Changes in Wealth and Labor Supply Responses of Older Households in the Great Recession: An Analysis with the Survey of Consumer Finances.[*]

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This version: December, 2013

Very preliminary. Comments welcomed.

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[*] The analysis and conclusions set forth are those of the authors and do not indicate concurrence by other members of the research staff or the Board of Governors of the Federal Reserve System. We thank John Sabelhaus for helpful discussions.

I. Introduction

Between December 2007 and June 2009, US households endured the deepest recession since the Great Depression. During this time, households saw a 30% decline in the S&P 500, a 20% decline nationally in house prices, and a five percentage point increase in the national unemployment rate. A decline in net worth and a temporary income shock may induce households to postpone retirement and stay in the labor force, though a local labor market with few opportunities may constrain households' supply of labor. These labor supply decisions should vary by age, as well, as older workers must quickly recapture lost wealth prior to retirement.

The labor force participation rate of males 55 and older increased from 45 percent in 2007 to 47 percent in 2012 even as prime-aged males' participation rate declined from about 90 percent to about 88 percent during this time period (Erceg and Levin, 2013, Figure 2 and Appendix Figure A3). In most developed countries, the post-2007 labor force participation rates either continued or accelerated the pre-recession trends toward greater participation for older workers (Burtless and Bosworth, 2013).

This paper addresses the role that changes in family balance sheets had on a measure of participation (expected retirement age) of older workers during the Great Recession. The data come from the 2007-09 Survey of Consumer Finances (SCF) panel, a special re-interview of the 2007 SCF cross-section, and the 2001, 2004, 2007, and 2010 SCF cross sections. The SCF is the foremost source for information on US households' assets and debts, and the SCF also collects detailed employment, income, and demographic information.[1]

The results from the SCF panel indicate that, in general, older workers lost retirement assets and that a transition to unemployment for older workers between 2007 and 2009 was associated with large declines in net worth. There were a variety of outcomes for older workers, though, and nearly 40 percent saw either no asset loss or asset gains between 2007 and 2009. We find that unemployment spells, local labor market conditions, and the magnitude of net worth decline influence when older households plan to retire in the SCF panel. The results also point to some role for media headlines driving postponing retirement plans, similar to results in Goda, Shoven, and Slavov (2012). Changes in assets and debts themselves have little role.

[1] On the whole, the 2009 SCF panel matches the aggregate decline in net worth between 2007 and 2009 but also shows the variety of net worth changes across households; for example, nearly one third of households saw either no decline or small gains in net worth (Bricker et al., 2011).

The SCF cross-sectional data reveal income shocks were a significant driver of the increase in expected retirement age of older SCF respondents, though other standard economic variables do not appear to be as important. Other than income shocks, most of the increase in expected retirement age from 2007 to 2010 (about 3/4^{ths} of a year) is driven by factors that cannot be modeled in the SCF. In 2010, in particular, nearly all of the expected retirement decisions of the 2010 SCF respondents cannot be modeled by the large asset, debt, and income changes that occurred between 2007 and 2010.

The remainder of the paper is organized as follows. In Section II, we provide a literature review and in Section III we discuss the SCF panel data. Section IV describes our results and Section V concludes.

II. Background[2]

Bosworth and Burtless (2013) use time-series data for 20 OECD countries, and explore whether the Great Recession resulted in a structural break in the pre-existing trend toward increased labor force participation (since the mid- to late-1990s in most of those countries) among older workers. In most countries and for most of the age groups (60-64; 65-69, and; 70-74) labor force participation among older workers rose even faster after 2007. The primary exceptions being the European countries experiencing the most extreme economic and fiscal crises (Greece, Portugal, and Ireland); only in the countries with largest increases in the unemployment rate did labor force participation among older workers remain constant or declined after 2007.

Coile and Levine (2009) use repeated cross-sections from 30 years of the March CPS to explore the impacts of stock, housing, and labor market conditions on the transitions into retirement of older workers.[3] They find that the "younger" cohort (55 to 61) does not alter its retirement behavior in response to fluctuations in the stock market, represented by the S&P 500 Index, or labor market, represented by the unemployment rate. The "older" cohort (62 to 69), however, does respond to slack labor market conditions by retiring earlier and to adverse stock market conditions

[2] There is a substantial literature trying to understand the decline in overall labor force participation in the Great Recession, including Erceg and Levin (2013) Fujita (2013), Aaronson, Davis and Hu (2012), and Hotchkiss et. al. (2012) among others. Some of these papers address older workers to some extent, particularly the influence of aging of the population on the overall labor force participation rate, but this literature is sufficiently distinct from the question of retirement decisions and the specific labor force decisions of older workers that we will not address those papers here.
[3] Coile and Levine (2009) classify retiring workers as those currently not in the labor force, but who had been working at least 13 weeks during the prior year.

by putting off retirement.[4] The labor market effect is much stronger, though. More highly educated workers respond more to stock market conditions, while less educated workers respond more to the labor market.

Coile and Levine's (2009) findings indicate that neither cohort of older workers alters their retirement decisions based on housing market conditions, which are represented by changes in the state-level Case-Shiller index. The CPS does not contain data on housing assets or home equity, so Coile and Levine use educational attainment as a proxy for stock holdings, and ownership status to proxy for exposure to housing market fluctuations.

McFall (2011) explores the impacts of stock market fluctuations on expected retirement age using a small panel of households who were surveyed in Spring/Summer 2008 and again in Spring/Summer 2009 as part of the from the University of Michigan's "CogEcon" study. The surveys resulted in 306 valid responses, those age 40 and older working in both waves and who also provided at least some information about wealth. McFall (2011) reports that wealth loss caused an increase in expected retirement age. Average wealth loss raised expected retirement by 2.5 months. The measure of wealth used in McFall (2011) is "sustainable consumption," which is the annuity that could have been purchased in using current wealth plus future earnings, Social Security, and pension income, but excluding owner-occupied housing. Wealth changes are not based on independent measurement in each wave, but instead on reported changes over the prior year, and with bonds assumed to remain constant.

