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# Retirement Date Effects on Pre-Retirement Wealth Accumulation: An Analysis of US Households

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# Retirement Date Effects on Pre-Retirement Wealth Accumulation: An Analysis of US Households*

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**Abstract**

This paper uses seven waves of data from the US Health and Retirement Study to investigate the impact of expectations regarding the timing of retirement on pre-retirment wealth accumulation. More specifically, we analyze the effect of the individual's subjective belief that he will work full time after age 62 on his current level of wealth. We use the individual's perception of the usual retirement age on the job as an instrument for his subjective belief that he will work full time after age 62. We look at single women, single men and married individuals separately. On a whole, the point estimates suggest that the responsiveness of individuals' saving behavior to retirement dates expectations is large. A ten percentage point increase in the subjective probability of working past age 62 results in a decrease in household wealth well in excess of 20% for most demographic groups. In addition, we find that, in the case of married couples in particular, there is a threshold effect in this response.

JEL classifications: E21, J26

Keywords: Retirement timing; Subjective beliefs; Wealth

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# 1 Introduction

To date, the empirical literature has failed to include expectations regarding the timing of retirement as an explanatory variable in regressions attempting to explain household saving behavior. The responsiveness of saving decisions to agents' expectations regarding the length of their work lives is important from a policy perspective. In the wake of the aging of the baby boomers and greater longevity in general, governments of many developed countries are desperately attempting to keep their public pension funds solvent by instituting policies to increase average retirement ages. Whether, or not, individuals take cognizance of their expected retirement date in saving decisions, has implications for how recent and expected future trends towards later retirement in these countries will affect the savings rates of their economies. Do individuals take account of necessary parameters, such as retirement date expectations, when making consumption-saving decisions? The now common notion of *the retirement-consumption puzzle*, where consumption levels are shown to drop at retirement, might indicate not. The retirement-consumption puzzle is indicative of saving shortfalls at retirement, and seriously threatens the life- cycle hypothesis, in which rational, risk averse agents maximize lifetime utility by smoothing the marginal utility of consumption across different time periods.

In this paper, we look directly at individuals' intentions *ex ante* to retirement by investigating whether agents' decisions to accumulate wealth are responsive to their subjective expectations regarding their retirement date. In conducting our analysis, we use data from seven waves of the Health and Retirement study, a nationally representative study of the elderly population in the United States, and look at the effect of the subjective probability of working full time after age 62 (P62) on wealth accumulation. Further, we analyze whether this effect differs amongst married women, single women, married men and single men, and whether the effect varies with pension status. On a whole, our point estimates suggest that the responsiveness of households' saving behavior to retirement dates expectations is large. We find that a ten percentage point increase in the household subjective probability of working past age 62 results in a decrease in household wealth well in excess of 20% for most demographic groups. We do, however, find a threshold effect in this response in the case of married couple households.

In the large, our results suggest that individuals do plan rationally, with regards to taking the expected timing of retirement into account when accumulating wealth. Contrary to what the notion of the retirement-consumption puzzle might suggest, they are not myopic in this domain. This lends support to theories in the literature attempting to explain the puzzle within the context of the rational life-cycle paradigm. For example, Banks et al. (1998) and Haider and Stephens (2007) emphasize the importance of unanticipated shocks causing individuals to retire earlier than expected[1]. However, to the extent that the *ex-*

[1]Other explanations for the retirement- consumption puzzle have been offered by various authors. For example, Hurd and Rohwedder (2003) suggest that after retirement individuals substitute home production for bought goods, so that a drop in consumption expenditure

*pected* retirement date is an important parameter in individuals' pre-retirement saving decisions, aggregate trends towards later retirement in the US are likely to have a non-trivial effect on saving rates in the economy.

Central to our analysis is the issue of endogeneity between retirement date decisions and wealth. The problem in such models arises due to two main issues. In cross-sectional analysis it is not possible to control for unobserved heterogeneity such as tastes, which might effect both the timing of retirement and wealth accumulation. The second issue is the direct endogeneity between retirement date expectations/decisions and wealth. While expectations regarding the timing of retirement are likely to have a direct effect on wealth accumulation prior to retirement, pre-retirement wealth is also likely to have an effect on retirement date decisions. We attempt to correct for these problems as follows. In using panel data we are able to conduct *Fixed Effects* regression analysis, which allows us to control for unobserved heterogeneity across individuals that might affect both wealth accumulation and retirement date decisions. We further attempt to correct for the direct endogeneity problem (between wealth and retirement expectations) by using *Instrumental Variables* estimation. We thus conduct an *Instrumental Variables Fixed Effects Regression* to analyze the effect of exogenous variation in P62 on wealth accumulation. We use respondents' self reported responses regarding the usual retirement age in the job that he/she is currently working in, as an instrument for the probability of working full time after age 62.

The instrumental variable approach has the added advantage of dealing with measurement error and focal point responses (answers centred around 0, 50 or 100) that tend to plague subjective probability responses. A lot of the literature interprets focal point answers as an indication of the agent being uncertain as to the probability of the event, which in turn leads to him reporting biased estimates (cf., e.g., Lillard and Willis, 2001; Hill et al., 2004; Hurd et al., 2005). To the extent that these probabilities still reflect an individual's *perception* of the probability, they reflect exactly what we want them to in our analysis, and there is no problem. As discussed by Smith et al. (2001) and Khawaja et al. (2006), these focal point answers contain a lot of information regarding an agent's belief, in that a subjective probability of working full time after age 62 of one indicates a very high belief of the probability of the event occurring, while a subjective probability of zero indicates a very low belief of the probability of the event occurring, even to the extent that these estimates are biased. However, Basset and Lumsdaine (2001), say focal point answers and general inconsistencies in the answering of probabilistic questions are indicative of low cognition and inadequate understanding of the nature of probabilities. From this point of view,

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does not necessarily imply a drop in consumption. Laibson (1998) and Angeletos et al. (2001) suggest that the retirement-consumption puzzle is due to hyperbolic discounting. French (2005) and Laitner and Silverman (2005) show that a drop in consumption at retirement is consistent with the life-cycle hypothesis when preferences are seen to be non-separable in consumption and leisure. In such a case, smoothing the marginal utility of consumption over time does not necessarily imply the smoothing of consumption over time, and the drop in consumption at retirement may thus be planned.

responses can be regarded as implausible estimates of the relevant subjective probability. To the extent that focal point answers and general inconsistencies in responses imply that the question was not fully understood, and are thus implausible estimates of the individual's subjective probability, the problem needs to be corrected. Since ignoring observations with these focal point answers is implausible, firstly due to the large number of observations reflecting these responses, and secondly due to the possible (and in my view, likely) information content displayed in them, instrumenting for these probabilities with other non-probabilistic variables mitigates any possible problem[2].

Similar to our approach is Bloom et al. (2007), who use the health and retirement study (HRS) to look at the effect of subjective survival probabilities on wealth accumulation decisions in the United States. Bloom et al find that an increase in the subjective probability of living to age 75 increases household wealth amongst couples only. They do not, however, control for retirement date expectations in the wealth regressions. Whether individuals respond to variation in subjective retirement expectations in a similar fashion as they do to variation in subjective survival expectations, is a matter we consider in this paper. To date, there are no studies that include subjective retirement date probabilities in wealth regressions.

The remainder of this paper proceeds as follows. In section 2, we present a simple theoretical model illustrating both the effect of variation in the anticipated retirement date on saving behavior (and hence wealth accumulation), and the nature of the endogeneity problem between the retirement date and wealth. In section 3 we discuss our data and methodology, also looking at various descriptive statistics. Section 4 presents a discussion of our regression results. We conclude in section 5.

# 2 Theoretical Model

## 2.1 The Effect of Changes in the Retirement date on Pre-Retirement Saving

We consider a deterministic model in which we have a rational agent whose aim is to maximize lifetime utility. We assume that the agent lives till (and including) period $T$. Within this period he will spend a certain amount of time working full time and the rest of the time in retirement, during which time he will live off savings accumulated during his working years and social security (and/or private pension) income. We assume that in order to maintain his lifestyle post retirement, savings are necessary to supplement social security/pension income. Assuming that the agent does not face any liquidity constraints in that he is able to borrow against future income, we now proceed to analyze the effect of variation in the anticipated retirement date on pre-retirement consumption/saving decisions.

