Good times make you sick

By: Christopher J. Ruhm

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Abstract:
This study uses microdata from the 1972–1981 National Health Interview Surveys (NHIS) to examine how health status and medical care utilization fluctuate with state macroeconomic conditions. Personal characteristics, location fixed-effects, general time effects and (usually) state-specific time trends are controlled for. The major finding is that there is a counter-cyclical variation in physical health that is especially pronounced for individuals of prime-working age, employed persons, and males. The negative health effects of economic expansions persist or accumulate over time, are larger for acute than chronic ailments, and occur despite a protective effect of income and a possible increase in the use of medical care. Finally, there is some suggestion that mental health may be procyclical, in sharp contrast to physical well-being.
Keywords: Health status; Morbidity; Macroeconomic conditions

Article:
1. Introduction
Strong evidence has recently been provided that mortality increases when the economy temporarily improves. Using aggregate data for a panel of the 50 states and District of Columbia over a 20-year period (1972–1991), Ruhm (2000) indicates that state unemployment rates are negatively and significantly related to the total death rate and 8 of 10 specific causes of fatalities, with suicides the important exception. For instance, a 1 percentage point fall in unemployment is associated with 0.5, 3.0, 0.7, and 0.4% increases in mortality from all causes, motor vehicle fatalities, influenza/pneumonia, and cardiovascular disease. Compared to earlier research, this study has the advantage of estimating fixed-effect (FE) models that exploit within-state changes and so automatically control for time-invariant factors that are spuriously correlated with economic conditions across locations.[1] Using similar methods, other research documents a procyclical fluctuation in fatalities using aggregate data for 50 Spanish provinces over the 1980–

[1] Widely cited analyses of aggregate time-series data by Harvey Brenner (1973, 1975, 1979) reveal a counter-cyclical variation in admissions to mental hospitals, infant mortality rates, and deaths due to cardiovascular disease, cirrhosis, suicide, and homicide. However, this research suffers from serious technical flaws (Gravelle et al., 1981; Stern, 1983; Wagstaff, 1985; Cook and Zarkin, 1986) and studies correcting the problems (Forbes and McGregor, 1984; McAvinchey,1988; Joyce and Mocan,1993) fail to uncover a consistent relationship between the macroeconomy and health. Instead, the results are sensitive to the choice of countries, time periods, and outcomes, with falling unemployment frequently being correlated with worse rather than better health. The lack of robustness is unsurprising, since any lengthy time-series may contain factors that are confounded with economic conditions. For instance, dramatic reductions in joblessness at the end of the great depression were accompanied by spuriously correlated improvements in health due to better nutrition and increased availability of antibiotics.

1997 period (Tapia Granados, 2002), 16 German states from 1980–2000 (Neumayer, 2002), and 23 OECD countries between 1960-1997 (Gerdtham and Ruhm, 2002).

However, at least two important questions remain unanswered. First, mortality could be procyclical while other aspects of poor health are not. For example, accident fatalities exhibit a particularly strong variation but may be only weakly related to previous health status.[2] Second, individual-level relationships cannot be ascertained using aggregate data. Thus, the effects could vary by age, sex, ethnicity, or employment status. These issues are addressed below. Microdata for persons aged 30 and over from the 1972–1981 years of the National Health Interview Survey (NHIS) are used to examine how health fluctuates with state economic conditions after controlling for personal characteristics, time-invariant factors, general time effects, and (usually) state-specific time trends. The proxies for health include the prevalence of medical conditions, specific morbidities, activity limitations, and the utilization of medical care.

The major finding is that most measures of health decline as the economy improves. In the preferred specifications, a 1 percentage point drop in the state unemployment rate is associated with a statistically significant 1.5% rise in the probability that respondents report one or more medical problems and a 1.2% (1.6%) growth in the probability of one or more "restricted-activity days" ("bed-days") during the previous 2 weeks. The cyclical variation is especially pronounced for males, employed persons, and those of prime-working age.[3] The negative health effects of sustained economic expansions persist or accumulate over at least a 3-year period and occur despite a possible procyclical variation in the use of medical care.

The fluctuation in health is more pronounced for acute than chronic problems. Thus, the one point decline in unemployment is estimated to raise the percentage of individuals reporting at least one acute (but no chronic) condition by a statistically significant 3.9%, versus a statistically insignificant 1.1 % growth in the prevalence of chronic ailments. However, there is considerable variation across types of chronic morbidity. For instance, the drop in joblessness is correlated with a 4.3% (8.7%) rise in ischemic heart disease (intervertebral disk problems) but a 7.3% decrease in non-psychotic mental disorders.

One concern is that worse measured health during good times might reflect better access to medical care (e.g. due to higher incomes or enhanced insurance coverage) resulting in improved identification of existing problems, rather than a deterioration in actual status. The evidence does not support this possibility. The counter-cyclical variation is generally stronger for employed persons under the age of 65 (for whom access to medical care is less of an issue) than for the full sample, while income has a protective effect on measured health.

2. Why might good economic times make you sick?

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[2] Also, small negative health shocks associated with transitory upturns may cause frail persons to die slightly sooner than otherwise, while having little effect on overall population health. Conversely, some medical problems (such as arthritis) have little effect on mortality.

[3] In this paper, discussions of "cyclical" variations or "macroeconomic" effects refer to fluctuations within states rather than at the national level. Thus, the term "expansion" is used loosely to indicate the effects of a relative improvement in the state economy and does not refer to a technical definition based on changes in national GDP.

Many researchers hypothesize that cyclical upturns benefit health by reducing the stress associated with economic insecurity (e.g. Brenner and Mooney, 1983; Catalano and Dooley, 1983; Fenwick and Tausig,1994). However, there are at least three reasons why health might instead worsen. First, non-market "leisure" time decreases making it more costly for individuals to undertake time-intensive health-producing activities such as exercise.[4] Consistent with this, data from the Behavioral Risk Factor Surveillance System (BRFSS) indicates that lower joblessness is associated with increases in smoking, severe obesity, and physical inactivity (Ruhm, 2000, 2002). Second, health may be an input into the production of goods and services. Most obviously, hazardous working conditions, the physical exertion of employment, and job-related stress could have negative effects, particularly when job hours are extended during short-lasting economic expansions (Baker, 1985; Karasek and Theorell, 1990; Sokejima and Kagamimori, 1998). Cyclically sensitive sectors, such as construction, also have high accident rates and some joint products of economic activity (e.g. pollution or traffic congestion) present health risks.[5] Third, income growth may increase risky activities such as drinking and driving (Evans and Graham, 1988; Ruhm, 1995; Freeman, 1999; Ruhm and Black, 2002), raising deaths from external causes such as motor vehicle fatalities and possibly elevating related non-fatal accidents and health problems.

