Equations for Men Aged 62-64
Dependent Variable = 1, if respondent leaves his 1973 job by 1975

	Regression Results						Logit Results	
	(1)		(2)		(3)		(4)	
Explanatory Variables	B	t	B	t	B	t	B	t
Constant	.466		.438		.460		-.105	0.75
Health limitation, '73	.064	1.55	.073	1.79*	.073	1.78*	.144	1.52
Health deterioration '73-75	.078	2.03*	.085	2.22*	.086	2.25*	.182	2.04*
Mandatory retirement after '75	.024	1.02	.030	1.29	.023	0.99	.079	1.33
Married	.043	0.88	.051	1.06	.062	1.24	.128	1.08
Eligible for full pension by '75	.209	4.55**	.061	1.03	--	--	--	--
Eligible for reduced pension by '75	.001	0.19	-.061	1.10	--	--	--	--
Earnings last year	-.008	2.79**	-.010	3.43**	-.011	3.48**	-.024	2.87**
Social Security DELTA			.023	2.71**	.030	3.25**	.081	3.60**
Pension DELTA			.047	3.26**	.041	3.16**	.101	2.88**
Social Security WEALTH					-.010	0.83	-.002	0.62
Pension WEALTH					.023	1.66*	.006	1.75*

*Significant at 5 percent level (one-tailed test).
**Significant at 1 percent level (one-tailed test).

Definitions of Variables and Mean Values

Variable	Definition	Mean Value
Health limitation	"Does your health limit the kind or amount of work or housework you can do?" (Yes = 1)	.22
Health deterioration	"How would you say your health today compares with your own health two years ago. Is it better, worse, or the same?" (Worse = 1)	.25
Mandatory Retirement after 1975	Mandatory retirement some time after the transition period (1973-1975)	.25
Married	(Yes = 1)	.87
Eligible for full pension by 1975	(Yes = 1)	.18
Eligible for reduced pension by 1975	Reduced, but not full (Yes = 1)	.14
Earnings last year	(Thousands of dollars)	8.78
SS DELTA	See text (thousands of dollars, at 5% discount rate)	1.60
Pension DELTA	See text (thousands of dollars, at 10% discount rate)	.66
Social Security WEALTH	See text (ten-thousands of dollars, at 5% discount rate)	4.66
Pension WEALTH	See text (ten-thousands of dollars, at 10% discount rate)	0.86
Imputed Wage Rate	(Dollars per hour)	4.37

20 percentage points.[7] We will argue below that it is not eligibility, but rather the financial incentives which accompany eligibility (the DELTAs) which are important. This view is supported by the fact that the coefficient on eligibility for a reduced pension is insignificant, probably because the economic incentives are much weaker then. As expected, last year's earnings are important, and those who enjoy a high market value are more likely to stay on, ceteris paribus, than those who do not. Marital status does not appear to be important, nor does a mandatory retirement constraint after the transition period.

The most interesting findings appear in column 2. When the DELTA values are included, they are both significant, and the eligibility dummies are not. This suggests that the size of the wealth loss associated with continued work is the key dimension, and that actuarially fair pension plans should not have a dramatic impact when the year of eligibility arrives.[8] This is as expected; a small DELTA indicates that there is little financial penalty involved in delaying retirement, since the benefits foregone are approximately made up by higher benefits later.

Even if pensions did treat early and late retirements in an actuarially fair manner (and the DELTA values were zero), pension and social security programs should still have a straightforward wealth effect. The rights to future streams of retirement benefits do represent wealth (though they are routinely ignored in the wealth literature), and in fact are more important, in aggregate, than other more traditional forms

of wealth. In column 3, the WEALTH terms are included, and the insignificant eligibility dummies are dropped. The DELTA terms remain significant, and suggest that each $1,000 loss in wealth associated with delayed retirement increases the probability of leaving the job (and claiming the pension) by 3 to 4 percentage points.[9] Of the WEALTH terms, only the pension coefficient is significant, and that only barely so. Insignificant wealth effects are frequently found in the retirement (and other labor supply) literature, and may reflect an unobserved correlation between wealth and a proclivity for work.[10]

In the final column, logit results are presented for the specification we use in our simulation. The signs and significance levels are almost identical. Health deterioration, large DELTA values, and pension wealth appear to induce job separation, whereas high earnings levels discourage it. Marital status, future mandatory retirement, and social security wealth are statistically significant.