[2] See Bloom et al. (2007) who instrument for survival probabilities to eliminate any focal point, or inconsistency problem.

The agent's instantaneous utility at time $t$ is given by $\hat{u} = [u(c_t) + v(l_t)]$, where $u(c_t)$ is the utility derived from consumption, and $v(l_t)$ is the utility derived from leisure. That is, we assume utility to be a separable function of consumption and leisure. We further assume time separability. We define leisure, $l_t$, to be 1 before retirement, and equal to $\bar{l} > 1$ every period after retirement, with $v'(l_t) > 0$, so that $v(l_t)$ is greater after retirement than before retirement.

For a given anticipated date of retirement, $t_{ret}$, (and hence a given $v(l_t)$ in every period), the agent's aim at time $t$ is to maximize utility as follows:

$$\max_{(c_t \ldots c_T)} \sum_{k=t}^{T} \beta^{k-t}(u(c_k)) \tag{1}$$

where $\beta$ is the discount factor $= \frac{1}{1+\rho}$, where, $\rho$, is the rate of time preference.

The dynamic budget constraint at any time $t$ is given by:

$$\begin{aligned} x_t &= (x_{t-1} - c_{t-1}) \cdot R + y_t \\ &= a_t \cdot R + y_t \end{aligned} \tag{2}$$

where $x_t$ is "cash on hand"; $R$ is the fixed gross return on assets, $a_t$, and is equal to $(1 + r)$, where $r$ is the interest rate common to borrowing and lending; and $y_t$ is non-capital income. We assume, further, that

$$y_t = \begin{cases} I_t \text{ if } t < t_{\mathrm{Re}\,t} \\ i_t \text{ if } t \geqslant t_{\mathrm{Re}\,t} \end{cases} \tag{3}$$

where $I_t$ is labor income, and $i_t$ is social security/pension income. We assume $I_t > i_t$.[3]

Human capital wealth, $h_t$, is the sum of discounted non-capital income and is given by

$$\begin{aligned} h_t &= \sum_{k=t+1}^{T} y_k \cdot R^{-(k-t)} = \frac{h_{t+1} + y_{t+1}}{R} \\ &= \sum_{k=t+1}^{t_{\mathrm{Re}\,t}-1} I \cdot R^{-(k-t)} + \sum_{k=t_{\mathrm{Re}\,t}}^{T} i \cdot R^{-(k-t)} \end{aligned} \tag{4}$$

Finally,

$$w_t = x_t + h_t \tag{5}$$

where $w_t$ is total worth at time $t$, and evolves according to the following equation:

[3] This assumption is certainly valid in the context of the US, as well as most other developed countries where the old age pension is earnings related, i.e., the old age pension replaces a *percentage* of pre-retirement income.

$$w_t = (w_{t-1} - c_{t-1}) \cdot R \tag{6}$$

We also have

$$\sum_{k=t}^{T} \frac{c_k}{R^{k-t}} = w_t \tag{7}$$

with terminal condition

$$w_{T+1} = 0 \tag{8}$$

That is, the present value of all future consumption must equal total wealth, and further, the binding constraint in equation 7 and terminal condition given by equation 8 imply that all wealth must be consumed by the time the agent dies[4].

**Observation** : *$w_t$ is a strictly increasing function of $t_{ret}$.*

In particular, the change in human capital as a result of increasing the retirement date from $t_{ret}^1$ to $t_{ret}^2$ is equal to

$$\left[ \sum_{k=t_{ret}^1}^{t_{ret}^2 - 1} (I - i) \right] \cdot R^{-(k-t)} \tag{9}$$

Thus, delaying the date of retirement allows the agent to substitute labor income for social security income between $t_{ret}^1$ and $t_{ret}^2$, increasing human capital wealth and hence total worth[5].

Writing the utility maximization problem, from the perspective of any time period, $t$, as a standard dynamic programming problem, we have

$$J(a_t, I, i,\ t_{ret}) = \max_{(c_t \dots c_T)} \sum_{k=t}^{T} \beta^{k-t} (u(c_k)) \tag{10}$$

where $J(a_t, I, i,\ t_{ret})$ is the value function, which depends on assets, $a_t$, pre retirement income, $I$, post retirement social security/pension income, $i$, and the date of retirement, $t_{ret}$. The first order conditions pertaining to consumption for the above maximization problem, conditioned on the budget constraint result in the following:

$$u'(c_t) = \beta R u'(c_{t+1}) = .....\beta^{T-t} R^{T-t} u'(c_T) \tag{11}$$

$\Rightarrow$

$$\frac{u'(c_t)}{u'(c_{t+1})} = \beta R \tag{12}$$

Let us assume that the form of the utility function is of standard constant relative risk aversion (CRRA) form,

[4] For the purpose of this model, we abstract from the bequest motive.

[5] We assume, for simplicity, that $i_t$ is independent of the retirement date.

$$u(c_k) = \frac{c_k^{1-\theta}}{1-\theta} \tag{13}$$

with $\theta \neq 1$. $\theta$ reflects the curvature/concavity of the utility function with a higher value of $\theta$ reflecting a more concave utility function. $\frac{1}{\theta}$ reflects the intertemporal elasticity of substitution.

Now,

$$u'(c_k) = c_k^{-\theta} \tag{14}$$

and from equation 12

$\Rightarrow$

$$\left(\frac{c_t}{c_{t+1}}\right)^{-\theta} = \beta R \tag{15}$$

$\Rightarrow$

$$\left(\frac{c_t}{c_{t+1}}\right) = [\beta R]^{-\frac{1}{\theta}} \tag{16}$$

If the rate of time preference, $\rho$, is equal to the rate of return, $r$, then

$$\left(\frac{c_t}{c_{t+1}}\right)^{-\theta} = 1 \tag{17}$$

$\Rightarrow$

$$c_t = c_{t+1} \tag{18}$$

and recursively,

$$c_t = c_{t+1} = ... = c_T \tag{19}$$

If, however, the rate of time preference is greater than the rate of return, consumption will tend to decrease over time. On the other hand, if the rate of return is greater than the rate of time preference, consumption will tend to increase over time.

**Proposition 1** *Our solution for consumption in any time period $t$ can be given by:*

$$c_t = \left(\frac{R^{T-t}}{\sum_{j=0}^{T-t} (\beta R)^{\frac{j}{\theta}} \cdot R^{T-t-j}}\right) \cdot w_t \tag{20}$$

with the marginal propensity to consume out of total worth equal to $\left(\frac{R^{T-t}}{\sum_{j=0}^{T-t} (\beta R)^{\frac{j}{\theta}} \cdot R^{T-t-j}}\right)$

**Proof.** *See appendix A* ■■

Taking the natural log of expression 20, we have

$$ln c_t = \ln\left(\frac{R^{T-t}}{\sum_{j=0}^{T-t}(\beta R)^{\frac{j}{\theta}} \cdot R^{T-t-j}}\right) + \ln w_t \tag{21}$$

and,

$$\frac{\Delta \ln c_t}{\Delta t_{ret}} = \frac{\Delta \ln\left(\frac{R^{T-t}}{\sum_{j=0}^{T-t}(\beta R)^{\frac{j}{\theta}} \cdot R^{T-t-j}}\right)}{\Delta t_{ret}} + \frac{\Delta \ln w_t}{\Delta t_{ret}} \tag{22}$$

Since $\ln\left(\frac{R^{T-t}}{\sum_{j=0}^{T-t}(\beta R)^{\frac{j}{\theta}} \cdot R^{T-t-j}}\right)$ is constant with respect to $t_{ret}$, we have

$$\frac{\Delta \ln c_t}{\Delta t_{ret}} = \frac{\Delta \ln w_t}{\Delta t_{ret}} \tag{23}$$

and hence proposition 2.

$$\Rightarrow \frac{\Delta \ln c_t}{\Delta t_{ret}} > 0 \tag{24}$$

That is, the relative change in consumption at time $t$ with respect to a unit change in the anticipated retirement date, is equal to the relative change in total worth at time $t$ for a unit change in the anticipated retirement date. Since total worth increases with the retirement age (see observation ), so too does consumption.

