WHY SOME WORKERS REMAIN IN THE LABOR FORCE BEYOND THE TYPICAL AGE OF RETIREMENT

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ABSTRACT

This study explored the ways in which race, gender, and age moderated the effects of several determinants of labor force participation among people ages 60 to 80. The role of race, gender, and age in moderating the effect of various factors on labor force participation was examined using the 1998 Health and Retirement Study (HRS) data. Binomial logistic regression models were used to evaluate the interaction between race, gender, age and other determinants of labor force participation. The effects of various factors on labor force participation differed by gender, race, and age. The negative effects of low education and poor health, respectively, were stronger for women and blacks. Also, the positive effect of low nonwage income was weaker for older workers, probably due partly to poorer health. Our findings suggest that different types of policies would help to encourage labor force participation among different groups. Because lack of access to employment may deter continued work among subgroups such as blacks and women with low education, job training or job search programs might provide incentives for employment in these groups. Additionally, employer flexibility regarding part-time work and work demands might make continued work attractive for more older workers.

While there are exceptions (e.g., Parnes & Less, 1985; Parnes & Sommers, 1994), relatively few retirement studies have given more than passing attention to the labor market experience of workers during their seventies. Although labor force participation rates drop sharply during the early sixties, particularly at ages 62 and 65, a substantial minority do work beyond age 65. Compared to what we know about determinants of labor force participation among those in their early to mid sixties, we know relatively little about those who elect to work well beyond this age.

Rates of labor force participation for workers age 65 and over are much lower today than they were fifty years ago. In 1950 approximately 46 percent of men age 65 and older were still in the labor force; however, by 1991 the figure had declined to 17 percent (Parnes & Sommers, 1994). There is some evidence suggesting that the trend toward earlier retirement ended or at least took a hiatus between the mid 1980s and the late 1990s (Burtless & Quinn, 2000; Quinn, 1999), and some analysts argue that we may see a trends toward increasing labor force participation among older workers in the years ahead (Steuerle & Carasso, 2001). However, most analysts agree with Costa (1999) that it is most likely that long-term trend toward early retirement will continue in the decades ahead.

If ways could be found to keep the average age of retirement from declining any further or better yet if ways could be found to keep more people in the labor force beyond their mid sixties, this would help alleviate the economic burden of our aging population. More specifically, it would help ease the burden of paying for such programs as Social Security and Medicare.

For policy makers seeking to increase labor force participation rates among those who are beyond their mid sixties, it should be useful to learn more about why at least some workers currently remain at work through their late sixties and into their seventies. In any such analysis it also makes sense to examine differences in the reasons for continued labor force participation for different categories of workers, particularly those defined by race, gender, and age. Some policy changes, such as the elimination of the earnings test for Social Security beneficiaries over the age of 65, may be best suited to boost labor force participation for groups such as high-wage workers. Different incentives might be more effective for other subgroups. This information should be useful to those looking for ways to increase labor force participation among older workers that are sensitive to differences in preferences and needs that vary by race, gender, and age.

BACKGROUND

Many prior studies emphasize the role of race and gender in influencing retirement decisions suggesting that for those close to the traditional retirement age, race and gender moderate the effects of other factors, such as health and pension availability. High levels of poor health, low work incentives, unstable work history, lack of pension income, and discrimination shape the labor force participation patterns of blacks (Burr, Massagli, Mutchler, & Pienta, 1996; Gibson 1987, 1991; Parnes & Nestel 1981). Similarly, family influences and career patterns shape the retirement patterns of men and women differently (DeViney & O'Rand, 1988; Henretta & O'Rand, 1983; Moen, 1996; O'Rand & Landerman, 1984). In addition, a substantial number of previous studies have found that race (Flippen & Tienda, 2000; Gohmann, 1990; Gustman & Steinmeier ,1986; Hayward, Hardy, & Chen, 1996) and gender (Loprest, Rupp, &

Sandell ,1995; Reimers & Honig, 1996; Szinovacz, DeViney, & Davey, 2001) moderate the effects of factors such as Social Security eligibility, family circumstances, health, and pension wealth on retirement.

Several recent studies point to the considerable variation in age of retirement (Han & Moen, 1999; Mutchler, Burr, Pienta, & Massagli, 1997). And a few have discussed why some workers do remain in the labor force after the typical age of retirement (Borus, Parnes, Sandell, & Seidman, 1988; Hayward, Hardy, & Liu, 1994; Parnes & Less, 1985; Parnes & Sommers, 1994; Perkins, 1993). For instance, Mutchler et al. (1997) use data from the 1984 Survey of Income and Program Participation to assess the work and retirement behavior of men ages 55 to 74. They find that older men often supplement limited nonwork income and lack of pension eligibility by remaining in labor force, even in their late sixties and early seventies. Although their study challenges the idea of a crisp exit from the labor force at age 65, the authors pay relatively little attention to how the impact of various factors, such as race and gender, differ by age. Han and Moen (1999) also focus on the increasing heterogeneity in the timing of retirement. They explore ways in which career pathway types influence the planning, expectations, and timing of retirement. Although they control for cohort and gender, they do not pay adequate attention to the ways in which age might moderate the effect of other variables such as education.

A smaller group of studies focus on how the factors influencing labor force participation after the typical age of retirement differ from those influencing labor force participation before that age. Parnes and Sommers (1994) find that good health, a commitment to work, and distaste for retirement are important factors differentiating men who do not retire from those who do. Their study, because it focuses primarily on men, pays relatively little attention to how the

experience of women and blacks might differ. However, other research, such as Perkins (1993), indicates that women ages 66 to 84 are likely to return to work after retirement due to the financial insecurity that results from a work life in sex segregated jobs. The contribution of our article is based on its attention to those who do not retire by their mid sixties with special attention to gender and race differences in the reasons as to why.

