Do Economic Crises Harm Mental Health?
Effects of the Great Recession on Older Americans

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Introduction

The house price collapse and subsequent Great Recession of 2007 to 2009 reduced the wealth of Americans age 50 and over by nearly 10 percent (Gustman, Steinmeier, and Tabatabai 2012; Munnell and Rutledge 2013). Unemployment rates also rose from 5 to 10 percent over roughly the same time period (Bureau of Labor Statistics 2012). What were the mental health consequences of this economic crisis? Did rates of depression rise as a result of lost wealth and employment?

Previous studies which describe the health impacts of recessions produce mixed results. On the one hand, some studies find an inverse relationship between health and economic productivity (Ruhm 2000), where healthy behaviors such as physical activity and reductions in smoking improve during times of economic hardship (Ruhm 2005; Ásgeirsdóttir et al. 2012). There is also consistent evidence that mortality declines during recessions (Tapia Granados and Diez Roux 2009; Ruhm 2000; Neumayer 2004), though more recent evidence suggests that this procyclical association between economic growth and mortality may be weakening in recent years (M. P. McInerney and Mellor 2012). On the other hand, there is accumulating evidence that mental health declines during recessions. For example, studies consistently find that suicides increase during recessions (Nandi et al. 2012; Tapia Granados and Diez Roux 2009), a pattern which is replicated during the Great Recession (Barr et al. 2012). Recent studies focused specifically on the Great Recession also found some evidence that national rates of depression (Mehta et al. 2015) and internet search queries about psychological distress (Ayers et al. 2012) rose in parallel with the economic crisis. These results are not very compelling however, as they simply describe trends and do not link events from the Great Recession itself to changes in mental health.

The goal of this study is to examine the impact of the economic conditions prompted by the 2006 housing collapse and ensuing recession on the mental health of older adults. We specifically address the following questions: Did area housing prices and/or unemployment rates predict worse mental health outcomes? And if so, were the effects differential among those with greater income or wealth losses?

We hypothesize that the loss of housing wealth and/or employment caused by the Great Recession decreased the mental health of older adults. Despite literature in psychology linking wealth reductions to increased stress and subsequently worse mental health (Rabkin and Struening 1976; Schneiderman, Ironson, and Siegel 2005), few studies have examined the effects of losses prompted by the Great Recession on mental health. Of the existing literature, results are mixed.

M. McInerney, Mellor, and Nicholas 2013 find that sudden losses in wealth lead to increases in short-term depressive symptoms and antidepressant medication use, but not in clinically validated measures of depression among older adults in the Health and Retirement Study. After estimating the relationship between mental health drug prescriptions and the unemployment rates across census regions, Bradford and Lastrapes 2014 find a similarly mixed message: mental health drug prescriptions rose when employment fell, but only for patients in the Northeast region of the United States.

It is difficult to study the impact of individual-level wealth and income loss on health because the decrease in wealth or income is often confounded by its cause. For instance, divorce may lead to a decrease in wealth *and* a decrease in mental health. To get around this issue, we exploit exogenous changes in wealth and income brought about by changes in area-level house prices and area-level unemployment rates in the Great Recession. The extent of the Great Recession varied significantly across areas (Joint Center for Housing Studies of Harvard University 2011). For example, house prices in Phoenix and Las Vegas fell by 56 and 66 percent respectively, while house prices in Pittsburgh and Buffalo fell by only 8 to 9 percent. Similarly, unemployment in Stockton and Cape Coral (FL) rose by over 10 percentage points, while unemployment in Little Rock and Omaha rose by less than 3 percentage points ("HPI, MSA - Economic Data Series | FRED | St. Louis Fed" n.d.). If economic conditions affect mental health, regional variation in mental health measures should mirror regional variation in the Great Recession.

Understanding the impact of economic crises on health is also important to allow policymakers to plan for population needs and provide the appropriate support in response. For instance, recent evidence shows that Medicare spending grows faster during recessions (M. P. McInerney and Mellor 2012). Because mental illness is a key part of medical spending and depression has been found to increase short-term health care expenditures among older adults (Shen et al. 2013; Choi, Hasche, and Nguyen 2015), understanding the mental health effects of the recession could have important consequences for expenditures in the Medicare program as well as in Social Security.

Data and Measures

The target population for this study is middle-aged and older adults whose mental health may have been affected by the Great Recession of December 2007 to June 2009. To study this

population, we employ data from the 2000 to 2014 waves of the Health and Retirement Study (HRS). The HRS is an on-going nationally representative panel survey of more than 22,000 adults aged 51 and over in the United States; data are collected every even numbered year (National Institutes on Aging, National Institutes of Health 2007).

Analyses were restricted to two groups of respondents for whom geographic and housing data were available: those aged 51 to 61 ("pre-retirement" adults) and those aged 65 to 74 ("post-retirement" adults). Age ranges were held constant for each wave included in the study. Therefore, the composition of the study within each age group changes as individuals age in and out of that age group. Respondents aged 62 to 64 were excluded to omit early retirees as well as anticipatory effects related to retirement at age 65.

All data on individuals including health, demographic, social, financial and employment status, were drawn from the HRS between 2000 and 2014. Housing prices reached their highest point in early 2006 before beginning to fall in that same year (Byun 2010). To avoid capturing effects related to endogenous moves made in response to the housing market downturn, each person's place of residence for the duration of the study period was assigned based on where they lived in 2004. Thus area-level housing prices and unemployment rates correspond for each person correspond to their area of residence immediately preceding the peak of the housing bubble.

Housing

Area-level housing prices were measured using the Federal Housing Finance Agency's (FHFA) yearly Housing Price Index (HPI). The HPI is a weighted, repeat-sales index of single-family housing prices whose mortgages have been purchased or securitized by Fannie Mae or Freddie Mac. For respondents living in a core-based statistical area (CBSA) in 2004, HPI data was assigned to each individual for that CBSA for every even year from 2000 to 2014. When the respondent lived outside a designated CBSA in 2004, HPI data were assigned to respondents at the state level.

Unemployment

Unemployment data was obtained from the Bureau of Labor Statistics (BLS) estimates of local area unemployment for each commuting zone in each year from 2000 to 2014 ("Local Area Unemployment Statistics Geographic Concepts" n.d.). BLS estimates of local area unemployment

are based on a wide variety of sources, including the Current Population Survey, various sources from the Census Bureau, and unemployment insurance claims from State workforce agencies ("BLS Handbook of Methods, Chapter 4" n.d.). The area unemployment value for a given year was calculated as the average of the unemployment rate in that year (*t*) and the previous year (*t-1*). Two-year average unemployment was calculated in order to capture any lagged effects on mental health from the previous year's unemployment in addition to unemployment in the current year. As with housing, area unemployment was defined for each individual based on their commuting zone of residence in 2004. Commuting zones (CZs) are clusters of counties that define local labor markets based on commuting patterns from the 1990 Census.

Mental Health

Mental health was evaluated based on self-reported indicators of depression. The primary measure of depression in the HRS is a short version of the center for epidemiology and depression (CES-D) scale (Radloff 1977; Kohout et al. 1993), which has been validated and widely used for both the young and elderly (Vilagut et al. 2016). While the original CES-D is measured on a 20-point scale, the shortened CES-D ranges from 0 (no signs of depression) to 8 (all measured signs of depression are present). The eight-point scale is the sum of six "negative" indicators of depression and the absence of two "positive" indicators, all shown in Table 1.

