The Role of Economic Shocks on Health: Evidence from German Reunification

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Abstract:

Sudden economic shocks impact the everyday lives of people from one day to the next. A number of studies have examined the association between economic fluctuations and health, however, no consensus on the nature of this relationship has been established. By exploiting the dramatic economic fluctuations following the German Reunification of 1990, which included a sudden change from a socialist to a capitalist system in East Germany, this study examines the association between broad negative economic shocks and health. The paper finds that increases in state unemployment rates are associated with large and statistically significant declines in health outcomes. Estimates are stronger for people who became unemployed shortly after reunification, for low-income individuals, and for East Germans, a group confronted with larger economic fluctuations. When examining potential mechanisms that could explain the observed health deteriorations, the study finds significant reductions in exercise frequency, increases in economic uncertainty and overall stress.

1. Introduction

Negative economic shocks like the global recession of 2008-2009 are characterized by a rise in unemployment rates. While having significant impact on labor markets, these negative economic events can further affect other areas, such as the health of the population. Health can be influenced in a number of ways. On the one hand, health may improve due to increased time spent on health-promoting activities following declines in work time. On the other hand, health may worsen due to an increase in economic uncertainty and stress as well as increased participation in unhealthy behaviors. Due to these contrasting pathways, the direction of the association between economic shocks and health remains an empirical question and previous evidence on the topic has provided mixed findings. This study contributes to the literature by examining health changes as a result of the broad negative economic shock in Germany that followed the reunification of East and West Germany on October 3rd, 1990. Given that unemployment rates in Germany rose from 4.1% in 1990 to 11.8% in 1994, with even larger increases in the Eastern part of the country, this time period offers a unique setting to test the association between regional unemployment rates and health.

Beginning with Ruhm (2000), numerous studies have examined the relationship between economic downturns and a number of health outcomes such as mortality (Neumayer 2004; Miller et al. 2009), self-reported health status (Currie, Duque, and Garfinkel 2015), health behaviors (Ruhm and Black 2002; Currie, Duque, and Garfinkel 2015) as well as mental health (McInerney, Mellor, and Nicholas 2013). Despite the number of studies on the topic, uncertainty still remains regarding the effects of economic fluctuations on health as well as on the potential mechanisms through which health could be affected by the economy. On the one hand, several studies provide strong evidence for declines in mortality and improvements in health behaviors

like smoking, drinking, exercising and weight loss as a response to being confronted by economic downturns (Ruhm 2000; Ruhm and Black 2002; Dehejia and Lleras-Muney 2004). On the other hand, recent studies show that increases in unemployment rates lead to declines in physical and mental health as well as to deteriorations of health behaviors (McInerney, Mellor, and Nicholas 2013; Currie, Duque, and Garfinkel 2015). The disparity of findings in the literature suggests that additional research is needed to better understand how macroeconomic events impact health-related outcomes.

This study advances previous work on the relationship between economic conditions and health in several ways. First, post-reunification Germany offers a unique opportunity to examine the association between economic shocks and health. Previous work on the link between economic conditions and health have examined changes in health outcomes during recessions. Besides causing substantial increases in unemployment rates, the reunion of East and West Germany also led to large structural changes to the economy. East Germany's communist system was replaced with the western system of capitalism; monetary and social unions additionally influenced the lives of people. Second, this paper is one of very few studies to use longitudinal data to analyze the effects of economic fluctuations on health, which allows controlling for individual time-invariant characteristics that could be correlated with health and for reference bias in the reporting of health. Third, I examine the presence of heterogeneous health effects by testing for differences across East and West Germany, employment status and income distribution in order to examine which groups of the population are affected the most from economic downturns. Fourth, by exploiting the richness of the dataset, the analysis also investigates the role of a number of potential mechanisms such as physical activity, economic uncertainty and stress. Previous work on health effects of recession has found contradicting

evidence on potential channels. Finally, the study examines whether changes in income inequality in Germany following reunification, measured by variations in statewide Gini coefficients, are associated with health outcomes.

The findings of this study show that increases in unemployment rates are associated with significant declines self-reported health status of individuals. Following the dramatic economic fluctuation after reunification, Germans report significant declines in health satisfaction, while increasing the number of doctor and hospital visits. The analysis shows that the effects are stronger for people who are unemployed shortly after reunification, for low-earning individuals as well as for people in East Germany, who were confronted with larger economic fluctuations. When examining potential mechanisms underlying the association between economic conditions and health, I find that reductions in exercise frequency, increases in economic uncertainty and stress can explain the observed declines in health. Overall, the findings suggest that government officials should not only focus on policies that are able to stabilize the economy, but also consider ways to help individuals better deal with economic downturns and prevent negative effects on health.

2. Background on the German Reunification

German Reunification

Political unification in Germany was finalized on October 3, 1990 when the six eastern states East Berlin, Brandenburg, Mecklenburg-Western Pomerania, Saxony, Saxony-Anhalt and Thuringia, which previously formed the German Democratic Republic (GDR), were included in the German Federal Republic (West Germany). Besides the political annex and the immediate adaption of the capitalist system in East Germany, reunification furthermore included both a monetary and a social union. The events of 1990 led to substantial changes in the German labor

market. Unemployment rates in East Germany increased by 18.4 percentage points between 1990 and 1998 due to the terrible state of the East German economy in the late 1980s, where productivity levels were one-third of its West German counterpart. During the time period examined in this study, West German unemployment rates also increased by 4.4 percentage points. As part of the monetary union, the East German mark was replaced with the West German mark.[1] Additionally, significant income support transfers from West to East were conducted shortly after reunification (Frijters, Haisken-DeNew, and Shields 2004). As part of the social union, individuals from East Germany were allowed to travel to West Germany for the first time in almost four decades.

Given the dramatic and unexpected changes to the economic system as well as changes to the social order, political system, and the everyday lives of people in Germany, the 1990s offer a unique opportunity to examine the role of a broad negative economic shock on health outcomes.

German Reunification and Health

Despite the large number of changes individuals in Germany were confronted with after reunification, Frijters, Haisken-DeNew, and Shields (2005) point out that no changes in several health-producing circumstances occurred at the time – hospitals kept working similar to before and vaccination programs remained alike (Frijters, Haisken-DeNew, and Shields 2005). Nonetheless, the East German health care system was reformed in the time following 1990 (Nolte 2004; Vogt and Vaupel 2015). With the exception of a 5-year period of grace for the

[1] Reunification affected prices of various goods differently in East Germany. While the prices of previously subsidized goods increased to adjust to West German levels. Other goods that were highly taxed previously became much cheaper following reunification. Overall, East German CPI dropped following monetary union, while continuous changes in wage levels and administered prices led to an increase in the index of 16 percent between 1991 and 1992 (Kroger and Teutemann, 1992).

maintenance of polyclinics and related facilities, West Germany's health care structure was transferred over to the former GDR region in the post-reunification period.

The large and unexpected changes that occurred in Germany shortly following reunification could have influenced health outcomes through internal and external effects. The dramatic increases in unemployment rates could directly impact the health of households that experienced job loss following reunification (internal effects). On the one hand, health could improve since people have more time to engage in health-enhancing activities, such as exercising, due to lower opportunity cost and increased time availability (e.g. Ruhm 2000). On the other hand, health could decline due to increases in stress and economic uncertainty, which could induce unhealthy behaviors such as drinking and smoking. Thus, the direction of the internal effects is ambiguous and remains an empirical question. Since both German regions experienced increases in unemployment rates in the 1990s, internal effects could have occurred in East and West Germany. However, given that economic changes were substantially larger in East Germany, we might expect differences between the regions.

