



Bad Times, Bad Health

Economic downturns might also drag down your health.

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When economic conditions worsen, the number of people in bad health increases (Figure 1). According to the U.S. Census Bureau’s Current Population Survey (CPS), self-reported bad health rose by about 0.5 to 0.75 percentage point after each of the last three recessions.¹ This suggests that economic indicators such as the employment-to-population ratio do not capture the full toll of a recession. Downturns can affect our physical and mental health, too.

Economists have long argued that monetary policymakers face a tradeoff between inflation and unemployment. To encourage job creation, a central bank may need to loosen monetary policy—but in doing so, it risks contributing to inflationary pressure. On the other hand, by tightening monetary policy, a central bank may dampen inflation at the cost of people’s jobs. For this (and other) policy decisions, it is important to know the full cost of economic fluctuations, which include the effects on population health.

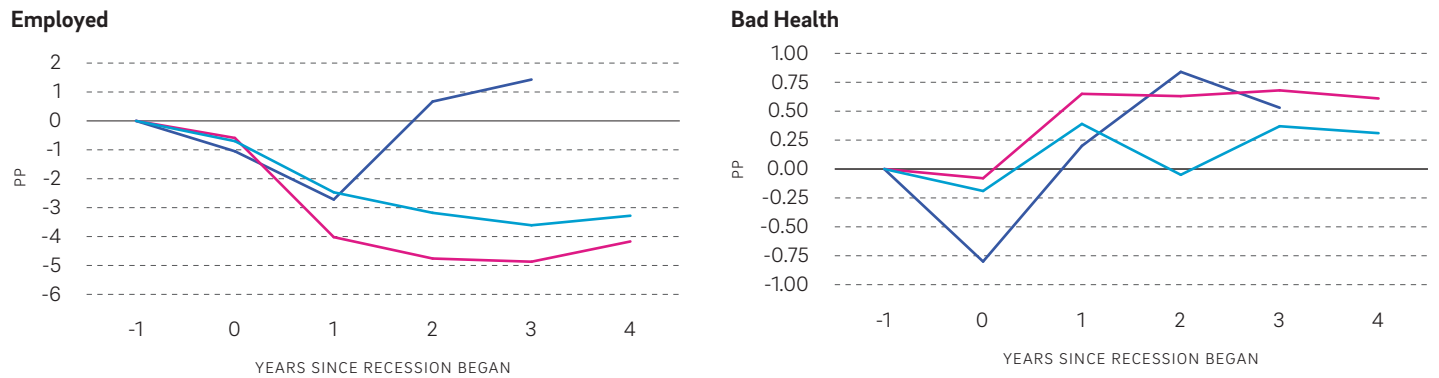
However, uncovering the systematic relationship between economic activity and population health is more complicated

FIGURE 1

Following an Economic Downturn, the Fraction of People in Bad Health Increases

Percentage point change in employment and self-reported bad health among individuals 25 to 54 years old in each March following the three U.S. recessions since 2000 (after detrending)

■ Dot-com bust: Mar to Nov 2001 ■ Great Recession: Dec 2007 to Jun 2009 ■ COVID-19: Feb to Apr 2020



Data Source: U.S. Census Bureau and Bureau of Labor Statistics, obtained via IPUMS CPS, University of Minnesota, www.ipums.org

than it may seem. For example, in his influential paper—provocatively titled “Are Recessions Good for Your Health?”—University of Virginia professor of public policy and economics Christopher Ruhm presents evidence that mortality is *negatively* correlated with a state’s unemployment rate. But while mortality is undeniably an important health outcome, it is not the only health indicator of interest, and not all causes of death are closely tied to an individual’s health. (Think, for example, of traffic deaths.) Although unconditionally our measure of population health tends to move in line with mortality, we show that—over the business cycle—the two measures paint different pictures. Besides the difficulty of measuring health, factors missing from the data—such as innovations in medicine or changes in health policy—can also influence the relationship between population health and the business cycle. So, what can we learn from the data? Using the concept of a health production function as a guide, we analyze different possible links between population health and the business cycle. We argue that it is unlikely that changes in inputs or health behaviors fully account for the link between economic and health fluctuations. Instead, stress may explain this link.

The Correlation Between Population Health and the Business Cycle

To show that the relationship between population health and the business cycle is indeed systematic, we take a longer view than just the last three recessions.