DATA AND METHODS

This analysis draws on data from the Health and Retirement Study, a nationally representative sample of persons ages 50 and older. The wave 4 (1998) preliminary release data is used. The sub-sample used in this analysis includes 11,849 respondents for whom data on all predictors and current workforce status are available.[1]

Variables included are whether working, education, nonwork income, health, whether female, whether black, whether married, assets, age in years, whether age 62 and whether age 65. Respondents are defined as "working" if they report that they are working for pay currently. Respondents who are not working and who report that they are unemployed or temporarily on leave are excluded from this analysis.[2] Education is a three-category variable: eight or fewer years, nine to sixteen years, and more than sixteen years. Whether female, whether black, and whether married are dichotomous predictors.

Age is a continuous variable defined as age in years from age sixty. We include age splines at age 62 and 65 to account for early and full eligibility for Social Security, respectively. In the logistic regression models, the splines represent the additional increment or decrement in the log odds of working for being age 62 or age 65.[3]

Measures of economic resources include assets and nonwork income. Assets is household net assets, in thousands of dollars. Nonwork income is based on the difference between total income and respondent's income from wages, salaries, tips, commissions, and any income from a second job. Parnes and Sommers (1994) include the income of the spouse as part of nonwork income. However, as Mutchler et al. (1997) note, this strategy tends to under emphasize the additional costs of having another family member. Like them, we deflate the nonwork income of married respondents by .8. We then categorize respondents into low, medium, and high brackets: less than four thousand, between four thousand and sixteen thousand, and more than sixteen thousand dollars.[4]

We use self-rated health, categorized as "excellent," "very good to fair," or "poor." Some previous studies suggest that non-working people report that they are in poor health as a socially acceptable reason to be out of the labor force. We use this measure cautiously, and supplement its interpretation through use of activity of daily living measures in several sub-analyses. Moreover, although we recognize the debate about the poor health, this is probably less applicable to older groups of respondents (Parnes and Sommers, 1994). While a certain degree of stigma is associated with retirement for persons under the normal age of retirement, working is not the norm for the older age groups.

This analysis uses binomial logistic regression. [5] Interaction terms are used to evaluate how age, race, and gender moderate the effects of variables on the logged odds of working. Studies of factors influencing the retirement decision generally develop separate models for men and women, although some studies do not (Santiago and Muschkin, 1996; Wray, 1996). In this analysis, we choose to include interaction terms between gender and all other predictors. This approach allows us to evaluate whether the effect of a given predictor on labor force

participation is significantly different for men and for women. Similarly, we include interaction terms distinguishing between different age groups and between blacks and nonblacks.

In this analysis, we sometimes present net coefficients based either on the combined effect of age and age splines or on the net effects of an independent variable at various levels of the moderator variable.[6] For instance, we present net coefficients for the effect of poor health for black and non-black respondents.

All percentages discussed in this article are weighted using the HRS preliminary person level weight. We did not weight the logistic regression analysis. As Lohr (1999) notes, weighted and unweighted models generally do not produce substantially different coefficients if the model is properly specified.

RESULTS

As noted earlier, in recent years most retirement studies have focused on respondents in their early to mid sixties, and for good reason. A substantial proportion of workers exit the labor force during these years, particularly when they become eligible for early and full Social Security benefits at ages 62 and 65. Education, income, health, gender, race, whether married, assets, and age have all been linked to exit from the labor force.

Model 1 in Table 1 focuses on respondents ages 60 to 67 in 1998. Those who have the ability and the inclination to remain in the labor force tend to do so. For instance, those who rate themselves in excellent health (b= .4110, p<.001), who have very high nonwork income (b= .3623, p<.001), and who have more than 16 years of education (b= .3665, p<.001) are more likely to remain in the workforce. Conversely, respondents with poor health (b= -1.8325, p<.001) and low education (b= -.3134, p<.01) are less able to remain in the labor force. Those with extremely low nonwork income (b= 1.1570, p<.001) are substantially more likely to remain

in the labor force than those with medium or high nonwork income. Our interpretation is that they cannot afford to retire. Age in years (b= -.2024, p<.001) and whether female (b= -.5520, p<.001) also predict decreases in labor force attachment. Our findings in Model 1 are consistent with most previous studies of this age group. They indicate that the propensity to work for people ages 60 to 67 is influenced by factors such as health, education, and nonwage income.

(Insert Table 1 about here)

Age and nonwork income

Although previous research indicates that economic resources, education, health, age, and gender are strongly associated with labor force participation for those in their early to mid sixties, it is less clear how the factors that influence the propensity to work might differ for those who are beyond this age range. Model 2 in Table 1 extends this model to respondents ages 68 to 80. Some predictors, such as education and gender, appear to have similar effects for both the older and younger age groups. The effect of age in years (b= -.1027, p<.001) is slightly weaker, but similar to the effect in model 1. The coefficients for whether black, whether married, and assets also remain similar for both groups.

However, the magnitude of the effects of adjusted nonwork income and health differ for the older age group. The effect of having less than $4000 adjusted nonwork income appears to be weaker for the older age group. Having low nonwork income increases the odds of working by a factor of 3.l803 for the younger age group. The corresponding statistic (1.1670) is smaller and non-significant for the older age group. In addition, while the coefficient for poor health is still significant for the older group (b= -.8583, p<.001), the negative effect appears weaker than the effect for the younger age group (b= -1.8325, p<.001).

Models 3 and 4 show the additive and interactive models for the combined (age 60 to 80) sample, respectively. In model 3, splines at age 62 and 65 have stronger effects on the log odds of working than does the linear effect of age in years indicating that ages 62 and 65 have an above average impact relative to other years over this 20 year period. While model 3 does indicate that the log odds of working decrease with age, it does not show how the effect of factors such as nonwork income and health might differ with age. Model 4 is a revised interactive model including interactions of various predictors with age. All predictors, except for the age splines, were tested for interaction with age using product-term interaction. Model 4 in Table 1 includes all additive terms, but only those interactive terms that were significant at $p < .10$ when the model with all interaction terms was used.