The positive health effects of economic contractions need not be restricted to or concentrated among those becoming newly unemployed. Instead, job loss could induce stress that counteracts other beneficial effects, raising the possibility that jobless persons get sick even while average health improves.[6] Similarly, there is no reason to believe that all facets of health respond in the same way. For instance, increasing stress provides one reason why mental health might deteriorate despite gains in physical well-being.[7] Finally, it should be emphasized that health problems associated with transitory upturns do not imply negative effects ofpermanent economic growth. The key distinction is that agents have greater flexibility in making consumption, time-allocation, and production decisions in the long-run. Temporary increases in output usually involve more intensive use of labor and health inputs with existing technologies. Conversely, permanent growth results from technological improvements or expansions in the capital stock that, by pushing out the production possibility frontier, has the potential to ameliorate or eliminate any costs to health. Similarly, individuals are more likely to defer health investments in

[4] The time price of medical care may also rise if persons working more hours find it harder to schedule medical appointments for themselves or their dependents. Consistent with this, Mwabu (1988) and Vistnes and Hamilton (1995) report a negative relationship between employment and the utilization of medical care.

[5] For instance, Chay and Greenstone (1999) show that county-level reductions in pollution, associated with the 1981–1982 recession, led to substantial decreases in infant mortality.

[6] There is no doubt that the non-employed are in worse average health than workers (e.g. Morris et al., 1994; Currie and Madrian, 1999; Ettner, 2000). However, since poor health reduces employment probabilities, the direction of causation is not well understood (Bartley, 1996; Goldney, 1997). Martikainen and Valkonen (1996) compare the mortality rates of persons losing jobs in Finland during times of relatively low and high joblessness. Consistent with the hypothesis of stronger selection during good times, they find that the association between unemployment and subsequent mortality weakens as joblessness rises.

[7] Jobless persons are more likely than employed individuals to be mentally ill or to commit suicide (Dooley et al., 1988; Catalano, 1991; Lewis and Sloggert, 1998; Mortensen et al., 2000). While it is difficult to infer causation, a careful investigation by Hamilton et al. (1997) finds a detrimental effect even after accounting for the endogeneity between mental illness and unemployment.

response to temporary than lasting increases in work hours, while sustained income growth permits purchases of consumption goods (such as vehicle safety) that improve health .[8]

3. Econometric methods

The basic regression specification estimated below is:

$$H_{ijt} = \alpha_t + X_{ijt}\beta + E_{jt}\gamma + S_j + \varepsilon_{ijt}, \qquad (1)$$

where H measures the health or medical care utilization of individual i in state j at time t, X is a vector of personal characteristics, E the macroeconomic variable (typically the unemployment rate), α a year-specific intercept, S a state fixed-effect, and ε a disturbance term.

The year effect holds constant determinants of health that vary uniformly across states over time; the fixed-effect accounts for those that differ across locations but are time-invariant. Therefore, the impact of the macroeconomy is identified by within-state variations in economic conditions, relative to the changes occurring in other states. One advantage of this procedure is that the state and year effects automatically control for a wide variety of difficult-to-observe factors that might affect health (such as lifestyle differences between residents of Nevada and Utah or advances in widely available medical technologies). However, the model specified by Eq. (1) does not account for factors that vary over time within states (like changes in household structure or medical insurance coverage). Therefore, the "preferred" estimates also include a vector of state-specific linear time trends (S_jT), implying the regression equation:[9]

$$H_{ijt} = \alpha_t + X_{ijt}\beta + E_{jt}\gamma + S_j + S_jT + \varepsilon_{ijt}. \qquad (2)$$

For ease of interpretation, the results of linear probability models are presented below; however, almost identical predicted effects are obtained from corresponding binary probit models. All of the estimates weight the observations to account for unequal probabilities of inclusion in the sample.

4. Data

Data are from the 1972–1981 years of the National Health Interview Survey (NHIS), which is conducted by the National Center for Health Statistics at the Centers for Disease Control and Prevention. The NHIS is designed to assess the amount and distribution of illness, disability, and chronic impairment of the civilian non-institutionalized population of the US, as well as the type and duration of health services received by them.[10] Most information comes from the NHIS Cumulative Core File (CCF), compiled by the Inter-University Consortium for Political and

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[8] Ettner (1996) and Pritchett and Summers (1996) provide examples of research showing a positive relationship between (permanent) income and health. Graham et al.'s (1992) analysis of US time-series data indicates that mortality rates are negatively (positively) related to permanent (transitory) income, as proxied by per capita consumption (the inverse of unemployment). However, Snyder and Evans (2002) show that reduced incomes of the social security "notch" beneficiaries were associated with decreases in mortality.

[9] A potential issue is that the state-specific trends might absorb most of the within-state variation in unemployment rates. This problem does not appear to be severe—the addition of trends eliminates <38% of the variation in unemployment rates remaining after including general year and state fixed-effects.

[10] The web-site http://www.cdc.gov/nchs/nhis.htm contains further information on the NHIS.

Social Research. The NHIS-CCF contains variables incorporated in eight or more of the 1969 through 1981 annual surveys and includes persons aged 30 and over.[11]

One limitation of the NHIS-CCF is that geographic information is restricted to the four census regions (Northeast, Midwest, South, and West). Since I am interested in determining how changes in local economic conditions affect health status, this level of aggregation is inadequate. Fortunately, the annual NHIS surveys (prior to 1984) identify the standard metropolitan statistical area (SMSA) for persons residing in 31 large SMSAs.[12] This information was merged onto the Cumulative Core File to create geographic identifiers corresponding to the 20 states in which the 31 SMSAs are located.[13] Data in the NHIS-CCF are quite old, raising the possibility that the effects of interest may have altered over time, particularly for groups (such as women) with substantial changes in labor force participation. More recent information could not be used, however, because geographic identifiers (beyond the census region) have been stripped off the public-use files after 1984.[14]

4. 1. Outcomes

Since no single variable captures all aspects of health, I examine a variety of dichotomous outcomes, noting the strengths and weaknesses of each. The first group includes three variables that measure whether the respondent suffers from at least one medical condition, chronic ailment, or acute (but no chronic) morbidity at the survey date.[15] The second pair indicates one or more "restricted-activity day" or "bed-day" during the preceding 2 weeks. Restricted-activity days are defined by a significant reduction in usual activities due to illness or injury.[16] Bed-days occur if the individual stays in bed the majority of daylight hours for these reasons.[17]

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[11] The "core" questions included in the NHIS were substantially changed in 1982, so that it is not possible to compare information collected before and after that date. The years prior to 1972 are not used because state unemployment rates are frequently unavailable. Further information on the NHIS-CCF can be obtained under study number 8629 in the archives section of the ISCPR web-site: http://www.icpsr.umich.edu.

[12] The SMSAs are: Boston, New York, Philadelphia, Pittsburgh, Detroit, Chicago, Cincinnati, Los Angeles— Long Beach, San Francisco—Oakland, Baltimore, Atlanta, Buffalo, Cleveland, Minneapolis—St. Paul, Milwaukee, Kansas City, St. Louis, Houston, Dallas, Washington, D.C., Seattle—Everett, San Diego, Anaheim-Santa Ana-Garden Grove, Miami, Denver, San Bernardino—Riverside-Ontario, Indianapolis, San Jose, New Orleans, Tampa—St. Petersburg, Portland (Oregon). Thirty-nine percent of the NHIS-CCF sample lives in one of these SMSAs.