Additionally, external effects caused by changes in the environment that are unrelated to people's employment status may have impacted health. One example of this is the sudden change from socialism to capitalism in East Germany, leading to the first free elections in the former GDR following four decades of authoritarian rule. In addition, the West German currency, systems of justice, regulation, industrial relations, banking, education, social security and welfare were all transferred to East Germany (Hunt 2008). These changes could have influenced health outcomes as well as health-related behaviors by increasing uncertainty about the future among people who lived the majority of their lives under the socialist regime. Early evidence from the medical literature provides evidence that stress can lead to significant health

declines (Sterling and Eyer 1981; Henry 1982). Similarly, recent work shows that the Great Recession in the US negatively affected both physical and mental health of individuals. Again, it can be expected that these external effects are larger for individuals living in East Germany.

Similar to the majority of previous work on the association between economic changes and health outcomes, this study is not able to disentangle the role of internal and external effects in the main analysis. However, I indirectly test for the two effects by adding four additional specifications to the analysis. First, using the longitudinal nature of the German Socio-Economic Panel (GSOEP), I stratify the sample by employment status, which allows me to check whether the changes in health were different across people who lost their job immediately following reunification and those who remained employed. If the association between unemployment rates and health is the same for both groups, this would provide suggestive evidence that external factors play a substantial role in explaining health changes. Second, I stratify the sample into different age groups. Given that people's labor market attachment differs at various ages, this can shed further light on whether the association between reunification and health is coming from internal or external effects. Third, I examine the association between state unemployment rates and health separately for individuals living in East and West Germany. Due to the large differences in unemployment rate changes across the two regions, this could provide additional evidence for the presence and the magnitude of external and internal effects. Fourth, I further separate both the East and West German sample into two groups: 1) states that experienced high increases in unemployment rates following reunification; 2) states that experienced relatively small increases in unemployment rates.

3. Previous Literature

Several researchers have previously investigated the role of economic fluctuations on health. The first study to examine this topic was conducted by Ruhm (2000) by linking US data on state unemployment rates to state-level Vital Statistics Death Records from 1971 to 1972. Ruhm finds that a one percentage point increase in the state unemployment is associated with a 0.5% reduction in state mortality rates suggesting that economic downturns potentially have positive effects on population health. In a similar study, Neumayer (2004) provides additional evidence supporting the findings by using data from Germany. In the US, these mortality declines during bad economic times have been shown to be driven by elderly parts of the population (Miller et al. 2009). Researchers have suggested that improvements in health-related behaviors such as smoking, drinking, diet, exercising and weight loss could serve as underlying mechanisms (Ruhm 2000; Ruhm and Black 2002; Dehejia and Lleras-Muney 2004, Ásgeirsdóttir et al. 2014). These findings underlie the idea that unemployment reduces the opportunity cost of engaging in healthy behaviors in bad economic times.

More recent work, however, contradicts earlier evidence in the literature (McInerney and Mellor 2012; McInerney, Mellor, and Nicholas 2013; Currie, Duque, and Garfinkel 2015). Wealth losses following the negative economic events during the latest recession are shown to increase depression among older adults (McInerney, Mellor, and Nicholas 2013), while being negatively associated with physical and mental health as well as with health behaviors (McInerney and Mellor 2012; Currie, Duque, and Garfinkel 2015). These results are consistent with another stream of papers that find substantial health declines as a result of negative employment events such as mass layoffs, plant closings and job loss (Sullivan and von Wachter 2009; Eliason and Storrie 2009a and 2009b; Schmitz 2011; Marcus 2013; Schaller and Stevens 2015).

When examining potential mechanisms for the health deteriorations, Charles and DeCicca (2008) find evidence for weight gains and increased smoking rates for African-American men as well as for men who have the highest probability of being unemployed. Colman and Dave (2014) provide evidence for large declines in physical activity and small increases in body weight as a result of becoming unemployed using data from the most recent recession in the US. Currie, Duque, and Garfinkel (2015) show that controlling for time-invariant individual fixed effects is important when examining the role economics fluctuations on health-related outcomes. To my knowledge, only a few studies so far use longitudinal data for the question on hand (Neumayer 2004; Davalos and French 2011; Davalos, Fang, and French 2012; Ásgeirsdóttir et al. 2014; Colman and Dave 2014; Currie, Duque, and Garfinkel 2015). The disparity of findings in the literature suggests that additional research is needed to better understand how macroeconomic events are associated with health-related outcomes.

Despite the changes that occurred in Germany during the early 1990s, only a limited number of studies have so far examined the effects on health. Riphahn and Zimmermann (2000), Eberstadt (1994) as well as data from the World Health Organization (WHO 1993) provide evidence that the reunion led to a "mortality crisis" in the former GDR, while Vogt and Kluge (2015) find that life expectancy increased following reunification. East Germans have been found to be less likely to be satisfied with their health, while being more likely to suffer from stress- and alcohol-related diseases after reunification (Riphahn and Zimmerman 2000). Consistent with early evidence in the medical literature, stress could potentially explain changes in health (Sterling and Eyer 1981; Henry 1982). Using the same data set as this study, Frijters, Haisken-DeNew, and Frick (2005) exploit income transfers to the East German population in the early 1990s, which were part of the collectively bargained wage increases following

reunification. The authors find small positive effects of additional income on health. The focus of that study is testing for a causal link between income and health satisfaction, whereas this study examines the association between state-level variations in unemployment rates and health outcomes of Germans after reunification. To my knowledge, this is the first study that explores the large economic variations in Germany during the early 1990s in order to examine the association between economic conditions and health.

4. Data

German Socioeconomic Panel (GSOEP)

In order to investigate the effects of economic fluctuations on health during the 1990s, this analysis uses data from the international version of the GSOEP, a nationally representative large sample of individuals that started in 1984 in West Germany.[2] In 1990, the panel was extended to include residents of the former GDR, with the first East German sample being taken several months before reunification.[3] All individuals above the age of 15 living in the household at the time of the interview are surveyed each year. Due to the large economic differences between East and West Germany, the analysis excludes individuals who migrate between East and West Germany (n=67) during the study period, while those moving within the same regions are kept in the analysis (n=304).[4] Respondents who are missing health data in at least one period

[2] This study uses the version SOEP v.28.1.i, which is the international version of the GSOEP. Due to German data protection laws, it only includes 95% of the original sample. For an overview of the data set, please see Haisken-DeNew and Frick's Desktop Companion (2005).

[3] It should be acknowledged that several changes occurred in the months prior to reunification on October 3rd, 1990 and following the fall of the wall on November 9th, 1989. These changes included the first free elections in the GDR on March 18th, 1990, and the currency union on July 1st, 1990. Given that the East German sample began only in 1990, I am not able to use more years of pre-unification data.

