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# Health and Health Inequality during the Great Recession: Evidence from the PSID[*]

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## Abstract

We estimate the impact of the Great Recession of 2007-2009 on health outcomes in the United States. We show that a one percentage point increase in the unemployment rate resulted in a 7.8-8.8 percent increase in reports of poor health. Mental health was also adversely impacted and reports of chronic drinking increased. These effects were concentrated among those with strong labor force attachments. White Americans and the less educated were the most impacted demographic groups.

*Keywords: Great Recession, Health Behaviors, Health Outcomes, Inequality*

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## I. Introduction

Recessions are a major source of systematic risk to households. Because they affect large groups of people at once, they are very difficult to insure. Moreover, due to moral hazard problems, public insurance schemes like unemployment insurance only provide limited recourse to the unemployed. As a consequence, recessions can have serious, adverse impacts on household and individual welfare.

One of the more commonly studied of these potential impacts is the effect of recessions on human health. Early work on the topic indicated that poor macroeconomic conditions raised mortality rates substantially (*e.g.* Brenner 1979). However, seminal work by Ruhm (2000) pointed out severe methodological shortcomings in this earlier work and he showed that, once these issues are corrected, mortality rates tend to *decline* during recessions so that mortality rates are actually pro-cyclical in the aggregate data.[1] Improved health-related behaviors due to relaxed time constraints and tightened budget constraints was cited as a mechanism driving these results by Ruhm (2000, 2005), although subsequent work by Stevens, *et al.* (2015) suggested that higher rates of vehicular accidents and poor nursing home staffing during robust economic times were the primary mechanisms. Notably, more recent work by Ruhm (2015) has shown that mortality rates for many causes of death did not decline during the Great Recession and that mortality due to accidental poisoning actually increased. All of these studies utilize aggregate state-level mortality and unemployment rates and so their unit of analysis is a state/time observation.

On the other hand, studies that are based on individual-level data mostly show that health and health-related behaviors worsen during recessions. For example, Gerdtham and Johannesson (2003, 2005) use micro-data and show that mortality risks increase during recessions for working-aged men. Similar evidence over the period 1984-1993 is provided for the United States by Halliday (2014) who used the Panel Study of Income Dynamics (PSID). Browning and

[1] This result has been replicated in other countries such as Canada (Ariizumi and Schirle 2012), France (Buchmueller, *et al*. 2007), OECD countries (Gerdtham and Ruhm 2006), Spain (Tapia Granados 2005), Germany (Neumayer 2004), and Mexico (Gonzalez and Quast 2011).

Heinesen (2012) use Danish administrative data and show that involuntary job displacement has large effects on mortality, particularly, from cardiovascular disease which is similar to results in Halliday (2014). This paper builds on earlier work by Browning, Dano, and Heinesen (2006) that does not find any impact of displacements on hospitalization by using more outcomes including mortality, a sample with stronger labor force attachments, as well as a substantially larger data set. In a similar vein to these studies, Jensen and Richter (2003) showed that pensioners who were adversely affected by a large-scale macroeconomic crisis in Russia in 1996 were 5 percent more likely to die within two years of the crisis. Related, Charles and DeCicca (2008) use the National Health Interview Survey (NHIS) and MSA-level unemployment rates to show that increases in the unemployment rate were accompanied by worse mental health and increases in obesity. Hence, while the macro-based studies tend to be somewhat conflicted, the micro-based studies indicate that the uninsured risks posed by recessions have real, adverse impacts on human health. That said there are some micro-based studies that show that health improves during recession *e.g.* Ruhm (2003) who uses a sample from the National Health Interview Survey from 1972-1981.

In this study, we consider how the Great Recession impacted the health of Americans. Specifically, we ask three questions. First, did the Great Recession impact health in the United States? Second, how did it impact health? Third, who did it impact?

The Great Recession is an important episode to study since this recession was the deepest and longest recession during the post-war period. In fact, Farber (2015) estimates that, over this period, one in six workers lost their job at least once. From trough to peak, the unemployment rate increased from 4.6 to 9.3 percent which is the largest increase during the post-war period. To illustrate, we present Figure 1 which shows the unemployment rate during this period. This figure clearly indicates that the recession of 2007-2009 was the most severe. In addition, as shown in Figure 2, unemployment duration during the most recent recession was also, by far, the longest of any recession since World War II peaking at just over 40 weeks.

One recent study that considers the health impact of the Great Recession is Tekin, et al. (2017). They use the Behavioral Risk Factor Surveillance System (BRFSS) and find little impact using

state level unemployment rates. Our study offers two innovations upon their study. First, because we employ panel data from the PSID, we have a reliably consistent sample across years and are not subject to notoriously high non-response rates in many epidemiological surveillance data sources. For example, during the 2000's, the NHIS had a non-response rate over 10 percent (p. 44, Massey and Tourangeau 2012) and the BRFSS had a non-response rate approaching 50 percent during the same period (p. 188, Groves, *et al.* 2009). If the non-response in these surveys is in any way correlated with the business cycles or employment status, then researchers employing these data sources will have biased results. The second advantage of our study is that we are able to employ more granular information on economic conditions at the county level because we employ the PSID's geocode file. This accomplishes two things. First, it provides us with a more detailed portrait of the economic conditions that an individual faces. Second, it provides us with more variation in our right hand side variables which increases the precision of our estimates and, hence, the power of our study.

