NBER WORKING PAPER SERIES

HOW DOES JOB LOSS AFFECT THE TIMING OF RETIREMENT?

Sewin Chan
Ann Huff Stevens

Working Paper 8780
http://www.nber.org/papers/w8780

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
February 2002

We thank seminar participants at Princeton University, Rutgers University and the NBER summer institute Aging Program for helpful comments, and gratefully acknowledge financial support from National Science Foundation Grants 9905275 and 9907824. The views expressed herein are those of the authors and not necessarily those of the National Bureau of Economic Research.

How Does Job Loss Affect the Timing of Retirement?
Sewin Chan and Ann Huff Stevens
NBER Working Paper No. 8780
February 2002
JEL No. J6, J2

ABSTRACT

We use the Health and Retirement Study to examine the effects of job loss on factors affecting retirement incentives, including earnings, assets and pensions. We then estimate models of the retirement decision, which take into account the incentive to retire and any additional effects of displacement that are not captured by retirement incentives. There are substantial effects of displacement on retirement incentives as the result of changes to both earnings and pensions. Displacement significantly increases the probability of retirement, but only a small fraction of the displacement-induced changes in retirement behavior and labor force participation are the result of workers responding to these altered retirement incentives.

Sewin Chan
Robert F. Wagner School of Public Service
New York University
4 Washington Square North
New York, NY 10003
sewin.chan@nyu.edu

Ann Huff Stevens
Department of Economics
Yale University
New Haven, CT 06520
and NBER
ann.stevens@yale.edu

Job loss leads to dramatic and lasting reductions in the employment levels of older workers. Among workers nearing normal retirement ages, reduced employment may represent either involuntary non-employment, or voluntary retirement from the labor force. This paper provides a framework for interpreting older workers' behavior following job loss by combining information about job losses with a model of optimal retirement behavior. Because job loss will alter the earnings, pensions and wealth available to workers, we would expect an effect on recently displaced workers' labor force behavior and retirement timing, even in the absence of any search costs or barriers to new employment. We use data from the Health and Retirement Study to examine the effects of job loss on components of retirement incentives, including earnings and pensions. We then estimate models of the retirement decision, which take into account those retirement incentives along with any additional effects of displacement that are not captured by retirement incentives.

Older workers who have lost jobs have long spells of non-employment and may remain out of work for several years after the job loss.[1] This could be the result of difficulty finding new employment due to the loss of firm-specific skills, employers' unwillingness to invest in workers near the end of their career, or barriers such as age discrimination. On the other hand, extended joblessness could be an optimal response to changes in workers' earnings opportunities or pension structures. Distinguishing between these two types of explanations is important for developing and evaluating policies to assist older displaced workers. For example, labor market policies that tackle barriers to reemployment and promote the retraining of older workers may be appropriate for the former but ineffective for the latter since workers are simply reacting to changed financial incentives.

---

[1] See Chan and Stevens (2001a) for a description of the employment experiences of older displaced workers.

Our approach is to combine an empirical examination of retirement behavior after job loss with a variant of the option value model of optimal retirement developed by Stock and Wise (1990). This allows us to examine how displacement might impact a worker's optimal date of retirement, as well as to examine the actual retirement patterns of displaced workers.

The empirical analysis proceeds in two stages. First, we seek to understand how workers' earnings, assets, pensions and the resulting retirement incentive measures are affected by job loss. Second, by controlling for both displacement and retirement incentives, we can see whether displacement has effects on retirement or employment beyond those that work to change the optimal date of retirement.

The remainder of this paper is organized as follows. Section 1 presents the data we use in the subsequent analysis. Section 2 describes our model of retirement decision-making and the empirical strategy for its implementation. Section 3 gives results from the effects of job loss on components of the incentive to retire, while section 4 presents the results of our retirement decision estimation. Finally, section 5 concludes.

1. Data

To study job loss and retirement, we use publicly released data from the first three waves of the Health and Retirement Study (HRS), conducted in 1992, 1994 and 1996. We limit our sample to individuals between 50 and 75 years of age, with positive earnings some time during the three interview waves and with complete information on the starting and ending dates of jobs held at each of the three waves.[2] Further, because we rely on self-reported pension information, we must eliminate individuals who report having a pension, but who do not have sufficient information on the type or details of that pension. Our final sample contains 3,997 men and 3,962 women. Without the pension information restriction we would have 4,510 men and 4,154 women. Of the individuals in our final sample, 10.5 percent experience a job displacement at some time between 1986 and the wave 3 survey.

To track job loss among older workers in the HRS, we use the extensive information on earnings and employment collected at each survey wave, including information on job changes that took place between the waves. We also utilize information collected at the initial survey wave relating to previous jobs held. From the wave 1 data, we obtain information on up to two jobs for each individual in the survey. First, for those working at the wave 1 survey date we use information on earnings and employer characteristics on the current job. Those who are not working at wave 1 are asked to provide information on their previous employer, including when the job ended, why it ended, and final earnings on that job. Second, all individuals (employed or not at wave 1) are asked to provide information on the most recent previous job that lasted for at least five years. Thus, we also use retrospective information on relatively long-term jobs that ended prior to the wave 1 survey.

We take as our sample of displaced workers those who respond that their job ended when either (1) the "business closed" or (2) they were "laid off or let go." While the second part of this definition may include some individuals fired for cause, we include them for consistency with many recent definitions of displaced workers. Other possible responses to the question

[2] This final restriction is necessary to identify the timing of a reported job loss, and results in the loss of about 500 individual observations.

about how the previous job ended include “quit”, “retired”, “temporary layoff”, and “wanted a better job.”