Our oldest available survey of self-reported health began in the 1970s. When we plot survey measures of poor health and unemployment among the prime-aged in the survey, we see that increases in poor population health coincide with increases in unemployment (Figure 2). Although the relationship is noisy, with health exhibiting more jagged behavior than unemployment, there is a clear association between the two series. For

example, peaks in the unemployment rate tend to coincide with peaks in the fraction of people in bad health.²

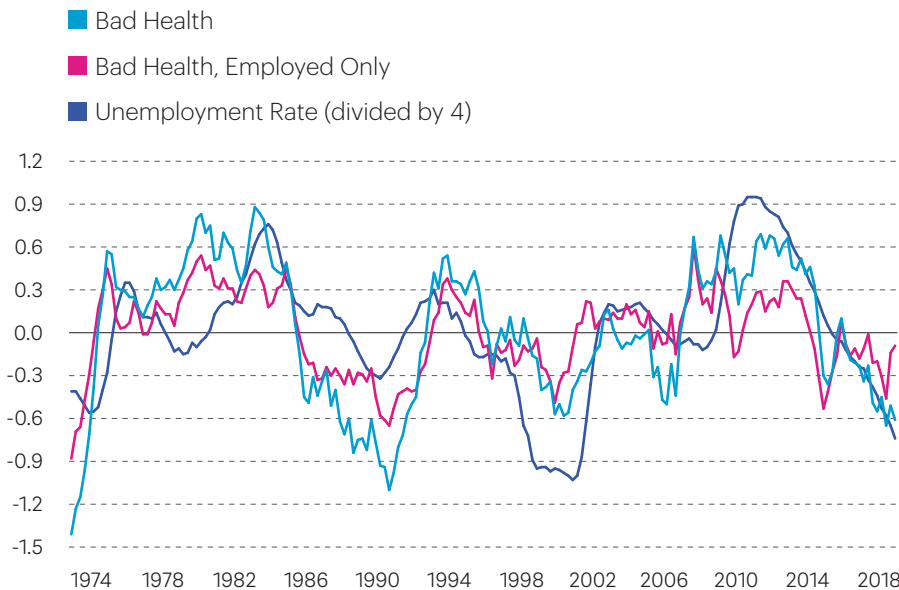
But correlation is not causality. Other forces, such as innovations in medicine or changes to Medicaid, could explain the comovement of the unemployment rate and population health. That’s why we adopt “local projections,” a statistical technique that allows us to identify cause and effect. Specifically, we project outcomes of interest on a measure of surprise changes in aggregate demand due to a discretionary change in policy—that is, due to a shock to aggregate demand (Figure 3). This leaves us with the causal effect of these shocks on population health. By focusing on surprise discretionary changes, we rule out anything other than the change in aggregate demand—in this case, anything other than an unexpected discretionary change in policy.³

The fiscal policy shock we use is an unexpected change in the level of defense spending. The advantage of defense spending is that, unlike other forms of government spending, its surprise components are less likely to be a direct response to domestic conditions. This means it’s unlikely that defense spending unexpectedly increases *because* unemployment is rising unexpectedly. Following the shock, whose impact we have scaled to an initial 1 percent increase in defense spending, demand remains elevated and gradually declines to zero after two and a half years (that is, after 10 quarters). The results are statistically different from zero for the first eight quarters. The increased demand is associated with a drop in the unemployment rate (for people 25 to 54 years old) by a little bit more than 0.05 percentage point. This response is significantly different from zero between 11 and 14 quarters after the initial shock. Average health in this population follows a similar pattern but is estimated more precisely. Bad health is statistically lower following the expansionary change in fiscal policy: Three to 15 quarters after a defense spending shock, the fraction of individuals reporting poor health decreased about 0.05 percentage point, which is slightly less than the peak decline in the unemployment rate.

FIGURE 2

Increases in Poor Population Health Coincide with Increases in Unemployment

Unemployment and bad health (percentage point deviation from trend) among individuals 25 to 54 years old, 4q1972–4q2018



Data Source: National Center for Health Statistics, National Health Interview Survey, various years, obtained via IPUMS NHIS, University of Minnesota, www.ipums.org

Note: To smooth out noise and eliminate seasonal factors, we computed a four-quarter moving average prior to detrending.

We repeated this analysis for a contractionary monetary policy shock (Figure 4). Following the policy shock, interest rates increase persistently for at least a year by about 1 percentage point. The unemployment rate rises above its baseline value after about 10 quarters and continues to increase gradually to 0.3 percentage point after 16 quarters. Similarly, the fraction of prime-age individuals in bad health also rises; it becomes significantly positive roughly two years after the initial shock and then remains elevated. Its increase is about 0.15 percentage point of the underlying population.

In sum, once we strip out all other forces by focusing on economic fluctuations known to be caused by policy shocks to aggregate demand, population health worsens when the economy sours.

Does Measurement Matter?