Goda, Shoven, and Slavov (2011) explore the factors influencing changes in the expected retirement age and the reported probability of working at age 62 and 65 between two recent HRS waves (2006 and 2008). All three measures rose between the 2006 and 2008 survey waves, showing older workers plan to work longer. The study exploits the plausible exogeneity of the date of the survey in 2008 (economic conditions were dramatically worse in late 2008 than in early 2008), and finds that the sharp drop in stock market increased the reported probability of working at 62, only partially offset by higher unemployment leading to somewhat decreased probability. Market fluctuations were not found to impact the other two retirement indicators. Similar to Coile and Levine (2009), Goda, Shoven, and Slavov (2011) find no evidence of housing wealth impacts, and

[4] In previous work (Coile and Levine (2006)) found that while labor market fluctuations from the late 1980s to 2002 were positively related with retirement among older workers, stock market fluctuations did not have any consistent impact.

also rely on aggregate measures – as opposed to household-level data – for housing and the stock market.

Farber (2011) uses the Displaced Worker Survey (1984 to 2010) to analyze trends in job loss and the labor supply responses of job losers. Job loss hit modern historic highs in the Great Recession, with the three-year job loss rate climbing to 16 percent in 2007-09. Job loss rates are always lower among older workers, but they have also reached historic highs, rising above 14 percent (3-year rate for workers age 50 to 64). Older job losers are more likely to drop out of the labor force than younger workers (20 percent of job losers between 55 and 64, compared to 10 percent for workers 25 to 44 and 45 to 54). In the recent recession – as well as the previous one – however, the share of older job losers dropping out of the labor force declined (from 26 percent in 2006 to 20 percent in 2008 and 2010), while it is unchanged for workers 25 to 54).

Gustman et al's (2011) analysis of the HRS (including the 2010 wave) suggests that labor supply responses of workers nearing retirement age are more modest than previous studies have indicated. The work and retirement decisions made between 2006 and 2010 by the cohort of workers nearing retirement age (ages 53 to 58 before the onset of the Great Recession) are broadly similar to those made by older cohorts at the same ages. The most recent cohort of near-retirement workers has suffered much larger increases in layoffs and unemployment, but has not exhibited increased movement into retirement or disability programs relative to previous cohorts. This cohort has not altered its retirement, Gustman et al suggest, because few of them have suffered multiple adverse effects. Average wealth losses suffered by are modest (a decline of 2.8 percent compared to gains of five percent experienced over the same ages for older cohorts), heavily concentrated among high-wealth households, and are predominantly driven by housing losses which can be recouped over time. Gustman et al's use of individual-level panel data with relatively high-quality asset and wealth data represent an improvement over some previous studies. Their finding of no net change in retirement and labor supply, relative to previous cohorts, obscures the independent and offsetting influences (asset shock reducing retirement and labor market shock accelerating retirement) that motivates much of the literature.

Some of this previous literature contains no household-level information on stock-market exposure, and rely strictly on market –wide measures of stock market fluctuation. None of the previous study use asset data that are as comprehensive and precise as what is contained in the SCF. Also, only one of the previous studies uses household-level housing equity. Instead these studies

typically use state-level housing price change and home ownership to reflect the housing market shock. But there is substantial variation across household in stock market exposure and in housing equity. Regional housing market shocks and national stock market fluctuations may induce different labor supply responses depending on the household-level asset and equity conditions.

III. Data & Methodology

2001-2010 Survey of Consumer Finances

The SCF provides the most comprehensive and highest-quality micro data available on U.S. household wealth. The survey collects detailed household-level data on assets and liabilities and on demographic characteristics, income, employment and pensions, credit market experiences, and expectations and attitudes. The data are reported as of the time of the interview, except for income, which refers to the prior calendar year.

SCF sample design and unit of observation

The SCF employs a dual-frame sample design, including a multi-stage area-probability (AP) sample and a list sample. The AP sample, which comprises roughly 60 percent of the total sample, provides broad national coverage and was selected by NORC at the University of Chicago (see Tourangeau et al., 1993). The list sample oversamples households that are predicted to be relatively wealthy based on a model of wealth estimated using statistical data derived from tax returns (see Kennickell and McManus, 1993 and Kennickell 1998, 2001). The two components of the sample are combined to represent the population of households.

In the SCF, the eligible respondent in a given household is the economically dominant single individual or the financially most knowledgeable member of the economically dominant couple. Most of the questions in the interview are focused on the "primary economic unit" (PEU) a concept that includes the core individual or couple and any other people in the household (or away at school) who were financially interdependent with that person or couple.

2007-2009 Survey of Consumer Finances Panel[5]

This paper draws on data from the 2007 Survey of Consumer Finances (SCF) and the special 2009 panel follow-up. The 2009 survey was conducted to provide a fuller picture of the effects of the intervening recession on households' finances. Although the aggregate effects of the economic downturn were readily apparent in 2009, comparatively little was known about the economic

[5] Bucks et al. (2009) provide additional detail on the 2007 Survey of Consumer Finances. Bricker et al. (2011) and Kennickell (2010) discuss details of the 2007–2009 SCF panel.

experiences for the full range of U.S. households. To fill this gap, the Federal Reserve Board designed and implemented a follow-up survey of families that had participated in the 2007 wave of the Survey of Consumer Finances.

For the 2009 follow-up survey, a concerted effort was made to track every 2007 household and to conduct an interview with the original respondent or an eligible alternate.[6] Almost 89 percent of the eligible 2007 SCF participants were re-interviewed in the 2009 follow-up. Analysis of nonresponse to the 2009 interview suggests that there is little relationship between response and most important characteristics in the panel. Nevertheless, Kennickell (2010) finds that geographic mobility was one of the few statistically significant correlates of non-response: families that moved between 2007 and 2009 were less likely to complete the 2009 follow-up survey (conditional on having been located). An additional concern is that families that moved between 2007 and 2009 might be expected to be more difficult to locate and, hence, to have been re-interviewed: less than three percent of 2007 SCF participants could not be located (Kennickell, 2010). These considerations suggest that the 2007–2009 SCF panel might under-represent families that moved. Any resulting bias to the estimates may be mitigated by our use of the nonresponse-adjusted weights, which incorporate the extensive information available on all households that participated in the 2007 SCF.

