# How Do Long-Run Financial Planning Expectations and Decisions Respond to Short-Run Fluctuations in Financial Markets?

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## Abstract

While media reports predicted substantial changes in labor supply behavior due to the sharp decline in the value of the stock market in October 2008, empirical evidence on the relationship between equity markets and retirement is mixed. We use panel data from the Health and Retirement Study to investigate the relationship between stock market performance and plans for retirement during 1998-2008, a period that includes the recent financial crisis, by exploiting within-year variation in the S&P 500 index across plausibly exogenous dates of interview. While we do detect a statistically significant negative relationship between the reported probability of working full-time at age 62 and the S&P 500 index in the most recent years of our study period, we do not find strong evidence that changes in equity markets influence changes in retirement plans over the period as a whole. We conclude that the higher probabilities of working reported in recent years were likely due to factors other than stock market performance, such as pessimism about economic security more generally.

## I. Introduction

The percentage of employees who participated in defined benefit plans declined from 80 percent in 1985 to 33 percent in 2008, while the share participating in defined contribution plans rose from 41 percent to 55 percent over the same time span (EBRI 2010). The decline of the defined benefit pension plan and the rise of the defined contribution plan have dramatically shifted the responsibility of planning for retirement to workers, who must make decisions regarding the amount to contribute to defined contribution plans and how to allocate the investments. While the spread of defined contribution plans has offered workers more labor market flexibility and control over their investments, it has also led to an increase in equity exposure among households and shifted the risk of poor investment experience from employers to employees.

This increase in equity exposure is particularly important given the high volatility markets have experienced over the last decade. The U.S. stock market experienced double-digit returns in the late 1990s, followed by a loss of 37 percent of the value of the S&P 500 index between March 2000 and September 2001. More recently, the S&P 500 index lost more than 50 percent of its value from its peak in October 2007 to its bottom in March 2009. A 2009 survey by the Pew Research Center found that 56 percent of individuals aged 65 and over, and 75 percent of individuals aged 50-64, report that the financial crisis and recession that began in 2007 "will make it harder to meet retirement needs" (Taylor et al. 2009).

The life-cycle model predicts that unanticipated changes in wealth would change expectations regarding labor market and retirement behavior. This sentiment is seen in press reports which suggest that the declines in wealth brought about by the steep fall in asset values forced households to delay their plans for retirement. The Wall Street Journal reported in April

2008, "Investment advisers and retirement planners … say they are seeing large numbers of older workers put off retirement as the housing and stock-market troubles have deepened."[1] By September 2008, the problem had only gotten worse: "With nest eggs shrinking, housing prices still falling and anxieties about their financial future growing, the oldest members of the baby-boom generation are putting the brakes on plans to leave the office."[2] Similar ideas were expressed earlier in the decade: Time Magazine's July 29, 2002 cover article was entitled, "Will You Ever Be Able to Retire?"

However, there are several reasons to think that fluctuations in the stock market may not have had such dramatic effects. Gustman, Steinmeier, and Tabatabai (2009a, 2009b) suggest that the average person approaching retirement age is not likely to have suffered a substantial financial shock from the stock market downturn in 2008-2009 because the current generation of retirees do not have a large amount of their wealth in defined contribution plans. Moreover, Engen, Gale and Uccello (2005) find no link between the adequacy of retirement savings and aggregate equity values. This result is explained by the unequal distribution of equity holdings: equity holdings are concentrated among households with significant amounts of other wealth. In addition, increased layoffs brought on by the recession may increase the amount of involuntary retirements, pushing in the opposite direction (Gustman et al. 2009a, 2009b). Finally, there is some evidence that changes in stock market wealth may have affected consumption more than leisure (Kezdi and Sevak 2004) and that other constraints, such as penalties from defined benefit pension plans for retiring early or the loss of employer-sponsored health coverage, may attenuate the effect of wealth shocks on retirement behavior (Khitatrakun 2003).

[1] "Americans Delay Retirement As Housing, Stocks Swoon," *The Wall Street Journal*, April 1, 2008, page A1.
[2] "Baby Boomers Delay Retirement," *The Wall Street Journal*, September 22, 2008, page A4.

Previous work on the effect of stock market gains on labor supply behavior has found mixed results. Cheng and French (2000) and Gustman and Steinmeier (2002) estimate parameters of a structural model which indicate high stock market returns increase retirement rates. Coronado and Perozek (2003) find that holders of corporate equity retired approximately 7 months earlier than expected due to the bull market of the 1990s, and Sevak (2002) finds evidence that workers with DC plans retired earlier than workers with DB plans when the stock market increased in value. However, Hurd and Reti (2001) and Hurd, Reti, and Rohwedder (2005) find no effect of increased stock market wealth on retirement expectations, and Coile and Levine (2006) show that the stock market decline which began in 2000 did not drive aggregate increases in labor supply among older workers in the early 2000s. In follow-up work, Coile and Levine (2009) find that older workers with higher levels of education are sensitive to stock market conditions, though they estimate that the increase in retirement attributable to rising unemployment will be almost 50 percent larger than the delayed retirement due to the recent stock market crash.

In this paper, we examine how expectations regarding labor force participation and retirement change when stock market values fluctuate. We utilize the Health and Retirement Study (HRS), a longitudinal panel study conducted every two years that is intended to be representative of the over-50 population. The HRS contains detailed information about individuals' wealth, income, and demographic characteristics, as well as self-reported measures of retirement expectations (the probability of working after age 62, the probability of working after age 65, and the expected retirement age). We exploit changes within the year in the value of the S&P 500 index to determine whether individuals who were surveyed on days when the S&P 500 index was lower, or had delivered a lower return over the previous year, changed their expectations of labor force behavior relative to individuals who were surveyed when the stock

market was higher in value. The panel nature of the data allows us to control for unobserved heterogeneity in tastes for working, and detailed information on each respondent's location allows us to control for local (state and county level) changes in housing and labor market conditions. We look at not only the years surrounding the recent financial crisis, but also additional market fluctuations between 1998 and 2008.

Overall, we find very little evidence that stock market fluctuations, whether measured by the level of stock values or the recent rate of return on stocks, affect people's self-reported retirement plans. We then investigate whether individuals respond differently to positive and negative stock market returns; this might occur because of loss aversion or employment-related factors that make it easier to delay retirement than move it forward (e.g., early retirees may lose employer-provided health insurance before becoming eligible for Medicare). However, we find no evidence of a relationship for either positive or negative stock market returns. We do find a relationship between stock market performance and the self-reported probability of working after age 62 during the most recent crisis (i.e., in the 2006 and 2008 survey waves), but we hesitate to interpret this as a causal relationship between the stock market and retirement plans. The relationship only exists in the most recent two waves of the survey, and stock market performance might have been correlated with other factors (e.g., risk of more serious economic problems) during the financial crisis.

It is possible that most people are not sensitive to stock market performance because wealth shocks will not materially affect their standard of living during retirement (they either have very little wealth, or sufficiently high wealth to be protected from shocks), or because they lack flexibility in adjusting their retirement date. To test whether this is the case, we identify groups that are likely to be more responsive to stock market changes. These groups include individuals

aged 58 and above (who have less time to recover from wealth shocks), those with financial assets greater than their current income but less than 20 times their current income (whose standard of living during retirement is most likely to be sensitive to wealth shocks), those not covered by defined benefit pensions (who are more likely to be exposed to the stock market and less likely to face penalties for retiring early), and those with retiree health insurance (who can retire early without losing health insurance). We do find a negative and statistically significant relationship between stock market performance and retirement plans for individuals aged 58 and above. However, among the other groups, we find no evidence of responsiveness to stock market performance. Moreover, the relationship for the older group does not hold up under further scrutiny; for example, older individuals with defined contribution plans (whom we would expect to be more exposed to the stock market) do not appear to react to stock market changes. This further reinforces our conclusion that there is little evidence for a strong relationship between stock market performance and (self-reported) retirement plans.

While we are certainly not the first to use HRS data – or the questions about retirement expectations – to study the impact of wealth shocks on retirement plans, our paper contributes to the existing literature in several ways. First, we are among the first to use newly released data from the 2008 HRS to provide direct empirical evidence of the impact of the financial and economic crisis of 2007-09. Second, by requesting permission to use restricted HRS data, which contains the exact interview dates for each respondent, we generate considerable variation in stock market activity by exploiting plausibly exogenous dates of interview within each survey wave. Under the assumption that the exact date of interview is more or less random, we can compare how expectations regarding retirement changed for respondents who experienced a large gain in the value of the stock market between their previous and current interview relative

to respondents who saw a large loss. The interviews for the 2008 HRS took place between March 2008 and February 2009, and the volatility in the stock market over that period implies that respondents who were interviewed on different dates had very different stock market experiences. For example, while the average respondent from the 2008 wave experienced a loss in the S&P 500 of 24 points (1.67 percent) since their previous interview, depending on the timing of interviews, the change ranged from a loss of 648 points (44.9 percent) to a gain of 190 points (15.5 percent).

In addition, through use of state and county-level geographic identifiers in the restricted HRS data, we are able to control for local labor and housing market conditions in a more precise way than previous studies. We can match respondents with county-level unemployment rates and state-level house price indices.[3] This is important because the weak labor market brought on by the recession may increase the amount of involuntary retirements, offsetting any delays in retirement as a result of the stock market (Gustman, Steinmeier, and Tabatabai 2009a, 2009b; Coile and Levine 2009). Furthermore, failing to control adequately for shocks to housing wealth (which are likely to be positively correlated with shocks to stock market wealth) may cause one to overestimate the impact of stock market valuations on retirement decisions. Finally, we provide further tests on the relationship between equity markets and retirement behavior by separating our sample into groups that are more and less likely to respond to changes in stock values.

