# Unemployment Benefit Increases and Mortality*

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May 9, 2014

**Abstract**

I examine the impact of mass layoffs on mortality and test whether unemployment insurance benefits provide protection against the negative impact of job loss. I use county-level data for all 50 US states and the District of Columbia from the National Center for Health Statistics and the Department of Labor. Using a difference-in-differences approach with state and year fixed effects, I estimate that a one percent increase in mass layoffs leads to a 0.35 percent increase in mortality. Males are more vulnerable to mass layoffs than females, black and hispanic workers are more vulnerable to mass layoffs than whites, and young and older workers respond less to a mass layoff than the rest of the working population. I also estimate that an increase in extended unemployment benefits has a protective effect on the increase in mortality due to mass layoffs. A thousand dollars per unemployed person increase in extended benefits reduces the mortality due to mass layoffs by 0.007 percent. In the context of sequestration, budget cuts, and the increasing scrutiny of federal expenditures, these results have policy implications regarding optimal allocation of funds as well as the optimal levels of benefit generosity. Unfortunately, I cannot rule out the possibility that my results are driven by time trends or omitted variables that are not able to be controlled for due to the limitations of the data.

*I am grateful to Lesley J. Turner my advisor for this project. I am also thankful to John Straub and Jeffery DeSimone for their guidance and support. Additionally, I benefited from helpful comments from seminar participants at the University of Maryland, College Park and Georgetown University's Carroll Round Conference. I would also like to thank the BLS Department of Mass Layoff Statistics who provided the data for this project as they were being phased out due to budget cuts, as well as Kim Hyunchung and Thomas Stengle from the Department of Labor who provided further detail on the Unemployment Insurance Data available on their website.

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# 1 Introduction

In this paper, I examine the impact of layoffs on mortality over the last decade and test whether unemployment insurance provides protection against the negative impacts of job loss. Sullivan and Von Wachter (2009) estimate that high tenure men laid off during the early 1980s recession in Pennsylvania were 50-100 percent more likely to die in the following year. Furthermore, they show a positive correlation between average income loss and mortality, suggesting that this a the mechanism through which layoffs increase mortality. If average income loss does increase mortality, then replacement income may have a protective effect. Using a difference-in-differences approach with state and year fixed effects, I exploit the large variation in mass layoffs and extended unemployment insurance benefits in the early 2000s and most recent Great Recession to identify the causal impact of job loss on mortality and the effect of unemployment insurance benefits on this relationship.

I use the Bureau of Labor Statistics' county-level extended mass layoff data from 1999 to 2010 to examine the impact of job loss on mortality. Sullivan and Von Wachter (2009) argue that mass layoffs represent an exogenous shock to the economy, the timing of which is unlikely correlated with individual characteristics that may be responsible for increases in mortality as well as layoffs.

My empirical approach is most similar to Ruhm (2000), who uses state and year fixed effects to analyze state-level changes in mortality by type of death based on unemployment rates. I use county-level data from the National Center for Health Statistics and the Department of Labor containing information on mortality, mass layoffs, and unemployment insurance benefit generosity.

I estimate that a one percent increase in mass layoffs leads to a 0.35 percent increase in mortality. Additionally, I find that males are more vulnerable to mass layoffs than females, black and hispanic workers are more vulnerable to mass layoffs than whites, and young and older workers respond less to a mass layoff than the rest of the working population. I also estimate that an increase in extended benefit generosity has a protective effect on the increase in mortality due to mass layoffs. For every extra thousand dollars per unemployed person, extended benefits reduce the mortality due to mass layoffs by 0.007 percent.

In the context of sequestration, budget cuts, and the increasing scrutiny of federal expenditures, these results have policy implications regarding optimal allocation of funds as well as the optimal levels of benefit generosity. Unemployment insurance benefits' reduction of the mortality due to layoffs represents a positive externality that has not been accounted for in previous literature. (Albrecht and Vroman (2005); Chetty (2008); Shimer and Werning (2007)) Aside from the implications regarding unemployment insurance benefit levels, my estimates of the differential effects of mass layoffs on mortality across demographic groups provides useful information for policy decisions. Social welfare programs may be inefficiently targeting populations that are not as vulnerable as others. Furthermore, the inclusion of women in the analysis of mass layoffs is an important addition, as previous analysis has left out this population due to sample size issues. Unfortunately, due to data limitations, I cannot rule out the possibility that my results are driven by time trends or omitted variables. For example, trends in tech heavy counties may be substantially different from counties that have different industry compositions.

# 2 Literature Review & Background

## Literature Review

Sullivan and Von Wachter (2009) match administrative data on individuals' earnings and employment histories to death records from the Pennsylvania Unemployment Insurance Office and Social Security Administration to estimate the impact of job loss on the probability of death among high tenure male workers that were displaced in PA from 1980-1986. They estimate that workers laid-off are 50 to 100 percent more likely to die in the year following a layoff. While the impact of being laid off on mortality declines over time, men who lost their job remain up to 15 percent more likely to die 20 years after the layoff relative to men that did not experience a mass layoff. Sullivan and Von Wachter (2009) also show that the amount of permanent income loss following job displacement could account for 50 to 75 percent of the increase in mortality they find.[1] While unemployment insurance benefits (UIB) are not the same as income from employment, partial replacement of lost earnings via UIB should mediate the negative effects of being laid off if average income loss is the mechanism through which mass layoffs affect mortality.

Other studies suggest mortality is procyclical, decreasing as unemployment rates rise(Ruhm (2000, 2003, 2005); Granados (2005, 2008)).[2] Sullivan and Von Wachter (2009) also find evidence of procyclical mortality in their sample, and explain the seeming contradiction in that mass layoffs of the high tenure workers in their studies are a small fraction of the US labor force. On average, they explain that mortality changes in the number of hours worked by employed workers and changes from individuals with shorter tenure who may be more able to substitute to leisure may account for difference in the two treatments.

The analysis of mass layoffs in the 1999-2010 period is even more empirically interesting given Ruhm (2013)'s most recent working paper indicating that procyclical mortality may be breaking down in recent years.[3] Also, given changes in key features of the U.S. labor market over the previous two decades, it is unclear whether the link between job loss and mortality would be as strong in this period. Since expectations of long term employment with the same company have dropped since the 1980s, many workers may be affected less by a layoff event than in the past.[4]

Farber (2009) indicates that since 1973, tenure (years with current employer) for males in the

[1] They also show that the standard deviation of this income loss could account for an additional 20 percent of the effect. This indicates that large swings in income also have a negative impact on individuals, and further implicates income changes as a mechanism for the mortality effects they observe.

[2] Behavioral changes in recessions have been previously linked to *decreases* in mortality. For example, Ruhm (2005) estimates a decline in heavy smoking, a fall in body weight of the severely obese, and an increase in exercise in the previously inactive population that may account for decreases in preventable diseases observed in Ruhm (2000), and Cotti and Tefft (2011) indicate that average vehicle miles traveled and total fatality accidents due to alcohol are reduced during recessions.

[3] This is especially interesting given Egan et al. (2013)'s use of mortality as a metric of the business cycle, and their argument that the procyclical nature of recessions imply that they are less serious than previously thought.

[4] Kalleberg (2009) indicates that there has been a general decline in the length of time people spend with their employers, and Fullerton and Wallace (2007) estimates a reduction in perceived job security from 1977 to 2002. Additionally, 75 percent of respondents felt that companies were less loyal to their workers than they used to be and 64 percent said that workers were less loyal to their companies in a 1995 survey by the *New York Times*.

private sector has declined, and this decline may have been previously masked by a concurrent increase in female tenure. The large increase in women's mean tenure length highlights the importance of women in the workforce, and the need to include them in the analysis of mass layoffs.[5] Women are an increasingly large segment of the workforce, representing 47 percent of the U.S. labor force in 2012 (compared to about 39 percent in 1974)(*Women in the Labor Force: A BLS Databook.* (2013)). In addition, Montez and Zajacova (2013) document a 38 percent increase in the mortality gap across education levels in white women aged 45 to 84 from 1986 to 2006, and attribute the change to smoking and employment status. The increases in women's mortality, as they have become a larger fraction of the workforce, underscores the need for an account of the mortality effects due to layoffs for women. Sullivan and Von Wachter (2009) were unable to include women in their study due to sample size issues while the data used in this study allows for the analysis of gender and race as well as age.

### Background

During the most recent Great Recession (December 2007 to June 2009) unemployment levels increased from 4.7 percent in November of 2007 to 10.0 percent in October of 2009 and as of April 2014 the unemployment rate was still above 6.3 percent.[6] In 2008, due to the Federal Extended Benefits Program, many states reached the threshold for implementation of extended UIB as outlined in the Extended Benefit (EB) program (20 additional weeks).[7] This level of extended benefits was then extended five more times from the middle of 2008 to November of 2009, producing a complex system of tiers that allowed up to 99 weeks of UIBs depending on a state's unemployment rate (Whittaker (2008); Whittaker and Isaacs (2012); Farber and Valletta (2013)). Additionally, during the early 2000s recession, unemployment rates climbed from 3.9 percent in December of 2000 to 6.3 percent in June of 2003 and UIB benefits through the EB and Temporary Emergency Unemployment Compensation (TEUC) programs reached 72 weeks.[8] The large changes in unemployment rates and the concurrent large extension of UIBs during these recessions provide an environment where the effects of layoffs and interaction between layoffs and UIB generosity can be studied in detail.