There are also some other studies that have investigated the impact of the Great Recession on inputs to health, particularly, illicit drug use. For example, Carpenter, *et al.* (2016) look at the impact of the business cycle over the period 2002-2013 on illicit drug use in the United States and find that there is strong evidence that economic downturns lead to increases in the use of prescription pain relievers. This result is consistent with findings in Ruhm (2015) who showed that mortality due to accidental poisoning in the United States increased during the Great Recession. Related to this, Bassols, *et al.* (2016) showed that the Great Recession increased legal and illegal drug use in Spain. Finally, Asgeirsdottir, *et al.* (2012) showed that the 2008 economic crisis in Iceland reduced consumption of health compromising goods.[2]

The findings of our study are as follows. First, there is very strong evidence that the Great Recession impacted the health of working-age Americans. Using a common omnibus measure of health status, self-reported health status, we show that a one percentage point increase in the unemployment rate resulted in a 7.8-8.8 percent increase in reports of fair or poor health status.

[2] Although, with respect to this finding, it is possible for a recession to reduce consumption of a normal good such as alcohol, while also increasing problematic binge drinking which may be more akin to an inferior good.

This finding is robust to a number of tests. These effects were not present in a sample of older people with weaker labor force attachments. Second, the Great Recession adversely impacted mental health and increased drinking, although these effects were weaker than the impact on self-rated health. Third, we detect the strongest impacts on white Americans and those with at most 12 years of schooling. In this sense our findings are consistent with important findings by Case and Deaton (2015) who show that mortality rates of whites with less education have increased recently.

The balance of this paper is organized as follows. In the next section, we discuss some avenues through which the macro-economy can affect health. After that, we discuss our data. After that, we describe our empirical methods. We then present our findings. Finally, we conclude.

## II. Mechanisms

Theoretically, the impact of recessions on health and health-related behavior is ambiguous with some effects promoting health and others adversely impacting health. This is clearly borne out in the empirical evidence as discussed above. On the whole, the health-promoting effects of recessions will happen via time investment in health and reduced consumption of vices provided that they are normal goods. On the other hand, the harmful effects of recessions will happen through increased consumption of vices if they are inferior goods, increased stress levels, or reduced physical exertion at work if work is physically strenuous.

### Health-promoting Effects

These effects have been discussed by many including Ruhm (2000). Essentially, recessions will reduce the opportunity cost of time and reduce incomes. As a consequence, time investment in health will increase and consumption of vices that are also normal goods will decline. Ruhm (2005) does provide evidence for both of these channels using the BRFSS. Evidence for reduced consumption of alcohol and other potentially harmful goods is also provided by Asgeirsdottir, *et al.* (2012) and Cotti, *et al*. (2015). However, it is important to bear in mind that alcohol is a normal good and, so just because some drinking declines during recessions that does not

preclude problematic, binge drinking from increasing.

Harmful Effects

Recessions may damage health via two channels. First, if some vices are inferior goods, then consumption of them will increase. Moreover, although it may be the case that a good such as alcohol is normal (*e.g.* Cotti, *et al*. (2015)), excessive use of it might be an inferior good if it is used a coping mechanism during stressful times (*e.g.* Dee (2001), Davalos, *et al.* (2012)). A similar argument can be made for obesity since idle time can be used for eating more and food can also provide comfort during stressful times. Second, if people have physically strenuous occupations, then job loss could be associated with less physical exertion.

## III. Data

We utilize data from the PSID which is a national longitudinal study that collects individual-specific information on health, demographic, and socioeconomic outcomes that is run by the University of Michigan. The PSID began in 1968 with interviews of about 5000 families and has continued to interview their descendants since then. To obtain county-specific information, we use the county identifier file from the PSID.[3] We utilize the 2003, 2005, 2007, 2009, 2011 and 2013 waves. We employ these waves because the 2007 and 2009 waves contain the recession and we have two waves prior to the recession (2003 and 2005) and two waves after the recession (2011 and 2013). Because only heads of household and their spouses were asked the health-related questions in the survey, we limit our sample to them. We employ regional economic indicators from the Local Area Unemployment Statistics (LAUS) of the Bureau of Labor Statistics (BLS) which were then merged into the PSID for each year using PSID's geocode file.

For most of the estimations, we restrict the sample to people with strong labor force attachments which we define to be people between ages 25 and 55. Sample sizes by year for the 25-55

[3] See http://simba.isr.umich.edu/restricted/ProcessReq.aspx for details.

sample are reported in Table A1. In addition, we further restrict this sample by dropping people who reported being out of the labor force, retired and disabled people, students, and housewives. We also present some estimations for people age 65 or older. The idea for using this sample is that this sub-sample has weaker labor force attachments and so if the impact of the recession on health is operating through the labor market then we should see attenuated effects in this population. In addition, because the goal of this exercise is to see if the recession impacted people with weak labor force attachments, we included the retired, disabled, students (to the extent that there are full-time students older than 65), and housewives as well as people who reported being out of the labor force.

Descriptive statistics for our sample are reported in Table 1. The data can be categorized under the rubrics: economic conditions, health outcomes, and demographic controls. The demographic variables are fairly self-explanatory and are listed in the bottom portion of the table.

The health outcomes that we consider are drinking, mental health, self-reported health status (SRHS), and obesity. The drinking variable that we use is an indicator for chronic drinking which we define to be drinking several times per week or every day. For mental health outcomes, we use the *K6 Non-specific Psychological Distress* scale which was also used by Charles and DeCicca (2008). The K6 index is based on six questions designed to measure different markers of psychological distress including reports of feelings of effortlessness, hopelessness, restlessness, sadness, and worthlessness during the past 30 days. The K6 distress scale is a weighted sum of these six outcomes. Kessler, *et al.* (2003) has shown that the K6 scale is at least as effective as a number of other depression scales in predicting serious mental health problems. Next, SRHS is a categorical variable that takes on integer values between one and five where one is excellent and five is poor. We transform the SRHS variable into a binary variable that we call poor health when SRHS equal to four or five. Halliday (2014) has shown that SRHS is strongly predictive of mortality in the PSID. Finally, obesity is an indicator for body mass index exceeding 30 which is the standard definition from the Centers for Disease Control and Prevention.