The remainder of this paper proceeds as follows. Section II provides an overview of the literature on wealth and retirement, and recent work regarding the 2007-2009 financial crisis and its expected impact on elderly workers. In Section III, we describe the data used in this study,

[3] The public release version of the HRS contains only the month of interview and Census region for each respondent.

and provide our empirical strategy in Section IV. Section V presents our results, and Section VI concludes.

## II. Previous Literature

There has been a large amount of interest in the effect of wealth on retirement behavior more generally. Economic theory suggests that leisure is a normal good and that higher amounts of wealth should reduce labor supply. The difficulty in testing this hypothesis is that households with higher wealth differ on unobservable characteristics from those with lower amounts of wealth. Therefore, researchers have sought sources of exogenous variation in wealth to identify the causal impact. Aside from studies which exploit changes in stock market valuations referenced earlier, sources of variation have included lottery winnings (Imbens, Rubin, and Sacerdote 2001), inheritance receipt (Holtz-Eakin, Joulfaian, and Rosen 1993, Joulfaian and Wilhelm 1994, Brown, Coile, and Weisbenner 2010), housing wealth (Farnham and Sevak 2007), and Social Security "notch" cohorts who saw a large change in Social Security wealth (Krueger and Pischke 1992). Holtz-Eakin, Joulfaian, and Rosen (1993), Imbens, Rubin, and Sacerdote (2001), Brown, Coile, and Weisbenner (2010), and Farnham and Sevak (2007) find evidence of labor supply responses to changes in wealth. By contrast, Krueger and Pischke (1992) and Joulfaian and Wilhelm (1994) find little to no response in labor supply and retirement behavior.

More recently, the events surrounding the financial crisis between 2007 and 2009 have spurred additional research regarding the impact of the crisis on elderly workers and retirees. Some of the recent work has attempted to quantify the impact on the asset holdings of older Americans. Butrica, Smith and Toder (2009a, 2009b) and Bosworth and Smart (2009) simulate the impact of the 2008 stock market crash on future retirement savings, and Bosworth and Smart

also examine the expected impact of the collapse of the housing market. Johnson, Soto, and Zedlewski (2008) and Soto (2008) estimate the losses in retirement account assets and home values, and survey the evidence on how these losses, combined with weak labor markets, might affect retirement plans and retiree well being. Coile and Levine (2010) estimate the impact of stock market performance, as well as labor market conditions, around the time of retirement on retirement income. They find that stock market performance has a significant impact on investment income during retirement, while labor market conditions have a significant impact on Social Security income. A series of Society of Actuaries telephone surveys has found that the fraction of near-retirees and retirees stating that they planned to work longer to increase financial security has not significantly changed between surveys conducted in June 2007 and July 2009. However, when primed with references to the recent recession, 23 percent of retirees and 64 percent of pre-retirees sampled in 2009 responded that they felt they would have to reenter the labor force or delay retirement as a result of recent economic events (Society of Actuaries 2010).

A few studies have looked at the impact of the recent recession on labor supply decisions. Coile and Levine (2009) use Current Population Survey data to show that longer-term changes in stock market valuations appear to affect the retirement of workers aged 62 to 69, particularly those with more education (which they argue proxies for stock market exposure). However, they find no such evidence for workers aged 55-61. Moreover, the increase in labor force participation caused by the stock market crash is more than offset by the reduction in labor force participation (concentrated among less-educated workers) as a result of the weak labor market. They do not find a relationship between retirement behavior and a regional house price index, even for homeowners.

## III. Data

Like many of studies cited previously, we use data from the Health and Retirement Study (HRS), a longitudinal panel study with a wealth of information about the elderly and near-elderly population. The HRS began in 1992 by surveying a nationally representative sample of individuals age 51 to 61 in 1992 and their spouses. The HRS is conducted every two years, and has been periodically refreshed with additional cohorts to be representative of the over 50 population. The survey asks respondents a wide variety of questions regarding income, work, assets, pension plans, health insurance, and disability and physical health. We utilize the RAND version of the HRS dataset which provides consistent variables and definitions across the waves of the survey.

We merge several supplemental datasets with the HRS data. First, we obtained the exact date of interview and detailed geographic identifiers from HRS by applying for restricted access. Second, we use the S&P 500 index to capture aggregate fluctuations in the value of the stock market and obtain daily closing values of the index fromYahoo! Finance which are merged by date of interview.[4] For some specifications, we compute the percent change in the S&P 500 in the year preceding the interview date. Third, we include controls for housing market fluctuations using the Federal Housing Finance Agency (FHFA) index based on all-transactions published on a quarterly basis for each state.[5] Fourth, we merge in county-level unemployment rates during the month of interview.[6] Finally, we merge data files underlying the tables in Gustman, Steinmeier and Tabatabai (2010) which are made available through the

[4] When an interview took place on a day that the market was closed, we substitute the closing value on the previous trading day.
[5] This index was downloaded from http://www.fhfa.gov, and is estimated using both sales prices and appraisal data.
[6] Monthly county-level unemployment rates were obtained by creating custom tables at http://www.bls.gov/lau/, the website of the Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics Program. We thank Sally Anderson at BLS for help with matching the BLS county-level unemployment series with the corresponding county Federal Information Processing Standards (FIPS) codes.

HRS data downloads page. These files contain information regarding balances in defined contribution accounts.[7]

Beginning in 1998 and continuing for subsequent waves, respondents are asked to estimate the probability that they will work full-time after age 62 (P62), the probability that they will work full-time after age 65 (P65), and the age at which they expect to stop working (E(R)).[8] We use the responses to these questions as measures of respondents' retirement plans. The first two measures are asked only of those who have not attained age 62 or 65, respectively, and all measures are only asked among respondents who are still working. Other studies that use these expectations measures include Khitatrakun (2003) (who uses E(R)); Hurd and Reti (2001) and Hurd, Reti, and Rohwedder (2005) (who use P62); and Coronado and Perozek (2003) (who use E(R)). While these measures are self-reported and therefore subjective, Hurd and Reti (2001) and Hurd, Reti, and Rohwedder (2005) show that P62 is correlated with actual full-time work behavior after age 62, and Khitatrakun (2003) shows that E(R) is a good predictor of actual retirement age.

We report results using all three measures of retirement plans. The three measures are positively correlated with one another – people who report higher P62 and P65 values also report higher expected retirement ages. However, the questions are asked at different points in the survey and there are inconsistencies in responses. For example, some people report that they will definitely be working after age 62 (P62=100 percent), while they expect to retire at an age that is considerably less than 62; others report a zero probability of working full-time after

[7] The information regarding balances in defined contribution accounts is contained in Dataset 9, and is only available for the current job. We combine this information with the RAND variables indicating the types of pension plans in which the respondent participates through the current job. If the RAND variables indicate that the respondent does not have a DC pension, or if no pension information is available, we assume that the individual has a zero DC balance. If the RAND variables indicate that the respondent participates in a DC pension, but pension information is missing in Dataset 9, we set the value of the individual's DC balance to missing.

[8] The expected retirement age is constructed using the year of planned retirement and the month and year of birth of the respondent. Retirements are assumed to occur on July 1 of the planned retirement year.

age 62, but an expected retirement age that is much greater than 62. Our view is that P62 and P65 are better measures of individuals' retirement plans for several reasons. First, the questions underlying E(R) refer to the age at which the respondent "plans" or "thinks" that he or she will stop working. It is not clear how to interpret the responses to these questions. One possibility that individuals provide the expected value their retirement age based on the probability distribution of possible retirement ages; another possibility is that they report the mode of the probability distribution. Second, for P62 and P65, the underlying questions explicitly refer to full-time work after the relevant age, while for E(R) they are more vague.[9] Finally, E(R) is missing if the individual reports that he or she will never stop working.

As the retirement expectations questions are only asked among individuals who are still working, following Khitatrakun (2003), we replace E(R) with the actual retirement age for those individuals who retired between two waves. That is, we replace E(R) in wave *t* with the actual retirement age if an individual retired between waves *t-1* and *t*. Thus, in our first-difference approach, the change in E(R) is constructed by differencing the actual retirement age and the expected retirement age reported in wave *t-1*. We do not do this for P62 and P65 because it entails replacing the probability of an event with its realization. Thus, for the regressions explaining P62 and P65, we do not use any observations in which an individual is retired. We examine the implications of this sample selection in our sensitivity analyses described in Section V.

[9] Individuals are first asked about their retirement plans. If the respondent reports that he or she plans to stop working entirely, the follow-up question is, "At what age do you plan to stop working?" If the respondent reports not having a retirement plan or not having thought about it, the follow-up question is, "At what age do you think you will stop working?" In the RAND version of the data, E(R) is constructed by combining responses to the two follow-up questions. Note that the second follow-up question – "At what age do you think you will stop working?" – does not specify full-time versus part-time work.

