The Impact of Diminished Housing Wealth on Health: Evidence from the Great Recession

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Abstract

This study investigates how the decline in housing wealth during the recent Great Recession affected the psychological and physical health of homeowners. We also study whether the stress caused by the financial loss interfered with life and work activities. Controlling for the changes in family income and employment status, we show that the decline in housing wealth is associated with an increase in psychological distress and a deterioration of physical health. The interference of stress with life and work activities is most pronounced among younger, middle-aged, and African-American homeowners.

JEL Classifications: D12, D14, D91

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I. INTRODUCTION

Housing wealth is an important component of household portfolios. The value of owner-occupied housing accounted for 33% of total household wealth in 2007. Housing wealth is particularly important for middle-class families since two-thirds of median household wealth is invested in the principal residence (Bricker et al. 2012a). The 2007–2009 Great Recession significantly affected housing wealth, as median home value fell by roughly 12 percent (Bricker et al. 2012b). In addition, median and average homes sales prices fell by10 percent from 2006 to 2010 (Census Bureau 2012).

A rapid decrease in the value of primary residence and thus in the value of home equity has substantial effects on the financial well-being of homeowners and housing tenure decisions. The decline in home equity diminishes the likelihood of refinancing or a sale. Homeowners with outstanding housing debt may become "upside-down" in their mortgages, i.e., their mortgage becomes larger than the value of their home. In response to a decrease in home value, some homeowners, especially those with negligible down payments and negative home equity, may decide to default and "walk away" from their home mortgage loan. While this type of default on a mortgage may be a rational choice, foreclosures may also have numerous adverse consequences, ranging from the need to find a new residence to credit downgrades, tax obligations, and the emotional toll of leaving behind a home and neighborhood.[1]

[1] See MSN Real Estate: 6 Big Consequences of Foreclosure on http://realestate.msn.com/article.aspx?cp-documentid=13107768. This list provides evidence that foreclosures are significant causes of financial stress. It would be of interest to investigate the impact of foreclosures on the psychological distress caused by the financial problems. Our data set include information in 2009 on whether the foreclosure process started or the household is behind on mortgage payments. However, the small number of foreclosures or distressed mortgages in our data

If homeowners with positive equity are not affected by short-term liquidity constraints, default on a mortgage liability might not be an issue. Nevertheless, the financial well-being of the household could still be negatively affected by diminished housing wealth. Earlier studies have established a link between consumption and home prices (Browning, Gørtz, and Leth-Petersen 2013), but the nature of this link is unclear. It has been explained in two different ways. First, households may adjust their lifetime plan regarding consumption and labor supply when they receive new information about their lifetime wealth. This rationale has been questioned, however, since a decrease in housing wealth may have a small effect on real lifetime wealth, especially if the homeowner expects to continue living in the current home. However, several empirical studies suggest that home values *do* have consumption effects.[2] Second, a change in housing wealth may affect consumption by relaxing or tightening borrowing constraints. For example, a decline in housing equity reduces the possibility of utilizing the home as collateral for a loan, which may cause household consumption to decline.[3]

A decline in housing wealth can also affect psychological and physical health in several ways. First, diminished economic resources can cause changes in health-related behaviors that have negative consequences on health. For example, households experiencing a decline in wealth may attempt to reduce expenditures by not filling prescriptions, postponing doctor visits for preventive care, and substituting less healthy but more affordable foods for more healthy and

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prevented us from conducting such an empirical analysis. We provide the summary statistics on foreclosures and distressed mortgages below.

[2] Several studies have investigated whether an increase in house prices raises consumption through its impact on (housing) wealth. Campbell and Cocco (2007) studied the correlation between changes in consumption and house prices for older/younger homeowners and renters/owners. The price elasticity of consumption was the largest for older homeowners. Lovenheim and Reynolds (2013) found that an increase in a family's housing wealth during a child's high school years increased the likelihood that child would attend a higher quality (and more expensive) university.

[3] For example, Hurst and Stafford (2004) investigated the extent to which homeowners utilize home equity to smooth consumption. They found that households with low liquid assets are more likely to extract equity from their homes when they experience a spell of unemployment.

nutritious but more expensive food (Feinstein 1993; Jensen and Richter 2004; Lusardi, Schneider, and Tufano 2010). Second, an unexpected decline in wealth or an increase in the likelihood of mortgage default creates emotional distress. Around three-quarters of Americans cite money issues as a significant cause of stress (American Psychological Association 2012).[4] Emotional distress affects both mental and physical health. Stress is associated with anxiety, depression, sleeping and eating disorders, weight loss/gain, and also leads to health-undermining behaviors, such as smoking, and the abuse of alcohol and/or drugs.[5] In addition, stress is considered to be one of the causes of hypertension (high blood pressure) and therefore is a risk factor for heart attack and stroke (Cohen, Janicki-Deverts, and Miller 2007; Strike and Steptoe 2004). Stress may also depress the immune system, increasing susceptibility to various diseases including cancer (Chida et al. 2008; Cohen et al. 2012). Finally, stress can induce other changes in behavior, such as social withdrawal, poor performance at work, and absenteeism (Schuler 1980).

In this study, we use data from the Panel Study of Income Dynamics (PSID) for 2007–2009 to investigate the effects of an unexpected wealth loss on psychological distress and physical health. We also study whether the stress caused by a decline in the value of a housing asset interfered with life activities and had negative behavioral consequences. Measuring the impact of wealth on health typically presents an empirical challenge because the causal relation might also run from health to wealth. We avoid reverse causality bias in our estimates by utilizing the exogenous changes in wealth caused by the Great Recession. There is ample evidence that the sudden shock to home values from 2007 to 2009 was not caused by U.S. households suddenly becoming ill (Demyanyk and van Hemert 2011; Foster and Magdoff 2009;

[4] A number of studies (Bridges and Disney 2010; Brown, Taylor, and Price 2005) found that household indebtedness is associated with higher stress levels.

[5] Goldberger and Breznitz (1993) and Cooper (2004) review studies on the relationship between stress and health.

Mian and Sufi 2009).[6] The extent of the loss in home value might be correlated with both observed (e.g., demographic variables) and unobserved (e.g., investment preferences and health endowments) characteristics. For example, the housing crisis affected low-income communities and minorities more severely than other groups (Bernanke 2012).[7] Besides controlling for observed demographic and socio-economic characteristics, we also control for unobserved time-invariant characteristics by using a fixed-effects estimation strategy.

We find that homeowners who experienced a decline in housing wealth between 2007 and 2009 report a significant increase in psychological distress and a significant deterioration in self-reported health status. Somewhat surprisingly, the magnitude of the decline in the value of housing seems to have a monotonic effect on psychological and physical health, as homeowners who experienced a loss in the value of their housing asset of less than 20% were the most affected. Households with larger losses (30% or more) experienced insignificant changes in psychological and physical health. Our explanation for this finding is that households with larger losses also experienced higher unemployment rates and income losses that contributed to their health problems and reduced the significance of the impact of the decline in home value on health outcomes. Our findings also show that homeowners who experienced a decrease in housing wealth suffer from stress that interferes with the course of their normal life activities. In addition, these households reported a greater number of days that they were unable to work or carry out normal activities because of stress. The behavioral consequences of stress are more significant among households headed by young and middle-aged individuals, and by African

[6] We use the change in housing wealth during the Great Recession in our analysis, rather than the decline in the value of financial assets such as retirement accounts or other investments. Unlike housing wealth, which is illiquid in the short term, households can adjust financial assets as their values decrease. For example, if they choose to liquidate stocks, the estimates on the change in stock holdings would be biased downwards.