As mentioned above, we also estimate prediction equations for those who did leave their base year jobs, and who therefore moved either to a new job or out of employment altogether.[11] The explanatory power of this equation is very low, but a few interesting results appear. Those who leave their jobs and whose health deteriorates are less likely to remain employed, though the effect is not quite significant. Eligibility for a pension on the base year job (full or reduced) and the asset value of that pension are both deterrents to reemployment. Social security wealth, on the other hand, is not significant. This difference may reflect the

fact that pension rules (unlike social security) do sometimes prevent reemployment in the same industry. For someone with considerable industry-specific training, this constraint would mean a sizable wage decrease in alternative employment, and a large disincentive to finding a new job. Finally, the market wage rate is significant and positive, indicating that respondents are more likely to continue working the higher the reward for doing so.

Transition Predictions

The equations above were estimated using only those respondents who were not subject to mandatory retirement during the transition period. In this section, we concentrate on the 127 non-self-employed men who were. Of these men, all of whom were employed in 1973, 82 percent were out of the labor force by 1975. (See Table 3.) Of those remaining in, 11 percent were still on their 1973 job, and 7 percent had switched jobs. This contrasts strongly with the behavior of those who were not subject to mandatory retirement by 1975. Of these, only 40 percent moved out of the labor force, 49 percent stayed on the 1973 job, and 11 percent changed jobs. These numbers represent a very large potential mandatory retirement effect. The percentage moving out of employment is twice as high (40 vs. 82 percent) among those with a mandatory retirement constraint. Although interesting, this is not the relevant comparison since it ignores differences in other characteristics between the two groups. In Table 3, we present our predictions on how those subject to mandatory retirement

Table 3

Transition Percentages, Actual and Predicted, for Those with and without Mandatory Retirement (MR), Men Aged 62-64 in 1973

Mandatory Retirement Status	Same Job	New Job	No Job
Regression Results			
Not subject to MR: Actual	49	11	40
Subject to MR: Predicted	38[a]	6[b]	56[b]
Actual	11	7	82
Logit Results			
Not subject to MR: Actual	49	11	40
Subject to MR: Predicted	30[c]	8[c]	62
Actual	11	7	82

[a]Based on the regression equation in Table 2, column 3.

[b]Based on an equation not shown in the text, but available from the authors.

[c]Based on the logit equation in Table 2, column 4.

would have behaved if this constraint did not exist but all their other characteristics remained the same. We derive these predictions from the regression and logit equations (Table 2, columns 3 and 4) by applying them to the mandatory retirement populations. If our predictions, which ignore mandatory retirement, turn out to be quite close to actual behavior, then there is little room for a mandatory retirement effect. The larger the gap in predicted vs. actual behavior, the greater the potential effect of mandatory retirement.

As is seen in Table 3, differences in other explanatory variables explain some, but certainly not all, of the differences between those who are and are not currently subject to mandatory retirement. Half of the men who were not subject to retirement remained on their same job. Of those who were subject, we predicted that 30 percent would remain, but only 11 percent did. Of the initial 38-percentage-point gap (49-11), 19 points are explained by other differences (49-30), and 19 points are not (30-11). From another view of the same transition, only 40 percent of those not facing mandatory retirement left employment by 1975. Of those who did face it, we predicted that 62 percent would leave, but 82 percent actually did. Of the 42-point differential in actual behavior, then, 22 points (52 percent of the total difference) are explained while 20 points are not.

The simulation results using the regression transition equations are similar. In this case, our predictive power is slightly lower, and we are able to explain 38 percent of the total NOJOB (= "no job") differential with factors other than mandatory retirement.