We also perform some of our analysis for specific groups who are most likely to be sensitive to stock market changes. These groups include individuals closer to retirement (age 58 and above), individuals whose gross (household) financial assets excluding Social Security and defined benefit pension wealth are between one and 20 times their current annual household income, individuals with retiree health insurance, and individuals who do not participate in a DB plan. [10] We believe that individuals with less than a year's income in financial assets are likely to draw most of their retirement income from Social Security and therefore be insensitive to stock market fluctuations. Moreover, individuals with financial assets greater than 20 times their household income are likely to be sufficiently protected from shocks to their wealth. We also believe, as Khitatrakun's (2003) analysis suggests, that individuals with retiree health insurance and individuals who are not covered by a defined benefit pension plan are likely to be more flexible in changing their retirement date and, therefore, may be more responsive to fluctuations in the stock market.

Table 1 provides summary statistics for all variables used in our regressions. Each observation represents a person-wave combination. The S&P 500 variable reflects the value of the S&P 500 index on the date of interview reported in the restricted HRS data. We construct the percent change in the value of the index for the 12-month period prior to the interview as well as the percent change since the respondent was last interviewed (which could represent between 11 and 35 months depending on the respective interview dates). The reported probability of working full-time at age 62 is 53 percent across all waves of the survey, and when asked about the probability of working full-time at age 65, the probability is lower,

[10] Gross financial assets include assets in IRA accounts, stocks or stock funds, checking/savings accounts, CDs, bonds or bond funds, assets in DC accounts, and other investment assets. This amount is gross of other debts such as credit card balances, medical debts, and other loans. Household annual income includes respondent and spouses income from earnings, pensions, Social Security, unemployment, workers compensation, other government transfers, household capital income, and income from alimony, insurance, or inheritance.

approximately 34 percent. Both P62 and P65 are slightly higher in 2008 than the rest of the sample years. The expected retirement age is approximately 65 years old for our sample, but as noted above, this variable is coded as missing if the individual says that he or she will never retire. This and other data limitations result in many missing values for the expected retirement age outcome variable. While we report summary statistics for demographics such as age, gender, race, and education, our first-difference approach will omit time-invariant characteristics in the estimation.

To provide an idea of the amount of variation in stock market performance we find in the data, Figure 1 shows the S&P 500 over time, and Figure 2 shows the distribution of growth rates in the S&P 500 over the prior year for each person-year observation in our sample, separately for each wave of the survey. Figure 2 highlights the fact that we obtain considerable variation as a result of differences in interview dates, even within each wave of the survey. Figure 3 illustrates the distribution of the ratio of financial assets to current income for all individuals in the sample. As shown in the figure, when we focus on individuals with financial assets between 1 and 20 times their current income, we are limiting our attention to individuals between the $44^{th}$ and $91^{st}$ percentiles of the distribution in our sample.

Figure 4 shows the probability of working after age 62 plotted against the value of the S&P 500 index over each wave of the survey. This figure illustrates our basic identification strategy, which exploits the fact that individuals sampled at different times of the year were interviewed in different periods of stock market activity. Under the assumption that the change in the S&P 500 index experienced across two waves is exogenous, the change in the probability of working full-time at age 62 can be interpreted as causal. Without controlling for other covariates or

accounting for unobserved heterogeneity, the relationship across waves appears inconsistent.[11] We do observe cross-wave differences in the probability of working after age 62, which appear to be correlated with cross-wave differences in the S&P 500. For example, between the 2006 and 2008 waves, the average probability of working after age 62 rose from 52 percent to 55 percent, while the S&P 500 fell. Between the 2000 and 2002 waves as well, the average probability of working after age 62 rose from 52 percent to 54 percent, while the S&P 500 fell. However, without observing such a correlation within waves, we hesitate to attribute the cross-wave differences in the probability of working after age 62 to the stock market. The next section formalizes the analysis of this relationship.

## IV. Methods

We focus primarily on two specifications:

$$Y_{it} = \alpha_0 + \alpha_1 \ln(S\&P500_{it}) + \alpha_2 \ln(FHFA_{it}) + \alpha_3 \ln(unemp_{it}) + \alpha_4 X_{it} + \theta s_{it} + \rho w_t + \pi_i + \varepsilon_{it} \quad (1)$$

$$Y_{it} = \beta_0 + \beta_1 \%\Delta S\&P500_{it} + \beta_2 \ln(FHFA_{it}) + \beta_3 \ln(unemp_{it}) + \beta_4 X_{it} + \gamma s_{it} + \delta w_t + \lambda_i + u_{it}, \quad (2)$$

where $Y_{it}$ is our measure of retirement plans (either P62, P65, or E(R)) for individual *i* in wave *t*; $S\&P500_{it}$ is the level of the S&P 500 index on individual *i*'s interview date in wave *t*; $\%\Delta S\&P500_{it}$ is the percent change in the S&P 500 in the year preceding individual *i*'s interview date in wave *t*; $FHFA_{it}$ is the level of the housing index in individual *i*'s state during the quarter of individual *i*'s interview in wave *t*; $unemp_{it}$ is the unemployment rate in individual *i*'s county during the month of individual *i*'s interview in wave *t*; $X_{it}$ is a vector of controls; $s_{it}$ is a vector of state dummies; $w_t$ is a vector of wave dummies; $\lambda_i$ and $\pi_i$ represent unobserved individual heterogeneity; and $\varepsilon_{it}$ and $u_{it}$ are stochastic error terms. $X_{it}$ includes age, marital

[11] While not shown, an analogous figure plotting the probability of working after age 65 rather than 62 displays the same relationships.

status, retirement status of spouse (if married), homeownership status, self-reported health status, length of tenure at the current job, an indicator for whether the current employer offers retiree health insurance, an interaction between homeownership status and the house price index, and an interaction between high school completion and the unemployment rate.[12] To highlight the effects of the current recession, we estimate (1) and (2) for the two most recent waves of the HRS (2006 and 2008), and for all waves combined. We take first differences of both equations to eliminate the individual heterogeneity, $\lambda_i$ and $\pi_i$. For the regressions that use only two waves of data, first differencing is computationally identical to including individual fixed effects. When more than two waves are included, these approaches are not computationally identical, but both provide consistent estimates of the parameters in (1) and (2). We report robust standard errors clustered at the household level.

We hypothesize that $\alpha_1, \beta_1 < 0$. That is, positive shocks to financial wealth reduce the probabilities of working after age 62 and 65, as well as the expected retirement age. The difference between (1) and (2) is that, in (1), individuals are assumed to react to the level of the S&P 500, while in (2), individuals are assumed to react to the growth in the S&P 500 over the previous year. For example, the closing value of the S&P 500 index was 1335.49 on June 11, 2008, representing a decline of 11.5 percent from its value one year earlier. The closing value was almost the same (1333.7) on March 5, 2008, but this represented only a 2.9 percent decline from its value one year earlier. Specification (1) implies that an individual will report similar retirement plans if interviewed on March 5 and June 11 (holding the other covariates constant). Specification (2) implies that an individual will report lower probabilities of working after age 62

[12] As discussed in Section II, Coile and Levine (2009, 2010) find that less educated individuals are more affected by labor market conditions.

and 65, and a lower expected retirement age, if interviewed on March 5 rather than June 11. Because we think that both reactions are possible, we estimate both specifications.

We also explore the possibility that individuals may react asymmetrically to positive and negative shocks to retirement wealth. There are several reasons why this might occur. Loss aversion may induce individuals to react more strongly to recoup losses in their retirement income. As discussed by Khitatrakun (2003), the structure of DB plans, liquidity constraints, and employment-based health insurance may induce a similar effect. Individuals who retire early may face loss of employer-sponsored health insurance and penalties based on their DB plan rules. Moreover, early retirees may be unable to finance an adequate level of consumption if they cannot borrow against future DB and Social Security income. Thus, delaying retirement may be easier than moving it forward. To check if this is the case, we estimate (1) and (2) separately for individuals who experienced positive and negative changes in the S&P 500 over the preceding year.

Finally, we investigate whether there is heterogeneity across individuals in terms of their responses to stock market changes. To do this, we identify groups that are more likely to respond to stock market changes and reestimate (1) and (2) for these groups separately. We hypothesize that individuals aged 58 and above have less time to recover from wealth shocks, and are therefore more likely to adjust their plans. We also hypothesize that both individuals who have very little retirement wealth outside of Social Security and defined benefit pensions as well as individuals with sufficiently high wealth to absorb a loss are less likely to react to stock market performance. Finally, along the lines of Khitatrakun (2003), we hypothesize that respondents whose employers provide retiree health benefits as well as those who do not participate in a DB pension plan have more flexibility in responding to positive stock market

changes. Thus, we focus on four groups: (1) individuals aged 58 and older, (2) individuals whose gross (household) financial assets are between one and 20 times their current annual (household) income, (3) individuals with retiree health insurance from their current employer, and (4) individuals who do not participate in a DB plan. Group (1) includes 57 percent of the sample. As shown in Table 1 and Figure 3, group (2) includes 47 percent of the sample, group (3) includes 36 percent of the sample, and group (4) includes 75 percent of the sample. We select our sample for these regressions based on the characteristic in the initial wave of the first-difference.

