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Taxes, Wages, and the Labor Supply of Older Americans

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Abstract

Given the aging of the U.S. population, and the greater contributions of older workers to the labor force, understanding how policy levers can affect elderly labor supply has become increasingly important. In this paper we use data from the Health and Retirement Study linked to state identifiers to estimate the responsiveness of the labor supply of older workers to the wage and features of the tax code, both on the probability of participating in the labor market, as well as on hours of work for those who choose to work. We find that a 10 percent increase in the wage is associated with a five percent increase in participation, and we estimate slightly larger responses to marginal tax rates. These results suggest that government policies could increase the labor supply of older individuals by changing the returns to work through the tax code.

Keywords: Aging, Labor Supply, Elderly, Taxes

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Biographical Sketches

Lucie Schmidt is an Associate Professor in the Department of Economics at Williams College. Professor Schmidt's research to date has concentrated on the economics of marriage and fertility decisions, and on examining costs and benefits of various social insurance programs. She has also written on the relationships between asset accumulation and gender, marriage, and immigration. She received her Ph.D. (2003) and M.A. (1997) degrees in Economics from the University of Michigan, and received an A.B. (1992) in Government from Smith College.

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I. Introduction

Even before the downturn in the stock market began in 2000, the decades-long trend in earlier retirement had started to reverse, as the oldest baby boomers were delaying retirement. Evidence for this is presented in Figure 1, which shows the labor force participation rate for men aged 66-85.[1] The subsequent reduction in the value of many seniors' retirement portfolios may have heightened this trend.

The aging of the U.S. population, combined with an increasing probability that any given older individual will work, means that the contributions of older workers to the labor force are rising. Understanding how policy levers can affect the labor supply of the elderly therefore has become increasingly important. In this paper we use data from the Health and Retirement Study (HRS) linked to state identifiers to estimate the responsiveness of the labor supply of older workers to features of the tax code, both on the probability of participating in the labor market, as well as on hours of work for those who choose to work Other research has attempted to examine the effects of the tax structure on the labor force decisions of older workers. However, it generally suffers from some of the traditional problems associated with the labor supply literature. Specifically, variation in federal tax rates comes entirely from individual-level potential earnings, which are a function of past labor force decisions and are likely to be correlated with tastes for work.

Our data allow us to use individual-level information from earnings histories as well as state- and year-level variation in the tax treatment of earned income, Social Security income, and pension income to identify variation in the returns to work faced by older workers. Our measure of the marginal tax rate an individual faces varies due the interactions between individual potential earnings and state- and year- differences in the tax code. The interaction of these multiple sources of variation allow us to estimate labor supply responses while better controlling for factors which could be correlated with tastes for work. We find evidence that the labor supply of older workers is

responsive to both potential wages in and the tax structure. We find that an increase of 10 percent in the potential wage increases labor force participation by approximately five percent for both men and women. Responses to the tax code are slightly higher, in that an increase of 10 percent in the after-tax return to work leads to an increase in labor force participation of 7.5 percent among men and 11.4 percent among women. However we find that among those who choose to participate in the labor force, neither the wage or tax rate has a significant effect on hours worked.

Our results have important policy implications. Understanding how wages and various features of both the federal tax code and state tax structures may either encourage or discourage older individuals to work is critical for understanding the effects of potential changes in the Social Security system on labor supply, as well as to understanding the role that the increased labor supply of older workers might play in the long-run viability of the Social Security system. Our results suggest that government policies could play a role in increasing the labor supply of older individuals by changing the returns to work through the tax code. In addition, our findings are encouraging for firms who may be looking for tools to attract or retain older workers because of their skills or experience.

II. Background

In standard life-cycle models of labor supply, retirement is a one-time decision. However, as noted by Maestas (2004), 24% of all retirees exhibit "unretirement," defined as a reversal in labor force participation. Unretirees return to the labor force after partially or fully retiring. It is unclear why individuals would retire and then return to the labor force. If there are significant costs associated with retiring and then returning to the labor force, one would not expect to see so many cases of unretirement.

One possible explanation is that the elderly return to work as a result of poor financial planning. However, recent work casts doubt on this explanation. Haider and Loughran (2001) find that labor supply among the elderly is concentrated among the healthiest, wealthiest, and most educated older individuals, and that these individuals earn relatively low wages. They interpret these findings as indicating that work is more like leisure for these older workers, and that the return to working in the form of the wage does not have a large effect on the labor force decisions of older individuals.[2] Consistent with Haider and Loughran, Maestas (2004) finds that retirees who return to work have not suffered from poor financial planning, inadequate resources, or negative wealth shocks, and that they had higher pre-retirement earnings and education than retirees who remain out of the labor force.

Of the other economic factors potentially affecting labor supply decisions of the elderly, the Social Security earnings test has been studied most extensively. However, the many papers on the earnings test fail to reach a consensus on its effects. Friedberg (2000) uses three changes in the earnings test between 1978 and 1990 that differentially affect particular age groups to examine the effects on labor supply. She estimates small but statistically significant income and wage elasticities of elderly labor supply among workers, but finds no evidence of effects on the decision to work. Gruber and Orszag (2003) use the same policy changes (and an additional change in 1996-1998) to analyze the effect of the earnings test on the decision to work and on aggregate hours, and find no influence on labor supply decisions of men. Haider and Loughran (2008) find that when allowing for measurement error and rigidities in the labor market, changes in the earnings test have had substantial effects on the labor supply decisions of men. Song and Manchester (2007) analyze the removal of the earnings test in 2000 for persons at the full retirement age or older, and find large

effects of the earnings test on the earnings of individuals in the 50th to 80th percentiles, but no effect on earnings at lower levels, and find no clear effect on labor force participation.

