

THE EFFECT OF MACROECONOMIC FLUCTUATIONS ON HEALTH:
EVIDENCE FROM 2000-2010

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**THE EFFECT OF MACROECONOMIC FLUCTUATIONS ON HEALTH:
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ABSTRACT

Recessions are broadly understood to impose negative consequences on the populations who experience them, but recent scholarship shows, counterintuitively, that some measures of health improve as the economy worsens. Using microdata from the Behavioral Risk Factor Surveillance System (BRFSS) for the years 2000-2010, I examine the effect of state unemployment on the health and health behaviors, including care utilization, of the working-age population. I find continued support for the hypothesis that health is countercyclical, even in the midst of the Great Recession. Fixed-effects analysis reveals positive associations between rising joblessness and both physical and mental well-being, as well as increased rates of exercise. The last finding suggests that changes in the time-price of health-promoting activities may be one reason why the population becomes healthier as times grow tougher.

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I. INTRODUCTION

Recessions are broadly understood to impose negative consequences on the populations who experience them. Poor macroeconomic performance reduces household income and assets, depresses housing markets and rates of home ownership, and increases the share of individuals living in poverty. Economic insecurity also leads to lower birth rates and fewer marriages, and can affect employment prospects and earnings for years after a downturn has ended. It is thus of little surprise that the magnitude of the setbacks and hardships experienced by Americans in recent years, as a result of the Great Recession, may not have been eclipsed in the U.S. since the last “great” economic collapse, in the depression days of the 1930s.

Nevertheless, recent scholarship has suggested that the connection between macroeconomic conditions and well-being is less straightforward than is often assumed. Since Ruhm (2000), evidence has mounted showing that at least some health outcomes *improve* as economies weaken. Rising unemployment repeatedly has been tied to falling mortality rates, while increased joblessness, in the aggregate, may also be associated with higher incidences of health-promoting behaviors. Though the mechanisms underlying these counterintuitive findings are not well understood, some have suggested a role for business-cycle variations in (1) the time-price of health-promoting activities; (2) the physical and psychological demands of employment; (3) external causes of death and morbidity, like traffic accidents and environmental pollution; and (4) the supply of health care services, among other possibilities.

This paper continues previous research into the relationship between the macroeconomy and health by examining the effect of fluctuations in the states’ unemployment rates on the health status and behaviors of working-age adults within each state. I build on the work of past studies in three ways. First, I make current our understanding of this association as it now exists

for the working-age population, by examining data from the past decade, 2000 to 2010. The addition of recent data into our frame is significant for two reasons, first, because the period includes the Great Recession. No other analysis of the macroeconomy and aggregate health has yet examined broadly this critical time for its effects on the working-age population, and thus it remains an open question whether older findings of a positive association between state unemployment rates and physical health persist during a once-in-a-generation shock to the economy. Moreover, an updated analysis may prove to be especially useful, in light of suggestions by other researchers that the nature of some of these relationships may have been changing over time, even before the nation experienced the recent economic collapse (McInerney and Mellor 2012; Stevens et al. 2011).

Second, I shed light on ongoing efforts to identify the mechanisms driving recession-timed health improvements, in particular, in an area of relative tension in the literature. As others have observed, a frequently cited explanation for pro-cyclical mortality -- that the time costs of healthy behaviors are lower during recessions than in periods of high employment -- resides uneasily next to the well-established finding that own job loss negatively impacts health (Miller et al. 2009; Sullivan and von Wachter 2009). I seek to resolve some of this tension by controlling in the microdata for own employment status, including for individuals who are self-employed, and by examining fluctuations in medical care utilization and physical activity across unemployment.

Third, rigorous studies of the effects of the macroeconomy on health have tended to focus on mortality and measures of physical well-being. I add to our understanding of the whole-health picture by examining the link between state unemployment and mental health -- an area in which one might expect a more straightforward, negative relationship to exist.

II. LITERATURE REVIEW

In keeping with the intuitive and generally well-supported understanding that a recession negatively impacts well-being, observers had, for many years, concluded that bad economic times worsen population health. At the individual level, it is well accepted that involuntary job loss is strongly associated with poor physical and mental health (for an overview, see Dooley et al. [1996]; see also Strully [2009]). While drawing a causal connection between individual unemployment and illness sometimes can be difficult (Stewart 2001), researchers have grown increasingly comfortable identifying such a link. Thus, for example, Sullivan and von Wachter (2009) estimate that layoffs of high-tenure male workers raised their mortality rates by 50%-100% in the years immediately following job loss and continued to exert negative pressure on their health as many as twenty years later. At the aggregate level, intuition suggests that the same relationship adheres; the negative shocks associated with recession may work directly and indirectly to reduce public health (Catalano 2009). Thus, influential time-series analyses by Brenner (e.g. 1979) find negative correlations between health outcomes and macroeconomic decline.

In recent years, however, this assumed link at the population level has been strongly challenged. In a pathbreaking study, Ruhm (2000) finds that mortality rates declined, and health-promoting behaviors increased, as macroeconomic conditions deteriorated. Subsequently, Ruhm and others have sought both to replicate this finding -- with respect to mortality, morbidities, behaviors, and other indicia of health -- and to understand the mechanisms by which macroeconomic forces might produce these outcomes. The preponderance of these investigations has reinforced the core hypothesis that recessions improve population (physical)

health in the short term. However, the magnitude of the association, its specific contours, and an explanation for any causal link remain contested.

A. Mortality

Though the suggestion of a counterintuitive relationship between population health and macroeconomic conditions is not new (e.g. Eyer 1977), the hypothesis did not gain wide traction until the relatively recent and more rigorous analysis in Ruhm (2000). Ruhm's core contribution in this initial work was to show that mortality rates in U.S. states actually *decreased* as state unemployment rates went up (other findings in the study are treated below). In an advance over previous analyses, he derived this relationship through a regression model that controlled for fixed effects for state and year, state-specific time trends, and a number of demographic characteristics. Using data from 1972-1991, Ruhm finds that a one percentage point increase in the state unemployment rate was associated with about a .5% decline in the jurisdiction's mortality rate. Ruhm's specific analysis has been replicated (e.g., Miller et al. 2009); and other researchers, employing similar specifications, have uncovered the same negative relationship for different populations, albeit with varying degrees of intensity. Thus, for example, Johansson (2004) observes a .4% decrease in mortality in 23 OECD countries from 1960-1997, Neumayer (2004) finds a 1.1% reduction across German states from 1980-2000, and Lin (2009) records a negative effect of 1.4% for eight Asia-Pacific nations from 1976-2003.

Several subpopulation results, as well as potential changes in the relationship over time, deserve mention. First, researchers have attempted to ascertain whether the overall negative association between unemployment and mortality holds for specific subpopulations, including age group and gender. As to age, Ruhm's initial investigation (2000) finds some evidence of a greater negative impact for individuals aged 20-44 than for seniors (aged 65 or older), but

subsequent research has introduced conflicting accounts of these connections. Miller et al. (2009) and Stevens et al. (2011) find that economic bad times are associated with a much more pronounced decrease in mortality for the elderly than for the working-age population, while McInerney and Mellor's (2012) results provide a strikingly different conclusion: that there is a pattern of countercyclical mortality for seniors (that is, mortality rates increased as unemployment increased). Gender has received relatively less attention, and those findings, too, are relatively unclear. Some researchers calculate that unemployment has a modestly greater negative impact on female mortality than it does on male mortality (Stevens et al. 2011; Neumayer 2004), but these observations may be sensitive to the time period under study (thus, the greater effect on females that Stevens et al. [2011] observe when incorporating more recent data reverses when that data is excluded).