Table 1. Components of CES-D scale in the HRS

CES-D indicator type	Respondent experienced the following sentiments all or most of the time:
Negative Indicators	1. Depression 2. Everything is an effort 3. Sleep is restless 4. Felt alone 5. Felt sad 6. Could not get going
Positive Indicators	7. Felt happy 8. Enjoyed Life

In addition to depression, we also examine the impact of the Great Recession on pain and functional limitations. Each of these are important outcomes in their own right, and affect both Medicare spending and Disability Insurance receipt. Pain and functional limitations may also be a manifestation of mental health. For example, it has been demonstrated that a high proportion of patients with depression only report physical symptoms and thus go undiagnosed (Simon et al. 1999). Self-reported pain ranges from 0 (none) to 3 (severe) and is based on the following the set of questions from the HRS: "are you often troubled with pain" and if yes, "how bad is the pain most of the time: mild, moderate, or severe?". A "no" response to the first question is recorded as a pain score of 0, while a "yes" followed by a "moderate" gets a score of 2. Functional limitations are measured based on self-reported difficulty with seven activities of daily living (ADLs) related to mobility. These include: walking a block; sitting for around two hours; climbing a flight of stairs without resting; stooping, kneeling, or crouching; lifting or carrying weights over 10 pounds (like a bag of groceries); reaching or extending arms above shoulder level; and/or pulling/pushing large objects like a living room chair. Each variable is coded as an indicator and the final measure of functional limitations is the sum of these seven indicators. The functional limitations variable can therefore take on values from 0 (none) to 7 (all).

Empirical Strategy

Separate models were run for the pre-and-post-retirement age groups (aged 51 – 61 v. 65 – 74) to account for the differential importance of housing wealth as an investment for each. All regressions were weighted to make estimates representative of the overall target population. OLS estimation was used unless otherwise indicated.

Basic Specification

For each of the mental health measures, we estimate the coefficients in the following equation:

$$MH_{ict} = \beta_0 + \beta_1 Area_{ct} + \delta X_{ict} + \gamma_t + \lambda_i + \epsilon_{ict} \qquad (1)$$

MH_{ict} represents the health outcome of interest for person i in area c at time t. $Area$ is a vector of area-level variables which includes housing price index, the four-year percent change in the housing price index, and two-year average unemployment rate. X is a vector of individual level variables and controls, including homeownership status, non-housing wealth, marital status, labor

force status, and existing health diagnoses. A full list of controls included are listed in Table 2. Individual (λ_i) and year (γ_t) fixed effects were also included. The individual fixed effects eliminate the need for time independent Xvariables, such as race, gender, and education.

Table 2. Full list of controls included in model specification

Category	Measures
Demographic	Age group (51 – 55, 56 – 61, 65 – 69, 70 – 74), gender, marital status, homeownership status, educational attainment (>high school or ≤ high school)
Financial and Economic	Labor force status, an indicator for whether the respondent was a blue-collar worker[†] in 2004, total financial assets not related to housing
Health	Heart disease, stroke, high blood pressure, diabetes, cancer, arthritis, lung disease
Other	An indicator for whether the respondent is in their first wave of the HRS[‡]

[†]Blue-collar worker status was classified according to the Organisation for Economic Co-operation and Development's (OECD) definition for production workers (OECD 2002).
[‡]An indicator for the first wave is included because participants tend to be healthier in their first wave.

Specification with Interactions

In addition to the basic specification, models with interactions between area level variables and socioeconomic variables were fit to allow for variation in area unemployment and housing by factors such as educational attainment, non-housing wealth, and homeownership status (denoted by the vectors $Area$ and X_2). These models also included interactions of socioeconomic variables with each other. For instance, the interaction of age and gender allows for the possibility that mental health outcomes to evolve differentially among men and women as they age. These models take the form:

$$MH_{ict} = \beta_0 + \beta_1 Area_{ct} + \delta X_{ict} + \alpha_1 Area_{ct} X_{2ict} + \gamma_t + \lambda_i + \epsilon_{ict} \qquad (2)$$

Factors allowed to vary with each other in this model included: unemployment rate by education and blue-collar worker status in 2004, housing price index and four-year percent change in housing price index by non-housing financial assets and separately by homeownership, education by homeownership, and age by gender. We chose these specific interactions to allow for heterogeneity across groups that we hypothesized would be differentially affected by changing economic conditions. For instance, workers with at most a high school education were more likely to lose their employment during the Great Recession. Blue collar jobs were also hit particularly hard. We therefore expected area unemployment rates to affect these two groups more than those with who obtained education beyond high school degree and those in non-blue-collar industries. Similarly, we interacted area housing price with homeownership status because we expected homeowners to be more affected by changes in area housing prices than non-homeowners. Because changes in area prices should mirror fluctuations in homeowners' own housing values, we hypothesized that wealth loss associated with changing prices caused declines in mental health. As this should affect homeowners with differing levels of non-housing wealth differently, we also include the interaction of area housing price with non-housing financial assets. Finally, we include the interactions of education and homeownership and age by gender based on previous research which shows that rates of homeownership and depression differ by educational attainment (Gyourko and Linneman 1997), and that women are more likely to report depression and related outcomes than men (Gotlib and Hammen 2010).

Robustness Checks

Ordered probit models were run to ensure that the interpretation of OLS results is consistent with the correctly specified model for ordinal outcomes.

Empirical Results

The final sample consists of 18,077 individuals and 75,043 person-waves.[1] Of these, 10,051 individuals (31,470 person-waves) were between the ages of 51 and 61 at some point between 2000 and 2014 while 13,680 individuals (43,573 person-waves) were between the ages of 65 and 74 at some point during the study period. The mean age at which the younger group was analyzed was 57.0 years, while the mean age at which the older group was analyzed was 69.4 years. Slightly over half (54 percent in each) of each age group was female and a majority of adults in both age groups (75 percent in each) identified as homeowners. A description of the sample for the entire study period is shown in Table 3.

Prior to the decline in housing prices, the typical adult from 2000 to 2004 in the HRS sample (weighted to represent the broader target population) had about $390,000 in total accumulated wealth, reported a CES-D score of 1.46, little to no pain (score = 0.57), and around 2 functional limitations. When broken out by age group, the typical person in the pre-retirement age group had slightly less accumulated wealth, marginally higher depression and pain, but fewer functional limitations when compared to the typical person in the post-retirement age group when ($393,797 v. $432,202; see Table 4).

Tables 5 and 6 present the results of both sets of regressions for 51 – 61-year-olds and 65 – 74-year-olds, respectively. The first column for each outcome corresponds to the basic specification without interactions (columns 1, 3, and 5), while the second column for each outcome corresponds to the richer model with interaction terms (columns 2, 4, and 6). Because all regressions include individual fixed effects, coefficients should be interpreted in relation to each individual's baseline in 2000 holding all other variables in the model constant. Although richer models allow for heterogeneity across sub-populations who may be differentially impacted by changing economic conditions, patterns of statistical significance remain largely consistent within each outcome across the basic and interacted models.

[1] Since the HRS is a biennial survey conducted in even years, one wave corresponds to every other even year.