Despite the extensive literature on the effects of the Social Security earnings test on the labor supply of older workers, and an even more extensive literature on the effects of the income tax code on the labor supply of prime-age workers (see Blundell and MaCurdy (1999) and Pencavel (1986) for reviews of this literature), relatively little work examines the effects of the income tax code on elderly labor supply. One exception is work by Favreault et al (1999) that estimates the effects of the federal tax code (income taxes, the employee share of payroll taxes, and reduced Social Security benefits from the earnings test) on the labor supply of older workers. They examine both the extensive margin of labor force participation, and the intensive margin of hours worked, using data from the Survey of Income and Program Participation (SIPP) linked to Social Security Summary Earnings Records and Master Beneficiary Records. They calculate an individual's "potential earnings," which is an approximation of the labor income the person could gain through employment, based on the past covered wages from the Social Security earnings histories. They find a large effect of federal tax rates on the participation decision. However, their variation comes entirely from individual-level potential earnings, which are a function of past labor force decisions and are likely to be correlated with tastes for work. They also do not model taxes at the state level, and therefore their approach cannot speak to whether two otherwise identical individuals with the same earnings history will respond to differences in net wage rates generated by the tax system.

In the United States, there is a great deal of cross-state variation in both marginal tax rates and the tax treatment of pension and Social Security income. Table 1 summarizes some features of state tax rules in 2003. The state marginal tax rate on labor market earnings varies from zero to almost ten percent across the 50 states.[3] Resulting differences in the after-tax wage may be

especially important because for households with significant nonlabor income, such as many of the elderly, substitution effects are more likely to dominate income effects in labor supply decisions. In addition, interactions of nonlabor income with the graduated structure of our income tax code may further reduce the incentive to work for older workers. Retiree income, to the extent that it is taxable, often increases the marginal tax rate a potential worker faces on their earnings. Thus, the after-tax wage they earn is lower than it was before they started to receive retiree income.

Cross-state differences in the tax treatment of pension and Social Security income could therefore lead to large differences in the financial reward to working, particularly for individuals with substantial nonlabor income. Take for example, a single elderly man who receives $30,000 in pension income, $6,000 in Social Security income, and no other income. Given the usual federal and state exemptions and deductions, his total tax liability (combined federal and state) is $5,357 if he lives in Wisconsin, but it is $3,705 (about 30 percent lower) if he lives in Michigan. Furthermore, the marginal tax rate he would face (again, from combined federal and state taxes) if he began to work is 15 percent if he lives in Michigan and 22.3 percent if he lives in Wisconsin. Despite the fact that his gross income is the same in both states, his after-tax annuity income and potential after-tax wage are quite different. As a result the incentives to work are quite different depending on his state of residence. In addition to being interesting from a policy perspective, these state differences provide variation in after-tax wages with which to estimate labor supply equations.[4]

In this paper, we examine the importance of wages and taxes on the labor supply decision, using a dataset that allows us to do so more precisely than has been possible in the past. The HRS data, described in the next section, contain detailed work histories, which allow us to create measures of potential wages for both workers and non-workers. In addition, through restricted

access data, we can observe the state of residence of all the respondents, allowing us to model the federal and state income taxes they face.

III. Data

We use data on individuals ages 70 to 84 from the 1998, 2000, and 2002 waves of the Health and Retirement Study (HRS). The HRS is a nationally representative panel dataset that began in 1992. The study interviewed individuals ages 51 to 61 in 1992 and has been re-interviewing them every two years since then. In 1998, when the original sample was ages 57 to 67, the HRS merged with the AHEAD survey, a survey of individuals who were ages 75 and older in 1998. New respondents who were ages 68-74 or 51-56 were also added, making the survey a representative sample of individuals who were ages 51 and older in 1998.

The HRS contains detailed data on many of the factors that would influence labor supply decisions. Studies of labor supply are typically limited by the fact that wages are unobservable for non-workers. Researchers must impute a wage using observable characteristics and a variety of controversial assumptions. However, HRS respondents are asked a variety of questions about their *prior* jobs, including what their earnings or wages were, and the occupation and industry of the job. Using these data, we can construct a potential wage for all individuals, regardless of their current employment status.[5]

In addition to the wage, the HRS contains rich measures of financial well being, health, and family structure that should affect tastes for work. Because the HRS identifies respondents' state of residence, we are able to model features of state income taxes discussed in the previous section that could have strong effects on the incentive to work.[6]

IV. Methodology

A. Estimating Determinants of Labor Force Participation

The key economic factors influencing whether an individual works are the return to working and his or her level of nonlabor income. Personal characteristics such as health and marital status may also be important determinants of the labor supply decision. We estimate logits of labor force participation of the form:

$$L_{it} = f\left[\beta_o + \beta_1 \ln w_{it} + \beta_2 \ln\left(1-\tau_{ijt}\right) + \beta_3 \ln I_{it} + X_{it}\delta + \sum_j S_j + \beta_4 U_{jt} + v_{it}\right] \qquad (1)$$

where *i* indexes the individual, *j* indexes the state in which the individual resides, and *t* indexes the year. In this equation, *L* equals 1 if the individual works and equals zero otherwise.[7] *w* represents the potential wage available to the worker, τ represents the marginal tax rate on the first dollar of earnings, and *I* is a measure of nonlabor income. The *X* vector captures a number of individual-level characteristics. We describe these variables in greater detail in the following paragraphs. In addition, we include *U,* the county level unemployment rate in a given survey year, to account for regional fluctuations in labor demand. We also control for state fixed effects, *S,* in all of our analyses to capture the effects of any time-invariant state characteristics that may affect labor supply. This is important because some of these characteristics may be correlated with the tax structure of the state.[8] Finally, we adjust our standard errors to reflect the fact that the same individuals may be present in multiple waves of the HRS.

We restrict our sample to individuals 70 and older because most of these individuals will already have retired from their "career jobs."[9] By focusing on the population that has already retired, we are implicitly treating previous labor supply histories as exogenous to post-retirement labor supply decisions.[10] This is a reasonable assumption for much of the population if, during their working years, individuals assume that they will retire at some point close to age 65. Because individuals who have retired from a job but are currently working for pay may be less likely to identify as retired, we select our sample of "retirees" based on age, rather than a respondent's self-

reported retirement status. This avoids sample selection bias that would arise if we selected our sample based on self-reported retirement status. We exclude individuals who are or were self-employed mainly because wage measures were often missing and noisy for them.[11] In addition, retirement may be a more gradual process for the self-employed, and as a result, the dynamics of their labor supply decisions may be quite different than that of workers.