Employed individuals are asked whether they hold the same job as in the previous wave. If not, the reason for leaving the previous wave’s job is ascertained. Non-employed individuals are asked what happened to their last job. Finally, the HRS questionnaire allows for the possibility of multiple jobs held between the survey waves. Thus, information on “interim” jobs – those that both start and end between two survey dates – is collected along with the data on jobs held in a previous wave. Thus, our sample of job losses consists of reported displacements from: long-term jobs ending prior to wave 1, jobs held immediately prior to becoming non-employed at the wave 1 survey date, (up to two) jobs ending between waves 1 and 2, and (up to two) jobs ending between waves 2 and 3.

For each of the jobs documented in the HRS, information is also collected on pension eligibility, structure, and benefit amounts. Similar to the wave 1 job history, pension information is collected at the wave 1 survey on pensions connected with both current jobs and jobs that have ended. Then, at each survey wave, respondents are asked whether their pension information has changed and what those changes are, or to give pension information for any new job since the last survey wave. Ultimately, for any job reported in the HRS, information is collected on up to three different pension plans associated with that employer.

We are relying on self-reported pension information from the three survey waves of the HRS since the employer-matched pension plan file is matched to employer plans for wave 1 pensions only.[3] While concerns have been raised regarding the accuracy and completeness of

---

[3] Restricted-access pension-provider and social security data matched to the HRS files have been used recently by researchers to forecast pension accumulation and social security wealth. See Gustman and Steinmeier (1998), McGarry and Davenport (1997), Gustman, Mitchell, Samwick and Steinmeier (1997), Moore and Mitchell (1997), Venti and Wise (1997) and Mitchell, Olson and Steinmeier (1996) among others.

self-reported pensions in the HRS, it is the only available source of detailed longitudinal data on private pension wealth and eligibility rules among displaced workers. We do utilize the social security earnings history files to calculate individuals' eligibility for social security benefits at alternative retirement ages.

2. The Retirement Decision and Job Loss

The option value model of retirement

To understand the impact of job loss on retirement, we must first specify the determinants of the retirement decision. To do this, we use a variant of the option-value framework originally presented by Stock and Wise (1990). This model emphasizes that individuals will retire when the utility associated with immediate retirement exceeds the utility associated with retiring at some optimal time in the future. The difference between these payoffs of immediate versus deferred retirement is known as the option value of continued work (or deferred retirement). As shown by Stock and Wise in their original and subsequent work, and by Samwick (1998), the option value is a comprehensive measure of future retirement incentives that has greater explanatory power than measures based on the one-year accrual of retirement wealth or the level of retirement wealth.

Our empirical approach is to estimate the effects of job loss on forward-looking measures of retirement wealth accumulation such as option value. We then examine whether such forward-looking incentive measures fully capture the effects of a previous job loss on retirement by estimating models that include both the option value measure and a dummy variable indicating a previous job loss.

We begin by presenting a model of the retirement decision. The original Stock and Wise formulation does not allow for saving and borrowing: utility in each period is based solely on current period income, either from earnings or from pension benefits. Thus, any temporary shock to earnings, which does not induce retirement during the period of the shock, has no effect on the retirement decision thereafter. There is no persistent effect of temporary shocks to earnings since consumption cannot be smoothed across time: our focus on the impact of displacement makes this feature unappealing. There is reason to believe that, following a job loss, workers may draw on savings or debt to finance a period of job search or depressed earnings and we want to allow a role for this in the retirement decision.

Thus, we propose the following option-value model, based on the concept of Stock and Wise, but which allows saving and borrowing across time periods. We assume that at time t, individuals maximize a lifetime utility function of the form:

$$V_t = \sum_{s=t}^{S} \beta^{s-t} u(c_s, l_s) \qquad [2]$$

where c is consumption, l is leisure, S is the termination date, and β is the subjective discount factor. The lifetime budget constraint at time t is:

$$\sum_{s=t}^{S} \left(\frac{1}{1+i}\right)^{s-t} c_s = A_t + \sum_{s=t}^{S} \left(\frac{1}{1+i}\right)^{s-t} y_s(R) \qquad [3]$$

where i is the real interest rate, A_t is the stock of assets at time t and y_s is income in period s, which depends on the retirement date R. The last term is the present value of all future income, which depends on the retirement date R. We call this $Y_t(R)$:

$$Y_t(R) = \sum_{s=t}^{S}\left(\frac{1}{1+i}\right)^{s-t} y_s(R) \qquad [4]$$

Following many previous applications, we assume that the period utility function $u(c_s, l_s)$ is additively separable in consumption and leisure, so that we can write V_t as:

$$V_t = \sum_{s=t}^{S}\beta^{s-t}u^C(c_s) + \sum_{s-t}^{S}\beta^{s-t}u^L(l_s) \qquad [5]$$

We assume leisure l_t is either 0 or 1:

$l_t = 0$ when $t < R$, before retirement

$l_t = 1$ when $t \geq R$, after retirement

and we normalize:

$u^L(0) = 0$ and $u^L(1) = U_L$

i.e., the utility of leisure takes on a fixed value, and is independent of income. We further assume a constant relative risk aversion utility function with risk aversion parameter $1/\alpha$. Thus, we can rewrite the decision as:

$$\max\ V_t(R) = \sum_{s=t}^{S}\beta^{s-t}\frac{c_s^{1-\alpha}}{1-\alpha} + \sum_{s=R}^{S}\beta^{s-t}U_L \qquad [6]$$