Now saving at any point in time, $t$, is given by:

$$s_t = y_t - c_t \tag{25}$$

Taking the natural log of both sides

$$\ln s_t = \ln(y_t - c_t) \tag{26}$$

and using the law for the log of a summation/subtraction,

$$\ln s_t = \ln(y_t) + \ln(1 - e^{(\ln c_t - \ln y_t)}) \tag{27}$$

As the change in $t_{ret}$ gets very small,

$$\frac{\Delta \ln s_t}{\Delta t_{ret}} \approx \left(-\frac{1}{(1 - e^{(\ln c_t - \ln y_t)})} \cdot e^{(\ln c_t - \ln y_t)} \cdot \frac{\Delta \ln c_t}{\Delta t_{ret}}\right)^{6} \tag{28}$$

[6]Note that this expression is the derivative of the expression $\ln y + \ln(1 - e^{(\ln c - \ln y)})$ with respect to $t_{ret}$ (lny is independent of $t_{ret}$). $\frac{\Delta \ln s_t}{\Delta t_{ret}}$ approximates this expession as $\Delta t_{ret}$ gets very small and tends to the continuous time situation, where the derivative expression is appropriate.

where, $\frac{\Delta \ln s_t}{\Delta t_{ret}}$ shows the relative change in saving at time $t$, for a unit change in the retirement date.

Since $\frac{\Delta \ln c_t}{\Delta t_{ret}} > 0$, and $(\ln c_t - \ln y_t) < 0$ (implying $0 < e^{(\ln c_t - \ln y_t)} < 1$), we have proposition 3.

**Proposition 2** $\frac{\Delta \ln s_t}{\Delta t_{ret}} < 0$

Thus, an increase in the anticipated retirement date will result in the agent saving less in that, and every subsequent period, thereby accumulating less asset wealth over time[7].

Up to this point, we have investigated the effect of variation in the anticipated date of retirement on wealth accumulation decisions. We now show how the retirement date itself is dependent on wealth. In doing this we need to show how the optimal date of retirement is determined.

## 2.2 Determination of the Optimal Date of Retirement

Now that we view the retirement date as being determined endogenously, the maximization problem facing the agent at time $t$ can be written as:

$$\max_{(c_t \ldots c_T),(l_t \ldots l_T)} \sum_{k=t}^{T} \beta^{k-t} \cdot (u(c_k) + v(l_k)) \tag{29}$$

Maximization with respect to $t_{ret} \Rightarrow$

$$\frac{\triangle\, U}{\triangle\, t_{ret}} + \frac{\Delta V}{\Delta t_{ret}} = 0 \tag{30}$$

where

$$U = \sum_{k=t}^{T} \beta^{k-t} \cdot u(c_k). \tag{31}$$

and

$$V = \sum_{k=t}^{T} \beta^{k-t} \cdot v(l_k) \tag{32}$$

i.e., the optimal retirement date is where the marginal benefit of delaying retirement by an extra time period $(\frac{\triangle U}{\triangle t_{ret}})$ is equal to the marginal cost of delaying retirement by one more period $(\frac{\Delta V}{\Delta t_{ret}})$[8].

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[7] It should be clear from equation 2 that $a_t = a_{t-1} \cdot R_{t-1} + s_{t-1}$.

[8] If convergence does not occur, then the optimal retirement date is where

$$\min \left|\frac{\triangle\, U}{\triangle\, t_{ret}} + \frac{\Delta V}{\Delta t_{ret}}\right|$$

That is, if $\frac{\triangle U}{\triangle t_{ret}} + \frac{\Delta V}{\Delta t_{ret}} \neq 0$, then the expression should be as close to zero as possible.

Now,

$$\begin{aligned}
\frac{\Delta V}{\Delta t_{ret}} &= \sum_{k=t}^{T}\left(\frac{\partial V}{\partial v_k}\cdot\frac{\partial v_k}{\partial l_k}\cdot\frac{\Delta l_k}{\Delta t_{ret}}\right)\\
&= \sum_{k=t}^{T}\left(\beta^k\cdot v'(l_k)\cdot\frac{\Delta l_k}{\Delta t_{ret}}\right) \qquad (33)
\end{aligned}$$

where $\frac{\Delta l_k}{\Delta t_{ret}}<0$ for at least one time period $k$, so that $\frac{\Delta V}{\Delta t_{ret}}<0$,
and

$$\frac{\triangle\, U}{\triangle\, t_{ret}}=\sum_{k=t}^{T}\left(\frac{\partial U}{\partial u_k}\cdot\frac{\partial u_k}{\partial c_k}\cdot\frac{\partial c_k}{\partial w_t}\cdot\frac{\partial w_t}{\partial h}\cdot\frac{\triangle\, h}{\triangle\, t_{ret}}\right) \qquad (34)$$

so that $\frac{\triangle U}{\triangle t_{ret}}>0$.

Thus, maximization requires that the marginal benefit of delaying retirement by an extra time period( $\frac{\triangle U}{\triangle t_{ret}}$) is equal to (as close as possible to) the marginal cost of delaying retirement by one more period ($\frac{\Delta V}{\Delta t_{ret}}$).

Any factor that increases the marginal cost of delaying retirement, will result in an earlier retirement date. Similarly, any factor that decreases the marginal benefit of delaying retirement, will also decrease the optimal date of retirement.

**Endogenous Relationship between Retirement date and Wealth** As illustrated in equation 34, any factor that decreases the marginal utility of consumption, $\frac{\partial u_k}{\partial c_k}$, decreases the marginal benefit of delaying retirement. For an agent that is risk averse ($\theta>0$, so that $u''(c)<0$), it is clear that a higher level of consumption will result in a lower marginal utility of extra consumption. It is also clear, from equations 5 and 20, that a higher level of physical wealth/assets, $a_t$, and hence greater total worth, supports a higher level of consumption. Since the marginal utility of consumption is low, an agent will tend to retire earlier, the more assets he has. We have also established in section 2.1 that, for a given level of $a_t$, $I$, and $i$, an earlier anticipated retirement date will encourage such an agent to accumulate more assets. Thus, we have an endogenous relationship between wealth and the date of retirement.

## 3 Data and Methodology

We draw on data using seven waves (1992- 2004) of the Health and Retirement study (HRS). Conducted by the Institute for Social Research (ISR) at the University of Michigan, the HRS is a nationally representative survey of the elderly population in the United States. The initial survey was conducted in 1992 and the sample consisted of individuals born between 1931-1941 (aged 51-61 in 1992), and their spouses of any age. This initial wave consisted of 12 652 individuals. These respondents were re-interviewed in 1994 and 1996. In 1993, another survey (Assets and Health Dynamics amongst the Oldest-old, AHEAD) interviewed respondents born in or before 1923. They were re-interviewed in

1995. In 1998, the two cohorts were merged into a single sample, and another cohort of respondents born between 1924 and 1930 was added to this sample. The sample was again representative of American individuals aged 51 and above. The 1998 sample was re-interviewed in 2000 and 2002, and in 2004 a new cohort (1948-53) was added. The HRS includes extensive data on wealth, retirement and subjective expectations, making it ideally suited for the purpose of our study. We look at married households, single male households and single female households separately, since we feel that the behavioral foundations governing wealth accumulation, and in particular in response to retirement expectations, will differ across these groups of individuals.

The dependent variable used in this analysis is net household wealth (WEALTH). This variable is analogous to the asset variable, $a_t$, of our theoretical model. All else equal, individuals who save more/less over time, will accumulate more/less asset wealth (see footnote 7). It is calculated as the net value of all household wealth less all debt, exclusive of social security and work sponsored pension wealth. In particular, it is calculated as the sum of: Net value of primary residence; net value of vehicles; net value of businesses; net value of IRA, Keogh accounts; net value of stocks, mutual funds and investment trusts; value of checking, savings and money market accounts; value of CD, government saving bonds, and T-bills; net value of bonds and bond funds; net value of all other savings; less all other debt.