[7] For example, the decline in the median value of the primary residence is most pronounced for Hispanic households (Pew Research Center 2011). Hispanic households lost 51 percent of home value from 2005 to 2009, while white households lost 18 percent and Black households lost 23 percent.

Americans.

The remainder of the paper is structured as follows. Section II discusses the relationship between wealth and health. Section III presents the data, and Section IV provides the descriptive statistics. Section V presents the estimates of the impacts of the changes in home value on health outcomes and the behavioral consequences of increased stress. Section VI investigates whether demographics such as age and race play a significant role in determining the impact of housing wealth losses on health. Finally, section VII summarizes our findings.

II. BACKGROUND

Previous research showed that wealthy people are in better health (Michaud and van Soest 2008; Poterba, Venti, and Wise 2011; Smith 1999). There are several potential explanations for the observed correlation between wealth and health. One possibility is that wealth affects health. Individuals with more wealth live in a healthier environment, have access to better medical care and nutrition, and are better insulated from the harmful consequences of financial stress.[8] Another possibility is that health affects wealth. Healthier individuals are more productive, work longer hours, and therefore accumulate wealth faster.[9] Finally, other factors, such as social background or personality traits, may determine both health and wealth. For example, patient individuals invest in more education and adopt habits that lead them to be healthier and wealthier. Higher education also leads to higher earnings and more wealth as well as healthier lifestyles.

[8] Deaton (2002) discusses the literature that links health to income and wealth.

[9] Currie and Madrian (1999) provide a survey of the effects of health on wages, earnings and working hours. Babiarz, Widdows, and Yilmazer (2012) showed that adverse health events are associated with increases in unsecured debt, especially among low-asset households. Yilmazer and Scharff (2013) and Babiarz and Yilmazer (2013) found that lower earnings and high medical expenditures attributable to health adversities disrupt household wealth accumulation.

However, most studies that try to determine the direction of causality in the health-wealth nexus argue that wealth does not have a strong positive casual effect on physical and mental health. For example, Adams et al. (2003) and Michaud and van Soest (2008) showed that lagged wealth and income do not predict the changes in health for elderly. Lyons and Yilmazer (2005) examined the relationship between health status and financial strain controlling for the dual endogeneity. Their findings suggest that severe health conditions may result in larger financial burdens while large financial burdens are unlikely to accelerate a decline in health status. Similarly, Meer, Miller, and Rosen (2003) showed that the effect of wealth on health is insignificant when the endogeneity of wealth is taken into account. However, neither the lagged income and wealth variables, used in Adams et al. (2003) and Michaud and van Soest (2008), nor the instrumental variables, utilized in Lyons and Yilmazer (2005) and Meer et al. (2003), are truly exogenous.

A few studies rely on a quasi-experimental design to create an exogenous wealth or income shock.[10] Using information on monetary lottery prizes to create exogenous variation in income, Lindahl (2005) found that income gains causally lead to fewer symptoms of poor mental health, decrease problems with being overweight, and reduce mortality. Jensen and Richter (2004) utilized a one-time funding crisis of the pension system in Russia in 1996 that prevented many pensioners from being paid. Their results showed that the intake of calories and the use of health services and medications declined significantly among the pensioners during the crisis. In addition, the health of male pensioners worsened and their mortality increased. In the absence of

[10] A larger number of studies focused on understanding the effects of unemployment and job loss on health. Using administrative data on employment and earnings, Sullivan and von Wachter (2009) showed that mortality rates increase following exogenous job displacements. Similarly, Eliason, and Storrie (2009a; 2009b) utilized establishment closings to solve the problem of health selection in job displacement. Their findings showed that job loss significantly increases the risk of mortality, suicides, and hospitalizations due to alcohol-related conditions.

similar natural experiments in the U.S., our study utilizes the unexpected housing wealth loss caused by the economic recession to understand how wealth affects health.

Recessions can affect health in several ways. Unemployment rates, as well as other economic indicators of the conditions of financial and non-financial markets, worsen during recessions. As a response to changes in earnings, time-constraints, and stress (resulting from a job loss), and changes in wealth and income (resulting from declining economic conditions), individuals could modify their health behaviors. The directional effect should depend on the specific behavior, which could be health-promoting (adopting a more nutritious diet or exercising more) or health-compromising (smoking, heavy drinking, and consuming fast food), as well as the type of change in income and time constraint. For example, a job loss would entail increases in leisure that could be devoted to health-promoting behaviors, which would improve health. At the same time, income loss caused by unemployment could shift demand towards cheaper fast food. Since the Great Recession, there has been increased interest in understanding the relationship between business cycles and health (Miller et al. 2009; Xu 2013). Most studies focus on the impact of unemployment and job loss on health and health-related behaviors. Our study contributes to the literature by identifying how the financial loss in the form of a decline in housing wealth affected health.

III. DATA

We draw upon the 2007 and 2009 waves of the PSID, a nationally representative random sample of the U.S. households. The economic recession of 2007–2009 officially began in December 2007 and ended in June 2009.[11] The data for the 2009 PSID wave were collected

[11] We define the beginning and end dates of the recession using the National Bureau of Economic Research data on economic cycles, available at http://www.nber.org/cycles.html.

between March and December. However, over 75 percent of the households were interviewed between April and June in 2009 (Bosworth 2012). A number of studies have used the 2007–2009 PSID to investigate the impact of the recession on wealth, retirement decisions, and economic well-being (Bosworth 2012; Dynan 2012; Lerman and Zhang 2013).

We follow the literature in measuring housing wealth as the value of the home reported by homeowners in each survey and calculate the loss on housing wealth as the difference of the value of home between 2009 and 2007. The value of the primary residence is measured similarly in several other surveys, such as the Health and Retirement Study (HRS) and the Survey of Consumer Finances (SCF), and is regularly used in calculations of household net worth.[12,13]

We use four variables to capture the effects of a change in housing wealth on health: psychological distress, self-reported health status, doctor-diagnosed onsets of high blood pressure, and doctor-diagnosed onsets of psychiatric problems. Psychological distress is measured using the K-6 Non-Specific Psychological Distress Scale (Kessler et al. 2003) used in the PSID to determine if and how often a respondent experienced certain symptoms during the past 30 days. It includes six questions that ask the respondents if they felt (1) "*so sad that nothing could cheer you up*"; (2) "*nervous*"; (3) "*restless or fidgety*"; (4) "*hopeless*"; (5) "*that everything is an effort*"; and (6) "*worthless*". The possible responses are "*none of the time*"=0, "*a little of the time*"=1, "*some of the time*"=2, "*most of the time*"=3 and "*all of the time*"=4. Our measure of psychological distress is the sum of the answers to these six questions, ranging from

[12] In 2009 the Federal Reserve Board implemented a follow-up survey of households who had participated in the 2007 triennial cross-section of the SCF. While the SCF includes detailed information on wealth holdings, the data on health is limited to a single question on self-reported health status. To ensure the representativeness of PSID home value data, we compared the distribution of the change in home values that we obtained from the 2007 and 2009 waves of the PSID to the 2007–2009 SCF. These comparisons are reported below.