Our measure of health is self-reported. Does that make it less reliable? For example, might an otherwise healthy person report being in bad health to lessen the possible stigma of being unemployed? Although our baseline measure of health is well established in the literature, we address this concern by considering alternative measures of health. Specifically, we consider several measures consistently available in the Centers for Disease Control and Prevention’s National Health Interview Survey (NHIS), a nationally representative survey of the civilian noninstitutionalized population, from 1997 to 2018 (Figure 5).⁴

We find that the CPS and the NHIS report similar increases in bad health. We also find that alternative measures of health rise along with doctor visits. Specifically, an average of about 30 medical conditions—the so-called frailty index—rises by about 1.5

See *Is Self-reported Health a Good Measure of Health?*

units, as does the reported inability to work. Although these measures are also self-reported, we think it less likely that survey respondents would misreport these other conditions.

What specific medical conditions rise? Of the 1.5 standard deviation increase, about 40 percent is due to depression. Depression has well-documented and severe negative economic effects for individuals as well as large aggregate costs.⁵ An increase in certain nonpsychiatric medical conditions accounts for a similar share of the increase, with most of the remainder accounted for by functional limitations.

We can safely discount stigma as an explanation for our results: We observe similar cyclical increases in bad health among both the employed and the unemployed. Although the employed are, on average, less likely to report being in bad health, the relative fluctuation of *all* people 25 to 54 years old is similar to that of employed people 25 to 54 years old.

Worse Health and Lower Mortality—Contradictory Evidence, or Evidence of Disparity?

Our finding that self-reported and other measures of health deteriorate in recessions seems to contradict the research by Ruhm mentioned above. According to Ruhm, recessions are good for your health because they are associated with lower mortality.

Specifically, Ruhm finds that states with an above-average unemployment rate had a below-average mortality rate. Although there is some controversy about his finding, it was confirmed in 2020 by Northwestern University associate professor of education and social policy Hannes Schwandt and UCLA professor of economics Till von Wachter, at least for young adults in the immediate aftermath of the recession. However, Schwandt and von Wachter attribute the mortality decline to external causes such as a decline in accidents.⁶

One of this article’s authors, along with Boston College professor of economics Pablo Guerron-Quintana and Hebrew University assistant professor of economics Alexey Khazanov, is using aggregate data to confirm this finding for U.S. business cycles.⁷ (Their research uses the same

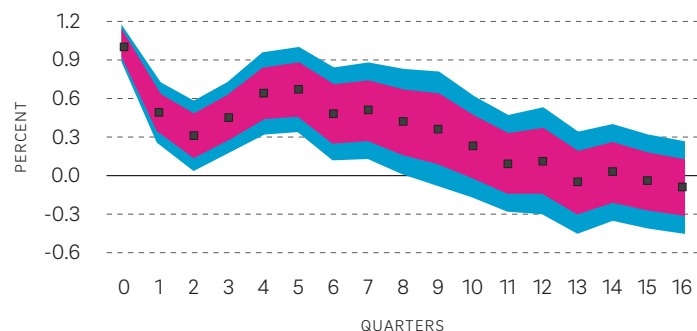
FIGURE 3

Following an Expansionary Defense Spending Shock, Population Health Improves

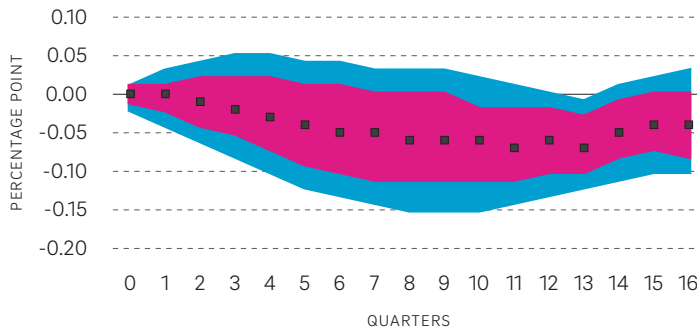
This is evidence that expansions improve population health.

Changes in federal defense spending, the unemployment rate, and the fraction of people in bad health (the latter two for individuals 25 to 54 years old) following a one-time defense spending shock, 1974–2007

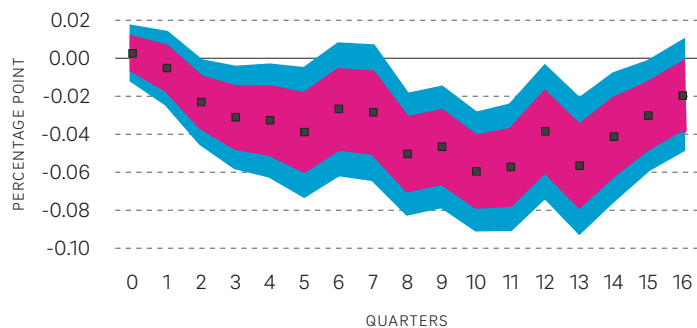
Defense Response



Unemployment Rate



Bad Health



Data Sources: National Center for Health Statistics, National Health Interview Survey, various years, obtained via IPUMS NHIS, University of Minnesota, www.ipums.org; Bureau of Economic Analysis, obtained via FRED; Drautzburg (2020)

Note: Red band represents 1 standard error from the response estimated by our regression analysis; blue band represents 1.65 standard errors from the estimated response. The shock is normalized so that defense spending's initial increase is 1 percent.

statistical approach used in this article.) They show that, following a contractionary demand shock, the mortality of prime-age adults falls even as bad health rises. Unlike Schwandt and von Wachter's data, their data do not allow for a breakdown by cause of death. It is thus possible that the fall in mortality does not reflect underlying health but simply fewer deaths from accidents while working or commuting to work.⁸ In that case, fewer deaths would be unrelated to better health as measured in this article.