## V. Results

### *a. Baseline Results*

The first six columns of Table 2 report results from estimating equation (1) using the two most recent waves (columns 1-3) as well as all waves (columns 4-6). The last six columns report results from estimating equation (2) using the two most recent waves (columns 7-9) as well as all waves (columns 10-12). We report only the coefficients on the S&P 500 level or growth rate, the unemployment rate, the housing index, and interactions including them. The coefficient on the level of the S&P 500 is statistically significant in the expected direction only in the most recent pair of waves for the probability of working after age 62. This estimate suggests that a 10 percent increase in the S&P 500 decreases the probability of working after age 62 by 1.209 percentage points. The coefficient on the growth rate of the S&P 500 is also statistically significant in the expected direction in the most recent pair of waves for the probability of working after age 62. It implies that a 10 percentage point increase in the growth rate of the S&P 500 (e.g., from 10 percent to 20 percent) decreases the probability of working after age 62 by 1.858 percentage points. The coefficient on the growth rate of the S&P 500 is statistically

significant in explaining the probability of working after age 65 for all waves. However, the effect is smaller. Across all waves, a 10 percentage point increase in the growth rate of the S&P 500 lowers the probability of working after age 65 by 0.6720 percentage points. None of the other stock market coefficients are statistically significant. Overall, our interpretation of Table 2 is that there is little evidence that individuals have adjusted their self-reported retirement plans in response to stock market changes. The table also does not provide strong evidence that retirement plans were affected by changes in housing markets or unemployment rates.

As discussed in section IV, it is possible that individuals respond differently to positive and negative changes. The first three columns of Table 3 report the results from estimating equation (1) for only those observations with positive changes in the S&P 500 over the past year; the second three columns present results for those observations with negative changes. The last six columns repeat this exercise for equation (2).[13] We see some evidence of greater responsiveness to negative changes. However, when we perform the regressions separately by wave (not shown) we find that this result is primarily driven by the most recent wave. Therefore, we are cautious in interpreting these results as indicative of a response of retirement plans to negative changes in the S&P 500 index.

Table 4 presents results from estimating (1) and (2) for individuals aged 58 and older. Table 5 presents restricts the sample to individuals with financial assets between one and 20 times their current annual income. Table 6 presents these results for individuals who do not participate in a defined benefit pension plan, and Table 7 presents these results for individuals whose current employers provide retiree health insurance. With the exception of individuals aged 58 and older, we do not find much evidence for a relationship between stock market fluctuations and

[13] We do this exercise for all waves and not the most recent pair of waves because no one in the most recent wave experienced a positive return over the year prior to their interview.

retirement plans, even for these more sensitive groups. We do obtain larger (and statistically significant) coefficients in the most recent waves' P62 equations for those with retiree health insurance. While it is plausible that retiree health insurance has an effect in the P62 but not the P65 equations (as those who retire after age 65 are eligible for Medicare), the presence of retiree health insurance should matter more for *earlier* than anticipated retirement rather than for the *delays* in retirement that we would have observed in the most recent waves.

We also further explore the relationship between the S&P 500 and retirement plans for the 58-and-over group. Within this group, we reestimate equations (1) and (2) for the subgroups of individuals who meet the criteria for groups (2)-(4) (i.e., individuals with assets in the specified range, individuals with retiree health insurance, and individuals not covered by a defined benefit pension). If the stock market is in fact causing changes in retirement plans within the 58-and-older group, then we would expect these subgroups to be more sensitive to the stock market than the 58-and-older group as a whole. These results are not reported, but are available upon request. We do not find a stronger relationship between the level or change in the S&P 500 and reported retirement plans within these subgroups. For the subgroup not covered by a DB pension, the coefficients on the S&P 500 variables are similar in magnitude and significance to those reported in Table 4. For the other two subgroups, they are generally insignificant. These results lead us to the conclusion that we cannot give a causal interpretation to the relationship between the S&P 500 and retirement plans in the 58-and-over group.

Our results are largely consistent with those reported in Hurd and Reti (2001) and Hurd, Reti, and Rohwedder (2005), who find that while stockowners and individuals with high wealth retire earlier, analyzing changes in the probability of working shows no systematic relationship between the change in wealth and the change in P62. Khitatrakun (2003) analyzes E(R) and

shows that the stock market boom of the late 1990s led to negative changes in E(R) for those with high stock holdings and no constraints on retirement behavior; however, the limited sample period does not allow analysis of the stock market bust that followed. The difference between our results and his can also be explained by the different sources of variation in the two studies: Khitatrakun exploits differences in levels of stock ownership while we exploit within-wave differences in the S&P 500 index. We believe that within-wave variation in the value of the stock market provides more exogenous variation than the amount of stock holdings. For example, risk aversion may be correlated with both the amount of stock ownership and the ability to respond to shocks in wealth by adjusting the timing of retirement. However, when an individual was surveyed within a wave of the HRS is unlikely to be correlated with plans for retirement. Our result that individuals closer to retirement are more responsive to stock market fluctuations is consistent with Coile and Levine (2009), who find a similar result. However, we do not find evidence that this relationship is causal. Our empirical approach is quite different from that of Coile and Levine (2009) because we use panel data and self-reported retirement expectations rather than cross-sectional CPS data and actual retirement behavior.

*b. Sensitivity Analysis*

Thus far, the results show no clear evidence of a relationship between shocks to the stock market and retirement plans. To test whether this finding is sensitive to our specification of the model and definitions of variables, we perform a number of robustness checks. The full regression results from this sensitivity analysis are not reported, but are available upon request.

First, our estimation of equation (2) uses one-year changes in the S&P 500. The one-year horizon is somewhat arbitrary. Using a shorter horizon (e.g., 1 month prior to the interview) would give us more individual variation in S&P 500 growth rate. On the other hand, previous

work has found that individuals are sensitive to stock market returns over longer periods (Coile and Levine 2009). To test whether individuals respond to stock market performance over a longer or shorter time horizon, we re-estimate equation (2), but replace the one-year growth rate in the S&P 500 with the 1-month growth rate and the 5-year growth rate. We find no evidence of a relationship between the 1-month and 5-year growth rates of the S&P 500 and reported retirement plans.

Second, we examine whether individuals respond differently across thresholds other than zero percent. For example, it is possible that the relevant threshold is not zero percent but rather the average historical annual stock market return over several years. We therefore estimate specifications (1) and (2) separately for observations that experienced an annual gain on either side of 7.1 percent, the average return of the S&P 500 index since 1950. Our results are quantitatively and qualitatively similar to those reported in Table 3.

Third, the HRS only asks individuals who are currently working to report P62, P65, and E(R). This causes a potential sample selection problem. As discussed in Section III, if an individual retires between waves *t-1* and *t*, he or she would have responses to the questions about retirement expectations in wave *t-1*, but not in wave *t*. Thus, if we focus only on expectations of working full-time at age 62 or age 65, we are forced to drop individuals who retire between waves. This issue does not exist for E(R), as we replace E(R) in wave *t* with the actual retirement age for individuals who retired between waves *t-1* and *t*. This sample selection may make it difficult to detect a response of retirement plans on stock market changes, particularly during periods of stock market increases. If there is a stock market boom, individuals who are sensitive to stock market changes leave the labor force. Thus, only the less sensitive individuals are observed, and they report similar values of P62 and P65 compared to before the boom. This

might cause us to conclude, incorrectly, that there is little relationship between the stock market and retirement plans. We think this is unlikely because of the lack of a statistically significant relationship between expected retirement age (which is not subject to the sample selection problem) and stock market performance. But to confirm, we reestimate the regressions in Table 2 using only those individuals who remained in the labor force until they reached the relevant age (62 or 65). Our estimates of the coefficients on the stock market variables are similar in magnitude and statistical significance to those reported in Table 2.

Fourth, we perform additional checks on the results we obtained for the 58-and-over group in Table 4 by reestimating equations (1) and (2) for two additional subgroups: individuals who own any stocks outside of a retirement account, and individuals who participate in a defined contribution retirement plan. If stock market fluctuations are causing the changes in retirement plans among the 58-and-over group, we would expect the effect to be more pronounced for these subgroups that are more exposed to the stock market. For stockholders, the coefficients on the S&P 500 variables do tend to be larger and more significant than those reported in Table 4; however, for individuals who participate in defined contribution plans, they are consistently insignificant. As discussed earlier, stockholders are a selected group, and choosing to buy stocks might be correlated with other traits (e.g., degree of risk aversion) that make it easier to adjust to wealth shocks. Thus, without finding a similar result for other subgroups, we do not think the results for stockholders warrant the conclusion that there is a causal relationship between stock market performance and retirement plans.