The economic indicators that we consider are regional unemployment rates and

employment/population ratios. The county-level unemployment rate, which is our main economic indicator, was obtained from the LAUS of the Bureau of Labor Statistics (BLS). We collected 3,218 county unemployment rates from every other year between the years of 2003 to 2013 which corresponds to the years of our PSID sample. In our sample, the average county-level unemployment rate was 6.95 percent with a standard deviation of 2.75 percent indicating that there is substantial variation in county-level unemployment rates in our data. Moreover, a regression of the county-level unemployment rate onto county fixed effects has an $R^2$ of 47.55 percent indicating that over half of the variation of the county-level unemployment rate is within counties which is critical for our research design's success. In addition, for some of the estimations, we employ regional employment/population ratios. The employment counts in the numerators come from the LAUS and the population counts in the denominators come from the Surveillance, Epidemiology, and End Results Program (SEER). These data have the advantage of coming from administrative sources so should be less prone to measurement errors. The $R^2$ from a regression of the employment/population ratio onto a set of county dummies is 42.89 percent once again indicating substantial within county variation.

## IV. Methodology

To estimate the effect of the Great Recession on health outcomes and health-related behaviors, we employ a linear regression model. If we let *i* denote the individual, *c* the county, *s* the state, and *y* the year, the basic estimation model is:

$$H_{icsy} = \beta_0 + \beta_1 U_{cy} + \beta_2 X_{iy} + \delta_c + \delta_y + \delta_s * t + \varepsilon_{icsy}. \qquad (1)$$

The dependent variable, $H_{icsy}$, is a health outcome or behavior. The county-specific unemployment rate in a given year is $U_{cy}$. The vector, $X_{iy}$, contains individual-specific control variables including age, gender, race, marital status, and education. We also include county and year dummies which are denoted by $\delta_c$and $\delta_y$. Finally, we include state-specific time trends which are denoted by $\delta_s * t$. We estimate two different specifications of equation (1) both with and without the state-specific trends which has the advantage of controlling for potentially

confounding within state trends but the disadvantage of eliminating potentially meaningful exogenous variation in the county-level unemployment rates. All standard errors were clustered on the county level. Finally, we employ the weights provided by the PSID when estimating these models.

An important feature of this research design is that we employ both county and state-specific unemployment rates. The advantage of using county-specific indicators is that within states, there can be considerable variation in local economic conditions, particularly, in larger states. As such, using county-specific unemployment rates does a better job of capturing the macroeconomic circumstances that an individual is facing. In this sense, the state-specific unemployment rates can be viewed as error-ridden proxies for the county-specific rates. On the other hand, as pointed out by Bartick (1996) and Hoynes (2000), there can be considerable amounts of measurement errors in county-specific unemployment rates since these come from surveys and imputations are often used for small counties. Note that this would tend to attenuate estimates based on county-level unemployment rates and, so estimates based on them should be viewed as lower bounds in the presence of classical measurement error. In addition, Lindo (2015) has argued the spillovers in regional economic conditions across counties may result in smaller estimates at the county level. To address these issues, we will employ economic measures at both the county and state levels.

In this paper, we provide a formal test for the presence of spillovers. To do this, we compute an F-test of the equality of the coefficients on the county and state unemployment rates. First, we estimated two models, one with the county unemployment rate and one with the state unemployment rate, as a system. This allowed us to compute the covariance between the two parameter estimates. Next, using the two estimates from this system, we tested the null that the two parameters from the different equations were equal. This provides a formal test of the presence of spillovers that properly accounts for a positive covariance in the two estimates.

Our study also does a comprehensive job of controlling for heterogeneity across local labor markets. Importantly, Tekin, *et al.* (2013) and Ruhm (2005) only control for state fixed effects which only accounts for the state-level and time-invariant confounders. Clearly, the use of state

fixed effects may be too coarse since potential confounders such as education and health infrastructure, culture, demographic composition, and weather may vary at a finer geographical level. For example, Asians are about one third of the population in San Francisco whereas they are only 0.4 percent of the population of Sierra County in California. Another example is that within states, particularly in the South, some counties are "dry" which means that alcohol cannot be purchased within them. Simple inclusion of state fixed effects would not account for these within state confounders.

We also adopt a more comprehensive approach to addressing heterogeneity by including individual fixed effects which subsume the county fixed effects. This approach has the advantage of controlling for a greater amount of unobserved confounding variables than the county fixed effects. However, it comes with the cost of wasting important exogenous variation in the data as has been argued by Deaton (1997) and Angrist and Pischke (2008). It is also less efficient and exacerbates the attenuation bias caused by measurement errors (*e.g.* Griliches and Hausman 1986). As such, we view the results with the individual fixed effects as a robustness check for our core results and we primarily focus on the results with the county fixed effects for most of the paper.

## V. Results

In this section, we answer our three research questions. First, did the Great Recession affect health? Second, how did it affect health? Third, who did it affect?

*Did the Great Recession affect health?*

To address this question, we estimate equation (1) using poor health as the dependent variable. We begin with the SRHS measure as it is a good omnibus measure of health status that exhibits meaning time series variation. Moreover, as shown in Halliday (2014), it is highly correlated with mortality in the PSID. The results are reported in Table 2.