The 2007 and 2009 survey instruments

Like other waves of the triennial cross-sectional SCF surveys, the 2007 SCF collected detailed information on all aspects of household finances, most of it at the level of individual items. For example, the survey collected details for up to three mortgages (in addition to home-equity lines of credit) on a primary residence, with questions on all aspects of the mortgage terms and on various institutional details. To reduce the response burden, the 2009 follow-up survey typically collected less detail. In a few important instances—particularly mortgages on primary residences and components of income—the survey retained the full detail of the 2007 survey. But the 2009 SCF follow-up interview retained, as much as possible, the structure, ordering, and framing of concepts

[6] If the 2007 respondent was alive and not living permanently outside the U.S, the target household in 2009 was the one that contained that person. If (a) the 2007 respondent was either deceased or living permanently outside the U.S. and (b) the 2007 respondent had a spouse or partner who was a part of the PEU as defined in the 2007 survey and who lived permanently in the U.S., the target household in 2009 was the one that contained the 2007 spouse or partner of the 2007 respondent. Otherwise, the case was considered to be out of scope for the 2009 survey. As in the 2007 cross section, a knowledgeable proxy was allowed to complete the interview on behalf of the respondent if the respondent was disabled, too busy, or not knowledgeable about the household finances.

in the 2007 survey to maximize the comparability of data in both years of the panel. As a consequence, it is possible to construct parallel estimates for all of the most important aspects of wealth in both 2007 and 2009.

Key SCF Variables

Given the differences in survey instruments between 2007 and 2009, we give a brief description of our variables, beginning with SCF variables and continuing with variables from external sources. In the analysis that follows, we generally focus on the male "heads of household."

Change in net worth: families are classified by the difference in their percentile rank in the wealth distribution in each of the two years. The difference in percentile ranks is a measure of change that we favor over two other alternatives: the dollar value change in net worth and the percent change in net worth. Our measure is more independent of the initial wealth level than the dollar value change in net worth and the percent change in net worth may be overly influenced by large changes relative to the initial base wealth.

Unemployment spell: is asked in both the 2007 and 2009 SCF. "During the past 12 months, how many weeks in total were you unemployed and looking for work?" and is potentially asked to both the Head of households and the Spouse. Due to the look-back nature of the question, this question gets the broadest sense of families transitioning from employment to unemployment (even if they are currently employed at the time of the 2009 interview).

Change in liquid assets: is the change in the level of checking, savings, money market, and brokerage call accounts between 2007 and 2009.

Change in equity assets: is the change in the level of IRAs, current account-type pensions (e.g. 401(k) plan account), past account-type pensions, directly-held stocks (and stock mutual funds), and equity held through trusts and annuities between 2007 and 2009.

Change in home price: is the change in the self-reported house price between 2007 and 2009. This question is asked to all home-owners and the wording is "What is the current value of this home? I mean, without taking any outstanding loans into account, about what would it bring if it were sold today?"

Initial home equity: is the difference in the self-reported house price in 2007 and self-reported debt held against the house in 2007. Housing debt is the sum of mortgage (1^{st} and 2^{nd}), home equity lines of credit, home equity loans, and any other debt used for the purchase of the home (e.g. a loan from a parent).

In addition, distributional indicators of net worth, an indicator of coverage by a DB-type plan, number of children in the family, age, education status, marital status, and median Census-tract income and house prices are also included as covariates in the analysis. Two outcome variables taken from the SCF are:

Change in expected retirement date: is the difference in the responses to the question "At what age do you expect to stop working altogether?" To keep independence in responses, the respondent is not reminded of their 2007 response when they are prompted for a 2009 response.

Expect to postpone retirement: is a dummy variable that takes the value "1" if the respondent expects to delay retirement beyond their expected retirement date given in 2007 and "0" otherwise. This is the dummy variable equivalent to *change in expected retirement date*.

Key External Variables

Change in unemployment rate: is a categorical variable based the percentage point difference in the unemployment rate in the county of residence during the interview month in 2007 and the unemployment rate during the interview month in 2009. The variable takes on four categories: (1) an increase of 3 percentage points or less, (2) an increase of 3 to 4.5 percentage points, (3) an increase of 4.5 to 6 percentage points, (4) and an increase of more than 6 percentage points. Due to differences in the timing of interviews, there is variation in *change in unemployment rate* between families in a given county. The unemployment rate is taken from the BLS Local Area Unemployment Statistics.

Change in S&P 500: is defined as the difference in the level of the S&P 500 as of the interview day in 2007 and the interview day in 2009. Due to differences in the timing of interviews, there is variation in *change in S&P 500* across families.

Change in Loan Performance HPI: is defined as the difference in the level of the state-level Loan Performance Home Price Index as of the interview month in 2007 and the interview month in 2009. Due to differences in the timing of interviews, there is variation in *change in Loan Performance HPI* across families within states.

2007-09 SCF Panel Analysis

Our analysis of the 2007-2009 SCF panel data mainly focuses on older families and their transitions into and out of the labor market. Much of the analysis focuses on the OLS regressions:

(0.0) $$Y = f(Key\ External\ Variables, X) + \varepsilon,$$

(0.0) $$Y = f(Key\ Internal\ Variables, X) + \varepsilon,$$

(0.0) $$Y = f(\textit{Key External Variables}, \textit{Key Internal Variables}, X) + \varepsilon,$$

where the *Key Internal Variables* and *Key External Variables* are those described above. The outcome *Y* will be *change in expected retirement date*, and *expect to postpone retirement*.

With equation (1.1) we will be able to see the correlation of postponing retirement with economic shocks that hit the nation or the respondent's local area; with equation (1.2) we will be able to see the correlation of postponing retirement with economic shocks that his the respondent's family; and with equation (1.3) we will be able to see the correlation of postponing retirement with both.

2001-2010 SCF Cross Section Analysis

Our analysis of the 2001-2010 SCF cross sections is centered around the DiNardo, Fortin, and Lemieux (1997) re-weighting estimator.