The problem when dealing with wealth as a variable is both one of scale, where very large absolute values dominate a regression, and one of very skewed distribution. For both reasons, a log transformation would be desirable. The difficulty with a direct log transformation, is that the wealth variable takes on both zero and negative values, for which the log transformation is not defined. Authors have dealt with the issue of non positive wealth values in various ways. Some authors have taken a log transformation, dropping households with non-positive wealth values (cf., e.g., Diamond and Hausman, 1984; Kings and Dicks-Mireaux, 1982). However, restricting a sample in this sense can create a significant selection problem. Other authors have replaced the non-positive values with a small positive number before applying the log transformation (cf., e.g., Engen and Gale, 2000, Carroll and Samwick, 1997, 1998; Lundberg and Ward-Batts, 2000). The problem with this methodology is that it does not account for variation between observations with different negative values, and between negative values and zero values. An alternative approach is to use the Inverse Hyperbolic Sine function (IHS). This approach, first suggested by Johnson (1949), and first applied to wealth equations by Burbridge et al. (1988), has subsequently been used in wealth regressions by numerous authors (cf., Carroll et al., 2003; Cobb-Clark and Hildebrand, 2003; Kapteyn and Panis, 2003; Wenzlow et al., 2004; Pence, 2006). The Inverse Hyperbolic Sine function is given by

$$h(x) = \ log(\sqrt{x^2+1}+x) \tag{35}$$

and takes care of non-positive values of x [9]. We apply this transformation to

[9] Some studies insert a dampening factor, $\theta$, such that the function is given by $g(x,\theta) =$

the wealth variable in our regression analysis.

The explanatory variable of interest is the probability of working full time after age 62 (P62). The question asked in the HRS is "Thinking about work generally and not just your present job, what do you think are the chances that you will be working full- time after you reach age 62?" The question is asked only to individuals who are working for pay at the time of the interview. We therefore think of the answer as a conditional probability– the probability of an individual working full time after reaching age 62, given that he/she is working at age $x < 62$. The variable is calibrated on a scale of 0-100. Since P62 is an individual variable, and wealth is a household variable, it is necessarily to control for spouse characteristics in the regressions when we have married individuals. In figure 1, we show how the P62 variable tends to follow a random walk over time. Figure 2 shows the distribution of P62 for all individuals. There is a clear case of focal point responses, with probabilities centering around 0, 50 and 100.

We include control variables in the regressions which may be correlated with both WEALTH and P62. We include the hourly wage rate (WGHR), and the number of hours worked per week (HOURS), to control for current labor/self-employment income. The hourly wage rate is an effective hourly wage rate in that it takes into account labor earnings, whether as a result of a set salary, or, whether derived from profit sharing. We control for various other sources of income (OTHERINC) which includes lump sum payments from insurance, pension or inheritance, plus alimony and any other source of income, excluding labor/self employed income, capital income, and any pension or social security income. We include three pension dummy variables: PENSION<=62 is a dummy variable taking on the value 1 if an individual has a work sponsored pension and is eligible for full benefits at age 62 or younger (This is our base category). PENSION>62 is a dummy variable taking on the value 1 if the individual has a work sponsored pension and is eligible for full benefits after age 62. NOPENSION is a dummy variable taking on the value 1 if the individual does not have a work sponsored pension. If the individual's planning horizon is longer than 10 years, the variable (FINPLAN) takes on the value 1. This variable is a proxy for the effective rate of time preference. (HEALTH) is the individuals self reported health which takes on the value 1 if the individual reports his/her health to be fair or poor, and takes on the value zero if health is reported to be excellent, very good or good. (HCOV) takes on a value of 1 if the individual does not have employer sponsored health cover that extends into retirement. Mortality expectations are controlled for by looking at the respondent's self reported probability of living till age 75 (P75), while the respondent's self reported probability of leaving a large bequest (>=$100 000) is given by (PBEQUEST). Other variables controlled for are: age of individual (AGE); marital status for single individuals, i.e., whether (DIVORCED) or (WIDOWED), with the base category being people who have never been married; and number of children in the household (HCHILD). Controlling for marital history and number of children is

$log(\sqrt{\theta x^2 + 1} + \theta x)/\theta$. We follow studies such as Kapteyn and Panis (2003) and others, and set $\theta = 1$.

important in controlling for the structure of the single household. A divorced single would behave very differently from a single person who has never been married, or is widowed. In the case of non fixed effects regressions we control for (RACE) and (EDUCD). RACE takes on a value of 1 if the individual is white and zero otherwise. EDUCD takes on the value 1 if the individual has a college education and zero otherwise. Time dummies are included in all regressions.

As an instrument for P62, we use the individual's response to a question asking what the usual retirement age is for people in their kind of job. USUALD is a dummy variable taking on a value 1 if the age given is 62 or younger. We transform the variable into a dummy variable in this fashion, since what is likely to matter for the probability of working past age 62, is whether the usual retirement age is past age 62. The first stage regressions in Tables 14 and 15 confirm the appropriateness of constructing the dummy variable in this manner.

We provide a brief intuitive argument for the validity of the instrument. It might be argued that there are certain job characteristics such as pension and health coverage characteristics that might effect both the usual age of retirement on the job and individual saving behavior. Hurd and Mcgarry (1993a, 1993b) show that the pension characteristic that most determines the age of retirement, is the age at which an individual can start receiving full benefits (usually referred to as the normal retirement age of the pension). Since we have controlled for this pension characteristic in the regression, variation in the usual retirement age should not reflect variation in the normal retirement age of the pension. Hurd and Mcgarry (1993a) also show that whether or not retirees are covered by employee health insurance also influences the probability of working past age 62. This is since individuals only become eligible for medicare at age 65. Since we have controlled for this in the regression, variation in the usual retirement age does not reflect variation in health care of retirees of the firm. The effective hourly wage controls for earning characteristics of the job that might simultaneously effect the individual's saving behavior and the usual retirement age on the job. It is thus likely, that any variation in the usual retirement age on the job, is a reflection of job characteristics such as physical and mental demands, stress levels, and convention in decision making— characteristics that are all likely to be exogenous to the individual's saving decision.

In the context of married couples we control for the characteristics of both spouses. All variables referring to the husband will be prefixed with an H, and those referring to the wife prefixed with a W.

In Tables 1 to 5, we present various summary/descriptive statistics concerning the WEALTH and P62 variables. In Table 6 we present some summary statistics on the instrument. Table 1 illustrates the fact that on average married households have the most wealth, followed by single men. Single women have the least wealth. Table 2 illustrates that married women have a substantially lower probability of working full time past age 62 than any other group. Table 3 shows the percentage of individuals in each group having WEALTH less than, equal to, and greater than zero. Single women have the least amount of positive wealth, followed by single men, and then by married couples. Single women also incur the most debt. Table 4 shows the mean and median wealth levels, for P62 greater than, and smaller than its median. With the exception of single men, higher probabilities of working full time after age 62 are associated with lower wealth levels. Of course the question to be answered is which way the direction of association runs. Table 5 shows how the mean of P62 changes with age, and pension characteristics. We see that for all groups, the subjective probability of working after age 62 increases as the individual approaches age 62. We notice too, that the average probability of working full time past age 62 is lower for individuals who can receive full pension benefits at 62 or younger, than it is for individuals who can receive full pension benefits only after age 62, or individuals who have no pension at all. Table 6 shows the distribution of the usual retirement age on the job. Only about 20% of people perceive the usual retirement age as being 62 or below.

As indicated in the introduction, we conduct a Fixed Effects regression to control for unobserved heterogeneity that may affect both the expected retirement dates and wealth levels. We further attempt to correct for the direct endogeneity problem (between wealth and retirement expectations) by using Instrumental Variables estimation. We thus conduct an Instrumental Variables Fixed Effects regression to analyze the effect of exogenous variation in P62 on WEALTH.