Along these lines, it is possible that some of these subpopulation-specific differences may stem, in part, from changes in the broader relationship between population health and macroeconomic conditions over time. McInerney and Mellor (2012) note that their study of the senior population is drawn from data more recent (1994-2008) than that relied on by Ruhm in his earlier work and wonder whether the previously observed pattern of pro-cyclical mortality may be weakening. This suggestion finds support from others, including Stevens et al. (2011). In reproducing Ruhm's analysis, those researchers discover that the addition of 15 years of data (extending the initial frame to the mid-2000s) effectively halves the regression coefficient on unemployment -- though it remains negative. Similarly, Lin's (2009) study of Asian-Pacific countries notes that when data is separated into two time periods -- the first, from 1976-1996, and the second, from 1997-2003 -- the estimated impact of unemployment on total mortality ceases to be statistically significant.

B. Health Status and Behaviors

1. Physical Health and Health Behaviors

While researchers often have analyzed the impact of the macroeconomy on health in terms of unemployment and mortality rates, they have also frequently estimated the effect of the former on other indicators of health status and healthy living. As with the mortality studies, the relevant contributions largely begin with Ruhm (2000). Utilizing a regression model similar to the one described above and data from the Behavioral Risk Factor Surveillance System (BRFSS) for the years 1987-1995, he finds that downturns in the economy were associated with *decreased* smoking and BMI levels -- with more pronounced reductions for obesity in particular -- and *increases* in exercise and diet quality.

Follow-up efforts by the same researcher and others generally have reinforced the notion that many positive health outcomes and healthy behaviors become more prevalent as unemployment increases. Dehejia and Lleras-Muney (2004) examine the connection between the unemployment rate at the time of a baby's conception and health outcomes at birth and find that economic downturns were positively correlated with infant health. Ruhm and Black (2002) report pro-cyclical fluctuations in alcohol consumption, while Ruhm's (2005) later research, relying on expanded BRFSS data from 1987-2000, confirms that smoking, obesity, and physical inactivity decrease when unemployment rises (Gruber and Frakes [2006] show the same for obesity). Last, yet another Ruhm (2003) study observes relationships of the same direction -- downward as unemployment rises -- for measures of adults who report suffering from at least one medical condition and for the probability of sickness-induced inactivity. These results appear substantively largest for men and prime-age workers, though Ruhm notes that the data

from which they are derived -- responses to the National Health Interview Survey (NHIS) for the years 1972-1981 -- are old and may not reflect current effects.

At the same time, other findings introduce ambiguity. For example, Aguiar and colleagues (2011) use recent data from the American Time Use Survey to conclude that higher rates of unemployment in the Great Recession are correlated with modest increases in exercise -- but also with an apparently larger rise in sedentary pursuits and sleeping. The last of these activities may often be beneficial to health but, in excess, is associated with poor outcomes (Alvarez and Ayas 2004).

Charles and DeCicca (2008) rely on an approach more akin to Ruhm's, regressing the unemployment rate for major metropolitan statistical areas on a number of health behaviors for which data is available in the NHIS (for the years 1997-2001). In contrast to Ruhm, however, they find that increases in unemployment are associated with unhealthy weight gains for those least likely to be employed and for African-Americans, as well as higher levels of smoking for African-American males. Moreover, they divine no systematic connection between unemployment and exercise.

2. Mental Health

It is by now well established that individual job loss is strongly associated with poor psychological health (e.g. Murphy and Athanasou 1999; Dooley et al. 1996). The effect of recessions on mental health at the population level, however, has been the subject of relatively less rigorous study. One exception is Di Tella et al. (2003), who attempt to measure the impact of macroeconomic conditions on the happiness of nations and conclude that economic downturns generate large psychic costs on the populations who experience them. This perhaps intuitive

finding is in keeping with those who suggest that poor macroeconomic performance produces stress about job loss that leads to worse health outcomes (e.g. Catalano and Dooley 1983).

Moreover, and largely in contrast to what their findings say for aggregate physical well-being, the recent regression analyses already discussed provide some reason to believe that a conventional link might exist between unemployment and population mental health. In his earlier work, Ruhm (2000) uses suicide as a proxy for mental health and shows that these deaths are countercyclical; later (2003) he measures substantial declines in non-psychotic mental disorders as economies improve. Similarly, both McInerney and Mellor (2012) and Charles and DeCicca (2008) estimate declines in mental health metrics as unemployment increases: the former do so in the case of seniors, while the latter pair observe it generally among males and particularly among those least likely to be employed.

C. Health Care Access and Utilization

Job loss and, to a lesser extent, the restructuring of employee benefits, reduce the rate of private health insurance coverage during recessions. While some of those who lose employer-sponsored coverage remain insured through continuation coverage (COBRA) or a public program like Medicaid, evidence shows that downturns increase the ranks of the uninsured, particularly as to men (Cawley and Simon 2005). These dynamics have recurred in the recent recession (Cawley et al. 2011; Holahan 2011). Because a lack of insurance generally inhibits access to care (Kaiser Family Foundation 2010), macroeconomic effects that decrease coverage through employment loss should be expected to decrease health care utilization among the working age population, as well (see e.g. Gruber and Currie [1996] for a discussion of the relationship between coverage and utilization). Thus, Lusardi et al. (2010) use responses to the

2009 TNS Global Economic Crisis Survey to demonstrate a significant negative association between the recession -- in terms of unemployment and wealth loss -- and routine medical care.

Limited investigation of this issue in the key regression analyses discussed previously lends some support to this reasoning, as Ruhm (2000, 2003) also finds limited evidence of fewer, relatively routine medical exams during recessions, as well as reduced doctor visits and hospitalizations. Interestingly, McInerney and Mellor's (2012) study of U.S. seniors reveals *greater* utilization, at least in terms of inpatient care. They hypothesize that this seemingly inconsistent finding may be a supply-side effect of hard times among the working-age population. Specifically, they suggest that rising unemployment reduces utilization among those under age 65, freeing provider capacity. This capacity may then be redirected to the Medicare population and presents in the form of higher utilization among the elderly.

Somewhat to the contrary, however, other limited evidence suggests that even the relationship between macroeconomic conditions and the frequency of medical care use may be more complicated than is often assumed. Thus, the time use study by Aguiar et al. (2011) finds a modest increase in the time devoted to medical care during the recent recession. In more specific contexts, Vistnes and Hamilton (1995) see a negative association between a mother's employment status (and hours worked) and her child's medical care utilization, and Dehejia and Lleras-Muney (2004) link a worsening economy to increases in prenatal care. Reconciling these findings with those that show worse access to and less frequent use of care during downturns is an objective of this study.