As discussed earlier, many studies of labor supply are limited by the fact that wages are unobservable for non-workers. Summary statistics in Table 2 show that 8.3 percent of the men in the sample are working and 5.1 percent of women are working. The HRS job histories and demographic and employment information allow us to calculate a potential wage, w for all individuals in our sample. We regress the respondent's wage at their last job (adjusted by the CPI) on education, race, Hispanic ethnicity, industry of last job, occupation of last job, and year of interview, and use the estimated coefficients from this regression to predict a potential wage.[12] We use this potential wage in estimating (1) rather than the self-reported prior wage, because the reported wage may have measurement error that varies systematically with one's taste for leisure. Specifically, the prior wage will be a noisier measure of the potential wage for respondents who have been out of the labor force longer, who may have a stronger taste for leisure.

Using the National Bureau of Economic Research's *TAXSIM* program for each year of the survey, we calculate the marginal tax rate that each household faces, τ.[13] The marginal tax rate is a function of household size, income and state of residence. Because we want to estimate the effect of tax rates and wages on the work decision, we hold hours of work constant at zero hours for all respondents for the purposes of calculating the marginal tax rate. We use the marginal tax rate facing the first dollar earned rather than the observed marginal tax rate given their actual earnings. This is because the latter is a function of the individual's chosen hours of work, while the former is

exogenous to their contemporaneous labor supply decision. To do this, we use observed household size, nonlabor income and state of residence and set all wage and salary income to zero before running *TAXSIM*. For married couples, we set earnings of both spouses to zero, and we use the same marginal tax rate for both spouses.

Variation in τ, the marginal tax rate, comes from variation at both the state and the individual level. First, τ will be higher in states with higher tax rates. Second, among individuals with pension or Social Security income, τ will be higher in states that tax these types of income. Third, given a graduated tax structure, τ will be higher for individuals with higher income. We would like our coefficient to tell us the effect on labor force participation if we changed the tax rate incrementally, but held constant an individual's other income and wealth and anything else that might affect their labor supply. To do this, we explicitly control for nonlabor income, labor market characteristics and other variables that may be correlated with τ (discussed in detail below). Thus, we can interpret the coefficient on $\ln(1-\tau)$ as the effect on labor force participation to the payoff to working that arises solely from the variation in the interaction of a household's nonlabor income and their state of residence.[14] The mean marginal tax rate on the first dollar earned is approximately 25 percent, with a standard deviation of roughly 13 percentage points, suggesting that there is a substantial amount of variation in these tax rates across the individuals in our sample.

Our measure of nonlabor income, *I*, is an after-tax measure that includes all non-wage income at the household level.[15] Working men have an average of about $34,000 of nonlabor income while nonworking men have an average of about $37,000. It is not surprising that nonlabor income is significantly higher among male nonworkers than male workers of the same gender, given that nonworkers are more likely to collect both Social Security and pension benefits. In addition, time spent on leisure usually increases with income. Women have nonlabor income of

approximately $29,000, and this appears to be independent of whether the women are working or not. We scale household nonlabor income by 0.75 for married couples to account for economies of scale. We also control for whether the respondent is a homeowner or receives any pension income as proxies for financial security. Among both men and women, a significantly lower percentage of workers have pensions than nonworkers. While working men have significantly higher home ownership rates than nonworking men, homeownership rates do not differ significantly between female workers and nonworkers.

Since households can also draw on their assets to supplement retirement income, we include the following asset values: home equity, IRAs, balances in defined contribution (DC) pension plans, and other wealth, which includes other real estate, stocks, bonds, certificates of deposit (CDs), bank balances, and automobile wealth. As with nonlabor income, we scale these measures of wealth by 0.75 for married households to account for economies of scale. We also include a measure of debt. Means in Table 2 do not show consistent differences in wealth among workers and nonworkers. Male workers have significantly lower levels of pension receipt and higher levels of homeownership than male nonworkers. Male and female workers have significantly higher levels of debts and DC pension balances. The higher level of DC pension balances among workers is likely due to the fact that upon leaving a firm, DC pension balances are often converted to IRAs or annuities. In addition, DC pension balances may be more subject to underreporting among nonworkers.[16] Nonworking women have significantly higher levels of other wealth than working women, but there are no significant differences in these variables between working and nonworking men.

While we treat nonlabor income as exogenous to current labor supply decisions, it is clear that both assets and pension income are a function of past labor force decisions, and are therefore

likely to be correlated with tastes for work and other unobservables that will affect the current labor supply decision. However, if those with higher assets and nonlabor income had stronger preferences for work, we would expect this bias to lead to a positive relationship between nonlabor income and labor supply. This would bias us against finding the negative relationship that would be predicted by theory.

The *X* vector includes indicator variables for single year of age, since, as illustrated in Figure 2, there is a strong negative relationship between age and labor supply for this group. It also controls for marital status, health status (indicators for in excellent or very good health, in fair or poor health, with good health as the excluded category), and a series of expectations variables. These variables control for differences in expectations about the economy or financial security that might also affect the decision to return to work. The HRS asks respondents to report on a scale from 0 to 100 how likely it is that: a) their income will keep up with inflation for the next five years; b) that they will leave an inheritance of $10,000 or more; and c) that they will need to give major financial help to family members over the next ten years. Female nonworkers report a higher probability of giving financial help to family members than do female workers, but workers and nonworkers do not differ significantly in other expectations.

B. Estimating Determinants of Hours Worked

The factors that influence whether an individual works should also influence how many hours they work. Although prime age workers may not have much control over how many hours they work (see Card (1990), Altonji and Paxson (1988), and Hausman (1980))**,** retirees may exhibit greater elasticity in their hours decision, given the significant amount of nonlabor income received by many of them. This may be particularly true if the nonpecuniary benefits of work such as staying active and social are important.

Analogous to equation (1) we estimate the following model of hours worked

$$\ln H_{ijt} = f\left[\beta_o + \beta_1 \ln w_{it} + \beta_2 \ln\left(1-\tau_{ijt}\right) + \beta_3 \ln I_{it} + X_{it}\delta + \sum_j S_j + \beta_4 U_{jt} + v_{it}\right] \quad (2)$$

Because most retirees do not work, *H=0* for the majority of the sample, and OLS is not an appropriate method to estimate (3) among the sample of all retirees. We address this by restricting our sample to the sample of workers with positive hours of work.[17] For this sample of workers, we use the marginal tax rate that workers would face if they worked full time.[18] To do this, we impute full time earnings using the potential wage estimated in the prior section. For married couples, we do this assuming the higher earner works full time.