Table 3. Final Sample Characteristics

Characteristics	**Ages 51-61**		**Ages 65-74**	
Number of Observations:	29,820		43,571	
	Mean	(SD)	Mean	(SD)
Economic: Area-Based				
Housing Price Index (HPI)	401.3	(252.0)	392.3	(254.1)
4 year change in HPI	7 %	(14 %)	6 %	(14 %)
2 year avg. unemployment rate	6 %	(2 %)	6 %	(2 %)
Economic: Individual				
Financial Assets ($)	313,518	(921,012)	388,742	(1,227,856)
Homeownership Status†				
Homeowner	75 %	–	75 %	–
Non Homeowner	13 %	–	14 %	–
Labor Force Status				
Full Time	55 %	–	12 %	–
Part Time	14 %	–	17 %	–
Not in Labor Force (NILF)/Unemployed	22 %	–	66 %	–
Blue Collar in 2004	4 %	–	1 %	–
Demographic				
Age	57.0	(3.0)	69.4	(2.9)
Educational Attainment				
$\leq$ HS Degree	43 %	–	56 %	–
Marital Status				
Married/Partnered	74 %	–	67 %	–
Separated/Divorced	16 %	–	13 %	–
Widowed	5 %	–	16 %	–
Never Married	5 %	–	4 %	–
Gender				
Female	54 %	–	54 %	–
Health (% reporting ever diagnosed)				
Heart Disease	13 %	–	25 %	–
Stroke	4 %	–	8 %	–
High Blood Pressure	41 %	–	59 %	–
Diabetes	14 %	–	22 %	–
Cancer	8 %	–	16 %	–
Arthritis	43 %	–	63 %	–
Lung Disease	6 %	–	11 %	–

†: the remaining 12% of values are missing.

Table 4. Weighted Depression, Pain, and Functional Limitations

	Ages 51-61		**Ages 65-74**	
	Pre 2006	2006 to 2014	Pre 2006	2006 to 2014
Depression Symptoms (obs.)	14,101	14,070	15,613	25,144
Mean	1.48	1.44	1.40	1.25
(SD)	(2.01)	(2.06)	(1.88)	(1.86)
Self-Reported Pain (obs.)	15,166	14,597	17,079	26,347
Mean	0.58	0.64	0.55	0.67
(SD)	(0.94)	(0.96)	(0.94)	(0.97)
No Pain	68 %	66 %	71 %	64 %
Mild Pain	10 %	11 %	7 %	11 %
Medium Pain	17 %	18 %	17 %	20 %
Severe Pain	5 %	6 %	5 %	6 %
Functional Limitations (obs.)	15,192	14,628	17,119	26,452
Mean	1.55	1.59	1.99	2.01
(SD)	(2.10)	(2.05)	(2.05)	(2.10)
Wealth (obs.)	15,192	14,628	17,119	26,452
Mean	$393,797	$503,349	$432,202	$578,045
(SD)	($1,064,218)	($1,060,749)	($961,889)	($1,388,167)
Age (obs.)	15,192	14,628	17,119	26,452
Mean	56.7	57.8	69.1	69.8
(SD)	(3.1)	(2.6)	(2.9)	(2.8)

Area Housing Prices and Mental Health

The first row of coefficients in each table correspond to area housing prices as measured by the housing price index (HPI) at the CBSA level. Because we use an annual average of HPI, the results should be interpreted as the effect that below-versus-above-average HPI—adjusted for national trends—has on health. In the younger group, HPI is a statistically significant predictor of less severe pain and fewer functional limitations across both sets of specifications. Based on these results, a one-standard deviation increase in HPI predicts about a 0.018-point decrease in the severity of pain reporting and a 0.03-point drop in the number of reported functional limitations. Although the magnitude of these effects is small, the consistency of the relationship between HPI, pain, and functional limitations suggests that something about the increase in area housing prices improves these two outcomes. To test whether this is due to changes in housing wealth, we can look at the difference in response to HPI between homeowners and non-homeowners (HPI x Homeowner). If the loss of housing wealth is an important predictor of depressive outcomes, we

would expect to see homeowners respond more strongly to changes in their area's HPI when compared to non-homeowners. The coefficients on the interaction between HPI and homeownership are not statistically significant for any of the outcomes, however. We therefore conclude that the relationship between area housing prices and mental health is likely not mediated by changes in individual housing wealth.

To test whether the trend in housing wealth affect the mental health of adults aged 51 to 61, we turn to the percentage change in HPI over the last four years (4 year % change in HPI). If there is a lagged effect of housing price growth on mental health, the main effects of 4 year % change in HPI should be consistently statistically significant across outcomes and if it is due to changes in housing wealth, homeowners should be more affected by changes than non-homeowners. None of the main effects or relevant interactions (4 year % change in HPI x Homeowner) are statistically significant in our model. Thus, there is little evidence to support this relationship in our results.

The results look quite different for the older group. For the older population, higher area housing prices predict fewer functional limitations, though they do not predict pain severity. The results also differ by homeownership status. An increase in HPI predicts marginally fewer depressive symptoms and less severe pain among homeowners relative to non-homeowners. This is not consistent with the theory.

There is also some evidence that longer-term changes in housing prices affect the severity of pain reported in the older group. Both the main effect of the four-year percentage change in HPI and its interaction with homeownership status are statistically significant. For example, a 1 standard deviation increase in the four-year percent change in HPI a 0.2-percentage-point drop in the severity of self-reported pain. The slope of the relationship between four-year HPI change and the severity of pain also differs by homeownership status. The positive coefficient on the interaction between four-year change in HPI and homeownership means that homeowners do not report as large a drop in pain severity as non-homeowners do.

To better understand the regression results linking area housing prices and depressive outcomes, Figures 1 - 4 depict mental health outcomes by homeownership status. Each plot compares the mean for each depression outcome over time between areas where housing prices dropped more than average from 2006 to 2012 versus areas where housing prices dropped less

than average from 2006 to 2012. Figures 1 and 2 depict mental health outcomes over time for the younger group while Figures 3 and 4 show mental health outcomes for the older group.

Figures 1 and 2 show the evolution of mental health outcomes among adults aged 51 – 61 by homeownership status. Among those who identified as homeowners in 2004[2] (Figure 1), there is very little difference in the level or trend for depression, pain, and functional limitations by drop in housing price. For non-homeowners (Figure 2), several trends stand out. First, depression declines over time for both those in areas with higher versus lower changes in housing prices. This stands in contrast with the nearly unchanging trend in depression among homeowners. Second, mean pain severity and the mean number of functional limitations follow notably different trends for each geographic group. In areas where housing prices dropped more than average from 2006 to 2012, the mean severity of pain and the number of functional limitations declines. In contrast, those who in 2004 lived in areas where housing prices dropped less than average actually saw mean pain severity and the number of functional limitations increase. This is consistent with the results from Table 5 which suggest that something about area housing prices affects the mental health of non-homeowners but not that of homeowners.

Unlike the results for the younger group[3], Figures 3 and 4 show very little difference in either the level or trend of mental health outcomes by drop in area housing price. The only exception to this is functional limitations among homeowners in Figure 3, which increase for those who lived in 2004 in areas where housing prices dropped less than average but remain more or less steady for those who lived in areas where housing prices dropped more than average.

[2] In our sample, 4,150 individuals aged 51 – 61 reported owning a home in 2004 while 843 reported that they did not own a home.

[3] In the older group, 4,396 respondents in our final sample identified as homeowners in 2004 while 860 did not identify as homeowners.

Changes in Wealth

Figures 5 – 7 depict changes in wealth by 2004 homeownership status. Several patterns which emerge from these figures may help shed light on the results linking area housing prices and mental health. Although housing wealth does rise and decline in the expected manner for homeowners aged 51 – 61 in areas where housing prices dropped more than average, total wealth for the same group steadily increases over time (see Figure 5). In other words, the growth of non-housing wealth for this group offset the fluctuation in their housing wealth. Therefore, even though we control for total non-housing wealth in the regressions in Table 5 (see: Financial Assets), changes in area housing prices may not be affecting homeowners in the younger age group because their housing wealth is not a very large component of their overall wealth.

At the same time, total wealth and housing wealth follow a very different pattern among homeowners aged 65 – 74 (Figure 6). In this latter group, total and housing-only wealth decline steadily over time among homeowners who's 2004 place of residence experienced a larger than average decline in housing prices. The characteristic peak in housing wealth followed by a decline is also observed only among homeowners aged 65 – 74 in an area where housing prices declined *less* than average.

