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The Impact of Displacement on Older Workers

Abstract: We examine the impact of job displacement on older workers. Whereas previous studies focus on the earnings losses associated with displacement, we examine compensation losses more generally. Using the Health and Retirement Study, we measure the impact of a job loss on earnings, pension wealth, and health insurance. When pension and health insurance losses are incorporated to measure the overall impact of a displacement, the estimated total compensation loss increases by nearly 100 percent relative to the standard analysis that only examines earnings losses.

1. Introduction

According to Bureau of Labor Statistics (BLS) estimates, the job displacement rate declined from 1991-92 to 1997-98 for all workers, with the decline presumably related to the robust economic expansion (see Helwig, 2001). However, the decline for workers over the age of 54 was less (4.4 to 3.1 percent) than the decline for workers age 25 to 54 (3.9 to 2.3 percent). In fact, this 0.8 percent gap between younger and older workers was the widest over the two decades the underlying data were collected. The estimates imply that, even in the robust economic conditions of the late 1990s, between 10 to 15 percent of workers would experience a displacement during their 50s.

Understanding the impact of a displacement on older workers is important for many reasons. First, as the estimates in the previous paragraph suggest, displacement is fairly common among older individuals. Second, older workers have less working years to adjust to any income or wealth shocks, implying that the negative consequences of a job loss could substantially alter behavior. Third, the impact of displacement could be more severe for older workers. For workers with more tenure (a common characteristic of older workers), Valetta (1991) finds longer periods of joblessness and Farber (1993) finds a larger reduction in wages following a displacement. Finally, due to the well-known aging of the U.S. demographic shifts, older workers will represent an increasingly larger share of the population at risk to be displaced.

A large literature has examined the impacts of a displacement on employment and earnings outcomes.[1] To quantify this impact, studies typically examines the length of the resulting unemployment and the decline in earnings when the individual returns to work. These studies find that there is a substantial decline in the employment rate and earnings initially following a displacement, but after a few years, the employment rate differences tend to fade away and only an earnings gap remains. However, most of this research focuses on prime-aged workers, ignoring older workers. Including

older workers complicates the standard analysis because, if older workers are more likely to retire after a job loss, then the length of unemployment and earnings on returning

[1] See Hammermesh (1989), Fallick (1995), and Kletzer (1998) for useful reviews of the displacement literature.

to work would not be observed. Moreover, even for workers who are not displaced, employment rates decline among older workers because of retirement; any estimate of earnings and employment losses must include an assumption regarding what the retirement patterns of the displaced would have been if they were not displaced.

In this paper, we examine the impact of displacement on the compensation for older workers. Consistent with previous studies, we first examine the impact of a job loss on earnings. However, our estimation approach explicitly accounts for the decline in employment among the individuals who were not displaced. We also examine the impact of displacement on two other forms of compensation that could be valuable to older workers, pensions and health insurance. Displacement could severely affect the pension wealth of older workers because pension wealth often accrues most rapidly during the years just before retirement (Kotlikoff and Wise, 1987) and the accrual of additional pension wealth at a new job might be precluded because of standard vesting rules. Displacement could also leave an older individual without health insurance, exactly during a time when health care costs and/or health insurance premiums are relatively high.

A few studies have directly examined the employment impacts of displacement on older workers (Diamond and Hausman, 1984; Chan and Stevens, 2001a; Elder, 2000). These studies find that older workers are more likely to retire following a displacement, and conditional on eventually returning to work, they tend to be unemployed longer. Two recent studies have examined the broader impact of displacement using the Health and Retirement Study (HRS), the same data set we use. Couch (1998) examines the impact of displacement on earnings, pension eligibility, and employer provided health insurance. However, Couch (1998) only analyzes wave 1 of the HRS, and thus relies on limited retrospective information and is unable to examine the longer-term effects of displacement. Our analysis relies on four waves of the HRS. Chan and Stevens (2001b) examine the impact of displacement on earnings and pension wealth. They find significant and long-term impacts of displacement on earnings, but their analysis ignores retirement for both the displaced and the non-displaced workers. They find little significant effects on pensions, but they rely on self-reported pension information in the HRS. Gustman and Steinmeier (1999) compares the self-reported pension information in the HRS to firm-reported pension

and find that the self-reports are severely limited. We explicitly use methods that allow for retirement among the displaced and non-displaced and we rely on the firm-reported pension data.

Our results show that there are large impacts of displacement. We find significant earnings losses for displaced workers following a job loss. However, unlike previous studies that find a permanent reduction in earnings, we find that the effect disappears after five years. The earnings losses disappear because the non-displaced individuals begin to retire, not because displaced individuals return to their pre-displacement earnings. We estimate pension wealth to fall almost 30 percent. However, these pension losses are nearly equal to the estimated earnings losses. Finally, we estimate an 11 percent short-run reduction in health insurance for displaced workers and a corresponding 7.5 percent decline in the monetized value of these benefits. Our results also suggest that older job losers are losing access to retirement health insurance benefits. Overall, the fringe benefit loss is as large as the earnings losses following a displacement.

The rest of the paper proceeds as follows. Section 2 describes the data we use and presents descriptive results associated with displacement. We describe our statistical framework in Section 3. We present results concerning the impact of displacement on earnings, pensions, and health insurance in Section 4 and conclude in Section 5.

2. The Data and Descriptive Analysis

We use the first four waves of the Heatlh and Retirement Study (HRS).[2] The HRS is an on-going longitudinal survey of households with at least one adult born between 1931 and 1941. The first wave of the survey was collected in 1992 with subsequent waves collected on a bi-annual basis. We use the final release of Waves 1 and 2, the partial public release of Wave 3, and the early release of Wave 4. In Wave 1, the HRS yielded 12,652 respondents from 7,702 households.