Our core results are reported in the first four columns. In the first column where county fixed

effects are included, the estimate is 0.008 and is significant at the 1 percent level. This indicates that a one percentage point (PP) increase in the unemployment rate results in a 0.8 PP increase in the probability of reporting poor health. Inclusion of the state-specific trend slightly attenuates the estimate to 0.007 but it is still highly significant. The mean of reports of poor health in our data is 0.09, so these estimates constitute 7.8-8.8 percent increases. In the next two columns, we replicate the specifications from the first two columns except with individual fixed effects in lieu of county fixed effects and we see that the estimates are essentially the same.

One concern with the estimates with the county fixed effects in the first two columns is that healthier people may selectively migrate out of depressed areas as shown in Halliday (2007). If this were to happen then areas with high unemployment rates would have a less healthy population due to selection as opposed to a structural effect of the macroeconomy on individual health. One way to address this is with the inclusion of individual fixed effects as in columns three and four. Another way to address this is to re-estimate the models in the first two columns for a subsample of people who do not move counties while in the sample. These results are reported in columns five and six. Both estimates are 0.007 and are still significant at the 1 percent level. This indicates that selective migration is not driving our results.

In columns seven and eight, we use the state unemployment rate instead of the county unemployment rate. The estimates are 0.010 and 0.009 without and with state-specific trends. While this is larger than the analogous estimates in the first two columns, the magnitude of difference is not as large as what was found in Lindo (2015). The p-values on an F-test of the equality of the coefficients on the county and state unemployment rates are close to unity indicating that we cannot reject the null that the two estimates are the same. This casts doubt that there are spillover effects in our context.

Finally, we report estimates based on county and state level employment/population ratios in the final four columns. Of these four estimates, only the estimate using the state level ratio in column 11 is significant. In addition, none of the corresponding estimates with the other

outcomes produced a significant estimate.[4] Given that most of our effects appear to be operating through the unemployment rate, we will focus on it for the duration of the paper.

*How did the Great Recession affect health?*

Having established that the Great Recession impacted an omnibus health measurement, we now try and understanding how the recession impacted different components of health. To get at this, we estimate the model in equation (1) using the K6 index, the chronic drinking indicator, and the obesity indicator as the dependent variables.

The results are reported in Table 3. First and consistent with Tefft (2011), we see in the first two columns that mental health as proxied by the K6 scale deteriorated during the Great Recession. The estimates without and with the state-specific trends are significant at the 10 percent level. Note that in columns three and four where we use state level unemployment rates, both estimates are small in magnitude and not significant, but due to their large standard errors, we cannot reject that these estimates are equal to the estimates at the county-level. Moving on to drinking in columns five and six, we see that a one PP increase in the county-level unemployment rate increases the propensity to drink by 0.6-0.8 PP. From Table 1, the mean of this variable is 0.25, so this constitutes a 2.4-3.2 percent increase. The corresponding estimates with the state unemployment rate in columns seven and eight are similar in magnitude, although only the estimate with the state-trends is significant at conventional levels. Once again, we do not find any evidence of spill-overs. Finally, we look at obesity in the final four columns and see no evidence of any effects.

Next, in Table 4, we estimate our model for our four main outcomes on a sample that is 65 or older that has weak labor force attachments. None of the estimates are significant. Although it is true that due to a smaller sample size, this may be the result of less power. However, it is interesting to note that the magnitudes also tend to be smaller than the corresponding magnitudes in Tables 2 and 3 for the working age population, so the lack of significance is not only due to higher standard errors. This is suggestive that our effects are operating via the labor market.

[4] These results are available upon request.

*Who was impacted the most by the Great Recession?*

Finally, we investigate how the Great Recession affected different socioeconomic groups. In Table 5, we estimate our models separately for blacks and whites. In Table 6, we estimate the model separately for high school and college educated people.

In Table 5, we report the results for blacks in the top panel and for whites in the bottom panel. For blacks, we do not see any impacts on poor health or the K6 scale. In contrast, we do see strong evidence of effects on these outcomes for whites. Based on these outcomes, the recession had larger effects on whites. Next, looking at drinking, we see tightly estimated and significant effects on drinking behavior for whites. For blacks, the estimates are less tightly estimated and only the estimate with the state-trends is significant in column six. However, the magnitudes are larger for blacks than for whites. Finally, looking at obesity in column seven which excludes the state-trends, there is evidence of impacts on obesity albeit in opposite ways. A one PP increases the propensity to be obese for blacks by 1.3 PP but *decreases* the propensity for whites by 0.5 PP. However, these results are not robust to the inclusion of state-trends in the final column. Our interpretation of these results is that there is stronger evidence that the recession impacted the health of white Americans than black Americans.

Table 6 is analogous to the previous table except that now we stratify by education level. First, we see that none of the estimates are significant for college graduates. Second, we see that, for the high school educated, there are significant impacts on SRHS and drinking when state-trends are included in column six. This table suggests that there is stronger evidence that the recession had larger impacts on the less educated.

Taken together, these findings suggest that the effects of the Great Recession were disproportionately borne by the less educated and by whites. This is consistent with important recent findings by Case and Deaton (2015) who show that mortality of less educated whites has risen over the period 1999-2013.

## VI. Conclusions

In this paper, we showed that the Great Recession resulted in worse health outcomes. We built on previous work by employing more granular information on local macroeconomic conditions by using the geocode file from the Panel Study of Income Dynamics. Specifically, we show that a one percentage point increase in the unemployment rate results in a 7.8-8.8 percent increase in reports of poor health. In addition, increases in unemployment are also associated with worse mental health and increases in reports of chronic drinking. The bulk of our effects were borne by white and less educated people. We do not uncover any evidence that macroeconomic measures at larger levels of aggregation have larger effects than at smaller levels and, thus, this paper provides no evidence of spill-overs.