There is a clear difference in total wealth accumulation among non-homeowners aged 51 – 61 based on their 2004 place of residence (Figure 7). Although their housing wealth is near 0, 51 – 61 -year-old respondents who identified as non-homeowners in 2004 and resided in areas with a greater drop in housing price see a steady and relatively linear increase in their total wealth over the course of the study period. The opposite is true for non-homeowners of the same age who resided in areas with a less than average drop. Figure 7 also shows overlapping trends for non-homeowners in the older age group up until 2012, when there may be a divergence in wealth that occurs.

Unemployment Rates and Mental Health

The first row of coefficients under the "employment" heading in Tables 5 and 6 corresponds to area unemployment rates averaged over the course of two years at the commuting zone level. In the younger group (Table 5), the main effects of unemployment do not predict any changes in mental health. There is some evidence, however, that unemployment rates affected blue collar workers differently. We had hypothesized that blue collar workers would report worse

outcomes as unemployment rates increased, but this is not what we find. Instead, we find that blue collar workers report less severe pain as the two-year average unemployment rate rises. The magnitude of the coefficient is large, but so is the uncertainty about the estimate based on the width of the confidence interval. There is also evidence that unemployment rates affected respondents differently based on educational attainment. Respondents who obtained more than a high school education report many fewer functional limitations than those with less than a high school degree as the averaged unemployment rate increases. For this group, a one-point increase in the average unemployment rate over two years predicts a 32 percent larger drop in functional limitations for the more versus less educated group. It is worth noting that the confidence interval is large, but that the lower bound still represents a 6-percentage-point drop.

The results for unemployment from Table 6 should be treated as a placebo test. Because the vast majority (83 percent) of adults over 65 in our sample do not work or work only part time, unemployment rates should not affect the mental health of the older adults in our sample in the same way that they affect the younger group. The coefficients on the unemployment rate should therefore not be statistically significant on any of the terms. This is indeed the case for all coefficients with the exception of one: more educated older adults report a greater number of depressive symptoms as the unemployment rate increases.

Individual Events and Mental Health

How much do area economics affect mental health relative to individual life events? It is well established in the depression literature that major life events precede the onset of many, if not the majority, of depressive episodes (Gotlib and Hammen 2010; Hammen 2005). We therefore begin by calculating the impact of divorce or losing a spouse on depression. In the younger group, divorce or becoming a widow or widower predict large increases in depression. Losing a spouse predicts a 9-percentage point increase in depressive symptoms, while becoming divorced predicts nearly a 6-percentage point increase. In comparison, a one standard deviation increase in HPI predicts a modest 0.6 percentage point decrease in self-reported pain and a 0.5 percentage point decrease in the number of functional limitations. Thus, the magnitude of divorce or the death of a spouse are roughly 10 to 18 times greater.

Conclusions

The Great Recession was the biggest economic downturn since the Great Depression. Its effect was felt throughout the economy and for many years. Thus, it is natural to see how the Great Recession affected health. Our paper addresses this question. We examine the impact of the Great Recession on three measures of health: depression, pain, and functional limitations.

We identify the effect of the Great Recession using cross-area data. House prices fell by more in some areas than in others; unemployment rose by more in some areas than others. We examine how health changes differently in areas affected more and less by the Great Recession.

Our results show that people are more resilient than one might guess. In most of our specifications, there is little variation in health between those more and less affected by the Great Recession. There are some findings for which this is not the case, but the general pattern is of very small impacts of economic change on health. And even when there are significant relationships between economic conditions and health, the effects are much smaller than the impact of personal conditions on health – changes in marital status and diagnosis with serious health conditions, for example.

The major question raised by these results is what explains this resilience. It is possible that resilience is a product of social circumstance – the recession affected everyone, so perhaps social support limited the damage that hard economic times can otherwise engender. Alternatively, our measures of mental and physical health might be more sensitive to personal insults than economic hardship – though they are closely related to the reasons that most people go on disability insurance. Understanding the reasons for this resilience is a central area for future research.

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Table 5. Estimates of the Relationship between Economic Conditions and Health amongst 51 – 61-year-olds

	Depression		Pain		Funct Lim	
Independent Variables	1	2	3	4	5	6
Area Economics						
Housing Prices						
Housing Price Index (HPI)[†]	-0.014	-0.016	-0.016 **	-0.015 *	-0.028 **	-0.026 *
	(0.017)	(0.018)	(0.008)	(0.008)	(0.013)	(0.014)
4 yr % change in HPI	-0.020	-0.027	0.016	0.020	0.114	0.056
	(0.109)	(0.122)	(0.049)	(0.055)	(0.083)	(0.093)
HPI × Homeowner (HO)	–	0.001	–	-0.001	–	-0.002
		(0.002)		(0.001)		(0.002)
4 yr % change in HPI × HO	–	-0.006	–	0.010	–	0.033
		(0.029)		(0.013)		(0.022)
Employment						
Unemp. Rate[§]	-0.137	0.460	-0.536	-0.816	-1.626	-0.389
	(1.465)	(1.604)	(0.655)	(0.717)	(1.113)	(1.218)
Unemp. Rate× >HS Degree	–	-1.231	–	0.620	–	-2.223 **
		(1.207)		(0.543)		(0.922)
Blue Collar[±] x 2 year avg UR	–	2.884	–	-3.582 **	–	-2.466
		(4.441)		(1.782)		(3.034)
Demographic[‡]						
Homeowner	0.026	0.017	-0.075 ***	-0.072 ***	-0.041	-0.041
	(0.055)	(0.057)	(0.025)	(0.026)	(0.043)	(0.044)
Homeowner × >HS Degree	–	0.006	–	0.003	–	0.014
		(0.012)		(0.006)		(0.010)
Financial Assets[∓]	-0.002	0.005	-0.013	-0.022	-0.016	-0.015
	(0.017)	(0.034)	(-0.008)	(0.015)	(0.013)	(0.026)
Marital Status						
Separated/Divorced	0.506 ***	0.507 ***	-0.023	-0.022	-0.054	-0.055
	(0.071)	(0.071)	(0.071)	(0.032)	(0.055)	(0.055)
Widowed	0.848 ***	0.851 ***	0.040	0.044	0.027	0.028
	(0.090)	(0.090)	(0.041)	(0.041)	(0.070)	(0.070)
Never Married	0.324 *	0.326 *	-0.025	-0.020	0.137	0.142
	(0.173)	(0.173)	(0.080)	(0.080)	(0.136)	(0.136)
Age						
55-61	-0.002	-0.014 *	0.040 ***	0.055 ***	-0.023	0.011
	(0.034)	(0.044)	(0.015)	(0.019)	(0.026)	(0.033)
55-61 × Female	–	0.055 *	–	-0.007	–	-0.003
		(0.030)		(0.016)		(0.026)
Employment Status						
Part-Time	0.066 *	0.064	0.045 **	0.044 **	0.137 ***	0.135 ***
	(0.040)	(0.040)	(0.018)	(0.018)	(0.031)	(0.031)
Not in Labor Force/Unempl.	0.286 ***	0.285 ***	0.046 ***	0.045 **	0.336 ***	0.335 ***
	(0.039)	(0.039)	(0.018)	(0.018)	(0.030)	(0.030)