# 3 Data & Methodology

## 3.1 Data

I use administrative data from the National Center of Health Statistics (NCHS) on mortality and from the Bureau of Labor Statistics (BLS) on mass layoffs. Both data sets include all 50 US states

[5] According to Farber (2009) mean tenure for females at age 50 increased from 9.3 to 12.8 years while men at 50 experienced a decline from 13.5 to 11.4 from the 1970s to the early 2000s.

[6] Unemployment Data from the Bureau of Labor Statistics, http://data.bls.gov/pdq/SurveyOutputServlet

[7] The Federal Extended Benefits Program was implemented in 1970 (Whittaker (2008); Whittaker and Isaacs (2012); Farber and Valletta (2013))

[8] Through the TEUC program (2002-2004) all states received 13 weeks of additional benefits and a few states triggered to receive a higher tier of 26 weeks. If eligible for 20 weeks of high EB benefits as well, the total reached 46 weeks of extended benefits.

and the District of Columbia.

The mass layoff data are county-level, indicating the number and demographic information for those individuals that reside in a particular county that have been involved in a mass layoff. I do not observe mass layoffs in counties with low numbers of firms that experienced mass layoff events. Since specific demographic combinations ( e.g. Asian females from 30 to 44 years of age) have small numbers of mass layoffs by county, I treat the categories of gender, race, and age separately to reduce the number of counties that are unavailable due to the BLS's confidentiality requirements. Furthermore, counties with fewer than a total of 10 mass layoffs are excluded due to BLS confidentiality requirements.

In the specifications broken down by demographic category ln(Mass layoff) has been changed to ln(1+Mass layoff) as per Wooldridge (2009). This allows the observations where there are no mass layoffs in a particular demographic to be included in the regressions. The number of zeros are small relative to the total size of the sample.[9]

A mass layoff is herein defined as the BLS's extended mass layoff statistic, which is determined by a layoff in which at least 50 unemployment insurance claims are filed against a firm during a consecutive 5-week period and at least 50 workers are separated from jobs for more than 30 days.

This definition guarantees that all individuals that are considered to be part of a mass layoff also receive UIBs, which, in most states guarantees a year of prior tenure.[10]

The NCHS data set contains individual-level data on mortality by residence of the decedent, including cause of death. The NCHS data are aggregated to the county-level, the resulting unit of observation is a county-year. Additionally, the deaths for individuals over 65 years of age and under 16 are excluded as they are less likely to be part of a layoff. This data set is restricted access and all results have been reviewed to insure that no confidential information has been disclosed.

Unemployment Insurance Benefit (UIB) data are from the from the Department of Labor. I construct a measure of UIB generosity by measuring thousands of dollars of benefits provided per unemployed person in a given state. In addition to accounting for different state sizes, this metric captures the large state level variation in the replacement rate, minimum and maximum benefit provided, as well as the percent of unemployed actually receiving benefits. Furthermore, the metric provides easily interpretable results for policy implications.

More specifically, regular benefits are divided by the unemployed population who have been unemployed less than or equal to 26 weeks, and extended UIB dollars are divided by the population unemployed longer than 26 weeks. Extended UIB dollars include both Emergency Unemployment Compensation (EUC) dollars as well as dollars from the standard program that the Department of Labor classifies as extended benefits. Total UIB generosity is the sum of regular and extended benefit dollars divided by the total unemployed population.

[9] In these regressions every observation is weighted by its demographic specific population. For example, this means that a county with a hispanic population of zero that has no mass layoffs will drop out of the analysis due to the population weights, but those counties with high hispanic populations and no mass layoffs will be included as a relevant zero.

[10] In a few states the requirement for UIB eligibility is just under 1 year of prior work.

Since I construct measures of UIB generosity at the state level, these variables are constant over counties within a state, but vary over time and states. I collect state and county unemployment data from the Bureau of Labor Statistics (BLS) Local Area Statistics program. Finally, I use population data from the US Census Population Estimates Program's Intercensal Estimates to control for county demographic changes that may be correlated with mass layoffs and mortality rates.

Table I provides information on average mortality and mass layoffs by demographic category over the sample period (1999-2010.) On average, women have lower mortality, and have fewer mass layoffs per capita than men. Average deaths and mass layoffs are generally higher per capita for blacks than for other races. [11] The averages for deaths in the age category indicate generally increasing mortality as age increases, while mass layoffs per capita are lower for the younger and older workers. Workers age 30 to 54, those with the most experience and tenure, experience more mass layoffs, on average. Averages for total UIB generosity, regular UIB generosity, and UIB extension generosity are also shown, but since UIB extensions were relatively small in the early portion of the sample the comparison between these averages is better seen via yearly averages. The number of observations for these variables reflects that they only vary at the state level.

Figure 1 traces average mortality and mass layoffs per capita on the same graph over time. The two variables do not seem to trend together, and estimated correlation coefficient between the two variables is very close to zero, -0.07.

Figures 2-4 show the same graph for each demographic group. Mass layoffs generally follow the same trend regardless demographic group, only the average levels are different.[12] Per capita mortality rates do not, however, follow the same trends across demographic groups.

Figure 5 shows the variation in unemployment insurance benefit (UIB) generosity per year. The left panel shows the changes in total UIB and the right panel shows the change in UIB extensions.

Figure 6 details the geographic variation in Mortality, Mass Layoffs and Unemployment Insurance Benefit Extensions for 2007 while Figure 7 does the same for 2009. The figures also show the missing counties in the unbalanced data set that has been created. Since I do not observe counties with low numbers of mass layoff events, there is an increase in counties available in the 2009 data when there are higher numbers of mass layoffs. Additionally, there are a higher proportion of metropolitan areas represented in the sample overall.

## 3.2 Methodology

I use county-level data and a difference-in-differences approach to identify the impact of mass layoffs on mortality, and determine how this relationship interacts with unemployment insurance benefit (UIB) generosity. I observe mass layoffs and mortality by gender, race, and age and test whether different populations are more prone changes in average mortality due to a mass layoff. Additionally, using information on UIB generosity due to state-specific polices and the triggering of

[11] Notice that these descriptive statistics also show the lower mortality rate known as the hispanic paradox. According to Smith and Bradshaw (2006) this may be due to the way in which hispanic deaths may be systematically under reported.

[12] Females, the young, and elderly all experience lower average mass layoff numbers in the sample.

UIB extensions, I evaluate whether mass layoffs have a smaller impact on mortality when workers who have been laid off have access to more generous UIB.

My base specification is as follows:

$$\ln\left(Mortality\right)_{y,c} = \beta_0 + \beta_1 \ln\left(Masslayoff\right)_{y,c} + \beta_2\left(UIB\right)_{y,s} + \beta_3\left(\ln\left(Masslayoff\right)_{y,c} * \left(UIB\right)_{y,s}\right) + \beta_4 State_s + \beta_5 Year_y + \gamma X_{y,c} + \epsilon_{y,c}$$

Where $c$ indicates county, $s$ indicates state, and $y$ indicates year. $\mathbf{X}_{y,c}$ is a vector of county characteristics that are potentially correlated with mass layoffs and mortality (e.g., county demographic characteristics such as the proportion of elderly residences may be related to both mass layoffs and deaths.) $\mathbf{State}_s$, and $\mathbf{Year}_y$ are vectors of dummy variables to account for state and year fixed effects. The coefficient $\beta_1$ represents the estimated effect of mass layoffs on mortality, and $\beta_3$ represents the estimated effect of UIB generosity on this relationship. I expect $\beta_1$ to be positive, and $\beta_3$ to be negative. Furthermore, if, as Sullivan and Von Wachter (2009) suggest, mass layoffs represent the causal effect of getting laid off, $\beta_3$ not only represents the effect that UIB generosity has on the mortality due to mass layoffs, but it also has implications for all layoffs. Estimates of $\beta_2$ may be biased by procyclical mortality, as higher unemployment has been shown to be negatively correlated with mortality( Ruhm (2000, 2003, 2005); Granados (2005, 2008)).