Our findings are not consistent with most of the aggregate studies in this literature in that we do not find compelling evidence that any of our health measures improved during the Great Recession. However, they are consistent with a growing body of evidence that employs individual level data and shows that health tends to deteriorate when the economy worsens. Moreover, we show that the people who were the most impacted were less educated, white, and younger than age 55. This is consistent with important new findings on mortality trends in the United States from Case and Deaton (2015).

**References**


Angrist, Joshua D., and Jörn-Steffen Pischke. *Mostly harmless econometrics: An empiricist's companion*. Princeton university press, 2008.

Ariizumi, Hideki, and Tammy Schirle. "Are recessions really good for your health? Evidence from Canada." *Social Science & Medicine* 74, no. 8 (2012): 1224-1231.

Asgeirsdottir, Tinna Laufey, Hope Corman, Kelly Noonan, Þórhildur Ólafsdóttir, and Nancy E. Reichman. *Are recessions good for your health behaviors? Impacts of the economic crisis in Iceland*. No. w18233. National Bureau of Economic Research, 2012.

Bartik, Timothy J. "The distributional effects of local labor demand and industrial mix: Estimates using individual panel data." *Journal of Urban Economics* 40, no. 2 (1996): 150-178.

Bassols, Nicolau Martin, and Judit Vall Castelló. "Effects of the Great Recession on drugs consumption in Spain." *Economics & Human Biology* 22 (2016): 103-116.

Brenner, M. Harvey. "Mortality and the national economy: A review, and the experience of England and Wales, 1936-76." *The Lancet* 314, no. 8142 (1979): 568-573.

Browning, Martin, Anne Moller Dano, and Eskil Heinesen. "Job displacement and stress-related health outcomes." *Health economics* 15, no. 10 (2006): 1061-1075.

Browning, Martin, and Eskil Heinesen. "Effect of job loss due to plant closure on mortality and hospitalization." *Journal of health economics* 31, no. 4 (2012): 599-616.

Buchmueller, Thomas C., Michel Grignon, Florence Jusot, and Marc Perronnin. *Unemployment and mortality in France, 1982-2002*. Centre for Health Economics and Policy Analysis, McMaster University, 2007.

Carpenter, Christopher S., Chandler B. McClellan, and Daniel I. Rees. *Economic Conditions, Illicit Drug Use, and Substance Use Disorders in the United States*. No. w22051. National Bureau of Economic Research, 2016.

Charles, Kerwin Kofi, and Philip DeCicca. "Local labor market fluctuations and health: is there a connection and for whom?." *Journal of Health Economics* 27, no. 6 (2008): 1532-1550.

Case, Anne, and Angus Deaton. "Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century." *Proceedings of the National Academy of Sciences* 112, no. 49 (2015): 15078-15083.

Cotti, Chad, Richard A. Dunn, and Nathan Tefft. "The Great Recession and Consumer Demand for Alcohol: A Dynamic Panel-Data Analysis of US Households." *American Journal of Health Economics* (2015).

Dávalos, María E., Hai Fang, and Michael T. French. "Easing the pain of an economic downturn: macroeconomic conditions and excessive alcohol consumption." *Health economics* 21, no. 11 (2012): 1318-1335.

Deaton, Angus. *The analysis of household surveys: a microeconometric approach to development policy*. World Bank Publications, 1997.

Dee, Thomas S. "Alcohol abuse and economic conditions: evidence from repeated cross-sections of individual-level data." *Health economics* 10, no. 3 (2001): 257-270.

Farber, Henry S. *Job loss in the Great Recession and its aftermath: US evidence from the displaced workers survey*. No. w21216. National Bureau of Economic Research, 2015.

Gerdtham, Ulf-G., and Magnus Johannesson. "A note on the effect of unemployment on mortality." *Journal of health economics* 22, no. 3 (2003): 505-518.

Gerdtham, Ulf-G., and Magnus Johannesson. "Business cycles and mortality: results from Swedish microdata." *Social science & medicine* 60, no. 1 (2005): 205-218.

Gerdtham, Ulf-G., and Christopher J. Ruhm. "Deaths rise in good economic times: evidence from the OECD." *Economics & Human Biology* 4, no. 3 (2006): 298-316.

Gonzalez, Fidel, and Troy Quast. "Macroeconomic changes and mortality in Mexico." *Empirical Economics* 40, no. 2 (2011): 305-319.

Granados, José A. Tapia. "Recessions and mortality in Spain, 1980–1997." *European Journal of Population/Revue européenne de Démographie* 21, no. 4 (2005): 393-422.

Griliches, Zvi, and Jerry A. Hausman. "Errors in variables in panel data." *Journal of econometrics* 31, no. 1 (1986): 93-118.

Groves, Robert M., Floyd J. Fowler Jr, Mick P. Couper, James M. Lepkowski, Eleanor Singer, and Roger Tourangeau. *Survey methodology*. Vol. 561. John Wiley & Sons, 2011.

Halliday, Timothy J. "Business cycles, migration and health." *Social Science & Medicine* 64, no. 7 (2007): 1420-1424.

Halliday, Timothy J. "Unemployment and Mortality: Evidence from the PSID." *Social Science & Medicine* 113 (2014): 15-22.

Hoynes, Hilary Williamson. "Local labor markets and welfare spells: Do demand conditions matter?." *Review of Economics and Statistics* 82, no. 3 (2000): 351-368.