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	Depression		Pain		Funct Lim	
Independent Variables	1	2	3	4	5	6
Year (relative to 2000)						
2002	-0.067	-0.067	0.014	0.012	0.058 *	0.058 *
	(0.043)	(0.043)	(0.019)	(0.019)	(0.032)	(0.032)
2004	-0.121 **	-0.121 **	0.077 ***	0.074 ***	0.155 ***	0.153 ***
	(0.054)	(0.054)	(0.024)	(0.024)	(0.041)	(0.041)
2006	-0.089	-0.085	0.127 ***	0.124 ***	0.246 ***	0.248 ***
	(0.061)	(0.061)	(0.027)	(0.027)	(0.046)	(0.046)
2008	-0.219 ***	-0.217 ***	0.110 ***	0.108 ***	0.214 ***	0.213 ***
	(0.069)	(0.070)	(0.031)	(0.031)	(0.053)	(0.053)
2010	-0.312 ***	-0.304 ***	0.147 ***	0.141 ***	0.341 ***	0.346 ***
	(0.106)	(0.107)	(0.048)	(0.048)	(0.081)	(0.081)
2012	-0.368 ***	-0.360 ***	0.101 **	0.096 **	0.266 ***	0.272 ***
	(0.100)	(0.101)	(0.045)	(0.045)	(0.076)	(0.077)
2014	-0.441 ***	-0.433 ***	0.182 ***	0.179 ***	0.218 ***	0.225 ***
	(0.098)	(0.098)	(0.044)	(0.044)	(0.075)	(0.075)
Health						
Heart Disease	0.181 **	0.176 **	0.129 ***	0.129 ***	0.366 ***	0.362 ***
	(0.073)	(0.073)	(0.033)	(0.033)	(0.056)	(0.056)
Stroke	0.196	0.189	0.006	0.011	0.587 ***	0.582 ***
	(0.129)	(0.129)	(0.057)	(0.057)	(0.097)	(0.097)
High Blood Pressure	0.113 **	0.109 **	0.013	0.013	0.061	0.057
	(0.051)	(0.051)	(0.022)	(0.022)	(0.038)	(0.038)
Diabetes	0.003	0.002	0.011	0.011	0.142 ***	0.141 ***
	(0.068)	(0.068)	(0.031)	(0.031)	(0.052)	(0.052)
Cancer	0.222 ***	0.221 ***	0.137 ***	0.138 ***	0.343 ***	0.343 ***
	(0.085)	(0.085)	(0.038)	(0.038)	(0.065)	(0.065)
Arthritis	0.128 ***	0.131 ***	0.181 ***	0.182 ***	0.597 ***	0.599 ***
	(0.049)	(0.049)	(0.022)	(0.022)	(0.037)	(0.037)
Lung Disease	0.136	0.136	0.100 **	0.103 **	0.319 ***	0.315 ***
	(0.099)	(0.100)	(0.044)	(0.045)	(0.075)	(0.075)
Summary Statistics						
Observations	28,171		29,763		29,820	
Adj. R^2	0.551		0.561		0.72	

Note: All regressions include individual fixed effects and are weighted to represent the broader target population.
$^{*} = p < 0.1$, $^{**} = p < 0.05$, $^{***} = p < 0.001$; †: Per 100 percentage point increase in HPI
§ The unemployment rate is the average of the current and previous year's unemployment rates
$^{\pm}$ Indicator is true if participant was a blue collar worker in 2004
‡ Reference cat: non-homeowners, <=HS degree, married, 51-<55 for ages 51-61, 65-<70 for ages 65-74, full time employment
$^{\mp}$: Per $1,000,000 increase in non-housing wealth

Table 6. Estimates of the Relationship between Economic Conditions and Health amongst 65—75-year-olds

	Depression		Pain		Funct Lim	
Independent Variables	1	2	3	4	5	6
Area Economics						
Housing Prices						
Housing Price Index (HPI)[†]	0.006	0.017	-0.001	0.002	-0.029 ***	-0.024 **
	(0.013)	(0.013)	(0.007)	(0.007)	(0.011)	(0.012)
4 yr % change in HPI	-0.106	-0.066	-0.060	-0.091 *	0.001	-0.024
	(0.085)	(0.094)	(0.045)	(0.050)	(0.074)	(0.082)
HPI × Homeowner (HO)	–	-0.003 *	–	-0.002 **	–	-0.002
		(0.002)		(0.001)		(0.001)
4 yr % change in HPI × HO	–	-0.014	–	0.021 *	–	0.026
		(0.022)		(0.011)		(0.019)
Employment						
Unemp. Rate[§]	-0.031	-1.136	-0.420	-0.637	0.507	0.758
	(1.088)	(1.143)	(0.571)	(0.599)	(0.950)	(0.996)
Unemp. Rate× >HS Degree	–	2.573 ***	–	0.576	–	-0.408
		(0.834)		(0.440)		(0.732)
Blue Collar[±] x 2 year avg UR	–	6.580	–	1.567	–	0.174
		(5.715)		(2.905)		(4.831)
Demographic[‡]						
Homeowner	-0.042	-0.029	-0.007	-0.000	0.000	0.010
	(0.045)	(0.046)	(0.024)	(0.024)	(0.039)	(0.040)
Homeowner × >HS Degree	–	0.004	–	0.002	–	0.021 ***
		(0.009)		(0.005)		(0.008)
Financial Assets[∓]	0.002	0.046 **	0.002	-0.004	-0.014 *	-0.003
	(-0.009)	(-0.020)	(0.005)	(-0.010)	(-0.008)	(-0.017)
Separated/Divorced	0.475 ***	0.475 ***	-0.082 **	-0.083 **	-0.074	-0.074
	(0.069)	(0.069)	(0.036)	(0.036)	(0.059)	(0.059)
Widowed	0.677 ***	0.684 ***	-0.092 ***	-0.092 ***	-0.091 **	-0.087 **
	(0.046)	(0.046)	(0.024)	(0.024)	(0.041)	(0.041)
Never Married	0.687 ***	0.696 ***	0.025	0.024	0.226 *	0.228 *
	(0.146)	(0.146)	(0.079)	(0.079)	(0.129)	(0.129)
Age						
70-74	0.021	0.055*	-0.001	-0.007	-0.020	-0.003
	(0.025)	(0.030)	(0.013)	(0.016)	(0.022)	(0.026)
70-74 × Female	–	-0.061 **	–	0.010	–	-0.031
		(0.030)		(0.016)		(0.026)
Employment Status						
Part-Time	-0.043	-0.045	-0.004	-0.004	0.126 ***	0.123 ***
	(0.038)	(0.038)	(0.020)	(0.020)	(0.033)	(0.033)
Not in Labor Force/Unempl.	0.113 ***	0.110 ***	0.025	0.024	0.191 ***	0.189 ***
	(0.038)	(0.038)	(0.020)	(0.020	(0.033)	(0.033)