Conceptually the DFL estimator is simple: this method re-weights data from one point in time to give it the same demographic composition as is seen at another point in time. When the expected retirement ages of the SCF samples are compared, the estimated counterfactual becomes "what would the density of expected retirement ages have been among the 2010 SCF family heads if they had the balance sheets, income, and demographics of the 2007 SCF families (but retained their own retirement age decision rule)." The outcome of interest (here, expected retirement age) and the regressor (here, balance sheets, income, and demographics) are assumed to have a joint distribution, so that as the regressor is observed more (or less) frequently, so will the outcome. Importantly, no parametric assumptions are placed on the formation of these outcomes and the estimator allows inferences to be drawn along all points of the distribution of outcomes. The estimator also forces estimates to be drawn from common support across the two samples.[7]

Both observables and unobservables determine the outcome. The method assumes that the density of an outcome conditional on inputs and the density of the inputs are independent. The inputs are re-weighted while the conditional density remains unchanged, so the estimates rely on changes in observables only while keeping the distribution of unobservables unchanged. I assume that a change in the distribution of regressors will not change the distributional structure of the

[7] Common support precludes the use of key external data because there is either scant or no common support across the 007 and 2010 SCF samples in terms of county unemployment rates and S&P 500 index values.

outcome (i.e. general equilibrium effects of the change in the regressors are assumed away).[8] This is a key assumption.

Begin by defining $M^t(z,u)$ as the function that relates observable (z) and unobservable (u) inputs to the outcome (m) at time t. Realizations of the outcome $m = M^t(z,u)$ and the conditional density of the outcome is $f(m \mid z)$. The observables are distributed according to $h(z)$ and unobservables are distributed as $g(u)$. At time t and given attributes z, the conditional density is $g(u \mid z,t)$.

Assumption III.1: $g(u \mid z,t) = g(u \mid z,s)$ for time = t and time = s.

At time t, the density of the outcome is:

$$f(m \mid z,t) = \int 1[(M^t(z,u) = m) \mid z,t] g(u \mid z,t) du$$

Using Assumption III.1, the distribution of the outcome at t is the same as at s:

$$f(m \mid z,t) = \int 1[(M^t(z,u) = m) \mid z,t] g(u \mid z,t) du = \int 1[(M^t(z,u) = m) \mid z,t] g(u \mid z,s) du = f(m \mid z,s)$$

The distribution of the outcome unconditional of z is: $f(m \mid z,t) = \int f(m,z \mid t) dz$, so $f(m \mid z,s) = \int f(m,z \mid s) dz = \int f(m \mid z,s) h(z \mid s) dz$. By assumption III.1,

$$f(m \mid s) = \int f(m \mid z,t) h(z \mid s) dz = \int \frac{f(m,z \mid t)}{h(z \mid t)} h(z \mid s) dz = \int f(m,z \mid t) \frac{h(z \mid s)}{h(z \mid t)} dz$$

and $f(m \mid s) = \int f(m,z \mid t) \psi(z) dz = \int f(m \mid z,t) h(z \mid t) \psi(z) dz$.

The re-weighting function is defined as a ratio of propensity scores:

$\psi(z) = \frac{\Pr(s \mid z)}{\Pr(t \mid z)} \frac{\Pr(t)}{\Pr(s)}$ where the p-scores are found from a probit regression. The SCF cross section data sets are pooled and an indicator variable is generated to denote which of the two (2007

[8] Note that we allow unobservables to have a (possibly large) role in determining both the math major decision and the wage schedule. We assume that the effect says the same across cohorts, though. In the following paragraphs, I define $f(m \mid z,t)$ - it is this distribution that cannot respond to changes in z.

or 2010) samples the observation is from. The probability of being in the 2007 SCF and on being in the 2010 SCF, conditional on characteristics z, is computed in a probit regression.

As noted by DiNardo (2002), this re-weighting by a (ratio of) propensity scores allows the same benefits as Rosenbaum and Rubin (1983) propensity score matching. The problem lies in the fact that z is can be composed of many variables and integrating over many variables is cumbersome. The weight ($\psi(z)$) introduced above allows us to collapse a multidimensional integration problem (i.e. integration over each component of z) into a one-dimensional integration problem.

One can also decompose the effect that a subset of Z has on the outcome y. To use a concrete example, we can find the effect of changes in income on the expected retirement age while holding the other variables (assets, debts, demographics) constant. To do so, we can estimate the propensity scores conditional only on one variable of interest (call it z_1) and find the re-weighting function $\psi(z_1)$.

If we define $z = [z_1, z_2]$ then the distribution of z can also be written as the joint distribution of $[z_1, z_2]: F(z_1, z_2 \mid t_z = t) = \int dF(z_1 \mid z_2, t_z = t) dF(z_2 \mid t_z = t)$. This leads to re-writing $f(y; t_y = t, t_z = t)$ as $\int f(y \mid z_1, z_2, t_y = t) dF(z_1 \mid z_2, t_{z_1|z_2} = t) dF(z_2 \mid t_{z_2} = t)$, which implies that the counterfactual can be written as:

$$f(y; t_y = t, t_{z_2} = t, t_{z_1} = s) = \iint f(y \mid z_1, z_2, t_y = t) dF(z_1 \mid z_2, t_{z_1|z_2} = s) dF(z_2 \mid t_{z_2} = t)$$

$$= \iint f(y \mid z_1, z_2, t_y = t) \psi(z_1) dF(z_1 \mid z_2, t_{z_1|z_2} = t) dF(z_2 \mid t_{z_2} = t)$$

where $\psi(z_1)$ is a weighting function: $\psi(z_1) = \dfrac{dF(z_1 \mid z_2, t_{z_1|z_2} = s)}{dF(z_1 \mid z_2, t_{z_1|z_2} = t)}$.

IV. Results and Discussion

A. Employment changes and net worth changes of older workers

Table 1A shows the employment transitions made by 2007 older (50 to 64 year old) male heads-of-household between their 2007 and 2009 interviews. Roughly 84 percent of older male heads of household who were employed in 2007 were still employed in 2009 while 6 percent had transitioned into unemployment at the 2009 interview date and 7 percent had left the labor force (through either retirement, disability, or becoming a student or homemaker). In the fourth row we see that among those unemployed in 2007, some had transitioned into employment (24 percent) or self-employment (12) by the time of their 2009 interview date, though most either stayed unemployed (39 percent) or transitioned out of the labor force.