We assume the subjective discount rate is equal to the real interest rate (i.e., $1/(1+i) = \beta$). With this equality and our assumption of time-separable utility, consumption in each period will be equal to the present value of lifetime resources divided by the total number of time periods weighted by the discount factor:

$$c_t = \frac{A_t + Y_t(R)}{\sum_{s=t}^{S}\beta^{s-t}} \qquad \text{for all } t \qquad [7]$$

where $Y_t(R) = \sum_{s=t}^{S}\beta^{s-t}y_s$

We can now write the maximization problem as:

$$\max\ V_t(R) = \sum_{s=t}^{S} \beta^{s-t} \frac{\left(\dfrac{A_t + Y_t(R)}{\sum_{s=t}^{S} \beta^{s-t}} \right)^{1-\alpha}}{1-\alpha} + \sum_{s=R}^{S} \beta^{s-t} U_L \qquad [8]$$

Thus, we have a utility function that depends on the present value of lifetime resources plus a measure of utility derived from leisure during retirement. Saving and borrowing allow transfers between each period, and the retirement decision is no longer constrained by consuming current period income.[4] Individuals now chose the retirement age (R) that will maximize their lifetime utility.

Empirical implementation of the retirement decision model

Our empirical approach is to calculate the option value of continued work, defined as the difference in utility between immediate retirement and retirement at the optimal age. The calculated option value measure can then be used as the key independent variable in a reduced form model of the retirement decision. If we ignore displacement for the moment, empirical

[4] This setup is similar in spirit to that of Stock and Wise. Their functional form is power utility with parameter γ and the value of leisure expressed as a multiplicative factor k on retirement benefits during retirement.

$$V_t(R) = \sum_{s=t}^{R-1} \beta^{s-t} Y^{\gamma} + \sum_{s=R}^{S} \beta^{s-t} (kB)^{\gamma}$$

If their income Y and benefits B are replaced with consumption C_w before retirement, and consumption C_r after retirement, and log utility is used (a limiting case of their power utility, and α=1 in our setup), we get

$$V_t(R) = \sum_{s=t}^{R-1} \beta^{s-t} \ln(C_{ws}) + \sum_{s=R}^{S} \beta^{s-t} \ln(kC_{rs})$$

Breaking out the second term:

$$V_t(R) = \sum_{s=t}^{R-1} \beta^{s-t} \ln(C_{ws}) + \sum_{s=R}^{S} \beta^{s-t} \ln(C_{rs}) + \sum_{s=R}^{S} \beta^{s-t} \ln(k)$$

First order conditions would have that consumption is equal in all periods, i.e., C_w=C_r, and thus we have our equation [6] where our U_L corresponds to their ln(k).

implementation of the retirement decision suggested by [8] is relatively straightforward. Information on asset holdings, A_t , comes directly from the data. We assume a value for β following the approach used in Samwick (1998).[5] We calibrate U_L for each feasible value of α by choosing the U_L which produces a simulated distribution of retirement dates consistent with the retirement behavior in the HRS sample.

We obtain $Y_{it}(R)$ by calculating the following:

$$Y_{it}(R) = \sum_{s=t}^{R-1} \beta^{s-t} \hat{y}_s(X_{it}) + \sum_{s=R}^{S} \beta^{s-t} \hat{y}_s(R, X_{it}) \qquad [9]$$

where $\hat{y}_s(X_{it})$ is expected income while working based on personal characteristics X_{it} and $\hat{y}_s(R, X_{it})$ is expected income while retired based on the retirement age R and personal characteristics. To forecast future earnings, we use earnings information from current jobs and from job histories available in the HRS. We deflate these earnings using the CPI and estimate a fixed-effects regression, including a fourth order polynomial in age. The age effects are then used to predict earnings growth at each age from 50 to 75. Not surprisingly, wage profiles are very flat for workers age 50 and over. The estimated age-earnings profiles are illustrated in Appendix Figure 1. Once retired, expected income will depend on the retirement date, pension benefits and benefit timing rules. For this forecast, we use information on when pension benefits will begin, how pensions continue to accrue from the employer while employed and the amounts of pension benefits to be received.

[5]An alternative is to estimate the full dynamic programming model by maximum likelihood. Samwick (1998) assumes values for the discount rate and utility function parameters, noting identification difficulties in precisely estimating both parameters. This approach was also considered in Lumsdaine, Stock and Wise (1992) who found that such models do capture many of the key features of the dynamic retirement model, although they may be inferior in predictive power to the fully structural model.

One complication in calculating $Y_{it}(R)$ for displaced workers is the need to estimate future earnings for individuals who are displaced and currently unemployed. To begin, we assume that unemployed displaced workers can return to work with a probability equal to one and that they will receive earnings that are reduced from their pre-displacement level by the amounts estimated for reemployed displaced workers. That is, we take the average earnings losses of displaced workers estimated in Section 3 and reduce the future earnings of displaced workers by that amount. We note that the predicted earnings for unemployed displaced workers are likely to overstate their expected future earnings because the earnings losses are estimated only for the sample of individuals who do return to work: we should expect those who are not reemployed to face worse wage opportunities. We later relax the assumption that displaced workers can return to work with certainty.