# 4 Regression Results

For wealth values not too close to zero, the inverse hyperbolic sine function (IHS),

$$h(\text{WEALTH}) \approx \begin{cases} log(2\text{WEALTH}) \ for \ \text{WEALTH}>0 \\ \text{-}log(2\text{WEALTH}) \ for \ \text{WEALTH}<0 \end{cases} \tag{36}$$

The IHS is anti-symmetric so that

$$h(\text{WEALTH}) = -h(-\text{WEALTH}) \tag{37}$$

Thus, interpreting the regression coefficients of the IHS regression, is essentially the same as interpreting a regression with the dependent variable logged in the usual manner. Multiplying the coefficient by 100, simply shows a percentage change in wealth for a one unit change in any of the explanatory variables, x.

For all groups of individuals, we report the results of the OLS, Fixed Effects and IV Fixed Effects regressions (First stage regressions for IV Fixed Effects are given in Tables 14 and 15.) Table 7 reports the regression results for single females, Table 8 for single males, and Tables 9 and 10 for married couples. The reported Hausman statistics for the IV regressions indicate that the IV fixed effects regression is most appropriate in all cases, and the significance of the USUALD variable in the first stage regressions indicates that it is certainly legitimate.

When looking at the point estimates of the IV Fixed Effects regressions, we notice that single individuals tend to behave differently from married individuals with regards to how they respond to an increase in the subjective probability of working past age 62. The point estimates for both single women and single men indicate a large negative causal effect running from p62 to WEALTH. In particular, for single women, the estimate implies that a 10 percentage point increase in the subjective probability of working past age 62, results in a 28% decrease in wealth[10], while for single men, the same increase in this probability results in a 25% decrease in wealth. However, while these point estimates are very similar, the estimate for single women is significant at the 10% level, while that for single men is not. There is thus a large amount of variability around the point estimate for single men. It is probable that this has something to do with the fact that in the case of single men, the variable USUALD is a weak instrument for P62 ( F-stat –t-stat squared- on USUALD in first stage regression is less than ten). The fact, however, remains that the difference in the magnitude of the effect between single individuals and married individuals is stark, and suggests that single individuals on a whole behave very differently from married individuals in this respect. The point estimates for married individuals suggests that a ten percentage point increase in the husband's subjective probability of working past age 62, decreases household wealth by only 4%, while a ten percentage point increase in the wife's subjective probability of working past age 62 increases household wealth by 1%. Neither estimate is significantly different from zero.

How can we explain the fact that married individuals seem less likely to take cognizance of their retirement date expectations when making saving decisions? It is important to note that the sample of married couples we have in our regression are those where both partners are currently working (This is because they will only enter the regression sample if neither the value for HP62 or WP62 is missing. This will only occur if husband and wife are both working). Thus, a change in one partner's probability of working past age 62, keeping the other's constant might not translate into a significant enough change in future household income to induce changes in household saving. Further, it is probable that one partner's unchanged P62 will allow a certain threshold of consumption to be maintained, even if the other partner retires earlier. Thus, smoothing consumption completely may not be as important as simply maintaining consumption above a certain minimum threshold. We attempt to verify this hypothesis in two different ways. First, we add an interaction term of HP62 with WP62 (In the Instrumental Variables regression, we add an instrument constructed by interacting HUSUALD with WUSUALD). This interaction term will show the effect of variation at the same time in both partners' P62. As a second check, we take a sample of married men whose wives are not currently working, and check whether they are more inclined to take cognizance of HP62 in saving decisions. We do the same for a sample of married women whose husbands are not currently working. The results of the IV Fixed Effects regressions are presented in Table 11. Looking at the point estimates, the interaction term presents an

[10] Or, equivalently, a one percentage point increase in the subjective probability of working past age 62 results in a 2.8% decrease in household wealth. We interpret our estmates in terms of a 10 percentage point increase in P62, since it more plausible to expect a change in this variable of the magnitude from 50 to 60%, say, then from 50 to 51%.

effect almost identical to that in the case of single women and single men. A ten percentage point increase in both the husband and wive's probabilities of working past age 62, results in 29% less household wealth, than if just one spouse's probability increased by the same amount (in which instance there was a negligible effect). Looking at the case where the husband is the sole earner, we see a massive effect. A ten percentage point increase in the husbands probability of working past age 62, results in a 70% decrease in household wealth. Again, however, we need to take cognizance of the large standard errors around these point estimates, probably due to the relative weakness of the instrument for married individuals. While there probably is a large effect for married men who are sole earners, 70% is most likely an overestimate.

In the case of the wife being the sole earner, the magnitude of the effect is very small, i.e., an increase in such a woman's probability of working past age 62 does not have much of an effect on household wealth. This sample of women (whose husbands are most likely unable to work), are probably less able to save for retirement, due to more pressing and immediate responsibilities.

We have thus far established that married couples where both partners are working, are the least likely to alter their savings behavior in response to a change in the probability of working full time after age 62 of just one partner. Apart from sole earning married women, all other individuals seem to take cognizance of this probability in wealth accumulation decisions. Further, due to the small standard errors around the point estimate for single women, we are most confident in this effect for this group. The results seem to suggest that there is a threshold effect in terms of how responsive household wealth is to changes in the household probability of working past age 62. While (with the exception of sole earning married women) a 10 percentage point increase in the *household* probability of working past age 62 results in a decrease in household wealth of 25% or more, the same percentage point change for just one member of a two person working household results in a change in wealth of far less than 10%. It thus seems that it is not so much complete consumption smoothing that is important, as it is to maintain a certain minimum level of consumption, when this can be achieved by the spouse who anticipates no change in his/her retirement date.

It is interesting to note that in all instances (for single women, single men, married men) the age at which one is eligible for full pension benefits is not significant in the wealth equation, but is significant in determining P62 (see first-stage regressions in appendix). Thus, whether individuals have a pension, and the age of pension eligibility, affects their retirement expectations, rather than their saving decisions. However, if retirement expectations change for reasons other than a change in pension status, pension status might affect the manner in which individuals' savings behavior reacts to such a change in retirement expectations. Thus, as a last measure, we analyze whether pension characteristics, and in particular, the earliest age at which one is eligible to receive full benefits, is significant in determining whether individuals take cognizance of retirement date expectations in wealth accumulation decisions. We would expect individuals who expect to retire earlier to save more, if retiring early imposes a significant wealth or liquidity effect. An individual who expects to retire at or before age 62 and is eligible for full pension benefits at or before age 62, is in a far better position than one who expects to retire at or before age 62, but is only eligible for full pension benefits after age 62, or does not have a pension at all. We thus run separate IV Fixed Effects regressions for the sample of individuals with NOPENSION=1 or PENSION>62 =1 (no pension, or eligibility for full pension benefits after age 62), and for those with PENSION<=62=1 (pension with eligibility for full benefits at age 62 or earlier).

Tables 12 and 13 show the coefficient on p62 by pension characteristics. Married individuals here are those from the original sample of a two person working household. We notice that on a whole (with the exception of single men), the negative causal relationship running from P62 to wealth is far more predominant if individuals have no pension, or are only eligible for full benefits after age 62.

# 5 Conclusion

This paper investigates the impact of subjective expectations regarding the timing of retirement on pre-retirement wealth accumulation. More specifically, we analyze the effect of the agent's subjective belief that he will work full time after age 62 (P62) on his current level of wealth. We use Instrumental Variables Fixed Effects regression to correct for any endogeneity between P62 and wealth. The individual's perception of the usual retirement age on the job acts as an instrument for p62.

On a whole, the point estimates suggest that the responsiveness of individuals' saving behavior to retirement dates expectations is large. A ten percentage point increase in the probability of working past age 62 results in a decrease in household wealth well in excess of 20% for most demographic groups. There are two notable exceptions. One is married women who are the sole earners. The other is when there is a change in the probability of working past age 62 for just one member of a two person (married) working household. While a simultaneous ten percentage point increase in this probability for both partners results in a 29% decrease in household wealth, the same percentage point increase in this probability for just one partner has a negligible effect on household wealth. It is, thus, probable that the household is happy to rely on one partner's unchanged p62 to maintain a certain consumption threshold, in the event that the other partner retires earlier. It thus seems that it is not so much complete consumption smoothing that is important, as it is to maintain a certain minimum level of consumption.