[4] The results remain consistent when excluding these "movers" from the sample. Evidence by Kröhnert and Vollmer (2012) suggests that migration rates from East to West Germany were larger for women following reunification. This could lead to compositional changes in the sample of people remaining in East Germany and therefore impact the estimates. However, recent evidence by Stauder (2016) shows that differences in net migration rates by gender for individuals above age 24 can be explained by less women migrating from West Germany to East Germany. In

are dropped from the analysis (n=143). I include all individuals between the years 18 to 85 in the main sample, and I additionally test for different effects by age groups. Given the reunification significantly affected the lives of Germans, not only those of working age, elderly people are also included in the sample. This leaves the analysis with a sample size of 61,573 observations for the time period 1990 to 1998. I use 1998 as the end of the sample period since it has been shown that the economic downturn came to a stop in East Germany in the late 1990s with unemployment rates slowly decreasing (Hunt, 2008).[5]

Health Outcomes

The main outcome variable of the study is self-assessed health satisfaction, which respondents are asked to rate each year on a scale from 0 (=very dissatisfied) to 10 (=very satisfied). This outcome has been used by several previous studies examining GSOEP data to test for health changes (e.g. Riphahn and Zimmermann 2000; Frijters, Haisken-DeNew, and Frick 2005). A more commonly used subjective health outcome is health status, which is usually reported on a scale from 1 (=very good) to 5 (=poor). Given that health status is not available in 1990, 1991 and 1993 in the GSOEP, health satisfaction is the main outcome variable for the analysis.[6] As shown by previous work, self-assessed health is a powerful predictor of other health indicators, such as future hospitalizations (Nielsen 2016), mortality (Idler and Benyamini 1997), and future health care usage (van Doorslaer et al. 2000). The longitudinal nature of the GSOEP furthermore reduces the potential measurement error in the self-reported health variable

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the data set used for this study, no differences in migration rates by gender are observable. Furthermore, no differential trends by gender are observable between women and men in East Germany, which suggests that the results are not driven by compositional changes in the sample.

[5] The main findings of the paper remain unchanged when the sample period is reduced and extended. These additional results are not shown in the paper, but are available upon request.

[6] Using data for the years in which both variables are available, I find a strong and statistically significant association between reported health status and health satisfaction.

in two ways: 1) by comparing each individual's health only to their own prior assessment, and 2) by controlling for the fact that each respondent may have their own scales in ranking their health (reference bias).

A potential concern when examining changes in self-reported health measures is that they might capture changes in general well-being, rather than actual changes in health. An approach to removes doubts about the estimates used in previous work is to additionally examine other potentially more objective health indicators (Johnston, Propper, and Shields 2009). I follow this approach by examining changes in the frequency with which individuals go to the doctor per year and in the likelihood of staying at a hospital overnight (Nielsen 2016). Given that the original SOEP question refers to the number of doctor visits in the last three months, the provided measure of annual doctor visits only includes multiples of four. I estimate the association between higher unemployment rates and five different cutoffs points for the frequency of annual doctor visits. Based on the assumption that improvements in health reduce the need for medical care, a larger number of doctor and hospital visits can be viewed as additional indicators of poor health, while also removing concerns that changes in health satisfaction are solely driven by changes in general well-being.

As documented in previous work, West Germany's health care structure was transferred over to East Germany during the 1990s (Nolte 2004; Vogt and Vaupel 2015). The validity of using health care usage as a proxy for health could potentially be limited if better access to health care led to the diagnosis of previously unknown conditions. By using the longitudinal nature of the data, I find that the frequency of doctor visits and hospital stays are strongly correlated with lower health satisfaction in both East and West Germany. Since the provision of health care did not change in the latter region, this backs up the idea of using medical care as a proxy for health.

When examining potential channels through which economic conditions can affect health, I investigate whether changes in the frequency with which individuals exercise influenced health outcomes of Germans. This outcome includes the frequency with which respondents participate in recreational exercise, while ignoring any time of other physical activity such as physical activity on the job or through household chores. Thus, it can provide evidence for whether individuals change their health behaviors during times of economic shocks and uncertainty.

Descriptive Statistics

Table 1 presents summary statistics for the sample of 61,573 individuals for the period of my study (1990-1998). It is noticeable that 32.3% of the sample resides in East Germany, whereas the sample consists evenly of both male and females. When looking at health-related statistics, it can be seen that average health satisfaction is 6.60, whereas 10.90% of individuals report to have stayed in a hospital overnight. Using data on average state unemployment rates from the Bundesagentur für Arbeit (Federal Employment Agency), Table 1 also shows that state-level unemployment rates increased significantly immediately after 1990 and continued to increase steadily until 1994. This study uses these fluctuations in state-level economic conditions as the main independent variable capturing the large overall economic shock, which occurred in Germany at the time.

Graphical Evidence

Based on the statistics shown in the previous section, Figure 1a) graphically illustrates changes in state unemployment rates and health satisfaction in Germany between 1990 and 1998. The picture provides suggestive evidence for an inverse relationship between economic fluctuations and health satisfaction following reunification. Figure 1b) indicates that

unemployment rates are positively associated with the share of individuals who stayed in a hospital overnight. Given the assumption that individuals are more likely to spend a night at the hospital if their health deteriorates, this provides additional evidence for declines in health following reunification.

5. Methods

This study applies individual fixed effects models in order to estimate the association between the substantial economic fluctuations during the 1990s in Germany and individual health outcomes. Currie et al. (2015) point out the importance of controlling for individual fixed effects when testing for the relationship between variations in state unemployment rates and health. The main equation being estimated in this study is the following:

$$Y_{ist} = \beta_0 + \beta_1 UR_{st} + \beta_2 X_{ist} + \lambda_1 State_{it} + \lambda_2 Year_t + \alpha_i + \varepsilon_{ist}, \quad (1),$$

where the dependent variable Y_{ist} is self-reported health satisfaction (rated on a scale from 0 to 10) for individual i in state s at time t. As mentioned before, individuals moving from one state to another within East or West Germany are kept in the sample, while those moving from one region to the other are removed from the analysis. I estimate four different specifications to examine the association of unemployment rates and health satisfaction: 1) OLS estimation on health satisfaction (ranges from 0 to 10), which captures the overall impact on the health distribution; 2) OLS estimation using a cutoff of 8 to test for the association between unemployment rates and the likelihood of rating one's health with a 9 or 10; 3) By dividing the responses into four groups (0-2, 3-5, 6-8 and 9-10), I estimate ordered logit models to additionally examine the impacts for the entire distribution of health; 4) Finally, I apply the fixed

effect ordered logit estimator which was recently introduced by Baetschmann, Staub and Winkelmann (2015) for examining dependent variables with ordered nature (BUC estimator).

Two additional health-related outcomes that I examine include frequency of annual doctor visits (using five different cutoff points) and overnight hospitalizations. When investigating potential mechanisms underlying the association between economic shocks and health, I examine the following five outcomes: 1) changes in the frequency with which respondents engage in recreational exercise; 2) satisfaction with one's living situation (on a 0 to 10 scale); 3) satisfaction with one's leisure time (0 to 10); 4) changes in whether respondents report being hopeful about finding a new job; 5) changes in whether individuals work in an occupation for which they received training for.