[13] Merging information on the SMSA of residence required extracting from the annual 1972–1981 NHIS files (10 data sets) the SMSA, survey year, primary sampling unit, interview quarter and week, segment, household, and person number for each respondent living in an identified SMSA. Since the same information (except for the SMSA) are available in the NHIS-CCF, individuals can be uniquely identified and the merge performed.

[14] A set of public-use NHIS State Data Files, containing state identifiers, has been released for the years 1990–1994. However, the data are not useful for this analysis because: (1) the small number of years makes it difficult to separate the effects of secular trends from changes in macroeconomic conditions; (2) many of the variables in the full NHIS were deleted or converted from continuous to categorical variables; (3) it is not possible to link data files collected within a single survey year (e.g. the person, medical condition, or hospitalization files), so that individual-level outcomes for many of the dependent variables can not be constructed.

[15] Medical conditions represent departures from a state ofphysical or mental well-being as indicated by a positive response to one of a series of "medical-disability impact" or "illness-recall" questions. Acute morbidities have lasted <3 months and involved either medical attention or restricted activity. Chronic ailments have lasted more than 3 months but need not restrict activities. It is not possible to determine whether individuals with chronic conditions also have acute medical problems using the NHIS-CCF. I also analyze some models for a continuous measure of the number of health problems.

[16] This does not require complete inactivity but the decrease must be significant.

[17] Days in the hospital are classified as bed-days, even if the patient was not in bed more than half the day.

One concern is that a procyclical variation in reported morbidities or restricted-activity days (but probably not bed-days) may be induced if health problems limit employment more than non-market pursuits, since working is more likely to be the "usual" activity in good times than bad.[18] Increased access to medical care due to higher incomes or improved health insurance coverage could also result in improved identification of existing problems, even with no change in health status. Several strategies for addressing these possibilities are detailed below. Briefly, they involve examining subsamples of employed individuals under the age of 65 or working prime-age males, for whom "usual" activities and access to medical care are relatively homogenous, and investigating how changes in incomes are related to measured health.

The distinction between acute and chronic morbidities is imprecise because certain ailments (e.g. arthritis, cancer, diabetes, heart trouble, or stroke) are defined as chronic regardless of onset date and because the NHIS-CCF identifies chronic conditions that are primary or secondary causes of activity limitations but does not explicitly distinguish between other chronic and acute problems. This analysis classifies individuals as having an acute condition if they report morbidity and at least one restricted activity day in the last 2 weeks but no limiting chronic condition. By this definition, 36% of the sample has a chronic ailment and 6% have an acute (but no chronic) problem.[19] Fourteen percent have one or more restricted-activity day during the prior 2 weeks and 7% at least one bed-day.[20]

The NHIS-CCF contains data on up to five specific chronic medical conditions that are primary or secondary causes of activity limitations. This information, as coded under the 8th or 9th revision of the International Classification of Diseases, was used to identify: diseases of the heart (heart), arthritis and related disorders (arthritis), chronic obstructive pulmonary disease (lung), diabetes mellitus (diabetes), circulatory system disorders (circulatory), intervertebral disk disorders (back), cerebrovascular disease (stroke), malignant neoplasms (cancer), mental disorders (mental), and central nervous system disorders (CNS) .[21] These conditions are either major sources of adult deaths (heart, stroke, cancer, pulmonary, diabetes) or have relatively high prevalence rates (arthritis, back, mental, CNS, circulatory) .[22] Ischemic heart disease (ischemic) is also separately broken out from other heart problems since it is particularly responsive to changes in stress or lifestyles.[23] Similarly, I distinguish between psychotic and non-psychotic mental disorders (psychosis and neurosis). The former often have organic causes, while the latter may vary more with environmental factors such as macroeconomic conditions.[24]

[18] Chronic health conditions that permanently change the individual's usual activities will also not be reflected.
[19] All reported means are weighted using NHIS sampling weights. The unweighted estimates are generally similar.
[20] Bed-days are associated with activity restrictions in virtually all cases.
[21] ICD-8 categories are used until 1978 and ICD-9 classifications thereafter. With the exception of back disorders, the ICD-8 and ICD-9 categories are the same for the conditions examined. The ICD groupings, shown in parentheses, are heart (390–429), arthritis (710–719), lung (490–496), diabetes (250), circulatory (440–459), back (ICD-8: 725; ICD-9: 722), stroke (430–438), cancer (140–208), mental (290–316), and CNS (340–349).
[22] Several major causes of death (e.g. pneumonia/influenza; nephritis/nephrotic syndrome/nephrosis; chronic liver disease/cirrhosis) were not separately analyzed because of their extremely low prevalence in the NHIS-CCF. Prevalence rates are also relatively low for some included conditions, limiting statistical power to reject the null hypothesis of no macroeconomic effects.
[23] For instance, a recent study by Liu et al. (2002) identifies long work hours and insufficient sleep as significant risk factors for heart attacks. The ICD category for ischemic heart disease are 410–414.
[24] The ICD-9 categories for psychoses and neuroses are 290–299 and 300–316.

Half of the 36% of the NHIS-CCF sample with a chronic ailment have an activity-limiting condition and 74% of this latter group are identified as having one of the 10 specified morbidities.[25] Heart disease has the highest prevalence rate (5.5% of the full sample, 1.7% with ischemic heart disease), followed by arthritis (3.7%), lung disease (1.3%), diabetes (1.2%), circulatory disorders (1.0%), back problems (1.0%), stroke (0.7%). mental disorders (0.7%, 85% of which are neuroses), and central nervous system ailments (0.5%).[26]

The final two binary outcomes indicate hospitalizations or doctor visits during the prior year. Twelve percent of the sample had at least one hospital episode and 76% saw a physician in the previous 12 months. Ceteris paribus, healthier persons need less medical care, so that higher use in good times suggests worse health. However, since utilization may rise because incomes grow or insurance becomes more available, the findings for medical services must be interpreted carefully. One strategy will be to focus on hospitalizations, which have a lower discretionary component than outpatient care. A second will be to examine the extent to which the fluctuations are explained by variations in incomes or direct measures of health status.

4.2. Explanatory variables

State unemployment rates are the primary indicator of macroeconomic conditions, with data obtained from a consistent unpublished series provided by the Bureau of Labor Statistics.[27] The rates refer to calendar year averages, which are not ideal since respondents are surveyed throughout the year. For this reason, I used weighted averages of current and previous year unemployment. For individual i interviewed in calendar year t, these are calculated as:

$$E_i = \frac{(M_i \times E_{it}) + (12 - M_i)E_{it-1}}{12}, \qquad (4)$$

Where M is the interview month (equal to 1 in January and 12 in December) and E the annual unemployment rate. For example, weights on the current and prior year are 1/4 and 3/4 for persons surveyed in March. This procedure places the greatest weight on the calendar year that includes the majority of the 12 months preceding the interview date. Some regressions also hold constant average real state per capita incomes, constructed as above and using data from the Bureau of Economic Analysis.