For each worker, we next calculate a predicted present value of lifetime income measure $Y_{it}(R)$, for each possible future retirement age R, and the corresponding lifetime utility $V_{it}(R)$. We then choose the R associated with the highest value of $V_{it}(R)$ and call this R_{it}^*, with the corresponding lifetime utility denoted by V_{it}^*. The value of working versus immediate retirement is given by the difference in utility between V_{it}^* and the value of V_{it} if the worker retires immediately, known as the "option value" of retirement Z_{it}:

$$Z_{it}(R) = V_{it}^*(R^*) - V_{it}(t) \qquad [10]$$

Having estimated each worker's option value, we next estimate the likelihood of retirement as a logit with $Z_{it}(R)$ as an explanatory variable.

$$\text{Probability } (Retire) = \frac{e^{F(X_{it}, Z_{it})}}{1 + e^{F(X_{it}, Z_{it})}} \qquad [11]$$

where X_{it} include individual and time specific characteristics, and Z_{it} is the option value. This makes clear that displacement should affect the retirement decision through its effects on any of the variables in $Z_{it}(R)$, including future earnings, asset holdings, and future pension benefits. In addition, if displaced workers face significant barriers to reemployment that prevent them from following their optimal retirement strategy, a variable indicating a previous displacement should remain significant even after option value measures are included in the regressions.

The HRS analysis sample

The sample that we use includes all workers (as described in the previous section) who are currently at risk for retirement or who have just retired, because our primary interest is in examining the effects of displacement and retirement incentive measures on the probability of retirement. Sample means of key variables for the sample used in the analysis are shown in Appendix Table 1. The first two columns in the table are based on the final year in which individuals in our analysis sample are observed. This is the year of retirement for those who retire (because they then leave the "at risk" pool) or the final year of observation for those who have not yet retired. The second two columns are based on observations for all person years.

3. The Effects of Job Loss on Retirement Incentives

Earnings

Probably the most widely studied effect of displacement on individual workers is that of reduced wages and earnings.[6] Job loss may produce significant changes in workers' forecasts of future labor income opportunities, even once they are reemployed. Simple summary statistics confirm the significant negative impact of displacement on earnings among workers 50 and over in the HRS. Of those who are reemployed, half receive wages that are at least 19 percent below their pre-displacement wages, and almost a quarter see their wages halved. In contrast, workers who do not suffer a job loss have wage growth of approximately 5 percent between waves.

We estimate the effects of job loss on earnings using fixed effects regressions to control for both observable and unobservable worker characteristics that might be correlated with displacement probabilities. For the earnings regressions only, we use some additional data beyond that described in section 1. Individuals in the HRS were asked in wave 1 about wages on all jobs held prior to wave 1 that lasted five years or more. By making use of these additional wage observations from prior job displacements, we are better able to estimate the effect of displacements that occur during and after the survey years. We use all wage observations from 1980 and later.[7] Earnings from jobs starting or ending prior to 1980 are eliminated because of concerns about the accuracy of retrospective information from more than a decade earlier. The

[6] For example, Jacobson, LaLonde, and Sullivan (1993) find that a typical worker (aged 55 and younger in their sample) faces quarterly earnings reductions of up to 25 percent, as much as six years after a job loss. Ruhm (1991), Stevens (1997), and Schoeni and Dardia (1997) also find persistent earnings reductions following job loss. Furthermore, Stevens (1997) shows that displaced workers often face substantial employment instability, with repeated job losses over the next several years. Focusing on older workers, Ruhm (1990) finds significant earnings reductions among those who leave career jobs for whatever reason, and Couch (1998) finds earnings reductions of 39 percent in the initial two years after a job loss among first wave respondents of the HRS.

[7] We obtain similar results using a balanced sample in which each individual contributes four wage observations to the sample – one in each survey wave and one from a long-term job held prior to wave 1.

dependent variable used is the log of annual salary based on full-year full-time work: individuals are asked how much they earn on a given job, and these reports are converted to earnings on an annual basis. This means we are ignoring the portion of earnings losses due to part-year unemployment or part-year work. As noted above, a variable for displacement is coded when a job ends as the result of a layoff or business closing.

The effects of job loss on earnings are summarized in Table 1. As expected, there are large and persistent effects of job loss on earnings. Among men, earnings are immediately reduced by 33 percent, and remain 19 percent below the level expected in the absence of displacement after six or more years. Women experience similar losses, with earnings initially reduced by 21 percent, and slightly larger losses six or more years later. These earnings losses point to the first component of the effects of job loss on workers' gains to deferring retirement. There is less gain to continued work because of the often sharp reductions in wages associated with post-displacement jobs. For comparison with our results on asset and pension measures, the first row of Table 2 shows the results of a simpler specification of the effects of displacement on earnings. This simplified specification includes only one indicator variable for previous job loss instead of the six indicators for years-after-job-loss in Table 1. The average reduction in earnings over all years following job loss is 27 percent for men and 19 percent for women.

Assets

The effects of job loss on savings or asset holdings is an issue of particular concern for those close to typical retirement ages and has been less well documented than the effects of displacement on wages. The loss of income associated with displacement may alter planned accumulation of savings for retirement. It is not immediately clear how changes in these asset levels will affect the retirement decision in our model since it enters equation [8] in a very non-linear fashion. The second row of table 2 shows the effects of displacement on stocks of financial assets, excluding home equity.[8] These estimates are based on fixed effects regressions that include controls for the calendar year, age, health and marital status. The results are perhaps surprising: for both men and women, there is no statistically significant effect of job loss on non-pension asset holdings.