As a comparison of the coefficients between models 1 and 2 suggest, there is significant interaction between low nonwork income and age or poor health and age. The positive effect of low nonwork income is weaker at older ages. At age 60, having less than $4,000 in adjusted low nonwork income increases the odds of working by a factor of 3.7188. By age 70, the net odds ratio decreases to 1.7444. By age 80, the net odds ratio decreases again to .8182.[7] Thus, at age 60, the effect of extremely low levels of nonwork income on labor force participation is large and positive. At age 80, the effect is small and negative.

A separate sub-analysis (not shown) suggests that one reason for the smaller effect of nonwork income is the increase in the incidence of functional disability with age. Both old and young respondents with low levels of nonwork income may need the additional economic resources available through continued employment. However, low nonwork income respondents ages 68 to 80 are much more likely than low nonwork income respondents ages 60 to 67 to report functional disabilities such as difficulty walking, climbing stairs, and stooping. For

example, in the low income group, 23.4 percent of the older respondents and 10.9 percent of the younger respondents reported difficulty walking several blocks. Persons with low nonwork income are especially vulnerable at older ages; they lack both economic resources and the ability to supplement their economic position through continuing labor force participation.

Because health plays an important part in explaining the effect of adjusted nonwork income at different ages, it may seem counterintuitive that the effect of self-rated poor health decreases with age. Being in poor health at age 60 cuts the odds of working by 86 percent ($b = -1.9629$, $p < .001$). However, by age 80, the net odds ratio indicates that poor health decreases the odds of working by only 36 percent.[8] Poor health differentiates clearly between workers and non-workers at the younger ages. It differentiates less clearly between workers and non-workers at older ages. In part, these results reflect the difference in how people understand "poor" and "excellent" health. People implicitly understand their health in terms of what they consider normal in a particular context. When asked if their health is poor, they are likely to rate whether their health is poor for their age group. In general, as people age, they are willing to tolerate higher levels of disability. For the same level of functional disability, an eighty-year-old is more likely to rate his or her health as good than would a sixty-year-old. For instance, in a separate sub-analysis (not shown), we found that, among those reporting a series of functional disabilities, a smaller proportion of the older respondents rated themselves in poor health. For those ages 60 to 67, some 62.8 percent of those who reported difficulty preparing meals considered themselves in poor health. Among those ages 68 to 80, only 42.4 percent of people with the same functional disability considered themselves in poor health. Accordingly, the results for health reflect the way that people understand their health.

Thus, model 4 provides evidence that continued work may be less attractive or possible for many people ages 68 to 80, even if they have very low nonwork income. The effect of low nonwork income decreases with age, probably in some part due to higher levels of functional disability. This suggests that the incentives that would be needed to make continued work attractive would differ by age.

Gender and education

The results above indicate that age represents one source of diversity in labor force participation among those ages 60 to 80. Many prior studies have reported evidence of lower labor force participation rates for women across a wide age range, but this literature gives very little attention to how the effect of factors affecting the propensity to work might differ by both gender and age.

The model in Table 2 initially included all two-way interactions for gender, and all significant two-way interactions with age. However, in the version presented in Table 2 only terms initially significant at the $p < .10$ level are retained. Some of our findings presented in Table 2 confirm what has been found in prior studies. For instance, while marital status has little effect on the labor force participation of men, it has a strong negative effect for women.

(Insert Table 2 about here)

In addition, Table 2 provides evidence that whether female (gender) moderates the effect of low education (b= -.4136). Based on the data from this table we can show that, for men, having fewer than eight years of education predicts an 17 percent decrease in the odds of working. For women, the effect of low education is stronger; it predicts a 45 percent decrease in the odds of working.[9] Women with low education may have more difficulty finding employment,

when compared to men with equivalent levels of education. A separate sub-analysis, not shown, indicates that only about 10.0 percent of unemployed women with fewer than eight years of education believed that they had at least a sixty-percent chance of finding a job in the next month. Almost twice as many unemployed men (21.4 percent) with the same level of education believed they had at last a sixty-percent chance. Among employed respondents with low education, 40.7 percent of men but only 22.4 percent of women said that they if they lost their job they would have at least a sixty-percent chance of finding another job within a month. Thus, for women with low education, a real or perceived lack of access to employment opportunities might make continued work less attractive.

In addition, the combined effects of age and gender highlight the complex interaction of factors influencing labor force participation. Being in poor health predicts an 84 percent decrease in the odds of working for 60 year old men, but only a 22 percent decrease for 80-year old men. It predicts an 90 percent decrease in the odds of remaining in the labor force for a 60 year old woman, but only an 51 percent decrease for an 80-year old women.[10] This evidence of complex interactions among age, gender, and health suggest to us that policy makers seeking to influence labor force participation rates among older workers need to take into consideration subgroup differences in the propensity to work and in the kinds of incentives that will make continued work attractive.

The results in Table 2 indicate that the effect of low education differs for men and women. This suggests that, while a perceived lack of employment opportunities may deter many people with low education from remaining in the labor force, this issue is especially pronounced for women.

Race and health

Similar to the combined effects of gender and age, the combined effects of race and age put some people at double disadvantage. Table 3 shows a simplified model. This model initially included all two-way interactions with age and race. Only terms initially significant at $p < .10$ have been retained. Three way interactions were tested and the three-way interaction between age, race, and poor health was retained. Some of our findings confirm previous research. The interaction between whether female and whether black ($b = .3080$, $p < .05$) indicates that the effect of being female is a stronger predictor for whites than it is for blacks. For blacks, being female is associated with a 20 percent decrease in the odds of working; for white women, the decrease associated with being female is substantially larger. This may be because the work histories of women of color are more similar to those of men than are the work histories of white women.