Supplemental covariates include dummy variables for the age ranges (in years) 40–49, 50–59, 60–69, 70–79, and 80 or above, with 30–39-year-olds the reference group. Five categorical education variables are controlled for: high school dropouts (< 12 years of completed education), some college (13–15 years), college graduates, graduate school attendees (17 or more years of

[25] The limiting chronic condition is not identified in a small number of cases, implying that the percentage with one of the 10 specific problems is actually slightly understated.

[26] The NHIS includes detailed "condition lists" for a subset of chronic morbidities; these vary across individuals and years. Published prevalence rates differ from those obtained in this analysis because the former are calculated only for respondents asked the specified condition list, whereas the latter are for the full sample. The year dummy variables will capture most of the effect of including alternative condition lists in different years.

[27] I thank Edna Biederman of the BLS for supplying this information, which is calculated from the Current Population Survey and refers to non-institutionalized persons aged 16 and over. Data are available starting in 1970 for most large states but not until 1976 for some smaller ones. No consistent series of SMSA-level employment data is available during the period of study, precluding analysis of metropolitan area economic conditions.

schooling), and education not reported. High school graduates form the excluded category. Dummy variables for veteran status, gender, two race variables (black and "other" nonwhite), central city residence, and three indicators of marital status (married, widowed, and separated/divorced) are incorporated.[28] Finally, year and state dummy variables and (usually) state-specific linear time trends are held constant.

5. Economic conditions and health status

Table 1 summarizes the results of regression models estimating the relationship between economic conditions and health status. The first three columns refer to the full sample, the next three columns to 30–64-year-olds employed at the survey date, and the last three to working men aged 30–55. For each group, the first column displays (weighted) mean values of the dependent variables, while the second and third show predicted effects of a 1 percentage point increase in the state unemployment rate from models without and with controls for state-specific time trends. As mentioned, specifications that include the trends are less likely to suffer from omitted variables bias and so are focused upon below. All models also hold constant individual characteristics, state fixed-effects, and year dummy

Table 1
Predicted effect of changes in state macroeconomic conditions on health status

Health outcome	Full sample			30–64-year-old workers			30–55-year-old employed men		
	$\bar{Y}$	$\hat{\beta}$		$\bar{Y}$	$\hat{\beta}$		$\bar{Y}$	$\hat{\beta}$	
≥1 Medical condition	0.4185	−0.0036 (0.0034)	−0.0061** (0.0027)	0.3164	−0.0050 (0.0045)	−0.0082* (0.0044)	0.2889	−0.0070 (0.0047)	−0.0086* (0.0047)
≥1 Chronic condition	0.3603	−0.0015 (0.0035)	−0.0039 (0.0031)	0.2527	−0.0027 (0.0044)	−0.0057 (0.0047)	0.2293	−0.0039 (0.0050)	−0.0061 (0.0051)
≥1 Acute condition	0.0582	−0.0021*** (0.0007)	−0.0022*** (0.0008)	0.0637	−0.0022** (0.0011)	−0.0025** (0.0012)	0.0596	−0.0031** (0.0012)	−0.0025 (0.0017)
≥1 Restricted-activity day	0.1366	−0.0024* (0.0013)	−0.0017 (0.0014)	0.0971	−0.0022 (0.0015)	−0.0022 (0.0014)	0.0872	−0.0041*** (0.0014)	−0.0037** (0.0016)
≥1 Bed-day	0.0667	−0.0014** (0.0006)	−0.0011 (0.0008)	0.0492	−0.0009 (0.0006)	−0.0005 (0.0009)	0.0424	−0.0020** (0.0008)	−0.0017 (0.0012)
State-time trends		No	Yes		No	Yes		No	Yes

Note: Data are from the National Health Interview Survey Cumulative Core File. The sample includes respondents 30 years and older who were surveyed in 1972–1981 and resided in one of 31 large SMSAs. Medical conditions indicate acute or chronic ailments at the survey date. Chronic and acute conditions are defined in the text. Restricted-activity days refer to days, in the last 2 weeks, where the individual cut down on "usual" activities due to illness or injury. Bed-days refer to days in the last 2 weeks that the respondent stayed in bed for most or all of the day due to illness or injury. The regression equations are estimated as linear probability models and also contain state and year dummy variables, covariates for age, education, gender, race, veteran status, marital status, residence in a central city and (where indicated) state-specific linear time trends. $\bar{Y}$ displays the average value of the dependent variable; $\hat{\beta}$ shows the predicted effect of a 1 percentage point rise in the state unemployment rate. The sample means and regression estimates are calculated using sampling weights. Robust standard errors, estimated assuming that observations are independent across but not within states, are reported in parentheses. The first three columns show results for the full sample; the next three for 30–64-year-olds who are working at the survey date; the last three for 30–55-year-old employed males. The number of observations is 217,471 for the full sample, 115,463 for 30–64-year-old workers, and 57,633 for employed 30–55-year-old males.

* $P < 0.10$.
** $P < 0.05$.
*** $P < 0.01$.

variables. Robust standard errors are calculated using the Huber-White sandwich estimator, assuming that observations are independent across but not within states.[29]

[28] Ethnic status is not controlled for because it is unavailable until 1976 and recorded inconsistently thereafter.

[29] Bertrand et al. (2002) raise concern that the presence of serial correlation can lead to severe understatement of the standard errors in difference-in-difference estimates. The problem is less serious here than in their simulations because extensive regression controls are included and the macroeconomic variables exhibit considerable variation over time—in contrast to their analysis of legislation dummy variables whose value is zero (one) for all years before (after) enactment. Nevertheless, due to this possibility, I cluster standard errors on states, which is one technique proposed by Bertrand et al. for dealing with this problem.

Most measures of health worsen when the economy strengthens. A 1 percentage point fall in unemployment is estimated to increase the full sample probability of having one or more medical conditions by 0.36 percentage points or 0.9% (0.0036/0.4185 = 0.0086) in the model without state-specific trends.[30] The "preferred specifications", which contain trends, imply a larger and statistically significant 0.61 point or 1.5% (0.0061/0.4185 = 0.0146) growth in prevalence.[31] This results from a 0.39 percentage point (1.1%) predicted rise in chronic problems and a statistically significant 0.22 point (3.9%) increase in acute ailments.[32] The proportionately larger fluctuation in acute morbidities is plausible, since these are more likely to be affected by transitory changes in stress, employment conditions, or lifestyles.