For our sample, we only include males who responded to the first four waves of the survey and who were at-risk for losing a job that was held for at least three years, not in-

[2] For additional information on the HRS, see Juster and Suzman (1995).

cluding self-employment. We include the three year tenure restriction to match the federal government definition of job displacement and the definition used in previous economic research (Hamermesh, 1987). With these restrictions, we identify 1,849 males who are at-risk for a displacement in at least one period. An at-risk worker is considered to be displaced if he reports that a job ended because the "business closed" or he was "laid off or let go." Of the 1,849 males at-risk for displacement, we identify 209 who are displaced within the sample period.

In addition to the publicly available HRS data, we use restricted access employer-provided pension data to calculate pension wealth. The HRS surveyed the employers of respondents to obtain summary pension plan descriptions. A pension calculation program provided with these data computes pension benefits for all potential dates the worker may leave the firm. Employer-provided pension information is available for approximately two-thirds of Wave 1 employees who report they have a pension from their current employer.[3] Given that the firms need only provide the basic characteristics of their plans, it is likely that these data are measured with significantly less error than the individual reports (see Gustman and Steinmeier, 1999).

Table 1 presents basic attributes of our sample, including information on year of birth, race, and years of education. The displaced and non-displaced workers look fairly similar in age and race, but the non-displaced workers tend to be less educated. Both groups were born during 1936 on average and are approximately 86 percent white. However, displaced men have completed almost a year less education than non-displaced men (12.12 years versus 12.98 years).

We present a descriptive analysis of the impact of displacement in Table 2. We calculate the sample mean of various outcomes for individuals who are displaced and not displaced separately. In the first two columns, we examine individuals who are at-risk for losing a three-year job between waves 1 and 2. By comparing the mean outcomes by wave, we can examine how the impact of displacement changes with time since displacement.

[3] Because we focus on three-year jobs, workers who are at-risk for displacement between Waves 2 and 3 will have firm-provided pension data. We will not, however, have this data for the workers who became eligible for pension benefits after Wave 1.

We present similar tabulations for those who are at-risk of displacement between waves 2 and 3 and between waves 3 and 4.

Turning to the results, we first note that earnings decline substantially in the period following displacement for each at-risk period. For example, earnings drop from $44 to $18 thousand for those who lost a three job between waves 1 and 2, from $47 to $17 thousand for those who lost a job between waves 2 and 3, and from $41 to $22 thousand for those who lost a job between waves 3 and 4. Earnings also tend to fall for those who are not displaced. Thus, we should not attribute the entire drop in earnings for those who are displaced to the impact of displacement. In other words, even if the displaced workers were not actually displaced, it is likely that some of them would have begun to retire anyway. This point is further buttressed by the results in Table 2 that suggest approximately 50 percent of both displaced and non-displaced workers expect not to work full-time past the age of 62. Finally, although differences between the displaced and non-displaced earnings tend to decline over time, this is largely due to the earnings of the non-displaced falling; earnings of the displaced do not approach their pre-displacement levels.

The remaining tabulations in Table 2 consistently show losses with displacement across the various outcomes. The share who are working (including self-employment) declines by about 40 percent following displacement, with only slight gains being made in the subsequent periods following periods. Only about a half of these new jobs have any pension benefits. Losses in health insurance are not as dramatic, falling by about 10 percentage points with displacement. Given the larger losses in employment, it will be of interest to examine the source of these benefits.

3. The Statistical Model

The displacement literature generally focuses on two empirical concerns when estimating the impact of displacement. First, researchers typically distinguish between short-term and long-term impacts of displacement. For example, Ruhm (1991) finds that displaced workers experience increased unemployment but that the increased unemployment dissipates after four years. Ruhm further finds that there are lasting effects on earnings from

a displacement, with earnings remaining 10 to 14 percent lower even after four years. Second, researchers attempt to control for heterogeneity between displaced and non-displaced workers. Kletzer (1998) finds that minorities and the less-educated are more likely to be displaced. Because these workers also tend to earn less than the general population, for example, the earnings effect of displacement would be overstated if one simply compared the earnings of the displaced to the non-displaced at a point in time after displacement.

We rely on a regression model that is similar to that used in previous studies to address both of these empirical concerns (e.g., see Ruhm, 1991; Jacobson, LaLonde, and Sullivan, 1993; and Chan and Stevens, 2001b). In particular, we estimate a regression model that can be viewed as a generalization of a difference-in-difference identification strategy, comparing the change in outcomes for the displaced to those for the non-displaced. The model places no restrictions on the time-path for the displaced, estimating impacts for up to 3 waves (5 years) following a displacement. However, we modify the general approach in one important respect: we allow for a flexible time path for the workers who are not displaced and retain in our analysis workers who leave the labor force. This extension is necessary to account for the likely decline in employment for the displaced even if they would not have been displaced (see Table 2).

To fix ideas with respect to the regression analysis, consider the model,

$$O_{it} = \alpha + S_{it}'\beta_1 + (D_i * S_{it})'\beta_2 + X_{it}'\pi + \gamma_t + \varepsilon_{it}, \tag{1}$$

where O_{it} is the outcome for individual i in period t, S_{it} is a vector of dummy variables for the length of time since the person was at-risk for displacement, D_i is a dummy variable for whether a person was displaced, X_{it} is a vector of time-varying regressors, γ_t is a period fixed effect, and ε_{it} is a disturbance term. The vector β_1 measures the change in outcomes for non-displaced workers and the vector β_2 measures the difference in the outcome for displaced individuals relative to the time path of the non-displaced workers. This specification allows the time-path for each set of workers, the non-displaced and the displaced, to be completely free. For all of our specifications, we include a complete set of the time-path dummy variables for the non-displaced (S_{it}) and exclude the constant;

thus, these dummy variables capture the time-path directly, rather than describing the deviation from an excluded category.