III. CONCEPTUAL MODEL AND METHODOLOGICAL APPROACH

A. Conceptual Model

The literature identifies a variety of potential explanations for why macroeconomic forces might affect health at the population level. Though no consensus has formed in support of any particular mechanism or mechanisms, five causal stories deserve attention in this ongoing debate. Two of these hypotheses rely on the notion that economic downturns may bring on lifestyle changes that lead to better health. First, recessions likely alter the time-price of health-promoting activities (e.g. Ruhm 2000). We can expect that rising unemployment increases population leisure time, which in turn reduces the time-price of investments in health. Exercise and diet are behaviors seemingly most likely to respond in this fashion, and Ruhm's findings (2000, 2005) see evidence of this dynamic. But it may illuminate other behavior, too. An increase in leisure time plausibly might translate into increased care utilization, as Aguiar (2011) appears to observe, which could bolster health outcomes (though the negative impact of unemployment on insurance coverage provides reason to be skeptical of this possibility). Indeed, changing opportunity costs may also explain some of the observed decreases in bad health behaviors, like smoking and drinking alcohol, though the connection there is more attenuated and may involve income effects.

Second, health may be an input in the production of goods and services (Ruhm 2000). An increase in employment in boom times results, for many, in longer work hours and work intensity, and a consequent uptick in the physical and psychological demands of labor. Sleep is likely to decrease and workplace injuries and fatalities may rise (particularly in industries, like construction, which rise and fall with the business cycle), all of which take a toll on aggregate health.

Yet, though these theories attract considerable attention in the literature, there is some debate about the extent of their explanatory power. To begin, behavioral mechanisms must be reconciled with the evidence that unemployment negatively impacts health on the individual level. In order to square the positive health effects measured in the aggregate with the opposite impacts observed with respect to individual job losers, it would appear that the health benefits of recessions must accrue predominately to those who have not lost jobs (Stevens et al. 2011). However, it is this group -- those who remain employed in a tough economy -- who are seemingly relatively unlikely to experience the increase in leisure time that is at the root of these explanations. Moreover, findings from Miller et al. (2009) and Stevens et al. (2011) suggest that most of the recessionary declines in mortality come from the elderly, a population unlikely to be working and therefore unlikely to be impacted by changing opportunity costs for healthy behaviors (see also Ruhm 2007).

Third, large-scale ecological factors associated with changes in economic performance may influence health from a position external to the individual. One example is literally environmental: many forms of pollution are likely to occur pro-cyclically, and in so doing may depress health outcomes in time with the business cycle, particularly as to infants (Chay and Greenstone 2003). Separately, evidence suggests that upswings in employment and economic activity bring greater traffic congestion; and with more people on the roads, motor vehicle injuries and fatalities rise, as well (Gerdtham and Ruhm 2006; Ruhm 2000).

Fourth, in recent work, Stevens et al. (2011) argue that, at least as to the elderly population, observed outcomes may be a consequence of health supply. They assert that the pro-cyclical mortality fluctuations they register among seniors may be understood by reference to staffing levels at nursing homes. As economies improve and labor market mobility increases,

staffing at skilled nursing facilities declines significantly. This trend, they posit, leads to relatively worse care quality and a related increase in senior mortality.

Fifth and finally, no effort to conceptualize the relationship between recessions and health is complete in the absence of an explanation in keeping with common expectation. Thus, some suggest, and see evidence in support, that economic downturns produce such stress and insecurity about the possibility of job loss and income reduction that population health is negatively impacted (e.g. Charles and DeCicca 2008; Catalano and Dooley 1983).

B. Empirical Model

In order to test the hypothesized relationships, I employ the following equation, derived from Ruhm (2000):

$$H_{ijt} = \alpha_t + \beta X_{ijt} + \gamma E_{jt} + S_j + \varepsilon_{ijt}$$

The dependent variable, **H**, represents the particular health outcome under study; **X** is a set of individual characteristics, including age, sex, race, education, income, employment, marital status, and health insurance coverage status; **E** represents the state's economic condition, operationalized by its annual unemployment rate; **α** incorporates general time effects; **S** captures state fixed effects; ε is the error term; and **i**, **j**, and **t** index the individual, state of residence, and year surveyed, respectively. Since my dependent variables are dichotomous, I estimate results using both linear probability and binary probit models.

IV. DATA AND VARIABLES

A. Data Sources

My data spans the years 2000 to 2010 and is merged from two sources. Data for my primary explanatory variable, state unemployment rates, comes from the Bureau of Labor Statistics (BLS). BLS administers the Local Area Unemployment Statistics Database, which

provides, among other information, the annual unemployment rate for the fifty states and the District of Columbia for each of the years under study.

Information on health outcomes and individual characteristics comes from the Behavioral Risk Factor Surveillance System. The BRFSS is a large, cross-sectional telephone survey of American adults that collects information on a variety of health-risking and health-promoting behaviors, including measures of care access and utilization. The survey was established in 1984 by the Centers for Disease Control and Prevention (CDC) and is conducted annually by state health departments under the administration of the CDC. In a given year, the survey comprises a set of core questions, asked of all respondents in all surveyed states, and a number of supplemental “modules,” posed only to respondents in those states that chose to adopt the particular module.

During the time period subject to my analysis, 2000-2010, the BRFSS was conducted annually in all fifty states, the District of Columbia, and several U.S. territories. Samples were large, ranging from more than 180,000 respondents nationally in 2000 to more than 450,000 by 2010, and were representative of the civilian non-institutionalized adult population in each surveyed region and for the U.S. as a whole.

B. Study Sample

As discussed above, this study focuses on the impact of state economic conditions on the health of the adult working-age population. Accordingly, I confine my analysis to a subsample of BRFSS respondents consisting of civilian non-institutionalized adults, aged 18-64, from all 50 states and the District of Columbia. This restriction thus excludes information for respondents from surveyed U.S. territories and for adults aged 65 or older.

Additionally, I select a study period so as to isolate a time range encompassing both strong and weak economic performance, subject to limitations in the availability and comparability of relevant BRFSS data. The period from 2000-2010 satisfies these criteria. These eleven years saw substantial variation in economic conditions, progressing from robust employment at the beginning of the range, to recession felt primarily in 2002-2003, to an accelerating economy in the middle of the decade, to the Great Recession at the period's end. Importantly, these fluctuations are evident in the unemployment rate data, both among and within states. Thus, while annual unemployment rates ranged from 2.3% (Connecticut and Virginia) to 6.2% (Alaska) in 2000, they stretched from 3.8% (North Dakota) to 13.7% (Nevada) in 2010. At the same time, none of the states ranked in the top five in unemployment in 2000 fell into the same category eleven years later. Only three states in the top ten (California, Mississippi, and Oregon) were similarly situated at the end of the period, and all experienced unemployment that was at least 80% higher than in 2000.

C. Dependent Variables

This analysis seeks to explain variations in the health of working-age individuals in terms of their (1) physical and mental health status; (2) access to and utilization of care; and (3) propensity to engage in physical activity. In order to gauge overall health, I rely on a series of questions from the BRFSS which ask respondents to assess their physical and mental health and the limitations resulting therefrom. Specifically, the BRFSS asks individuals to indicate the number of days in the past thirty in which their physical (mental) health was not good. Among those reporting at least one unhealthy day, the survey inquires as to the number of days, if any, in which the indicated poor physical or mental health kept the respondent from “doing [her] usual activities, such as self-care, work, or recreation.” While such self-reported indicators have well-

known limitations, they are, nonetheless, straightforward measures of respondents' perceptions of their own health, and similar measures have been used in previous work in this area (e.g. McInerney and Mellor 2012). Accordingly, I capture health status using three variables derived from these questions. Two indicators denote whether an individual experienced three or fewer physically (mentally) unhealthy days in the past 30 days; the third designates respondents whose unhealthy days limited their usual activities on at least one day in the previous month.