Activity limitations also become more common in good times. In the model without state-time trends, a 1 percentage point reduction in joblessness is associated with a 0.24 point (1.7%) increase in the prevalence ofrestricted-activity days. When trends are included, the rise is imprecisely estimated at 0.17 percentage points (1.2%). Similarly, the probability of bed-days is predicted to grow by a statistically significant 0.14 percentage points (2.1 %) in the first case and an insignificant 0.11 points (1.6%) in the second.

Restricted-activity days could become more common in good times because medical problems limit employment more than non-market activities rather than because health deteriorates. Also, access to medical care may improve with the result that existing health problems are more often revealed. These potential sources of bias should be substantially reduced by restricting the sample to workers under 65 years of age, since job-holders have relatively similar "usual" activities and employment is the major source of health insurance in the US for adults younger than 65. However, cyclical fluctuations in the composition of employment could induce changes in average health for this subsample (e.g. if unhealthy persons are drawn into the labor force in good times). The last three columns of Table 1 therefore show results for 30–55-year-old employed men, since males of this age have high and stable labor force attachments.[33] The

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[30] All percentage changes are calculated at the sample mean of the dependent variable. Results for the demographic covariates are generally as expected. Health is usually negatively related to age and positively correlated with education. Females, blacks, and unmarried or divorced individuals tend to be relatively unhealthy, as are residents of central cities.

[31] The unemployment rate averages 7.01% (with a standard deviation of 1.61%). Therefore, a one point drop corresponds to a 14.3% decrease at the sample average, and a 1.5% rise in the dependent variable implies an unemployment elasticity of around − −0.1. Tobit estimates, which allow for censoring at zero, indicate that a one point decrease in unemployment increases the estimated number of medical conditions by 1.2% (0.7%) in specifications with (without) state-specific time trends. Thus, the increased morbidity appears to occur entirely at the extensive margin. This is confirmed using log-linear models that show no change in the estimated number of morbidities in a subsample limited to persons with at least one condition.

[32] Discussions of statistical significance refer to *P*-values for a type I error under a single hypothesis test. The probability of one or more such error may, therefore, be understated when conducting multiple tests. Except where noted I do not explicitly correct for this. However, the use of multiple tests generally seems unlikely to play a major role in explaining the significant results obtained below. Notice, for example, that whereas chance variation would result in approximately half the coefficients having positive signs (under the null hypothesis of no effect), all 30 parameter estimates in Table 1 are <0.

[33] The upper age threshold was chosen to avoid confounding the effects of interest with those of early retirement. Eighty-eight percent of 30–55-year-old men worked in the 2 weeks prior to the survey, compared with <56% of the full sample. Controlling for personal characteristics, state and year effects, and state-time trends, a one point drop in unemployment increases the estimated employment rates of the former and latter groups by 2.0 and 2.7%, respectively.

exclusion of non-workers could mute the observed macroeconomic effects by removing much of the sample variation in health status. Conversely, the fluctuations might be larger if the negative impact of economic upturns reflects increases in job-related stress or higher time costs of health investments for those employed long hours.

Workers younger than 65 are relatively healthy. Just 32% suffer from a medical condition and fewer than 5% had a bed-day during the previous 2 weeks (compared to 42 and 7% of the full sample). Nevertheless, most aspects of their health exhibit a particularly strong counter-cyclical variation. In models with state-specific trends, a 1 percentage point drop in unemployment increases the estimated prevalence of medical conditions by 0.82 percentage points (2.6%), due to an insignificant 0.57 percentage point (2.3%) growth in chronic ailments and a significant 0.25 point (3.9%) rise in acute problems. Similarly, the likelihood of restricted-activity days grows 0.22 percentage points (2.3%), with weaker results for bed-days. There is even stronger evidence that employed 30–55-year-old males become less healthy when the economy improves. In the preferred specification, a one point decline in joblessness increases the predicted prevalence ofmedical conditions, chronic morbidities, acute ailments, restricted-activity days, and bed-days by 0.86, 0.61, 0.25, 0.37, and 0.17 percentage points (3.0, 2.7, 4.2, 4.2, and 4.1%). Unless noted, all remaining regressions control for state-specific trends as well as personal characteristics, state fixed-effects, and year dummy variables.

6. Medical care

Table 2 provides evidence that the use of medical services may increase when the economy strengthens, although large standard errors require caution in interpreting the results. A 1 percentage point decline in unemployment is associated with an imprecisely estimated 0.11 point (0.9%) rise in the probability of hospitalization during the previous year and a 0.3 point (0.4%) growth in the likelihood of having visited a doctor.

Two factors make it doubtful that the higher use ofmedical care reflects increases in health insurance coverage or incomes, rather than deteriorating health. First, the cyclical variation is usually stronger among workers, for whom fluctuations in insurance coverage are less important, than for the full sample: hospitalizations and physician visits are predicted to increase by 2.0 and 0.4% (2.8 and 0.8%) for employed persons under the age of 65 (working 30–55-year-old males). Second, as shown in Section 9, the unemployment coefficients are not attenuated by adding controls for incomes.

Table 2
Predicted effect of macroeconomic conditions on the use of medical care during past year

Type of medical care	Full sample			30–64-Year-old workers			30–55-Year-old employed men		
	$\bar{Y}$	$\hat{\beta}$		$\bar{Y}$	$\hat{\beta}$		$\bar{Y}$	$\hat{\beta}$	
≥1 Hospital episode	0.1185	−0.0011 (0.0011)	−0.0004 (0.0010)	0.0792	−0.0016 (0.0013)	−0.0010 (0.0012)	0.0638	−0.0018 (0.0021)	−0.0013 (0.0020)
≥1 Doctor visit	0.7577	−0.0032 (0.0023)	−0.0020 (0.0020)	0.7249	−0.0031 (0.0029)	−0.0016 (0.0024)	0.6722	−0.0049 (0.0046)	−0.0032 (0.0041)
Health status controlled		No	Yes		No	Yes		No	Yes

Note: See note in Table 1. The regressions also contain state and year dummy variables, state-specific time trends, and personal characteristics. The number of observations is 217,471 for hospital episodes and 215,652 for doctor visits for the full sample. For 30–64-year-old workers, the sample sizes are 115,463 and 114,317, and for employed 30–55-year-old men they are 57,633 and 56,993. Health status refers to a dichotomous variable indicating if the respondent suffers from one or more medical conditions at the survey date.