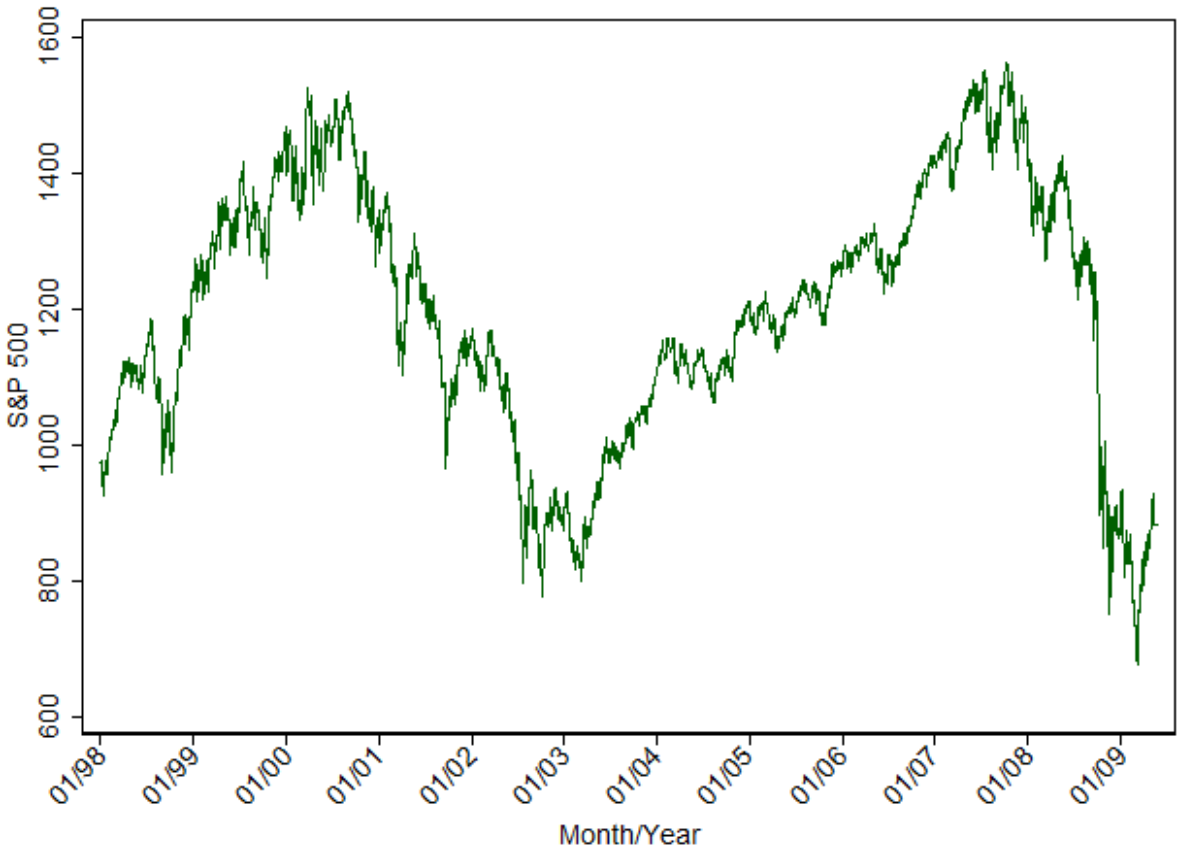
## VI. Conclusion

Despite the media attention to the issue, we find no evidence that stock market fluctuations have affected people's (self-reported) retirement plans. We do find a strong correlation between

the probability of working after age 62 and the S&P 500 for respondents interviewed in 2008. However, we hesitate to interpret this as a causal relationship given the lack of evidence in previous years, and for groups that we would expect to be more sensitive to the stock market. There is also some evidence that retirement plans shifted during the financial crisis. For example, in Figure 4, the average probability of working after age 62 is higher in 2008 than in 2006. Again, however, we find no evidence to allow us to conclude that this was caused by the decline in the stock market. In our regressions, such cross-wave differences in retirement plans are absorbed by our wave dummies. Attributing changes in retirement plans to the stock market would require a relationship between the S&P 500 and the probability of working *within* waves, and this is not present in most waves (see Figure 4).

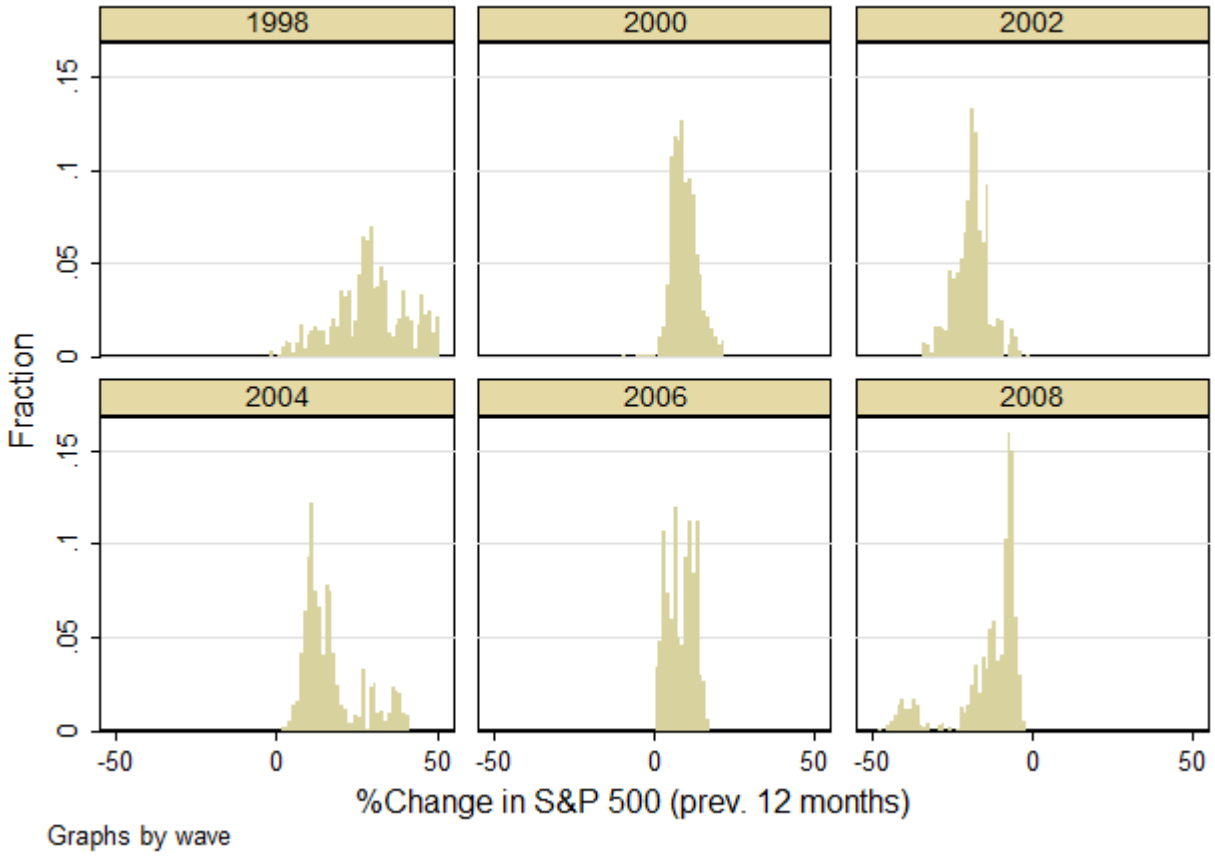
While explaining the cross-wave differences in the probability of work is beyond the scope of this paper, it is possible that the financial crisis increased the level of pessimism about the economy, making individuals less confident about their retirement security. The level of pessimism about the economy may have also been correlated with the S&P 500 during the recent financial crisis (but not in earlier periods), leading to our finding of a relationship between the stock market and retirement plans in 2008. Alternately, media coverage regarding the stock market may have been particularly salient in 2008 relative to earlier years. Thus, while there is clearly variation in retirement plans both within and across waves, and that variation sometimes does appear to be correlated with stock market performance, a deeper investigation reveals that there is insufficient evidence to establish a causal relationship between retirement plans and stock market indices more generally.

**Figure 1**: Level of S&P 500 index between 1998 and 2009



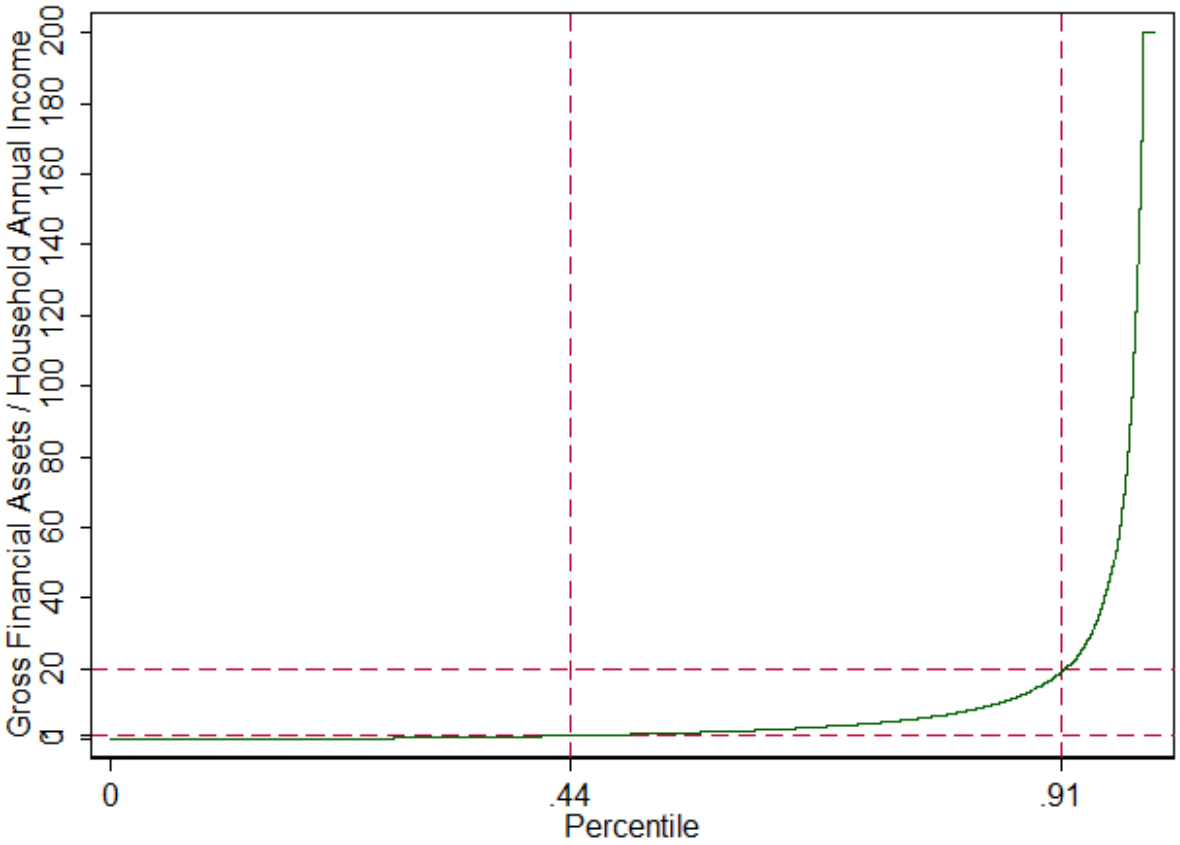

Source: Yahoo! Finance.