In summary, there are large differences in labor force behavior when those who are and who are not currently subject to mandatory retirement are compared. Those who do face mandatory retirement are over twice as li ely to leave the labor force as those who do not. Approximately one-half of this difference, however, can be attributed to other factors, such as the different pension incentives which apply. The remainder, 20 to 26 percentage points, cannot be explained, and might be attributed to the residual factor, mandatory retirement.

These unexplained residuals, however, probably represent upper bounds for the impact of mandatory retirement and probably overstate its importance, for at least two reasons. First, the distribution of workers among jobs with and without mandatory retirement is probably not random, but rather is likely to be correlated with retirement age preferences. For individuals who prefer to work after age 65, a compulsory retirement rule is a serious drawback. It will either result in an involuntary retirement, or a job switch at an age where job and career transitions are very difficult. We expect that such individuals will tend to stay away from jobs with this constraint, either by avoiding them completely, or by moving out long before the compulsory date arrives. Those who prefer to retire at or before 65, on the other hand, would not view compulsory retirement provisions as a drawback and should be disproportionately represented in such jobs.

Statistically, this issue can be viewed in two ways--as a case of specification error, or one of simultaneity bias. In the first, an unmeasured explanatory variable (underlying propensity to retire) is

missing, and is positively correlated with one of the variables we are analyzing--the presence of mandatory retirement provisions. In the second, a dimension which we are treating as exogenous (the existence of mandatory retirement provisions) is not strictly so, but rather is jointly determined with the retirement decision we are studying. In either case, mandatory retirement will appear more important than it is.

Unfortunately, this is only speculation. We can establish the direction but not the magnitude of this effect. The latter would require a model of initial job selection and job changes during the work life. We find some support for our proposition in the paper by Halpern (1978), in which she finds very few people, in either the National Longitudinal Surveys or the Surveys of New Beneficiaries, who are subject to mandatory retirement, who do retire at that age, and who claim that they would prefer to work longer.

The second basic reason that we consider our estimates as upper bounds concerns the nature of the sample we are studying. Since our methodology concentrates on transitions over time, we begin with a sample of employed workers. We have eliminated from our analysis, then, some respondents who were especially sensitive to social security and pension effects, and who withdrew from the labor force prior to age 62. Compulsory retirement is irrelevant for these individuals. We are then left with a sample which is more likely than average to have ignored these incentives, and therefore more likely than average to encounter and be influenced by mandatory retirement.

4. SUMMARY AND CONCLUSION

This research suggests that mandatory retirement may have an important effect on the labor supply patterns of older workers, but that it is smaller than simple comparisons of the two groups would indicate. This is because those with mandatory retirement provisions are also more likely to have other characteristics which induce labor force withdrawal. We have suggested that our estimates of the mandatory retirement impact are upper bounds of the actual effect. In this section we use these results to estimate the absolute magnitude of the mandatory retirement effect, and to put it into perspective, relative to the size of this age cohort. We do this by asking how the labor force would have changed over this two-year period if mandatory retirement at age 65 were forbidden, as it currently is.

These estimates are of course merely a first approximation, since they are made in a partial equilibrium framework. Ehrenberg (1980) has pointed out that wages, pensions, and mandatory retirement rules are probably determined simultaneously, since they are all parts of the compensation package. In the simulations below, we consider the effect of changes in mandatory retirement, but leave wage rates and pension characteristics unchanged. The ultimate impact of the change in the law will depend crucially on how firms alter these other dimensions of the package.

We have estimated two mandatory retirement effects. The major one is running into the constraint (i.e., during the transition period)

and the minor one is having such a constraint in the future (after the two years under study). The former was studied with the methodology discussed in the paper. For the latter, we simply inserted a dummy variable into the equations. Its coefficient was positive (suggesting that some people may leave their job in anticipation of mandatory retirement), small, and insignificant (see Table 2). Nonetheless, we use the point estimate in the counterfactual experiment below.