[13] The literature provides evidence that some homeowners misestimate their house value, although the magnitude of error is not large, typically ranging between 3 and 5 percent (Agarwal 2007; Goodman and Ittner 1992). We do not think that this measurement error affects our results because consumption and spending decisions, as well as decisions regarding repaying or defaulting on mortgage loans, depend on the homeowner's subjective estimate of house value (Agarwal 2007).

the minimum value of 0 to the maximum value of 24. The respondent is considered to be depressed (the variable Substantial distress=1) if her response to one of the six questions used to create the psychological distress variable is "*some of the time*"=2, "*most of the time*"=3, or "*all of the time*"=4.

The second measure of health is self-reported health status. The responses are collected on a 5-point scale from "*excellent*"=1, "*very good*"=2, "*good*"=3, "*fair*"=4 and "*poor*"=5. Finally, the PSID reports the history of doctor-diagnosed health conditions. High blood pressure and psychiatric problems are two health conditions that are caused and/or aggravated by high levels of stress. We identify new onsets of high blood pressure and psychiatric problems and use them as the third and fourth measures of health status.

The PSID also includes a number of questions designed to identify the behavioral consequences of stress. Individuals who reported being depressed (Substantial distress=1) are asked "*How much do these feelings usually interfere with your life or activities?*" The possible responses are "*not at all*"=0, "*a little*"=1, "*some*"=2, and "*a lot*"=3. Those who reported being depressed were asked two additional questions: the number of days during the past 30 days that they were unable to work or carry out normal activities dues to depression (Days unable to work due to stress) and the number of days during the past 30 days that they were able to work but had to reduce their activities (Days had to reduce work due to stress). Our last measure of the behavioral consequences of stress is Body Mass Index (BMI), which is calculated from the individual's weight and height.

IV. DESCRIPTIVE STATISTICS

Our sample consists of 4,013 households who were homeowners in both 2007 and

2009.[14] Of this sample, 3,699 households did not move between the two waves. Table 1 presents the definitions of the key variables and provides the summary statistics for both of these groups of homeowners. The summary statistics for both types of homeowners, those who moved between 2007 and 2009 and became an owner of another house and those who stayed in their homes, are very similar. The average home value decreased by 12%, from $286,381 to $255,740.[15] The percentage of households holding mortgages and the amounts of the outstanding mortgage loans were similar in 2007 and 2009. The PSID added questions about difficulties with mortgage payments and foreclosures in 2009. Among those with a mortgage loan, 5% reported that they had difficulty making their mortgage payments, and almost 1% reported that they were in the foreclosure process. The percentage of "underwater" mortgages increased from 2.4% in 2007 to 8.0% in 2009.

The measure of psychological distress averaged at 2.40 (out of 24) in 2007 and increased to 2.67 in 2009, a change that is statistically significant. The distribution of psychological distress (in both 2007 and 2009) is skewed to the right, with the 50th percentile around 1 and the 75th percentile around 4 in 2009 (not shown). Among homeowners, 35% in 2007 and 38% in 2009 reported having substantial psychological distress. Four of the six criteria – feeling nervous, restless, hopeless, and worthless – significantly increased from 2007 to 2009. The highest increases were reported for feeling nervous and restless, and were roughly 10% each.

The measure of self-reported health status averaged at 2.39 in 2007 and 2.48 in 2009, both of which fall between the responses "*very good*" and "*good*". The median was similar to

[14] Approximately 67% of the households in PSID owned their homes in 2007. Out of 4,408 homeowners, 203 became renters in 2009 and 102 changed marital status from 2007 to 2009. Our sample includes the homeowners in both survey waves whose marital status stayed the same.

[15] The summary statistics regarding homeownership and home values are very similar to the SCF. According to 2007–2009 SCF, the percentage of homeownership increased slightly from 69% in 2007 to 70% in 2009. The average home value dropped from $301,687 in 2007 to $260,622 in 2009.

mean, with 50% of household heads evaluating their health as "*very good*" or "*good*". Self-reported health status significantly worsened between 2007 and 2009. While 70% of homeowners reported no change in their health status, 23% reported a one unit deterioration (such as reporting "*very good*"=2 in 2007 and "*good*"=3 in 2009), while 16% reported a one unit improvement in health status. The percentage of household heads with high blood pressure increased from 35.7% in 2007 to 42.8% in 2009, and the percentage of household heads with psychiatric problems increased from 5.5% in 2007 to 7.5% in 2009.

Among the households with substantial psychological distress, 45% in 2007 and 49% in 2009 reported that psychological distress interfered with their life activities ("*a little*"=1, "*some*"=2 or "*a lot*"=3) (not shown). The reported averages in Table 1, 0.71 in 2007 and 0.76 in 2009, include the households who responded "*not at all*". In addition, the number of days (of the previous 30 days) that these households were unable to work, and the number of additional days they needed to reduce work due to psychological distress, averaged 0.78 and 1.14 in 2007, respectively.[16] There was no significant change in BMI across the two survey waves (28.1 in 2007 and 28.2 in 2009).

The last panel of Table 1 presents the demographic characteristics of homeowners. The average age of a household head was 54.0 years in 2007. About 79% of the households who owned a home were headed by males in both surveys, and approximately 70% of them were married.[17] Among homeowners, 7.5% were Hispanic and 8.2% were African-American. The

[16] Among households under substantial distress, 10% reported that they were unable to work some days and 15% reported that they need to reduce work due to psychological distress during the past 30 days. The average numbers of days for these households who reported more than zero days of not working and reducing work were 10 and eight days, respectively.

[17] Our sample includes both married and single households. For married households, the PSID identifies the male respondent as the household head.

unemployment rate increased from 1.9% in 2007 to 3.9% in 2009.[18] There was a slight increase in total family income, from $92,896 in 2007 to $95,959 in 2009.[19]

We divided the sample into 2 groups according to whether reported home value increased (995 homeowners) or did not increase (2,469 homeowners).[20] Homeowners who reported that their home value did not increase are divided into 6 groups according to the magnitude of the change in home value. These groups include those who experienced (1) no change (519 households), (2) a 0 to 10% decrease (642 households), (3) a 10 to 20% decrease (603 households), (4) a 20 to 30% decrease (317 households), (5) a 30 to 40% decrease (182 households) and (6) a 40% or more (206 households) decrease in their home value.[21] Table 2 presents housing wealth, health outcomes and demographics for each of these groups. Households who experienced a decrease in home value from 2007 to 2009 had larger mortgages in 2007. In addition, the percentage decrease in home value from 2007 to 2009 is positively associated with the home value in 2007. For example, the average home value in 2007 was $289,518 for households who lost 10% or less of home value, while the average home value in 2007 was $384,582 for households who lost 40% or more. Homeowners who reported that their home value decreased are more likely to live in metropolitan areas and the states that

[18] The unemployment rates among homeowners were smaller than those of the rest of the population. According to the Bureau of Labor Statistics, the overall unemployment was 4.6% in January 2007 and reached 10.0% in October 2009. See http://data.bls.gov/timeseries/LNS14000000.

[19] According to the 2007–2009 SCF, the mean income among homeowners was slightly higher in 2007, $102,691, than it was in 2009 ($97,043).

[20] The sample includes 3,464 homeowners who did not move from 2007 and 2009 and who reported a value (instead of a range) for their home value in both survey waves.