We note that the responsiveness of saving decisions to retirement date expectations is generally more predominant, the more a change in retirement expectations imposes a wealth or liquidity effect, as measured by pension status. In particular, the negative causal relationship running from P62 to wealth is far more predominant if individuals have no pension, or are only eligible for full benefits after age 62.

It is important to take cognizance of the fact that except for the case of single women, in which case the instrument is strong, the standard errors around the other point estimates are large. Thus, while we maintain that it is likely that large effects are present for other demographic groups, we need to be aware that the standard errors are smallest in the case of single women.

In that —on a whole— the point estimates suggest that individuals do seem to take cognizance of retirement date expectations in decisions to accumulate wealth, the retirement-consumption- puzzle is not due to complete myopic behavior. We have however shown that —in certain instances— it is likely that complete consumption smoothing is not as important as maintaining a certain minimum threshold level of consumption, in which instance consumption would drop to a degree at retirement. The fact remains that individuals do— in the large— alter their saving behavior in response to changes in the expected timing of retirement that will induce significant enough changes in future household income. As such, changing trends in retirement dates is likely to have a negative effect on individuals' pre-retirement saving behavior.

In conclusion, we emphasize the fact that the point of this paper is to examine the behavioral effect of changing retirement dates on saving. We need to acknowledge that we are not analyzing aggregate saving. Aggregate saving is determined by the aggregation of the saving of the young and the dissaving of the old. In addition to the behavioral effects of individual saving behavior addressed in this paper, there is a compositional element at the aggregate level which is induced by a change in retirement dates ( c.f., Romm and Wolny, 2011). That is, with later retirement dates there is an increase in the percentage of the working population relative to the non-working population. This compositional effect implies that there is also a greater percentage of savers. Thus, while the aim of this paper is to study how later retirement dates affect the saving behavior of the individual, we also need to be aware that at the aggregate level there is a positive compositional effect in addition to this negative behavioral effect. The net effect of later retirement dates on aggregate saving, will be determined by the relative strengths of the behavioral and compositional effects[11].

[11] Romm and Wolny (2011) show that —in general—the behavioral effect will dominate.

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Appendix A: Proofs

**Proof of Proposition 1**

We use recursive methods, as illustrated by Stockey et al. (1989).

From condition 8, we know that all worth should be exhausted by the end of time $T$. Thus

$$c_T = w_T \tag{38}$$

In general, we can write:

$$c_T = m_T \cdot w_T \tag{39}$$

where $m_T$ is the marginal propensity to consume out of total worth in period $T$, with $m_T = 1$.

Now, by equation 16 we have $c_{T-1} = (\beta R)^{-\frac{1}{\theta}} c_T$, and by equation 6

$$(\beta R)^{\frac{1}{\theta}} \cdot c_{T-1} = (w_{T-1} - c_{T-1}) \cdot R \tag{40}$$

$\Rightarrow$

$$c_{T-1} = \left( \frac{R}{(\beta R)^{\frac{1}{\theta}} + R} \right) \cdot w_{T-1}$$

i.e.

$$m_{T-1} = \left( \frac{R}{(\beta R)^{\frac{1}{\theta}} + R} \right) \cdot m_T$$

and by continuing recursively, we have in general

$$c_{T-k} = \left( \frac{R^k}{\sum_{j=0}^{k} (\beta R)^{\frac{j}{\theta}} R^{k-j}} \right) \cdot w_{T-k} \tag{41}$$

and

$$m_{T-k} = \left( \frac{R^k}{\sum_{j=0}^{k} (\beta R)^{\frac{j}{\theta}} R^{k-j}} \right) \cdot m_T \tag{42}$$

with $m_T = 1$.

Appendix B: Figures and Tables

Figure 1: Plot of P62 against L.P62

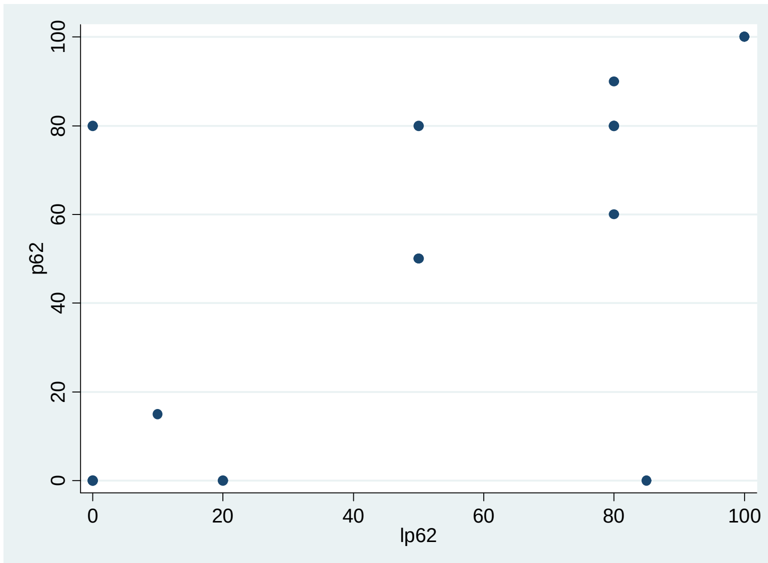
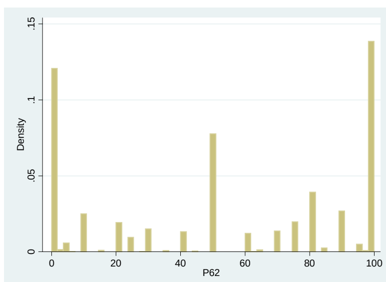
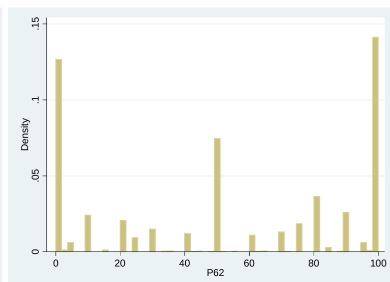


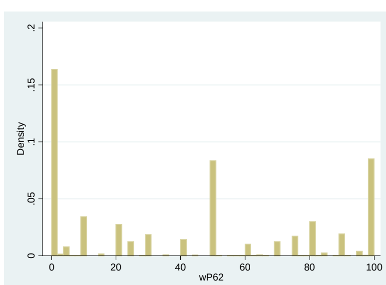
Figure 2: Distribution of p62



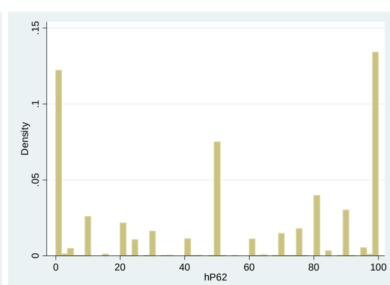

Single Women




Single Men




Married Women




Married Men

| | WEALTH (in levels) | | |
|---|---|---|---|
| | Single Women | Single Men | Married Couples |
| mean | 149 001 | 225 079.7 | 372 970.6 |
| median | 50 000 | 57 700 | 166 000 |
| standard Deviation | 502 152.2 | 1049 573 | 1033 032 |
| no of observations | 32 662 | 12 159 | 42 319 |

Table 1: Summary Statistics for Wealth

| | P62 | | | |
|---|---|---|---|---|
| | Single Women | Single Men | Married Men | Married Women |
| mean | 53.2 | 52.7 | 52.8 | 40 |
| median | 50 | 50 | 50 | 41.5 |
| standard deviation | 39.4 | 39.6 | 39.3 | 37.9 |
| no of observations | 6342 | 2921 | 12 843 | 14 953 |

Table 2: Summary Statistics for p62

| | Single Women | Single Men | Married Households |
|---|---|---|---|
| % with WEALTH <0 | 5.4 | 5.1 | 2.3 |
| % with WEALTH=0 | 10 | 8 | 1 |
| % with WEALTH >0 | 84.6 | 87 | 96.7 |