Another explanation, however, is that population-level outcomes hide systematic differences between groups. Later in this article, we discuss research that shows that, when economic activity declines, fitness improves for some demographic groups but worsens for groups more closely attached to the labor market—that is, for those who are working or seeking work. Similarly, health outcomes may worsen for some and improve for others, manifesting as more individuals who report being in bad health while the death rate declines for other individuals.

How Health May Influence the Economy

None of the research discussed thus far suggests that a decline in population health harms the economy, which is another possible explanation for the correlation of health and the business cycle. Beyond case studies or pandemics, no data exist to test such a theory. But by disaggregating the national time series discussed above, we can learn much from the cross-sectional variation between states.

We broke down to the state level the national time series for the Great Recession that began in late 2007 (Figure 6). We then analyzed how population characteristics as of 2008 affected state employment outcomes after the recession. We find that states with worse initial health had lower employment rates in 2014 even when we condition on the state's employment level in 2008. Although this does not prove causation, it suggests that population health may influence labor market outcomes.

A Deeper Dive Into the Correlation Between Health and the Business Cycle

Economists analyze output as the result of a production function that transforms inputs—such as materials and hours worked—into output. Although such a production function accurately describes the production of concrete products—such as bread, electricity, and hip replacements—it is only a fictional accounting identity when applied to an abstract concept such as gross domestic product (GDP), the most commonly used measure of aggregate output. And yet this accounting identity helps us understand the determinants of output and productivity, the latter of which we can think of as a residual or unexplained “leftover” of the function. Similarly, the concept of a production function helps us understand the determinants of population health.

What would a health production function look like? In the canonical model developed by City University of New York emeritus professor Michael Grossman, current health depends on past health and current health investments, or inputs.⁹ Inputs include preventive, curative, and rehabilitative health care services, but also health behaviors and conditions such as drug

abuse and addiction. The “product” of these inputs would be current health. More health investments, better health behavior, and fewer past adverse conditions would be associated with better health today. And just as productivity is a residual in the production of output, we may think of “residual health” as the part of current health left unexplained by past health conditions and current inputs and behaviors.

Past health conditions are a given, so when we observe a change in health today, the production function approach leaves us three possible explanations: (1) a change in health inputs, (2) a change in health behaviors, or (3) residual health. Here, we define health inputs as those consumed by individuals, such as health care goods and services, or emissions. Health behaviors are produced by individuals—think of life-style choices that impact health.¹⁰

Health Inputs

Could a decline in health inputs explain the decline in population health? Maybe some people can no longer afford to see a doctor during a recession. In the United States, more than half of individuals under age 65 access health insurance via their employer.¹¹ If they lose their job, they may lose health insurance and become unable to afford health services.

But this cannot be the sole cause of the correlation between population health and unemployment: Prime-age adults visited their doctors *more* frequently during the 2001 recession and the Great Recession from 2007 to 2009, yet more of them reported poor health (Figure 2). Moreover, individuals *with* and *without* health insurance reported a similar decline in health and a similar increase in doctor visits (Figure 7).

Not all health inputs are choices. Some are externalities, such as polluted air. And to the extent that economic activity is linked to pollution, there is a natural link to the business cycle. For example, one recent study found that a reduction in emissions improves population health for children.¹² However, to the extent that pollution and economic activity move in tandem, this channel cannot explain why bad health *rises* during a downturn. This suggests that, at best, a fall in health inputs explains only part of the rise in bad health during economic downturns.

Health Behaviors

Health behavior is a broad category that we do not fully capture in our data.¹³ Using the NHIS data, we can measure two important health behaviors: exercise time and alcohol consumption. Neither the average amount of time prime-age adults spend exercising nor the fraction of prime-age adults who frequently have five or more drinks a day exhibits a systematic relationship with population health or employment. We found no relationship in the aggregate, nor when conditioning on health or employment status.