[21] The distribution of the decline in home value from 2007 to 2009 is very similar to that reported in the 2007–2009 SCF, where approximately 25% of homeowners reported that their home value increased and 10% reported that their home value did not change. According to the PSID, 29% of homeowners experienced an increase in their home value and 15% of homeowners experienced no change in their home value from 2007 to 2009. According to the SCF, homeowners who reported that their home value increased or unchanged lived in their homes longer. The PSID does not have information on when homeowners moved in to their residence. However, homeowners who reported that their home value increased or unchanged were less likely to have a mortgage liability.

experienced more than 20% declines in home values from 2007 to 2009.[22] While the percentages of "underwater" mortgages were similar across the seven groups in 2007, the percentage of "underwater" mortgages increased with the decline in home value. The percentage of "underwater" mortgages reached 41% among those who lost 40% or more of their house value.

Household income in 2007 exhibited a hump-shaped pattern in the percentage decline in home value.[23] Those who experienced a 0 to 30% decrease in their home value had the highest household income ($103,000), compared to those who experienced an increase or no change ($85,000), and those who experienced a decrease of more than 30% ($87,000). Households with higher percentage declines in home value also experienced significant decreases in household income and increases in unemployment rate.

A comparison of the health outcomes of those whose home value declined to the rest of homeowners shows that their psychological distress significantly increased and self-reported health status significantly deteriorated between 2007 and 2009. However, with the exception of self-reported health status in 2007, there is only a small variation in health outcomes by the degree of home value loss. Health status in 2007 follows the trend in household income. Those who reported that their home value declined between 0 and 30% were healthier in 2007 compared to those who experienced an increase in home value and those who experienced a more significant decline. Compared to African-Americans and whites, Hispanic homeowners experienced much larger declines in home value.

[22] The percentage of decline in home value at the state level is calculated using data from the Federal Housing Finance Agency (http://www.fhfa.gov/webfiles/25186/1q13hpistspo.txt). According to sales price data, the home prices dropped more than 20 percent in Arizona, California, Florida, Maryland, Michigan and Nevada.

[23] Similarly, the financial assets exhibit a hump-shape with those who lost 0 to 30% of their home value having the largest median values (not shown).

V. IMPACT OF THE DECLINE IN HOME VALUES ON HEALTH OUTCOMES

We measure the impact of the change in home value on health by estimating the following equation:

$$\Delta Health_i = \beta_1 \Delta Home\ Value_i + \beta_2 \Delta Unemployment_i + \beta_3 \Delta \log Income_i + X_i\delta + \varepsilon_i, \quad (1)$$

where the change in health ($\Delta Health_i$) for individual *i* is regressed against change in home value ($\Delta Home\ Value_i$), the change in unemployment status ($\Delta Unemployment_i$), the change in log of income ($\Delta \log Income_i$), a series of demographic controls (X_i), and a random error term (ε_i). We expect β_1 to be positive, which would show that the wealth shock caused by the recession has a negative impact on psychological and physical health. In addition, we expect to find that the behavioral symptoms of stress are aggravated by the decline in home value.[24]

The change in health is measured as the first difference of psychological and physical health outcomes (psychological distress, substantial distress, health status, high blood pressure, and psychiatric problems). The change in psychological distress and health status is simply the change in the index values of psychological distress and health status between 2009 and 2007, and the change in substantial distress (–1, 0, 1) is the difference between the values of the indicator variable in 2009 and 2007. The changes in high blood pressure and psychiatric problems are defined as an indicator variable equal to 0 if there is no change and equal to 1 if the individual develops the condition. The changes in the behavioral consequences of stress (distress interference with normal activities, the number of days unable to work due to stress, the number of days of reduced work due to stress, and BMI) are measured similarly by taking the difference

[24] There are competing explanations that may explain the relationship between a wealth shock and BMI, one of our behavioral symptoms of stress. If those who experience a wealth shock cut back on food expenditures and increase the intake of calorie-dense foods, we expect them to gain weight. At the same time, a wealth shock can cause psychological distress, which may manifest itself in over- or under-eating. Consistent with these explanations, we do not propose a direct relationship between a wealth shock and weight gain.

between the 2009 and 2007 values.[25]

The change in home value is measured in two ways: (1) an indicator variable equal to 0 if the reported value of the home increased from 2007 to 2009 and equal to 1 otherwise, and (2) a series of indicator variables that measure the magnitude of the change in home value (home value increased, home value was unchanged, home value decreased by (1) 0 to 10%, (2) 10 to 20%, (3) 20 to 30%, (4) 30 to 40%, (5) 30 to 40%, and (6) 40% or more). In our first measure, homeowners who experienced no change in home value are coded as 1 (home value decreased) since these households experienced a loss in real terms (home value adjusted for inflation).[26] We control for financial assets in 2007, since the magnitude of initial financial wealth might moderate the impact of wealth loss on health. Homeowners with more financial assets can more easily tolerate a larger loss of their home value than those with lower financial assets. In our models that control for the percentage loss in home value, we also include home value in 2007 as a control variable.[27] Combined with the percentage loss, initial home value helps us to interpret the impact of the amount of financial loss on health outcomes.

We include demographic controls to capture trends in health outcomes and home values: age, age-squared, race (African-American and Hispanic), gender, marital status (married), educational status (no high school, high school, some college, college degree, and graduate

[25] For distress interference with normal activities, individuals who do not have substantial psychological distress and those whose response was "not at all" are coded zero. Similarly, the number of days unable to work and the number of days needed to reduce work due to stress are coded zero if the individuals reported that they did not have substantial psychological distress or reported zero number of days.

[26] According to the Consumer Price Index, inflation was roughly 5% from 2007 to 2009 (ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt). In addition, home prices increased by roughly 27% from 2003 to 2007 (U.S. Bureau of the Census 2012), presumably leaving most homeowners with the expectation that the increase in home prices would continue.

[27] Our findings are robust to including home value in 2007 in those models in which we only control for whether home value declined.

school), and change in family health insurance coverage. We use a fixed-effects estimation to control for unobserved heterogeneity.

Our use of first-differences eliminates the correlation from omitted unobserved individual characteristics such as preferences for savings and investments that might confound the assessment of the impact of the change in home value on the change in health outcomes. However, there may be unobserved neighborhood effects that affect home value and health outcomes. In addition, there are geographic variations in the severity of the impact of the Great Recession on state economies. Homeowners who experienced the largest financial losses are more likely to live in states that were the most adversely affected. This implies that the estimated coefficient on the change in home value might capture the variation in the impact of the recession on the local area. We control for this potential correlation by including as control variables state fixed effects and the population of the residence area (metropolitan areas with 1,000,000 residents, counties with 250,000 to 1,000,000 residents, urban areas with 20,000 to 250,000 residents, urban areas with 20,000 residents, and rural).

Table 3 reports the ordinary least squares (OLS) estimates for the changes in health outcomes between 2007 and 2009. We present the estimated coefficients for variables reflecting the major effects of the Great Recession on household financial well-being, including the magnitude of the loss in home value, the change in unemployment status, the change in the log of family income, and the log of financial assets in 2007. In our first model, we restrict the sample to households who were homeowners in both 2007 and 2009 (Model I). The regression estimates show that the coefficient for the variable that indicates a decrease in home value between 2007 and 2009 is significant and positive for the indicators for psychological distress, substantial distress, health status, and psychiatric problems. The coefficient for psychological

distress (0.27) implies that experiencing a decrease in home value would increase the baseline level of psychological distress (2.48) by 11%. Similarly, experiencing a decrease in home value increases the baseline substantial distress (0.35) by 14%, results in a deterioration of health status (2.42) of 3%, and increases baseline psychiatric problems (0.057) by 19%. Households who became unemployed in 2009 also have higher psychological distress, but the change in unemployment does not seem to affect the other measures of health.