We extend (1) to allow for flexible impacts by age. In particular, we interact the time variable S_{it} with three age categorical variables. Thus, the model becomes,

$$O_{it} = \alpha_i + (S_{it} * agecat_{it})'\beta_1 + (D_i * S_{it} * agecat_{it})'\beta_2 + X'_{it}\pi + \gamma_t + \varepsilon_{it}. \qquad (2)$$

The age categorical variables are for whether an individual is currently age 51 to 55 ($age51_{it}$), 56 to 61 ($age56_{it}$) or over 62 ($age62_{it}$). We note that these variables are for current age and not for the age at displacement. Thus, this parameterization does not directly trace the impact of displacement by age group but rather it examines the impact of displacement around ages at which retirement incentives often change. For example, individuals may qualify for an early retirement package in their late 50s, and individuals qualify for reduced social security benefits at age 62; equation (2) allows there to be a systematic change in outcomes at age 62, regardless of length of time since being at-risk for displacement. The interactions with the displacement variable ($D_i * S_{it} * agecat_{it}$) can be interpreted as the deviation in the outcome between the displaced and non-displaced within the same age group.

We implement this statistical model by first defining an individual to be at-risk for a displacement between two waves if he is an employed worker with at least three years of tenure in the first of the two waves. For individuals who are at-risk betwee the first two waves, we can observe the impact for displacement for 3 waves (or five years). For displaced individuals, the at-risk dummies (S_{it}) and the dummies for time since displacement ($D_i * S_{it}$) are defined with respect to the period after displacement. For individuals who are at-risk for displacement in multiple periods but are not displaced during the sample period, there is some ambiguity regarding regarding which at-risk period should be used to define the variables S_{it}. We resolve this ambiguity by randomly choosing one of the potential at-risk periods for these individuals and define S_{it} with respect to the chosen period.[4] We

[4] Ruhm (1991) uses a similar strategy.

then can trace out the change in outcome in subsequent waves for the non-displaced: $S1$ for one wave after displacement, $S2$ for two waves after displacement, etc.

We use various methods to control for individual-level heterogeneity. For earnings regressions, we specify our dependent variable as the relative change in earnings from the at-risk period and then drop the at-risk period from our analysis. For example, an individual with earnings of $50,000 in the at-risk period and $55,000 in the following period is coded as $O_{i1} = 1.10$. Thus, these regressions directly take into account individual-level differences in the first period.[5] When we estimate employment outcome regressions, the outcomes in the base period must already be identical across all individuals; for example, all individuals must be employed in the at-risk period by definition. For these models, we estimate simple linear probability models (e.g., for whether a person is working or employed), still dropping the first period. For the health insurance regressions, there can exist differences in coverage before displacement. We rely on fixed effect estimates, similar to previous studies, for these regressions.

4. The Compensation Losses of Displacement

4.1 Earnings Effects

We first examine the impact of displacement on earnings, similar to the research on younger populations. However, we follow all workers who were at-risk of being displaced, regardless if they subsequently leave the labor force. Thus, reductions in earnings for both groups can be associated with reduced wages or increased leisure. We examine employment outcomes to shed light on the extent to which this occurs. Regardless, any measured earnings losses still suggest that consumption would be changing systematically for displaced workers.

We present the regression results for the impact on earnings in Table 3 based on equation (1). In column 1, we present the relative change in earnings for one, two, and

[5] The motivation for using this specification rather than a fixed effect estimator is that this specification finesses the usual problem of running log regressions with zeroes.

three waves after a person is at-risk for losing a three year job. The variables $S1$, $S2$, and $S3$ measure the changes in earnings for the non-displaced, and the interactions $(D*S1)$, $(D*S2)$, and $(D*S3)$ measure the deviation in earnings changes of the displaced from the non-displaced. Again, we are including a complete set of time-path variables and excluding the constant so that the time-path of the non-displaced can be observed directly. For example, the first three coefficients in column 1 of Table 3 imply that earnings decline for the non-displaced by 19.8, 39.1, and 52.3 percent for one, two, and three waves after an individual is at-risk of being displaced. Thus, earnings decline substantially for individuals who are not displaced.

Our focus, however, is the relative change in earnings for those who were displaced. Our estimates imply that earnings declines by an additional 33.6 percentage points for individuals in the wave after displacement (the coefficient on $D*S1$). There remained a large and significant impact two waves later (12.5 additional percentage points), but the relative declines were no longer significantly different from zero after three waves. These results are different than those reported for younger populations in which earnings loss remain after four years (e.g., Ruhm, 1991) and in the results for older workers in Chan and Stevens (2001b). However, our estimates imply that these earnings losses disappear because of the continued reduction in earnings for those who were not displaced (the declines in $S2$ and $S3$).

In the latter two columns of Table 3, we present results for employment outcomes. These columns estimate similar regressions with the same sample as used for the earnings losses, except the dependent variable is a dummy variable coded to one if the individual is unemployed. The results indicate that there is a small chance that individuals will be unemployed even if they are not displaced (examining $S1$ through $S3$, approximately 2 percentage points). For individuals who are displaced, there is a much higher chance of being unemployed. For example, our results suggest that individuals are 18.3 percentage points more likely to be unemployed one year after displacement. This effect declines to zero very quickly, with the estimate after two waves not being statistically different from zero. The results are very similar when employment rates are examined directly.

To examine how these earnings outcomes vary by age, we present regression results based on equation (2) in Table 4. For individuals who were not displaced (the age interactions with the S variables), the results do not vary appreciably by age for one wave after being at-risk, with earnings declining markedly for all three age groups. The gaps become large after two and three waves, with the oldest individuals generally having larger declines. The results are very similar for the employment outcomes.

We find large and significant declines in earnings one wave after displacement for workers in all three age groups. Earnings were 31.6 percentage points lower for men aged 51 to 55, 34.8 percentage points lower for men 56 to 61, and 33.0 percentage points lower for those who were older than 61. The earnings losses persist for two and three waves following displacement for the younger two age groups but disappear for the individuals over 61. Even for the younger age groups, our earnings losses are less than those reported by Chan and Stevens (2001b) but these lower losses are explained by the non-displaced individuals retiring.