I operationalize access to and utilization of care using three dichotomous variables drawn from the core questions that explore these concepts in the BRFSS. The first variable shows whether the respondent reported having at least one personal doctor or health care provider. The second switches on if the respondent visited a doctor for a routine checkup in the last year. The third variable indicates whether the respondent reports that she needed to see a doctor in the last year, but was unable to do so because of cost.

Finally, I measure physical activity using a dichotomous variable derived from the BRFSS's core question about exercise. A respondent who reports having "participate[d] in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise," other than as part of her regular job, is designated as physically active; a respondent who responds negatively is not.

D. Independent Variables

My primary explanatory variable, which proxies for a state's economic condition, is the state annual unemployment rate. The rate is measured as a percentage of the civilian non-institutionalized population, aged 16 or older, who are without jobs, are actively seeking employment, and are available to work. Regressions testing the effect of the state economy on

health rely on the raw percentage of state unemployment, though I transform the variable to categorical and dichotomous measures for descriptive purposes.

In addition, I control for a set of individual characteristics. Dummy variables specify a respondent's age (18-24; 25-44; and 45-64), sex, race (non-Hispanic White; non-Hispanic Black; and Hispanic), educational attainment (high school graduate; high school dropout; some college; and college graduate), income (less than \$15,000; \$15,000-\$24,999; \$25,000-\$34,999; \$35,000-\$49,999; \$50,000-\$74,999; and \$75,000 and above), employment (employed for wages; self-employed; and out-of-work) marital status (never married; married; divorced/separated; widowed), and health insurance coverage status (some insurance; uninsured).

V. DESCRIPTIVE STATISTICS

Table 1 displays simple descriptive statistics for the dependent variables under study, incorporating BRFSS final sampling weights. For the period from 2000 to 2010, more than three-quarters of working-age adults (77.1%) reported having a regular doctor, though only about two-thirds (64.0%) visited a provider for a regular checkup in the year prior to being surveyed. About 14% of the cohort reported having forgone medical care because of its cost, while 39% of those who experienced at least one day of poor physical or mental health indicated that their health status had limited their usual activities.

Table 1.
Descriptive Statistics for Dependent Variables.

Variable	Sample Size	Weighted Mean
At least one personal doctor or health care provider	2,474,599	77.1%
Visited doctor for routine checkup in last year	1,870,879	64.0%
Could not see a doctor in last year because of cost	2,454,644	14.2%
Leisure time physical activity or exercise in last month	2,599,817	76.7%
Physical health: 3 or fewer unhealthy days in last 30	2,491,521	80.4%
Mental health: 3 or fewer unhealthy days in last 30	2,491,494	76.1%
Health limitations: At least one day in last 30 when poor physical or mental health limited activities (among those reporting unhealthy days)	1,353,167	39.4%
<i>Notes: Data are from the Behavioral Risk Factor Surveillance System for the years 2000 to 2010. The sample consists of civilian non-institutionalized adults, aged 18-64, from all fifty states and the District of Columbia.</i>		

Table 2 displays unweighted descriptive information for my chief explanatory variable, state unemployment rates. The unusually high levels of unemployment experienced during the Great Recession skew the distribution upwards, with the mean rate of 5.74% resting nearly half a percentage-point higher than the median.

Table 2.
Descriptive Statistics for State Unemployment Rates.

Variable	Sample Size	Mean	Std. Dev.	Min.	Median	Max.
Unemployment rate (state annual average, in percent)	2,601,445	5.74	2.11	2.3	5.3	13.7
<i>Notes: State unemployment rate data are from the Bureau of Labor Statistics Local Area Unemployment Statistics Database and cover the years 2000 to 2010.</i>						

Controls for individual characteristics are summarized in Table 3. The sample is split

Table 3.
Descriptive Statistics for Control Variables.

<u>Variable</u>	<u>Sample Size</u>	<u>Weighted Mean</u>
Age (years)	2,601,445	40.1
Sex (% male)	2,601,445	50.0%
<u>Race/Ethnicity</u>	2,601,231	
White, non-Hispanic		67.6%
Black, non-Hispanic		10.2%
Hispanic		14.6%
<u>Education</u>	2,601,445	
Some high school		10.8%
High school graduate		28.5%
Some college		27.2%
College graduate		33.1%
<u>Income</u>	2,600,138	
Less than \$15,000		8.5%
\$15,000 - \$24,999		13.3%
\$25,000-\$34,999		10.6%
\$35,000-\$49,999		14.3%
\$50,000-\$74,999		16.1%
\$75,000 and above		26.0%
<u>Employment Status</u>	2,600,551	
Employed for wages		61.2%
Self-employed		9.4%
Out-of-work		6.7%
<u>Marital Status</u>	2,600,986	
Never married		21.8%
Married		60.0%
Divorced/separated		11.7%
Widowed		1.9%
<u>Health Insurance Coverage Status</u> (% with some insurance)	2,601,442	81.6%
<i>Notes: Data are from the Behavioral Risk Factor Surveillance System for the years 2000 to 2010. The sample consists of civilian non-institutionalized adults, aged 18-64, from all fifty states and the District of Columbia.</i>		

evenly among men and women and the average respondent is 40 years old. Roughly two-thirds of non-elderly adults (67.6%) identify as non-Hispanic White, one-third graduated from a four-year college, and just over one-fourth reported earning at least \$75,000 in the previous year.

Sixty-one percent of the working-age population is employed for wages, about one-in-ten are self-employed (9.4%), and 6.7% are out-of-work. Most of the cohort (60.0%) is married, while a large majority (81.6%) report having at least some form of public or private health insurance coverage.

Table 4 illustrates simple variation in the weighted means of the dependent variables, in cases where state unemployment was very low (defined as being in the bottom 20% of unemployment rates over the time period, equal to a rate of 4.1% or below) or very high (defined as being in the top quintile, encompassing rates of 7.1% and higher). Values are statistically different in the two unemployment contexts across all but one outcome variable (whether respondents reported having a regular doctor).

Table 4.
Cross-Tabulation of Dependent Variables by Indicators of Low and High Unemployment.

<u>Outcome Variable</u>	<u>Low Unemployment</u>	<u>High Unemployment</u>
At least one personal doctor or care provider	77.7	77.6
Visited doctor for routine checkup in last year	66.2	63.6***
Could not see a doctor in last year because of cost	12.8	16.9***
Leisure time physical activity or exercise in last month	76.9	77.5**
Physical health: 3 or fewer unhealthy days in last 30	81.8	79.3***
Mental health: 3 or fewer unhealthy days in last 30	77.4	75.4***
Health limitations: At least one day in last 30 when poor health limited activities (among those reporting unhealthy days)	37.9	41.1***
<i>Notes: Values are statistically different across unemployment rate categories as indicated by *** for values significant at the .01 level and ** for the .05 level.</i>		

In general, outcomes worsen as unemployment rises. Thus, working-age adults are about 3 percentage points less likely to report having had a regular checkup during high unemployment

periods than they are when the economy is good, while the chance that one failed to see a doctor in the previous year because of the cost of care increases by nearly a third moving from low to high unemployment (12.8% to 16.9%). Self-reported health status is also worse in bad economic times, by between 2 and 3 percentage points for physical and mental health, and by a slightly larger margin (3.2 percentage points) for health limitations. The direction of the change in the case of physical health is noteworthy at this early threshold of analysis, given that it shows a relationship opposite to that predicted by recent research.