UR_{st} represents average annual state-level unemployment rates, which is the main parameter of interest. The baseline specification includes controls for state and year dummies as well as for individual fixed effects (α_i). In two additional specifications, state-specific and region-specific time trends are included to capture changes across states as well as between East and West Germany, respectively. In a final specification, X_{ist} also includes the most likely endogenous variables employment status and monthly personal income (Ruhm 2000). The estimate from this model can provide suggestive evidence for whether changes in health in the post-reunification period were driven by changes in employment status or by external factors that are independent from one's labor market experience. However, this estimate should be treated with caution since these added variables are, given the potential endogeneity, "bad mediators" (Angrist and Pischke 2009). Given that East Germany experienced strongly declining birth rates following

reunification Chevalier and Marie (2016), marital status and the number of children are not included in the model.[7]

Due to the presence of substantial differences in the magnitude of economic variations between East and West Germany, I additionally estimate separate models for both regions (given the differences in economic conditions, East and West Berlin are treated as two separate states in the main analysis). By exploiting the longitudinal nature of the GSOEP, I am able to separately test for health effects for individuals who became unemployed shortly after reunification and for those who remained employed throughout the sample period. In two additional models, I examine differences in health changes between individuals across age groups and across different parts of the income distribution.

6. Results

Main Results

Table 2 presents individual fixed effect estimates for the role of changes in state unemployment rates following reunification on self-reported health satisfaction from three specifications. Panel A shows results from the baseline model, which examines the association between state unemployment rates and health satisfaction, which is measured on a scale from 0 to 10. Column (a) indicates that a one percentage point increase in state unemployment rates is associated with a 0.019-point decline in health satisfaction, with the estimate being statistically significant at the 1% level. The estimate corresponds to a 0.29 percent change, implying that the increase of unemployment rates of 9.55 percentage points in Germany between 1990 and 1997 is associated with a decline of health satisfaction of 2.77 percent.

[7] In additional models, I find that the results remain almost unchanged when including marital status and the number of children in the model. These results are available upon request.

In column (b), the potentially endogenous variables income and employment status are added to the baseline model. The estimate remains almost unchanged, which provides suggestive evidence that the declines in health might be the result of external effects, which are unrelated to the respondent's own job loss and potential reductions in income. In the following sections, I examine additional models that aim to differentiate between internal and external effects on health. Columns (c) and (d) show that the results remain consistent when controlling for state-specific time trends and region-specific time trends, respectively. Again, the results remain almost unchanged from the baseline estimates.

Panel B examines the association between unemployment rates and the likelihood of reporting health satisfaction of 9 or 10. The basic model finds that a one percentage point increase in unemployment rates is associated with 0.78 percentage point reduction in the likelihood of reporting health satisfaction in the top two categories, which corresponds to a 4.27 percent change. The estimate is statistically significant at the 1 percent level. Again, the estimates remain unchanged when adding additional controls to the specification. Finally, Panel C provides results obtained from ordered logit estimation. Consistent with the previous findings, the estimates show that higher unemployment rates significantly worsen health satisfaction. Respondents are more likely to report health satisfaction of 0 to 2 and 3 to 5, while being less likely to report health satisfaction of 6 to 8 and 9 to 10. All estimates are statistically significant at the 1 percent level, providing additional evidence for the negative association between the economic fluctuations in Germany following reunification and health.[8]

Fixed Effect Ordered Logit Estimation

[8] In order to confirm that the inferences are not affected by the small number of clusters, I conduct a block bootstrap analysis. The significance remains robust to the estimates from Table 2. These additional results are not shown in the paper, but are available upon request.

A recent study by Baetschmann, Staub and Winkelmann (2015) introduces a new consistent ordered fixed effect logit estimator when examining dependent variables with ordered nature by combining the information associated with different cut-off points in a single likelihood function in order to obtain a one-step estimator of β_1. The authors refer to it as BUC estimator ("blow up and cluster") since it is obtained by replacing every observation with K-1 copies of itself ('blowing up' the sample size) before dichotomizing each of the K-1 copies of the individual at a different cut-off point. The authors claim that one advantage over other estimators is that BUC results are obtained through Conditional Maximum Likelihood estimation using the entire sample, allowing them to account for the incidental parameters problem, which is an issue of previous fixed effect approaches and which can lead to inconsistent and biased estimates (Neyman and Scott 1948; Lancaster 2000; Greene 2004). Table 3 reports the BUC estimates for the role of state-level variations in unemployment rates on health satisfaction following reunification. It is noticeable that the estimates are consistent with the main results shown in Panel A of Table 2. The estimates are slightly larger in magnitude, while remaining statistically significant at the 1 percent level and therefore providing further evidence for a negative association between economic downturns and health.

Result by Subgroups

Table 4 shows results for the association of unemployment rates and health satisfaction across regions, age groups, employment status and income. All estimates are again obtained using individual fixed effects. Besides shedding light on the heterogeneity in the association between economic shocks and health, the results can also provide suggestive evidence on whether the main estimates shown in Table 2 are driven by internal or external effects following reunification.

Panel A shows that a one percentage point increase in state unemployment rates is associated with a 0.0324-point reduction in health satisfaction for individuals living in East Germany throughout the sample period. The estimate is statistically significant at the 10 percent level, whereas the increase in the standard error from the compared to the baseline estimate from Table 2 could be due to the relatively small sample of East Germans. In contrast, the estimates for West Germany indicate that changes in unemployment rates are not negatively associated with health satisfaction. The West German estimate is positive, but statistically insignificant. A likely explanation for the large differences between the two regions are the substantial differences in unemployment rates in East and West Germany following reunification.[9]

Panel B presents evidence suggesting that the association between state unemployment rates and health satisfaction differs across different age groups. The negative relationship is strongest for individuals between the ages 25 and 50, with the estimate being statistically significant at the 1 percent level. For younger individuals between the ages 18 and 24, a group that might still be completing their education, and for those between the ages 51 to 65, the estimates are smaller but still statistically significant at the 10 percent level. However, for individuals between the ages 66 to 85, the estimate is negligent and statistically insignificant. Given that individuals in this age group have the lowest attachment to the labor force, this latter finding suggests that there were no external effects influencing the health of elderly individuals.

Panel C explores differences in health changes following increases in state unemployment rates across individuals whose labor market outcomes were affected differently. By using the longitudinal nature of the data, I stratify the sample into two groups based on the respondent's

[9] The average increase in state unemployment rate between 1990 and 1991-1998 was 2.87 percentage points in West Germany and 14.90 percentage points in West Germany.

employment status between the years 1990 and 1993: 1) individuals who were employed both before reunification and throughout first three years after 1990; 2) individuals who were employed before reunification but were unemployed during the three years after 1990.[10] Due to the previously observed differences in health changes across the two regions, I conduct this analysis separate for East and West Germany. The results show that higher state unemployment rates have the strongest negative association with newly unemployed East Germans. For this group, a one percentage point increase in state unemployment rates is correlated with a 0.1437-point decline in health satisfaction, with the estimated statistically significant at the 1 percent level. This finding is consistent with previous evidence showing negative health impacts as a result of job loss (Sullivan and von Wachter 2009; Eliason and Storrie 2009a and 2009b; Marcus 2013; Schaller and Stevens 2015). The estimates for newly unemployed West Germans as well as for employed individuals in both regions confirm the negative association, while the estimates are statistically insignificant due to inflated standard errors. However, given that the estimates are still larger in magnitude than the baseline estimates from Table 2, these findings provide suggestive evidence that other factors besides one's labor market situation are affecting people's health following reunification.