In an effort to further analyze variation in unemployment insurance (UIB) generosity, I break down total UIB generosity into regular and extended unemployment insurance benefit generosity. This specification includes lagged extended mass layoffs because very few individuals actually receive extended benefits in the same year that they were laid off. This specification is as follows:

$$\ln\left(Mortality\right)_{y,c} = \beta_0 + \beta_1 \ln\left(Masslayoff\right)_{y,c} + \beta_2 \ln\left(Masslayoff\right)_{y-1,c} + \beta_3\left(regUIB\right)_{y,s} + \beta_4\left(extendedUIB\right)_{y,s} + \beta_5\left(\ln\left(Masslayoff\right)_{y,c} * \left(regUIB\right)_{y,s}\right) + \beta_6\left(\ln\left(Masslayoff\right)_{y-1,c} * \left(extendedUIB\right)_{y,s}\right) + \beta_7 State_s + \beta_8 Year_y + \gamma X_{y,c} + \epsilon_{y,c}$$

Where $regUIB$ represents regular unemployment insurance benefit generosity and is measured as thousands of dollars spent per person unemployed for less than 26 weeks, and $extendedUIB$ represents extended unemployment insurance benefit generosity, measured in thousands of dollars spent per person unemployed longer than 26 weeks. Here, $\beta_6$ captures effects on the change in mortality due to mass layoffs resulting from marginal differences in generosity levels across states as well as from the difference between those counties that are receiving no extended benefits and those counties that have had extended benefits turned on due to state unemployment level triggers. By contrast, $\beta_5$ only evaluates the effect on a county level change in mortality due to mass layoffs whether one is in a high generosity state verses a low generosity state.

Unfortunately, I do not observe UIB generosity across demographic groups. In the regressions broken down by demographic category the specification is as follows:

$$\ln(Mortality)_{y,c,d} = \beta_0 + \beta_1 \ln(Masslayoff)_{y,c,d} + \beta_2 \ln(Masslayoff)_{y,c,d} + \beta_3 D_{y,c,d} + \beta_4 \left(\ln(Masslayoff)_{y,c,d} * D_{y,c,d}\right) + \beta_5 State_s + \beta_6 Year_y + \gamma X_{y,c,d} + \epsilon_{y,c,d}$$

Where $D$ is a dummy variable for gender, race, or age depending on the category for the regression, and the subscript $d$ represents the demographic characteristic (gender, age, or race) over which mortality and mass layoffs vary. The vector of coefficients $\beta_4$ represent the effects of mass layoffs on mortality. All regressions are weighted by county population and include robust standard errors that are clustered at the county level.

## 4 Results

Table II column 1 displays the results from a regression of log mortality on log mass layoffs with year fixed effects. The column 2 model includes county and year fixed effects. The $R^2$ indicates a near perfect fit of the data, suggesting that county fixed effects capture all of the variation in mortality rates. Column 3 displays estimates from a model with state and year fixed effects, removing omitted variables that vary on the state level and are constant over time as well as those that vary over time but are constant over geography.[13] Since I do not specifically control for county level omitted variables, there is some worry that changing demographics within a county may bias my results. For example, counties that have increases in the elderly population as well as increases in mass layoffs, would incorrectly attribute changes in mortality due to the aging population to changes in mass layoffs. Column 4 estimates are from a model that includes county-level demographic characteristic percentages to account for this bias, including percentage female, white, black, hispanic, age 16 to 29, age 30 to 44, age 45-54, and age 55 and above.

Column 5 of Table II shows results from a specification that includes county and state level unemployment rates. State unemployment rates are included because UIB variables added later in the analysis are triggered by these rates. County unemployment rates estimate the expected procyclical relationship between unemployment rates and mortality, and do not change the point estimate or significance of the effect of mass layoffs on deaths. The p-value shown in this column is from the hypothesis test that the addition of unemployment rates does not change the estimated effect of ln(Mass layoffs), and indicates that the null is not rejected.

Column 6 estimates indicate that a one percent rise in mass layoffs corresponds to a 0.35 percent increase in mortality. This is my preferred specification due to the addition of the lagged ln(Mass

[13]State fixed effects account for omitted variables such as lifestyle differences that vary between states, and year fixed effects account for omitted variables such as increases in medical technology that apply across the whole country.

layoff) term, which captures the persistent effect of mass layoffs. Since Sullivan and Von Wachter (2009)'s estimates of mortality are noticeable up to 20 years after a mass layoff event and decline gradually over time, the continued significance of mass layoffs on mortality is consistent with their estimates.[14] However, at the sample mean a 0.35 percent increase in deaths implies 0.8 deaths/100,000 people, due to 5 mass layoffs per 100,000 that is implied by a 1 percent increase in mass layoffs.

My key identifying assumption is that there are no unobservable time varying factors that affect both mass layoffs and mortality. Under this assumption the above estimates represent the causal impact of mass layoffs on mortality, and if, as Sullivan and Von Wachter (2009) suggest, mass layoffs represent the causal effect of getting laid off, my results have implications for the broad set of individuals laid off over the past decade. However, my model cannot account for omitted variables, such as mortality increases due to increases in bankruptcies. This would help to explain the large effects seen in Table II. Dobbie and Song (2013)'s estimates imply that bankruptcy is correlated with an increased risk of mortality, which is also plausibly linked to increases in mass layoffs over the sample period and would not be controlled for by the year or state fixed effects.

Since the addition of lagged mass layoffs were so crucial to the estimation of the magnitude of the affects on mass layoffs, in Table III to confirm the direction of causation, I test whether future mass layoffs are correlated with current deaths. Results indicate that current deaths are correlated with future mass layoffs. This result may be due trends in mortality and mass layoffs at the county level that are not controlled for in the model. Alternately, omitted variables that vary over time and states may bias my estimates. *Unfortunately, this suggests that my identifying assumption may not hold.* For example, trends in tech heavy counties may be substantially different from counties that have different industry compositions. [15]

Additionally, the analysis of mortality by type of death shows little variation in the mass layoff effects observed, suggesting that time trends may be affecting my results.[16] I would not have expected to see changes in the effect of UIB generosity on the mortality caused by mass layoffs for certain types of deaths such as in the cases of Flu, Sudden Infant Death Syndrome (SIDS), and in congenital defects such as hypertrophic cardiomyopathy, but should have seen decreases in diseases such as cardiovascular disease, overdose, and cirrhosis of the liver.

Table IV-VI displays the results from the regressions for each demographic category. Table IV examines heterogeneity by gender. The results indicate that men respond more to a mass layoff event than women (the coefficients are similar but an F-test of equality reveals that they are statistically different with a p-value less than 0.001.) A one percent increase in mass layoffs increases mortality by 0.03 percent more for men relative to women.

Table V examines heterogeneity by race. The mortality of black and hispanic individuals is more

[14] The point estimate associated with lagged mass layoffs is lower than the immediate impact.

[15] Table A.1 in the appendix includes lagged ln (Mortality) as an independent variable, unfortunately this increases the data requirements and results in over-fitting the data ($R^2 = 0.999$.) I also perform the unit-root tests in Table A.2 where I strongly reject the null hypothesis that all of the panels contain unit roots.

[16] Table A.5 in the appendix provides my cause of death results, some of the cause of death categories have been omitted, but none of the 39 cause of death categories had results substantially different than those that are shown.

responsive to mass layoffs than white mortality.[17] This accounts for 0.16 percent more for the black compared to the white population and 0.09 percent more for the hispanic population compared to the white population. Finally, Table VI estimates heterogeneity by age. Results show even smaller differences in the age categories than gender or race, but indicate that on average, the young and elderly experience smaller mortality increases following a mass layoff. These results mirror Sullivan and Von Wachter's estimates where those individuals in their prime working years are affected more by mass layoffs. Presumably, these are the individuals with the most attachment to the labor force and the most amount of experience in a particular industry, yet are not to the point where they are close to retirement.[18]

Table VII shows the results from the specification using the total UIB generosity variable. The estimate for the interaction between UIB generosity and mass layoffs indicates that UIB generosity per unemployed individual does not have a protective effect on the increase in mortality caused by mass layoffs. This is in contrast to the main effect of UIB generosity, which suggests that states with more generous UIB have lower mortality rates. [19] In column 2 of Table VII, the magnitude and significance of the effect drops to zero with the addition of ln(mass layoff) lagged by one year. The effect on the interaction of lagged mass layoffs and UIB generosity is similar in magnitude and significance to column 1. In column 2, the lagged interaction is more in line with the timing of extended benefit receipt. The coefficient of 0.014 suggests that, an additional thousand dollars spent per unemployed individual leads to a 0.014 percent increase in mortality due to mass layoffs.

Table VIII provides further evaluation of the variation in total UIB generosity seen in table VII. However, the coefficients on the interaction of ln(mass layoffs) with extended benefit generosity both in column 1 and 2 are not statistically different from zero, but provide a sharp contract to the results for the regular benefit interaction with ln(mass layoffs).[20]

Table IX runs the same specification, but looks at deviations in generosity from the yearly mean. If marginal changes in UIB generosity are the same across the range of the benefits for each year then the estimation will be similar to Table XIII.[21] The results show that while regular benefit changes are not protective against mortality caused by mass layoffs, changes in extended benefits

[17]These results are only affected by the "hispanic paradox" noticed in the descriptive statistics if you believe that the reason for the paradox is correlated with mass layoffs.

[18]Table A.4 in the appendix evaluates the results for each demographic category at the sample means.