(Insert Table 3 about here)

In addition, being black decreases the effect of poor health. Although poor health for blacks is still associated with a large net coefficient, health is a less powerful predictor of who works than it is among whites. One possible reason is that blacks are less likely to be able to find steady employment regardless of their health. For instance, a separate sub-analysis (not shown) indicates that 32.1 percent of black women and 25.9 percent of black men who were unemployed indicated that they had no chance of finding employment in the next month. The comparable figures for white women and men were 25.9 percent and 8.4 percent respectively. This suggests that the type of policies that would make continued work attractive for blacks might differ from those that make continued work more attractive for whites**.**

Race, gender, and age

The concept of "double disadvantage" typically refers to the combined effects of factors such as race, class, and gender. Persons who are poor and of color are assumed to be at a disadvantage due to their social class and to their race. Similarly, black women are subject to the risks of being black and the risks of being female. However, age is a dimension of inequality that has often received less attention than have race, class, and gender in the retirement literature. Our results in tables 1 through 3 indicate that age, in combination with gender and race, moderates the effect of various factors on labor force participation. Table 4 shows a combined simplified model in which only coefficients that were significant at $p<.10$ from the previous models are included.

(Insert Table 4 about here)

Table 5 shows net coefficients and odds ratios, based on the logit coefficients in Table 4,[11] for the effects of poor health, low education, and low nonwork income. The combination of net effects and percentages provides evidence of both the amount of variation in the effects of these variables and the percentage of the sample affected by them.

(Insert Table 5 about here)

The variation by race and gender suggests a real or perceived lack of access to employment opportunity makes continued work less attractive for some blacks and women with low education. The effect of poor health is weaker for blacks than for whites. The negative effect of low education is somewhat stronger for women than it is for men. A substantial proportion of the sample is either female with low education (3.7 percent), black (17.1 percent), or both. This indicates that job search or job training programs, by providing greater access to employment opportunities, might make continued work more attractive for some subgroups. Additionally, at

older ages, the effect of low nonwork income decreases. Our results suggest that one reason may be high rates of functional disability in the older population, particularly among older workers with low nonwork income. A sizeable minority (4.4 percent) of the population has less than $4,000 in adjusted nonwork income. While it would be inappropriate for people with substantial functional disabilities to continue working, employer flexibility regarding hours of work per week and job requirements might make continued work more attractive for people with mild functional disabilities (such as difficulty lifting heavy loads or running).

DISCUSSION

The preceding analysis of the effects of race, age, and gender on retirement decisions leads us to several conclusions about the effect of various factors on labor force participation. First, the negative effect of low nonwork income is weaker for older respondents, probably due in part to their lower functional ability in general. Second, the negative effect of low education is stronger for women. Third, the positive effect of low nonwork income is weaker for blacks. In part, the results for women with low education and blacks reflect a real or perceived lack of access to employment opportunities.

To test the stability of the models noted above, we replicated each model under different assumptions. First, we replicated each model using the HRS preliminary person-level weight. When we did this, we found no substantial difference in the coefficients.

Second, given the small effect of assets, we considered including only assets or only nonwork income. To ensure that collinearity did not distort our results, we replicated the initial models twice, omitting each of these variables in turn. When nonwork income was omitted, the effect of assets was similar, but non-significant. When the assets variable was excluded, the

effects of both low nonwork income and high nonwork income were similar to those shown in Tables 1 through 4.

We explored the use of continuous linear and logged, rather than dichotomous, versions of education and adjusted nonwork income. The effect of education in years was modest but significant, while the effect of nonwork income was non-significant. We continued to use the dichotomous versions throughout this paper for two reasons. First, while low education might limit access to suitable employment, high education might allow people to obtain more enjoyable jobs. Second, in the case of adjusted nonwork income, the non-significant effects of the linear and logged versions indicate that varying levels of medium nonwork income do not have substantial effects on labor force participation. Instead, the effects of nonwork income are only at the very highest and lowest levels. We also replicated the models in Table 1 treating age as a dichotomous variable differentiating between those up to age 67 and those 67 to 80. We found that all predictors had similar effects, and the interaction terms for low adjusted nonwork income and poor health remained significant. However, because the splines at age 62 and 65 were significant in many models, we used the continuous version throughout the analysis.

We investigated alternative predictors for the race and gender models. Regarding gender, some research indicates that women who have never married, are divorced, or are widowed have different levels of economic resources. We tested the effects of whether divorced and whether widowed on labor force participation. While the effect of whether divorced was small positive and nearly significant, the effect of whether widowed was non-significant and close to zero. Similarly, the interactions of these two dummy variables and age were non-significant. Based on this evidence, we elected to use a dichotomous indicator for whether married.

Similarly, we replicated the race analysis omitting all black respondents and using interaction terms to distinguish between Hispanics and non-Hispanic white respondents. We found no significant interaction. Consequently, we elected to distinguish between blacks and non-blacks throughout the analysis.

Our findings imply that policy makers intent on influencing labor force participation among older workers should consider subgroup differences in the propensity to work during late life as well as differences in the kinds of incentives that will be needed to make continued work attractive. Some recent reforms, such as eliminating the retirement earnings test for those over the age of 65, may be best suited to encourage labor force participation among high-wage individuals. Very different types of policies might make continued work attractive for other subgroups, such as blacks and women with low education. For many of these individuals, a real or perceived lack of access to employment may be a reason for exiting the labor force early. Developing job training or job search programs for older workers might provide them with more opportunities for continued work.

In addition, our findings suggest that the situation is more complex for older workers, who generally have lower levels of functional ability than their younger counterparts. For people with low functional abilities, continued work is often inappropriate. Moreover, for individuals with mild functional disabilities (such as difficulty lifting heavy loads), full-time work or physically demanding work may also be inappropriate. These same individuals might want to continue to work in part-time or less physically demanding jobs. Employer flexibility in number of hours worked and type of work required may allow people with mild functional disabilities continue to work.