Additionally, Panel D shows results for the association between state unemployment and health across the distribution of income.[11] The estimates indicate that health declines were largest for individuals below the 25th income percentile ($p<0.01$). The association is smaller for

[10] I have also performed the same analysis when looking at employment outcomes for the whole period of the study (1990-1998) and find that the results remain unchanged. Examining only labor market changes three years after reunification allows testing for health changes as a result of the large economic changes that shortly followed 1990.
[11] When stratifying the sample by income, I am using income at baseline prior to the reunification in order to examine how the events of 1990s changed health outcomes of people across different parts of the income distribution.

individuals between the 25th and the 75 income percentile ($p<0.05$), while being even smaller and statistically insignificant for the highest income group.

Additional Health Outcomes

Table 5 presents individual fixed effect estimates for the association between economic conditions and two measures of health care usage (doctor visits and hospital stays). These two measures are found to be strongly correlated with health satisfaction. Using five different cutoff points for the frequency of annual doctor visits, the estimates in Panel A provide evidence that worse regional economic conditions are associated with more frequent doctor visits. A one percentage point increase in state unemployment rates is associated with 1.81 and 0.72 percentage point increases in seeing a doctor at least 8 and 20 times per year, respectively. All estimates are statistically significant at the 1 percent level. When comparing estimates across the two German regions, I find increases in the frequency of doctor visits for individuals in both East and West Germany. Three of the five estimates for the East German sample are statistically significant, while the West German results are imprecisely estimated.

Panel B shows that respondents were more likely to spend a night at a hospital when unemployment rates were higher. A one percentage point increase in state unemployment rates is associated with a 1.48 percentage point increase in the likelihood of staying at a hospital overnight ($p<0.01$), which corresponds to a 13.58 percent change. When stratifying the sample by region, I find a small negative association in East Germany and a small positive association in West Germany. Overall, the findings in Table 5 provide additional evidence for worsened health outcomes in response to the economic shock, given the assumption that health care usage is a proxy for health. Thus, these additional estimates remove potential concerns that the main

estimates of the study solely detect changes in general well-being rather than actual changes in health.

7. Mechanisms

While the previous section provides evidence of significant health declines following German Reunification, this section examines potential mechanisms underlying the relationships between economic conditions and health. Consistent with previous work that examines health effects of recessions (Ruhm 2000; Colman and Dave 2014), I test for the role of physical activity as a channel through which health is affected during economic fluctuations. Additionally, I look at changes in indicators of psychological well-being such as the respondents' satisfaction with their living situation and leisure time as well as with outcomes related to work-related stress.

Table 6 shows that respondents are significantly less likely to exercise at least once per week as a result of being confronted with increases in state unemployment rates following reunification. The baseline estimate suggests that a one percentage point increase in state unemployment rates is correlated with a 0.40 percentage point decrease in the likelihood of weekly physical activity ($p<0.05$), which corresponds to a 2.02 percent change from the mean. When examining outcomes related to individuals' stress levels, the results show that individuals are significantly less likely to be satisfied with both their living situation and their leisure time during times of higher unemployment rates. Additionally, I find that Germans are significantly less likely to believe they could find a new job, while also being significantly less likely to work in an occupation for which they have received training. Both results provide suggestive evidence for increases in work-related stress and economic uncertainty. Based on the assumption that reductions in physical activity as well as increased levels of stress and economic uncertainty

negatively affect peoples' health, the findings in Table 6 provide new evidence for mechanisms underlying the association between economic conditions and health.

8. Robustness Tests

The main analysis in Table 2 examined three different specifications in order to provide evidence for whether the observed association between changes in unemployment rates and health are the result of internal effects due to changes in employment status or external effects due to other changes in environment (sample stratified by employment status, age and region). In an additional test, I estimate the association when separating the two German regions into the following two groups: 1) States that experienced higher increases in unemployment rates following reunification; 2) States that experienced relatively smaller increases in unemployment rates following reunification.[12] The estimates from these specifications are shown in Table 7. For East Germany, I find that a one percentage point increase in state unemployment rates is associated with a 0.0679-point decline in health satisfaction in states with higher increases in economic conditions following reunification ($p<0.01$). The estimate is substantially smaller for states that experienced less economic variations ($p<0.10$), which provides further evidence for the presence of direct (internal) effects of reunification on health. In West Germany, a negative association between unemployment rates and health is only observable in states that experienced larger changes in economic conditions, while estimates for both groups of states are statistically insignificant.

[12] States with smaller changes in unemployment rates (compared to the mean for the region) were East Berlin, Brandenburg, Saxony and Thuringia in East Germany and Schleswig-Holstein, Hamburg, Bremen and Hessen in West Germany. States with relatively larger changes in unemployment (compared to the mean for the region) were Mecklenburg-Vorpommern and Saxony-Anhalt in East Germany and Lower Saxony, North-Rhine-Westphalia, Baden-Wuerttemberg and Bavaria in West Germany.

Given that the East German sample only started in 1990, the study is unable to use more than one period before reunification. The majority of the increases in unemployment rates occurred within the first year of reunification in East Germany. In an additional robustness test, I check for the association between economic fluctuations and health using only data from the post-reunification period (1991 to 1998) in order to check whether the observed changes in health are driven by immediate short-term changes or whether they are persistent in the years following 1990. Table 8 shows that the estimates for the reduced sample period are larger in magnitude than the baseline results for the period 1990 to 1998 ($p<0.01$). This suggests that the declines in health experienced by Germans were even stronger in the years following negative economic shock following reunification.

Given that it might be reasonable to expect that it takes some time before health consequences are observable following increases in unemployment rates, Table 9 reports estimates from using one-year lagged state unemployment rates as the main independent variable. The lagged estimates for health satisfaction are consistent with the baseline results shown in Table 2 ($p<0.01$), providing further evidence that negative economic events are correlated with persistent declines in health outcomes.[13]

Besides examining the relationship between fluctuations of economic conditions and health, previous work has also investigated health effects of changes in relative income (e.g. Kaplan et al. 1996; Subramanian and Kawachi 2003, Ram 2005). The majority of these studies provide evidence that higher income inequality is negatively associated with health. Given the large

[13] In an additional model, I use lead unemployment rates to remove concerns that changes in health influences economic conditions in Germany. While being imprecisely estimated due to higher standard errors, the lead estimates still show a negative association between state unemployment rates and health satisfaction. An explanation for this could be the fact that the correlation between the average of current and one-year lag unemployment rates and one-year lead unemployment rates is 0.88, suggesting that unemployment rates are strongly serially correlated. Thus, the inclusion of lead unemployment rates in the model by itself is likely picking up a past cumulative effect.

economic changes in Germany during the early 1990s, which also included a monetary union, income inequality increased significantly.[14] Table 10 reports results for the relationship between income inequality, captured by state-level variation of Gini coefficients, and health satisfaction and health care usage. The estimates correspond to increases in Gini coefficients of 0.1. Column (a) shows that an increase in the Gini index by 0.1 is associated with a 0.1038-point decline in health satisfaction, which corresponds to a 1.57 percent decline ($p<0.01$). Similarly, columns (b) to (d) indicate that higher income inequality in Germany following reunification were associated with increases in the frequency of doctor visits and the likelihood of staying in a hospital overnight.