Pensions

We next examine the private pension-related components of the option value to continued work. One expectation is that, among this population of older workers, it will be relatively rare for individuals to completely lose their pensions when they experience a job loss since most of them will be fully vested in their pension plans. Some simple tabulations of survey responses in the HRS show that indeed, relatively few workers lose their pensions with job loss.[9] Among recently displaced workers, only 5.5 percent of those with defined benefit pensions on their previous job, and 2.5 percent of those with defined contribution pensions report having lost the pension. The vast majority of those with defined benefit plans on the pre-displacement job (76 percent) report that they are either currently receiving benefits from the previous job pension, or will in the future. Another 19 percent of this group report that they received a cash settlement for their pension at the time of the job loss. Among displaced workers who had a defined contribution pension, 59 percent report that they either rolled over the DC pension into an IRA, or left the money in the account to continue accumulating. A quarter of those with DC pensions say that they received a cash settlement for their pension when they left their jobs.

[8] Including home equity does not change our results.
[9] See Chan and Stevens (2001b) for more detail on how pension eligibility and amounts are affected by job loss.

In the third row of Table 2, we examine the effect of displacement on the level of pension wealth assuming a retirement age of 65. As shown in the table, there is no statistically significant effect of job loss on the level of pension wealth summarized in this way. Similar results are obtained using the present value evaluated at alternative retirement ages. This confirms that there is not a strong relationship between a recent job loss and the pension wealth available to workers.

Job loss can still have an important impact on the retirement decision via private pensions, even when job loss has no effect on the *level* of retirement wealth. The relevant question is whether displacement alters the accumulation pattern of pensions. The fourth row of Table 2 looks at the effect of job loss on the "pension gain" from delaying retirement: the difference in the present value of pension wealth if retirement occurs immediately versus if it is deferred until pension wealth is maximized.[10] The concept is similar to option value, but focuses only on the pension component, ignoring income, assets, and the value of leisure in retirement. Using this measure of the incentive to delay retirement, we see large effects of displacement on the pension-related retirement incentive for men. The gain in pension wealth from deferring retirement among men is significantly reduced by more than $10,000 following job loss. For women, the estimated reduction is $3,131, but this is not statistically significant. These effects of job loss on earnings and pension gain suggest that job loss should have significant effects on the decision to retire.[11]

[10] This measure has been referred to as "peak value" by Coile and Gruber (2000).
[11] We have also considered whether there is an effect of displacement on Social Security benefits. This could happen if displacement affects the average of a worker's highest 35 quarters of earnings. In practice, we find no evidence of a reduction in estimated Social Security benefits from displacement.

Option Value

Finally, we estimate the effect of displacement on workers' option value, calculated as described in the previous section. For both men and women, there are statistically significant negative effects of job loss on option value. However, these negative impacts are small relative to the distribution of option values, as shown in the first and third columns of Table 3.

Given that many workers who are displaced begin to receive their pensions immediately, or receive some form of cash settlement, job loss may eliminate the gains to delaying retirement, resulting in an option value of zero. If a worker has a pension source not associated with her current (post-displacement) job, she will not have sharp gains that accrue from remaining employed, and so is less likely to have a positive option value. Reduced earnings will also make it more likely that the net utility gain to continuing employment is non-positive, leading to a zero option value. This effect is illustrated in the last row of Table 2, where we estimate the effect of a job loss on the probability of having a zero option value. A job loss increases the probability of zero option value by approximately five percentage points among both men and women.

Taken together, the results in Tables 1 and 2 illustrate mechanisms through which job loss affects individuals' retirement decisions. Because job loss alters workers' earnings and pension provisions, it also alters the option value to delaying retirement and thus should affect the timing of retirement.

4. The Effects of Job Loss on the Retirement Decision

We next examine the direct relationship between job loss and retirement, and between option value and retirement. The first column of Table 4 shows the effect of having a previous job loss on the probability of making a transition to retirement. The sample used here is all individual-year observations in which the person has not already retired or has just retired in the past year. Our dependent variable reflects whether or not the individual retired in the previous year. Specifically, individuals are retired if they answered yes to a question asking if they are "completely retired." In addition to a variable indicating a previous job loss we include controls for health, marital status, availability of retiree health insurance, education, race, and a series of dummy variables for age and for calendar year. As expected, having a recent job loss significantly increases the probability of retirement in the current year. For men, the coefficient on the variable for a previous job loss is 0.339, indicating an increase in the probability of retirement of approximately 3 percentage points.[12] The annual probability of retirement for not displaced workers is 9 percent, so displacement increases the probability of retirement each year by approximately one-third. For women, the coefficient for a previous displacement of 0.360 also suggests an increase in the probability of retirement of around 3 percentage points, or by roughly one-third. A recent job loss substantially increases the probability of retiring from the labor force.

The calculated option values are next used to explain the probability of retirement. The relationship between retirement and option value is summarized in Table 3, which shows the rate of retirement at various points in the distribution of option value. As expected, the retirement

[12] This effect is evaluated for a white 60-year-old married man of average health, with retiree health insurance and some college education in 1995.

rate is highest at zero option value and points low in the distribution of positive values. For individuals with option values above the median, retirement rates are substantially lower. At the median of positive option values, the rates of retirement for men and women are 9.8 and 5.2 percent. At the 90th percentile, the comparable rates are just 2.4 and 1.9 percent.

The second column of Table 4 shows the results of estimating a logit model for retirement, including option value measures and the same set of controls noted above. We include option value, and a dummy variable indicating that option value is equal to zero to allow for possible non-linearities in the effect of the option value measure around zero. The coefficient on option value for men and women is –0.25 and is statistically significant. To interpret this coefficient, consider the effect of increasing option value from the median (among those with a positive value), to the 75th percentile of this distribution. For men, this would increase option value by around 1,200, leading to an increase in the probability of retirement of 3 percentage points. For women, a movement from the median to the 75th percentile would correspond to an increase of in option value of approximately 1,000, leading to an increase in the retirement probability of 2.5 percentage points.