**Figure 2**: Distribution of growth rates in S&P 500 index for 12 months preceding interview date by wave



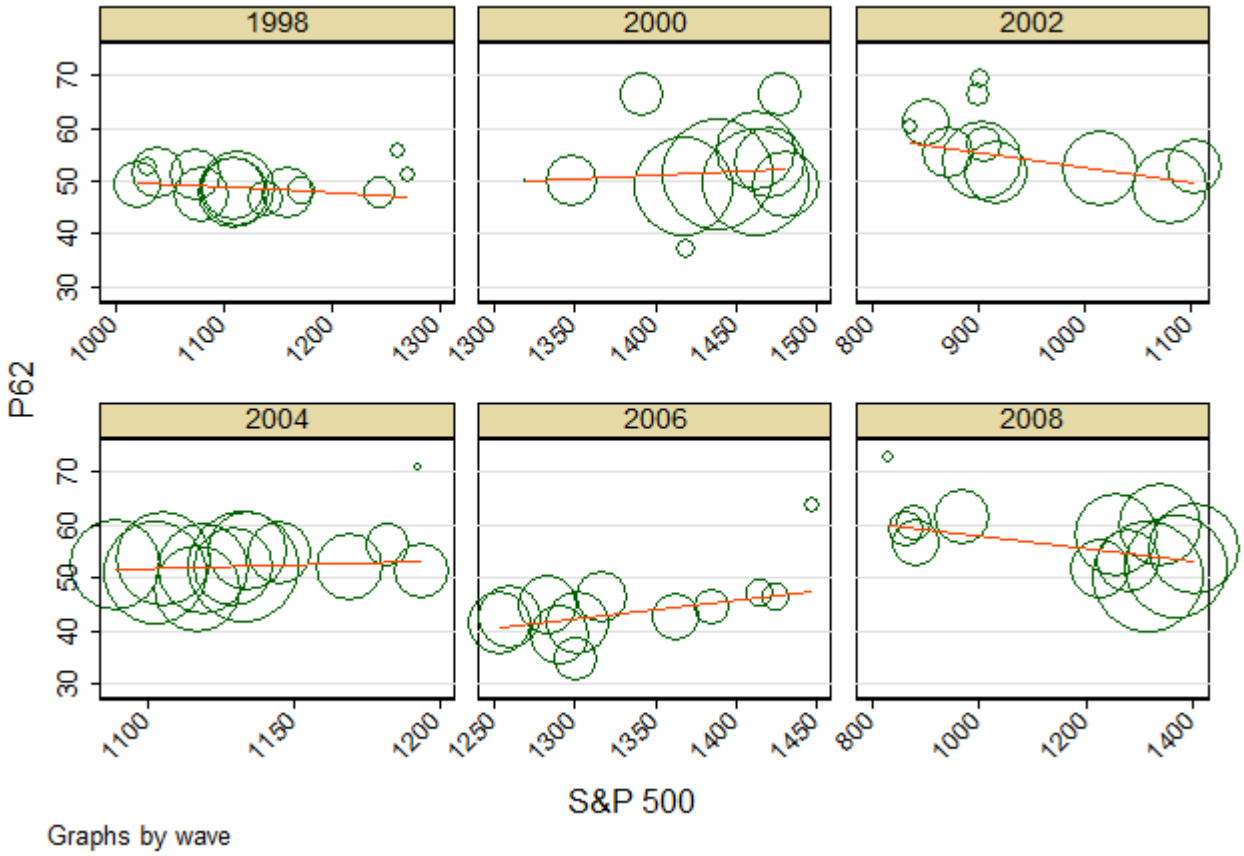

Notes: Growth rate in S&P index calculated for 12 months prior to interview date for each respondent in HRS.

**Figure 3**: Ratio of Gross Financial Assets to Household Annual Income




Notes: Gross financial assets include assets in IRA accounts, stocks or stock funds, checking/savings accounts, CDs, bonds or bond funds, assets in DC accounts, and other investment assets. This amount is gross of other debts such as credit card balances, medical debts, and other loans. Household annual income includes respondent and spouses income from earnings, pensions, Social Security, unemployment, workers compensation, other government transfers, household capital income, and income from alimony, insurance, or inheritance. Ratio is topcoded at 200 (approximately 1 percent of respondents).

**Figure 4**: Relationship between P62 and S&P 500 index on interview date by wave




Notes: P62 denotes probability of working full-time at age 62. P62 and S&P 500 averaged over month of interview. Size of circle represents weight of observations in each month. Line represents best fit linear regression line between P62 and S&P 500 for each wave.

**Table 1: Summary Statistics**

| | All Waves (N=14,507) | | | | 2008 Wave (N=3,135) | | | |
|---|---|---|---|---|---|---|---|---|
| | Mean | Std. Dev. | Min | Max | Mean | Std. Dev. | Min | Max |
| S&P 500 | 1249.91 | 168.05 | 752.44 | 1527.46 | 1277.78 | 147.83 | 752.44 | 1426.63 |
| % Change in S&P 500 (prev. 12 months) | 0.3% | 15.2% | -47.7% | 40.7% | -13.3% | 10.4% | -47.7% | -2.9% |
| % Change in S&P 500 (since last interview) | 7.4% | 21.1% | -48.0% | 59.2% | -1.7% | 12.3% | -44.9% | 15.5% |
| P62[a] | 53.1 | 38.3 | 0 | 100 | 54.5 | 38.7 | 0 | 100 |
| P65 | 34.4 | 35.6 | 0 | 100 | 36.4 | 36.3 | 0 | 100 |
| E(R)[b] | 65.3 | 4.5 | 49.7 | 95.4 | 65.8 | 4.4 | 52.4 | 95.1 |
| Positive Change in S&P 500 (prev. 12 months) | 0.593 | 0.491 | 0 | 1 | 0.000 | 0.000 | 0 | 0 |
| Gross Financial Assets/Household Income[c] | 9.312 | 401.689 | 0 | 64000 | 6.794 | 44.099 | 0 | 1144.55 |
| Has Retiree Health Insurance | 0.357 | 0.479 | 0 | 1 | 0.312 | 0.463 | 0 | 1 |
| Has DB Pension | 0.254 | 0.435 | 0 | 1 | 0.164 | 0.370 | 0 | 1 |
| County Unemployment Rate | 5.1 | 1.7 | 1.4 | 23.3 | 5.7 | 1.9 | 1.9 | 23.3 |
| State Housing Index (FHFA) | 339.4 | 121.0 | 143.8 | 722.5 | 376.4 | 110.6 | 206.3 | 686.8 |
| Age | 58.2 | 3.2 | 25.7 | 68.3 | 59.3 | 2.9 | 54.3 | 65.0 |
| Male | 0.477 | 0.499 | 0 | 1 | 0.445 | 0.497 | 0 | 1 |
| Race = White | 0.874 | 0.332 | 0 | 1 | 0.863 | 0.344 | 0 | 1 |
| Race = African American | 0.085 | 0.279 | 0 | 1 | 0.092 | 0.290 | 0 | 1 |
| Race = Other | 0.041 | 0.198 | 0 | 1 | 0.045 | 0.207 | 0 | 1 |
| Educ = < High School | 0.072 | 0.259 | 0 | 1 | 0.065 | 0.247 | 0 | 1 |
| Educ = HS Graduate | 0.314 | 0.464 | 0 | 1 | 0.307 | 0.461 | 0 | 1 |
| Educ = Some College | 0.283 | 0.450 | 0 | 1 | 0.292 | 0.455 | 0 | 1 |
| Educ = College + | 0.331 | 0.470 | 0 | 1 | 0.335 | 0.472 | 0 | 1 |
| Married - Spouse working | 0.513 | 0.500 | 0 | 1 | 0.481 | 0.500 | 0 | 1 |
| Married - Spouse home | 0.154 | 0.361 | 0 | 1 | 0.173 | 0.378 | 0 | 1 |
| Married - Spouse information missing | 0.062 | 0.241 | 0 | 1 | 0.044 | 0.204 | 0 | 1 |
| Single | 0.271 | 0.445 | 0 | 1 | 0.302 | 0.459 | 0 | 1 |
| Health Status Good or Better | 0.864 | 0.343 | 0 | 1 | 0.829 | 0.376 | 0 | 1 |
| Homeowner | 0.874 | 0.331 | 0 | 1 | 0.861 | 0.346 | 0 | 1 |
| Job Tenure in Current Job | 11.9 | 11.5 | 0 | 49.3 | 9.6 | 11.3 | 0 | 49.3 |

Notes: Observations at person-year level using 1998-2008 Waves of HRS as specified. [a] N=12,278 (all waves) and 2,426 (2008 wave). [b] N=6,911 (all waves) and 1,337 (2008 wave). [c] N=9,933 (all waves) and 1,843 (2008 wave).