It is worthy noting that hospitalizations, which have lower demand elasticities than outpatient care (Manning et al., 1987) and so are more likely to reflect actual changes in health status, rise proportionately more than doctor visits. Direct evidence that changes in health explain a portion of the variation in medical care is provided in the third column of Table 2 (for each group), by including a regressor showing if the respondent suffers from one or more medical conditions at the survey date. Doing so reduces the magnitude of the unemployment coefficient on hospital episodes (doctor visits) by 29–62% (35–48%).[34]

7. Subsamples

Table 3 summarizes findings for subsamples stratified by age, sex, and race. The first column restricts analysis to 30–55-year-old respondents who are of "prime working age"; the next four provide results for males, females, whites, and blacks.[35] Small sample sizes often lead to imprecise estimates, limiting our ability to make comparisons across groups. Nevertheless, the macroeconomic effects appear to be relatively large for prime-age adults and men. A 1 percentage point drop in unemployment is associated with 0.6, 0.4, 0.3, 0.2 and 0.2 point (1.9, 1.3, 4.2, 1.5, and 2.8%) increases in the probability that 30–55-year-olds have medical conditions, chronic ailments, acute morbidities, restricted-activity days and bed-days. These "effects" are one-tenth to two-thirds larger, in percentage terms, than for the full sample. The same fall in joblessness predicts a 6.5, 2.7, and 3.1 % rise in acute ailments, restricted-activity days, and bed-days for males versus 2.1, 0.3, and 0.8% growth for females, although the prevalence of chronic conditions increases slightly more for women than men (1.2 versus 0.9%). Mixed results are obtained for the race subgroups, with relatively large fluctuations in acute health problems and bed-days for whites, and in chronic conditions for blacks. The use of medical services increases in good times but with some variation in the patterns of inpatient and outpatient care.[36]

Some of these differences may reflect changes in lifestyles. For instance, Ruhm (2002) shows that increases in severe obesity and physical inactivity, during good economic times, are concentrated among groups with high labor force attachments (such as males) or large cyclical fluctuations in employment (like minorities). Future research is needed to more fully document the disparities in macroeconomic effects and identify mechanisms for them.

8. Specific chronic conditions

Specific limiting chronic morbidities are examined in Table 4. For expositional convenience, the predicted effects of a ten percentage (rather than one percentage) point rise in the state unemployment rate are shown. The most striking finding is the strong procyclical pattern of heart disease, the leading cause of mortality. This is completely accounted for

[34] Having one or more medical condition raises the predicted probability of hospitalizations (doctor visits) by a highly significant 11.4% (20.3%) points for the full sample.

[35] Small sample sizes preclude obtaining meaningful estimates for "other" nonwhites.

[36] One exception is that hospitalizations exhibit a statistically insignificant counter-cyclical variation for blacks.

Table 3
Predicted effect of macroeconomic conditions for subgroups

Dependent variable	30–55-Year-olds		Men		Women		Whites		Blacks	
	$\bar{Y}$	$\hat{\beta}$	$\bar{Y}$	$\hat{\beta}$	$\bar{Y}$	$\hat{\beta}$	$\bar{Y}$	$\hat{\beta}$	$\bar{Y}$	$\hat{\beta}$
≥1 Medical condition	0.3416	−0.0064 (0.0040)	0.3951	−0.0063* (0.0034)	0.4387	−0.0059** (0.0028)	0.4176	−0.0055* (0.0031)	0.4484	−0.0113*** (0.0035)
≥1 Chronic condition	0.2729	−0.0035 (0.0042)	0.3439	−0.0029 (0.0038)	0.3745	−0.0046 (0.0028)	0.3595	−0.0030 (0.0027)	0.3883	−0.0108*** (0.0034)
≥1 Acute condition	0.0686	−0.0029*** (0.0009)	0.0512	−0.0033*** (0.0012)	0.0642	−0.0013 (0.0009)	0.0581	−0.0025** (0.0010)	0.0600	−0.0004 (0.0017)
≥1 Restricted–activity day	0.1263	−0.0019 (0.0017)	0.1165	−0.0032** (0.0015)	0.1539	−0.0004 (0.0017)	0.1312	−0.0018 (0.0013)	0.1816	−0.0003 (0.0030)
≥1 Bed–day	0.0657	−0.0018*** (0.0007)	0.0551	−0.0017 (0.0011)	0.0768	−0.0006 (0.0008)	0.0630	−0.0012* (0.0007)	0.0958	0.0003 (0.0029)
≥1 Hospital episode	0.1034	−0.0020* (0.0011)	0.1041	−0.0011 (0.0017)	0.1310	−0.0013 (0.0013)	0.1175	−0.0017 (0.0012)	0.1311	0.0024 (0.0031)
≥1 Doctor visit	0.7451	−0.0027 (0.0024)	0.7052	−0.0036 (0.0028)	0.8028	−0.0030 (0.0023)	0.7551	−0.0026 (0.0025)	0.7896	−0.0080** (0.0038)

Note: See notes in Tables 1 and 2. The regressions also contain state and year dummy variables, state-specific time trends, and personal characteristics. Sample sizes range between 136,099 and 137,383 for 30-55-year-olds, and 99,024 and 100,044, 116,628 and 117,427, 186,978 and 188,383, and 24,793 and 25,146 for men, women, whites, and blacks, respectively. Standard errors are in parentheses.

* $P < 0.10$.
** $P < 0.05$.
*** $P < 0.01$.

Table 4
Predicted effect of macroeconomic conditions on specific limiting chronic conditions

Chronic condition	Full sample		30–64-Year-old workers		30–55-Year-old employed men	
	$\bar{Y}$	$\bar{\beta}$	$\bar{Y}$	$\bar{\beta}$	$\bar{Y}$	$\bar{\beta}$
Heart disease	0.0552	−0.0027 (0.0074)	0.0194	−0.0037 (0.0062)	0.0157	−0.0028 (0.0103)
Ischemic	0.0168	−0.0072 (0.0058)	0.0069	−0.0092** (0.0036)	0.0066	−0.0085 (0.0056)
Other	0.0383	0.0045 (0.0068)	0.0124	0.0055 (0.0047)	0.0091	0.0057 (0.0069)
Arthritis	0.0368	−0.0011 (0.0078)	0.0108	0.0011 (0.0062)	0.0071	0.0037 (0.0053)
Lung disease	0.0126	−0.0032 (0.0032)	0.0053	0.0004 (0.0025)	0.0047	0.0021 (0.0047)
Diabetes	0.0119	0.0010 (0.0028)	0.0042	−0.0007 (0.0037)	0.0036	−0.0024 (0.0071)
Circulatory	0.0100	0.0028 (0.0028)	0.0034	0.0046* (0.0024)	0.0020	0.0039** (0.0015)
Back disorders	0.0100	−0.0087*** (0.0023)	0.0082	−0.0068** (0.0033)	0.0092	−0.0081 (0.0060)
Stroke	0.0069	−0.0034 (0.0039)	0.0008	−0.0007 (0.0011)	0.0006	−0.0013 (0.0014)
Cancer	0.0054	−0.0010 (0.0019)	0.0017	−0.0010 (0.0011)	0.0011	0.0020 (0.0020)
Mental illness	0.0065	0.0033 (0.0022)	0.0022	0.0017 (0.0023)	0.0021	0.0003 (0.0034)
Psychosis	0.0012	−0.0007 (0.0010)	0.0002	−0.0011 (0.0007)	0.0003	−0.0005 (0.0009)
Neurosis	0.0054	0.0039** (0.0020)	0.0020	0.0028 (0.0023)	0.0018	0.0007 (0.0033)
Central nervous system	0.0053	−0.0035 (0.0027)	0.0019	−0.0007 (0.0014)	0.0015	−0.0011 (0.0022)

Note: See note in Table 1. The outcomes are dichotomous variables indicating if the respondent has the specified chronic condition at the survey date. This table shows the predicted effect of a 10 percentage point increase in the state unemployment rate, estimated from linear probability models that include state and year dummy variables, state-specific time trends, and personal characteristics. Sample sizes are 217,471 for the full sample, 115,988 for 30–64-year-old workers, and 57,633 for 30–55-year-old employed males.