Table 4 estimates the increase in the labor supply of men aged 64 to 66 in 1975 which would have occurred if mandatory retirement constraints had been eliminated. We begin by estimating the proportion of those men aged 62 to 64 in the labor force in 1973 who faced mandatory retirement before 1975 (now), after 1975 (later) or never. We then applied these proportions to the total population of employed men aged 62 to 64 to get the absolute number in each category (row 1). These numbers were then multiplied by the actual proportion of each group found to be in the labor force in 1975, given the institutional arrangements which actually existed. These proportions, derived from the RHS sample, yield the absolute labor force magnitudes in row 2. To derive the numbers in row 4 we added to these proportions the mandatory retirement effect and multiplied these augmented proportions by the population estimates in row 1.[12] The absolute increases in labor force participation are seen in row 6.

These rough estimates indicate that approximately 70,000 more men who were employed in 1973 would have remained so in 1975 had there

Table 4

Impact of Eliminating Mandatory Retirement (MR) on the Labor Supply of Men aged 62-64 in 1973

	Working Men Subject to MR Rules (000)[a]				Male Population Aged 62-64 (000)	
	Now	Later	Never	Total	Total[b]	Labor Force Participation Rate[c] (Employed/Pop.)
1973	238[c]	364[c]	1,039[c]	1,641	2,376	69%
1975 Subject to 1973 MR Rules	40	200	603	843	2,236[d]	38%
% Decline Over 1973	83%	45%	42%	49%		
1975 Subject to 1978 MR Rules	102	207	603	912	2,236[d]	41%
% Decline Over 1973	57%	43%	42%	44%		
Change (000)	+62	+7	0	+69		+3%

[a]Now = during the transition period 1973-75; later = after 1975.

[b]Estimate derived from Social Security data.

[c]Percentages of male worker population subject to MR, based on Table 1. Total labor force population based on estimates derived from social security data.

[d]Estimated from BLS data.

[e]Survivor rate, based on life tables for men.

been no mandatory retirement. This is an increase of about 8 percent (69/843) in the size of this employed pool. Nearly all of the increase occurs among the small proportion of men who would have confronted mandatory retirement during the period, and the rest comes from the small (and statistically insignificant) anticipatory effect. We assume that the change in the law would have had no impact on those in jobs without mandatory retirement rules.

This increase of 70,000 men is very small when compared to the population in this cohort. It raises the labor force participation rate by only 3 percentage points, from 38 to 41 percent. It is even smaller, of course, when compared to the size of the total labor force.

The impact of mandatory retirement, then, is both large and small. It is large in the sense that it does have a significant effect on the labor force participation probabilities of older men who are so constrained. We estimate that it raises the probability of moving out of the labor force, over a two-year period, by 20 to 26 percentage points, which is slightly more than one-half of the raw differential separating the two groups. When we compare, however, the actual number of men who work until they reach mandatory retirement age and would have worked longer to the size of their age cohort or the size of the labor force, the impact of the change of the law is seen to be very small in the aggregate.

NOTES

[1]Operationally a WEALTH and a DELTA variable were calculated for each worker who was eligible for either a pension or social security in 1975. For social security this was a relatively simple process because included in the RHS data are actual social security records. Social security WEALTH therefore is the present discounted value of the social security benefits stream B(s) of an individual if benefits are taken in 1974. It includes all potential workers, spouse, and survivors benefits. DELTA is the change in the WEALTH value if acceptance is postponed one year. We calculate a new WEALTH value for 1975 allowing B(s) to increase both because of the actuarial adjustment and the change in average monthly wages due to increased wage earnings. We assume wages in 1974 equal 1973 wages for all workers. Because these calculations are sensitive to the interest rate, we use a 2, 5, and 10 percent rate, both here and in the pension estimates.