Table 3: Distribution of Wealth

| | mean WEALTH | median WEALTH |
|---|---|---|
| Single Women | | |
| P62>50 | 128 743 | 51 500 |
| P62<50 | 144 765 | 55 300 |
| Single Men | | |
| P62> 50 | 313 156 | 65 250 |
| P62< 50 | 186 768 | 65 100 |
| Married Couples | | |
| HP62>50 | 300 500 | 115 800 |
| HP62< 50 | 342 300 | 168 000 |
| WP62 >40 | 305 740 | 136 000 |
| WP62<40 | 349 555 | 175 000 |

Table 4: Mean and Median Wealth by p62

| AGE | mean P62 | pension status | mean p62 |
|---|---|---|---|
| Single Women | | Single Women | |
| AGE <56 | 50.1 | PENSION<=62=1 | 39.8 |
| AGE>= 56 | 55.7 | PENSION>62=1 OR NOPENSION=1 | 54.2 |
| Single Men | | Single Men | |
| AGE<56 | 51.4 | PENSION<=62=1 | 37.5 |
| AGE >=56 | 53.9 | PENSION>62=1 OR NOPENSION=1 | 54.1 |
| Married Men | | Married Men | |
| HAGE <56 | 50.84 | HPENSION<=62=1 | 35.8 |
| HAGE>=56 | 54.2 | HPENSION>62=1 OR HNOPENSION=1 | 54.8 |
| Married Women | | Married Women | |
| WAGE <56 | 30 | WPENSION<=62=1 | 31.0 |
| WAGE>=56 | 50 | WPENSION>62=1 OR WNOPENSION=1 | 42.3 |

Table 5: Mean p62 by Age and Pension Status

| | Single Women | Single Men | Married Women | Married Men |
|---|---|---|---|---|
| % with USUAL <=62 | 18 | 19 | 22.4 | 22 |
| % with USUAL >62 | 25.1 | 27.6 | 24.2 | 30.86 |
| % with no usual or otherwise | 56.9 | 53.4 | 53.4 | 47.1 |
| no observations | 9094 | 4378 | 18 199 | 20 872 |

Table 6: Distribution of the variable -Usual

| | OLS | FIXED EFFECTS | IV FIXED EFFECTS |
|---|---|---|---|
| | IHS(WEALTH) | IHS(WEALTH) | IHS(WEALTH) |
| P62 | $-0.005^{***}$ | $-0.002$ | $-0.028^{*}$ |
| | $(-2.97)$ | $(-1.10)$ | $(-1.67)$ |
| WGHR | $0.002^{*}$ | 0.001 | -0.001 |
| | (1.89) | (0.54) | (0.79) |
| LNOTHERINC | $0.038^{***}$ | $0.037^{**}$ | $0.038^{***}$ |
| | (2.69) | (2.42) | (2.35) |
| PENSION>62 | 0.026 | $-0.051$ | 0.091 |
| | (0.10) | $(-0.19)$ | (0.31) |
| NOPENSION | $-0.510^{*}$ | $-0.107$ | 0.019 |
| | $(-1.90)$ | $(-0.34)$ | (0.06) |
| FINPLN | $0.669^{***}$ | 0.200 | 0.211 |
| | (4.55) | (1.14) | (1.17) |
| HEALTH | $-1.329^{***}$ | $-0.190$ | $-0.327$ |
| | $(-7.97)$ | $(-0.86)$ | $(-1.34)$ |
| HCOV | $0.608^{***}$ | $-0.418^{*}$ | $-0.282$ |
| | (3.84) | $(-1.87)$ | $(-1.15)$ |
| P75 | $-0.001$ | $-0.003$ | $-0.0002$ |
| | $(-0.56)$ | $(-1.08)$ | $(-0.06)$ |
| PBEQUEST | $0.031^{***}$ | $0.007^{***}$ | $0.006^{**}$ |
| | (19.28) | (2.45) | (2.38) |
| HOURS | 0.009 | $0.016^{***}$ | $0.023^{**}$ |
| | (1.60) | (2.10) | (2.54) |
| AGE | $0.037^{***}$ | $-0.234$ | $0.006^{**}$ |
| | (2.79) | $(-1.24)$ | (2.38) |
| DIVORCED | $0.658^{***}$ | $0.702^{**}$ | $0.606^{*}$ |
| | (4.07) | (2.09) | (1.72) |
| WIDOWED | $1.081^{***}$ | 0.324 | 0.049 |
| | (6.02) | (0.69) | (0.10) |
| HCHILD | $-0.046$ | 0.108 | 0.104 |
| | $(-1.55)$ | (1.07) | (1.00) |
| RACED | $1.363^{***}$ | | |
| | (10.10) | | |
| EDUCD | $0.580^{***}$ | | |
| | (3.63) | | |
| CONS | $5.301^{***}$ | $22.703^{***}$ | |
| | (6.37) | (3.33) | |
| no of obs | 4730 | 4730 | 4730 |
| hausman stat for IV regression | | | $46.50^{**}$ |

Notes: Time/ wave dummies are included in all regressions..
* denotes significance at the 10% level; ** at the 5% level, and *** at the 1% level.
Figures in parentheses are t values.

Table 7: Regression Results for Single Women

| | OLS | FIXED EFFECTS | IV FIXED EFFECTS |
|---|---|---|---|
| | IHS(WEALTH) | IHS(WEALTH) | IHS(WEALTH) |
| P62 | - 0.001 (−0.15) | 0.004 (1.27) | −0.025 (−0.67) |
| WGHR | 0.005*** (3.45) | 0.001 (0.30) | 0.001 (0.30) |
| LNOTHERINC | 0.053** (2.31) | 0.040 (1.49) | 0.023 (0.83) |
| PENSION>62 | 0.028 (0.09) | −0.369 (−1.03) | −0.110 (−0.22) |
| NOPENSION | 0.070 (0.21) | 0.367 (0.87) | 0.661 (1.14) |
| FINPLN | 0.040 (0.18) | −0.316 (−1.26) | −0.212 (−0.72) |
| HEALTH | −0.344 (−1.42) | −0.406 (−1.22) | −0.483 (−1.34) |
| HCOV | 1.178*** (5.63) | 0.207 (0.72) | 0.192 (0.64) |
| P75 | 0.004 (1.59) | 0.003 (0.68) | 0.004 (0.97) |
| PBEQUEST | 0.031*** (12.43) | −0.001 (0.32) | −0.001 (−0.05) |
| HOURS | 0.013** (1.96) | 0.020 (1.16) | 0.020 (1.33) |
| AGE | 0.036* (1.74) | 0.488* (1.90) | 0.401 (1.39) |
| DIVORCED | 0.265 (1.42) | −0.432 (−1.11) | −0.503 (−1.21) |
| WIDOWED | −0.465 (−1.54) | −0.671 (−0.77) | 0.661 (1.14) |
| HCHILD | −0.013 (−0.33) | - 0.052 (−0.45) | −0.064 (−0.52) |
| RACED | 1.280*** (6.49) | | |
| EDUCD | 0.830*** (4.02) | | |
| CONS | 4.54*** (3.67) | −15.311 (−1.17) | −10.16 (−0.67) |
| no of obs | 1980 | 1980 | 1980 |
| hausman stat for IV regression | | | 50.82** |

Notes: Time/ wave dummies are included in all regressions..
* denotes significance at the 10% level; ** at the 5% level, and *** at the 1% level.
Figures in parentheses are t values.