The combined effects of race, gender, and age highlight the importance of looking at subgroup differences in evaluating the probable effectiveness of proposed policies. For instance, for people who have both a lack of access to employment and mild functional disabilities, remaining in the labor force is a complicated matter. Programs aimed to help them remain in the labor force, should they want to do so, would need to both find employment for them and ensure that the employment allows a sufficient amount of flexibility in work hours and job demands.

Therefore, no one type of policy could hope to encourage labor force participation equally for all groups. A series of policies, ranging from the recent elimination of the earnings test to job search programs, would help to encourage labor force participation among different groups. A greater understanding of why different groups work beyond the typical age of retirement provides a basis for developing policies targeted toward each group.

ENDNOTES

[1] A relatively small number of cases were omitted due to missing data. Of the 12, 503 respondents between the ages of 60 and 80, 654 (or 5.23 percent) of the respondents were omitted due to missing data.

[2] Respondents in the HRS are asked both to list all of their work status (e.g., working, unemployed, homemaker) and are asked if they are currently doing any work for pay. A small number of respondents (71) report that they are not doing any work for pay and they are unemployed or temporarily on leave. This small number of respondents are omitted from the analysis as part of the 654 respondents with missing data.

[3] Age in years, centered at 60, represents the effect of each additional year on the log odds of working. The splines represent the additional increment or decrement in the log odds of working for being age 62 or age 65. Equation 1 shows a logistic regression model where X_1 is the respondents age, X_2 is whether 62, and X_3 is whether 65. In this model, the predicted log odds of working is

$$\ln\left(\frac{\text{pr Y}=1}{\text{pr Y}\neq 1}\right) = b_0 + b_1 X_1 + b_2 X_2 + b_3 \text{X}_3 \qquad \text{[Eq. 1]}$$

For a respondents younger than 62, the splines at age 62 and 65 are equal to 0. Thus, equation 1 becomes:

$$\ln\left(\frac{\text{pr Y}=1}{\text{pr Y}\neq 1}\right) = b_0 + b_1(age) + b_2(0) + b_3(0) = b_0 + b_1(age) \qquad \text{[Eq. 2]}$$

For respondents from ages 62 to 64, the spline at age 62 is equal to 1 but the spline at age 65 is equal to 0. Equation 1 then becomes:

$$\ln\left(\frac{\text{pr Y}=1}{\text{pr Y}\neq 1}\right) = b_0 + b_1(age) + b_2(1) + b_3(0) = b_0 + b_1(age) + b_2 \qquad \text{[Eq. 3]}$$

For respondents from ages 62 to 64, the splines at age 62 and 65 are both equal to 1. Equation 1 becomes:

$$\ln(\frac{\text{pr Y}=1}{\text{pr Y}\neq 1}) = b_0 + b_1(age) + b_2(1) + b_3(1) = b_0 + b_1(age) + b_2 + b_3 \qquad \text{[Eq. 4]}$$

Thus, the effect of age is evaluated using three different variables.

[4] Although this measurement strategy is slightly more accurate, in most cases the way that nonwage income is adjusted for married couples does not substantially alter the results. In a sub-analysis of three strategies for measuring nonwage income (omitting work income of respondent and spouse, omitting work income of respondent only, and omitting work income of respondent and deflating income by a factor of .8), we found that all correlations were at least in .80.

[5] We did not weight the logistic regression analysis. As Lohr (1999) notes, although opinions about whether to weight regression models differ, weighted and unweighted models generally do not produce substantially different coefficients if the model is properly specified.

[6] The interaction coefficients represents the change in the effect of a predictor for a one unit change in the moderator. If X_1 is the independent variable and X_2 is the moderator variable, the product term interaction is X_1X_2. The logistic regression model is then:

$$\ln(\frac{\text{pr Y}=1}{\text{pr Y}\neq 1}) = b_0 + b_1X_1 + b_2X_2 + b_3X_1X_2 \qquad \text{[Eq. 5]}$$

Similar to linear regression, this is equivalent to:

$$\ln(\frac{\text{pr Y}=1}{\text{pr Y}\neq 1}) = (b_0 + b_2X_2) + (b_1 + b_3X_2)X_1 \qquad \text{[Eq. 6]}$$

The term (b_o+b_2X_2) represents the net constant (designated b_0*) at different levels of the moderator X_2. What is more important, the term (b_1+b_3X_2) represents the net coefficient for X_1 (designated b_1*) at different levels of X_2. Taking the exponent of each side of the equation:

$$\frac{\text{pr Y} = 1}{\text{pr Y} \neq 1} = e^{(b_0 + b_2 X_2)} e^{(b_1 + b_3 X_2) X_1} \quad \text{[Eq. 7]}$$

Thus, the net logit coefficient is equal to

$$b_1 * = b_1 + b_3 X_2 \quad \text{[Eq. 8]}$$

while the net odds ratio is equal to:

$$e^{b1*} = e^{b1 + b3 X2} \quad \text{[Eq. 9]}$$

For a more complete explanation of interaction in logistic regression, see Jaccard, (2001).

[7] When low nonwage income is equal to 1 (yes), equation 9 becomes

$$e^{b*} = e^{1.3134 - .0757\,(age)} \quad \text{[Eq. 10]}$$

Thus, at age 60, the net odds ratio is 3.7188:

$$e^{b*} = e^{1.3134\ -.0757\ (0)} = 3.7188 \quad \text{[Eq. 11]}$$

At age 70, the net odds ratio is 1.7444:

$$e^{b*} = e^{1.3134\ -.0757\ (10)} = 1.7444 \quad \text{[Eq. 12]}$$

At age 80. The net odds ratio is .8182:

$$e^{b*} = e^{1.3134\ -.0757\ (20)} = .8182 \quad \text{[Eq. 13]}$$

[8] When poor health is equal to 1 (yes), the net odds ratio for age is equal to:

$$e^{b*} = e^{-1.9629 + .0762\,(age)} \quad \text{[Eq. 14]}$$

Therefore, at age 60, the net odds ratio for poor health is .1405.

$$e^{b*} = e^{-1.9629 + .0762\,(0)} = .1405 \quad \text{[Eq. 15]}$$

While at age 80, the net odds ratio for poor health is .6447.

$$e^{b}* = e^{-1.9629 + .0762\,(20)} = .6447 \qquad \text{[Eq. 16]}$$

The net odds ratio represents the factor by which the odds of working increase or decrease for a one unit increase in poor health. Thus, at age 60, being in poor health is associated with an 86 percent decrease in the odds of working. At age 80, being in poor health is associated with a 36 percent decrease.