Pension WEALTH and DELTA were more difficult to estimate since unlike social security, yearly benefits could not be calculated directly, but were based on individual response information. To obtain these data we used three sources in the RHS: (i) retrospective questions asked of those who had retired since the last survey; (ii) expected retirement benefits asked of all respondents; and (iii) actual pension income data referring to the previous calendar year. Relying on individual responses to estimate yearly pension data is made difficult because of the large number of "don't know" responses and the problem of differentiating

between reduced and full benefits. We have mitigated these two problems to a large extent by detailed culling of the data from the four waves of the RHS. Our computer program uses alternative sources of information when a initial question is not fully answered, and we were able to place a pension value on about 85 percent of workers in our sample who stated that they were eligible to receive pension benefits.

As with OASI, knowing a yearly pension is only the first step in estimating WEALTH and DELTA values. Because we had no details on the structure of pension plans, the following assumptions were made:

(a) The yearly benefits described by the workers did not include a joint and survivor provision.

(b) Once a worker was eligible to collect full benefits, yearly benefits did not increase when postponed.

(c) If a worker was eligible to collect reduced benefits, yearly benefits increased by a given percentage based on an industry-wide average. (This was calculated for us by James Shultz and Thomas Leavett using a 1974 BLS survey of defined private pension plans.)

(d) All increases in benefits due to additional contributions or years of service were ignored.

Each of these simplifying assumptions were made necessary because of data limitations.

We also develop dummy variables indicating eligibility for a full benefit eligibility or for a reduced benefit. For a fuller discussion

of the problems associated with all the variables used in our analysis see Burkhauser and Quinn (1980).

[2]For examples of single-period analyses of the impact of OASI on labor force participation, see Boskin (1977), Boskin and Hurd (1978), and Hall and Johnson (1980). The multi-period issue of changes in the asset value of OASI is not considered in the theoretical section of Boskin (1977) and explicitly assumed away in Boskin and Hurd (1978). Hall and Johnson (1980) acknowledge the importance of a multi-period model but present none. Their empirical estimate of the value of a pension is a single-year unadjusted flow value which does not make a distribution between initial or permanent benefit loss. For examples of attempts to use a replacement rate as an explanatory variable of OASI acceptance and labor force exit, see USDHEW (1976a), USDHEW (1976b). For an example of the use of a replacement rate variable for private pension acceptance, see Barfield and Morgan (1969).

For examples of attempts to use eligibility to collect OASI or private pensions as explanatory variables of the decision to exit from the labor force, see Quinn (1977), Clark, Barker, and Cantrell (1979), and Wertheimer and Zedlewski (1979). The last two references use such variables in the context of estimating the impact of mandatory retirement provisions. For a fuller discussion of the theoretical and empirical differences between an asset value approach and a replacement rate approach, see Burkhauser (1980).

[3]In fact the relationship between OASI and work is more complicated. Two points should be considered with respect to OASI. First, if OASI were

actuarially fair (DELTA = 0), the earnings test would be irrelevant since it would offer individuals a budget constraint no better, and over the range of the earnings test tax, inferior, to the budget constraint relevant for those not taking OASI benefits. For a fuller discussion of this issue, see Burkhauser (1980). Second, with respect to the slope of the budget constraint, a'a'' can be thought of as the actuarial difference in benefits when no additional work is done over the period. Then in comparison to Figure 3, the budget constraint would be more downward-sloping to reflect payroll taxes until the point where earnings were sufficient to increase future benefits. From that point, this increase in future benefits would offset to some degree both the payroll and earnings test and result in a somewhat higher slope. See Blinder, Gordon, and Wise (in press), and Burkhauser and Turner (1980) for a fuller discussion.

[4]The sample has been disaggregated by age because these groups are subject to different social security incentives. The youngest group (58 to 61) is ineligible for social security retired workers' benefits at the beginning of the transition period. The second group (62 to 64) is eligible, but only for reduced benefits. The oldest group (65 to 67) has already been exposed to the full social security incentives--the fact that benefits are adjusted much less than is actuarially fair after age 65. It is important to remember that although the wording of the earnings test does not change when one reaches 65, the incentives involved do, and dramatically. This occurs because the actuarial adjustment

drops from about 6-2/3 to 1 percent. With an actuarially fair adjustment, the incentive effect of the earnings test should be mitigated by the adjustments. Benefits foregone now (because of earnings over the exempt amount) are not really foregone, but just delayed, and returned in the form of higher (actuarially adjusted) benefits later. It is not clear whether 7 percent is fair or not, in an expected value sense; it is clear, however, that it is much fairer than 1 percent or the 3 percent effective in 1982.