V. Results

A. Participation

Estimated marginal effects and their standard errors from estimation of (1) by logistic regression can be found in Table 3.[19] We estimate separate equations for men and women. We estimate a positive and statistically significant effect of the log potential wage for both men and women. The marginal effect implies that a one percent increase in the wage is associated with an increase in the probability of work of 0.00043 percentage points for men and 0.00023 percentage points for women.[20] Given that 8.3 percent of the men and 5.1 percent of the women are working, our estimates are that a 10 percent increase in the wage would raise participation by 5.2 percent for men and 4.5 percent for women.

The estimated effect of $\ln(1-\tau)$ is also positive and statistically significant at the five-percent level for both men and women, suggesting that a one percent increase in $(1-\tau)$, leads to an increase in the probability of working of 0.00063 percentage points for men and 0.00059 for

women. This means that a 10 percent increase in the after-tax return to work would lead to increased participation of 7.5 percent among men and 11.4 percent among women.

Since the estimates are from a nonlinear model, the estimated effect of the tax rate will vary across individuals. To get another sense of the magnitude, we can consider an elderly man living in Wisconsin with $36,000 of nonlabor income (made up of Social Security and pension income) who would face a marginal tax rate of 32.9 percent on the first dollar he would earn in 2002. If he moved to Michigan, he would face a marginal tax rate of 22.5 percent. This means that he would earn 15.5 percent more for every dollar in Michigan than in Wisconsin. Our model predicts that the probability that he would work is 1 percentage point higher in Michigan than it would be in Wisconsin. Given that the participation rate among men is 8.3 percent, the lower tax rate in Michigan makes him about 12 percent more likely to work. The combined results from the wage and tax rate coefficients suggest that labor force participation of the elderly is quite responsive to the payoff to working.

The estimated coefficient on nonlabor income is not statistically different from zero for men, and is positive and significant for women, which is inconsistent with with a standard labor supply model in which leisure is considered to be a normal good. However, this finding is consistent with work by Haider and Loughran (2001) and Maestas (2004) that suggests that return to work among retirees is more likely among those in the best financial position. It would also be consistent with a correlation between nonlabor income and unobservable tastes for work.

Estimates for other variables are generally consistent with the differences between workers and non-workers observed in Table 2. Across some variables, both male and female workers seem to be in worse financial shape than non-workers. Those with pensions, with greater home equity, and with higher debt are less likely to work. Married men are more likely to work, and those in

better (self-rated) health are also more likely to participate in the labor force. The annual county level unemployment rate significantly affects the work behavior of both male and female retirees -- a one percent increase in the unemployment rate is associated with lower labor force participation of 0.00415 percentage points for men and 0.00188 percentage points for women. These estimates could suggest that older workers face the same type of cyclicality experienced by prime-age workers.

We next run regressions separately by for those with different levels of nonlabor income, dividing our sample into thirds, to test whether the responsiveness of labor supply to the variables of interest varies by income level. Results in Table 4 show that for both men and women, there is not much variation in the responsiveness of labor supply to our measure of the potential wage – for each third of the nonlabor income distribution, higher potential wages lead to increased labor supply for both men and women. Men in the lower third and women in the middle third of the distribution of nonlabor income are most responsive to the tax rate. For men, the labor supply of those in the middle third of the distribution of nonlabor income is the most responsive to the level of nonlabor income. Among women, there are interesting differences by in the responsiveness to nonlabor income. Among the middle third, greater nonlabor income is associated with reduced participation, as expected by theory, but among both the poorest and the richest thirds, greater nonlabor income is associated with greater participation. It could be the case that those with greater pension and Social Security Income have worked longer and harder, which may reflect greater tastes for work both in their working and in their elderly years. [21] In addition, it is possible that for wealthy elderly women, labor supply is more like leisure than work.

Declines in health may limit the labor supply of many of the elderly. The estimates just presented may understate the importance of wages and taxes if a significant portion of the sample is

physically constrained in their ability to work. To see if this is the case, we estimate participation equations separately by the self-reported health status of the respondent. These results are presented in Table 5. Labor supply responds to the potential wage and the tax rate for men who report their health status to be excellent, very good, or good, but not for those who are in fair or poor health status. For women, labor supply responds to the potential wage throughout the health distribution, but there appears to be a health gradient. Those in the best self-reported health respond the most to the potential wage, while those in worse self-reported health respond the least. A similar pattern appears with the tax rate, with those in the best self-reported health responding the most to higher taxes.

B. Hours

Table 6 presents results for equation (2), estimating the determinants of hours worked among workers. Neither the potential wage nor the marginal tax rate has coefficients that are statistically different from zero for either male or female workers. Those with greater nonlabor income work fewer hours, and the effect is statistically significant at the five-percent level for women.

The estimated effects of some covariates on hours worked are quite different than those on participation. The county unemployment rate, which had a large effect on the participation decision, has no significant effect on hours among those who are working. Similarly, while marital status had a significant effect on participation, it has no effect on hours worked among workers.[22]

VI. Discussion

Our results suggest that the labor force participation decisions of elderly Americans are responsive to economic factors. We find that a 10 percent increase in the (gross) potential wage is associated with labor force participation rates that are four to five percent higher for men and

women. We also find that older workers are responsive on the extensive margin of participation to the financial payoff from working generated by the tax code. Our estimates are that a reduction in the marginal tax rate that would increase the payoff to working by 10 percent would increase labor force participation by 7.5 percent among men and 11.4 percent among women. Consistent with previous literature, we find that greater nonlabor income is associated with higher propensities to work.

Our results also vary by the level of nonlabor income. The tax rate appears to have the greatest effect among middle income individuals. However, we find that higher wages are a significant predictor of increased participation across the distribution of nonlabor income. This suggests that even though those with greater nonlabor income are less likely to work, they are still responsive to the economic payoff to working.