[9] The net odds ratio for low education is equal to:

$$e^{b}* = e^{-.1898 - .4136\,(whetherfemale)} \qquad \text{[Eq. 17]}$$

Thus, for men, low education is associated with an 18 percent decrease in the odds of working (or an odds ratio of .8271).

$$e^{b}* = e^{-.1898 - .4136\,(0)} = .8223 \qquad \text{[Eq. 18]}$$

For women, low education is associated with a 45 percent decrease in the odds of working (or an odds ratio of .5469)

$$e^{b}* = e^{-.1898 - .4136\,(1)} = .5469 \qquad \text{[Eq. 19]}$$

[10] In the case of two two-way interactions, the logistic regression equation becomes:

$$\ln\left(\frac{\text{pr Y} = 1}{\text{pr Y} \neq 1}\right) = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_1 X_2 + b_5 X_1 X_3 \qquad \text{[Eq. 20]}$$

where b_1 is the independent variable and b_2 and b_3 are the two moderators. This is equivalent to:

$$\ln\left(\frac{\text{pr Y} = 1}{\text{pr Y} \neq 1}\right) = (b_0 + b_2 X_2 + b_3 X_3) + (b_1 + b_4 X_2 + b_5 X_3) X_1 \qquad \text{[Eq. 21]}$$

In the where X_1 is poor health, X_2 is age, and X_3 is gender, the net odds ratio is equal to:

$$e^{b}* = e^{-1.8032 + .0775\,(age) - .4679\,(whetherfemale)} \qquad \text{[Eq. 22]}$$

For a 60 year old man, this is equal to:

$$e^{b*} = e^{-1.8032 + .0775(0) - .4679(0)} = .1648 \quad \text{[Eq. 23]}$$

For a 80 year old man, this is equal to:

$$e^{b*} = e^{-1.8032 + .0775(20) - .4679(0)} = .7763 \quad \text{[Eq. 24]}$$

For a 60 year old woman, this is equal to:

$$e^{b*} = e^{-1.8032 + .0775(0) - .4679(1)} = .1032 \quad \text{[Eq. 25]}$$

For an 80 year old woman, this is equal to:

$$e^{b*} = e^{-1.8032 + .0775(20) - .4679(1)} = .4862 \quad \text{[Eq. 26]}$$

[11] The calculations for these net coefficients are not included. They are calculated as described above.

REFERENCES

Borus, Michael E., Herbert S. Parnes, Steven H. Sandell, and Bert Seidman. 1988. *The Older Worker*. Madison, WI: Industrial Relations Research Association.

Burr, Jeffrey A., Michael P. Massagli, Jan E. Mutchler, and Amy M. Pienta. 1996. "Labor Force Transitions among Older African American and White Men." *Social Forces* 74: 963-82.

Burtless, Gary, and Joseph F. Quinn. 2000. "Retirement Trends and Policies to Encourage Work among Older Workers." Paper presented at the 12th Annual Conference of the National Academy of Social Insurance, Washington, DC, January 26-27.

Costa, Dora. 1999. "Has the Trend toward Early Retirement Reversed?" Paper presented at the First Annual Joint conference for the Retirement Research Consortium, Washington, DC, May 20-21.

DeViney, Stanley and Angela M. O'Rand. 1988. "Gender-Cohort Succession and Retirement among Older Men and Women, 1951 to 1984." *Sociological Quarterly* 29: 525-40.

Flippen, Chenoa and Marta Tienda. 2000. "Pathways to Retirement: Patterns of Labor Force Participation and Labor Market Exit Among the Pre-Retirement Population by Race, Hispanic Origin, and Sex." *Journal of Gerontology: Social Sciences* 52B: S14-S27

Gibson, Rose C. 1987. "Reconceptualizing Retirement for Black Americans." *The Gerontologist* 27: 691-8.

Gibson, Rose C. 1991. "The Subjective Retirement of Black Americans." *Journal of Gerontology: Social Sciences* 46: S204-209.

Gohmann, Stephen F. 1990. "Retirement Differences among the Respondents to the Retirement History Survey." *Journal of Gerontology: Social Sciences* 45: S120-27.

Gustman, Alan L. and Thomas L. Steinmeier. 1986. "A Disaggregated, Structural Analysis of Retirement by Race, Difficulty of Work and Health." *The Review of Economics and Statistics* 68: 509-13.

Han, Shin-Kap and Phyllis Moen. 1999. Clocking Out: Temporal Patterning of Retirement. *American Journal of Sociology* 105: 191-236.

Hayward, Mark D., Melissa A. Hardy and Hsinmu Chen. 1996. "Race Inequities in Men's Retirement." *Journal of Gerontology: Social Sciences* 51B: S1-S10.

Hayward, Mark D., Melissa A. Hardy, and Mei-Chun Liu. 1985. "Early Retirement Processes Among Older Men." *Research on Aging* 7: 491-515.

Henretta, John C. and Angela M. O'Rand. 1983. "Joint Retirement in the Dual Worker Family." *Social Forces* 62: 504-20.

Jaccard, James. 2001. *Interaction Effects in Logistic Regression*. Thousand Oaks, NJ: Sage Publications.