4.2 Pension Effects

As we noted above, pension benefits are a source of compensation that are usually ignored in studies of job displacement.[6] The results presented in Table 2 suggest that a substantial number of displaced workers are losing access to pension benefits. For example, 73 percent of workers who were displaced between waves 1 and 2 were on jobs that had pension benefits, and at wave 2, only 21 percent of these workers had new jobs on which they were eligible for pension benefits; similar declines are observed for those who are displaced between the other waves. These losses in pensions could potentially represent dramatic declines in wealth available to the displaced during retirement. Measuring the true amount of lost pension wealth is not a straightforward task because the measurement will depend, in part, on why pensions exist. We consider two measures of pension loss.

Our first measure of pension loss is usually associated with defined benefits (DB) plans and is referred to as "capital loss" (Ippolito 1985). The basis of capital loss rests

[6] One exception is Chan and Stevens (2001b), who find that there is little evidence of significant differences. However, their results are based on self-reported pension benefit levels.

with the theory that DB pension plans arise from an implicit contract between the firm and the worker. This implicit contract "backloads" or delays accrued compensation so that a worker has a clear incentive not to shirk. Such a theory provides a clear explanation for the common characteristic of DB pension plans that pension wealth accrues most rapidly for high tenure workers. A defined contribution (DC) pension plan could provide a similar incentive if the plan were structured so that benefits were relatively more generous for high tenure workers. In either case, if the worker were caught shirking and gave cause for termination, then the worker would be forgoing the right to work during years in which previously delayed earnings were repaid through relatively high pension accumulation rates. If such backloading of compensation occurs through pensions, consider the case where a worker is displaced but has not shirked. Such a worker would not be given the opportunity to work during the high pension accumulation years and thus would not have the opportunity to receive the delayed compensation. This loss of delayed compensation is referred to as a capital loss and represents a real destruction of wealth that has already been earned. Because capital loss ignores any lost future pension benefits, it can be considered as a conservative estimate of pension loss under the assumption that pensions backload compensation.

Our second measure of lost pension wealth accounts for the lost future pension benefits. Regardless of whether an individual has a DB or a DC pension plan, pensions will stop accumulating (with a particular firm) after a displacement. We define "accumulation loss" as the difference between the pension wealth an individual would have received if he remained with the firm until his expected retirement age and the amount of pension wealth he accumulated at the date of his displacement.[7] Depending on the amount of these lost future benefits, a worker could potentially enter retirement with substantially less total wealth than they were expecting. It should be noted that this measure of pension loss implicitly includes the capital loss because it directly accounts for the future generosity

[7] For workers who do not have an expected retirement age or say that they will never retire, we calculate the accumulation loss relative to the normal retirement age specified in the workers' pension plans. Ideally, this second measure would also net out any pension wealth that is earned at jobs subsequent to displacement. However, such information is not available from the firm-level data, and given the low rates of pensions on subsequent jobs (see Table 2) and low pension accumulation in early years on a job, such a concern is likely to be unimportant empirically.

of the pension plan at the displaced firm. Accumulation loss is our preferred measure of pension wealth loss because the lost future pension benefits could have a substantial effect on consumption and retirement decisions.

To examine pension wealth and pension wealth losses, we rely on the firm-level reports of pension plan structure and individual-level reports of tenure, earnings, and expected retirement age. Importantly, given that we have the pension plan structure, we can calculate the pension wealth for each individual under a variety of scenarios. For example, we can compute the pension wealth for an individual who retires in a current period or at their expected retirement age. This method of computing losses does not suffer from any heterogeneity issues because we use a worker's own plan structure to make these computations. The appendix provides further details on these pension plan calculations.

We examine the level of pension wealth for the displaced and non-displaced workers in their respective at-risk period in Panel A of Table 5.[8] The first two columns of the table indicate that pension wealth is 50 percent higher for the non-displaced workers relative to job losers. These differences in pension wealth either can come from differences in the generosity of pension plans or from differences in the characteristics of the workers. To examine the issue of pension generosity, we also present regression-adjusted pension wealth values. Since a majority of pension benefits are calculated as a (non-linear) function of job tenure and final earnings, these figures are calculated from a regression of pension wealth on a quartic in tenure and a quartic in earnings using all at-risk workers.[9] Comparing the regression adjusted pension wealth with the unadjusted figures reveals that roughly 52 percent of the $66,500 unadjusted difference in pension wealth between non-displaced and displaced workers can be explained by observable characteristics. The unexplained gap in pension wealth likely reflects differences in the generosity of pension plans.

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[8] These calculations assume a 3 percent real interest rate and a 4 percent inflation rate. All pension wealth calculations in Table 5 are for the sub-sample of pension covered workers for whom we have firm-reported pension data. Since the employer provider pension data (discussed below) was only collected in wave 1, the results in this section are limited to workers at-risk for a displacement between wave 1 and wave 2 as well as between wave 2 and wave 3.

[9] The group averages are fairly robust to specifications which use only linear and quadratic terms, as well as specifications which include age and those which only use tenure.

The first column of Panel B in Table 5 presents capital loss and accumulation loss calculations for all displaced workers. Average pension wealth at the time of a job loss is $131,900 while the average capital loss for these workers is $12,500. The lost pension wealth that represents a destruction in wealth is therefore 9 percent of the average pension wealth holding of displaced workers. The accumulation loss for these workers is $43,600, indicating that displaced workers have 31 percent less pension wealth then they would have had if they had worked with the firm until their expected retirement date.

Since workers with defined benefit pensions are primarily affected by capital loss, we repeat the pension loss calculations for the subset of workers who have at least one defined benefit plan to examine if there are sub-groups who will be particularly affected. Column 2 of Panel B focuses only on workers with defined benefit pensions, although any pension wealth from defined contribution plans is included for the total pension wealth calculation. Although the value of the average capital loss increases to $16,500, the higher pension values for defined benefit workers keeps the capital loss at roughly the same fraction of total pension benefits as in Column 1. Furthermore, accumulation loss as a fraction of total pension wealth also remains approximately the same.