We also find that the labor supply of those older workers in the best self-reported health is most likely to respond to economic incentives. Continued improvements in the health of the elderly due to medical advances are likely, which suggest that a larger fraction of the elderly population in the future may respond positively to labor supply incentives. The responsiveness of older workers to the tax code suggests that public policy could influence elderly labor supply through this mechanism. This could prove extremely important in coming years as a greater share of the potential workforce reaches and passes the age of 65.

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Table 1: Selected Features of State Tax Systems in 2003

	Social Security Taxed?	Tax Exemption for Private Pension	Highest Marginal Tax Rate on Earnings
Alabama	No	full	3.25
Alaska	No	full	0
Arizona	No	0	4.93
Arkansas	No	6000	7.43
California	No	0	9.86
Colorado	Yes	24000	4.77
Connecticut	Yes	0	5
Delaware	No	12500	6.13
DC	No	0	9.4
Florida	No	full	0
Georgia	No	15000	5.83
Hawaii	No	full	8.04
Idaho	No	0	7.89
Illinois	No	full	3
Indiana	No	0	3.4
Iowa	Yes	6000	8.38
Kansas	Yes	0	6.51
Kentucky	No	39400	6.18
Louisiana	No	6000	3.92
Maine	No	6000	8.75
Maryland	No	19900	4.83
Massachusetts	No	0	5.3
Michigan	No	37710	4
Minnesota	Yes	0	8.09
Mississippi	No	full	4.93
Missouri	Yes	6000	5.91
Montana	Yes	3600	7.66
Nebraska	Yes	0	7.65
Nevada	No	full	0
New Hampshire	No	full	0
New Jersey	No	15000	6.37
New Mexico	Yes	0	7.81
New York	No	20000	7.7
North Carolina	No	2000	8.5
North Dakota	Yes	0	5.41
Ohio	No	credit of 200	7.5
Oklahoma	No	5500	6.38
Oregon	No	credit of 9%	9.1
Pennsylvania	No	full	2.8
Rhode Island	Yes	0	9.28
South Carolina	No	10000	7.09
South Dakota	No	full	0
Tennessee	No	full	0
Texas	No	full	0
Utah	Yes	7500	5.91

Vermont	Yes	0	8.5
Virginia	No	0	5.83
Washington	No	full	0
West Virginia	Yes	0	6.5
Wisconsin	Yes	0	6.75
Wyoming	No	full	0

Source: Wisconsin Legislative Fiscal Bureau (2005)

Table 2: Summary Statistics by Gender and Work Status
HRS Respondents ages 70-84 in 1998, 2000, or 2002

	Men				Women			
	Working (n=441; 8.3%)		Not Working (n=4844; 91.7%)		Working (n=282; 5.1%)		Not Working (n=5209; 94.9%)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Wage	10.70	17.13	24.39	431.93	10.70	23.54	6.82	17.92
After-tax potential wage	7.86	13.94	16.58	286.73	8.09	19.32	4.83	12.41
MTR faced on First Dollar Earned	0.25	0.14	0.27	0.14	0.23	0.12	0.26	0.13
After-tax Unearned Income	33,930	26,883	36,696	47,756	29,396	39,030	29,401	38,676
Unemployment rate in county	0.05	0.02	0.05	0.02	0.05	0.02	0.05	0.02
Retired	0.53	0.50	0.97	0.16	0.28	0.45	0.80	0.40
Age	73.31	3.35	76.06	4.15	73.87	3.67	76.35	4.25
Married	0.87	0.33	0.77	0.42	0.48	0.50	0.43	0.50
Years of Education	12.51	3.39	11.58	3.74	12.77	2.53	11.93	3.04
Black Race	0.10	0.30	0.11	0.32	0.10	0.29	0.13	0.34
Hispanic	0.05	0.21	0.06	0.24	0.02	0.14	0.05	0.22
Health=Exc, Very Good	0.46	0.50	0.30	0.46	0.61	0.49	0.34	0.47
Health=Fair/Poor	0.17	0.38	0.36	0.48	0.12	0.33	0.33	0.47
Has Pension	0.59	0.49	0.71	0.45	0.58	0.49	0.62	0.49
Home Owner	0.88	0.33	0.83	0.38	0.80	0.40	0.79	0.41
Home Equity	91,952	156,920	88,447	160,147	72,937	79,288	86,077	149,169
IRA Balances	36,948	92,419	33,145	87,520	21,703	64,516	27,217	144,904
DC Pension Balances	13,989	112,952	567	23,930	1,652	11,367	27	1,006
Other Wealth	128,455	372,798	141,139	483,387	83,170	177,814	119,043	292,010
Debts	-1,489	4,920	-858	4,165	-4,676	44,932	-860	7,261
Expect Inflation	47.46	29.59	49.05	32.40	44.82	32.75	44.55	31.48
Expect to Leave Inheritance	72.29	33.21	70.90	35.85	61.79	39.38	63.61	39.08
Expect to Help Family Financially	34.74	35.09	33.84	35.51	16.81	26.41	23.30	32.15

Notes: The tax rate is the marginal tax rate the respondent would face on the first dollar they earn. The wage is the wage at their prior job, adjusted by CPI.

See text for other variable definitions.

Table 3: Logit Estimates of Whether Respondent is Currently Working,

Among HRS Respondents Ages 70-84 in 1998, 2000, or 2002

	Men		Women	
	Marginal Effect (Standard Error)		Marginal Effect (Standard Error)	
ln(Wage)	0.043 (0.013)	**	0.023 (0.007)	**
ln(1-τ)	0.063 (0.025)	**	0.059 (0.017)	**
ln(Unearned income)	0.002 (0.004)		0.011 (0.005)	**
Unemployment rate in county	-0.415 (0.205)	**	-0.188 (0.102)	*
Married	0.018 (0.008)	*	-0.008 (0.005)	
Health=Exc, Very Good	0.010 (0.007)		0.027 (0.006)	**
Health=Fair/Poor	-0.038 (0.007)	**	-0.016 (0.005)	**
Has Pension	-0.031 (0.009)	**	-0.011 (0.005)	**
Home Owner	0.010 (0.009)		0.006 (0.005)	
Home Equity	0.000 (0.0005)		-0.001 (0.0004)	*
Other Wealth	-0.00004 (0.0001)		-0.00011 (0.0001)	
Debts	-0.01254 (0.0056)	**	-0.00338 (0.0011)	**
IRA Balances	-0.00052 (0.0005)		-0.00051 (0.0004)	
DC Pension Balances	0.00174 (0.001)	*	0.02191 (0.008)	**
Expect Inflation	-0.00018 (0.0001)	*	0.00005 (0.0001)	
Expect to Leave Inheritance	0.00005 (0.0001)		-0.00007 (0.0001)	
Expect to Help Family Financially	-0.00006 (0.0001)		-0.00022 (0.0001)	**
Mean of Y	0.083		0.051	
N	5,285		5,491	
Pseudo R-squared	0.149		0.160	

Notes: ** Denotes statistical significance at the 5% level and * at the 10% level.