[19]These findings are consistent with recent work on the increases in mortality due to income receipt from Social Security payments, tax rebates, Alaska dividend payments, and military income payments(Evans and Moore (2011, 2012)). However, Evans and Moore (2011) assert that the increase in mortality they observe due to income receipt may be a mechanism through which the observed procyclical nature of mortality occurs. If the increase in mortality due to experiencing a mass layoff represents the causal effect of job loss, as Sullivan and Von Wachter (2009) suggest, the negative correlation between the unemployment rate and mortality is likely driven by omitted variables that are not captured by the model fixed effects. Additionally, my results suggest that individuals who experience a mass layoff may still experience the income receipt effect described by Evans and Moore (2011, 2012) suggesting that it does not represent the effect that comprises the difference between the causal estimates for getting laid off and procyclical mortality.

[20]Table VIII column 2 looks at lagged mass layoffs interacted with extended benefits because extended benefits may be more in line with the timing of mass layoffs from the previous year.

[21]The transformation also reduces the interpretation of out of sample predictions, because the definition of a mass layoff includes receiving regular benefits.

from the yearly mean are protective. Extended UIB generosity is the only variable able to measure the difference between those who gain or lose benefits based on activation or deactivation of benefits at the state level. The contrasts between these two variables in table VIII and IX suggest that there are diminishing returns to the affect that UIB generosity has on the increased mortality due to mass layoffs. This indicates that the effect of getting extended benefits is protective against the negative impacts of job loss while the exact generosity level may play less of a roll. The model estimates a .007% decrease in mortality due to mass layoffs per thousand dollars spent above the yearly average.[22]. When compared to the increases in mortality due to mass layoffs that are estimated for regular UIB generosity, this may represent a sizable benefit attributed to receiving extended unemployment insurance benefits.

In addition, Albrecht and Vroman (2005)'s theoretical model suggests that if unemployment insurance benefits are front loaded, the theoretical reduction in moral hazard may be offset by the inefficiencies produced by the changing reservation wages the offset in benefits would create.[23] While further research is needed to parse out the differences in the estimated effects of regular verses extended benefits suggested by my results from Table IX, if extended benefits are more protective against mortality than regular benefits, reducing benefit levels based on the duration of unemployment would also produce a negative externality associated with mortality.

## 5 Conclusion

My results indicate that a one percent increase in mass layoffs leads to a 0.35 percent increase in mortality. This predicts an increase of 0.8 deaths per 100,000 people from a one percent increase in mass layoffs.[24] This is quite large compared to the 5 mass layoffs per 100,000 people that the one percent increase in mass layoffs represents, and highlights the limitations of this data set in the application of the empirical specification. However, since Sullivan and Von Wachter (2009) only study mass layoffs during one recession, and my data set covers two recessions as well as the periods between them, it is possible that the true effect of mass layoffs on mortality is even higher than previously estimated.

Tables IV-VI indicate that males are more affected by mass layoffs than females, blacks and hispanics are affected more than whites, and those individuals 30-44 and 45-54 are affected more than the young and older working population. However, these results are clouded by time trends or omitted variables that are not able to be controlled for due to the limitations of the data, making direct interpretation of Table VII, VIII, and IX to the other results difficult. However, the estimated interaction between UIB generosity and mass layoffs suggests that an additional thousand dollars of extended UIB, above the annual average, results in a 0.007 percent decrease in mortality due to mass layoffs.[25]. When compared to the increases in mortality estimated for regular UIB generosity,

[22] per person unemployed greater than 27 weeks

[23] Both the Netherlands and Spain have front loaded benefits (decreasing UIB generosity as unemployment duration increases.)

[24] Sample means are 232 deaths per 100,000 people and 486 mass layoffs per 100,000 people

[25] per person unemployed greater than 27 weeks

this may represent a sizable benefit attributed to receiving the extended UIB benefit. Moreover, income receipt has previously been associated with mortality increases rather than decreases (Evans and Moore (2011, 2012)) which highlights the large impact that unemployment insurance benefit extensions may have. Additionally, my results suggest that there are diminishing returns to the effect that UIB generosity has on increased mortality due to mass layoffs, and the contrast in the effects of regular and extended UIB have negative implications for policies where benefit levels decrease over time.

The direction for future research includes incorporation of county level industry data to instrument for mass layoffs, inclusion of UIB generosity triggers to further analyze extended benefit responses to mortality, and analysis of micro-data where individual level fixed effects could more appropriately control for time trends and omitted variables that may be clouding my results.

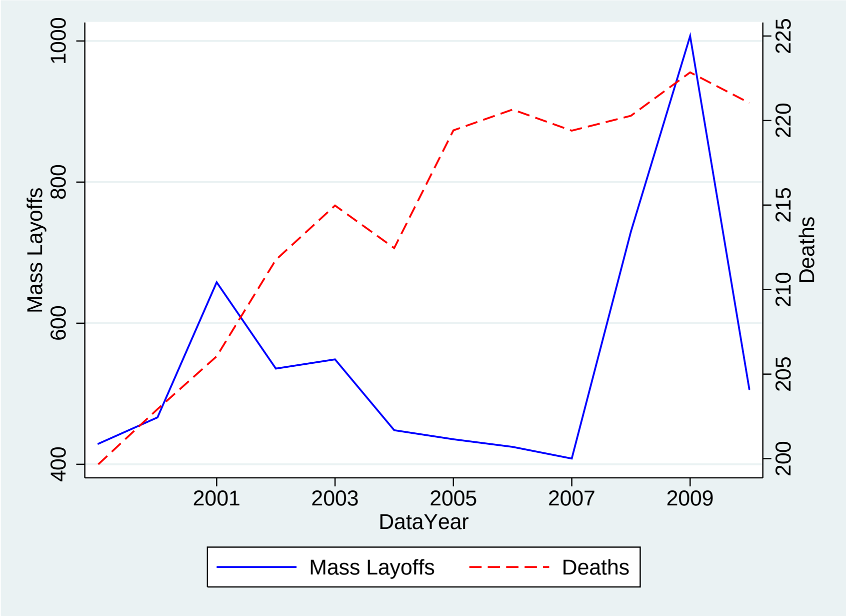
# 6 Figures and Tables

Table I - Summary Statistics

| VARIABLES | (1) total category | (2) total category | (3) Gender male | (4) Gender female | (5) Race white | (6) Race black | (7) Race hispanic | (8) Age 16-29 | (9) Age 30-44 | (10) Age 45-54 | (11) Age 55-64 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Deaths per capita | 231.8 | | 292.6 | 170.1 | 237.3 | 276.6 | 99.7 | 97.0 | 188.4 | 453.3 | 429.8 |
| | (70.85) | | (95.63) | (58.38) | (72.53) | (661.6) | (205.8) | (57.8) | (88.4) | (168.8) | (130.2) |
| Mass layoffs per capita | 485.5 | | 614.7 | 342.7 | 427.1 | 624.4 | 396.3 | 473.7 | 891.3 | 887.1 | 314.5 |
| | (531.2) | | (711.9) | (424.1) | (494.2) | (1,868) | (964.5) | (548.8) | (1,011) | (1,033) | (440.7) |
| Total UIB (2010$) | | 5.92 | | | | | | | | | |
| | | (2.97) | | | | | | | | | |
| Extended UIB (2010$) | | 3.79 | | | | | | | | | |
| | | (5.21) | | | | | | | | | |
| Regular UIB (2010$) | | 6.16 | | | | | | | | | |
| | | (2.74) | | | | | | | | | |
| Observations | 23,536 | 593 | 23,536 | 23,536 | 23,536 | 23,536 | 23,536 | 23,536 | 23,536 | 23,536 | 23,536 |

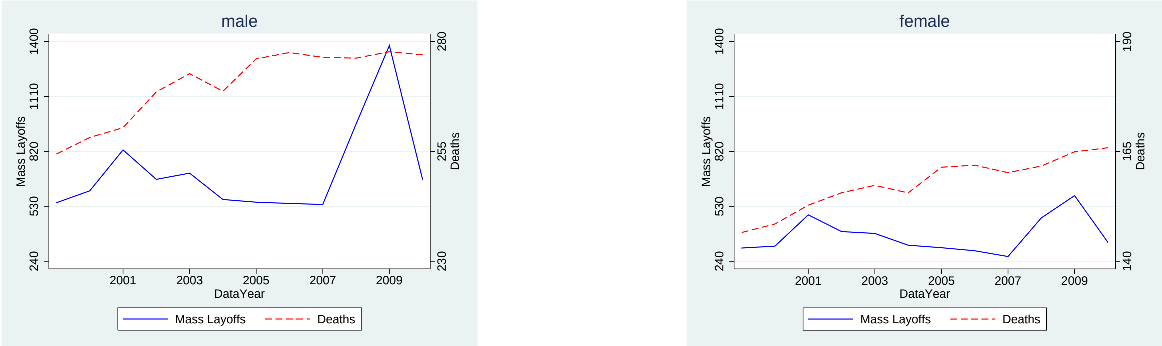
Deaths per capita and mass layoffs per capita are measured per hundred thousand individuals per county. Total unemployment insurance benefit generosity (Total UIB) includes regular and extended benefit dollars spent divided by the total unemployed population in each state. Generosity for unemployment insurance benefit extensions (Extended UIB) include Emergency Unemployment Compensation dollars as well as the extended benefits from previous legislation, and are divided by the population of workers unemployed greater than 26 weeks. All generosity variables are measured in thousands of 2010 dollars per unemployed person per state. Statistics shown are sample means (1999 to 2010) that are not weighted by county population. Standard deviations in parentheses.