Jensen, Robert T., and Kaspar Richter. "The health implications of social security failure: evidence from the Russian pension crisis." *Journal of Public Economics* 88, no. 1 (2004): 209-236.

Kessler, Ronald C., Gavin Andrews, Lisa J. Colpe, Eva Hiripi, Daniel K. Mroczek, S-LT Normand, Ellen E. Walters, and Alan M. Zaslavsky. "Short screening scales to monitor population prevalences and trends in non-specific psychological distress." *Psychological medicine* 32, no. 06 (2002): 959-976.

Lindo, Jason M. "Aggregation and the estimated effects of economic conditions on health." *Journal of health economics* 40 (2015): 83-96.

Massey, Douglas S., and Roger Tourangeau. *The nonresponse challenge to surveys and statistics*. Sage, 2012.

Neumayer, Eric. "Recessions lower (some) mortality rates: evidence from Germany." *Social Science & Medicine* 58, no. 6 (2004): 1037-1047.

Ruhm, C. J. "Are Recessions Good for Your Health?" *The Quarterly journal of economics*, 115, no. 2 (2000): 617-650

Ruhm, Christopher J. "Good times make you sick." *Journal of health economics* 22, no. 4 (2003): 637-658.

Ruhm, Christopher J. "Healthy living in hard times." *Journal of Health Economics* 24, no. 2 (2005): 341-363.

Ruhm, Christopher J. "Recessions, healthy no more?." *Journal of Health Economics* 42 (2015): 17-28.

Stevens, Ann H., Douglas L. Miller, Marianne E. Page, and Mateusz Filipski. "The best of times, the worst of times: Understanding pro-cyclical mortality." *American Economic Journal: Economic Policy* 7, no. 4 (2015): 279-311.

Tefft, Nathan. "Insights on unemployment, unemployment insurance, and mental health." *Journal of Health Economics* 30, no. 2 (2011): 258-264.

Tekin, Erdal, Chandler McClellan, and Karen Jean Minyard. *Health and health behaviors during the worst of times: evidence from the Great Recession*. No. w19234. National Bureau of Economic Research, 2013.