Includes dummy variables for state and age. The wage is a predicted potential wage (see text for details).

The tax rate is the marginal tax rate the respondent would face on the first dollar they earn.

Table 4: Logit Estimates of Whether Respondent is Currently Working, by Income Third

Among HRS Respondents Ages 70-84 in 1998, 2000, or 2002

	Men		Women	
	Marginal Effect (Standard Error)		Marginal Effect (Standard Error)	
Poorest Third				
ln(Wage)	0.038 (0.147)		0.014 (0.007)	**
ln(1-τ)	0.191 (0634)		0.033 (0.069)	
ln(Unearned income)	0.004 (0.013)		0.013 (0.006)	**
Mean of Y	0.089		0.052	
N	1,727		1,830	
Pseudo R-squared	0.226		0.254	
Middle Third				
ln(Wage)	0.052 (0.024)	**	0.026 (0.014)	*
ln(1-τ)	0.047 (0.063)		0.207 (0.061)	**
ln(Unearned income)	-0.050 (0.043)		-0.006 (0.029)	
Mean of Y	0.093		0.069	
N	1,599		1,633	
Pseudo R-squared	0.181		0.137	
Richest Third				
ln(Wage)	0.046 (0.026)	*	0.027 (0.009)	**
ln(1-τ)	0.014 (0.045)		0.020 (0.018)	
ln(Unearned income)	0.003 (0.014)		0.014 (0.006)	**
Mean of Y	0.092		0.041	
N	1,505		1,784	
Pseudo R-squared	0.158		0.204	

Notes: ** Denotes statistical significance at the 5% level and * at the 10% level.

Includes all control variables listed in Table 3, as well as dummy variables for state and age. The wage is a predicted potential wage (see text for details). The tax rate is the marginal tax rate the respondent would face on the first dollar they earn.

Table 5: Logit Estimates of Whether Respondent is Currently Working, by Self Reported Health Status

Among HRS Respondents Ages 70-84 in 1998, 2000, or 2002

	Men		Women	
	Marginal Effect (Standard Error)		Marginal Effect (Standard Error)	
Health=Excellent or Very Good				
ln(Wage)	0.055 (0.024)	**	0.043 (0.018)	**
ln(1-τ)	0.105 (0.058)	*	0.134 (0.044)	**
ln(Unearned income)	0.020 (0.014)		0.035 (0.013)	**
Mean of Y	0.120		0.089	
N	1,676		1,946	
Pseudo R-squared	0.164		0.158	
Health=Good				
ln(Wage)	0.078 (0.024)	**	0.025 (0.011)	**
ln(1-τ)	0.084 (0.039)	**	0.067 (0.027)	**
ln(Unearned income)	-0.00005 (0.006)		0.003 (0.004)	
Mean of Y	0.100		0.050	
N	1,637		1,515	
Pseudo R-squared	0.164		0.157	
Health=Fair or Poor				
ln(Wage)	0.007 (0.015)		0.015 (0.005)	**
ln(1-τ)	0.031 (0.031)		0.007 (0.019)	
ln(Unearned income)	-0.002 (0.003)		0.008 (0.006)	
Mean of Y	0.058		0.031	
N	1,321		1,102	
Pseudo R-squared	0.167		0.144	

Notes: ** Denotes statistical significance at the 5% level and * at the 10% level.

Includes all control variables listed in Table 3, as well as dummy variables for state and age. The wage is a predicted potential wage (see text for details). The tax rate is the marginal tax rate the respondent would face on the first dollar they earn.

Table 6: OLS Estimates of Log Hours Worked,

Among HRS Respondents Working for Pay, Ages 70-84 in 1998, 2000, or 2002

	Men		Women	
	Coefficient (Standard Error)		Coefficient (Standard Error)	
ln(Wage)	-0.102 (0.153)		0.087 (0.218)	
ln(1-τ)	-0.074 (0.248)		0.010 (0.293)	
ln(Unearned income)	-0.079 (0.048)		-0.175 (0.087)	**
Unemployment rate in county	-0.552 (2.289)		-2.697 (2.335)	
Married	0.003 (0.109)		0.117 (0.101)	
Health=Exc, Very Good	0.081 (0.088)		-0.070 (0.083)	
Health=Fair/Poor	0.072 (0.098)		-0.164 (0.142)	
Has Pension	-0.178 (0.093)	*	-0.018 (0.105)	
Home Owner	-0.017 (0.118)		-0.234 (0.094)	**
Home Equity	0.000 (0.007)		-0.002 (0.004)	
Other Wealth	0.001 (0.002)		-0.003 (0.002)	
Debts	0.282 (0.117)	**	-0.011 (0.006)	*
IRA Balances	-0.012 (0.006)	**	-0.001 (0.011)	
DC Pension Balances	0.004 (0.005)		0.084 (0.026)	**
Expect Inflation	0.001 (0.002)		0.000 (0.002)	
Expect to Leave Inheritance	-0.002 (0.001)		0.001 (0.001)	
Expect to Help Family Financially	0.001 (0.001)		-0.001 (0.002)	
Mean of Y	24.75		22.15	
N	2,786		369	
R-squared	0.279		0.229	

Notes: ** Denotes statistical significance at the 5% level and * at the 10% level.