Finally, Table 5 displays the variation in weighted means across employment status and sex. In keeping with what we saw in Table 4's depiction of variation across the chief explanatory variable, measures of own-employment show statistically significant differences that trend in the direction that intuition suggests -- that is, worsening with job loss. Accordingly, the number of employed adults who report having a personal doctor is significantly and substantially higher than the share of out-of-work adults with the same response (78.4% compared to 62.1%). Likewise, the share of adults who could not see a doctor in the last year because of cost nearly triples moving from the employed to out-of-work categories (11.2% compared to 30.6%). Health status measures exhibit similar patterns. The unemployed are nearly 13 percentage points (15%) less likely to report being in good physical health and almost 16 percentage points (19.7%) less likely to say the same about their mental well-being. Conversely, they are much more likely (46.2%) than the employed to be limited in their daily activities because of their health: almost 49% of the out-of-work report such a limitation, compared with only a third of those employed for wages. Meanwhile, means for the self-employed tend to fall in between in these categories but resemble more the characteristics of wage earners. Notable exceptions are

for mental health and physical exercise, both of which show self-employed adults as the healthiest.

Table 5.
Cross-Tabulation of Dependent Variables by Employment Status and Sex.

<u>Outcome Variable</u>	<u>Employed</u>	<u>Self-Employed</u>	<u>Out-of-Work</u>	<u>Male</u>	<u>Female</u>
At least one personal doctor or care provider	78.4	74.0	62.1	71.5	82.8
Visited doctor for routine checkup in last year	64.0	56.5	55.6	57.8	70.2
Could not see a doctor in last year because of cost	11.2	16.0	30.6	12.0	16.4
Leisure time physical activity or exercise in last month	78.6	80.4	71.6	78.5	74.8
Physical health: 3 or fewer unhealthy days in last 30	85.5	84.6	72.7	83.0	77.8
Mental health: 3 or fewer unhealthy days in last 30	79.5	80.4	63.8	80.3	72.0
Health limitations: At least one day in last 30 when poor health limited activities (among those reporting unhealthy days)	33.3	36.1	48.7	38.3	40.2
<i>Notes: All values are statistically different from others in the same category (employment/sex) at the .01 level.</i>					

Turning to gender, differences are somewhat more modest but still statistically significant among all outcome variables. Women report better access to care than do men (82.8% say they have at least one personal care provider, compared to 71.5% of men) and are about 12 percentage points more likely to visit their doctor regularly (70.2% to 57.8%). On the other hand, women are about 36% (4.4 percentage points) more likely than men to report that cost pressures forced them to forgo desired care. These mixed results notwithstanding, working-age women appear to

be in worse health, on average, than their male counterparts, both in terms of physical health (a 5.2 percentage point deficit vis-à-vis men) and mental well-being (8.3 percentage points).

VI. RESULTS

A. The Effect of Macroeconomic Conditions on Health for Working-Age Adults

I begin my examination of the relationship between health outcomes and state economic conditions by using the primary specification derived from Ruhm (2000) and described above.

Results are displayed in Table 6. Here, as elsewhere, the reported estimates are from linear probability models; corresponding binary probit regressions yield near identical values.

Estimates in the primary specification are highly statistically significant for five of the seven dependent variables under study.

Table 6.
Effects of State Unemployment on Health Status, Care Access and Utilization, and Exercise:
Full Sample of Working-Age Adults.

	Personal Doctor (1) ($\mu = .771$)	Routine Checkup (2) ($\mu = .640$)	Foregone Care Because of Cost (3) ($\mu = .142$)	Leisure Time Physical Activity (4) ($\mu = .767$)	Physically Healthy (5) ($\mu = .804$)	Mentally Healthy (6) ($\mu = .761$)	Health Limitations (7) ($\mu = .394$)
State Unemployment Rate	.0030*** (.0007)	.0008 (.0009)	.0019*** (.0006)	.0059*** (.0007)	.0017*** (.0007)	.0031*** (.0007)	-.0002 (.0012)
<p><i>Notes:</i> Each column displays a regression estimate corresponding to a different dependent variable, as described more fully here and in the text: (1) had at least one personal doctor or health care provider; (2) visited doctor for routine checkup in last year; (3) could not see a doctor in last year because of cost; (4) engaged in leisure time physical activity or exercise in last month; (5) self-reported as physically healthy (3 or fewer unhealthy days in last 30); (6) self-reported as mentally healthy (3 or fewer unhealthy days in last 30); (7) experienced health limitations (at least one day in last 30 when poor physical or mental health limited activities, among those reporting unhealthy days). All models include controls for age, sex, race/ethnicity, education, income, employment status, marital status, and health insurance coverage status, as further described in the text, as well as year and state fixed effects. All estimates are obtained from linear probability models; probit average marginal effects are similar. Standard errors are shown in parentheses. Statistical significance is indicated by *** for values significant at the .01 level.</p>							

We see, first, that unemployment appears positively associated with self-reported health status, both as to physical and mental well-being. The model reveals that a one percentage point

increase in a state's unemployment rate is linked with a substantively modest but statistically significant .2 percentage point increase in the number of working-age individuals who report being physically healthy. And, perhaps surprisingly, this connection is stronger for mental health. There, an equal increase in unemployment is associated with a larger, and still statistically significant, rise in self-reported mental health of about .3 percentage points. This corresponds to about a .4% boost in mental well-being at the sample average. In contrast to these significant findings, there is no evidence that unemployment affects an individual's propensity to experience limitations in daily living on account of her health. Conditional on reporting one or more unhealthy days, the share of individuals who report such health limitations dips by a statistically insignificant .02 percentage points for every one percentage point increase in the jobless rate.

The relationship between unemployment and access to and utilization of care is, by these results, more murky. Working-age individuals are .3 percentage points (.4%) more likely to report having at least one personal doctor or health care provider, for each one percentage point rise in the unemployment rate. This highly statistically significant finding indicates a small positive association between care access and a bad economy. Cutting in the other direction, however, the model provides evidence that care utilization goes down as economic conditions worsen. A one percentage point increase in unemployment is timed with about a .2 percentage point uptick in the share of persons reporting that they could not see a doctor in the last year because of cost, a result equal to more than a 1% gain over the mean. The incidence of routine checkups, however, appears unaffected by state joblessness. A one percentage point increase in the unemployment rate is associated with a statistically insignificant .08 percentage point

increase in the proportion of those who report visiting a doctor for a routine checkup in the prior year.

Finally, we see that changes in the macroeconomy produce their largest effect among the studied variables in terms of an individual's propensity to be physically active. For a one percentage point increase in a state's unemployment rate, the share of working-age adults who engaged in leisure time physical activity or exercise in the last month rises by .6 percentage points -- an increase from the sample mean equal to about .8%.