Figure 1: Average Deaths and Mass Layoffs Per 100,000 Residents



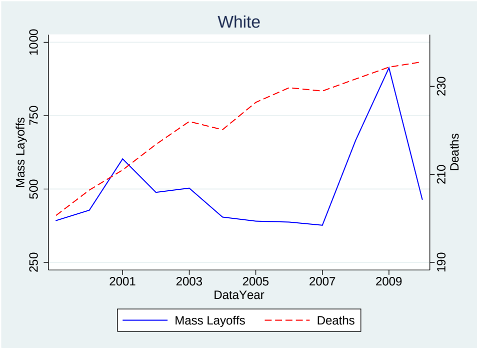

*Notes*: Both deaths and mass layoffs per capita are measured as the number of occurrences per year per 100,000 county residents. The data points above represent the average over the counties in each year. Counties with missing observations are removed so as not to skew the averages.

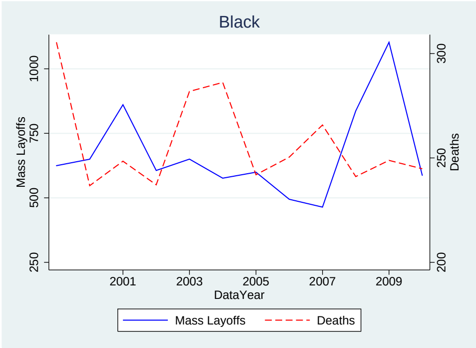
Figure 2: Average Deaths and Mass Layoffs by Gender

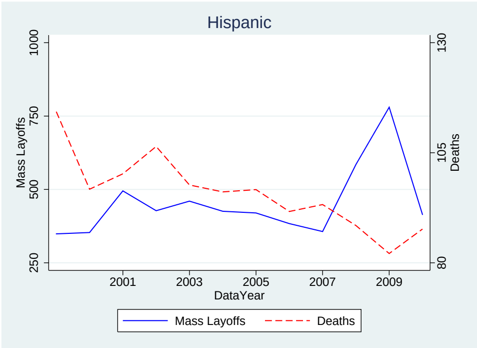



*Notes*: Both deaths and mass layoffs per capita are measured as the number of occurrences per year per 100,000 county residents. The data points above represent the average over the counties in each year. Counties with missing observations are removed so as not to skew the averages.

Figure 3: Average Deaths and Mass Layoffs by Race

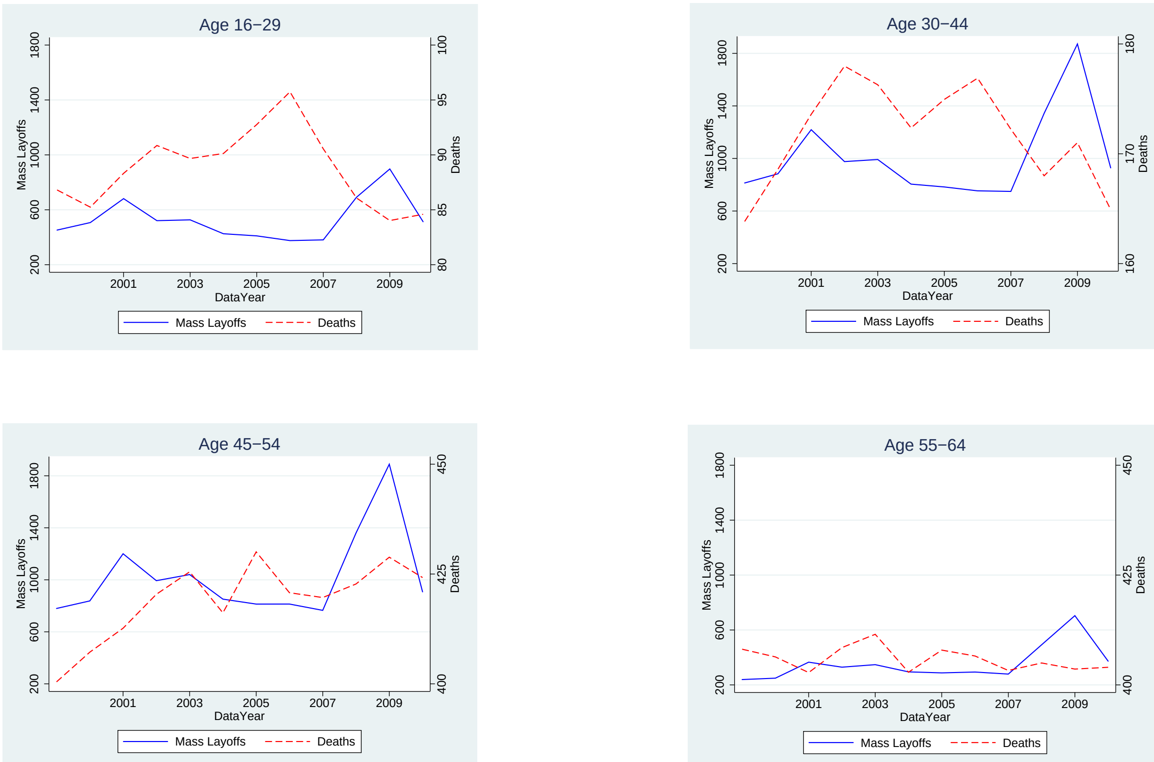


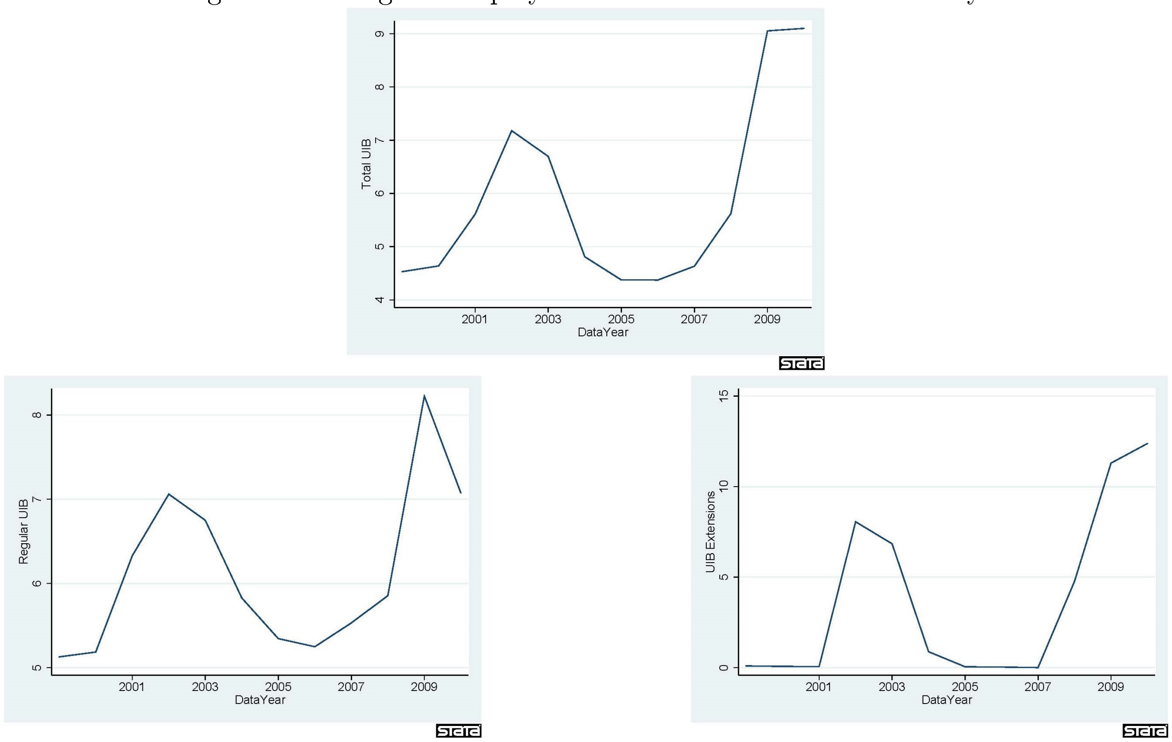

*Notes*: Both deaths and mass layoffs per capita are measured as the number of occurrences per year per 100,000 county residents. The data points above represent the average over the counties in each year. Counties with missing observations are removed so as not to skew the averages.