9. Conclusions

The findings of this paper provide evidence for the fact that a broad negative economic shock such as the German Reunification of 1990 is associated with significant health declines. The results contribute to earlier work examining potential health effects following economic downturns during recessions and are consistent with recent work examining data from the Great Recession (McInerney and Mellor 2012; McInerney, Mellor, and Nicholas 2013; Currie, Duque, and Garfinkel 2015). Two advantages of this study are the availability of both significant changes to the economy and the use of longitudinal data. The observed changes in health are found to be largest in East Germany, a region that experienced substantially larger increases in unemployment rates after reunification. Furthermore, health declines are shown to be larger for individuals who were unemployed during the early 1990s as well as for lower-income people. When examining potential channels explaining the inverse relationship between unemployment

[14] The average Gini coefficient in Germany during the period of the study was 0.4782 (0.5134 in West Germany, 0.4145 in East Germany). The index increased from 0.4301 in 1990 to an average of 0.4872 in the years 1991-1998, suggesting an increase in income inequality.

rates and health, the analysis finds that individuals are less likely to exercise frequently, experience significantly higher levels of stress and economic uncertainty suggesting that no single channel is responsible for the association between economic conditions and health.

By examining the association between state-level unemployment rates and health status during the Great Recession in the United States., Currie, Duque, and Garfinkel (2015) find a 4.3 percent decline in the likelihood of individuals reporting to be in excellent or very good health due to a one percentage point increase in unemployment rates. This is identical to the 4.3 percent decline in the likelihood of reporting health satisfaction of either 9 or 10, which is shown in this study (Table 2). The observed declines in physical activity following reunification are consistent with recent work by Colman and Dave (2014), who provide evidence that the Great Recession reduced total physical activity. Besides affecting overall health, this observed reduction of physical activity during economic downturns could affect overall health by increasing people's body weight, as suggested by several recent studies (Böckerman et al. 2007; Colman and Dave 2014; Currie, Duque, and Garfinkel 2015).

A better understanding of potential declines in health as well as of the mechanisms should be considered by governments in order to curb the negative effects of economic downturns. While this study looks at changes in health-related outcomes over a period of nine years, future work could attempt to examine long-term health effects of economic fluctuations such as health effects on adults who grew up during economic downturns. This would complement previous studies showing that health and labor market outcomes in later life are shaped at early stages of life (Smith 2009; Case, Lubotsky, and Paxson 2002; Case, Fertig, and Paxson 2005). Finally, knowing more about potential channels through which loss of employment and economic

instabilities affect health other than through the reduction of financial resources should be viewed as important by policymakers attempting to improve health outcomes of society.

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Table 1: Descriptive Statistics

Variable	Mean	Min	Max	N
Age	45.70	18	85	61,573
Male (%)	47.75	0	100	61,573
Married (%)	70.95	0	100	61,573
# Children in HH	0.67	0	7	61,573
High School or less (%)	86.51	0	100	61,573
Unemployed (%)	31.31	0	100	61,573
Monthly Net Income (DM)	1,353.07	0	6,000	61,573
Living in East Germany (%)	32.27	0	100	61,573
Health Satisfaction (0-10)	6.60	0	10	61,573
More than 7 Doctor Visits per Year (%)	37.88	0	100	52,896
Hospital Stay Overnight last Year (%)	10.90	0	100	48,002
Hopeful of finding a new Job (%)	19.23	0	100	17,197
State Unemployment Rates (%)				
1990	4.03	1.0	13.5	8,009
1991	7.45	3.5	12.5	8,009
1992	9.14	4.4	16.8	8,009
1993	11.05	6.3	17.5	8,009
1994	11.79	7.1	17.6	8,009
1995	11.37	7.0	16.5	8,009
1996	12.19	7.9	18.8	8,009
1997	13.58	8.7	21.7	8,009
1998	13.17	8.0	21.7	8,009

The descriptive statistics are obtained using sample weights provided in the GSOEP survey waves for the years 1990 to 1998.

Table 2: Individual fixed effect estimates for the role of economic shocks on health satisfaction

	Panel A: Basic specification			
	(a)	(b)	(c)	(d)
State UR	-0.0190***	-0.0181***	-0.0209***	-0.0195***
	(0.0058)	(0.0055)	(0.0084)	(0.0057)
Mean	*6.60*	*6.60*	*6.60*	*6.60*
Percent Change	*-0.29%*	*-0.27%*	*-0.32%*	*-0.30%*
Individuals	8,009	8,009	8,009	8,009
N	61,573	61,573	61,573	61,573
	Panel B: Cutoff = Health Satisfaction >8			
State UR	-0.0078***	-0.0078***	-0.0079***	-0.0078***
	(0.0013)	(0.0013)	(0.0013)	(0.0013)
Mean	*18.27%*	*18.27%*	*18.27%*	*18.27%*
Percent Change	*-4.27%*	*-4.27%*	*-4.32%*	*-4.27%*
Individuals	8,009	8,009	8,009	8,009
N	61,573	61,573	61,573	61,573
	Panel C: Ordered Logit			
	0 to 2	**3 to 5**	**6 to 8**	**9 to 10**
State UR	0.0011***	0.0039***	-0.0016***	-0.0034***
	(0.0003)	(0.0009)	(0.0004)	(0.0008)
Mean	*4.89%*	*26.05%*	*50.80%*	*18.27%*
Percent Change	*2.25%*	*1.50%*	*-0.32%*	*-1.86%*
Individuals	8,009	8,009	8,009	8,009
N	61,573	61,573	61,573	61,573
Year effects	Yes	Yes	Yes	Yes
More Controls		Yes		
State-specific time trends			Yes	
Region-Specific time trends				Yes

[a] Notes: Robust standard errors, clustered by states, are shown in parentheses. "More controls" include employment status and monthly individual net income. Furthermore, state dummies and individual fixed effects are included in all models.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Fixed effect ordered logit estimates for health satisfaction (BUC estimates)

	BUC Estimates		
	(a)	(b)	(c)
State UR	-0.0265***	-0.0264***	-0.0265***
	(0.0049)	(0.0049)	(0.0049)
Mean	*6.60*	*6.60*	*6.60*
Percent Change	*-0.40%*	*-0.40%*	*-0.40%*
Year effects	Yes	Yes	Yes
More Controls		Yes	
State-specific time trends			Yes
Individuals	7,946	7,946	7,946
N	234,449	234,449	234,449

[a] Notes: Robust standard errors, clustered by states, are shown in parentheses. "More controls" include employment status and monthly individual net income. Furthermore, state dummies and individual fixed effects are included in all models. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Individual fixed effect estimates on health satisfaction for subgroups