In Model II, we restrict the sample to homeowners who did not move between 2007 and 2009. Our findings are consistent with those from Model I. Households who experienced a decrease in home value report higher psychological distress and substantial distress, more psychiatric problems, and worsening health status. The decrease in home value might have a more substantial impact on health outcomes for households with outstanding mortgage loans because the value of their home can fall below the mortgage, thus complicating decisions to sell (requiring a short sale) or refinance. In Model III, we restrict the sample to homeowners with mortgage loans. The increase in psychological distress following changes in home value and unemployment status is more pronounced. This is not surprising since unemployment might have more severe consequences for households with mortgage payment obligations. At the same time, however, the impact of a decrease in home value on health status becomes insignificant. Model IV uses our second measure of the change in home value, which divides homeowners into seven groups according to the magnitudes of their losses in home value. For the sample of homeowners who did not move between the two survey years, we do not observe a consistent increase in psychological distress or deterioration in health status as the magnitude of the loss increases. Only homeowners who experienced a loss in home value of less than 20% were affected. Homeowners with a larger financial loss (greater than 30%) experienced a bigger income loss

and were more likely to be unemployed, which seems to be reducing the incremental impact of loss in housing value on psychological health.

The estimates for the change in the behavioral consequences of stress are presented in Table 4. In Model I, we restrict the sample to homeowners who did not move from 2007 to 2009. We find that the change in home value has sizable and significant effects on distress interfering with life activities, on the number of days unable to work due stress, and on the number of days work was reduced due to stress. The estimated coefficient implies that experiencing a decrease in home value would increase distress interference with life activities by 0.09, which is an increase of 33% from the baseline (0.26).[28] Similarly, stress related to a decrease in home value reduces the ability to work by a quarter of a day and reduces activities by additional quarter of a day. In addition to the loss in home value, those who become unemployed report that distress interferes with daily life and activities.

Model II in Table 4 controls for the change in psychological distress. The magnitudes of estimated coefficients on the change in home value decrease, but they are still significant for distress interfering with life activities and the days unable to work due to stress. Model III includes the interaction term for the change in psychological distress and change in home value. The estimated coefficient on the interaction term is insignificant. This implies that distress interfering with life activities or the number of days unable to work is not higher when the change in distress is caused specifically by a decrease in home value. Finally, in Model IV we control for the magnitude of the loss in home value. The change in distress interference with life activities is significant for five of the seven groups of households categorized according to their loss in home value. In terms of the number of days unable to work or days of reduced work, the

[28] The baseline is 0.71 among those who reported being under substantial distress. The estimated coefficient on stress interfering with life activities would then imply a 12% increase.

homeowners who report that the value of their home did not change or decreased by less than 10% are the most affected. Overall, the impact of the decline in home value on BMI is not significant, with the exception that those who experienced a major decline in home value (more than 40%) report a decline in BMI (marginally significant at a 10% level). This finding suggests that the reduction in financial resources combined with the stress it causes could reduce caloric intake.

VI. PSYCHOLOGICAL DISTRESS AND BEHAVIORAL SYMPTOMS OF STRESS BY AGE AND RACE

During the housing crisis, homeowners who purchased their homes at the peak of the housing bubble suffered the largest losses. These were mostly young adults and minorities (Bernanke 2012; McKernan et al. 2013; Steuerle et al. 2013). Higher ratios of mortgage debt to home value left many of these households "upside-down" in their mortgages when the value of their home fell. The Great Recession's impact on home values widened the wealth gap between young and old adults and between whites and minorities (McKernan et al. 2013; Pew Research Center 2011; Steuerle et al. 2013). In addition to relatively larger wealth losses, the unemployment rate during the recession was higher among young adults, African-Americans, and Hispanics (Pew Research Center 2010). According to a survey conducted by the Pew Research Center, younger adults were more likely to cut back on spending, borrow money, experience trouble paying for housing, and increase their credit card debt during the Great Recession. Similarly, in comparison to whites, African-Americans and Hispanics were more likely to borrow money from a family member or friend, and to experience problems paying their mortgage (Pew Research Center 2010). In light of these facts, we tested whether the impact of the decline in home value on psychological distress and behavioral symptoms varied by age and race.

We divided the sample into three groups according to the age of the household head: age 17–49, age 50–64, and age 65 and older. Consistent with the findings of the Pew Research Center, younger households experienced larger losses in the values of their homes and higher unemployment, but reported less psychological distress (summary statistics not shown). The regression estimates for the three age groups are presented in Table 5. While our findings in Table 3 show that those who experienced a decrease in home value reported an increase in psychological distress, this effect mostly disappears (due to the increase in standard errors) when the sample is divided into three age groups. However, the estimated coefficients for the age 17–49 and age 50–64 groups (0.25 and 0.28) are similar to the estimated coefficients for the whole sample (0.28).

The findings in Table 5 show that household heads younger than age 49 experienced a significant increase in distress interfering with life activities as their home values decreased. Younger homeowners also report a significant increase in the number of days that they are unable to work or must reduce work due to stress if they experience a decrease in their home value. A change in unemployment status increases psychological distress and distress interfering with life activities for household heads younger than age 49. Among the households headed by individuals younger than age 49, the behavioral consequences of distress (interference with life activities, an increased number of days unable to work, and an increased number of days that work must be reduced due to stress) are negatively correlated with an increase in family income.[29] None of the estimated coefficients on the change in home value, employment status or family income is significant for the older age groups. Our findings provide evidence that

[29] We acknowledge that family income might actually fall as a result of the household head not being able to work due to stress.

households younger than age 49 were among the most severely affected by the impact of the recession on housing wealth and employment.

We also divided the sample into three groups according to race and ethnicity: white, African-American, and Hispanic. Descriptive statistics reveal that Hispanics, followed by whites, experienced larger losses in home values and larger increases in unemployment rates. The unemployment rate among African-American homeowners was the highest in 2007, but did not change much from 2007 to 2009. In Table 6, we present the estimates for the three ethnic groups. Households headed by a white individual report a significant increase in psychological distress if they experienced a decrease in home value. While the estimated coefficient on the change in psychological distress for households headed by African-Americans (0.36) is similar to that for white households (0.31), it is insignificant. Both white and African-American households are more likely to report that distress interferes with their life activities if the value of their home decreased. While the stress caused by the financial loss does not affect white household's work activities, the number of days African-American households were unable to work or needed to reduce work due to stress significantly increased if they experienced a decrease in their home value. Surprisingly, the decline in home value does not have a significant effect on psychological distress for Hispanic households. Additionally, Hispanic households do not suffer from behavioral consequences due to the declines in their home values. These findings might be attributable to the small number of Hispanic households in our sample.

VII. CONCLUSION

This paper examines the impact of changes in housing wealth on health during the Great Recession. We also analyze the impact of a housing wealth shock on the behavioral consequences of psychological distress. Controlling for changes in family income, employment

status, and other relevant demographic and socio-economic factors, we find that a decline in housing wealth is associated with a significant increase in psychological distress and a noteworthy decrease in self-reported health. In addition, the decline in home value adversely affects work and other life activities. The behavioral consequences of stress caused by the housing wealth shock are more pronounced among younger and middle-aged and African-American households.