Figure 4: Average Deaths and Mass Layoffs by Age



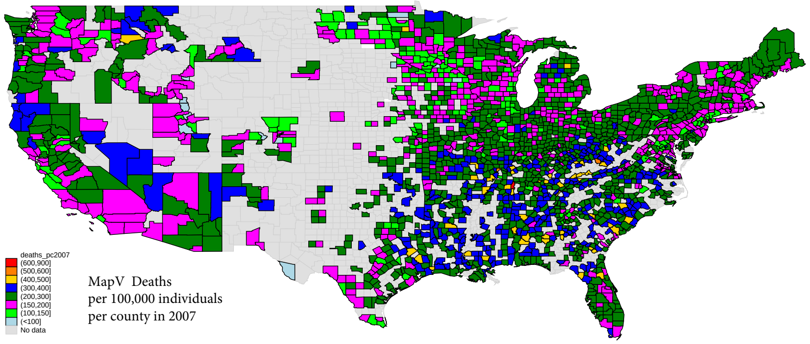

*Notes*: Both deaths and mass layoffs per capita are measured as the number of occurrences per year per 100,000 county residents. The data points above represent the average over the counties in each year. Counties with missing observations are removed so as not to skew the averages.

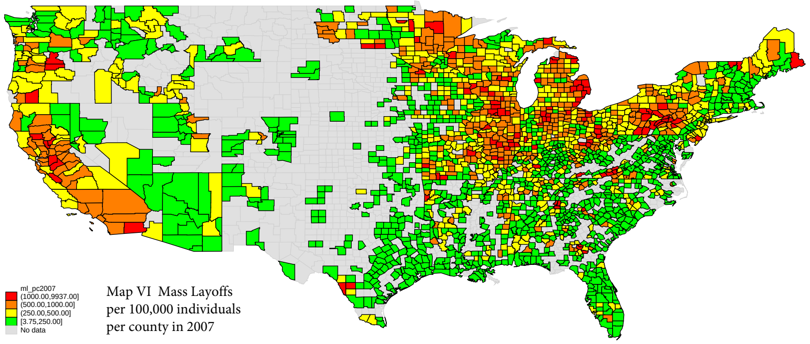
Figure 5: Average Unemployment Insurance Benefit Generosity

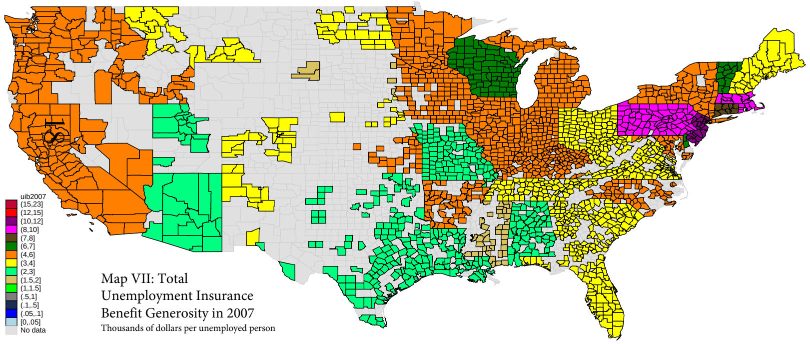



*Notes*: Total unemployment insurance benefit generosity (Total UIB) includes regular and extended benefit dollars spent divided by the total unemployed population in each state. Unemployment insurance benefit extensions (UIB extensions) include Emergency Unemployment Compensation dollars as well as the extended benefits from previous legislation, and are divided by the population of workers unemployed greater than 26 weeks. Regular benefits are divided by those unemployed less than or equal to 26 weeks. All 3 generosity variables are measured in thousands of dollars per unemployed person per state.