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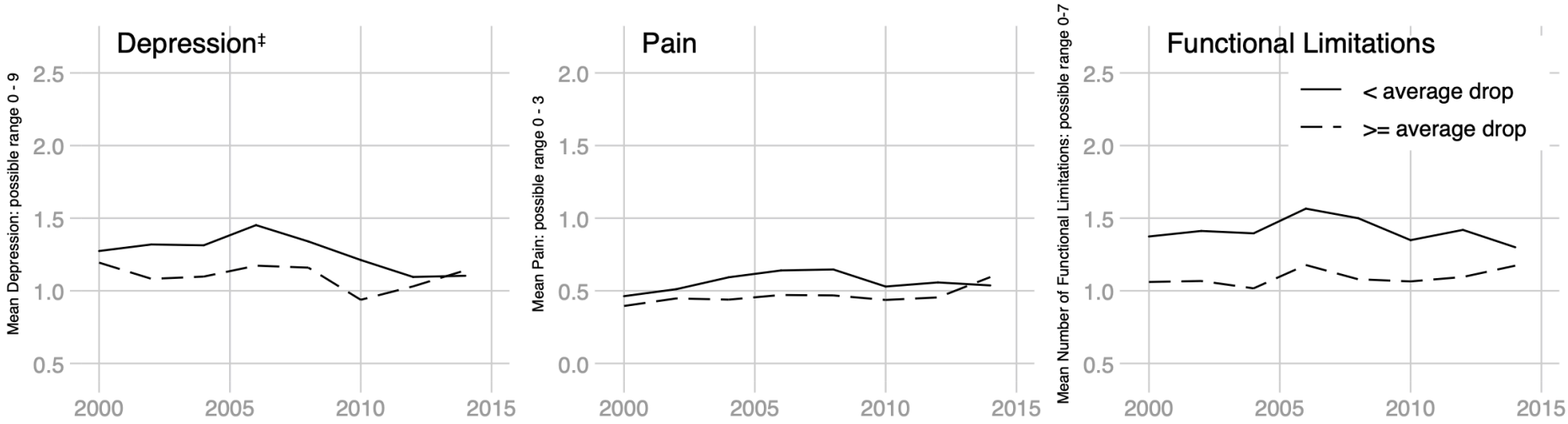
	Depression		Pain		Funct Lim	
Independent Variables	1	2	3	4	5	6
Year (relative to 2000)						
2002	-0.057 *	-0.058 *	0.029 *	0.028	0.225 ***	0.223 ***
	(0.034)	(0.034)	(0.017)	(0.017)	(0.029)	(0.029)
2004	-0.128 ***	-0.130 ***	0.092 ***	0.091 ***	0.327 ***	0.326 ***
	(0.044)	(0.044)	(0.023)	(0.023)	(0.038)	(0.038)
2006	-0.143 ***	-0.147 ***	0.128 ***	0.127 ***	0.470 ***	0.468 ***
	(0.051)	(0.051)	(0.027)	(0.027)	(0.044)	(0.044)
2008	-0.210 ***	-0.210 ***	0.115 ***	0.114 ***	0.501 ***	0.499 ***
	(0.058)	(0.058)	(0.030)	(0.030)	(0.050)	(0.050)
2010	-0.303 ***	-0.303 ***	0.187 ***	0.185 ***	0.637 ***	0.632 ***
	(0.085)	(0.085)	(0.044)	(0.044)	(0.075)	(0.075)
2012	-0.255 ***	-0.254 ***	0.162 ***	0.160 ***	0.650 ***	0.646 ***
	(0.083)	(0.083)	(0.043)	(0.043)	(0.072)	(0.072)
2014	-0.273 ***	-0.271 ***	0.244 ***	0.243 ***	0.787 ***	0.785 ***
	(0.081)	(0.081)	(0.043)	(0.043)	(0.071)	(0.071)
Health						
Heart Disease	0.200 ***	0.201 ***	0.063 ***	0.063 ***	0.238 ***	0.237 ***
	(0.043)	(0.043)	(0.023)	(0.023)	(0.037)	(0.037)
Stroke	-0.120 *	-0.123 *	0.015	0.016	0.667 ***	0.668 ***
	(0.070)	(0.070)	(0.035)	(0.035)	(0.057)	(0.057)
High Blood Pressure	0.015	0.015	0.036 *	0.037 *	0.053	0.053
	(0.040)	(0.040)	(0.021)	(0.021)	(0.035)	(0.035)
Diabetes	0.069	0.072	-0.044 *	-0.042	0.088 **	0.086 **
	(0.050)	(0.050)	(0.026)	(0.026)	(0.043)	(0.043)
Cancer	0.256 ***	0.248 ***	0.033	0.034	0.279 ***	0.278 ***
	(0.051)	(0.051)	(0.026)	(0.026)	(0.044)	(0.044)
Arthritis	0.101 **	0.101 **	0.136 ***	0.136 ***	0.352 ***	0.351 ***
	(0.044)	(0.044)	(0.023)	(0.023)	(0.038)	(0.038)
Lung Disease	0.285 ***	0.290 ***	-0.018	-0.016	0.280 ***	0.282 ***
	(0.061)	(0.061)	(0.031)	(0.031)	(0.052)	(0.052)
Summary Statistics						
Observations	40,757		43,426		43,571	
Adj. R^2	0.599		0.555		0.735	

Note: All regressions include individual fixed effects and are weighted to represent the broader target population.
$^{*} = p < 0.1$, $^{**} = p < 0.05$, $^{***} = p < 0.001$; †: Per 100 percentage point increase in HPI
§ The unemployment rate is the average of the current and previous year's unemployment rates
$^{\pm}$ Indicator is true if participant was a blue collar worker in 2004
‡ Reference cat: non-homeowners, <=HS degree, married, 51-<55 for ages 51-61, 65-<70 for ages 65-74, full time employment
$^{\mp}$: Per $1,000,000 increase in non-housing wealth

Figure 1. Mean Depression Outcomes for Homeowners aged 51 – 61 by Drop in Housing Price Index, (2006 – 2012)[†], 2000 – 2014



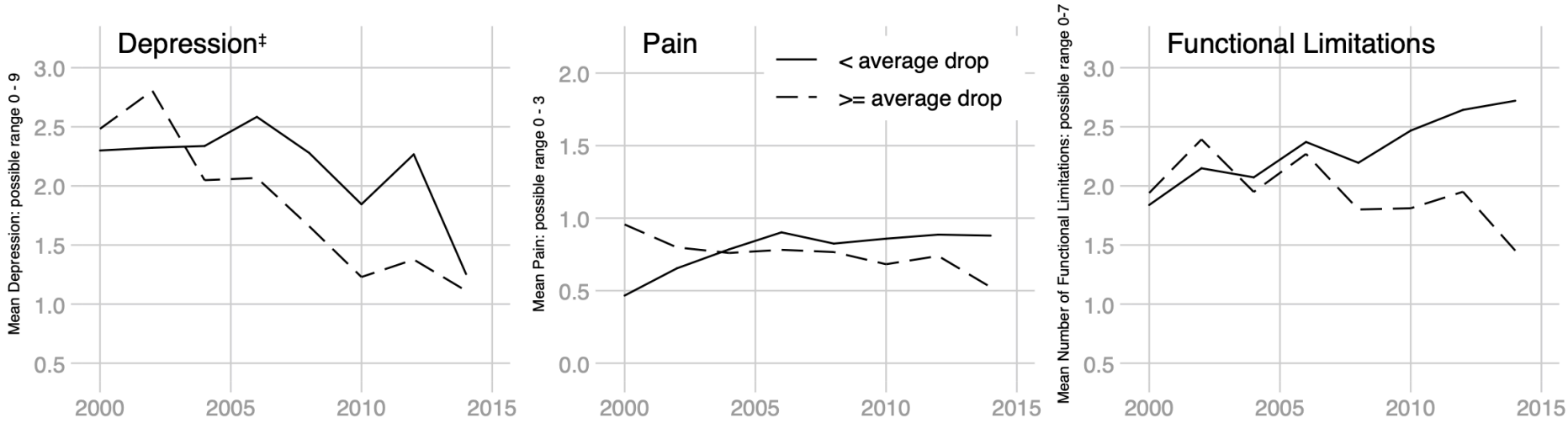
[†] Housing price change is calculated based on the difference in the housing price index (HPI) between 2006 and 2012 based on 2004 residence. These dates were chosen to correspond as closely as possible to the highest and lowest points of the 2006 housing bubble.

[‡] Depression is measured using the Center for Epidemiologic Studies Depression (CES-D) scale.

Homeownership is defined based on homeownership status in 2004.

Note that not all scales presented are equivalent. Means are weighted to represent broader target population.