Table 1B shows the previous employment status of 2009 male heads-of-household. Here we see that unemployment was typically a new experience for the 2009 unemployed. Roughly 69 percent of the 2009 unemployed were either employed in 2007 (62 percent) or self-employed (7 percent). And rejoining the labor force was not a common event: 96 percent of older male heads of household that were employed in 2009 were also employed in 2007 (93 percent employed by someone else and 3 percent self-employed) and only 4 percent of the 2009 employed were out of the labor force or unemployed in 2007.

Self-employment appears to be one transition out of unemployment during the Great Recession. As seen in Table 1B, 12% of the 2009 self employed were employed in a more formal relationship in 2007. In unreported results, nearly half of male heads of household that transitioned from employment to self-employment reported having a spell of unemployment that lasted one week or more in the year prior to the 2009 interview, implying that the current self-employment status in 2009 may be more of a necessity than a choice. This result stands in contrast to previous results from better economic times (Dawson et al., 2009).

As seen in the top panel of Table 2, the transition into unemployment appears to come at a cost to net worth. The families where the head remained employed saw a decline of about 17 percent at the median but for older families that transitioned into unemployment (seen in column 4 of Table 2) the median change in net worth among families that transitioned into unemployment in 2009 was -24 percent.

In the panel B, we see that the decline in house values is in line with the decline in net worth and the bottom two panels indicate that families that transitioned to either unemployment or out of the labor force may have drawn on liquid and quasi-liquid assets (and implies that some transitions out of the labor force may not have been voluntary).

Overall, Tables 1 and 2 present a picture of transitions into unemployment are associated with decline in a family's net worth; the decline is partially due to spending down available assets.

One might expect the labor force decisions of older workers to be more responsive to the economic changes from 2007-2009. Figure 1 shows that the employment to population ratio showed larger declines for younger workers between 2006 and 2010. This differing response by age would be consistent with older workers needing to remain active in the labor force to make up for lost wealth due to asset price declines in the late 2000s.

Figure 2 paints a more nuanced picture. By 2008, 20-54 year olds began losing jobs at a substantial rate. By 2009, 55 to 69 year olds began losing jobs, too, and the employment to population ratio fell even further for the 20-54 year olds.

B. Expected Retirement Age Regressions – SCF Panel 2007-09

One factor that may change the employment to population ratio for older workers is retirement. Columns (1)-(3) of Table 3 present estimates of equation (1.1), (1.2), and (1.3) using the dependent variable *change in expected retirement date*, restricting the sample to working male heads-of-household aged 50 to 64 in 2007. The average change is expected retirement age is 0.6 years in this sample.

Column (1) presents estimates of equation (1.1) and uses non-SCF data that is similar to that used in earlier papers (Goda et al., 2011; Coile and Levine, 2009). The change in county unemployment rate had little discernable effect on postponing expected retirement date among the SCF panel respondents, as the coefficients are imprecisely estimated. The negative correlation between the *change in S&P 500* between 2007 and 2009 interview dates and *change in expected retirement date* implies that the decrease in the S&P 500 index between 2007 and 2009 is correlated with an increase in expected retirement age, and a one standard deviation change in the S&P 500 leads to a roughly 3 year increase in expected retirement age. Similar to Goda et al. (2011), differences in

interview date within SCF waves lead to variation across SCF families in the decline in this major equity index.[9]

Roughly 56% of SCF respondents live in a state that saw a 20% decline in house prices as measured by the state-level LoanPerformance home price index. Surprisingly, living in a state that saw a large house price decline is negatively correlated with postponing retirement; however, the estimate is imprecise and cannot be distinguished form zero.

Using SCF variables that describe relative percentage point decline in net worth, the families with the largest relative declines are expecting to increase retirement age by about 8 years relative to families with smaller losses, though again this is imprecisely estimated. Estimates of other key SCF variables in equation (1.1) (employment status, 2007 net worth percentile, education status, marital status, DB-type plan coverage, and median Census-tract income and house prices) are also included as covariates but are not discussed.

In column (2), we estimate equation (1.2) using the SCF measures of unemployment shocks, percent decline in equity holdings, and percent decline in house value, and initial 2007 home equity. Families that experienced an unemployment spell in the year prior to the 2009 interview increased their expected retirement age by roughly 2 years, though this estimate is imprecisely estimated. The correlation between changes in retirement accounts and changes in house values are economically small and cannot be distinguished from zero.

Column (3) includes the SCF variables as well as the external county and state-level data. The estimates in column (3) are similar to those in columns (1) and (2). This specification also includes an interaction between the family's 2007 home equity (measured in the SCF) and the dummy variable for living in a state with a large house price decline (measured by LoanPerformance). An older worker that entered the Great Recession with home equity, but then was hit by a large house price decline may need to postpone retirement to recoup the lost wealth. However, the interaction is economically small and cannot be distinguished from zero, which implies that there is no differential impact of house price shocks based on initial equity position.

We obtain similar results from a set of specifications using an indicator variable for any increase in retirement age between the two waves of the panel as the dependent variable. These results are available on request.

[9] In our sample, between the 2007 and 2009 interview dates, some families observed a 214 point decline in the S&P 500 while others observed a 565 point decline.

C. Expected Retirement Age Regressions – SCF Cross-Section 2007, 2010

The SCF panel results indicate a potentially large role for income shocks in explaining the delay in retirement age. Asset shocks (to housing or to other assets) appear to be less important. And the S&P results indicate that changes in traits that are hard to measure may be increasing the expected retirement age.

We use the 2001-2010 SCF cross sections to look further at the increase in expected retirement age. Figure 3 plots the expected age of retirement for workers aged 50-64 in these SCF cross sections. The expected age increased only slightly between 2001 and 2004, and increased by about one third of a year between 2004 and 2007. Between 2007 and 2010, though, expected retirement age increased by nearly three quarters of a year.

At the same time, the distribution of measurable characteristics changed over the decade. For example, median net worth increased from about one hundred thousand dollars in 2004 to about one hundred twenty five thousand dollars in 2007 and back down to about seventy seven thousand dollars in 2010. The fraction of families experiencing a recent unemployment spell was nearly 25 percent in 2010 but was closer to 15 percent in 2007.