Table 8: Regression Results for Single Men

| | OLS | Fixed Effects | IV Fixed Effects |
|---|---|---|---|
| | IHS(WEALTH) | IHS(WEALTH) | IHS(WEALTH) |
| HP62 | $-0.002^{***}$ (−4.25) | $0.001^{*}$ (1.71) | −0.004 (−0.58) |
| WP62 | $-0.004^{***}$ (−8.14) | $-0.003^{***}$ (−4.43) | 0.001 (0.11) |
| HWGHR | $0.001^{***}$ (5.42) | −0.0001 (−0.22) | −0.00001 (−0.10) |
| WWGHR | $0.003^{***}$ (5.11) | 0.0001 (0.05) | 0.00007 (0.11) |
| LNOTHERINC | $0.009^{**}$ (1.99) | 0.007 (1.53) | 0.007 (1.56) |
| HPENSION>62 | $-0.126^{*}$ (−1.77) | −0.085 (−1.26) | −0.071 (−0.92) |
| HNOPENSION | −0.006 (−0.09) | 0.051 (0.66) | 0.054 (0.62) |
| WPENSION>62 | 0.032 (0.45) | 0.053 (0.74) | 0.026 (0.31) |
| WNOPENSION | −0.120 (−1.66) | $0.140^{*}$ (1.72) | $0.135^{*}$ (1.73) |
| HFINPLN | −0.006 (−0.08) | 0.090 (1.01) | 0.061 (0.57) |
| WFINPLN | $0.247^{***}$ (3.43) | −0.138 (−1.60) | −0.138 (−1.49) |
| HHEALTH | $-0.452^{***}$ (−7.19) | $-0.132^{*}$ (−1.69) | $-0.153^{*}$ (−1.76) |
| WHEALTH | $-0.544^{***}$ (−8.24) | 0.058 (0.67) | 0.071 (0.73) |
| HHCOV | 0.047 (1.04) | 0.041 (0.65) | 0.034 (0.52) |
| WHCOV | 0.013 (0.33) | 0.005 (0.10) | 0.010 (0.19) |
| HP75 | $-0.002^{**}$ (−2.16) | −0.001 (−1.37) | −0.001 (−0.34) |
| WP75 | $0.002^{**}$ (1.98) | −0.0002 (−0.23) | −0.001 (−0.39) |
| HPBEQUEST | $0.011^{***}$ (21.79) | 0.0004 (0.64) | 0.001 (0.70) |
| WPBEQUEST | $0.010^{***}$ (19.66) | 0.0005 (0.67) | 0.0004 (0.52) |
| HAGE | $0.047^{***}$ (9.42) | −0.0003 (−0.01) | −0.0004 (−0.01) |
| WAGE | $0.024^{***}$ (6.29) | $0.054^{*}$ (1.91) | 0.051 (1.59) |
| HCHILD | −0.179 (−1.42) | $-0.463^{*}$ (−1.88) | $-0.456^{*}$ (−1.77) |
| HHOURS | $0.007^{***}$ (4.33) | −0.003 (−1.53) | −0.003 (−1.16) |
| WHOURS | $-0.005^{***}$ (−2.91) | 0.004 (1.60) | 0.003 (0.76) |

Table 9: Regression Results for Married Couples

| | OLS | FIXED EFFECTS | IV FIXED EFFECTS |
|---|---|---|---|
| HEDUCD | 0.173*** (3.36) | | |
| WEDUCD | 0.122** (2.26) | | |
| HRACED | 0.148*** (3.38) | | |
| WRACED | 0.227*** (5.22) | | |
| CONS | 7.405*** (21.51) | 9.859*** (5.16) | 10.130*** (4.67) |
| no of obs | 11932 | 11932 | 11932 |
| hausman stat for IV regression | | | 216.77*** |

Notes: Time/ wave dummies are included in all regressions..
* denotes significance at the 10% level; ** at the 5% level, and *** at the 1% level.
Figures in parentheses are t values.

Table 10: Regression Results for Married Couples- Continued

| | with interaction term | husband sole earner | wife sole earner |
|---|---|---|---|
| HP62*WP62 | −0.029 (−0.08) | | |
| HP62 | | −0.070 (−1.09) | |
| WP62 | | | 0.009 (0.39) |
| no of observations | 11 684 | 5245 | 5234 |

Table 11: Married Couples-More Results

| | Single Women | | Single Men | |
|---|---|---|---|---|
| | PENSION<=62 | PENSION>62 OR NOPENSION | PENSION<=62 | PENSION>62 OR NOPENSION |
| p62 | 0.005 (0.06) | −0.040* (−1.82) | −0.030 (−0.50) | −0.025 (−0.59) |
| no of observations | 328 | 4402 | 884 | 1096 |

Table 12: Effect of p62 on Wealth- by Pension Status

| | Married Men | | Married Women | |
|---|---|---|---|---|
| | HPENSION<=62 | HPENSION>62 OR HNOPENSION | WPENSION<=62 | WPENSION>62 OR WNOPENSION |
| P62 | 0.040 (1.18) | −0.016 (−0.90) | 0.087 (0.81) | −0.011 (−0.64) |
| no of observations | 2508 | 8400 | 2161 | 8652 |

Table 13: Effect of p62 on Wealth-by Pension Status-Continued

| P62 | Single Women | Single men |
|---|---|---|
| WGHR | 0.02 (1.15) | 0.001 (0.04) |
| LNOTHERINC | - 0.02 (−0.11) | - 0.404 (−1.63) |
| PENSION>62 | 4.82* (1.87) | 8.37** (2.23) |
| NOPENSION | 3.50 (1.16) | 9.36** (2.12) |
| FINPLN | 0.30 (0.18) | 3.66 (1.39) |
| HEALTH | −4.99** (−2.35) | −3.13 (−0.90) |
| HCOV | 5.37** (2.50) | −0.53 (−0.18) |
| P75 | 0.11*** (3.94) | 0.07* (1.79) |
| PBEQUEST | 0.005 (0.23) | 0.04 (0.97) |
| AGE | 3.091* (1.71) | −2.54 (−0.95) |
| DIVORCED | 4.81* (1.87) | −2.66 (−0.65) |
| WIDOWED | 3.500 (1.16) | −15.99* (−1.75) |
| HCHILD | - 0.283 (−0.29) | - 0.34 (−0.29) |
| HOURS | 0.298*** (4.10) | 0.294*** (2.75) |
| USUALD | −10.405*** (−6.37) | −6.70*** (−2.72) |
| CONS | −122.67 (−1.34) | 159.40 (1.16) |
| Time dummies are also included | | |

Table 14: First Stage Estimates: Singles

| WP62/HP62 | Married Women | Married Men |
|---|---|---|
| HHOURS | 0.002 (0.05) | 0.13*** (3.05) |
| WHOURS | 0.25*** (5.57) | 0.03 (0.66) |
| HWGHR | −0.004* (−1.77) | −0.0001 (−0.03) |
| WWGHR | −0.003 (−0.31) | 0.004 (0.36) |
| LNOTHERINC | −0.12 (−1.50) | 0.05 (0.59) |
| HPENSION>62 | 2.86** (2.33) | 4.69*** (3.68) |
| WPENSION>62 | 1.30 (0.99) | −3.64 (−2.68) |
| HNOPENSION | 3.30** (2.31) | 2.77 (1.48) |
| WNOPENSION | −0.04 (−0.03) | −0.69 (−0.45) |
| HFINPLN | 3.75** (2.30) | −2.46 (−1.45) |
| WFINPLN | 2.92* (1.85) | 1.97 (1.20) |
| HHEALTH | −1.90 (−1.34) | −5.25*** (−3.57) |
| WHEALTH | −3.56** (−2.26) | −0.57 (−0.35) |
| HHCOV | −0.75 (−0.65) | −1.83 (−1.53) |
| WHCOV | −0.46 (−0.46) | 0.5 (0.48) |
| HP75 | −0.07*** (−4.40) | 0.07*** (4.01) |
| WP75 | 0.08*** (4.88) | 0.01 (0.67) |
| HPBEQUEST | −0.02 (−1.63) | −0.001 (−0.03) |
| WPBEQUEST | 0.01 (1.07) | −0.003 (−0.23) |
| HAGE | 1.06** (2.09) | 0.75 (1.41) |
| WAGE | 1.16** (2.24) | 0.36 (0.65) |
| HCHILD | −6.07 (−1.35) | −2.82 (−0.60) |
| HUSUALD | −0.58 (−0.67) | −6.68*** (−4.96) |
| WUSUALD | −4.08*** (−4.81) | −1.84** (−2.09) |
| CONS | −77.06** (−2.22) | −9.43 (−0.26) |
| Time Dummies are included | | |

Table 15: First Stage Estimates: Married Couples