[5]The self-employed were excluded because they work in a very different institutional environment than do wage and salary workers, and are generally unaffected by mandatory retirement constraints. The government workers are dropped primarily because of their pension situation. All federal employees (and some state and local employees) are excluded from the social security system, and have employer (civil service) pensions which resemble social security more than they do most employer pensions. Since we keep social security and employer pensions separate in the analysis, we decided to avoid the confusion by concentrating on private sector workers. In addition, the mandatory retirement age for most federal government workers was 70 during this time (and has since been eliminated), so there was little to be learned about this issue from this subsample anyway.

[6]Our dependent variable is based on actual labor force status at two points in time, and we do not distinguish between quits (retirements) and layoffs. In this age cohort, however, among those not subject to mandatory retirement, we suggest that nearly all terminations are quits.

[7]A social security eligibility dummy is not included for this age cohort because they are all at least 62, and therefore nearly all eligible for (reduced) social security benefits.

[8]Some impact is still expected, however. For example, an older worker without private savings might have a cash flow problem if he were to retire before the age of eligibility, but this is because it is impossible (or difficult) to borrow against pension wealth. If borrowing were possible, and the benefit adjustment factors actuarially fair, the age of eligibility should have no special significance.

[9]We suspect that the social security coefficients may understate the actual impact of social security on labor supply for at least two reasons. First, our sample consists of men aged 62-64 who are still working in 1973. They are nearly all eligible for social security retired worker benefits but are nonetheless working. Those respondents particularly sensitive to the social security incentives may have already left the labor force and therefore have been excluded from this transition analysis. We have a sample biased toward those relatively unresponsive to (or ignorant of) the social security incentives. The result is coefficient estimates that are biased toward 0.

Secondly, social security differs from most pensions in that it permits partial retirement and continued work on the same job. There is an exempt amount before OASI benefits are decreased, and the implicit tax rate is 50 percent after that. In contrast, pensions usually require complete withdrawal from the current job, and sometimes from the industry.

Since our model concentrates on discrete changes in behavior, rather than on continuous changes in hours, we miss whatever hours effect social security induces, except when accompanied by a job change.

[10]This point was originally made by Greenberg and Kosters (1973). People with a taste for work are likely to have accumulated a large stock of assets (including retirement benefits) and are likely to retire later than others. This is not because one causes the other, but because both are caused by this unobserved personality characteristic. This positive correlation between assets and labor supply tends to mask the negative causational relationship which economic theory predicts.

Standard asset variables (e.g., stocks, bonds, real estate, etc.) were not included in the final equations for two reasons. First, they are very poorly measured, and there is a high proportion of "No Answer" and "Don't Know" responses. Second, the variable was consistently insignificant, probably because of measurement error and the missing-variable problem mentioned above.

[11]The specification we use here differs slightly from those used in Table 2. First, the pension DELTA term is excluded, since nearly all pensions require that one leave the job (and sometimes the industry), but rarely require complete labor force withdrawal. In other words, the pension (and the DELTA) can be claimed in either case, so the DELTA should not affect the choice. Concerning the social security DELTA, the theory is less clear, since the regulations penalize earnings (after the disregard) from any source. The social security DELTA was not

significant, however, and so was dropped. Finally, the market wage is represented by an imputed wage rate (from standard human capital equations for white- and blue-collar workers separately) rather than by last year's earnir ,s. We argue that those earnings reflect firm-specific human capital and accumulated seniority, both of which are forfeited when the base year job is left. The imputed wage reflects the average reward paid in the market for the individual's characteristics. All equations not shown are available from the authors.

[12]The current mandatory retirement effect is based on the regression section of Table 3 (82 - 56 = 26), and the anticipatory effect is based on Table 2, column 3 (.023).

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