Our findings provide evidence that wealth shocks have a casual effect on health. The empirical analysis uses data from 2007 and 2009, and over that relatively short time period we did not find that the magnitude of the deterioration in health increases with the size of the wealth shock. Our findings show that both the health outcomes and the behavioral consequences of stress are most visible for homeowners who lost less than 20% of their home value. Homeowners with a larger financial loss (greater than 30%) experienced bigger income loss and higher unemployment rates, which offset the impact of the incremental wealth loss on psychological health. Our findings also show that psychological factors seem to be the major channel through which the distress caused by a wealth shock interferes with life activities and eventually affects physical health. Finally, the effects of a housing wealth shock are heterogeneous across age and race.

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Table 1. Descriptive statistics

Sample:	Homeowners in both waves			Homeowners and non-movers between both waves		
Sample size:	4,013			3,699		
	2007	2009	Δ	2007	2009	Δ
Housing and wealth						
Home value	286,381	255,740	***	286,814	253,644	***
Holds mortgage (=1)	0.683	0.671		0.677	0.661	
Mortgage | mortgage=1	143,302	149,494		140,775	144,367	
Difficulty with mortgage (=1) | mortgage=1		0.053			0.052	
Foreclosure (=1) | mortgage=1		0.010			0.010	
"Underwater" mortgage (=1) | mortgage=1	0.024	0.080	***	0.024	0.077	***
Financial assets (median)	34,000	35,000		34,500	36,000	
Health outcomes						
Psychological distress	2.40	2.67	**	2.38	2.65	**
Feeling sad	0.31	0.33		0.31	0.33	
Feeling nervous	0.63	0.69	**	0.62	0.68	**
Feeling restless	0.68	0.75	**	0.67	0.74	**
Feeling hopeless	0.16	0.19	*	0.16	0.19	*
Feeling effortless	0.50	0.56		0.49	0.56	
Feeling worthless	0.13	0.16	*	0.13	0.16	*
Self-reported health status	2.39	2.48	***	2.40	2.49	***
High blood pressure (=1)	0.357	0.428	***	0.363	0.435	**
Psychiatric problems (=1)	0.055	0.075	***	0.056	0.076	***
Behavioral consequences						
Substantial distress (=1)	0.35	0.38	**	0.34	0.38	**
Distress interference | Substantial distress =1	0.71	0.76	*	0.71	0.77	
Days unable to work | Substantial distress =1	0.78	0.97		0.80	0.99	
Days had to reduce work | Substantial distress =1	1.14	1.32		1.17	1.34	
Body mass index (BMI)	28.13	28.24		28.16	28.27	
Socioeconomic variables						
Age of head	54.0	56.0	***	54.6	56.6	***
Head is male (=1)	0.789			0.782		
Head is married (=1)	0.695			0.688		
Total family income	92,896	95,959	*	91,927	94,900	
Unemployed	0.019	0.039	***	0.019	0.039	***
Hispanic	0.075			0.072		
African-American	0.082			0.085		
Uninsured	0.030	0.031		0.031	0.030	
Education						
No high school (=1)	0.099			0.101		
High school (=1)	0.311			0.314		
Some college (=1)	0.189			0.191		
College degree (=1)	0.253			0.246		
Graduate school (=1)	0.131			0.132		

Notes: Descriptive statistics are weighted using family weights. Psychological distress is the sum of six questions about feelings of sadness, nervous, restless, hopeless, effortless, and worthless. The possible responses for these feelings are "*none of the time*"=0, "*a little of the time*"=1, "*some of the time*"=2, "*most of the time*"=3 and "*all of the time*"=4. Psychological distress is measured on a 0-24 scale. Health status is measured on a 1-5 scale, where *"excellent"*=1, *"very good"*=2, *"good"*=3, *"fair"*=4 and *"poor"*=5. Substantial distress equals 1 if the respondent answered *"some of the time"*=2, *"most of the time"*=3, or *"all of the time"*=4 to one of the six questions about feelings. Distress interference measures whether substantial distress usually interferes with life or activities, on a 0-3 scale, where "*not at all*"=0, "*a little*"=1, "*some*"=2, and "*a lot*"=3. Days unable to work refers to the number of days out of the past 30 days the respondent were totally unable to work or carry out normal activities. Days need to reduce work refers to the number of the remaining days out of the past 30 days the respondent were able to work but need to reduce work. *** denotes difference in means significant at 1% level, ** denotes difference in means significant at 5% level, and * denotes difference in means significant at 10% level.

Table 2: Change in home value from 2007 to 2009

	Home value increased	Home value unchanged or decreased		Home value Unchanged	Home value decreased by …					
					0-10%	10-20%	20-30%	30-40%	40% or more	
Sample size:	995	2,469		519	642	603	317	182	206	
Δ in home value (2009-2007)	36,353	-56,563	***	0	-17,641	-53,975	-93,609	-120,782	-222,232	[a]
Home value 2007	192,943	321,492	***	253,092	289,518	357,345	373,170	345,901	384,582	[a]
Δ in mortgage (2009-2007) | mortgage=1	1,791	-1,678		-6,479	849	4,453	3,763	-8,620	-25,816	[b]
Mortgage 2007 | mortgage=1	105,677	152,857	***	109,864	149,769	163,686	172,336	152,358	200,923	[a]
Δ in underwater (2009-2007)	-0.014	0.074	***	-0.012	0.026	0.044	0.137	0.149	0.412	[a]
Underwater 2007	0.030	0.022	**	0.041	0.013	0.014	0.030	0.006	0.034	[b]
Δ in total income (2009-2007)	7,379	1,513		7,588	5,161	-588	168	-3,661	-13,038	[c]
Total income 2007	80,707	98,845	***	91,816	96,914	110,571	104,509	91,954	83,418	[a]
Δ in unemployment (2009-2007)	0.011	0.024	*	0.005	0.018	0.039	0.028	0.020	0.049	[b]
Unemployment 2007	0.019	0.018		0.022	0.017	0.013	0.020	0.018	0.022	[b]
Δ in psychological distress (2009-2007)	0.10	0.29	**	0.35	0.34	0.13	0.26	0.34	0.48	
Psychological distress 2007	2.48	2.33	**	2.28	2.32	2.29	2.42	2.33	2.44	
Δ in substantial psychological distress (2009-2007)	-0.003	0.043	**	0.048	0.022	0.035	0.071	0.101	0.020	
Substantial psychological distress 2007	0.351	0.342	*	0.338	0.355	0.340	0.320	0.345	0.352	
Δ in self-reported health status (2009-2007)	0.07	0.10	**	0.11	0.11	0.11	0.09	0.05	0.04	
Self-reported health status 2007	2.46	2.35	***	2.38	2.29	2.28	2.35	2.46	2.53	[a]
Δ in blood pressure (2009-2007)	0.064	0.072		0.060	0.063	0.073	0.070	0.108	0.099	
Blood pressure 2007	0.371	0.359	*	0.384	0.366	0.336	0.375	0.346	0.327	
Δ in psychiatric problems (2009-2007)	0.011	0.024		0.028	0.021	0.032	0.021	0.013	0.012	
Psychiatric problems 2007	0.062	0.054		0.064	0.044	0.053	0.053	0.062	0.063	
Age of head 2007	54.8	54.1		55.6	52.4	54.2	54.7	54.0	54.6	[a]
Hispanic	0.044	0.074	***	0.050	0.029	0.055	0.130	0.105	0.219	[a]
African-American	0.099	0.072	***	0.071	0.066	0.069	0.072	0.102	0.073	[a]
State Δ home value<-20%	0.084	0.278	***	0.101	0.132	0.232	0.473	0.670	0.668	[a]
Metropolitan	0.243	0.444	***	0.372	0.431	0.497	0.473	0.465	0.443	[a]

Note: Descriptive statistics are weighted using family weights. The sample includes households who were homeowners in both waves and did not move between 2007 and 2009. *** denotes difference in means significant at 1% level, ** denotes difference in means significant at 5% level, and * denotes difference in means significant at 10% level. [a] denotes the differences in means of at least two groups out of seven (home value increased, unchanged, decreased by 10%, 20%, 30%, 40% and more than 40%) significant at 1% level, [b] denotes the differences in means of at least two groups out of seven significant at 5% level, and [c] denotes the differences in means of at least two groups out of seven significant at 10% level.