Lohr, Sharon L. 1999. *Sampling: Design and Analysis.* Pacific Grove, CA: Duxbury Press.

Loprest, Pamela, Kalman Rupp, and Steven H. Sandell. 1995. "Gender, Disabilities, and Employment in the Health and Retirement Study." *Journal of Human Resources* 30: S293-S318.

Moen, Phyllis. 1996. "A Life Course Perspective on Retirement, Gender, and Well-Being." *Journal of Occupational Health Psychology* 1: 131-44.

Mutchler, Jan E., Jeffrey A. Burr, Amy M. Pienta, and Michael P. Massagli. 1997. "Pathways to Labor Force Exit: Work Transitions and Work Instability." *Journal of Gerontology: Social Sciences* 52B: S4-S12.

O'Rand, Angela M. and Richard Landerman. 1984. "Women's and Men's Retirement Income Status: Early Family Role Effects." *Research on Aging* 6: 25-44.

Parnes, Herbert S. and David G. Sommers. 1994. "Shunning Retirement: Work Experiences of Men in Their Seventies and Early Eighties." *Journal of Gerontology: Social Sciences* 49: S117-S124.

Parnes, Herbert S. and Gilbert Nestal. 1981. "The Retirement Experience." Pp 155-97 in *Work and Retirement: A National Longitudinal Study of Men*, edited by Herbert S. Parnes. Cambridge: MIT Press.

Parnes, Herbert S. and Lawrence J. Less 1985. "Shunning Retirement: The Experience of Full-Time Workers." In Herbert S. Parnes, Joan E. Crowley, R. Jean Haurin, Lawrence J. Less, William R. Morgan, Frank L. Mott, and Gilbert Nestel. Pp 175-208 in *Retirement Among American Men*. Lexington, MA: Lexington Books.

Perkins, Kathleen. 1993. "Working Class Women and Retirement." *Journal of Gerontological Social Work* 20: 129-146.

Quinn, Joseph F. 1999. "Has the Early Retirement Trend Reversed?" Paper presented at the First Annual Joint conference for the Retirement Research consortium, Washington, DC, May 20-21.

Reimers, Cordelia and Marjorie Honig. 1996. "Responses to Social Security by men and women: Myopic and far-sighted behavior." *The Journal of Human Resources* 31, 359-382

Steuerle, Eugene and Adam Carasso. 2001. "A Prediction: Older Individuals Will Work More in the Future." *Straight Talk on Social Security and Retirement Policy* 32, March 30: 1-2.

Szinovacz, Maximiliane E., DeViney, S., and Adam Davey. 2001. “Influences of Family Obligations and Relationships on Retirement: Variations by Gender, Race, and Marital Status." *Journal of Gerontology 56B*: S20-S27.

Santiago, Anna M. and Clara G. Muschkin. 1996. “Disentangling the effects of disability status and gender on the labor supply of Anglo, Black, and Latino older workers.” *The Gerontologist* 36: 299-310.

Wray, Linda Ann. 1996. “The role of ethnicity in the disability and work experiences of preretirement-age Americans.” *The Gerontologist* 36: 287-298.

TABLE 1.
Logistic Regression Models Predicting Who Remains in the Workforce by Age [a, b]

	Model 1. Ages 60 to 67 (N=5,581)		Model 2. Ages 68 to 80 (N=6,268)		Model 3. Additive Model Ages 60 to 80 (N=11,849)		Model 4 Interactive Model Ages 60 to 80 (N=11,849)			
							Additive Effects		Age Interaction Effects	
	b	e^b	b	e^b	b	e^b	b	e^b	b	e^b
Adjusted Nonwork Income										
Less than $4, 000 ($4, 000 to $15, 999)	1.1570***	3.1803***	.1545	1.1670	.8948***	2.4470***	1.3134***	3.7186***	-.0757***	.9271***
$1, 600 or more	.3623***	1.4366***	.3395***	1.4042***	.3456***	1.4129***	.3431***	1.4093***	.0008	1.0008
Education										
Fewer than 8 Years (8 to 16 Years)	-.3134**	.7310**	-.4994***	.6069***	-.3781***	.6852***	-.3712***	.6899***		
More than 16 Years	.3665***	1.5083***	.4143***	1.5133***	.3886***	1.4750***	.3860***	1.4711***		
Health										
Excellent Health (Fair to Very Good Health)	.4110***	1.5083***	.5971***	1.8168***	.4773***	1.6116***	.4175***	1.5182***	.0083	1.0084
Poor Health	-1.8325***	.1600***	-.8583***	.9024***	-1.4991***	.2348***	-1.9629***	.1405***	.0762***	1.0791***
Whether Female	-.5520***	.5758***	-.4730***	.6231***	-.5239***	.5922***	.5183***	.5955***		
Whether Black	-.1495	.8612	-.0147	.9854	-.0938	.9104	-.1002	.9046		
Whether Married	-.0282	.9722	-.0658	1.0680	.0015	1.0015	.0037	1.0037		
Net worth	.0045	1.0045	-.0031	.9969	.0028	11.0028	.0027	1.0027		
Age										
Age in years from 60	-.2024***	.5758***	-.1027***	.4239***	-.1214***	.8857***				
Spline— age 62	-.0512	.9501			-.2551***	.7749***				
Spline— age 65	.0608	1.0627			-.2248**	.7987**				
Constant	.6328***		-.2009		.5755***					
Model χ^2 (df)	964.952 (13)***		373.813 (11)***		2530.380 (13)***					

[a] Both logit coefficients (b) and odds ratios (e^b) are presented
[b] Terms in parenthesis represent the reference groups
* p<.05 ** p<.01 *** p<.001

TABLE 2
Logistic Regression Models Predicting Who Remains in the Workforce by Age and Whether Female (N=11,849) [a, b]