**Table 2: Effect of S&P 500 on Expected Labor Supply, Full Sample**

| VARIABLES | (1) P62 | (2) P65 | (3) E(R) | (4) P62 | (5) P65 | (6) E(R) | (7) P62 | (8) P65 | (9) E(R) | (10) P62 | (11) P65 | (12) E(R) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ln(S&P 500) | -12.09** | -1.489 | 0.180 | -4.086 | -0.558 | -0.107 | | | | | | |
| | (5.550) | (4.825) | (0.796) | (3.806) | (3.440) | (0.513) | | | | | | |
| %Change in S&P 500 | | | | | | | -18.58*** | -6.110 | -0.0837 | -4.732 | -6.720** | -0.217 |
| | | | | | | | (7.184) | (6.100) | (0.981) | (3.586) | (3.252) | (0.503) |
| ln(unemp) | -7.470* | 5.043 | 0.425 | -1.336 | 3.138* | 0.327 | -8.220** | 4.239 | 0.378 | -1.340 | 2.717 | 0.322 |
| | (4.049) | (3.521) | (0.538) | (1.791) | (1.712) | (0.242) | (4.117) | (3.594) | (0.539) | (1.788) | (1.716) | (0.242) |
| ln(unemp)*HS or less | 6.351 | -0.965 | -0.388 | -0.382 | -1.525 | -0.195 | 6.479 | -0.850 | -0.387 | -0.370 | -1.416 | -0.195 |
| | (5.201) | (4.331) | (0.587) | (2.508) | (2.206) | (0.320) | (5.203) | (4.332) | (0.586) | (2.506) | (2.205) | (0.320) |
| ln(FHFA) | 4.957 | 0.382 | -1.549 | 1.287 | 2.597 | -0.344 | 5.096 | 0.280 | -1.560 | 0.930 | 2.210 | -0.357 |
| | (8.619) | (7.481) | (1.346) | (4.193) | (3.684) | (0.571) | (8.618) | (7.490) | (1.347) | (4.201) | (3.684) | (0.576) |
| ln(FHFA)*homeowner | 0.261 | 0.213 | 0.0639 | -0.319 | 0.198 | -0.0316 | 0.253 | 0.196 | 0.0626 | -0.319 | 0.186 | -0.0315 |
| | (0.462) | (0.476) | (0.115) | (0.263) | (0.279) | (0.0491) | (0.461) | (0.476) | (0.115) | (0.263) | (0.280) | (0.0490) |
| Observations | 2,450 | 3,135 | 1,451 | 12,375 | 14,507 | 8,016 | 2,450 | 3,135 | 1,451 | 12,375 | 14,507 | 8,016 |
| R-squared | 0.073 | 0.060 | 0.170 | 0.027 | 0.027 | 0.170 | 0.074 | 0.061 | 0.170 | 0.027 | 0.027 | 0.170 |
| Waves | 2006-2008 | 2006-2008 | 2006-2008 | All | All | All | 2006-2008 | 2006-2008 | 2006-2008 | All | All | All |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Dependent variable indicated on column heading. P62 denotes probability of working full-time at age 62, P65 denotes probability of working full-time at age 65, and E(R) denotes expected retirement age. S&P 500 denotes value of S&P 500 index on interview date. % Change in S&P 500 denotes annual growth rate in S&P 500 during 12 months prior to interview date. Monthly unemployment rates measured at the county level and quarterly housing index measured at the state level. All regressions include controls for age, marital status, retirement status of spouse (if married), homeownership status, self-reported health status, length of tenure at the current job, and an indicator for whether the current employer offers retiree health insurance. All regressions are run in first differences. Standard errors clustered at the household level. See text for more details.

**Table 3: Percent Change Above and Below 0 Percent, All Waves**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VARIABLES | P62 | P65 | E(R) | P62 | P65 | E(R) | P62 | P65 | E(R) | P62 | P65 | E(R) |
| ln(S&P 500) | 8.517 | 6.894 | -0.133 | -9.160** | -2.292 | -0.178 | | | | | | |
| | (6.702) | (5.807) | (0.864) | (4.496) | (4.062) | (0.623) | | | | | | |
| %Change in S&P 500 | | | | | | | -0.466 | -5.063 | 0.116 | -14.59** | -7.488 | -0.596 |
| | | | | | | | (4.353) | (3.910) | (0.626) | (6.053) | (5.279) | (0.841) |
| ln(unemp) | -0.359 | -0.430 | 0.0877 | -3.870 | 5.373** | 0.551 | -0.430 | -0.579 | 0.0870 | -4.251 | 4.831* | 0.517 |
| | (2.448) | (2.257) | (0.344) | (2.574) | (2.481) | (0.343) | (2.449) | (2.260) | (0.343) | (2.602) | (2.516) | (0.346) |
| ln(unemp)*HS or less | 0.936 | 2.410 | 0.126 | -1.260 | -4.201 | -0.394 | 0.882 | 2.354 | 0.132 | -1.216 | -4.132 | -0.392 |
| | (3.715) | (3.048) | (0.469) | (3.035) | (2.791) | (0.401) | (3.713) | (3.046) | (0.467) | (3.035) | (2.791) | (0.401) |
| ln(FHFA) | 0.217 | 7.337* | -0.440 | 4.498 | -2.679 | -0.371 | -0.0425 | 6.563 | -0.426 | 5.065 | -2.324 | -0.350 |
| | (5.078) | (4.251) | (0.691) | (6.731) | (6.156) | (1.034) | (5.129) | (4.251) | (0.703) | (6.735) | (6.157) | (1.031) |
| ln(FHFA)*homeowner | -0.627* | 0.162 | -0.0397 | 0.0263 | 0.111 | -0.0145 | -0.629* | 0.156 | -0.0397 | 0.0263 | 0.0990 | -0.0153 |
| | (0.377) | (0.371) | (0.0622) | (0.339) | (0.381) | (0.0722) | (0.378) | (0.371) | (0.0621) | (0.339) | (0.381) | (0.0720) |
| Observations | 7,691 | 9,099 | 4,989 | 4,684 | 5,408 | 3,027 | 7,691 | 9,099 | 4,989 | 4,684 | 5,408 | 3,027 |
| R-squared | 0.022 | 0.026 | 0.175 | 0.052 | 0.045 | 0.184 | 0.021 | 0.026 | 0.175 | 0.052 | 0.045 | 0.185 |
| Relationship to Thresho | Above | Above | Above | Below | Below | Below | Above | Above | Above | Below | Below | Below |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: See notes for Table 2. Relationship to threshold denotes whether S&P 500 growth rate during 12 months prior to interview date was above or below 0 percent.

**Table 4: Effect of S&P 500 on Expected Labor Supply, Individuals Age 58+**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VARIABLES | P62 | P65 | E(R) | P62 | P65 | E(R) | P62 | P65 | E(R) | P62 | P65 | E(R) |
| ln(S&P 500) | -21.48*** | -5.854 | 0.562 | -10.40* | -2.134 | -0.172 | | | | | | |
| | (7.968) | (5.885) | (0.904) | (5.552) | (4.420) | (0.588) | | | | | | |
| %Change in S&P 500 | | | | | | | -32.70*** | -12.87* | 0.313 | -13.66** | -9.334** | -0.618 |
| | | | | | | | (10.07) | (7.429) | (1.126) | (5.507) | (4.516) | (0.600) |
| ln(unemp) | -0.749 | 10.89** | 0.468 | -2.096 | 4.623** | 0.350 | -1.943 | 9.833** | 0.412 | -2.301 | 4.003* | 0.323 |
| | (6.004) | (4.426) | (0.638) | (2.640) | (2.285) | (0.301) | (6.042) | (4.492) | (0.640) | (2.632) | (2.293) | (0.300) |
| ln(unemp)*HS or less | 3.277 | -2.845 | 0.176 | -0.451 | -0.548 | 0.183 | 3.525 | -2.672 | 0.171 | -0.399 | -0.394 | 0.186 |
| | (7.161) | (5.440) | (0.689) | (3.604) | (2.982) | (0.385) | (7.129) | (5.439) | (0.689) | (3.604) | (2.984) | (0.385) |
| ln(FHFA) | -1.485 | 6.985 | -1.199 | -6.911 | 1.475 | -0.296 | -1.694 | 6.815 | -1.224 | -7.808 | 0.940 | -0.333 |
| | (12.34) | (9.440) | (1.480) | (6.526) | (4.909) | (0.681) | (12.29) | (9.440) | (1.487) | (6.502) | (4.896) | (0.687) |
| ln(FHFA)*homeowner | -0.0633 | 0.0148 | 0.0662 | -0.231 | 0.772** | -0.00323 | -0.0771 | -0.00505 | 0.0654 | -0.236 | 0.757* | -0.00238 |
| | (0.872) | (0.672) | (0.113) | (0.442) | (0.390) | (0.0595) | (0.875) | (0.671) | (0.113) | (0.440) | (0.390) | (0.0594) |
| Observations | 1,279 | 1,974 | 1,138 | 6,099 | 8,268 | 5,844 | 1,279 | 1,974 | 1,138 | 6,099 | 8,268 | 5,844 |
| R-squared | 0.089 | 0.075 | 0.190 | 0.040 | 0.039 | 0.176 | 0.092 | 0.076 | 0.189 | 0.040 | 0.040 | 0.176 |
| Waves | 2006-2008 | 2006-2008 | 2006-2008 | All | All | All | 2006-2008 | 2006-2008 | 2006-2008 | All | All | All |

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Notes: See notes for Table 2. Regressions performed for subsample aged 58 and above.