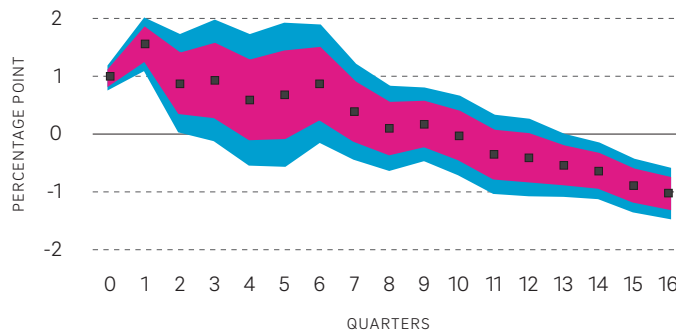
However, our degree of aggregation may mask individual differences. In one recent paper, researchers found that, when averaging age groups, there is no relationship between labor market conditions and fitness, but they also argue that the aggregate masks the fact that fitness improves for younger adults when the labor market is cooler. In contrast, it worsens for older

FIGURE 4

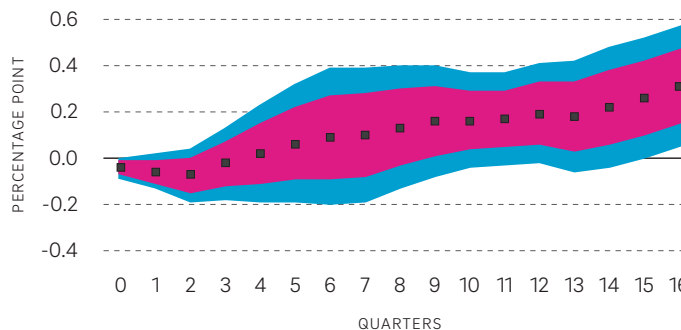
Following a Contractionary Monetary Policy Shock, Population Health Worsens

This is evidence that downturns worsen population health. Changes in short-term interest rates, the unemployment rate, and the fraction of people in bad health (the latter two for individuals 25 to 54 years old) following a one-time monetary policy shock, 1974–2007

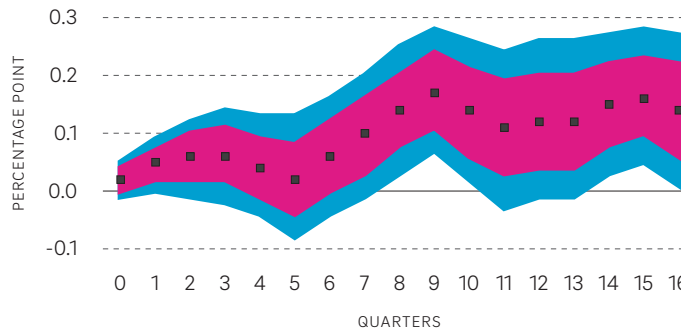
Federal Funds Rate



Unemployment Rate



Bad Health



Data Sources: National Center for Health Statistics, National Health Interview Survey, various years, obtained via IPUMS NHIS, University of Minnesota, www.ipums.org; Board of Governors of the Federal Reserve System (U.S.) obtained via FRED; Wieland and Yang (2020)

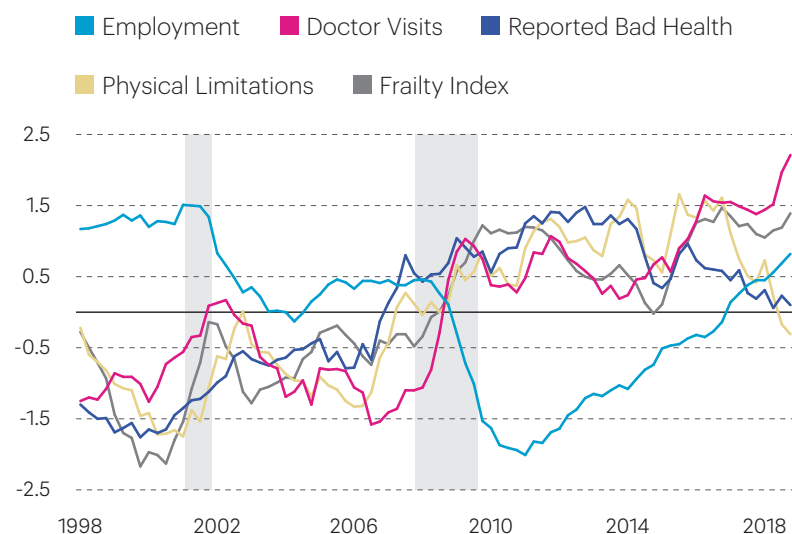
Note: Red band represents 1 standard error from the response estimated by our regression analysis; blue band represents 1.65 standard errors from the estimated response. The shock is normalized so that the federal funds rate’s initial increase is 1 percent.

FIGURE 5

Alternative Health Measures Paint the Same Picture

This validates our baseline measure.