To get a handle on how important changes in the distribution of observables are we use the DFL estimator and re-weight each cross section to have the same distribution of observable characteristics as had the previous cross-section. We begin with a focus on changes between 2007 and 2010. The DFL estimator will re-weight the 2007 SCF to have the same distribution of observable inputs to the retirement decision, such as demographics, health, assets (including housing, retirement assets (e.g. 401ks and IRAs), and businesses), debts, coverage by defined-benefit plans, income shocks, and unemployment spells that we observe in the 2010 SCF. In effect, the DFL estimator will give the 2007 families the shocks to assets and income that the 2010 families observed but will retain the 2007 rule that maps retirement inputs and expected retirement age.

When 2007 families are re-weighted to have the same demographic composition as observed in 2010, the expected retirement age does not change. When families in 2007 are given the 2010 distribution of assets (including housing, businesses, and retirement assets), debts, and family coverage by a defined-benefit retirement plan, expected retirement age increases by about one tenth of a year. That expected retirement age increases is not surprising: a negative asset shock should lead

to more households postponing retirement to recoup these assets. The overall increase in expected retirement age is nearly 3/4ths of a year, so the change in assets, debts, and DB plan coverage can explain only about 15 percent of this change.

However, including normal income and income shocks (that is, whether income in the past year was above normal, below normal, or about normal) increases expected retirement age by about 0.16 years; including a measure for whether the family was hit by a recent unemployment spell increased expected retirement age by another 0.12 years.

Overall, the changed composition of observables (e.g assets, debts, income) can explain about half of the increase in expected retirement age between 2007 and 2010. The change in income security (prevalence of income shocks and unemployment shocks), though, explains the majority.

Accounting for changes in the full retirement age (FRA) for Social Security between the two cohorts can explain about 20 percent of the change in expected retirement age between 2007 and 2010 (results not shown). However, given the change in FRA, re-weighting for changes in assets, debts, and income (as above) again explains about 50 percent of the change in expected retirement age.

The DFL estimator can be run in reverse by re-weighting the 2010 families to have the same observable distribution of the 2007 families. In this exercise the counterfactual that we estimate is "what would the expected retirement age of the 2010 SCF be if they had the observables of the 2007 SCF but retained their own retirement decision rule?"

In this exercise we can explain about 16 percent of the change in expected retirement age. This asymmetry is not unexpected: the DFL estimator is similar to Oaxaca-Blinder decomposition estimators in that the choice of base group impacts the amount that can be explained. In this case, the observed inputs to the retirement age decision rules of the 2007 families can explain changes in retirement age better than in the 2010 decision rule. That is, the 2010 decision rule is less well modeled by family traits like income and assets, and is more a function of unobservables.

Similar results are found when the 2010 families are given the observable composition of the 2004 SCF families.

None of the increase in expected retirement age between 2004 and 2007 can be explained by changes in the distribution of SCF observables (results not shown), though the change in FRA can

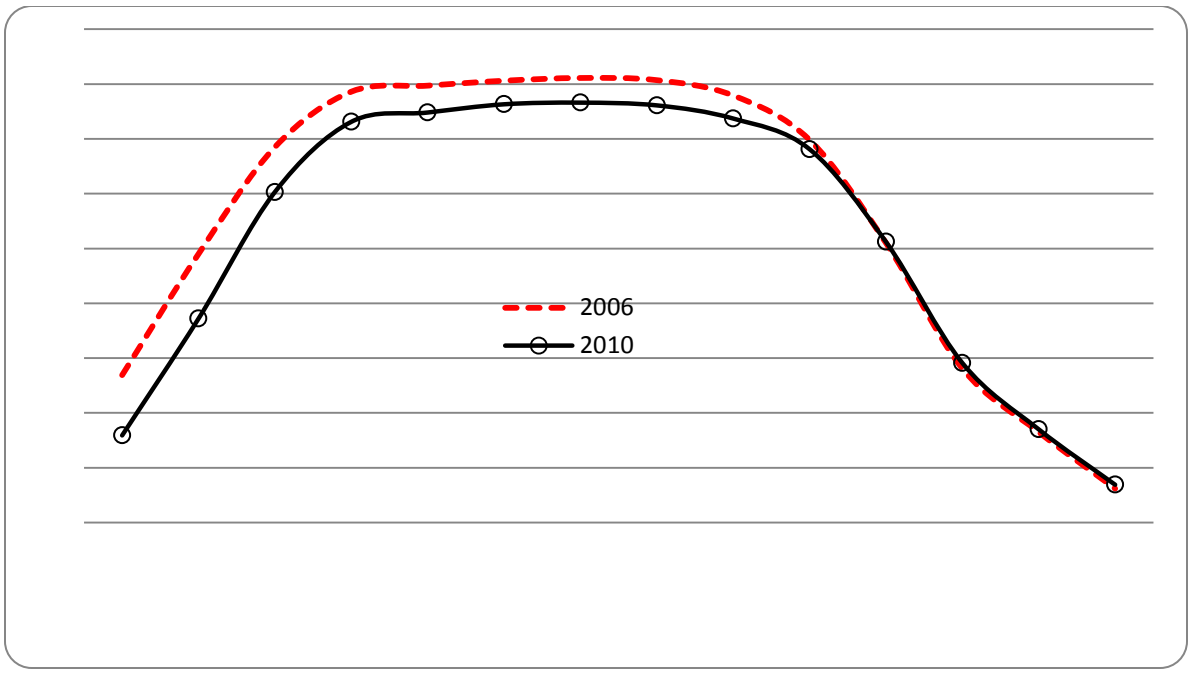
explain about 20 percent of the increase. Overall these results highlight the role that unobservables may be playing in the increase in expected retirement age (and similarly the increase in labor force participation rate of older workers). Examples of such unobservables can be changes in the employee's value of having employer-provided health coverage, changes in the option value of retaining one's job (for fear that one could not find a better job if they left), or affinity for one's current job.