**Figure 1 Total Unemployment Rate in Each Recession since Postwar**

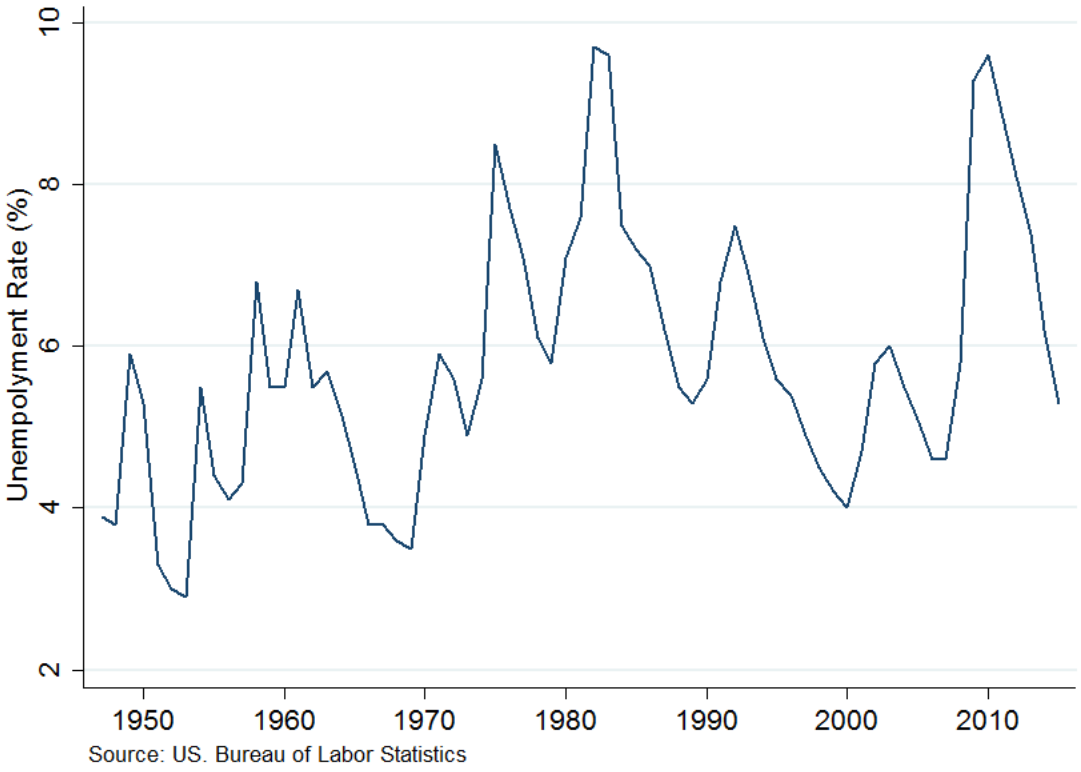

**Figure 2 Unemployment Duration since Postwar**

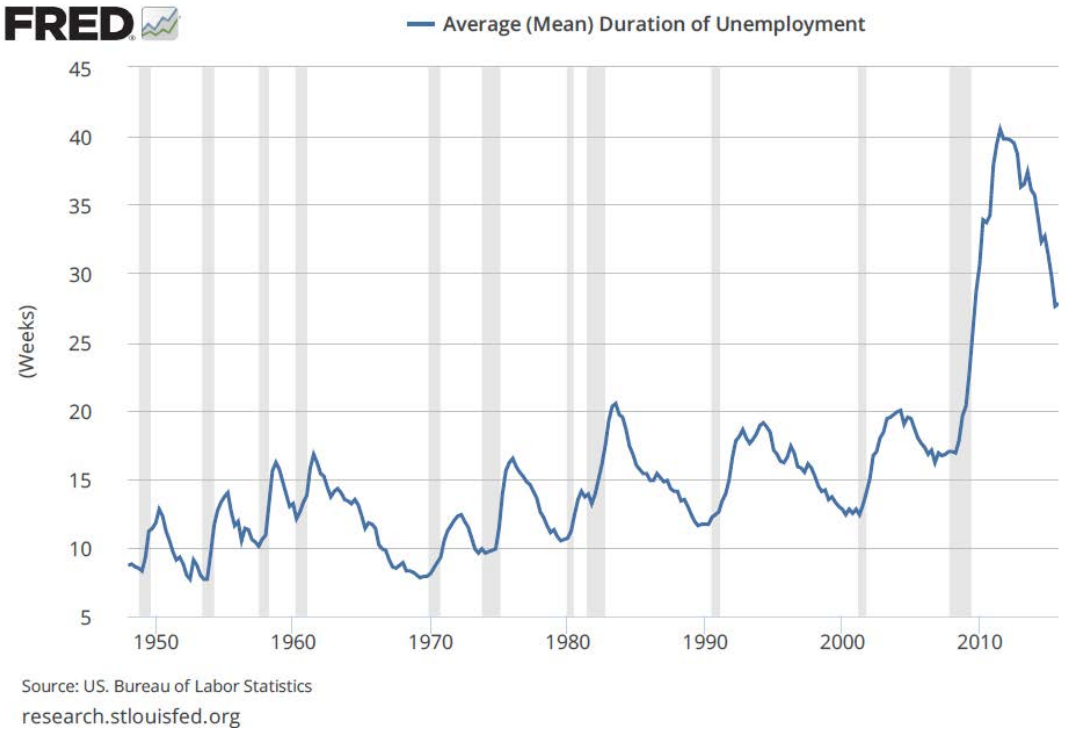

Table 1: Descriptive Statistics

| | Age 25 - 55 | | | Age 65 + | | |
|---|---|---|---|---|---|---|
| | Obs | Mean | Std. Dev. | Obs | Mean | Std. Dev. |
| ***Economic Conditions*** | | | | | | |
| County Employment to Population Ratio | 43280 | 0.45 | 0.06 | 9185 | 0.45 | 0.06 |
| State Employment to Population Ratio | 43280 | 0.47 | 0.03 | 9185 | 0.47 | 0.03 |
| County Unemployment Rate(%) | 43240 | 6.95 | 2.75 | 9177 | 7.04 | 2.64 |
| State Unemployment Rate (%) | 43280 | 6.88 | 2.20 | 9185 | 6.99 | 2.18 |
| ***Health Outcomes*** | | | | | | |
| Chronic Drinking | 24311 | 0.25 | 0.43 | 3360 | 0.31 | 0.46 |
| K6 Index | 35739 | 2.98 | 3.50 | 7138 | 2.60 | 3.57 |
| Poor Health | 42964 | 0.09 | 0.28 | 9060 | 0.32 | 0.47 |
| Obesity | 41903 | 0.26 | 0.44 | 8847 | 0.22 | 0.42 |
| ***Demographic Controls*** | | | | | | |
| Age | 43280 | 40.88 | 8.84 | 9176 | 75.25 | 7.60 |
| Sex | 43280 | 0.52 | 0.50 | 9185 | 0.43 | 0.50 |
| Married | 43275 | 0.67 | 0.47 | 9185 | 0.54 | 0.50 |
| Never married | 43275 | 0.16 | 0.37 | 9185 | 0.02 | 0.15 |
| Widowed | 43275 | 0.01 | 0.10 | 9185 | 0.33 | 0.47 |
| Divorced | 43275 | 0.13 | 0.34 | 9185 | 0.10 | 0.30 |
| Less than High School | 41205 | 0.07 | 0.26 | 8635 | 0.18 | 0.38 |
| High School Graduated | 41205 | 0.32 | 0.47 | 8635 | 0.40 | 0.49 |
| College | 43280 | 0.63 | 0.48 | 9185 | 0.45 | 0.50 |
| White | 42608 | 0.80 | 0.40 | 9030 | 0.87 | 0.33 |
| Black | 42608 | 0.13 | 0.33 | 9030 | 0.08 | 0.27 |

Table 2: Poor Health (SRHS = 4 or 5), Ages 25-55

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Unemployment Rate (County) | 0.008*** | 0.007*** | 0.007*** | 0.008*** | 0.007*** | 0.007*** | | | | | | |
| | (0.002) | (0.002) | (0.002) | (0.003) | (0.002) | (0.003) | | | | | | |
| Unemployment Rate (State) | | | | | | | 0.010*** | 0.009*** | | | | |
| | | | | | | | (0.002) | (0.003) | | | | |
| Emp/Pop Ratio (County) | | | | | | | | | 0.037 | 0.033 | | |
| | | | | | | | | | (0.037) | (0.040) | | |
| Emp/Pop Ratio (State) | | | | | | | | | | | -0.653** | -0.494 |
| | | | | | | | | | | | (0.274) | (0.371) |
| F-Test | | | | | | | (1)=(7) [0.984] | (2)=(8) [0.995] | | | (9)=(11) [0.981] | (10)=(12) [0.996] |
| County FE | X | X | | | X | X | X | X | X | X | X | X |
| Individual FE | | | X | X | | | | | | | | |
| State-specific Linear Trends | | X | | X | | X | | X | | X | | X |
| Non-mover Sample | | | | | X | X | | | | | | |
| NT | 40,721 | 40,721 | 40,721 | 40,721 | 25,142 | 25,142 | 40,761 | 40,761 | 40,761 | 40,761 | 40,761 | 40,761 |

* sig. at 10% level ** sig. at 5% level *** sig. at 1% level

Notes: All standard errors are clustered at the county level and are reported in parentheses. All specifications control for the demographic variables listed in Table 1. We report the p-value for the F-tests in brackets.