Employment, measures of bad health, and doctor visits among individuals 25 to 54 years old, standard deviations from mean, by quarter, 1q1998–4q2018



Data Source: National Center for Health Statistics, National Health Interview Survey, various years, obtained via IPUMS NHIS, University of Minnesota, www.ipums.org

Note: To smooth out noise and eliminate seasonal factors, we report a four-quarter moving average.

adults.¹⁴

Schwandt and von Wachter analyzed how a state’s unemployment rate at the time of college graduation affected individuals later in life. Among those who graduated during a period of high unemployment, they found an increase in mortality due to liver disease and lung cancer in midlife. This is consistent with downturns being associated with a larger propensity to drink alcohol and smoke, which in turn leads to higher mortality 10 to 20 years after the downturn. This suggests that worse health behaviors may originate in downturns but might not affect health outcomes during the downturn, which would be required for worse health behaviors to explain the patterns we document.

Although economic conditions may affect health behaviors, the absence of a clear pattern in our aggregated data suggests that this is likely not the full story. Could other forces directly affect both population health and the labor market?

Residual Health

Residual health can be divided in two: Residual health that varies systematically with business cycle shocks—such as the demand shocks discussed above—is the health channel; we can think of the remaining residual health as a “health shock.”

For our analysis of the link between business cycles and population health, we ignore health shocks. Although a fluctuation in population health could affect demand, the literature suggests that, catastrophic events such as pandemics aside, fluctuations induced by population health shocks are either too small or take too long to affect the business cycle.

We can also ignore individual health shocks, such as breaking a leg or becoming depressed. Although one person’s health shock can affect their

finances, that won’t impact population health.¹⁵ From an aggregate (“macro”) perspective, a health shock affects *population-level* health.

One source of such a shock is pharmaceutical innovation. However, pharmaceutical breakthroughs typically affect the labor supply over the course of decades, not from year to year, which is the time scale of the business cycle. For example, the introduction of opioid painkillers could explain about 40 percent of the decline in male labor force participation between 1999 and 2016 due to drug abuse.¹⁶ And access to contraceptives increased young women’s labor supply from 1970 to 1990.¹⁷ But business cycles are a shorter-term phenomenon.

Other medical changes can act as a population health shock in the short term. However, these are hard to find and probably too small to have an aggregate effect. For example, the sudden withdrawal of a popular painkiller likely reduced the overall labor force participation rate by only 0.35 percentage point.¹⁸ So, health shocks can be important for the economy but, with the notable exception of catastrophic events, they are unlikely to be a major driver of the typical business cycle.

This leaves us with a health channel. But what would that look like? One possibility is stress. For example, in 2009, Federal Reserve Bank of Chicago economist Daniel Sullivan and von Wachter estimated “a 50%-100% increase in the mortality hazard during the years immediately following job loss.” They argue that their “results are consistent with these effects causing acute stress, which may substantially raise the mortality hazard in the short term.”

In their 2012 article, Princeton University professor of economics Janet Currie and American University professor of health policy Erdal Tekin establish that local foreclosure rates were correlated with urgent, unscheduled hospital visits during the Great Recession. They suggest that stress due to financial distress may explain this link.¹⁹ Similarly, UCLA professor of epidemiology Teresa Seeman and her coauthors found that, during the Great Recession, many people experienced an increase in blood pressure and fasting glucose levels. These two biomarkers are responsive to stressful conditions and associated with negative health effects such as heart disease.

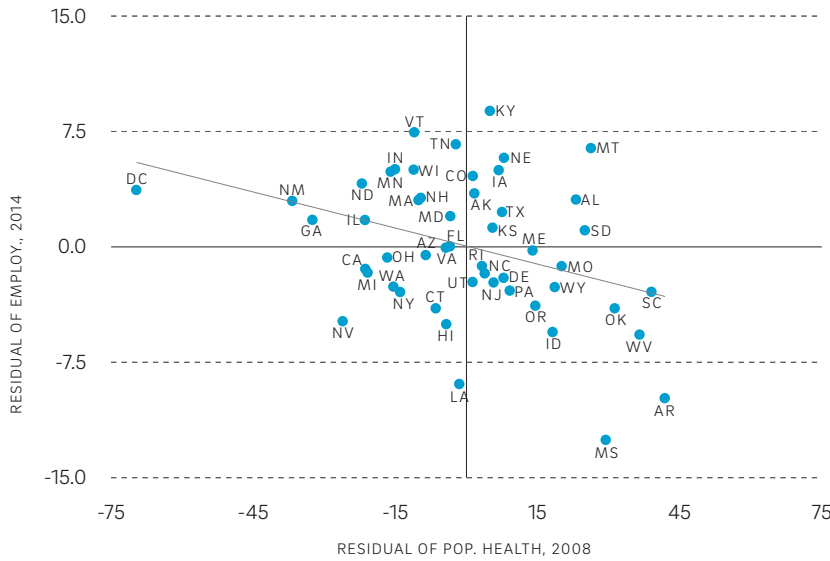
Stress resulting from an economic downturn is a plausible and concrete explanation for the causal link that our statistical approach has uncovered. It’s probably not the only channel, but its well-documented presence during economic downturns backs our analysis.