4.3 Health Insurance Effects

Health insurance is another fringe benefit that may be adversely affected by a job loss. The loss of health insurance due to a displacement can be particularly costly to older workers for a variety of reasons. Because firms are able to pool risk across many employees, employers can provide health insurance at a lower cost than an individual could otherwise purchase in the private market. Gruber (1998, p.9) reports that "[i]ndividual insurance generally costs at least 50 percent more than group policies." The federal COBRA law, which requires employers to allow former employees to purchase health insurance for up to eighteen months at 102 percent of the employer's average cost, allows displaced workers to avoid paying this higher cost but only for a limited duration. However, once these COBRA benefits run out, displaced workers who are unable to obtain coverage from a subsequent employer will be forced to purchase more costly private insurance. For older

workers who are displaced, relegation to the private insurance market may be particularly costly because of their age and the higher probability of poor health.[10]

Table 2 indicates that workers who are subsequently displaced are almost as likely to have any health insurance in the at-risk period as are non-displaced workers. To calculate the impact of displacement on access to health insurance, we again employ the regression approach previously described. As with the pension section, we limit the sample to the workers at-risk for a displacement between wave 1 and wave 2 as well as between wave 2 and wave 3.[11] We rely on fixed-effects models to control for individual-level heterogeneity in having health insurance, similar to previous studies.

The results for all displaced workers are presented in Table 6. The results in the final three rows of Column 1 show that displaced workers are 18 percentage points less likely to have employer provided health insurance in the year following a displacement and are still 15 percentage points less likely to have employer provided insurance five years following displacement. Displaced workers could avail themselves to health insurance either from the private market or from a governmental program such as Medicaid. Column 2 finds no evidence of increased of government health insurance by displaced workers. The results in column 3 indicate there is a 6 to 8 percentage point increase in the take-up rate of private insurance for displaced workers following a job loss. Accounting for these potential sources of insurance in Column 4, the overall gap in health insurance coverage between the displaced workers and stayers is 11 percent percentage points one year after a job loss. The overall health insurance gap becomes insignificant in the subsequent years.

We analyze the impact of a displacement on health insurance by the worker's age in Table 7. The immediate impact (one wave after a displacement) of a displacement on employer provided health insurance (Column 1) is larger for older workers: the impact is 5 percentage points for workers aged 51-55, 22 percentage points for workers aged 56-61, and 26 percentage points for workers aged 62 and older. The long-run effects on employer

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[10] The hypothesis that workers with poor health are averse to job turnover is the impetus behind the "job-lock" literature (e.g. Madrian 1994a, Kapur 1998).

[11] The reason for the eliminating the final at-risk period (between wave 3 and wave 4) is because information on retirement health insurance is not available past wave 2.

provided insurance taper off for the oldest group of workers, but increase for the younger two groups. However, the size of the standard errors for the longer run effects precludes us from drawing inference about any differences across age groups. The results for having any health insurance (Column 4) show even starker differences by age. The only significant impacts are found for the oldest age group, and only for the first following a job loss. Thus, the majority of the health insurance losses occur in the oldest age group.

Another potential lost component of health insurance is the availability of retirement health insurance. Since Medicare coverage is not available until age 65, retirement health insurance can reduce the cost of retirement prior to age 65.[12] Unlike pension benefits, retiree health benefits are not subject to federal vesting laws, and therefore can be rescinded upon displacement. A loss of retiree health benefits represents a real income loss and could further affect a worker's retirement plans.[13]

Using the self-reported information from respondents, 86 percent of the non-displaced workers who have health insurance also report having retirement health insurance, while 73 percent of displaced workers who have health insurance also have retirement coverage.[14] Blau and Gilleskie (1997) point out that respondents may mistakenly report the availability of COBRA continuation benefits as retirement health insurance. An important difference between COBRA and retiree health insurance is that employers usually pay some or all of the cost of retiree benefits while continuation benefits are paid entirely by the employee. Using additional information about who pays the cost of retiree insurance, Blau and Gilleskie create an alternative definition for determining the availability of retiree benefits by using information about whether the employer pays for any part of retirement benefits. Following this stricter definition, we report in Table 1 that 53 percent of insured

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[12] The literature generally finds that the availability of retirement health insurance increases the probability of retiring early. [e.g., see Madrian (1994b), Gruber and Madrian (1995), and Blau and Gilleskie (1997)]

[13] According to the Employee Benefit Research Institute (1997), the average annual employer cost of retiree health insurance in 1993 was $6,014 for workers under 65 and $2,059 for workers 65 and older. We have converted these figures to 1999 dollars using the CPI-U.

[14] These percentages are based on the workers with health insurance who know whether or not they have retirement health insurance. Twelve percent of all workers with health insurance do not know if they have retirement health insurance.

non-displaced workers have retirement health insurance benefits while 35 percent of insured displaced workers have these benefits.[15] As is the case with pension benefits, displaced workers appear to have slightly less generous health insurance benefits conditional upon having these benefits.

Although the HRS distinguishes whether the source of a respondent's employer provided health insurance is the current or prior employer, the respondent is not asked if health insurance obtained from a prior employer is retirement health insurance or continuation benefits under COBRA. However, if displaced workers are retaining access to retirement health insurance then they should be just as likely to report health insurance provided by an employer (either previous or current) as workers with retirement health insurance who remain on the same job. Columns 5 and 6 of Table 6 limit the sample to workers who report during their base year that retirement health insurance is available through their employer. Column 5 shows that displaced workers are 17 percent less likely to have employer-provided benefits the year after a job loss. Interestingly, this gap in coverage *increases* to 22 percent three years following a job loss. This increase may result from workers losing their eligibility for COBRA benefits from their previous employer. Since displaced workers may gain subsequent coverage from a future employer, these results should be regarded as a lower bound on the fraction of displaced workers losing retiree health benefits. Notice, however, that these workers are only slightly less likely to have any health insurance following a job loss (column 6). These results do not suggest that the reduction in health insurance is due to a reduced demand for having health insurance following a job loss. Thus, our results suggest that some displaced workers are losing access to employer provided retirement health insurance.