The primary specification has the virtue of revealing the association between economic conditions and the dependent variables along the continuum of unemployment and is the method most frequently utilized by past researchers who have explored this issue. For these reasons, I return to that specification in my analysis below. First, however, I employ an alternative model for estimating the key relationships, the results of which are displayed in Table 7. In this secondary specification, I substitute indicators of high and low unemployment for the continuous explanatory variable found in the primary model. In particular, I estimate the respective effects of living in a state with very low and very high unemployment, relative to a baseline of states with moderate levels of joblessness. Low and high unemployment states are again defined as those which experienced unemployment rates in the lowest and highest quintile, respectively, over the eleven-year study period. These categories correspond to rates that are less than or equal to 4.1%, in the case of low unemployment states, and greater than or equal to 7.1%, for the high unemployment states. Accordingly, the baseline group encompasses states with joblessness rates in between these extremes (with values ranging from 4.2% up to and including 7.0%).

Table 7 shows that the relationships between unemployment and health status are much more attenuated than in the primary model, with estimations producing only a single statistically

significant association in this area. We see that living in a low unemployment state is linked with a statistically significant .3 percentage point (.4%) drop in the share of physically healthy working-age adults, a relationship that is in the same direction as the one between unemployment and physical health catalogued in Table 6. But, no other coefficient on these unemployment indicators reveals a statistically meaningful connection with health status. Here, for example, and unlike in the primary specification, there is no evidence that self-reported mental health status responds to macroeconomic conditions.

Table 7.
Effects of Unemployment Rate Extremes on Health Status, Care Access and Utilization, and Exercise: Full Sample of Working-Age Adults.

	Personal Doctor (1) ($\mu = .771$)	Routine Checkup (2) ($\mu = .640$)	Foregone Care Because of Cost (3) ($\mu = .142$)	Leisure Time Physical Activity (4) ($\mu = .767$)	Physically Healthy (5) ($\mu = .804$)	Mentally Healthy (6) ($\mu = .761$)	Health Limitations (7) ($\mu = .394$)
Low State Unemployment	-.0017 (.0020)	.0043* (.0025)	-.0013 (.0017)	-.0044** (.0019)	-.0033* (.0017)	-.0023 (.0019)	-.0002 (.0030)
High State Unemployment	.0171*** (.0029)	.0026 (.0040)	.0047* (.0024)	.0144*** (.0027)	-.0021 (.0027)	.0014 (.0029)	.0016 (.0047)
<i>Notes:</i> See Table 6 for a description of the dependent variables and controls. Low and high state unemployment indicators reflect those states which experienced unemployment rates in the lowest and highest quintiles, respectively, over the time period (corresponding to rates less than or equal to 4.1%, for low unemployment states, and greater than or equal to 7.1%, for high unemployment states). Effects are shown relative to a baseline of moderate unemployment states (those with rates falling within the middle 60 percentiles, with values ranging from 4.2% to 7.0%). Standard errors are shown in parentheses. Statistical significance is indicated by *** for values significant at the .01 level, ** for the .05 level, and * for the .1 level.							

As we turn to the other dependent variables however, we observe impacts that are comparatively more robust. All three of the variables measuring access and utilization exhibit statistically significant associations with at least one of the unemployment indicators, in two instances revealing a relationship of the same sign as we would predict given the results from the primary model. Thus, individuals in high unemployment states are about 1.7 percentage points (2.2%) more likely than the baseline to report having a regular doctor and about .5 points (3.3%)

more likely to have foregone care in the previous year because of its cost. At the other extreme, low unemployment is associated with a .4 percentage point increase in the incidence of routine checkups, a statistically significant finding for a variable that displayed no rigorous relationship with the economy in the primary model. Finally, low and high unemployment states are associated with statistically significant differences from the baseline in the rate of leisure time physical activity. Working-age adults in low unemployment states are about .4 percentage points (.6%) less likely to exercise than those in moderate unemployment locations, while physical activity among individuals living in states with high levels of joblessness is 1.4 points (1.9%) more common than for the baseline. Both of these relationships are in the same direction as that observed for this variable in the primary model.

B. Employment Status and Health

We return to the primary specification to see what it reveals regarding the relationship between employment status and the dependent variables of interest. Table 8 displays estimates of the effects of being self-employed and out-of-work, respectively, relative to a baseline condition of being employed for wages. Unsurprisingly, the unemployed provide responses for most of these variables that, on average, reflect levels of health and opportunities for care lower than that experienced by the employed. With respect to self-reported health status, we see highly statistically significant differences between these groups. Holding all else in the primary specification equal, the share of the out-of-work subgroup reporting to be in good physical health is more than 8 percentage points lower than that for the employed group, and more than 10 percentage points below the baseline for mental health. And the prevalence of health limitations also diverges: these restrictions on daily living are 13 percentage points (or 33%) more common

among the unemployed versus the baseline, a value that is both statistically and substantively quite significant.

Rates of care access, utilization, and exercise, reveal statistically significant -- though substantively smaller -- differences among the out-of-work and the employed, as well. The share of the unemployed who report having a personal doctor is about 1.4 percentage points lower than it is for wage earners, while individuals in the former category are more than 6 percentage points (45%) more likely to say they have foregone medical care on account of its cost than are those in the latter group. However, there is no evidence that either category receives checkups any more frequently than the other; the modest, .5 percentage point difference in this category is not statistically significant. Finally, on average, those who are out-of-work are slightly more likely than the employed to indicate that they have engaged in leisure time physical activity (a statistically significant .7 percentage point increase over baseline).

Table 8.
Effects of Employment Status on Health Status, Care Access and Utilization, and Exercise:
Full Sample of Working-Age Adults.

	Personal Doctor (1) ($\mu = .771$)	Routine Checkup (2) ($\mu = .640$)	Foregone Care Because of Cost (3) ($\mu = .142$)	Leisure Time Physical Activity (4) ($\mu = .767$)	Physically Healthy (5) ($\mu = .804$)	Mentally Healthy (6) ($\mu = .761$)	Health Limitations (7) ($\mu = .394$)
Self-Employed	-.005*** (.0019)	-.0359*** (.0025)	.0177*** (.0016)	.0262*** (.0018)	-.0018 (.0016)	-.0011 (.0018)	.0206*** (.0031)
Out-of-work	-.0139*** (.0026)	-.0005 (.0032)	.0633*** (.0025)	.0074*** (.0025)	-.0827*** (.0025)	-.1019*** (.0028)	.1299*** (.0037)
<i>Notes:</i> See Table 6 for a description of the dependent variables and controls. Effects of employment status are shown relative to a baseline of individuals employed for wages. Standard errors are shown in parentheses. Statistical significance is indicated by *** for values significant at the .01 level.							

Turning next to the self-employed, we see that this group is relatively similar to the baseline in terms of health status. Neither the physical nor the mental self-reported health

category carries a coefficient that is statistically different among groups, though the self-employed are statistically more likely than regular wage earners to suffer from a health limitation (by about 2.1 percentage points).

Care access and utilization show more of a divergence, with the self-employed faring marginally worse than the baseline. Those in the former category are less likely to have a personal doctor (by about .5 percentage points) or attend routine checkups (by about 3.6 percentage points, or 5.6%), and are more likely to report having foregone care due to cost (1.8 percentage points, or 12.5%), than are wage earners.

Finally, as is true for those in the out-of-work category, self-employed individuals find time for physical activity at a rate that is statistically higher than the baseline (about 2.6 percentage points higher, in the case of the self-employed).