**Table 5: Effect of S&P 500 on Expected Labor Supply, Financial Wealth between 1 and 20X Income**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VARIABLES | P62 | P65 | E(R) | P62 | P65 | E(R) | P62 | P65 | E(R) | P62 | P65 | E(R) |
| ln(S&P 500) | -1.607 | 7.871 | 0.413 | 1.268 | 4.045 | -0.588 | | | | | | |
| | (10.22) | (8.620) | (1.486) | (6.072) | (5.531) | (0.860) | | | | | | |
| %Change in S&P 500 | | | | | | | -7.844 | 3.069 | 0.242 | 0.595 | -4.148 | -0.0590 |
| | | | | | | | (12.65) | (10.63) | (1.573) | (5.770) | (4.993) | (0.740) |
| ln(unemp) | -1.925 | 2.156 | 0.125 | 1.150 | 0.113 | 0.550 | -3.383 | 0.694 | 0.0969 | 1.086 | -0.525 | 0.572 |
| | (7.369) | (6.215) | (0.838) | (2.844) | (2.565) | (0.355) | (7.488) | (6.461) | (0.846) | (2.845) | (2.581) | (0.359) |
| ln(unemp)*HS or less | -12.61 | 4.450 | 0.221 | -8.025* | -4.179 | -0.296 | -12.24 | 4.809 | 0.215 | -7.998* | -3.916 | -0.291 |
| | (9.532) | (9.822) | (0.998) | (4.395) | (3.823) | (0.468) | (9.511) | (9.837) | (1.001) | (4.403) | (3.822) | (0.467) |
| ln(FHFA) | 6.757 | -11.22 | -0.360 | 4.199 | -5.092 | 0.912 | 6.036 | -12.13 | -0.345 | 4.243 | -5.403 | 0.890 |
| | (15.62) | (13.97) | (2.032) | (6.648) | (5.998) | (0.783) | (15.67) | (14.16) | (2.021) | (6.652) | (5.986) | (0.781) |
| ln(FHFA)*homeowner | -1.015 | -0.493 | 0.165 | -0.689 | -0.210 | 0.0450 | -1.004 | -0.478 | 0.165 | -0.689 | -0.210 | 0.0459 |
| | (1.054) | (1.238) | (0.133) | (0.615) | (0.564) | (0.0504) | (1.054) | (1.236) | (0.133) | (0.615) | (0.564) | (0.0503) |
| Observations | 738 | 956 | 515 | 4,508 | 5,273 | 3,107 | 738 | 956 | 515 | 4,508 | 5,273 | 3,107 |
| R-squared | 0.093 | 0.107 | 0.191 | 0.038 | 0.047 | 0.188 | 0.094 | 0.106 | 0.191 | 0.038 | 0.047 | 0.188 |
| Waves | 2006-2008 | 2006-2008 | 2006-2008 | All | All | All | 2006-2008 | 2006-2008 | 2006-2008 | All | All | All |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: See notes for Table 2. Regressions performed for subsample with gross financial wealth between 1 and 20 times household annual income.

**Table 6: Effect of S&P 500 on Expected Labor Supply, Individuals with Retiree Health Insurance**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VARIABLES | P62 | P65 | E(R) | P62 | P65 | E(R) | P62 | P65 | E(R) | P62 | P65 | E(R) |
| ln(S&P 500) | -17.53 | 3.115 | 1.123 | -4.580 | 4.955 | 0.757 | | | | | | |
| | (10.85) | (8.682) | (1.525) | (6.597) | (5.744) | (0.882) | | | | | | |
| %Change in S&P 500 | | | | | | | -28.33** | 2.190 | 1.687 | -6.451 | -6.506 | 0.534 |
| | | | | | | | (13.82) | (10.59) | (1.714) | (5.981) | (5.012) | (0.778) |
| ln(unemp) | -17.38** | 5.162 | -0.123 | -5.299* | 3.170 | -0.505 | -18.78** | 4.908 | -0.0524 | -5.314* | 2.376 | -0.517 |
| | (8.334) | (6.847) | (0.859) | (3.028) | (2.828) | (0.393) | (8.337) | (6.892) | (0.869) | (3.007) | (2.834) | (0.393) |
| ln(unemp)*HS or less | 20.84** | -0.883 | -0.196 | 7.195* | 1.594 | 0.662 | 21.41** | -0.846 | -0.200 | 7.207* | 1.817 | 0.657 |
| | (10.43) | (9.224) | (1.180) | (4.082) | (3.761) | (0.493) | (10.41) | (9.221) | (1.177) | (4.077) | (3.757) | (0.493) |
| ln(FHFA) | 5.038 | -5.655 | -0.401 | -4.158 | 2.164 | 0.859 | 4.750 | -5.756 | -0.398 | -4.592 | 1.678 | 0.899 |
| | (16.43) | (14.57) | (2.091) | (7.050) | (6.088) | (0.854) | (16.39) | (14.61) | (2.103) | (7.069) | (6.087) | (0.856) |
| ln(FHFA)*homeowner | -1.063 | -0.648 | -0.393 | -0.823 | -0.00918 | -0.0265 | -1.064 | -0.666 | -0.401 | -0.819 | -0.0294 | -0.0283 |
| | (1.620) | (1.194) | (0.326) | (0.535) | (0.530) | (0.0745) | (1.602) | (1.194) | (0.328) | (0.535) | (0.529) | (0.0743) |
| Observations | 691 | 932 | 411 | 4,144 | 4,995 | 2,840 | 691 | 932 | 411 | 4,144 | 4,995 | 2,840 |
| R-squared | 0.108 | 0.059 | 0.205 | 0.035 | 0.029 | 0.190 | 0.111 | 0.059 | 0.206 | 0.035 | 0.029 | 0.190 |
| Waves | 2006-2008 | 2006-2008 | 2006-2008 | All | All | All | 2006-2008 | 2006-2008 | 2006-2008 | All | All | All |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: See notes for Table 2. Regressions performed for subsample with retiree health insurance.

**Table 7: Effect of S&P 500 on Expected Labor Supply, Individuals with No DB Plans**

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VARIABLES | P62 | P65 | E(R) | P62 | P65 | E(R) | P62 | P65 | E(R) | P62 | P65 | E(R) |
| ln(S&P 500) | -8.677 | -0.708 | 0.385 | -1.181 | -0.104 | -0.137 | | | | | | |
| | (6.501) | (5.437) | (1.082) | (4.542) | (3.993) | (0.682) | | | | | | |
| %Change in S&P 500 | | | | | | | -13.86* | -6.890 | 0.0429 | -2.088 | -6.740* | -0.0925 |
| | | | | | | | (8.378) | (6.997) | (1.361) | (4.511) | (4.064) | (0.668) |
| ln(unemp) | -7.722* | 2.418 | 0.258 | -1.477 | 1.541 | 0.437 | -8.331* | 1.336 | 0.195 | -1.527 | 1.073 | 0.440 |
| | (4.608) | (3.972) | (0.788) | (2.188) | (2.082) | (0.354) | (4.695) | (4.050) | (0.789) | (2.193) | (2.092) | (0.353) |
| ln(unemp)*HS or less | 5.796 | -0.128 | -0.516 | -1.486 | -2.749 | -0.0578 | 5.930 | 0.0526 | -0.517 | -1.464 | -2.620 | -0.0570 |
| | (5.747) | (4.783) | (0.780) | (2.956) | (2.612) | (0.432) | (5.758) | (4.785) | (0.779) | (2.955) | (2.611) | (0.431) |
| ln(FHFA) | 5.464 | 0.633 | -2.999* | 1.621 | 3.034 | -1.061 | 5.740 | 0.554 | -3.013* | 1.495 | 2.707 | -1.067 |
| | (9.944) | (8.501) | (1.787) | (5.037) | (4.357) | (0.780) | (9.938) | (8.496) | (1.785) | (5.050) | (4.361) | (0.787) |
| ln(FHFA)*homeowner | 0.0970 | 0.220 | 0.137 | -0.139 | 0.388 | -0.0441 | 0.0890 | 0.191 | 0.136 | -0.142 | 0.369 | -0.0439 |
| | (0.494) | (0.507) | (0.133) | (0.301) | (0.304) | (0.0605) | (0.494) | (0.507) | (0.133) | (0.302) | (0.305) | (0.0602) |
| Observations | 1,896 | 2,475 | 1,025 | 8,788 | 10,464 | 5,357 | 1,896 | 2,475 | 1,025 | 8,788 | 10,464 | 5,357 |
| R-squared | 0.070 | 0.064 | 0.192 | 0.028 | 0.031 | 0.194 | 0.071 | 0.065 | 0.192 | 0.028 | 0.031 | 0.194 |
| Waves | 2006-2008 | 2006-2008 | 2006-2008 | All | All | All | 2006-2008 | 2006-2008 | 2006-2008 | All | All | All |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: See notes for Table 2. Regressions performed for subsample with no DB plans from current or previous employers.

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