Includes dummy variables for state and age. The wage is a predicted potential wage (see text for details). The tax rate is the marginal tax rate the respondent would face at full time work.

Appendix Table 1: OLS Regression of Log Wage

Among HRS Respondents Ages 70-84 in 1998, 2000, or 2002

	Men				Women			
	All		Workers		All		Workers	
Age	0.341	**	0.167		0.042		0.213	
	(0.114)		(0.337)		(0.14)		(0.381)	
Age squared	-0.002	**	-0.001		-0.001		-0.002	
	(0.001)		(0.002)		(0.001)		(0.003)	
Black Race	0.016		-0.064		0.143	**	-0.176	
	(0.052)		(0.089)		(0.067)		(0.219)	
Hispanic	-0.070		0.060		0.215	**	0.682	**
	(0.074)		(0.091)		(0.091)		(0.257)	
Years of Education	0.052	**	0.029	**	0.069	**	0.055	**
	(0.006)		(0.012)		(0.009)		(0.017)	
Occupation of Last Job (Agriculture is the excluded group)								
Mining & Construction	0.204		0.759	**	0.794	*	(dropped)	**
	(0.187)		(0.154)		(0.442)		(0)	
Manufacturing: Non Durable	0.041		0.290	*	0.698		0.485	**
	(0.188)		(0.157)		(0.433)		(0.154)	
Manufacturing: Durable	0.132		0.379	**	0.826	*	0.346	**
	(0.185)		(0.137)		(0.439)		(0.126)	
Transportation	0.194		0.346	**	0.957	**	0.435	**
	(0.185)		(0.12)		(0.452)		(0.109)	
Wholesale	0.090		0.338	**	0.890	**	0.389	*
	(0.201)		(0.141)		(0.442)		(0.201)	
Retail	-0.121		0.603	**	0.491		0.106	
	(0.188)		(0.136)		(0.443)		(0.106)	
Finance, Ins., & Real Estate	-0.026		0.397	**	0.757	*	0.198	*
	(0.198)		(0.169)		(0.438)		(0.109)	
Business and Repair Services	-0.014		0.404	**	0.759	*	0.091	
	(0.19)		(0.138)		(0.456)		(0.195)	

Appendix Table 1: OLS Regression of Log Wage (continued)

Among HRS Respondents Ages 65-85 in 1998, 2000, or 2002

	Men				Women			
	All		Workers		All		Workers	
Personal Services	-0.336		0.437	**	0.453		0.008	
	(0.235)		(0.152)		(0.45)		(0.194)	
Entertainment & Recreation	0.154		-0.042		0.815		0.177	
	(0.291)		(0.392)		(0.595)		(0.132)	
Professional and Related Services	0.057		0.571	**	0.600		0.312	**
	(0.186)		(0.193)		(0.433)		(0.081)	
Public Administration	0.189		0.311	*	0.933	**	0.233	*
	(0.19)		(0.172)		(0.436)		(0.125)	
Not Known	0.086		0.177		0.808	*	-0.343	
	(0.201)		(0.118)		(0.445)		(0.379)	
Industry of Last Job (Managerial is the excluded group)								
Professional Specialty Operation	-0.012		0.238		-0.012		-0.166	
	(0.058)		(0.203)		(0.078)		(0.168)	
Sales	-0.056		-0.332	**	-0.336	**	-0.138	
	(0.088)		(0.135)		(0.103)		(0.123)	
Clerical and Administrative Support	-0.456	**	-0.209		-0.383	**	-0.233	
	(0.073)		(0.157)		(0.072)		(0.143)	
Service: Private Household cleaning & building	-0.277		-0.116		-0.631	**	-0.157	
	(0.317)		(0.195)		(0.17)		(0.267)	
Service: Protection	-0.468	**	-0.300	**	-0.488	*	-0.368	**
	(0.112)		(0.13)		(0.261)		(0.148)	
Service: Food Preparation	-0.325	**	-0.589	**	-0.437	**	-0.238	*
	(0.161)		(0.156)		(0.123)		(0.138)	
Health Services	-0.885	**	(dropped)	**	-0.285	**	-0.281	
	(0.239)		(0)		(0.098)		(0.18)	
Personal Services	-0.378	**	-0.363	**	-0.400	**	-0.531	**
	(0.106)		(0.15)		(0.106)		(0.203)	

Appendix Table 1: OLS Regression of Log Wage (continued)

Among HRS Respondents Ages 65-85 in 1998, 2000, or 2002

	Men				Women			
	All		Workers		All		Workers	
Farming, Forestry, and Fishing	-0.513	**	-0.179		-0.089		-0.115	
	(0.169)		(0.173)		(0.696)		(0.144)	
Mechanics and Repair	-0.159	**	-0.146		-0.051		(dropped)	
	(0.061)		(0.124)		(0.186)		(0)	
Construction trade and extractors	-0.212	**	-0.124		-0.872	**	(dropped)	
	(0.072)		(0.138)		(0.222)		(0)	
Precision Production	-0.171	**	-0.041		-0.635	**	0.015	
	(0.066)		(0.198)		(0.212)		(0.26)	
Operators: Machine	-0.387	**	-0.174		-0.663	**	-0.337	**
	(0.063)		(0.154)		(0.123)		(0.14)	
Operators: Transport	-0.396	**	-0.135		-0.469		-0.482	**
	(0.069)		(0.124)		(0.32)		(0.153)	
Operators: Handlers	-0.544	**	-0.364	**	-0.473	**	0.638	**
	(0.083)		(0.145)		(0.176)		(0.251)	
Armed Forces	-0.938	**	-0.117		-0.727	**	(dropped)	
	(0.183)		(0.441)		(0.139)		(0)	
Not Known	0.219		(dropped)		-0.878	**	(dropped)	
	(0.239)		(0)		(0.39)		(0)	
Year=2000	0.033	**	0.022		0.092	**	0.128	**
	(0.012)		(0.052)		(0.014)		(0.063)	
Year=2002	0.066	**	0.206	**	0.146	**	0.247	**
	(0.019)		(0.064)		(0.019)		(0.074)	
Constant	-10.286	**	-4.694		0.942		-6.107	
	(4.362)		(12.689)		(5.354)		(14.337)	
R-squared			0.229				0.207	

Notes: ** Denotes statistical significance at the 5% level and * at the 10% level. Robust standard errors in parentheses.