V. Conclusion

The period between late 2007 (during the 2007 SCF field period) and mid-2009 (during the 2009 SCF field period) saw large declines in both equity asset prices and in home prices, and a deterioration of the labor market. Using data unique data from the 2007-2009 SCF, this paper has shown that transitioning into unemployment in 2009 is correlated with large net worth losses. Older workers are also more likely to expect to postpone retirement if they were interviewed at a time when S&P 500 declines were larger. This result is similar to Goda et al. (2011), who analyze a time period similar to ours (2006-2008), but in contrast to Goda et al. (2010), who analyze a longer time frame, and in contrast to Hurd and Reti (2001), and Coile and Levine (2006), who analyze earlier time periods. Goda et al. (2011) hypothesize that the negative correlation found for 2006-2008 may be due to omitted variables such as optimism or pessimism about the economy. However, including measures of optimism for the economy in equation (1.1) only slightly changes the estimate of *change in S&P 500*.[10] Similar to Gustman, et al. (2011), own asset changes do not correlate with changes in expected retirement age.

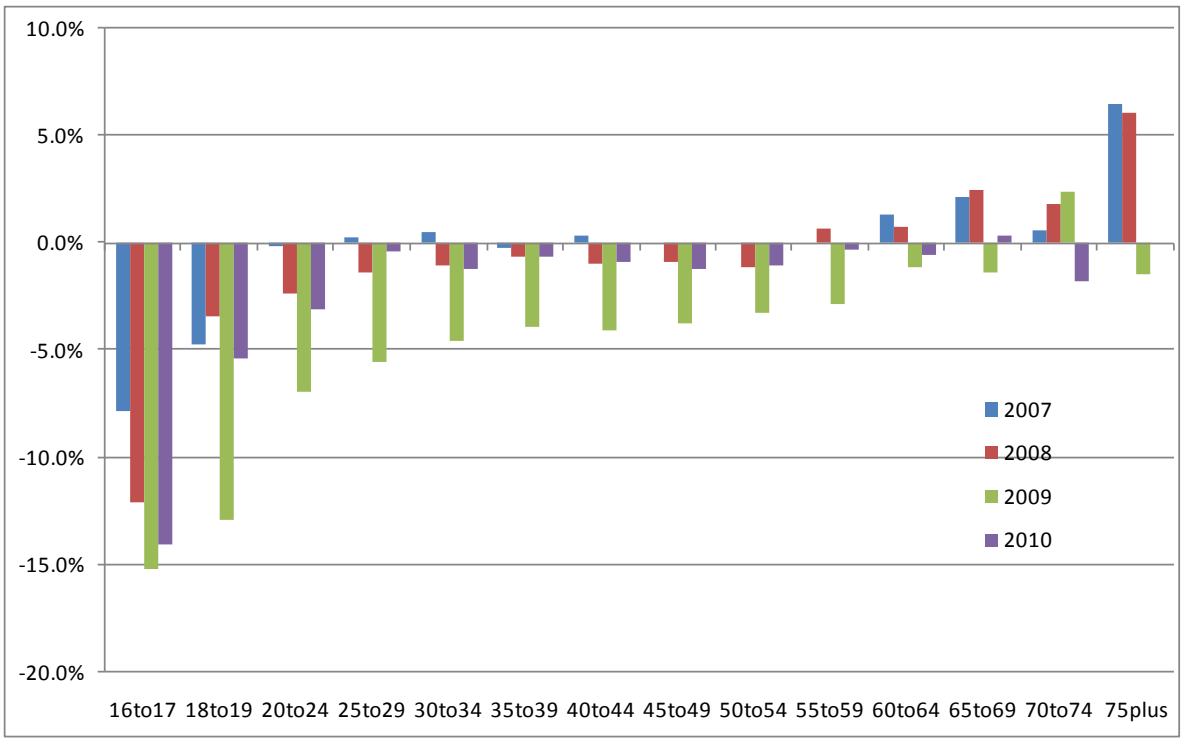
[10] Results not shown but are available upon request. Economic sentiment questions deal with outlook for the economy over the next 5 years ("Over the next five years, do you expect the U.S. economy as a whole to perform better, worse, or about the same as it has over the past five years?) and the family's outlook for their own income over the next year ("Over the next year, do you expect your total family income to go up more than prices, less than prices, or about the same as prices?"). These questions are asked in both 2007 and 2009.

Figure 1. Employment to Population Ratio, by Age Group 2006 and 2010



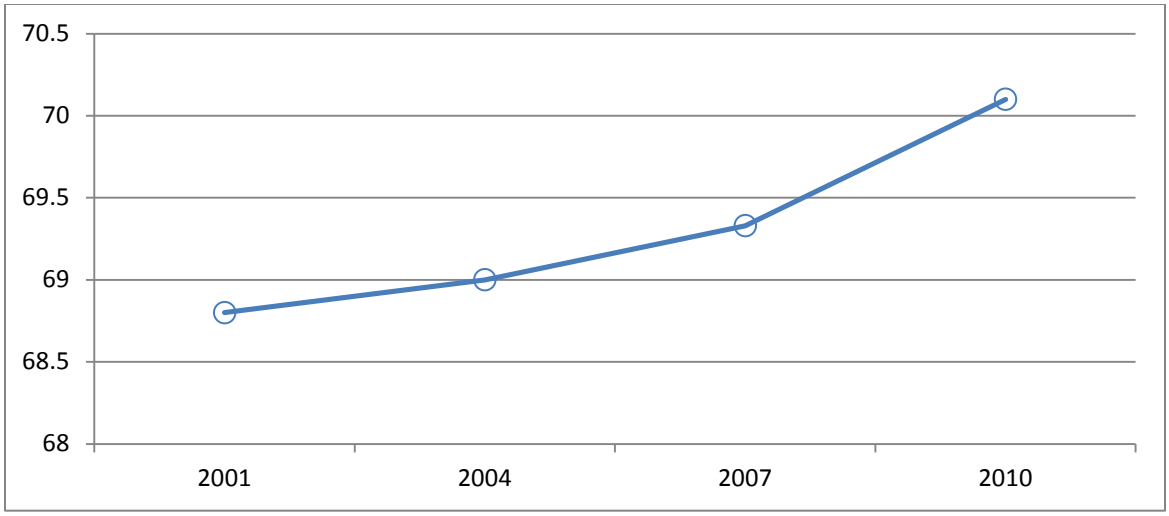
Data: Current Population Survey

Figure 2. Annual Percent Changes in EMP/POP Ratio 2007 to 2010, by Age Group



Data: Current Population Survey

Figure 3. Expected Retirement Age of Workers Ages 50 to 64



Source: Survey of Consumer Finances

Table 1A. Employment Transition Matrix: (relative to 2007 marginal distribution).