We further examine the loss of retirement health insurance benefits by age in the last two columns of Table 7. The results in column 5 indicate that among the subset of displaced workers with retirement health insurance benefits the loss of employer provided health insurance is concentrated in the oldest group. This result is somewhat surprising since the oldest workers should be those workers most likely to be eligible for retirement

[15] The stricter defintion of retirement health insurance cannot be determined for 20 percent of workers with health insurance.

health insurance benefits.[16] The final column of Table 7 shows no significant differences across age groups for this subset of workers to possess some form of health insurance following a displacement.

5. Discussion and Conclusions

In this paper, we provide new evidence concerning the job displacement effects on older workers. Consistent with prior studies of job displacement, we find large earnings losses following a displacement. Unlike previous results that focus on prime aged workers, we find that the earnings losses disappear within five years. This difference in finding rests with the workers who were not displaced earning less as they retire, not with with the displaced workers returning to their pre-displacement earnings levels. Our results also indicate that older workers lose pension wealth and health insurance with displacement.

To summarize our results, we estimate the total monetary value of the losses for each of the three types of compensation based. We present these calculations in Table 8. For the earnings losses, we rely on the regression estimates from Table 3 and the earnings levels from Table 2.[17] Our results suggest that the present discounted value of the earnings losses are approximately $45 thousand. This estimate is only slightly larger than the estimated loss in pension wealth in the previous sub-section ($44 thousand).

Calculating the value of the lost health insurance is more difficult becase of the need to first obtain a value for health insurance. EBRI (1997) places the average cost per participant of employer-provided health insurance at $4,747. Then, using a method similar to that for earnings losses, we multiply this value by the percentage of people who lose

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[16] However, since we do not know directly if workers are losing retirement health insurance benefits, these results could simply reflect the fact the younger workers are more easily able to obtain new employment that provides health insurance.

[17] Specifically, we estimate the time path in earnings for the non-displaced from the time path of earnings for the at-risk in Wave 1. We then adjust these earnings for the average gap between the displaced and non-displaced (from Table 2) and for the estimated earnings losses associated with displacement (from Table 3). We assume that these earnings losses correspond to one, three, and five years following a displacement, and the estimate the other years with linear interpolation; the earnings losses associated with 6 years is assumed to be zero.

health insurance and purchase health insurance (see Table 6).[18] The estimated value of the health insurance loss is approximately $3,600. This calculation suggests that the health insurance losses are small relative to the earnings and pension losses. However, this result is mainly driven by the fact that only a minority of displaced workers lose access to health insurance. For those workers who do not receive health insurance following a displacement, the present discounted value of the health insurance loss is approximately $25 thousand. Moreover, these results do not take into account loss retiree health insurance or the possibility that the health insurance that is replacing the employer-provided health insurance is of lower quality.

Overall, these results suggest that the average compensation loss associated with a displacement is substantial, amounting to almost $90 thousand. These findings suggest that ignoring fringe benefits leads to a substantial underestimate of the negative consequences of a displacement. Specifically, pension benefits are as important as earnings losses for the older workers. Moreover, although many individuals do not lose health insurance with displacement, the costs for those that do are also substantial. Thus, fringe benefit losses need to be considered in order to fully understand the costs of a displacement, especially for older workers.

[18] We exclude retirement health insurance from these calculations. The EBRI value could be considered an overestimate of health insurance costs because it also includes employee contributions. However, the EBRI value could be considered an underestimate to the extent that insurance purchased on the private market is more expensive than purchasing it through an employer.

Appendix

In the appendix, we provide further information about sample construction and the pension wealth calculations.

Sample construction

All dollar values are adjusted to 1999 dollars using the CPI-U.

Earnings are based on the self-reports from the labor market section. For individual with missing earnings, we rely on a "predictive mean matching" method of imputation (Little, 1988). This method is an extension of hot-decking in which a "donor" value is selected based on a prediction process. The regressors used for the prediction are age, education, race, and earnings in an adjacent year. This latter regressor is important to retaining the underlying auto-correlation in earnings. In addition, we only select a donor from among individuals with the same displacement status. We predict earnings for approximately 3 percent of the sample.

Using our definition of at-risk and displacement, only one worker suffered multiple displacements. For this worker, we simply ignored the second displacement.

We code someone as unemployed only if they are not working, report being unemployed, and report looking for work in the last four weeks.

Pension wealth calculations

We calculate capital losses, following Gustman and Steinmeier (1993), by comparing a worker's actual pension benefits to a hypothetical DC pension plan. This hypothetical pension plan is constructed so that it would pay the same pension benefits at retirement as the worker's backloaded DB pension plan and that a constant fraction of the workers pension wealth is set aside each period. The difference between this hypothetical plan and the worker's actual pension plan at any given age represents the capital loss the worker faces for leaving the firm prior to the retirement age. Gustman and Steinmeier show their method to be equivalent to Ippolito's method.

The capital loss is zero for the 13 percent of workers with defined benefit plans who are past their normal retirement date when displaced.

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Table 1: Sample Characteristics

	Mean	Std. Dev
At-risk and will not be displaced (N=1647)		
Year of birth	1936.5	3.13
White (1=yes)	0.86	--
Years of education	12.98	3.01
At-risk and will be displaced (N=209)		
Year of birth	1936.4	3.05
White (1=yes)	0.86	--
Years of education	12.12	3.05

Source: Authors tabulations from the HRS.
Notes: All means are weighted.