The coefficient for having a zero option value is positive for men, as expected, but not statistically significant. For women, the coefficient is negative and statistically significant. This is surprising since it suggests that women with no positive gain to continued work are less likely to retire. One possible explanation could involve liquidity constraints, so that women with very little retirement wealth (no private pension, for example) may find it necessary to continue working.

Consideration of these results, along with the fixed-effects regression of displacement on option value from Table 2, suggests that job loss must have strong effects on retirement, above and beyond those operating through option value. Having a previous displacement increases retirement by approximately 3 percentage points, according to the results in the fifth row of Table 2. From Table 4, we see that a change in option value in excess of 1,000 would be needed to generate the same magnitude change in the retirement probability. Displacement does significantly reduce option value, but by a much smaller magnitude.

The third column of Table 4 confirms this by including both option value and a variable for a past displacement in the logit for retirement. If the reduced-form effect of displacement is primarily the result of displacement-induced changes in option value, then the effect of displacement should be eliminated by conditioning on workers' estimated option value. Including the option value variables, along with the displacement dummy variable, reduces the estimated effect of displacement by only 0.05 for both men and women. The coefficient on job loss when option value controls are included is not significantly different from the coefficient when controls are not included. When option value regressors are included, there continues to be an effect of displacement on retirement of roughly 2.5 percentage points. This suggests that much of the increased retirement following job loss may not be financially optimal in the narrow sense of solely responding to changes in the option value of retirement, as we have measured it.

One possible reason why displacement continues to increase retirement even after controlling for option value is that we have not accurately captured displaced workers' true earnings possibilities. Recall that we assign displaced and unemployed workers the earnings that might be expected after displacement, based on the average losses experienced by displaced and reemployed workers. However, even reduced earnings may not be available if a displaced worker is unable to secure new employment.

To explore this possibility, we calculate an alternative version of the option value variable for displaced workers where the probability of returning to work is less than one. In this alternative specification, expected earnings for displaced workers are equal to the probability of returning to work multiplied by their (reduced) earnings. This is a way of incorporating the idea that displaced workers may not expect to have much in the way of future earnings, and so may choose to retire. For an estimate of the probability of receiving any future earnings, we turn to probabilities generated by previous work on employment transitions following displacement (see Chan and Stevens, 2001a). Our assumption is that workers will base their expectations of future income on a probability of securing new employment given their age and other characteristics. For example, the probability of returning to work for a 55-year-old man after one year out of work is 0.53. These probabilities will understate the possibility of returning to work since they combine the effects of being unable to return to work with the effects of being unwilling to return to work. This should provide a lower bound on the expected future earnings of displaced workers.

The final column of Table 4 shows the results from including this revised option value variable (labeled "option value II"), along with the displacement dummy in the retirement logit. For men, the effect of displacement is reduced by slightly more, although it still does not differ significantly from the full effect of displacement in column one. For women, there is no change in the displacement coefficient from this change in option value.[13]

[13] This exercise is only suggestive of the effects that employment barriers may have and some caution is required in interpreting the coefficients on this option value II measure. The large coefficients on the variable indicating a zero option value, for example, are largely the result of our construction of this alternative option value variable. For displaced individuals who have not returned to work, we assign only a probability of having future earnings. This creates a mechanical relationship between not being at work (including those displaced workers who have retired) and the earnings component of option value.

We have also performed a similar analysis to that in Table 4 using two alternatives to the self-reported retirement measure. Specifically, we have used an indicator for working, and an indicator for working *or* searching for work, as dependent variables. With each of these dependent variables we estimate regressions including only the displacement dummy (along with the control variables) and including the displacement dummy and option value. In all cases the results are similar: a previous displacement significantly lowers the probability of remaining in the labor force (or employed) even when conditioning on option value.

It is perhaps unsurprising that some of the effect of displacement remains after controlling for workers' option value. It is notable, however, that the vast majority of the displacement effect remains after controlling for these retirement incentive measures. This suggests that only a small fraction of displacement-induced changes in retirement and labor force participation are the result of workers responding optimally to altered pension and earnings incentives, as we have measured them through the option value.

Retirement is a one-time event. Thus, unlike the results for the effects of job loss on components of financial retirement incentives, the results for retirement behavior cannot be estimated with controls for fixed effects. This raises the concern that the results in Table 4 may be biased due to failure to control for unobserved permanent factors that are correlated with both the probability of retirement and our independent variables of interest. In particular, previous studies of the effects of displacement (along with our estimates in Table 2) typically include fixed effects out of concern that displaced workers may have unobserved characteristics that are correlated with wages, employment propensities, etc.. Additionally, in previous work (Chan and Stevens, 2001c) we argue that retirement equations identified from cross-sectional variation in option value may be biased due to unobserved factors that are correlated with both option value measures and tastes for retirement. We next consider whether such unobserved heterogeneity might be driving our results in Table 4.

We use information on individuals' stated expectations about retirement to provide some evidence on the effects of unobserved tastes for retirement. Employed individuals in the HRS are asked "what is the probability that you will continue to work full time after age 62?" In Table 5, we use the responses to this question from the first wave of the survey to control for potential heterogeneity in tastes for retirement. For this table, we limit the sample to observations from wave 2 and later, and eliminate workers who were displaced prior to wave 1. This gives a measure of retirement expectations elicited prior to job loss.