FIGURE 6

Population Health May Influence Labor Market Outcomes

States with worse initial health had lower unemployment even when we condition on initial employment.

Population health in 2008 and employment in 2014 across U.S. states after subtracting the mean from each data point and accounting for 2008 employment; residual as percentage



Data Source: U.S. Census Bureau and Bureau of Labor Statistics, obtained via IPUMS CPS, University of Minnesota, www.ipums.org

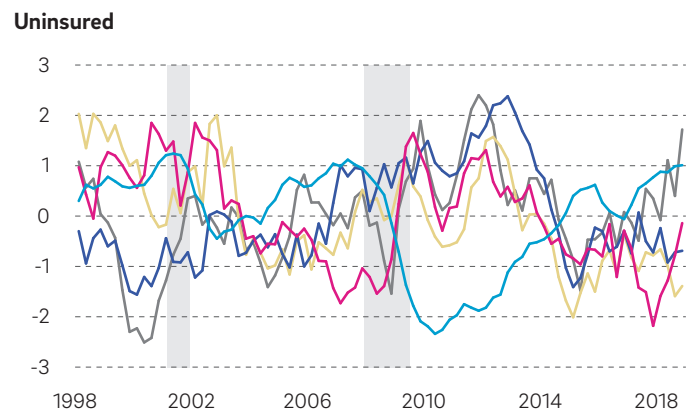
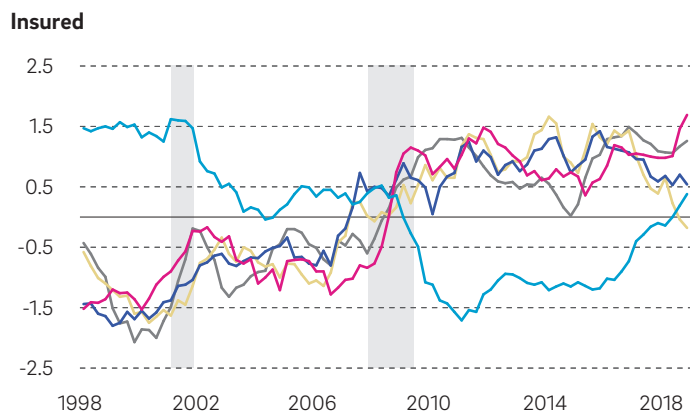
FIGURE 7

Lack of Health Insurance Can't Explain the Decrease in Population Health

Individuals with and without health insurance reported a similar decline in health and increase in doctor visits.

Employment, measures of bad health, and doctor visits among individuals 25 to 54 years old, standard deviations from mean, insured vs. uninsured, by quarter, 1q1998–4q2018

■ Employment ■ Doctor Visits ■ Reported Bad Health ■ Physical Limitations ■ Frailty Index



Data Source: National Center for Health Statistics, National Health Interview Survey, various years, obtained via IPUMS NHIS, University of Minnesota, www.ipums.org

Conclusion

More prime-age Americans report being in bad health during downturns than

during expansions. Although causality may run both ways, we provide evidence that shocks to aggregate demand alter not only economic activity but also health. Health behaviors may contribute to these results, but downturn-induced stress is likely part of the health channel that links economic fluctuations to health fluctuations. Together, this suggests that economic downturns have effects beyond the economy as narrowly defined. They also affect population health.

The efforts of Drautzburg, Guerron-Quintana, and Khazanov, discussed above, to develop a structural equilibrium model that will quantify the importance of this mechanism should help policymakers incorporate this health channel in their decision-making. □

See *Stress: Health Channel or Health Outcome?*

Is Self-reported Health a Good Measure of Health?

Self-reported health status is a widely used measure in the economic literature. This measure is based on a single question that has been asked in a nearly identical way across several major surveys over a long period.²¹ In contrast, many other health-related variables are frequently reworded or are recorded for only a handful of years.

Skeptics might argue that self-reported health is a poor measure of true underlying health. But true health is difficult to capture even with a variety of health-related questions, whereas self-reported health allows people to report on important aspects of their health that may be overlooked by typical survey questions. Despite the ambiguity of what exactly is being measured with self-reported health, its importance has been confirmed with many other more objective measures of health. Using data from the National Health Interview Survey (NHIS), we find that the risk of death in the two years after the survey is about 2.3 percent for those reporting bad health, while for those in good health this number is only 0.3 percent. Self-reported health has also been shown to contribute to or even outperform other more objective metrics in predicting mortality.²²

Self-reported health is also highly correlated with other measures of health. For example, during the Great Recession, self-reported bad health rose along with other measures of poor health.