Table 3: OLS estimates for the change in health outcomes

Dependent variable:	Δ in psychological distress (2009-2007)		Δ in substantial distress (2009-2007)		Δ in self-reported health status (2009-2007)		Δ in high blood pressure (2009-2007)		Δ in psychiatric problems (2009-2007)	
	Coefficient	St. Err.	Coefficient	St. Err.	Coefficient	St. Err.	Coefficient	St. Err.	Coefficient	St. Err.
Model I										
Value of home decreased or unchanged	0.270	0.122 **	0.054	0.022 **	0.067	0.031 **	0.003	0.010	0.011	0.006 *
Δ in unemployment status	0.382	0.225 *	0.018	0.040	-0.052	0.057	0.013	0.018	0.000	0.010
Δ in log(family income)	-0.117	0.073	-0.007	0.013	-0.017	0.018	-0.009	0.006	0.003	0.003
Log(financial assets 2007)	0.006	0.018	-0.001	0.003	-0.005	0.005	-0.001	0.001	-0.002	0.001 **
Sample: Homeowner in 2007 and 2009										
N	3,693		3,754		3,753		3,756		3,756	
Model II										
Value of home decreased or unchanged	0.262	0.131 **	0.050	0.023 **	0.073	0.033 **	0.003	0.010	0.011	0.006 *
Δ in unemployment status	0.486	0.237 **	0.038	0.042	-0.053	0.060	0.011	0.019	0.000	0.011
Δ in log(family income)	-0.120	0.075	-0.007	0.013	-0.022	0.019	-0.011	0.006 *	0.002	0.003
Log(financial assets 2007)	0.005	0.019	-0.001	0.003	-0.005	0.005	-0.001	0.002	-0.002	0.001 **
Sample: Homeowner in 2007 and 2009; non-mover										
N	3,396		3,454		3,453		3,456		3,456	
Model III										
Value of home decreased or unchanged	0.325	0.157 **	0.048	0.027 *	0.047	0.039	0.002	0.012	0.008	0.007
Δ in unemployment status	0.573	0.270 **	0.034	0.047	-0.073	0.067	0.028	0.021	0.001	0.012
Δ in log(family income)	-0.089	0.096	0.004	0.017	-0.026	0.024	-0.023	0.007 ***	0.001	0.004
Log(financial assets 2007)	-0.015	0.023	-0.004	0.004	-0.004	0.006	-0.002	0.002	-0.003	0.001 ***
Sample: Homeowner in 2007 and 2009; non-mover; have mortgage in 2007										
N	2,565		2,596		2,594		2,597		2,597	
Model IV										
Home value increased (reference group)										
Home value did not change	0.261	0.181	0.073	0.032 **	0.101	0.045 **	-0.014	0.014	0.010	0.008
Home value decreased by 0–10%	0.412	0.172 **	0.042	0.030	0.072	0.043 *	0.000	0.014	0.008	0.008
Home value decreased by 10–20%	0.083	0.178	0.036	0.031	0.090	0.045 **	0.015	0.014	0.013	0.008
Home value decreased by 20–30%	0.221	0.227	0.049	0.040	0.029	0.057	-0.001	0.018	0.018	0.010 *
Home value decreased by 30–40%	0.284	0.284	0.051	0.050	0.084	0.072	0.027	0.023	0.010	0.013
Home value decreased by 40% or more	0.120	0.276	-0.025	0.048	-0.022	0.069	-0.010	0.022	0.012	0.012
Δ in unemployment status	0.501	0.237 **	0.041	0.042	-0.049	0.060	0.011	0.019	-0.001	0.011
Δ in log(family income)	-0.121	0.075	-0.006	0.013	-0.023	0.019	-0.010	0.006 *	0.002	0.003
Log(financial assets 2007)	0.001	0.020	-0.002	0.003	-0.005	0.005	-0.002	0.002	-0.002	0.001 **
Log(home value 2007)	0.051	0.084	0.022	0.015	-0.005	0.021	0.008	0.007	0.000	0.004
Sample: Homeowner in 2007 and 2009; non-mover										
N	3,396		3,454		3,453		3,456		3,456	

Note: The regressions control for age, age squared, race (African-American and Hispanic), gender, marital status, education (no high school, high school, some college, college degree, and graduate school), change in family health insurance coverage, states and population size of residence area. The variations in sample sizes among different regressions are due to the missing values in the dependent variables. *** denotes coefficients significant at 1% level, ** denotes coefficients significant at 5% level, and * denotes coefficients significant at 10% level.

Table 4: OLS estimates for the change in behavioral consequences

Dependent variable:	Δ in distress interfere (2009-2007)		Δ in days unable to work due to stress (2009-2007)		Δ in days need to reduce work due to stress (2009-2007)		Δ in BMI (2009-2007)	
	Coefficient	St. Err.	Coefficient	St. Err.	Coefficient	St. Err.	Coefficient	St. Err.
Model I								
Value of home decreased or unchanged	0.087	0.029 ***	0.274	0.121 **	0.260	0.132 **	-0.010	0.094
Δ in unemployment status	0.144	0.053 ***	0.124	0.220	0.177	0.241	0.133	0.171
Δ in log(family income)	-0.022	0.017	-0.130	0.070 *	-0.081	0.076	0.081	0.054
Log(financial assets 2007)	-0.002	0.004	0.007	0.018	-0.038	0.019 *	-0.007	0.014
Sample: Homeowner in 2007 and 2009, and non-mover								
N	3,454		3,453		3,446		3,400	
Model II								
Value of home decreased or unchanged	0.056	0.025 **	0.223	0.121 *	0.205	0.130	-0.012	0.094
Δ in unemployment status	0.097	0.046 **	0.026	0.218	0.061	0.236	0.138	0.170
Δ in log(family income)	-0.005	0.015	-0.105	0.069	-0.045	0.075	0.086	0.054
Δ in distress	0.119	0.003 ***	0.207	0.016 ***	0.258	0.017 ***	0.022	0.013 *
Log(financial assets 2007)	-0.002	0.004	0.006	0.018	-0.041	0.019 **	-0.007	0.014
Sample: Homeowner in 2007 and 2009, and non-mover								
N	3,394		3,393		3,386		3,342	
Model III								
Value of home decreased or unchanged	0.057	0.025 **	0.223	0.121 *	0.208	0.130	-0.014	0.094
Δ in unemployment status	0.098	0.046 **	0.026	0.218	0.062	0.236	0.137	0.170
Δ in log(family income)	-0.005	0.015	-0.105	0.069	-0.047	0.075	0.087	0.054
Δ in distress	0.126	0.006 ***	0.203	0.028 ***	0.298	0.030 ***	-0.001	0.022
Value of home decreased or unchanged*Δ in distress	-0.010	0.007	0.005	0.034	-0.060	0.037	0.035	0.027
Log(financial assets 2007)	-0.001	0.004	0.006	0.018	-0.040	0.019 **	-0.008	0.014
Sample: Homeowner in 2007 and 2009, and non-mover								
N	3,394		3,393		3,386		3,342	
Model IV								
Home value increased (reference group)								
Home value did not change	0.115	0.041 ***	0.353	0.168 **	0.373	0.183 **	0.000	0.131
Home value decreased by 0–10%	0.100	0.039 ***	0.378	0.160 **	0.215	0.175	0.133	0.125
Home value decreased by 10–20%	0.091	0.040 **	0.130	0.165	0.211	0.180	-0.043	0.128
Home value decreased by 20–30%	0.030	0.051	0.316	0.210	0.273	0.229	-0.166	0.163
Home value decreased by 30–40%	0.134	0.064 **	0.142	0.264	0.478	0.289 *	0.074	0.204
Home value decreased by 40% or more	-0.055	0.062	-0.106	0.254	-0.067	0.277	-0.376	0.198 *
Δ in unemployment status	0.151	0.053 ***	0.140	0.220	0.187	0.241	0.149	0.171
Δ in log(family income)	-0.023	0.017	-0.134	0.070 *	-0.085	0.077	0.078	0.054
Log(financial assets 2007)	-0.002	0.004	0.003	0.018	-0.040	0.020 **	-0.007	0.014
Log(home value 2007)	0.002	0.019	0.047	0.078	0.012	0.085	-0.017	0.060
Sample: Homeowner in 2007 and 2009, and non-mover								
N	3,454		3,453		3,446		3,400	