The wage is the prior wage in the regression of all respondents and the current wage in the regression of current workers.

Appendix Table 2: OLS Estimates of Hours Worked,

Among All HRS Respondents, Ages 70-84 in 1998, 2000, or 2002

	Men		Women	
	Coefficient (Standard Error)		Coefficient (Standard Error)	
ln(Wage)	1.63 (0.47)	**	1.04 (0.268)	**
ln(1-t)	1.46 (0.798)	*	1.86 (0.412)	**
ln(Unearned income)	-0.15 (0.177)		0.06 (0.068)	
Unemployment rate in county	-16.14 (6.838)	**	-6.76 (2.913)	**
Married	0.56 (0.337)	*	-0.04 (0.209)	
Health=Exc, Very Good	0.74 (0.318)	**	0.97 (0.23)	**
Health=Fair/Poor	-1.07 (0.251)	**	-0.46 (0.159)	**
Has Pension	-1.43 (0.366)	**	-0.38 (0.208)	*
Home Owner	0.03 (0.37)		-0.24 (0.247)	
Home Equity	-0.0005 (0.011)		-0.0071 (0.005)	
Other Wealth	-0.0006 (0.002)		-0.0038 (0.002)	**
Debts	-0.2978 (0.28)		-0.3495 (0.079)	**
IRA Balances	-0.0297 (0.018)	*	-0.0069 (0.004)	*
DC Pension Balances	0.2375 (0.077)	**	4.0285 (0.589)	**
Expect to Live to 85	-0.0393 (0.013)	**	0.0291 (0.008)	**
Expect Inflation	-0.0073 (0.004)	*	0.0020 (0.004)	
Expect to Leave Inheritance	-0.0008 (0.004)		-0.0032 (0.003)	
Expect to Help Family Financially	-0.0010 (0.004)		-0.0071 (0.003)	**
Mean of Y	2.01		1.09	
R-squared	0.100		0.098	

Notes: ** Denotes statistical significance at the 5% level and * at the 10% level.
Includes dummy variables for state and age. The wage is a predicted potential wage (see text for details).
The tax rate is the marginal tax rate the respondent would face at full time work.

[1] These trends have also been reported in the popular press. See, for instance, "Baby Boomers Delay Retirement," *Washington Post*, April 6, 2000; "Reversing Decades-Long Trend, Americans Retiring Later in Life," *New York Times*, February 26, 2001; and Seniors Work Longer, Take Part-Time Jobs as Portfolios Plunge," *Money Magazine*, June 11, 2001.

[2] However, their findings are based on the variation in the hours of those who are currently working and it is possible that the wage may be more important determining whether one works (i.e. the participation decision) than how many hours they work (the hours decision).

[3] See http://www.nber.org/~taxsim/state-rates/maxrate.html for comparable tax rates for other years.

[4] One concern is that some elderly households may have migrated across state in order to decrease tax exposure. However, the literature finds little evidence for this (e.g. Conway and Houtenville, 2001; Conway and Rork, forthcoming). We do not explicitly address migration of the households in our sample.

[5] The HRS allows respondents to report their current and prior compensation as an hourly wage or daily, weekly, monthly or annual salary. Because they also report the usual number of hours and weeks worked at each of these jobs, we are able to calculate an hourly wage. This measure is subject to division bias, which should bias any estimated labor force responses downward in absolute value (see Heim, 2007).

[6] State identifiers in the HRS are available through restricted access.

[7] β_1 and β_2 should be identical theoretically, because $\ln(1-\tau)+\ln w = \ln\left[(1-\tau)w\right]$. This may not be the case empirically however, either because workers may respond differently to the wage and tax rates, or because of heterogeneity in the wage that may be correlated with important unobserved characteristics.

[8] Regressions run without state fixed effects provide estimates that are similar in magnitude and statistical significance.

[9] Of the men in our sample, 94% report that they are retired (97% of those not working and 53% of those working), compared to 78% of women (80% of those not working and 28% of those working).

[10] A tremendous literature exists on the determinants of retirement timing and it is not the goal of this project to enhance that literature. See for example Stock and Wise (1990).

[11] Specifically, we exclude those who were self-employed during any wave of the HRS, as well as those who report being self-employed in their previous job.

[12] Estimates from the prediction regression can be found in Appendix Table 1.

[13] TAXSIM is freely available at http://www.nber.org/taxsim/. The program is thoroughly described in Feenberg and Coutts (1993).

[14] Like income taxes, the Social Security earnings test may also reduce the payoff to working. However, since we focus our analysis on the population 70 and older, the earnings test does not apply.

[15] We calculate the taxes that would be owed when earnings equal zero.

[16] It is possible that changes in the value of assets, perhaps due to changes in stock prices over the time period of our sample, could themselves cause changes in labor supply. The evidence on the effects of such changes is mixed (see Kezdi and Sevak (2004) and Eschtruth and Gemus (2002). By controlling for year effects and the value of the assets, we partially control for such effects.

[17] We have estimated OLS and tobit regressions among the full sample of potential workers and our results mirror those of the participation equations [See Appendix Table 2]. Because most retirees report zero hours, this suggests that the dynamics of the participation decision dominate any dynamics of the hours decision when hours regressions are estimated on the full sample.

[18] We have also estimated specifications where we allow hours to be affected by both the marginal tax rate at full time hours and the marginal tax rate on the first dollar of income. We find no evidence that hours worked responds differently to these two tax rates.

[19] Coefficients available from the authors upon request.

[20] For right hand side variables that are in ln(X) form, it is necessary to divide the marginal effect by 100 to get the effect of a one percent increase in the variable X.

[21] We have also estimated regressions separately by self-reported health status (breaking out those who report their health to be "excellent/very good" from those who report their health to be "good" and those who report their health to be "poor"). We find few differences in labor supply response among these dimensions.

[22] We have also examined whether our hours results differ by income level, and find no differences in the responsiveness by groups. However, this could be due to the fact that the sample size (the number of workers and then stratified into a number of categories) becomes reduced, and coefficients are less precisely estimated.