Panel A: Regions				
	East		**West**	
State UR	-0.0324*	-0.0325*	0.0204	0.0204
	(0.0178)	(0.0178)	(0.0209)	(0.0209)
Mean	*6.48*	*6.48*	*6.66*	*6.66*
Percent Change	*0.50%*	*0.50%*	*4.32%*	*4.27%*
State-specific time trends		Yes		Yes
Individuals	2,548	2,548	5,394	5,394
N	22,648	22,648	38,492	38,492
Panel B: Age				
	18-24	**25-50**	**51-65**	**66-85**
State UR	-0.0146*	-0.0281***	-0.0106*	-0.0027
	(0.0078)	(0.0087)	(0.0059)	(0.0155)
Mean	*7.77*	*6.95*	*5.93*	*6.11*
Percent Change	*0.19%*	*0.40%*	*0.18%*	*0.00%*
Individuals	1,113	5,614	2,979	1,321
N	3,987	24,231	16,021	7,338
Panel C: Employment				
	Employed-East	**Employed-West**	**Unemployed >2 Years East**	**Unemployed >2 Years West**
State UR	-0.0254	-0.0396	-0.1437***	-0.0254
	(0.0287)	(0.0339)	(0.0571)	(0.0592)
Mean	*6.83*	*6.92*	*5.58*	*6.14*
Percent Change	*0.37%*	*0.57%*	*2.58%*	*0.41%*
Individuals	1,003	1,796	374	741
N	8,081	14,448	2,989	5,947
Panel D: Income				
	< 25th Percentile	**25-75th Percentile**	**>75th Percentile**	
State UR	-0.0368***	-0.0231**	-0.0141	
	(0.0099)	(0.0105)	(0.0101)	
Mean	*6.61*	*7.09*	*7.12*	
Percent Change	*0.56%*	*0.33%*	*0.20%*	
Individuals	1,146	2,490	1,274	
N	9,152	18,922	9,599	

[a] Notes: Robust standard errors, clustered by states, are shown in parentheses. Year and state dummies as well as individual fixed effects are included in all models. The sample stratification in Panel C is based on employment status between 1990 and 1993, while stratification by income in Panel D is based on reported income prior to reunification. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Individual fixed effect estimates for the role of economic shocks on health care usage

Panel A: Annual Doctor Visits	**Full Sample**			**Region**	
	(a)	(b)	(c)	*East*	*West*
Any annual doctor visit	0.0184***	0.0154***	0.0157***	0.0210**	0.0149
	(0.0021)	(0.0032)	(0.0032)	(0.0085)	(0.0137)
Percent Change	*2.73%*	*2.29%*	*2.33%*	*3.17%*	*2.19%*
At least 8 annual doctor visits	0.0181***	0.0178***	0.0181***	0.0150**	0.0208
	(0.0022)	(0.0024)	(0.0022)	(0.0063)	(0.0141)
Percent Change	*3.53%*	*3.47%*	*3.53%*	*2.98%*	*4.01%*
At least 12 annual doctor visits	0.0160***	0.0157***	0.0160***	0.0148**	0.0204
	(0.0032)	(0.0033)	(0.0032)	(0.0059)	(0.0147)
Percent Change	*4.22%*	*4.14%*	*4.22%*	*4.07%*	*5.27%*
At least 16 annual doctor visits	0.0108***	0.0106***	0.0108***	0.0042	0.0131
	(0.0027)	(0.0029)	(0.0027)	(0.0068)	(0.0127)
Percent Change	*4.48%*	*4.40%*	*4.48%*	*2.06%*	*5.04%*
At least 20 annual doctor visits	0.0072***	0.0072***	0.0072***	0.0048	0.0047
	(0.0027)	(0.0028)	(0.0027)	(0.0066)	(0.0100)
Percent Change	*3.97%*	*3.97%*	*3.97%*	*3.26%*	*2.37%*
More Controls		Yes			
State-spec. time trends			Yes		
Year effects	Yes	Yes	Yes	Yes	Yes
Individuals	8,009	8,009	8,009	2,548	5,394
N	52,896	52,896	52,896	17,434	35,014

Panel B: Hospital Stay Overnight	**Full Sample**			**Region**	
	(a)	(b)	(c)	*East*	*West*
State UR	0.0148***	0.0149***	0.0148***	0.0030	-0.0068
	(0.0016)	(0.0017)	(0.0016)	(0.0051)	(0.0062)
Percent Change	*13.58%*	*13.67%*	*13.58%*	*3.31%*	*-5.75%*
More controls		Yes			
State-spec. time trends			Yes		
Year effects	Yes	Yes	Yes	Yes	Yes
Individuals	8,009	8,009	8,009	2,614	5,456
N	48,002	48,002	48,002	17,783	30,219

[a] Notes: Robust standard errors, clustered by states, are shown in parentheses. "More controls" include employment status and monthly individual net income. Furthermore, state dummies and individual fixed effects are included in all models.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.0$

Table 6: The role of potential mechanisms underlying the link between economic conditions and health

	Exercise weekly		**Satisfaction with :**		**Work-Related Stress**	
	(a)	(b)	*Living Situation*	*Leisure Time*	*Hopeful of finding new job*	*Working in occupation trained for*
State UR	-0.0040**	-0.0036**	-0.1403**	-0.0441***	-0.0173***	-0.0139***
	(0.0016)	(0.0014)	(0.0633)	(0.0129)	(0.0037)	(0.0018)
Mean	*19.83%*	*19.83%*	*6.13*	*6.54*	*19.23%*	*53.77%*
Percent Change	*2.02%*	*1.82%*	*2.29%*	*0.67%*	*9.00%*	*2.59%*
More Controls		Yes				
Year effects	Yes	Yes	Yes	Yes	Yes	Yes
Individuals	8,007	8,007	8,009	8,009	6,129	6,129
N	41,988	41,988	41,541	41,541	17,197	17,197

[a] Notes: Robust standard errors, clustered by states, are shown in parentheses. "More controls" include employment status and monthly individual net income. Furthermore, state dummies and individual fixed effects are included in all models. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: Individual fixed effect estimates on health satisfaction in states with high and low unemployment changes

	East Germany		**West Germany**	
	Larger UR Increase	*Smaller UR Increase*	*Larger UR Increase*	*Smaller UR Increase*
	(a)	(b)	(c)	(d)
State UR	-0.0679***	-0.0379*	-0.0228	0.0811
	(0.0002)	(0.0153)	(0.0247)	(0.0890)
Mean	*6.44*	*6.49*	*6.67*	*6.64*
Percent Change	*-1.05%*	*-0.58%*	*-0.34%*	*1.22%*
Individuals	779	2,012	4,545	864
N	6,674	17,218	31,879	31,879

[a] Notes: Robust standard errors, clustered by states, are shown in parentheses. Year and state dummies as well as individual fixed effects are included in all models. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Individual fixed effect estimates on health satisfaction in post-reunification years only

	Health Satisfaction		
	(a)	(b)	(c)
State UR	-0.0348***	-0.0349***	-0.0349***
	(0.0115)	(0.0115)	(0.0115)
Mean	*6.57*	*6.57*	*6.57*
Percent Change	*-0.53%*	*-0.53%*	*-0.53%*
Year effects	Yes	Yes	Yes
State-specific time trends		Yes	
Region-specific time trends			Yes
Individuals	8,009	8,009	8,009
N	54,851	54,851	54,851

[a] Notes: Robust standard errors, clustered by states, are shown in parentheses. State dummies and individual fixed effects are included in all models. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: Lagged individual fixed effect estimates