Figure 6: Variation by county in 2007



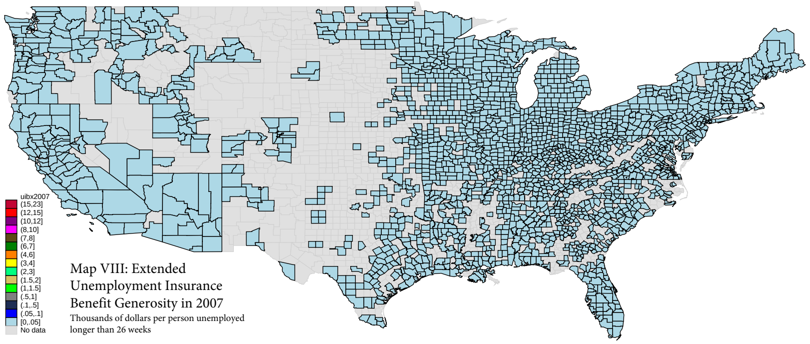



Figure 7: Variation by county in 2009

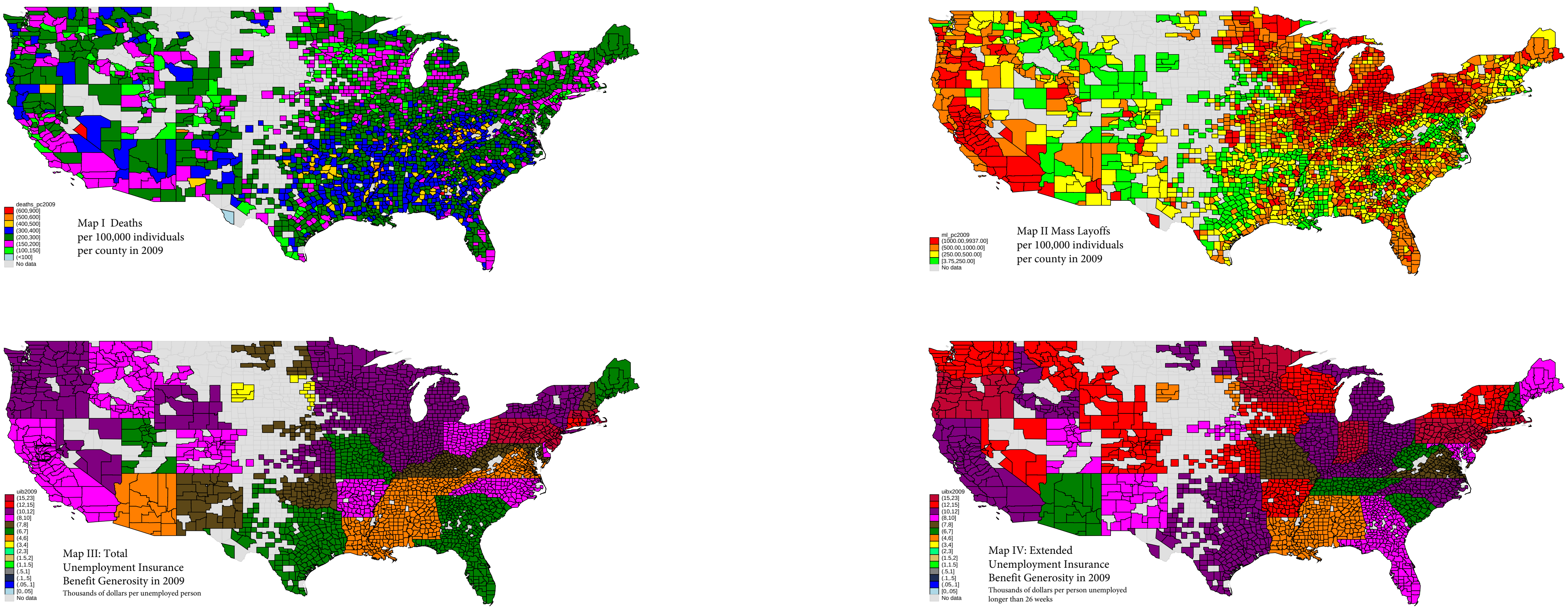


Table II – Preliminary Results for Mass Layoffs

| VARIABLES | (1)<br>ln(Mortality) | (2)<br>ln(Mortality) | (3)<br>ln(Mortality) | (4)<br>ln(Mortality) | (5)<br>ln(Mortality) | (6)<br>ln(Mortality) |
|---|---|---|---|---|---|---|
| ln (Mass Layoffs) | 0.683 | -0.005 | 0.793 | 0.632 | 0.626 | 0.352 |
| | (0.019)** | (0.003)+ | (0.019)** | (0.019)** | (0.018)** | (0.009)** |
| ln (Mass Layoffs)y-1 | | | | | | 0.337 |
| | | | | | | (0.010)** |
| County Unemployment Rate | | | | | -0.159 | -0.158 |
| | | | | | (0.011)** | (0.011)** |
| State Unemployment Rate | | | | | 0.083 | 0.066 |
| | | | | | (0.016)** | (0.016)** |
| Percent Female | | | | 6.555 | 5.144 | 4.049 |
| | | | | (1.356)** | (1.222)** | (1.148)** |
| Percent White | | | | -1.817 | -1.483 | -1.196 |
| | | | | (0.633)** | (0.527)** | (0.492)* |
| Percent Black | | | | 0.569 | 1.522 | 1.568 |
| | | | | (0.680) | (0.584)** | (0.543)** |
| Percent Hispanic | | | | -1.290 | -0.276 | -0.189 |
| | | | | (0.644)* | (0.552) | (0.505) |
| Percent Age16-29 | | | | 0.092 | -1.673 | -1.393 |
| | | | | (0.813) | (0.690)* | (0.650)* |
| Percent Age30-44 | | | | 6.843 | 3.565 | 2.802 |
| | | | | (1.617)** | (1.304)** | (1.199)* |
| Percent Age45-54 | | | | -0.321 | -3.645 | -2.798 |
| | | | | (2.039) | (1.908)+ | (1.842) |
| Percent Age 55+ | | | | -0.406 | -0.232 | -0.010 |
| | | | | (0.958) | (0.803) | (0.739) |
| Constant | 2.089 | 6.664 | 1.378 | -1.050 | 1.113 | 0.993 |
| | (0.121)** | (0.023)** | (0.112)** | (0.942) | (0.784) | (0.728) |
| $\chi^2$ from eq test | | | | | 1.0 | |
| p-value from eq test | | | | | 0.327 | |
| $H_0$: change in ln(Masslayoffs)=0 From (4) to (5) | | | | | | |
| Observations | 23,536 | 23,536 | 23,536 | 23,536 | 23,536 | 23,536 |
| R-squared | 0.732 | 0.997 | 0.822 | 0.858 | 0.875 | 0.894 |
| County FE | NO | YES | NO | NO | NO | NO |
| State FE | NO | NO | YES | YES | YES | YES |
| Year FE | YES | YES | YES | YES | YES | YES |

Robust standard errors in parentheses clustered at the county level. ** p<0.01, * p<0.05, + p<0.1 Observations are weighted by county population. $R^2$ in column (2) indicates a near perfect fit of the data. Column (5) hypothesis test shows that you cannot reject the null that the addition of unemployment rates does not change the estimated effect of ln(Mass layoffs). Column (6) shows the change after addition of ln(Masslayoffs) lagged by one year.

Table III - correlation of future mass layoffs & current deaths

| VARIABLES | (1)<br>lnmort | (2)<br>lnmort |
|---|---|---|
| ln (Mass Layoffs) | 0.157 | 0.173 |
| | (0.007)** | (0.007)** |
| ln (Mass Layoffs)y+1 | 0.230 | 0.205 |
| | (0.008)** | (0.008)** |
| ln (Mass Layoffs)y-1 | 0.172 | 0.189 |
| | (0.006)** | (0.006)** |
| ln (Mass Layoffs)y-2 | 0.193 | 0.210 |
| | (0.008)** | (0.007)** |
| County Unemployment Rate | -0.146 | -0.144 |
| | (0.012)** | (0.011)** |
| State Unemployment Rate | 0.066 | 0.064 |
| | (0.018)** | (0.012)** |
| Constant | 0.874 | -19.543 |
| | (0.710) | (12.408) |
| Observations | 20,092 | 20,092 |
| R-squared | 0.910 | 0.918 |
| State FE | YES | YES |
| Year FE | YES | YES |
| County Controls | YES | YES |

Robust standard errors in parentheses clustered at the county level** p<0.01, * p<0.05, + p<0.1
Observations are weighted by county population. Column 1 shows that future mass layoffs are correlated with current deaths. Column 2 adds state specific time trends.

Table IV - Heterogeneity by Gender

| VARIABLES | (1)<br>ln (Mortality) |
|---|---|
| Female | -0.100 |
| | (0.026)** |
| Male x ln(Masslayoffs) | 0.349 |
| | (0.009)** |
| Female x ln(Masslayoffs) | 0.318 |
| | (0.009)** |
| $\ln(\text{Masslayoffs})_{y-1}$ | 0.313 |
| | (0.009)** |
| County Unemployment Rate | -0.160 |
| | (0.011)** |
| State Unemployment Rate | 0.077 |
| | (0.015)** |
| Constant | 2.694 |
| | (0.636)** |
| Observations | 47,072 |
| R-squared | 0.881 |
| State FE | YES |
| Year FE | YES |
| County Controls | YES |
| Fstat from eq test | 52 |
| pval from eq test | <0.0001 |

Robust standard errors in parentheses clustered at county level, ** p<0.01, * p<0.05, + p<0.1 Observations are weighted by county population. County Controls include all the controls in Table 2 column (6) except the gender population variables. Results indicate that on average males involved in a mass layoff show higher mortality rates than females.

Table V – Heterogeneity by Race

| VARIABLES | (1)<br>ln (Mortality) |
|---|---|
| Black | -1.203 |
| | (0.081)** |
| Hispanic | -1.475 |
| | (0.137)** |
| White x ln(Masslayoffs) | 0.335 |
| | (0.011)** |
| Black x ln(Masslayoffs) | 0.492 |
| | (0.016)** |
| Hispanic x ln(Masslayoffs) | 0.424 |
| | (0.025)** |
| ln(Masslayoffs)$_{y-1}$ | 0.360 |
| | (0.009)** |
| Constant | -1.170 |
| | (0.843) |
| Observations | 70,590 |
| R-squared | 0.844 |
| State FE | YES |
| Year FE | YES |
| County Controls | YES |
| Fstat from eq test | 57 |
| pval from eq test | <0.001 |

Robust standard errors in parentheses clustered at county level, ** p<0.01, * p<0.05, + p<0.1 Observations are weighted by county population, and 20 county-year observations have no black residents. County Controls include of all the controls in Table 2 column (6) except the race population variables. Results indicate that on average Blacks and Hispanics have higher mortality rates than whites following a mass layoff.

Table VI Heterogeneity by Age

| VARIABLES | (1)<br>ln (Mortality) |
|---|---|
| Age30-44 | 0.110 |
| | (0.018)** |
| Age45-54 | 0.824 |
| | (0.022)** |
| Age 55-64 | 1.670 |
| | (0.027)** |
| Age16-29 x ln(Masslayoffs) | 0.324<br>(0.009)** |
| Age30-44 x ln(Masslayoffs) | 0.357<br>(0.008)** |
| Age45-54 x ln(Masslayoffs) | 0.368<br>(0.008)** |
| Age 55-64 x ln(Masslayoffs) | 0.343<br>(0.010)** |
| $\ln(\text{Masslayoffs})_{y-1}$ | 0.329 |
| | (0.009)** |
| Constant | 0.862 |
| | (0.628) |
| Observations | 94,144 |
| R-squared | 0.894 |
| State FE | YES |
| Year FE | YES |
| County Controls | YES |
| Fstat from eq test | 49 |
| pval from eq test | <0.001 |

Robust standard errors in parentheses clustered at the county level, ** p<0.01, * p<0.05, + p<0.1 Observations are weighted by county population. County Controls include of all the controls in Table 2 column (6) except the age population variables. Results indicate that on average the young and older working population have lower mortality rates following a mass layoff. This is consistent with Sullivan and Wachter (2009).

Table VII - Mass Layoffs and Total Generosity

| VARIABLES | (1)<br>ln(Mortality) | (2)<br>ln(Mortality) |
|---|---|---|
| ln (Mass Layoffs) | 0.281 | 0.345 |
| | (0.014)** | (0.016)** |
| ln (Mass Layoffs)y-1 | 0.334 | 0.262 |
| | (0.010)** | (0.016)** |
| Total UIB (2010$) | -0.150 | -0.159 |
| | (0.021)** | (0.022)** |
| Total UIB x ln (Mass Layoffs) | 0.014 | 0.001 |
| | (0.003)** | (0.003) |
| Total UIB x ln (Mass Layoffs)y-1 | | 0.014 |
| | | (0.003)** |
| County Unemployment Rate | -0.160 | -0.160 |
| | (0.011)** | (0.011)** |
| State Unemployment Rate | 0.043 | 0.041 |
| | (0.017)* | (0.017)* |
| Constant | 2.058 | 2.108 |
| | (0.741)** | (0.740)** |
| Observations | 23,536 | 23,536 |
| R-squared | 0.896 | 0.896 |
| State FE | YES | YES |
| County FE | NO | NO |
| Year FE | YES | YES |
| County Controls | YES | YES |

Robust standard errors in parentheses clustered at the county level ** p<0.01, * p<0.05, + p<0.1 Observations are weighted by county population. Uib variables measured in thousands of 2010 dollars per unemployed individual per state. Results suggest that benefits do not have a protective effect on the mortality increase from mass layoffs.