Note: The regressions control for age, age squared, race (African-American and Hispanic), gender, marital status, education (no high school, high school, some college, college degree, and graduate school), change in family health insurance status, states and population size of residence area. The variations in sample sizes among different regressions are due to the missing values in the dependent variables. *** denotes coefficients significant at 1% level, ** denotes coefficients significant at 5% level, and * denotes coefficients significant at 10% level.

Table 5: OLS estimates for the change in psychological distress and behavioral consequences for age groups

Dependent variable:	Δ in psychological distress (2009-2007)		Δ in distress interfere (2009-2007)		Δ in days unable to work due to stress (2009-2007)		Δ in days need to reduce work due to stress (2009-2007)	
	Coefficient	St. Err.	Coefficient	St. Err.	Coefficient	St. Err.	Coefficient	St. Err.
Model I								
Age 65+								
Value of home decreased or unchanged	0.119	0.307	0.055	0.070	-0.080	0.339	0.068	0.339
Δ in unemployment status	1.358	1.173	-0.024	0.277	0.127	1.337	-0.034	1.335
Δ in log(family income)	-0.020	0.142	-0.032	0.033	-0.070	0.159	-0.091	0.159
Log(financial assets 2007)	0.033	0.046	0.004	0.010	0.044	0.048	-0.051	0.048
Sample: Homeowner in 2007 and 2009; non-mover								
N	525		556		555		553	
Model II								
Age 50-64								
Value of home decreased or unchanged	0.282	0.210	-0.012	0.046	0.357	0.213 *	-0.017	0.216
Δ in unemployment status	-0.132	0.417	0.087	0.092	-0.222	0.426	-0.034	0.432
Δ in log(family income)	-0.102	0.124	0.031	0.027	0.019	0.126	0.136	0.128
Log(financial assets 2007)	0.031	0.032	0.006	0.007	0.058	0.032 *	-0.014	0.033
Sample: Homeowner in 2007 and 2009; non-mover								
N	1,194		1,207		1,207		1,204	
Model III								
Age 17-49								
Value of home decreased or unchanged	0.250	0.188	0.131	0.043 ***	0.256	0.151 *	0.568	0.183 ***
Δ in unemployment status	0.714	0.299 **	0.174	0.068 **	0.171	0.239	0.267	0.291
Δ in log(family income)	-0.193	0.124	-0.063	0.028 **	-0.262	0.100 ***	-0.231	0.121 *
Log(financial assets 2007)	-0.018	0.028	-0.008	0.006	-0.043	0.023 *	-0.051	0.028 *
Sample: Homeowner in 2007 and 2009; non-mover								
N	1,677		1,691		1,691		1,689	

Note: The regressions control for age, age squared, race (African-American and Hispanic), gender, marital status, education (no high school, high school, some college, college degree, and graduate school), change in family health insurance status, and population size of residence area. The variations in sample sizes among different regressions are due to the missing values in the dependent variables. *** denotes coefficients significant at 1% level, ** denotes coefficients significant at 5% level, and * denotes coefficients significant at 10% level.

Table 6: OLS estimates for the change in psychological distress and behavioral consequences for age groups

Dependent variables:	Δ in psychological distress (2009-2007)		Δ in distress interfere (2009-2007)		Δ in days unable to work due to stress (2009-2007)		Δ in days need to reduce work due to stress (2009-2007)	
	Coefficient	St. Err.	Coefficient	St. Err.	Coefficient	St. Err.	Coefficient	St. Err.
Model I								
White								
Value of home decreased or unchanged	0.311	0.145 **	0.079	0.034 **	0.053	0.125	0.153	0.149
Δ in unemployment status	0.375	0.290	0.213	0.068 ***	-0.037	0.250	0.433	0.299
Δ in log(family income)	-0.143	0.087 *	-0.010	0.020	-0.022	0.074	-0.030	0.089
Log(financial assets 2007)	-0.032	0.026	-0.002	0.006	0.002	0.022	-0.030	0.027
Sample: Homeowner in 2007 and 2009; non-mover								
N	2,365		2,386		2,387		2,382	
Model II								
African-American								
Value of home decreased or unchanged	0.359	0.283	0.147	0.056 ***	1.026	0.329 ***	0.695	0.279 **
Δ in unemployment status	0.444	0.482	0.056	0.097	0.232	0.566	0.043	0.484
Δ in log(family income)	-0.204	0.187	-0.074	0.037 **	-0.587	0.218 ***	-0.268	0.185
Log(financial assets 2007)	0.002	0.037	-0.006	0.007	0.019	0.042	-0.075	0.036 **
Sample: Homeowner in 2007 and 2009; non-mover								
N	717		741		739		737	
Model III								
Hispanic								
Value of home decreased or unchanged	-0.407	0.938	-0.140	0.192	0.249	0.314	-0.952	0.925
Δ in unemployment status	0.804	1.047	-0.027	0.230	0.342	0.377	0.581	1.109
Δ in log(family income)	-0.351	0.431	-0.168	0.094 *	-0.170	0.155	-0.185	0.455
Log(financial assets 2007)	0.173	0.068 **	0.027	0.015 *	0.015	0.025	0.032	0.072
Sample: Homeowner in 2007 and 2009; non-mover								
N	197		209		209		209	

Note: The regressions control for age, age squared, gender, marital status, education (no high school, high school, some college, college degree, and graduate school), change in family health insurance status, and population size of residence area. The variations among different regressions are due to the missing values in the dependent variables. *** denotes coefficients significant at 1% level, ** denotes coefficients significant at 5% level, and * denotes coefficients significant at 10% level.