Figure 2. Mean Depression Outcomes for Non-Homeowners aged 51 – 61 by Drop in Housing Price Index, (2006 – 2012)[†], 2000 – 2014



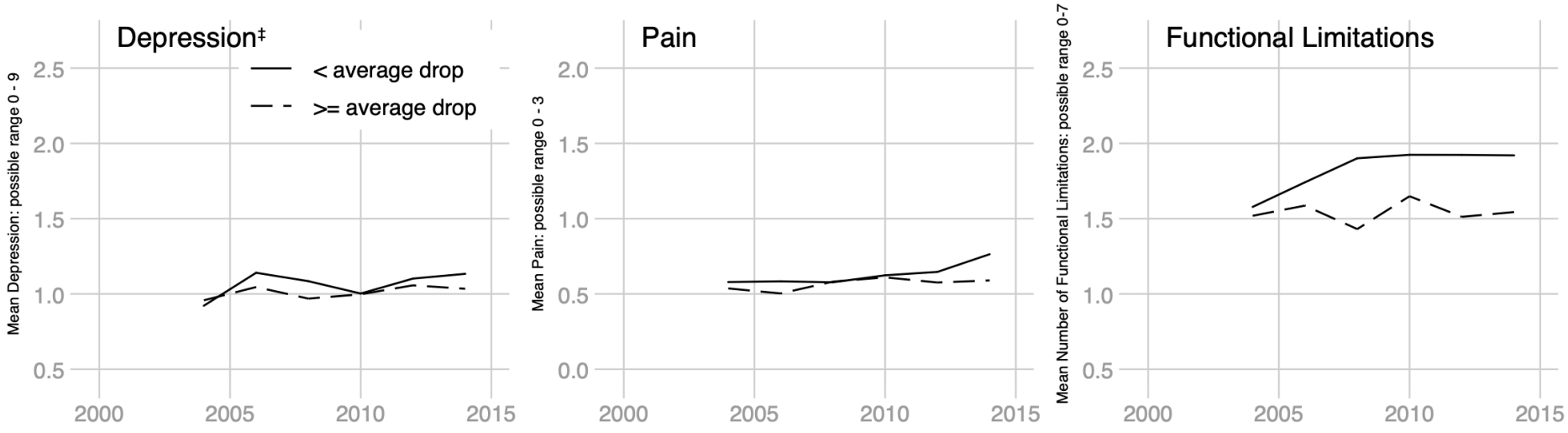
[†] Housing price change is calculated based on the difference in the housing price index (HPI) between 2006 and 2012 based on 2004 residence. These dates were chosen to correspond as closely as possible to the highest and lowest points of the 2006 housing bubble.

[‡] Depression is measured using the Center for Epidemiologic Studies Depression (CES-D) scale.

Homeownership is defined based on homeownership status in 2004.

Note that not all scales presented are equivalent. Means are weighted to represent broader target population.

Figure 3. Mean Depression Outcomes for Homeowners aged 65 – 74 by Drop in Housing Price Index, (2006 – 2012)†, 2000 – 2014



† Housing price change is calculated based on the difference in the housing price index (HPI) between 2006 and 2012 based on 2004 residence. These dates were chosen to correspond as closely as possible to the highest and lowest points of the 2006 housing bubble.

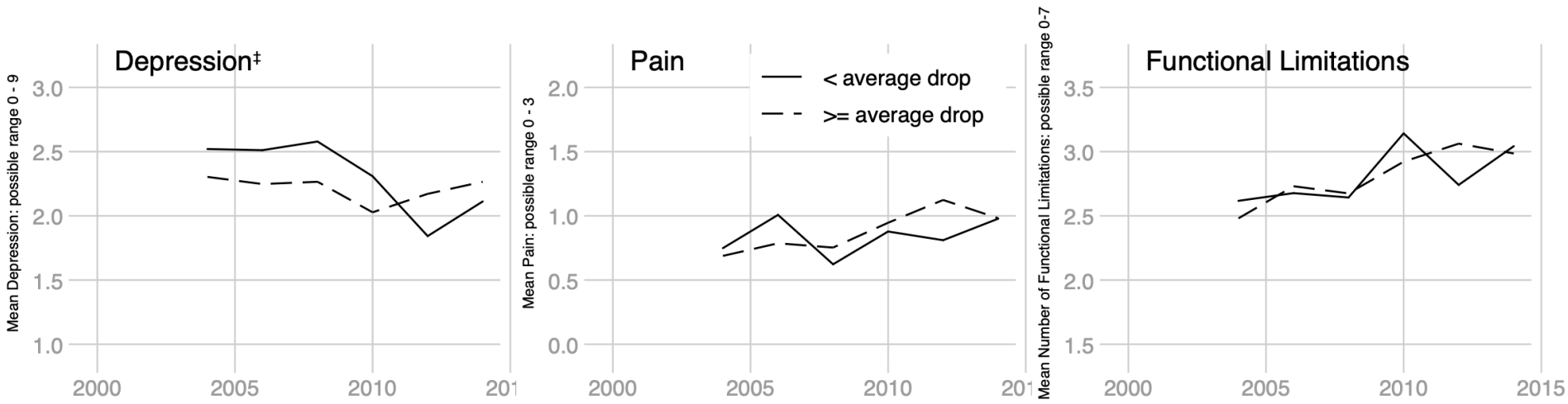
‡ Depression is measured using the Center for Epidemiologic Studies Depression (CES-D) scale.

Homeownership is defined based on homeownership status in 2004.

Values prior to 2004 were omitted due to insufficient sample size.

Not all scales presented are equivalent. Means are weighted to represent broader target population.

Figure 4. Mean Depression Outcomes for Non-Homeowners aged 65 – 74 by Drop in Housing Price Index, (2006 – 2012)†, 2000 – 2014



† Housing price change is calculated based on the difference in the housing price index (HPI) between 2006 and 2012 based on 2004 residence. These dates were chosen to correspond as closely as possible to the highest and lowest points of the 2006 housing bubble.

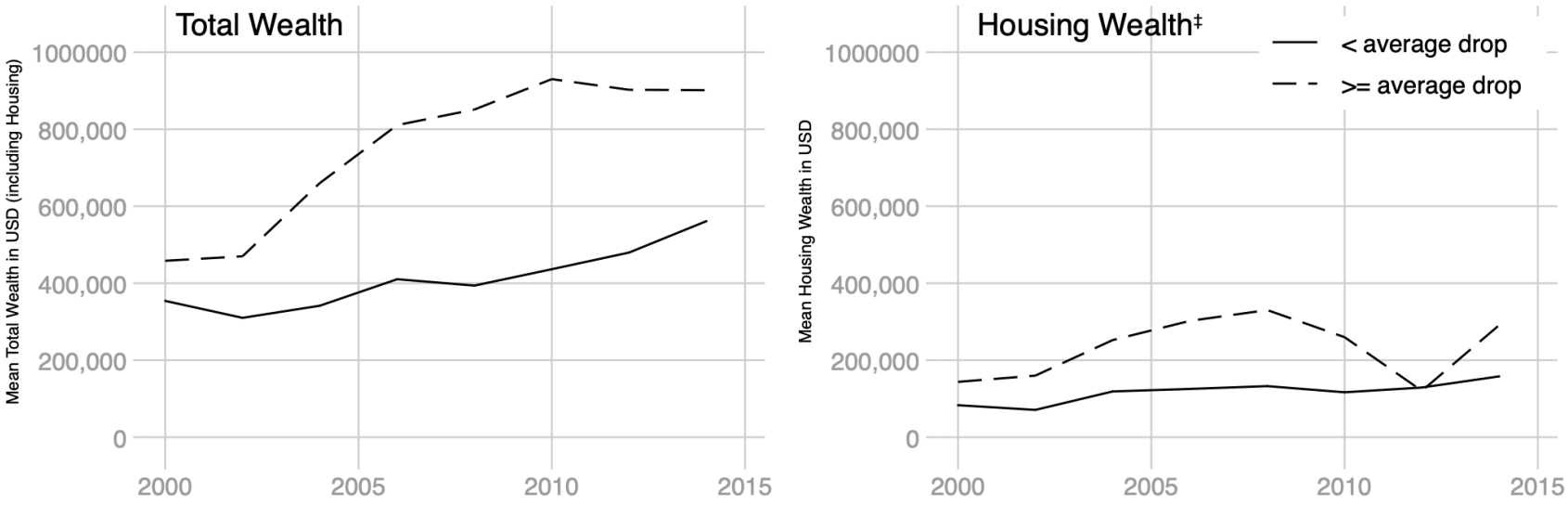
‡ Depression is measured using the Center for Epidemiologic Studies Depression (CES-D) scale.