	Health Satisfaction		
	(a)	(b)	(c)
State UR	-0.0169***	-0.0169***	-0.0169***
	(0.0043)	(0.0043)	(0.0043)
Mean	*6.60*	*6.60*	*6.60*
Percent Change	*-0.26%*	*-0.26%*	*-0.26%*
Year effects	Yes	Yes	Yes
State-specific time trends		Yes	
Region-specific time trends			Yes
Individuals	8,009	8,009	8,009
N	54,851	54,851	54,851

[a] Notes: Robust standard errors, clustered by states, are shown in parentheses. State dummies and individual fixed effects are included in all models. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10: Individual fixed effect estimates for the role of income inequality on health

	Health Satisfaction	**> 7 Doctor Visits**	**> 11 Doctor Visits**	**Hospital Stay**
	(a)	(b)	(c)	(d)
State Gini	-0.1038**	0.1230***	0.1199***	0.0927***
	(0.0464)	(0.0213)	(0.0206)	(0.0124)
Mean	*6.60*	*51.29%*	*37.88%*	*10.90%*
Percent Change	*1.57%*	*23.98%*	*31.65%*	*85.05%*
Individuals	8,009	8,009	8,009	8,009
N	61,573	47,578	47,578	48,002

[a] Notes: Robust standard errors, clustered by states, are shown in parentheses. Year and state dummies as well as individual fixed effects are included in all models. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure captions

Figure 1(a): Unemployment Rates and Health Satisfaction

Figure 1(b): Unemployment Rates and Hospital Stays

Figures

Figure 1(a)

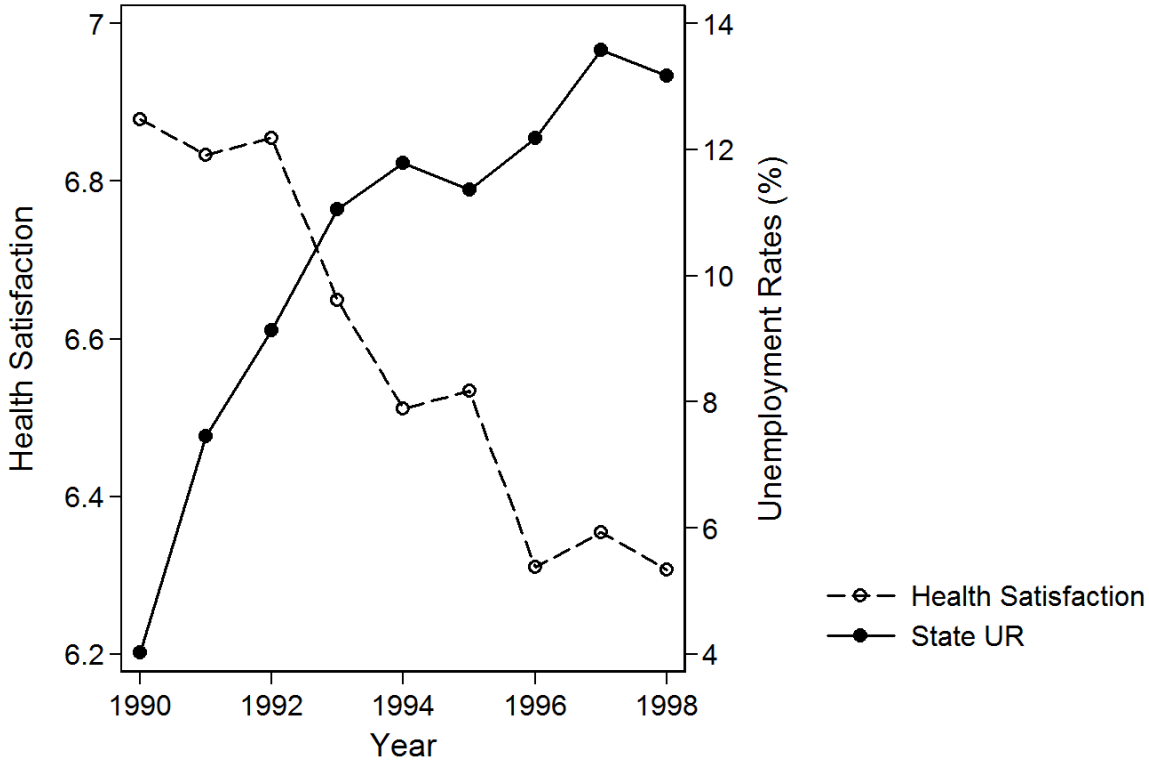
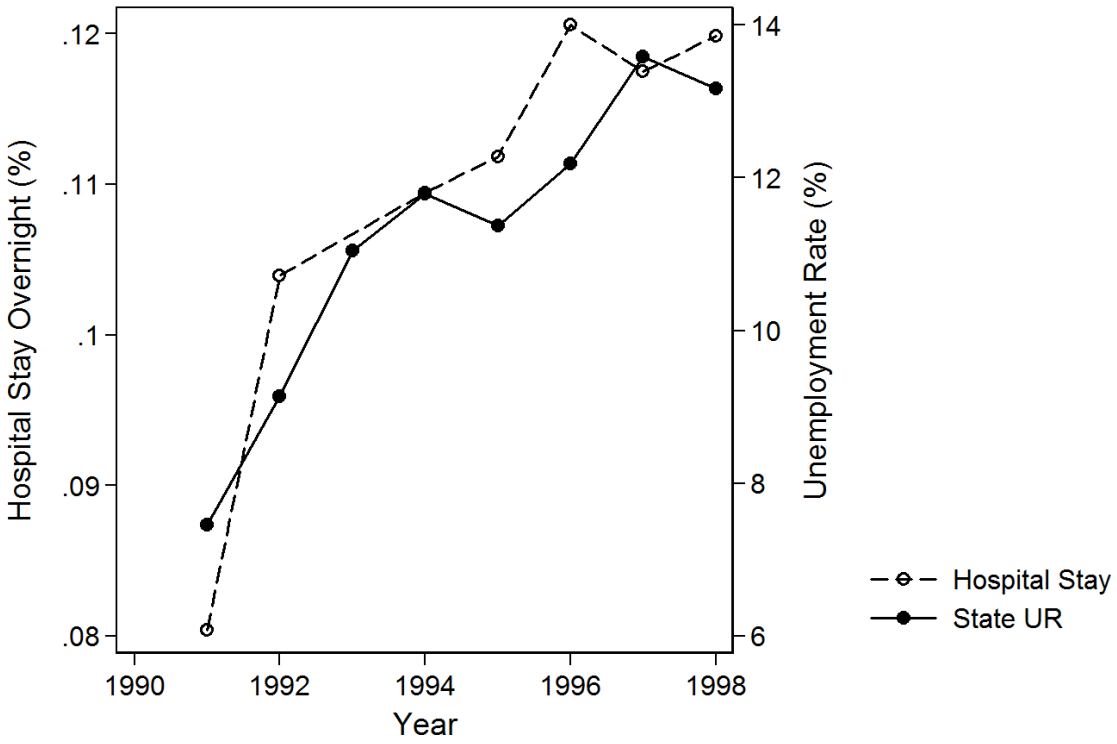


Figure 1(b)


Hospital Stay Overnight (%)
.08
.09
.1
.11
.12
Unemployment Rate (%)
6
8
10
12
14
1990
1992
1994
1996
1998
Year
Hospital Stay
State UR