C. Unemployment Rate Effects for Selected Subgroups

We move next to the effects of state unemployment for selected subgroups of the working-age adult sample. Table 9 displays these results, disaggregating effects by gender and employment status. For each dependent variable, the first column provides the weighted mean for the given group, while the second column shows the regression coefficient.

We examine gender first. Here, we see that, notwithstanding significant differences between men and women in average values for each of the dependent variables, the effects of fluctuating macroeconomic conditions are, for both sexes, identical in direction and quite similar in magnitude. On average, both males and females become modestly healthier as the state unemployment rate rises. A one percentage point increase in the joblessness rate is associated with about a .2 percentage point increase in the physical health metric for each sex (although the coefficient for men lies just beyond the threshold for statistical significance, with a p-value equal

to .104). And similar results present for mental well-being, where a one-step increase in unemployment links with a highly statistically significant .3 percentage point rise in the share of both men and women who report being in good mental health.

Table 9.
Effects of State Unemployment on Health Status, Care Access and Utilization, and Exercise: Selected Subgroups.

Group	Personal Doctor (1)		Routine Checkup (2)		Foregone Care Because of Cost (3)		Leisure Time Physical Activity (4)		Physically Healthy (5)		Mentally Healthy (6)		Health Limitations (7)	
	μ	β	μ	β	μ	β	μ	β	μ	β	μ	β	μ	β
Full Sample	.771	.0030*** (.0007)	.640	.0008 (.0009)	.142	.0019*** (.0006)	.767	.0059*** (.0007)	.804	.0017*** (.0007)	.761	.0031*** (.0007)	.394	-.0002 (.0012)
Male	.715	.0028** (.0012)	.578	.0021 (.0015)	.120	.0028*** (.0010)	.785	.0058*** (.0011)	.830	.0017 (.001)	.803	.0034*** (.0011)	.383	-.0001 (.0019)
Female	.828	.0030*** (.0009)	.702	-.0007 (.0011)	.164	.0010 (.0008)	.748	.0060*** (.0009)	.778	.0020** (.0009)	.720	.0029*** (.0010)	.402	-.0004 (.0014)
Employed	.784	.0055*** (.0009)	.640	.0023* (.0012)	.112	.0011 (.0008)	.786	.0056*** (.0009)	.855	.0007 (.0008)	.795	.0027*** (.0009)	.333	-.0000 (.0015)
Self-Employed	.740	.0017 (.0023)	.565	-.0027 (.0029)	.160	.0018 (.0020)	.804	.0051** (.0021)	.846	.0012 (.0020)	.804	.0015 (.0022)	.361	.0061 (.0039)
Out-of-work	.621	-.0014 (.0032)	.556	-.0013 (.0039)	.306	.0061** (.0031)	.716	.0093*** (.0030)	.727	.0038 (.0030)	.638	.0043 (.0033)	.487	-.0036 (.0043)

Notes: See Table 6 for a description of the dependent variables and controls. For each dependent variable, the first column displays the weighted mean for the given group; the second column provides the estimated coefficient for the state unemployment rate, with standard errors shown in parentheses. Statistical significance indicated by *** for values significant at the .01 level, ** for the .05 level, and * for the .1 level.

Likewise, when the unemployment rate fluctuates, men and women experience substantively similar (and statistically significant) percentage point changes in metrics gauging their access to care and propensity to exercise. Thus, a one percentage point increase in unemployment is timed with a .3 percentage point gain in the proportion of each group who report having at least one personal doctor, and a .6 percentage point increase in the share of men and women who say they have engaged in leisure time physical activity in the last month. The only category for which there exists both statistical and substantive differences between genders is the one that measures the rate at which individuals forgo care because of cost. For that variable, a one percentage point rise in state unemployment aligns with a highly statistically significant .3 percentage point increase in forgone care for men. However, the same

unemployment rate change produces a substantively smaller .1 point increase in the dependent variable for women, an effect that is not statistically different from zero.

In the bottom three rows of Table 9, we see the results of unemployment rate fluctuations stratified by employment status. As is this case with gender, there are significant disparities in the (weighted) mean values of each variable. Here, however, we find somewhat greater differentiation in effects across subgroups. We notice, first, that the apparent gains in mental health associated with a rise in unemployment are concentrated among those who are employed for wages. Whereas a one percentage point increase in the state unemployment rate is associated with a highly statistically significant .3 percentage point rise in the share of that group who are in good mental health, an equal increase in joblessness produces no statistically significant change in mental well-being for either the self-employed or the out-of-work.

Turning to care and utilization, we observe that modest subgroup differences persist. A one percentage point rise in state unemployment produces highly statistically significant positive changes in the proportions of wage earners who report having a regular doctor and who seek routine medical checkups (increases of .6 and .2 percentage points, respectively). However, neither the self-employed nor the unemployed experience similarly significant effects. Perhaps predictably, those who are out-of-work have a more difficult time affording care when the unemployment rate rises than do other groups. A one point addition to the state unemployment rate is associated with a .6 percentage point increase in foregone care among those without work, but no appreciable difference adheres for those with some form of employment.

Finally, one area in which all groups register statistically significant countercyclical behavior is exercise. There, a one percentage point rise in state unemployment is associated with

gains in the propensity to exercise ranging from .5 percentage points (for the self-employed) to .9 percentage points (for those who are out-of-work).

VII. SUMMARY OF FINDINGS AND LIMITATIONS

The results obtained here provide modest additional support for the counterintuitive hypothesis that poor macroeconomic conditions exert a positive impact on health. My analysis reveals limited positive associations between rising state unemployment rates and self-reported health status -- statistically significant findings that are evident not just in the case of physical health, but for mental well-being, too. While the former result is foreshadowed by previous research, the latter is somewhat contrary to expectations and indicates that, as with physical health, the psychological toll exacted by a bad economy *may*, at the population level, be offset by salutary effects not fully explored here.

Moreover, the evidence showing a link between better health and bad times extends to metrics gauging access to care and health-promoting behavior. Recessionary conditions are timed with an increased propensity to engage in non-work related physical activity -- a finding that holds for the full sample of working-age adults as well as for all studied subgroups. The magnitude of the effect observed for the full sample -- an approximately .6 percentage point rise in the rate of monthly exercise for each one percentage point gain in unemployment -- roughly aligns with previous findings by Ruhm (who identifies a .6 percentage point gain among all adults using BRFSS data from 1987-1995 [2000] and a .2 percentage point uptick when extending the data range through 2000 [2005]).

Similarly, and perhaps surprisingly, increases in unemployment are significantly associated with greater access to health care. The share of working-age adults who report having

a regular doctor rises with joblessness, though subsample regressions reveal the effect to be concentrated amongst individuals who are employed for wages.

The pattern of positive associations between economic downturns and health largely dissolves, however, when we turn to care utilization. The rate of routine medical checkups among working-age adults is not significantly impacted by changes in unemployment, a non-finding that itself is somewhat notable given that previous work has revealed a statistically significant decline in checkups as joblessness rises (Ruhm [2000] sees a roughly .5 percentage point decrease in their frequency among all adults during the 1987-1995 period). However, this overall result appears to be driven largely by modest *gains* in utilization among wage earners, which then may be offset by imprecisely estimated decreases in checkups for other employment groups.