Table VIII – UIB Generosity, Extensions and Regular UIB

| VARIABLES | (1)<br>ln(Mortality) | (2)<br>ln(Mortality) |
|---|---|---|
| ln (Mass Layoffs) | 0.252 | 0.253 |
| | (0.023)** | (0.024)** |
| ln (Mass Layoffs)y-1 | 0.327 | 0.331 |
| | (0.009)** | (0.011)** |
| UIB Extensions(2010$) | 0.024 | 0.016 |
| | (0.009)* | (0.010)+ |
| Regular UIB (2010$) | -0.229 | -0.218 |
| | (0.036)** | (0.034)** |
| ln (Mass Layoffs)x Regular UIB (2010$) | 0.021 | 0.019 |
| | (0.005)** | (0.005)** |
| ln (Mass Layoffs)x UIB Extensions (2010$) | -0.002 | |
| | (0.001) | |
| ln (Mass Layoffs)y-1 x UIB Extensions (2010$) | | -0.001 |
| | | (0.001) |
| County Unemployment Rate | -0.158 | -0.158 |
| | (0.011)** | (0.011)** |
| State Unemployment Rate | 0.054 | 0.052 |
| | (0.017)** | (0.017)** |
| Constant | 2.219 | 2.221 |
| | (0.736)** | (0.735)** |
| Observations | 23,536 | 23,536 |
| R-squared | 0.897 | 0.897 |
| State FE | YES | YES |
| Year FE | YES | YES |
| County Controls | YES | YES |
| Fstat from eq test | 14.80 | 13.20 |
| pval from eq test | <0.001 | <0.001 |

Robust standard errors in parentheses clustered at the county level. ** $p<0.01$, * $p<0.05$, + $p<0.1$
Observations are weighted by county population. Uib variables measured in thousands of 2010 dollars per unemployed individual per state. The subscript $_{y-1}$ indicates the variable was lagged one year. The coefficients on the interaction of ln(mass layoffs) with extended benefits in column (1) and column (2) are insignificant, but are significantly different from the regular benefit interaction (F-stat strongly rejects equivalence in both cases.)

Table IX- UIB Generosity, Extensions and Regular UIB with Deviations from Mean Generosity

| VARIABLES | (1)<br>ln(Mortality) | (2)<br>ln(Mortality) |
|---|---|---|
| ln (Mass Layoffs) | 0.372 | 0.373 |
| | (0.010)** | (0.010)** |
| ln (Mass Layoffs)y-1 | 0.327 | 0.326 |
| | (0.009)** | (0.009)** |
| UIB Extensions(2010$) deviation from mean | 0.061 | 0.051 |
| | (0.019)** | (0.018)** |
| Regular UIB (2010$) deviation from mean | -0.240 | -0.233 |
| | (0.039)** | (0.038)** |
| ln (Mass Layoffs)x Regular UIB (2010$) deviation from mean | 0.022 | 0.021 |
| | (0.005)** | (0.005)** |
| ln (Mass Layoffs)x UIB Extensions (2010$) deviation from mean | -0.007 | |
| | (0.003)** | |
| ln (Mass Layoffs)y-1 x UIB Extensions (2010$) deviation from mean | | -0.006 |
| | | (0.003)* |
| Constant | 0.911 | 0.927 |
| | (0.742) | (0.742) |
| Observations | 23,536 | 23,536 |
| R-squared | 0.897 | 0.897 |
| State FE | YES | YES |
| County FE | NO | NO |
| Year FE | YES | YES |
| County Controls | YES | YES |
| Fstat from eq test | 64.60 | 64.60 |
| pval from eq test | <0.001 | <0.001 |

Robust standard errors in parentheses clustered at the county level. ** p<0.01, * p<0.05, + p<0.1
Observations are weighted by county population. Uib variables are measured in deviation from the yearly average, in thousands of 2010 dollars per unemployed individual per state.

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# 7 Appendix

Table A.1 Inclusion of lagged mortality as an independent variable

| VARIABLES | (1)<br>ln (Mortality) |
|---|---|
| ln (Mortality)y-1 | 0.994 |
| | (0.001)** |
| ln (Mass Layoffs) | 0.002 |
| | (0.001)* |
| ln (Mass Layoffs)y-1 | 0.0005 |
| | (0.001) |
| Constant | 0.052 |
| | (0.015)** |
| Observations | 23,537 |
| R-squared | 0.999 |
| State FE | YES |
| Year FE | YES |
| County Controls | YES |

Robust standard errors in parentheses clustered at the county level. ** $p<0.01$, * $p<0.05$, + $p<0.1$
Observations are weighted by county population. County Controls include all variables listed in table II, column (6). $R^2$ indicates a near perfect fit of the data.

Table A.2 Unit-root tests for mortality and mass layoffs

| VARIABLES | Statistic | (1)<br>Mortality | (2)<br>Mass Layoffs |
|---|---|---|---|
| Inverse $\chi 2$ | P | 1.0e+04 | 1.70e+04 |
| | | (<0.0001) | (<0.0001) |
| Inverse normal | Z | -11.7 | -52.6 |
| | | (<0.0001) | (<0.0001) |
| Inverse logit | L* | -31.9 | -86.2 |
| | | (<0.0001) | (<0.0001) |
| Modified inverse $\chi 2$ | Pm | 55.8 | 127.9 |
| | | (<0.0001) | (<0.0001) |
| Number of Panels | | 2673 | 2673 |
| Average Number of Periods | | 8.81 | 8.81 |
| Number of Newey-West Lags | | 3 | 3 |
| Panel Means Subtracted | | Yes | Yes |
| Trend | | Included | Included |

The above tests can be viewed as a meta-analysis of Phillips-Perron tests, which are Dickey-Fuller unit root tests for each panel that have been made robust to serial correlation by using Newey-West heteroskedasticity and autocorrelation-consistent covariance matrix estimator. Inclusion of the trend allows for random walk with a drift, and the panel means are subtracted to minimize the impact of cross-sectional dependence. The p-values (in parenthesis) from all 4 calculations of the statistics proposed by Choi (2001) indicate that the null hypothesis of all panels containing unit-roots is strongly rejected for both Mortality and Mass Layoffs.

Table A.3 Predicted morality effects due to mass layoffs from unemployment insurance generosity changes

| VARIABLES | (1) |
|---|---|
| Providing benefits at the yearly average<br>per person unemployed longer than 26 weeks | 0.376<br>(.009)** |
| One thousand dollars above the yearly average<br>per person unemployed longer than 26 weeks | 0.369<br>(.009)** |
| Two thousand dollars above the yearly average<br>per person unemployed longer than 26 weeks | 0.362<br>(.009)** |
| Observations | 23,537 |

The predicted mortality effects due to mass layoffs are from the regression in Table IX column (1). Standard errors are produced from the linear combination of the ln (Mass Layoffs) and the ln (Mass Layoffs)x UIB Extensions terms.

Table A.4 Predicted increases in deaths for a 1 percent mass layoff increase

| VARIABLES | (1) total category | (2) Gender male | (3) Gender female | (4) Race white | (5) Race black | (6) Race hispanic | (7) Age 16-29 | (8) Age 30-44 | (9) Age 45-54 | (10) Age 55-64 |
|---|---|---|---|---|---|---|---|---|---|---|
| Predicted deaths per capita for a 1% increase in mass layoffs | .8 | 1.0 | .5 | .8 | 1.4 | .4 | 0.3 | 0.7 | 1.7 | 1.5 |
| Number of Mass Layoffs Per capita for 1% increase | 4.9 | 6.1 | 3.4 | 4.3 | 6.2 | 4 | 4.7 | 9 | 8.9 | 3.1 |

Deaths per capita and mass layoffs per capita are measured per hundred thousand individuals per county. Predicted deaths per capita are calculated my multiplying the sample mean and estimated percent increase in mortality due to a 1 percent increase in mass layoffs.

Table A.5 Cause of Death Results

| VARIABLES | (1) Cancer | (2) Cardiovascular Diseases | (3) Diabetes Mellitus | (4) Alzheimers | (5) Chronic Liver Disease and Cirrhosis | (6) Motor Vehicle Accidents | (7) Intentional Self Harm (Suicides) | (8) All external causes |
|---|---|---|---|---|---|---|---|---|
| ln (Mass Layoffs) | 0.352 | 0.357 | 0.339 | 0.378 | 0.360 | 0.322 | 0.353 | 0.341 |
| | (0.009)** | (0.010)** | (0.011)** | (0.012)** | (0.011)** | (0.011)** | (0.009)** | (0.010)** |
| Constant | 0.750 | 1.719 | -1.455 | -3.422 | -2.680 | 1.433 | -2.164 | 0.208 |
| | (0.749) | (0.741)* | (0.755)+ | (1.015)** | (0.822)** | (0.711)* | (0.769)** | (0.755) |
| Observations | 19,565 | 19,565 | 19,565 | 19,565 | 19,565 | 19,565 | 19,565 | 19,565 |
| R-squared | 0.889 | 0.894 | 0.879 | 0.833 | 0.865 | 0.857 | 0.852 | 0.878 |

Robust standard errors in parentheses clustered at the county level. ** p<0.01, * p<0.05, + p<0.1
Observations are weighted by county population. Columns 1-8 show results from same model as in Table II column 6, with only the observations for the cause of deaths listed in each column. They all include state and year fixed effects as well as the county controls listed in table II column 6.