Percent of older male heads of household		2009				
		Employed	Self-employed	Not in LF	Unemployed	*Total*
2007	Employed	84	3	7	6	100
	Self-employed	9	78	11	3	100
	Not in LF	9	2	85	4	100
	Unemployed	24	12	25	39	100

Notes: Data from 2007-2009 SCF panel and based on male heads of household only. Each row adds up to 100 percent. The interpretation of the upper left cell, for example, is that 84 percent of the 2007 employed older male respondents are still employed in 2009, while 3 percent have transitioned into self-employment, 7 percent have transitioned out of the labor force, and 6 percent have transitioned to unemployment as of the 2009 interview date.

Table 1B. Employment Transition Matrix: (relative to 2009 marginal distribution).

Percent of older male heads of household		2009			
		Employed	Self-employed	Not in LF	Unemployed
2007	Employed	93	12	19	62
	Self-employed	3	83	8	7
	Not in LF	3	3	71	11
	Unemployed	1	2	3	20
	Total	100	100	100	100

Notes: Data from 2007-2009 SCF panel and based on male heads of household only. Each column adds up to 100 percent. The interpretation of the upper left cell, for example, is that 93 percent of the 2009 employed older male respondents were employed in 2007, while 3 percent have transitioned into employment from self-employment, 3 percent of the 2009 older employed males were out of the labor force, and 1 percent were unemployed as of 2007 interview date.

Table 2. Employment Status Transition and Change in Net Worth of Older Workers

Panel A: Median change in net worth among the employed in 2007 that transitioned to…

	(1) Employed	(2) Self-employed	(3) Not in LF	(4) Unemployed
Percent Δ	-18	-17	-20	-24
Dollar Δ	-$30,500	-$112,000	-$17,000	-$40,000

Panel B: Median change in house value among the employed in 2007 that transitioned to…

	Employed	Self-employed	Not in LF	Unemployed
Percent Δ	-13	-16	-10	-23
Dollar Δ	-$29,000	-$62,000	-$18,000	-$40,000

Panel C: Median change in liquid assets among the employed in 2007 that transitioned to…

	Employed	Self-employed	Not in LF	Unemployed
Percent Δ	-16	-8	17	-53
Dollar Δ	-$525	-$188	$1189	-$939

Panel D: Median change in retirement account balances among the employed in 2007 that transitioned to…

	Employed	Self-employed	Not in LF	Unemployed
Percent Δ	-16	-16	-35	-6
Dollar Δ	-$7500	-$23,000	-$38,308	-$1,000

Notes: Male heads of household aged 50-64 only. Data from 2007-2009 SCF panel.

Table 3. Estimates of economic shocks on change in retirement age.

	(1) Δ in Expected Retirement Age	(2) Δ in Expected Retirement Age	(3) Δ in Expected Retirement Age
County unemp. rate difference is…			
between 3 to 4.5 ppt. increase	-0.72	-0.69	-0.74
	(0.90)	(0.90)	(0.88)
between 4.5 to 6 ppt. increase	1.05	1.07	0.90
	(0.96)	(0.95)	(0.92)
more than 6 ppt. increase	0.13	0.07	-0.12
	(1.01)	(0.99)	(0.96)
Change in S&P 500	-0.011	-0.012	-0.029
	(0.005)	(0.005)	(0.008)
Int. of change in S&P with I(have equities)	…	…	0.024
	…	…	(0.10)
LoanPerformance >20% decline	-0.36	-0.34	-0.42
	(0.57)	(0.60)	(0.52)
Unemp. spell in in 2008/2009	…	1.50	1.63
	…	(0.66)	(0.68)
Relative change in net worth…			
decline between 3 and 10 pct'ile pts.	…	-1.11	-1.07
	…	(0.97)	(0.81)
decline <3 or increase <3 pct'ile pts.	…	-1.49	-1.52
	…	(0.81)	(0.73)
increase between 3 and 10 pct'ile pts.	…	-2.32	-2.46
	…	(0.74)	(0.82)
increase greater than 10 pct'ile pts.	…	0.18	-0.07
	…	(0.95)	(0.89)
SCF demographic controls	Yes	Yes	Yes
SCF balance sheet controls	No	Yes	Yes
N	870	870	870
R^2	0.07	0.09	0.09

Notes: Data from 2007-2009 SCF panel, male heads of household aged 50 to 64, in the labor force both years. Standard errors are based on 999 bootstrap replicate weights that incorporate imputation and sampling variability. SCF demographic controls are dummies for educational attainment, marital status, dummy for coverage by a DB-type plan on either current job or past job, and interactions of 2007 and 2009 employment status. Additional SCF controls are: county unemployment rate in 2007; polynomials of 2007 levels of retirement assets housing assets, debts, and net worth; polynomials of change in retirement assets housing assets, debts, and net worth. Omitted groups are county unemployment rate difference less than 3 percentage point increase, and relative change in net worth was a decline of more than 10 percentile points.

Table 4. Change in retirement age between 2007 and 2010 explained by observables

Panel A. Expected retirement age

2007	2010
69.33	70.09

Panel B. Reweight each cohort via DFL estimator

Variable	Reweight the 2007 wave to have observables of 2010	Reweight the 2010 wave to have observables of 2007 wave
Age, education, marital	69.33	70.09
Health	69.32	70.12
Assets (excl. houses, bus, ret)	69.35	70.11
House values	69.36	70.10
Business values	69.39	70.08
Retirement accounts	69.41	70.06
Debts	69.41	70.06
Net worth	69.40	70.05
DB plan coverage	69.42	70.00
Normal income	69.42	69.99
Income shock	69.58	69.97
Unemployment spell (recent)	69.70	69.97
Percent explained	49 %	16%

Notes: Data from 2007 and 2010 SCF cross section, male heads of household aged 50 to 64.

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