Table 2: Impact of Displacement

	At risk in wave1		At risk in wave 2		At risk in wave 3	
	Displaced	Not disp.	Displaced	Not disp.	Displaced	Not disp.
N	79	1512	86	1348	44	1164
Mean Earnings						
Wave 1	44,461	47,133	42,805	46,875	39,594	44,287
Wave 2	18,380	42,642	46,533	48,132	38,056	45,843
Wave 3	20,994	34,180	16,629	39,903	40,804	45,315
Wave 4	18,664	28,284	19,286	32,112	22,287	37,927
*Probability working past age 62**						
Wave at risk	47.9	48.1	48.1	46.9	48.1	49.0
Share working						
Wave 1	1.00	1.00	0.95	0.99	0.97	0.97
Wave 2	0.55	0.90	1.00	1.00	1.00	1.00
Wave 3	0.61	0.77	0.51	0.85	1.00	1.00
Wave 4	0.59	0.65	0.57	0.71	0.62	0.83
Share working with pension						
Wave 1	0.73	0.83	0.73	0.80	0.71	0.74
Wave 2	0.21	0.74	0.78	0.84	0.70	0.78
Wave 3	0.30	0.58	0.12	0.68	0.72	0.83
Wave 4	0.41	0.47	0.27	0.54	0.27	0.64
Share with any health insurance						
Wave 1	0.93	0.97	0.92	0.97	0.89	0.95
Wave 2	0.86	0.96	0.97	0.97	0.94	0.97
Wave 3	0.89	0.95	0.78	0.96	0.94	0.96
Wave 4	0.93	0.95	0.87	0.96	0.87	0.96

Source: Authors tabulations from the HRS.
Notes: All means are weighted. *Only workers under the age of 62 were asked their probability of working past 62; these means are restricted to this sub-sample.

Table 3: Earnings Changes for Non-displaced and Displaced Workers

Regressors	Relative Earnings loss	Unemp.	Emp.
S1	-0.198	0.022	0.758
	(0.039)	(0.009)	(0.032)
S2	-0.391	0.024	0.595
	(0.045)	(0.011)	(0.037)
S3	-0.523	0.025	0.528
	(0.056)	(0.011)	(0.045)
D*S1	-0.336	0.183	-0.234
	(-0.037)	(0.030)	(0.036)
D*S2	-0.125	0.027	-0.045
	(0.047)	(0.017)	(0.042)
D*S3	-0.023	-0.009	0.016
	(0.070)	(0.004)	(0.058)
Age	-0.055	-0.001	-0.045
	(0.004)	(0.001)	(0.003)
Wave3	0.105	-0.007	0.121
	(0.024)	(0.010)	(0.020)
Wave4	0.274	-0.013	0.219
	(0.033)	(0.010)	(0.027)
White	-0.026	0.003	-0.031
	(0.031)	(0.007)	(0.026)
High school	0.025	-0.005	0.084
	(0.033)	(0.008)	(0.028)
Some college	0.016	0.001	0.075
	(0.038)	(0.010)	(0.033)
College	0.055	-0.004	0.103
	(0.036)	(0.008)	(0.030)
R-squared	0.418	0.102	0.734

Source: Authors tabulations from the HRS.
Note: These regressions are based on equation (1) in the text and are based on 3,889 observations for 1,849 individuals. Rather than including an intercept, these models include a complete set of dummy variables for the time path for the non-displaced (S1, S2, and S3). The excluded education category is individuals with less than a high school degree. Standard errors are robust to arbitrary autocorrelation within individual.

Table 4: Earnings Changes for Non-displaced and Displaced Workers, by Age

Regressors	Relative Earnings loss	Unemployed	Employed
S1*age51	-0.232	0.021	0.725
	(0.043)	(0.010)	(0.034)
S1*age56	-0.179	0.021	0.771
	(0.043)	(0.011)	(0.035)
S1*age62	-0.207	0.017	0.725
	(0.057)	(0.014)	(0.047)
S2*age51	-0.389	0.041	0.591
	(0.063)	(0.019)	(0.051)
S2*age56	-0.326	0.025	0.644
	(0.051)	(0.012)	(0.042)
S2*age62	-0.473	0.010	0.502
	(0.061)	(0.016)	(0.051)
S3*age51	--	--	--
S3*age56	-0.461	0.027	0.585
	(0.064)	(0.013)	(0.051)
S3*age62	-0.583	0.011	0.440
	(0.072)	(0.017)	(0.060)
D*S1*age51	-0.316	0.184	-0.149
	(0.077)	(0.063)	(0.069)
D*S1*age56	-0.348	0.204	-0.251
	(0.054)	(0.042)	(0.052)
D*S1*age62	-0.330	0.139	-0.286
	(0.071)	(0.056)	(0.072)
D*S2*age51	-0.202	0.028	-0.011
	(0.114)	(0.059)	(0.114)
D*S2*age56	-0.152	0.030	-0.085
	(0.074)	(0.025)	(0.059)
D*S2*age62	-0.066	0.023	-0.005
	(0.071)	(0.022)	(0.070)
D*S3*age51	--	--	--
D*S3*age56	-0.115	-0.014	-0.024
	(0.084)	(0.007)	(0.075)
D*S3*age62	0.071	-0.005	0.048
	(0.117)	(0.004)	(0.090)
Other regressors	Yes	Yes	Yes
R-squared	0.422	0.104	0.736

Source: Authors tabulations from the HRS.

Note: These regressions are based on equation (2) in the text and are based on 3,889 observations for 1,849 individuals. Rather than including an intercept, these models include a complete set of dummy variables for the time path for the non-displaced (S1, S2, and S3). The other regressors include age, wave dummies, white dummy, and education dummies. The excluded education category is individuals with less than a high school degree. Standard errors are robust to arbitrary autocorrelation within individual.

Table 5: Mean Pension Benefits and Losses

A. Pension Wealth	Displaced Workers	Non-Displaced Workers
Pension Wealth	131,900	198,400
	(24,000)	(9,400)
Regression Adjusted Pension Wealth	164,700	197,400
	(23,400)	(6,600)
B. Lost Pension Wealth	Any Pension	Have a Defined Benefit Pension
Total Pension Wealth	140,500	156,600
	(23,600)	(30,000)
Capital Loss	12,500	16,000
	(4,000)	(5,200)
Capital Loss/Wealth	0.09	0.10
Accumulation Loss	43,600	42,600
	(7,700)	(9,900)
Accumulation Loss/Wealth	0.31	0.27

Source: Authors tabulations from the HRS.
Note: The pension calculations are based on firm-provided pension information and are described in the text and the appendix. All means are weighted and standard deviations are presented in parentheses.