More straightforward are the findings for the utilization variable measuring whether an individual has foregone care on account of its cost. In accordance with common expectation, my analysis predicts that hard economic times will, on average, lead more individuals to abstain from desired care because of cost pressures. Unsurprisingly, this effect is most pronounced for those who are out-of-work, but the negative relationship between unemployment and this utilization metric is highly statistically significant for all working-age adults, as well.

Before extrapolating further from these findings, it is important to note their limitations. At the threshold, the standard admonition that must accompany this form of econometric analysis holds especially in this case: the statistically significant associations identified here need not imply a corresponding causal relationship. The model employed in this study attempts to control for a variety of confounding factors, among them, national trends over time and time-invariant effects within each of the states. Nevertheless, the complex nature of the relationships explored

here, and the relatively large size of the dataset -- which may improve the chances of finding statistically significant but substantively unimportant linkages -- requires that care be exercised when inferring causation.

More particularly, data constraints provide reason for caution in interpreting these results. While the BRFSS is a large and robust national survey which focuses recurring attention on many issues relevant to this analysis, its questions and survey patterns possess clear limitations. The first of these stems from the survey's reliance on self-reported information. While there is significant utility in testing the relationships of interest in terms of respondents' perceptions, a methodology that depends on self-reporting may necessitate rather more blunt or simplistic measures of health status and behavior and, depending on the question, may increase the likelihood of recall error and/or response bias. Thus, for example, the variables in this study which operationalize health status illuminate respondents' views of their own physical and mental well-being, but they cannot offer a more concrete picture of health that might be obtainable through the use of data that reflect clinical assessments.

The measure of exercise I employ poses related but distinct concerns. The variable, which derives from a BRFSS question asking, rather broadly, whether a respondent has engaged in any leisure time physical activity at least once in the prior month, provides only a relatively insensitive indicator of an individual's propensity to exercise. (Regrettably, there is little alternative; while BRFSS annual questionnaires sometimes seek greater detail about the frequency and nature of respondents' exercise patterns, the intermittent use of these questions severely restricts their value in analyses such as this one.) At the same time, the metric is vulnerable to measurement error of indeterminate direction (Prince et al. 2008), a characteristic it likely shares with the dependent variables measuring access and utilization of care.

Finally, two factors that likely play an important role in the relationships investigated here, health insurance coverage and work intensity, are accounted for only in a limited way that may mask their impact or bias estimates for the coefficient of interest. We might expect, in the case of the former variable, that changes in state unemployment would exhibit different associations with health depending on whether individuals have health insurance (and in particular, access to stable coverage). The analysis attempts to control for this using a variable constructed from the BRFSS's sole question about health insurance coverage, which asks respondents whether they "have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare." This broad inquiry offers insight as to coverage status at the time of interview, but the lack of follow-up in the survey to confirm uninsurance (where initially indicated) and to explore the nature and duration of the coverage make it a somewhat weak control in this context (see Kenney et al. 2006).

The matter of work intensity is perhaps more subtle but still problematic. This study, like many others in the same vein, controls for the effect of own-employment status on the macroeconomy-health relationship. What it does not do is account for fluctuations in the intensity of respondents' work -- for example, it does not reflect changes in the raw number of hours worked by respondents. This is an unfortunate data-imposed limitation which others should seek to resolve in future work. A more granular examination -- one which could reveal not simply the impact of being "employed" or "self-employed" but also the effect of reductions (or increases) in work hours -- would expand our understanding of whether and to what extent changing time-prices are responsible for producing better health during recessions.

VIII. CONCLUSIONS AND IMPLICATIONS FOR POLICY

These limitations notwithstanding, we can draw at least three tentative lessons from my findings. First, the counterintuitive relationship between the economy and the health of the working-age population, which previously was observed in data from earlier times, appears to have persisted in the past decade. Analysis of the period from 2000 to 2010 uncovers modest positive associations between state unemployment rates, on the one hand, and measures of well-being, access to care, and health-promoting behavior, on the other. These results imply that the macroeconomic fluctuations of the 2000s -- including, most significantly, the Great Recession -- may not have altered fundamentally the nature of the link between the business cycle and aggregate health.

Second, these findings advance efforts to discern the mechanisms that drive recession-timed health improvements, by providing limited support for the hypothesis that the economy affects well-being by changing the time-price of certain health investments. I observe evidence of this pathway primarily in the propensity to exercise, which increases along with unemployment. As the economy deteriorates -- and with it, the time-prices of leisure activities -- there is a statistically significant uptick in the likelihood that working-age individuals will devote time to physical activity. Beyond this population average, analysis by employment status appears to reinforce the overarching hypothesis. Specifically, the employment groups most likely to experience reduced time-prices for exercise during a recession (those who are out-of-work or self-employed) show larger impacts relative to those (the employed) seemingly least likely to see their opportunity costs changed.

Somewhat more ambiguous are the results from other dependent variables. Rising unemployment appears to coincide with statistically significant but quite modest increases in the

incidence of routine checkups among the employed. Greater care utilization of this sort might be predicted by the time-price hypothesis, though, again, individuals with jobs are the least likely of the employment groups to experience the increases in free time on which the mechanism is predicated. On the other hand, perhaps it is only the employed who can enjoy the benefits of declining time-prices of care. We might well suspect that, for the self-employed and out-of-work, such advantages would be swamped by the deleterious impacts of a poor economy -- including potentially powerful effects on income and health insurance (two factors controlled for here, but imperfectly). Perhaps to this end, we see that worsening economic conditions exert financial cost pressures that manifest in the form of higher rates of foregone medical care -- particularly for those without work but also across the full working-age population, as well.

Third, this study indicates, surprisingly, that population mental health may be countercyclical. Though the positive association observed between unemployment and physical health is anticipated in light of previous analyses, a result illustrating a similar link between recessions and psychological well-being is not. There is, as noted, comparatively little reason to believe that recessions might impact mental health positively (see e.g. Di Tella et al. 2003; Catalano and Dooley 1983), and those who have examined the issue have tended to identify declines in mental health as unemployment rates increase (e.g. Charles and DeCicca 2008; Ruhm 2003). Accordingly, the finding here suggests strongly that additional inquiry is needed to sort out this apparent contradiction and determine whether relationships are changing over time.

This paper adds to the body of literature which shows that population health worsens during periods of economic expansion and improves during times of contraction. When contemplating what might be done in response, it is worth stating outright that these patterns do not in any way suggest that policymakers should seek to bolster public health by pursuing

contractionary economic programs. The modest findings reported here and elsewhere do not begin to compensate for the host of substantial and profoundly negative consequences that accompany any recession, the most recent especially.

Nevertheless, the results do point the way to policies that might help maintain physical and mental well-being during economic booms. Given some indication that an improving economy may raise the time-price of health investments -- because of higher levels of employment and, perhaps, greater intensity of work by those already employed -- policies that reduce job-related opportunity costs by (1) promoting a healthy work-life balance; or (2) otherwise harnessing the employment relationship to encourage healthy behavior, may be fruitful. In the first category, policymakers might find particularly worthwhile proposals to require employers to offer their workers paid sick days and paid family leave. In the second, workplace wellness initiatives -- which can range in form from free medical screenings, to flex-time for exercise, to insurance premium reductions for the completion of a tobacco cessation program -- if designed well, can create partnerships between employers and employees that lower the barriers to health maintenance and improvement.

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