* $P < 0.10$.
** $P < 0.05$.
*** $P < 0.01$.

by changes in ischemic heart problems, where a one point fall in unemployment is associated with 4.3, 13.3, and 12.8% increases in prevalence for the full sample, 30–64-year-old employed individuals, and working men aged 30 to 55. Also noteworthy is the 8.7% predicted growth (for the full sample) in intervertebral disk disorders. Ischemic heart disease may rise in good times because elevated incomes increase risky behaviors and reductions in leisure elevate the time costs of health investments such as exercise. Back problems could become more common due to the physical strain of many types of employment, particularly as work hours increase. Reduced joblessness is also associated with statistically insignificantly higher rates of stroke and central nervous system disorders.

By contrast, statistically insignificant decreases are predicted for some other chronic ailments (like non-ischemic heart disease, diabetes, circulatory problems), which is not surprising since falling unemployment was shown above to be correlated with only a small rise in the overall prevalence of chronic morbidity.[37] Particularly interesting, however, is the large and statistically significant 7.3% (full sample) decline estimated for non-psychotic mental disorders and the even bigger (but imprecisely estimated) 13.6% decrease predicted for employed 30–64-year-olds. These findings suggest that some types of mental health vary procyclically. Further support comes from Ruhm's (2000) evidence that suicides (a proxy for mental health) are positively associated with unemployment rates, in contrast to the negative correlations for other causes of death. Thus, previous research may correctly hypothesize a role for reduced stress during upturns, while mistakenly taking this to imply a more general improvement in health.[38] However, the estimated effects are substantially attenuated when restricting the sample to prime-age working males, implying that this conclusion should be considered tentative.[39]

9. Income effects

Permanent income growth is expected to improve most aspects of health (e.g. by allowing purchases of more advanced medical care and health-preserving consumption goods, such as safer cars). These effects could be muted or reversed, however, when considering transitory changes in incomes. Moreover, even a protective effect of earnings growth could be overwhelmed during cyclical upturns by heightened job stress or greater time costs of health-enhancing activities. The role of income is addressed in Table 5. For each outcome, model (a) repeats the full sample findings reported above, while specification (b) adds controls for per capita personal income (in thousands of US$ 1981).

[37] Reports on specific chronic conditions were also used to construct the Charlson score, a commonly employed co-morbidity index, using the algorithm presented in D'Hoore et al. (1996). Since 98% of respondents had Charlson scores of 0 or 1(with higher scores indicating worse health),I then estimated a model with a dichotomous dependent variable distinguishing between Charlson scores of 0 and 1 or above. A one point fall in the unemployment increases the predicted probability of positive Charlson scores by 0.08 percentage points (with a standard error of 0.05 points), corresponding to a rise of 1.5%.

[38] Models estimated using dichotomous dependent variables indicating "poor" and "poor" or "fair" (rather than "good" or "excellent") overall health generally reveal negative but weak (and usually statistically insignificant) unemployment effects. This could result from the offsetting impact of macroeconomic conditions on physical and mental health, or because reporting patterns shift due to lower levels of life satisfaction during periods of cyclically high unemployment (as documented by Di Tella et al., 2001).

[39] The high proportion of insignificant effects and mix of positive and negative coefficients raises the possibility that some significant findings reflect type I errors under multiple hypothesis tests. After adjusting *P*-values for multiple tests using Holm's method (see Aickin and Gensler, 1996 for details), the coefficient onback disorders for the full sample remains highly significant (the Holm-adjusted *P*-value is 0. 013), that on circulatory problems for employed 30–55-year-old men is marginally significant (the adjusted *P*-value is 0.075), while all other coefficients are insignificant. However, there is considerable controversy over the use of adjustments for multiple hypotheses (e.g. see Perneger, 1988) and the power of the resulting tests to reject the null hypothesis of no effect is generally low.

Ceteris paribus, higher incomes are associated with better health. A US$ 1000 increase reduces the predicted probability of medical conditions, acute ailments, restricted-activity days, and bed-days by a statistically significant 2.6, 2.4, 3.2, and 2.2 percentage points (6.3, 40.4, 23.6, and 33.7%).[40] Changes in the use of medical care are estimated to be small and statistically insignificant.

Table 5

Predicted effect of macroeconomic conditions with controls for personal income

Regressor	(a)	(b)	(a)	(b)
	≥1 Medical condition		≥1 Chronic condition	
Unemployment rate	−0.0061** (0.0027)	−0.0097*** (0.0023)	−0.0039 (0.0031)	−0.0042 (0.0031)
Personal income		−0.0262*** (0.0077)		−0.0027 (0.0117)
	≥1 Acute condition		≥1 Restricted-activity day	
Unemployment rate	−0.0022*** (0.0008)	−0.0055*** (0.0016)	−0.0017 (0.0014)	−0.0061*** (0.0019)
Personal income		−0.0235*** (0.0084)		−0.0322*** (0.0103)
	≥1 Bed-day		≥1 Hospital episode	
Unemployment rate	−0.0011 (0.0008)	−0.0042*** (0.0015)	−0.0011 (0.0011)	−0.0011 (0.0013)
Personal income		−0.0225*** (0.0070)		0.0001 (0.0038)
	≥1 Doctor visit			
Unemployment rate	−0.0032 (0.0023)	−0.0039** (0.0020)		
Personal income		−0.0051 (0.0064)		

Note: See notes in Tables 1 and 2. The econometric models also control for state and year dummy variables, state-time trends, and individual characteristics. The table shows the predicted effect of a 1 percentage point increase in the unemployment rate or a US$ 1000 rise in per capita personal incomes (in US$ 1981).

** $P < 0.05$.

*** $P < 0.01$.

One implication is that the counter-cyclical variation in health would be even stronger were it not for the protective effect of income. Holding the latter constant, a one point reduction in unemployment increases the probability of medical conditions, acute problems, restricted-activity days, and bed-days by 1.0, 0.5, 0.6, and 0.4 percentage points (2.3, 9.4, 4.5, and 6.2%). These changes are 1.6–3.8 times larger than in model (a), suggesting that the negative effects of economic expansions may result from a combination of greater time costs of health-preserving investments or increases in job-related medical problems but not higher incomes.

10. Adjustment paths

Macroeconomic conditions have been assumed to have only a contemporaneous impact to this point. There are at least two reasons why this might not be so. The impact of health investments and job-related stress are likely to accumulate over time, if these represent flows that gradually alter the stock of health capital (Grossman, 1972), implying larger medium-term than short-run effects. On the other hand, agents have greater flexibility in making consumption, time allocation, and production decisions in the long-run, so that permanent income growth will eventually improve most aspects of health.