Table 3: Mental Health, Drinking, and Obesity, Ages 25-55

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | K6 Depression Index | | | | Chronic Drinking | | | | Obesity | | | |
| Unemployment Rate (County) | 0.053* | 0.057* | | | 0.006* | 0.008** | | | -0.002 | -0.001 | | |
| | (0.028) | (0.030) | | | (0.003) | (0.003) | | | (0.003) | (0.003) | | |
| Unemployment Rate (State) | | | 0.042 | 0.046 | | | 0.005 | 0.009* | | | -0.001 | 0.001 |
| | | | (0.031) | (0.039) | | | (0.004) | (0.005) | | | (0.003) | (0.003) |
| F-Test | | | (1)=(3) | (2)=(4) | | | (5)=(7) | (6)=(8) | | | (9)=(11) | (10)=(12) |
| | | | [0.999] | [0.999] | | | [0.999] | [0.998] | | | [0.999] | [0.999] |
| County FE | X | X | X | X | X | X | X | X | X | X | X | X |
| State-specific Linear Trends | | X | | X | | X | | X | | X | | X |
| NT | 33,937 | 33,937 | 33,937 | 33,937 | 23,288 | 23,288 | 23,307 | 23,307 | 39,774 | 39,774 | 39,813 | 39,813 |

* sig. at 10% level ** sig. at 5% level *** sig. at 1% level
Notes: Per Table 2.

Table 4: Ages 65 and older

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Poor Health | | K6 Index | | Chronic Drinking | | Obesity | |
| Unemployment Rate (County) | -0.003 | -0.002 | 0.012 | 0.022 | -0.001 | -0.006 | -0.003 | -0.004 |
| | (0.005) | (0.005) | (0.049) | (0.052) | (0.011) | (0.012) | (0.004) | (0.004) |
| County Fixed Effects | X | X | X | X | X | X | X | X |
| State-specific Trends | | X | | X | | X | | X |
| NT | 8,556 | 8,556 | 6,722 | 6,722 | 3,212 | 3,212 | 8,377 | 8,377 |

* sig. at 10% level ** sig. at 5% level *** sig. at 1% level
Notes: Per Table 2.

Table 5: Effects by Race, Ages 25-55

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | | | | | Blacks | | | |
| | Poor Health | | K6 Depression Index | | Chronic Drinking | | Obesity | |
| Unemployment Rate (County) | 0.003 | -0.001 | -0.047 | -0.025 | 0.012 | 0.022** | 0.013* | 0.011 |
| | (0.006) | (0.006) | (0.073) | (0.087) | (0.010) | (0.011) | (0.007) | (0.007) |
| County Fixed Effects | X | X | X | X | X | X | X | X |
| State-specific Trends | | X | | X | | X | | X |
| N | 12,929 | 12,929 | 10,795 | 10,795 | 6,404 | 6,404 | 12,673 | 12,673 |
| | | | | | Whites | | | |
| County Unemployment Rate | 0.008*** | 0.007*** | 0.061** | 0.069** | 0.007** | 0.009** | -0.005* | -0.003 |
| | (0.002) | (0.002) | (0.030) | (0.033) | (0.004) | (0.004) | (0.003) | (0.003) |
| County Fixed Effects | X | X | X | X | X | X | X | X |
| State-specific Trends | | X | | X | | X | | X |
| NT | 25,538 | 25,538 | 21,238 | 21,238 | 15,870 | 15,870 | 24,936 | 24,936 |

* sig. at 10% level ** sig. at 5% level *** sig. at 1% level
Notes: Per Table 2.

Table 6: Effects by Education, Ages 25-55

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | High School Education (at most 12 years of schooling) | | | | | | | |
| | Poor Health | | K6 Depression Index | | Chronic Drinking | | Obesity | |
| Unemployment Rate (County) | 0.008** | 0.007* | 0.048 | 0.034 | 0.006 | 0.013* | -0.006 | -0.006 |
| | (0.004) | (0.004) | (0.041) | (0.045) | (0.006) | (0.007) | (0.005) | (0.005) |
| County Fixed Effects | X | X | X | X | X | X | X | X |
| State-specific Trends | | X | | X | | X | | X |
| N | 15,977 | 15,977 | 13,073 | 13,073 | 8,207 | 8,207 | 15,649 | 15,649 |
| | College Graduates | | | | | | | |
| County Unemployment Rate | 0.004 | 0.002 | 0.019 | 0.041 | 0.008 | 0.004 | -0.002 | 0.001 |
| | (0.003) | (0.003) | (0.042) | (0.048) | (0.006) | (0.006) | (0.004) | (0.004) |
| County Fixed Effects | X | X | X | X | X | X | X | X |
| State-specific Trends | | X | | X | | X | | X |
| NT | 12,205 | 12,205 | 10,430 | 10,430 | 8,115 | 8,115 | 11,932 | 11,932 |

* sig. at 10% level ** sig. at 5% level *** sig. at 1% level
Notes: Per Table 2.

Table A1: Sample Sizes by Year, Ages 25-55

| Year | Sample size |
|---|---|
| 2003 | 7166 |
| 2005 | 7168 |
| 2007 | 7210 |
| 2009 | 7405 |
| 2011 | 7253 |
| 2013 | 7336 |