Some researchers have used a more concrete measure of health, the frailty index.²³ They construct this index by generating a score for each individual based on a variety of health conditions (such as diabetes and asthma); certain physical limitations (difficulty eating, walking); and certain risk factors (a high body mass index or a history of smoking tobacco products). The score is then normalized by the total number of factors considered. The frailty index and self-reported health have similar time series. This highlights the comprehensive nature of self-reported health: Respondents can factor in whichever aspects of their health they experience as debilitating.

However, health is complex and multifaceted. At the individual level, for example, someone in excellent general health can suffer from an acute illness. And mental and physical health need not move in tandem. At the population level, the divergence of self-reported health and mortality over the business cycle that we discuss also attests to the complexity of measuring health.

Stress: Health Channel or Health Outcome?

This article focuses on self-reported health as the main health outcome. In this article—as well as in much of the literature, such as in Grossman's canonical health model—health is summarized by a single number, but health is multifaceted, as the differences between mortality and self-reported health illustrate.

What would a richer model of health look like? We could think of health as a vector, or collection, of several health outcomes. Each of these health outcomes, in turn, is the result of a health production function whose inputs would include, among others, the past vector of health outcomes. Self-reported health could thus be like the frailty index, which we also discuss in this article, in that it can be conceptualized as a summary measure of these multidimensional health inputs.

In such a world, stress could thus be both an input and an outcome. For example, if economic distress causes mental or physiological stress today, this stress may then lead to a deterioration of other health outcomes. Stress would thus influence our health measure both directly and indirectly.

Notes

- 1** These numbers focus on so-called "prime-aged" individuals 25 to 54 years old. Results for the COVID-19 recession are sensitive to detrending, whereas results for the earlier recessions are not. We accessed the CPS data via IPUMS. See Flood et al. (2024).
- 2** Formally, the correlation between the two series is 0.6.
- 3** To compute this projection, we used ordinary least squares regression, building on work by Oscar Jorda and by José Luis Montiel Olea and Mikkel Plagborg-Møller. Jorda introduced the key idea in 2005, and Montiel Olea and Plagborg-Møller made an important contribution in 2021. Our aggregate demand surprises are measures of surprise changes in monetary and fiscal policy. These results are taken from ongoing work by Thorsten Drautzburg, Pablo Guerron-Quintana, and Alexey Khazanov. Readers can find additional details about this implementation in their paper.
- 4** We accessed the data via IPUMS. See Blewett et al. (2024).
- 5** See Abramson et al. (2024).
- 6** Importantly, they find midlife increases in mortality for those graduating in a recession. These increases later in life are persistent, larger than the initial declines, and disease-related.
- 7** See Drautzburg et al. (2024).
- 8** The Bureau of Labor Statistics reports that there were about 5,300 fatal work injuries in 2023. "Transportation incidents" are the most common cause of work fatalities, with 37 percent of the total. Overall, however, work fatalities account for a small fraction of U.S. deaths. If we apply the same 37 percent share to the roughly 5,500 work fatalities in 2022 (and if workers were largely 20 to 69 years old), then work fatalities caused by transportation incidents accounted for only about 6 percent of overall motor vehicle deaths (as measured by the Insurance Institute for Highway Safety) in 2022. As a fraction of all unintentional injuries in this age group, the share was lower still.
- 9** See Grossman (2000).
- 10** This distinction is not always sharp. For example, obtaining health care services can be time-intensive for individuals. And working with a physical therapist would count as a health input, whereas working out with a personal trainer would be considered a health behavior. However, for the data available to us, the distinction is unproblematic.
- 11** See Scott (2023).
- 12** See Simeonova et al. (2021).
- 13** Aspects of health behavior that we do not cover here include, for example, overwork, diet, and sleep.
- 14** See Papps et al. (2023), who used data on the run times of a weekly running event in the United Kingdom from 2004 to 2020.
- 15** For more on how an individual's health shock can affect their finances, see Hosseini et al. (2021).
- 16** See Krueger (2017).
- 17** See Bailey (2006).
- 18** See Garthwaite (2012).
- 19** The authors suggest stress as a "potential mechanism." They explain that "stress is thought to affect health both by depressing the immune system and through the direct action of 'stress hormones' on factors such as blood pressure and cardiovascular health.... Stress can also have harmful consequences through psychological responses such as depression" (p. 66). Foreclosures may also impact health behaviors indirectly by lowering wealth, but the authors show that their findings still hold when they focus on the "most serious acute conditions," such as heart attacks and kidney failure, whose treatment is not a choice. See Currie and Tekin (2012).
- 20** See, for example, Capatina (2015) and Halliday et al. (2021).
- 21** Respondents are asked: "Would you say that [person's] health in general is excellent, very good, good, fair, or poor?"
- 22** See Halliday et al. (2021).
- 23** See, for example, Hosseini et al. (2021), Searle et al. (2008), and Yang and Lee (2010).

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