	Additive Effects		Two-way Interactions			
			Age		Whether Female	
	b	e^b	b	e^b	b	e^b
Adjusted Nonwork Income						
Less than $4, 000	.9714***	2.6414***	-.0138	.9863	-.4842*	.6162*
($4, 000 to $15, 999)						
$1, 600 or more	.3121**	1.3663**	.0222*	1.0224*	-.1975	.8208
Education						
Fewer than 8 Years	-.1898	.8271			-.4136*	.6613*
(8 to 16 Years)						
More than 16 Years	.3710***	1.4492***			.0349	1.0355
Health						
Excellent Health	.5710***	1.7700***	.0040	1.0040	-.2204	.8022
(Fair to Very Good Health)						
Poor Health	-1.8032***	.1648***	.0775***	1.0806***	-.4679*	.6263*
Whether Female	-.2153	.8063				
Whether Black	-.0964	.9081				
Whether Married	.0197	1.0199			-.4601***	.6312***
Net worth	.0027	1.0027				
Age						
Age in years from 60	-.1364***	.8725***				
Spline— age 62	-.4230***	.6551***			.2180	1.2436
Spline— age 65	-.2611***	.7702***				
Constant						
Model χ^2 (df)	2530.929(25)***					

[a] Both logit coefficients (b) and odds ratios (e^b) are presented
[b] Terms in parenthesis represent the reference groups
* p<.05 ** p<.01 *** p<.001

TABLE 3
Logistic Regression Models Predicting Who Remains in the Workforce by Age and Race (N=11,849) [a, b]

	Additive Effects		Two-way Interactions				Three-way Interactions	
			Age		Race		Age*Race	
	b	e^b	b	e^b	b	e^b	b	e^b
Adjusted Nonwork Income								
Less than $4, 000	.8295***	2.2921***	-.0163	.9838				
($4, 000 to $15, 999)								
$1, 600 or more	.2195*	1.2454*	.0227*	1.0229*				
Education								
Fewer than 8 Years	-.3749***	.6873***						
(8 to 16 Years)								
More than 16 Years	.3919***	1.4797***						
Health								
Excellent Health	.4027***	1.4958***	.0077	1.0077	.4591	1.5827	-.0052	.9948
(Fair to Very Good Health)								
Poor Health	-2.1880***	.1121***	.0961***	1.1009***	.9042*	2.4699*	-.1049*	.9004*
Whether Female	-.5722***	.5643***			.3080*	1.3607*		
Whether Black	-.2995**	.7412**						
Whether Married	-.2864***	.7509***						
Net worth	.0025	1.0025						
Age								
Age in years from 60	-.1356***	.8732***						
Spline— age 62	-.2864***	.7509***						
Spline— age 65	-.2602***	.7709***						
Constant	1.0034***							
Model χ^2 (df)	2530.929 (25) ***							

[a] Both logit coefficients (b) and odds ratios (e^b) are presented
[b] Terms in parenthesis represent the reference groups
* p<.05 ** p<.01 *** p<.001

TABLE 4
Logistic Regression Models Predicting Who Remains in the Workforce by Age, Race, and Whether Female (N=11,849) [a, b]

	Additive Effects		Two-way Interactions						Three-way Interactions	
			Age		Race		Whether Female		Age*Race	
	b	e^b	b	e^b	b	e^b	b	e^b	b	e^b
Adjusted Nonwork Income										
Less than $4, 000 ($4, 000 to $15, 999)	1.0080***	2.7401***	-.0169	.9732			-.5198*	.5946*		
$1, 600 or more	.3247**	1.3836**	.0207	1.0209*			-.2052	.8145		
Education										
Fewer than 8 Years (8 to 16 Years)	-.1957	.8222					-.4059*	.6664*		
More than 16 Years	.3709***	1.4491***					.0393	1.0401		
Health										
Excellent Health (Fair to Very Good Health)	.5196***	1.6813***	.0059	1.0059	.4233	1.5270	-.2070	.8130	-.0052	.9948
Poor Health	-1.9977***	.1356***	.0961***	1.1009***	.9543**	2.5969**	-.4902*	.6125*	-.1048*	.9005*
Whether Female	-.0225	.9777								
Whether Black	-.1480*	.8624*								
Whether Married	00190	1.0192					-.4634***	.6291***		
Net worth	.0027	1.0027								
Age										
Age in years from 60	-.1364***	.8725***								
Spline— age 62	-.2907***	.7477***								
Spline— age 65	-.2586***	.7722***								
Constant	.6913***									
Model χ^2 (df)	2537.047 (28) ***									

[a] Both logit coefficients (b) and odds ratios (e^b) are presented
[b] Terms in parenthesis represent the reference groups
* p<.05 ** p<.01 *** p<.001

Table 5.
Net Effects of Poor Health, Low Education, and Low Nonwork Income by Age, Race, and Whether Female [a, b]

	Percent	Net Coefficients	Net Odds Ratio
Poor Health			
White Male	4.4		
Age 60		-1.9977	0.1356
Age 70		-1.0367	0.3546
Age 80		-0.0757	0.9271
Black Male	7.1		
Age 60		-1.0434	0.3523
Age 70		-1.1304	0.3229
Age 80		-1.2174	0.2960
White Female	5.5		
Age 60		-2.4879	0.0831
Age 70		-1.5269	0.2172
Age 80		-2.4879	0.0831
Black Female	10		
Age 60		-1.5336	0.2158
Age 70		-1.6206	0.1978
Age 80		-1.7076	0.1813
Low Education			
Male	3.5	-0.1957	0.8223
Female	3.7	-0.6016	0.5479
Low Nonwork Income			
Male	2.7		
Age 60		1.0080	2.7401
Age 70		0.8390	2.3141
Age 80		0.6700	1.9542
Female	1.7		
Age 60		0.4882	1.6294
Age 70		0.3192	1.3760
Age 80		0.1502	1.1621

[a] Weighted valid total percentages are shown
[b] Net coefficients and odds ratios are based on final model in Table 4