Table 6: Health Insurance Effects of a Job Displacement

	All at-risk workers				Workers with RETHI	
	Employer HI	Gov't HI	Private HI	Any HI	Employer HI	Any HI
Regressors	(1)	(2)	(3)	(4)	(5)	(6)
S1	0.011	0.011	-0.062	0.024	0.004	-0.001
	(0.027)	(0.024)	(0.039)	(0.024)	(0.023)	(0.013)
S2	0.030	0.047	-0.093	0.065	0.021	-0.002
	(0.057)	(0.049)	(0.080)	(0.048)	(0.049)	(0.029)
S3	0.073	0.078	-0.131	0.105	0.034	0.004
	(0.086)	(0.075)	(0.121)	(0.072)	(0.077)	(0.040)
D*S1	-0.179	-0.003	0.059	-0.110	-0.172	-0.089
	(0.043)	(0.023)	(0.029)	(0.039)	(0.076)	(0.056)
D*S2	-0.154	-0.011	0.076	-0.044	-0.221	-0.011
	(0.044)	(0.031)	(0.036)	(0.036)	(0.081)	(0.030)
D*S3	-0.099	0.030	0.084	-0.001	-0.130	0.002
	(0.060)	(0.051)	(0.053)	(0.042)	(0.104)	(0.025)

Note: The fixed-effects regressions in columns (1)-(4) are based on equation (1) in the text and are based on 4,734 observations for 1,341 individuals. The fixed-effects regressions in columns (5)-(6) are based on 1,717 observations for 484 individuals. Rather than including an intercept, these models include a complete set of dummy variables for the time path for the non-displaced (S1, S2, and S3). Standard errors are robust to arbitrary autocorrelation within individual.

Table 7: Health Insurance Effects of a Job Displacement, by Age

	All at-risk workers				Workers with RETHI	
	Employer HI	Gov't HI	Private HI	Any HI	Employer HI	Any HI
Regressors	(1)	(2)	(3)	(4)	(5)	(6)
S1*Age51	0.001	0.016	-0.049	0.019	-0.009	0.001
	(0.026)	(0.024)	(0.041)	(0.024)	(0.025)	(0.014)
S1*Age56	-0.002	0.010	-0.050	0.028	-0.046	-0.005
	(0.035)	(0.033)	(0.046)	(0.029)	(0.037)	(0.018)
S1*Age62	-0.049	0.077	-0.130	0.012	0.094	0.003
	(0.067)	(0.059)	(0.067)	(0.044)	(0.080)	(0.028)
S2*Age51	0.036	-0.002	-0.106	0.043	0.005	-0.023
	(0.057)	(0.048)	(0.083)	(0.043)	(0.053)	(0.037)
S2*Age56	-0.004	0.056	-0.058	0.067	-0.079	0.004
	(0.064)	(0.059)	(0.088)	(0.052)	(0.064)	(0.028)
S2*Age62	-0.061	0.143	-0.168	0.057	0.110	-0.008
	(0.097)	(0.089)	(0.104)	(0.065)	(0.104)	(0.044)
S3*Age51	--	--	--	--	--	--
S3*Age56	0.037	0.090	-0.110	0.101	-0.050	0.031
	(0.092)	(0.083)	(0.129)	(0.072)	(0.095)	(0.044)
S3*Age62	-0.047	0.177	-0.192	0.098	0.058	-0.028
	(0.130)	(0.113)	(0.147)	(0.094)	(0.132)	(0.060)
D*S1*Age51	-0.047	0.040	0.036	0.006	-0.037	-0.054
	(0.067)	(0.041)	(0.048)	(0.058)	(0.148)	(0.117)
D*S1*Age56	-0.219	0.007	0.059	-0.127	-0.139	-0.003
	(0.058)	(0.026)	(0.039)	(0.051)	(0.082)	(0.021)
D*S1*Age62	-0.261	-0.095	0.105	-0.232	-0.407	-0.270
	(0.097)	(0.064)	(0.067)	(0.089)	(0.169)	(0.161)
D*S2*Age51	-0.104	0.079	0.125	0.010	-0.015	0.021
	(0.138)	(0.049)	(0.103)	(0.120)	(0.065)	(0.039)
D*S2*Age56	-0.095	-0.033	0.040	-0.047	-0.112	-0.023
	(0.051)	(0.033)	(0.048)	(0.043)	(0.091)	(0.050)
D*S2*Age62	-0.234	-0.013	0.114	-0.051	-0.434	0.001
	(0.070)	(0.057)	(0.052)	(0.055)	(0.135)	(0.013)
D*S3*Age51	--	--	--	--	--	--
D*S3*Age56	-0.092	0.038	0.099	0.003	-0.034	0.019
	(0.076)	(0.067)	(0.075)	(0.065)	(0.122)	(0.023)
D*S3*Age62	-0.075	0.031	0.071	0.019	-0.068	0.021
	(0.089)	(0.082)	(0.069)	(0.061)	(0.140)	(0.032)

Notes: These regressions are based on equation (2) of the text, using displaced workers for the windows W1-W2 and W2-W3. See Section 5 of the text for further details.

Table 8: Compensation Losses Following a Displacement

	Earnings Losses	Pension Losses	Health Insurance Losses
Year of Displacement	$18,805		$921
One Year After	$13,596		$771
Two Years After	$8,401		$636
Three Years After	$4,054		$507
Four Years After	$2,193		$417
Five Years After	$617		$331
Present Value of Loss	$44,772	$43,600	$3,583

Note: These estimates for total compensation loss are based on the estimates in the text. Earnings losses and health insurance losses are based on the regression results in Tables 3 and 6. Pension losses come directly from Section 4.2. See Section 5 for the further assumptions underlying these calculations.