The first column of Table 5 shows the results of a logit including variables for a previous job loss (occurring some time after wave 1) and for a worker's stated retirement expectation at wave 1. There continues to be a positive and significant effect of job loss on retirement and the expectations variable takes the expected negative sign. Individuals with a low expectation of continuing work beyond age 62 as of wave 1 are more likely to have retired in subsequent waves. The effect of displacement for both men and women is roughly 60 percent larger than that shown in Table 4. This is partially a function of the different sample, which includes older workers and workers whose job losses occurred more recently than the sample used in Table 4. The effects of job loss among this sample are always larger (though not significantly so) when the expectations variables are included.

The next two columns of Table 5 show the effects of adding option value variables to the logit model. The pattern of these results is very similar to the pattern shown for the fuller sample in Table 4. When the option value variables are added to the specification, the coefficient on previous displacement falls by 0.07 among men and 0.04 for women (in Table 4 this was 0.05 for both men and women). Once again, the majority of the effect of job loss remains after controlling for changes in financial retirement incentives. This provides some evidence that omitted differences in tastes for retirement are not driving our results.

5. Conclusion

We find important effects of job loss on the main financial components of workers' incentive to retire. Labor earnings fall sharply as does the gain in pension wealth from continued work. Fixed-effects regressions show earnings reductions after displacement of 27 and 19 percent for men and women. While the *level* of pension wealth is not significantly altered, the gain in pension wealth from deferring retirement is reduced by more than \$10,000 for men and more than \$3,000 for women. These effects significantly reduce the total option value from delaying retirement following job loss.

These worsened financial conditions should lead to increased rates of retirement among displaced workers; however, observed rates of retirement following job loss go beyond the effects of purely financial considerations. Displaced workers retire at substantially higher rates than non-displaced workers, even after controlling for the option value of delayed retirement. Employment difficulties, high search costs, or other barriers to reemployment may be important explanations for the low employment rates of recently displaced older workers.

References

Chan, Sewin and Ann Huff Stevens. 2001a. "Job Loss and Employment Patterns of Older Workers." Journal of Labor Economics 19(2), April.

Chan, Sewin and Ann Huff Stevens. 2001b. "The Effects of Job Loss on Older Workers: Employment, Earnings and Wealth." Peter P. Budetti, Richard V. Burkhauser, Janice M. Gregory and H. Allan Hunt (editors), Ensuring Health and Income Security for an Aging Workforce, Kalamazoo: W. E. Upjohn Institute for Employment Research.

Chan, Sewin and Ann Huff Stevens. 2001c. "Do Changes in Pension Incentives Affect Retirement? A Longitudinal Study of Subjective Retirement Expectations." http://homepages.nyu.edu/~sc87/chanstevens_retirementexpectations.pdf

Couch, Kenneth. 1998. "Late Life Job Displacement." The Gerontologist. 38: 7-17.

Gruber, Jonathan and Courtney Coile. 2000. "Social Security and Retirement." NBER Working Paper No. W7830.

Gustman, Alan L., Olivia S. Mitchell, Andrew A. Samwick and Thomas L. Steinmeier. 1997. "Pension and Social Security Wealth in the Health and Retirement Study." NBER Working Paper No. 5912.

Gustman, Alan L. and Thomas L. Steinmeier. 1998. "Effects of Pensions on Savings: Analysis with Data from the Health and Retirement Study." NBER Working Paper 6681.

Jacobson, Louis, Robert LaLonde and Daniel Sullivan. 1993. The Costs of Worker Dislocation. Kalamazoo: Upjohn Institute for Employment Research.

Lumsdaine, Robin, James Stock and David Wise. 1992. "Three Models of Retirement: Computational Complexity Versus Predictive Validity." In Topics in the Economics of Aging. David Wise, ed. Chicago: University of Chicago Press.

McGarry, Kathleen and Andrew Davenport. 1997. "Pensions and the Distribution of Wealth." NBER Working Paper No.6171.

Mitchell, Olivia, Jan Olson and Thomas Steinmeier. 1996. "Construction of the Earnings and Benefits File (EBF) for Use With the Health and Retirement Survey." NBER Working Paper No. 5707.

Moore, James F. and Olivia S. Mitchell. 1997. "Projected Retirement Wealth and Savings Adequacy in the Health and Retirement Study." NBER Working Paper 6240.

Ruhm, Christopher. 1991. "Are Workers Permanently Scarred by Job Displacements?" American Economic Review 81: 319-324.

Ruhm, Christopher. 1990. "Bridge Jobs and Partial Retirement." Journal of Labor Economics 8: 482-501.

Samwick, Andrew. 1998. "New Evidence on Pensions, Social Security, and the Timing of Retirement." Journal of Public Economics 70(2): 207-36.

Schoeni, Robert and Michael Dardia. 1997. "Wage Losses of Displaced Workers in the 1990s." Unpublished manuscript.

Stevens, Ann Huff. 1997. "Persistent Effects of Job Displacement: The Importance of Multiple Job Losses." Journal of Labor Economics 15: 165-188.

Stock, James and David Wise. 1990. "Pensions, the Option Value of Work, and Retirement." Econometrica 58: 1151-1180.

Venti, Steven and David Wise. 1998. "The Cause of Wealth Dispersion at Retirement: Choice or Chance?" American Economic Review 88(2): 185-191, May.