Homeownership is defined based on homeownership status in 2004.

Values prior to 2004 were omitted due to insufficient sample size.

Note that not all scales presented are equivalent. Means are weighted to represent broader target population.

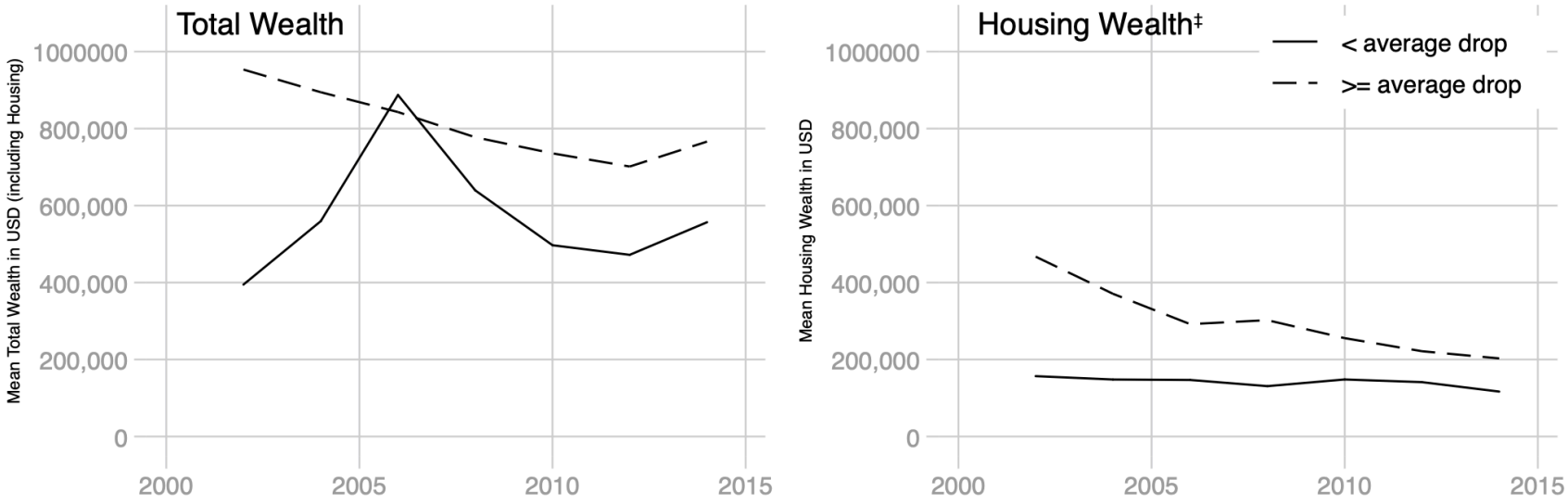
Figure 5. Mean Change in Wealth for Homeowners aged 51 – 61 by Drop in Housing Price Index, (2006 – 2012)†, 2000 – 2014



† Housing price change is calculated based on the difference in the housing price index (HPI) between 2006 and 2012 based on 2004 residence. These dates were chosen to correspond as closely as possible to the highest and lowest points of the 2006 housing bubble. Homeownership is defined based on homeownership status in 2004.

‡ Housing wealth refers to the difference in total wealth and total non-housing wealth.

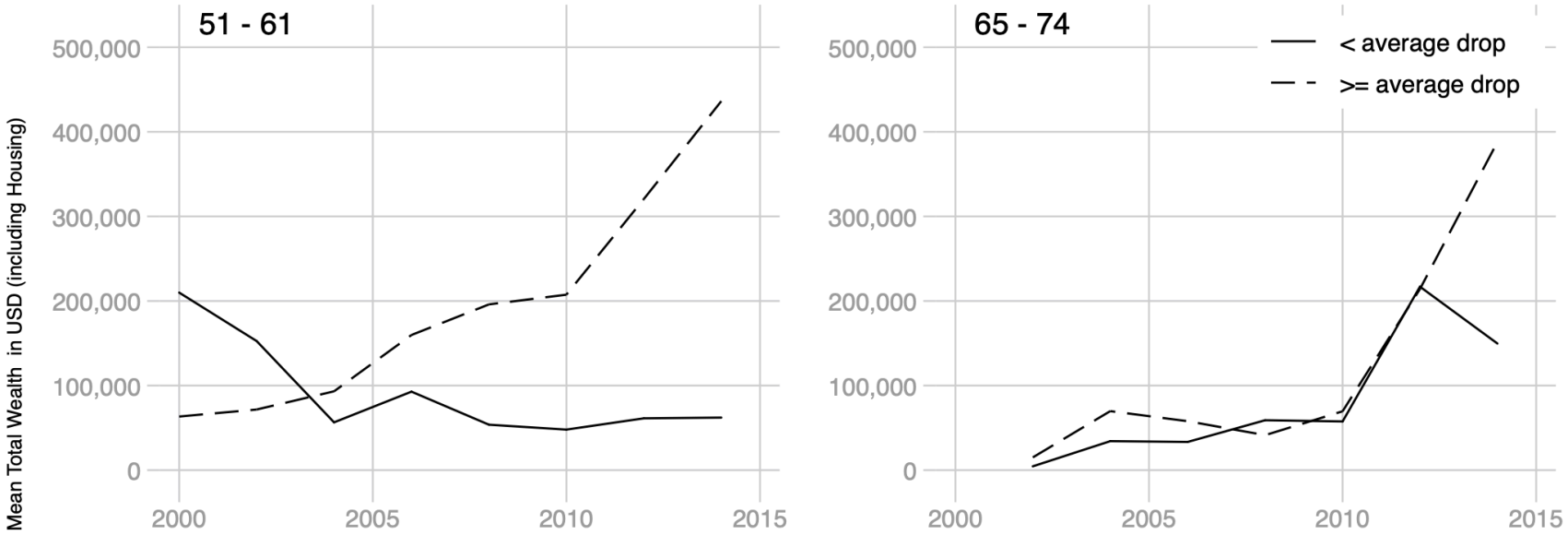
Figure 6. Mean Change in Wealth for Homeowners aged 65 – 74 by Drop in Housing Price Index, (2006 – 2012)[†], 2000 – 2014



[†] Housing price change is calculated based on the difference in the housing price index (HPI) between 2006 and 2012 based on 2004 residence. These dates were chosen to correspond as closely as possible to the highest and lowest points of the 2006 housing bubble. Homeownership is defined based on homeownership status in 2004.

[‡] Housing wealth refers to the difference in total wealth and total non-housing wealth.

Figure 7. Mean Total Wealth for Non-Homeowners by Drop in Housing Price Index, (2006 – 2012)[†], 2000 – 2014



[†] Housing price change is calculated based on the difference in the housing price index (HPI) between 2006 and 2012 based on 2004 residence. These dates were chosen to correspond as closely as possible to the highest and lowest points of the 2006 housing bubble. Homeownership is defined based on homeownership status in 2004.