[40] A US$ 1000 rise in income represents an increase of 8.6%. Income elasticities, therefore, exceed —1 for most of these measures of health. The US$ 1000 increase is predicted to reduce the probability of chronic conditions by 0.7%, the number of morbidities (acute or chronic) by 8.5%, and the prevalence of poor overall health by 13.7%. Estimates for specific limiting chronic conditions reveal a negative (although often insignificant) income effect for arthritis, diabetes, stroke, and psychotic disorders, and a positive effect for non-ischemic heart disease, non-psychotic mental disorders and central nervous system conditions. The income coefficients are of small magnitude and less than the associated standard errors for the other chronic conditions.

Information on the dynamics of the adjustment process was obtained by estimating models that include 3-year lags of the state unemployment rates and calculating the impact of a 1 percentage point rise in joblessness that persists for k years as, $\sum_{n=0}^{k}\hat{\beta}_{t-n}$, for $\hat{\beta}_{t-n}$ the regression coefficient on the n-year lag of unemployment.[41]

Table 6 summarizes the results. Despite some variation across outcomes, most findings suggest that the initial health effects are sustained or increase over time. A 1 percentage point drop in unemployment increases the estimated prevalence of medical conditions, chronic ailments, and doctor visits by 0.8, 0.6, and 0.4 percentage points in the year joblessness falls and by a similar 0.9, 0.5, and 0.4 points 3 years later. The effects appear to accumulate for acute morbidities, restricted activity days, and bed-days. Thus, the prevalence of acute conditions is predicted to rise 0.2 percentage points (3.6%) immediately and 0.4 points (7.4%) after 3 years. Bed-days grow even more, from a statistically insignificant 0.2 points (2.8%) initially to a highly significant 0.5 percentage points (7.3%) 3 years later. Restricted-activity days also increase when good times persist, although the adjustment pattern is less stable.[42] Conversely, hospital episodes, after first rising, fall by an imprecisely estimated 0.4 percentage points (3.5%) after 3 years.[43]

Table 6
Predicted effect of a sustained 1 percentage point increase in unemployment

Dependent variable	Effect after			
	0 Years	1 Year	2 Years	3 Years
≥1 Medical condition	−0.0080** (0.0036)	−0.0070* (0.0036)	−0.0094** (0.0042)	−0.0092 (0.0062)
≥1 Chronic condition	−0.0059 (0.0038)	−0.0038 (0.0042)	−0.0062 (0.0043)	−0.0050 (0.0070)
≥1 Acute condition	−0.0021* (0.0012)	−0.0032** (0.0016)	−0.0032* (0.0019)	−0.0043 (0.0028)
≥1 Restricted−activity day	−0.0009 (0.0018)	−0.0030 (0.0023)	−0.0019 (0.0031)	−0.0060 (0.0037)
≥1 Bed-day	−0.0019 (0.0015)	−0.0020 (0.0013)	−0.0025* (0.0013)	−0.0049* (0.0026)
≥1 Hospital episode	−0.0013 (0.0012)	0.0014 (0.0017)	0.0023 (0.0020)	0.0042 (0.0028)
≥1 Doctor visit	−0.0036 (0.0022)	−0.0025 (0.0024)	−0.0027 (0.0030)	−0.0040 (0.0034)

Note: See notes in Tables 1 and 2. Table displays the predicted effects of a 1 percentage point increase in unemployment that begins the specified number of years earlier and continues through the survey year. These are obtained from regressions that control for individual characteristics, state and year dummy variables, state-specific time trends, and state unemployment rates (in years) from t=3 to t. The sample size is 169,030 for doctor visits and 170,557 for all other outcomes.

* $P < 0.10$.

** $P < 0.05$.

[41] A 3-year lag allows for a reasonably lengthy adjustment period while minimizing the loss of sample size resulting from including additional lags. Qualitatively similar estimates are obtained from models with 2 or 4 year lags.

[42] These results contrast somewhat with Ruhm's (2000) evidence of greater impacts on most types of mortality after 2 than 4 years. Models that include a 1-year *lead* of the unemployment rate were also estimated to provide a crude test of reverse causation. The lead coefficient was of small size and statistically insignificant for all health and medical utilization outcomes shown in Table 6.

[43] Relatively large standard errors make it difficult to generalize about the dynamics of adjustment for specific chronic conditions. The results vary substantially in the few cases where a pattern can be discerned. Most importantly, the procyclical variation appears to dissipate over time for ischemic heart disease and intervertebral disk disorders while becoming more pronounced for stroke, cancer, and psychotic mental illness. Thus, a one point drop in unemployment is predicted to raise ischemic heart disease (back problems) by 1.25% (0.40%) points initially and —0.11 (0.01) points after 3 years. The contemporaneous impact (effect after 3 years) is 0.41, 0.01, and 0.19 (0.70, 0.88, and 0.55) points for stroke, cancer, and psychotic disorders.

These lasting impacts on health are particularly interesting given the protective income effects observed in Section 8. A plausible explanation is that health is a normal good which increases with permanent incomes, but with different effects for the deviations between actual and potential output that are proxied by unemployment rates. Specifically, economic slack may have positive effects due to reductions in time costs or some negative joint products of economic activity.

11. Discussion

Most aspects of health worsen when the economy temporarily improves. In the preferred models, a 1 percentage point fall in unemployment is estimated to raise the prevalence of medical problems, acute morbidities, restricted-activity days, bed-days, ischemic heart disease, and intervertebral disk disorders by 1.5, 3.9, 1.2, 1.6, 4.3, and 8.7%. The deterioration in health is particularly strong for persons of prime working age, employed individuals under the age of 65, and men. It occurs despite the protective effect of higher incomes and a possible increase in the use of medical care. There is no evidence that the negative health consequences dissipate over time if unemployment rates remain low. Instead, the effects frequently accumulate, leading to larger medium-term than short-run impacts.

Economic expansions are associated with increases in medical problems that are unrelated to mortality (like back ailments) as well as those that are major causes of death (such as ischemic heart disease). However, there is some evidence that non-psychotic mental disorders become less common. This emphasizes the distinction between physical and mental health and lends credence to psychological theories relating stress to economic insecurity. Nevertheless, any positive effects of good times appear to be more than offset by other changes that result in deterioration in most aspects of health.

We need to better understand why physical health worsens when unemployment rates fall. This may partially reflect direct risks of heightened economic activity (e.g. increases in workplace accidents and highway vehicle fatalities). Lifestyle factors and health investments could also play a role. For instance, smoking, heavy drinking, severe obesity and physical inactivity all increase in good times (Ruhm, 2002; Ruhm and Black, 2002). The use of medical care also rises. This is at least partly due to worsening health but could also reflect investments in preventive care that have a longer-term payoff. These represent important issues for future research.

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