Table 1: The Effect of Job Loss on Earnings

	Men	Women
Dependent variable: Log(Earnings)		
1 year after job loss	-0.403	-0.232
	(0.059)	(0.063)
	-33.2%	*-20.7%*
2 years after job loss	-0.262	-0.150
	(0.061)	(0.071)
	-23.0%	*-14.0%*
3 years after job loss	-0.288	-0.235
	(0.073)	(0.073)
	-25.0%	*-21.0%*
4 years after job loss	-0.166	-0.156
	(0.122)	(0.053)
	-15.3%	*-14.5%*
5 years after job loss	-0.310	-0.107
	(0.093)	(0.127)
	-26.6%	*-10.2%*
6 or more years after job loss	-0.211	-0.259
	(0.071)	(0.086)
	-19.0%	*-22.9%*
Number of observations	5,325	4,863

Notes: Fixed effects OLS coefficients. Standard errors, adjusted for person-level clustering, are in parentheses.

Percentage effect on wages in italics.

Table 2: The Effect of Job Loss on Components of the Incentive to Retire

	Men	Women
Dependent variable:		
Log(Earnings)	-0.318	-0.212
	(0.048)	(0.049)
number of observations	*5,325*	*4,863*
Financial assets	43,658	21,806
	(52,578)	(36,337)
number of observations	*10,785*	*10,814*
Present value of retirement wealth	7,095	-3,409
	(14,100)	(3,722)
number of observations	*10,208*	*10,684*
Pension gain from delaying retirement	-10,380	-3,131
	(3,091)	(2,801)
number of observations	*18,836*	*18,969*
Option value (utility) of delaying retirement	-136.5	-131.1
	(52.1)	(45.9)
number of observations	*18,836*	*18,969*
Probability of zero option value	0.0478	0.0488
	(0.015)	(0.019)
number of observations	*18,836*	*18,969*

Notes: Fixed effects OLS coefficients. Standard errors, adjusted for person-level clustering, are in parentheses.

Each row contains results from a separate regression and shows the effect of job loss on the indicated dependent variable.

Sample for first 3 rows includes one observation per person-survey wave. Sample for subsequent rows includes one observation per person-year since option value and pension components vary by age.

Table 3: Retirement Rates by Percentile of Option Value Distribution

	Men		Women	
	Option Value	Annual Rate of Retirement	Option Value	Annual Rate of Retirement
Zero option value	0	0.135	0	0.063
Distribution of non-zero option value:				
10th percentile	340	0.134	302	0.075
25th percentile	827	0.120	761	0.060
50th percentile	1,761	0.098	1,544	0.052
75th percentile	3,069	0.056	2,572	0.043
90th percentile	4,472	0.024	3,664	0.019

Notes: Retirement rates are for individuals with option value up to the given percentile of the distribution of non-zero option values.

Table 4: The Effects of Job Loss and Option Value on Probability of Retirement

	Men				Women			
Dependent variable: Retired								
Previous job loss	0.339		0.288	0.237	0.360		0.314	0.313
	(0.100)		(0.180)	(0.099)	(0.120)		(0.120)	(0.120)
Option Value ('000)		-0.250	-0.240			-0.250	-0.250	
		(0.050)	(0.050)			(0.038)	(0.038)	
Zero Option Value		0.061	0.059			-0.222	-0.226	
		(0.104)	(0.104)			(0.103)	(0.103)	
Option Value II ('000)				-0.230				-0.250
				(0.053)				(0.038)
Zero Option Value II				0.154				-0.196
				(0.102)				(0.101)
Number of observations	18,541				18,866			

Notes: Logit coefficients. Standard errors, adjusted for person-level clustering, are in parentheses.
Models also include controls for education, health, marital status, race, age, retiree health insurance availability and calendar year.
Option Value II refers to option value calculated assuming that displaced and not employed workers have expected earnings that incoporate probabilities of returning to work of less than one.

Table 5: The Effect of Job Loss and Option Value on the Probability of Retirement, Controlling for Retirement Expectations

	Men			Women		
Dependent variable: Retired						
Previous job loss	0.552		0.484	0.510		0.468
	(0.158)		(0.159)	(0.180)		(0.179)
Option Value		-0.250	-0.242		-0.260	-0.250
		(0.087)	(0.087)		(0.052)	(0.052)
Zero Option Value		-0.268	-0.260		-0.529	-0.543
		(0.173)	(0.173)		(0.164)	(0.164)
Wave 1 subjective probability of working at age 62	-1.464	-1.457	-1.460	-1.214	-1.201	-1.213
	(0.135)	(0.136)	(0.136)	(0.152)	(0.153)	(0.154)
Number of observations		9,344			9,015	

Notes: Logit coefficients. Standard errors, adjusted for person-level clustering, are in parentheses.
Models also include controls for education, health, marital status, race, age, retiree health insurance availability and calendar year.
Sample includes observations from waves 2 and 3. Displacements are after wave 1 only.

Appendix Table 1: Sample Means

	Individuals in their final year of observation		All person-years	
	Men	**Women**	**Men**	**Women**
Retired	0.33	0.22	0.07	0.05
Option Value	1,218	1,137	1,782	1,448
Peak Value	$22,485	$10,045	$44,946	$16,565
Annual Earnings	$35,610	$19,259	$37,822	$19,766
Financial Assets	$228,005	$177,058	$202,678	$148,564
Previous Displacement	0.11	0.10	0.09	0.09
Has Retiree Health Insurance	0.30	0.23	0.28	0.22
High School Graduate	0.32	0.39	0.32	0.39
Some College	0.18	0.19	0.18	0.20
College Graduate	0.23	0.15	0.24	0.16
Age	60.1	59.4	57.9	57.3
Self-reported health (1=poor, 5=excellent)	2.61	2.62	2.50	2.55
Married	0.86	0.68	0.87	0.68
Number of observations	3,997	3,962	18,541	18,866

Figure A1: Age-Earnings Profile Used in Earnings Forecasts