



Recessions and seniors' health, health behaviors, and healthcare use: Analysis of the Medicare Current Beneficiary Survey

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ABSTRACT

A number of studies report that U.S. state mortality rates, particularly for the elderly, decline during economic downturns. Further, several prior studies use microdata to show that as state unemployment rates rise, physical health improves, unhealthy behaviors decrease, and medical care use declines. We use data on elderly mortality rates and data from the Medicare Current Beneficiary Survey from a time period that encompasses the start of the Great Recession. We find that elderly mortality is *countercyclical* during most of the 1994–2008 period. Further, as unemployment rates rise, seniors report worse mental health and are no more likely to engage in healthier behaviors. We find suggestive evidence that inpatient utilization increases perhaps because of an increased physician willingness to accept Medicare patients. Our findings suggest that either elderly individuals respond differently to recessions than do working age adults, or that the relationship between unemployment and health has changed.

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1. Introduction

In the last decade, a number of studies have found that mortality rates decline as unemployment rates rise (e.g., Ruhm, 2000, 2007; Johansson, 2004; Neumayer, 2004; Tapia Granados, 2005; Buchmueller et al., 2006; Gerdtham and Ruhm, 2006; Lin, 2009). According to recent evidence from the U.S., most of the overall mortality decline associated with rising unemployment occurred in the elderly population (Miller et al., 2009; Stevens et al., 2011). The mechanisms that contribute to procyclical mortality are thought to include decreases in the time price of medical care, reductions in traffic congestion, and improvements in air quality. Because several studies find that health-related behaviors like exercise and nutrition improve during economic downturns (e.g., Ruhm, 2000, 2005), there is particular support for the explanation that unemployment reduces the opportunity cost of healthy living.

In this study, we contribute to the existing literature by conducting new analysis of both aggregate data on state mortality rates and microdata on health and health behaviors. We focus on the elderly given the importance of this population in explaining prior patterns

of procyclical mortality. Our study makes three specific contributions. First, we analyze mortality rate data that are more recent than the data examined in prior studies and from a time period that encompasses the start of the Great Recession. Second, we provide the first analysis of how seniors' health, health behaviors, and healthcare use change with the business cycle using individual-level data from the Medicare Current Beneficiary Survey (MCBS) Cost and Use files. Third, we explore how unemployment rates affect the supply of healthcare available to seniors using data from the Community Tracking Study Physician Survey.

We find that the robust findings of procyclical mortality observed in data from the 1970s to 1980s do not extend to the 15-year period from 1994 to 2008. In the more recent period, we observe a fairly robust pattern of *countercyclical* mortality in the senior population. Further, as state unemployment rates rise, we find that seniors on Medicare report worsening mental health, and we find no evidence that health behaviors improve. We also find suggestive evidence that seniors enrolled in traditional Medicare use more of some types of healthcare during recessions, which may result from an increased willingness by physicians to accept Medicare patients. Several of these findings differ from prior studies, which report that recessions lead to improvements in physical health and reductions in smoking, obesity, and the use of some types of healthcare among working age adults. Our work offers some important directions for future research, including

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an analysis of shifts in the relationship between mortality and the business cycle and a more detailed study of health provider responses to recessions.

2. Prior studies of unemployment, mortality, and individual-level health behaviors

In his seminal study on recessions and health, Ruhm (2000) uses annual U.S. state mortality rates from 1972 to 1991 and finds that a one percentage point rise in the unemployment rate reduces the overall mortality rate by 0.54%. Since then, procyclical mortality has been documented in other U.S. studies and in studies using data from France, Germany, and Spain, as well as groups of countries from the OECD, the EU, Asia, and the Pacific (Ruhm, 2008). Using U.S. data from 1979 to 2004, Miller et al. (2009) find that mortality declines among seniors are largely responsible for the overall trends. They calculate that nearly 85% of all deaths averted by a one percentage point rise in unemployment would occur in the population aged 65 and up (p. 124) and that averted deaths from cardiovascular disease account for one-third of the mortality decline. Almost all (96%) of these deaths occur in the population aged 65 and up (p. 125).

A number of studies have used microdata to identify the specific behaviors that contribute to the relationship between mortality and recessions. Ruhm (2000) reports that the state unemployment rate has statistically significant negative effects on smoking, body mass index (BMI), and the likelihoods of being overweight or obese; unemployment also has significant positive effects on physical activity and fruit and vegetable consumption. Ruhm (2005) finds that unemployment rate effects are largest among heavy smokers, the seriously overweight, and those with the lowest levels of physical activity. Both studies thus provide strong support for the “time use hypothesis,” which posits that economic downturns decrease the opportunity cost of engaging in healthy behaviors and in turn reduce mortality rates.

A different pattern is reported by Charles and DeCicca (2008), who find that increases in MSA-level unemployment rates lead to weight gain among working age men (as well as an increased propensity to be *underweight*) and a higher likelihood of smoking among black males and those least likely to be employed. They also find that mental health worsens during recessions, and posit the “economic stress hypothesis.”² According to this explanation, the threat of job loss triggers biological responses that might make individuals less healthy.

Existing studies based on microdata rule out increased medical care as the mechanism behind the mortality improvements timed with recessions. Ruhm (2000) reports that unemployment has negative and significant effects on the likelihoods of having routine medical exams and pap smears, and negative but insignificant effects on the use of mammograms and digital rectal exams. Ruhm (2003) finds that unemployment has a statistically significant negative effect on hospitalizations among working age adults and a negative and statistically significant effect on physician visits among blacks.³ Lusardi et al. (2010) show that U.S. households

reported a significant decline in routine non-emergency medical care use during the economic crisis of late 2008 and early 2009.⁴

Our study contributes to the literature by using data from 1994 to 2008 to examine both aggregate mortality rates and microdata on individuals' health, health behaviors, and healthcare use. We focus on the elderly given the importance of this population in explaining prior patterns of procyclical mortality. We conduct our analysis using data from 1994 to 2008 since we have access to both aggregate and microdata on seniors in those years.⁵ Including 2008 data allows us to examine the start of the Great Recession. Further, there is some evidence that the relationship between health and the business cycle may have changed in recent years. For example, Stevens et al. (2011) examine state mortality rates from 1978 to 2006 and find that including more recent data reduces the unemployment rate coefficient by half. A more recent focus is also valuable since most of the microdata studies cited above rely on data from the 1980s to 1990s.⁶

In addition, we provide the first analysis of how seniors' health, health behaviors, and healthcare use change with the business cycle using individual-level data from the MCBS Cost and Use files.⁷ Most studies that use U.S. microdata to examine the link between recessions and health focus on working age adults, either entirely or in large part.⁸ For example, Ruhm (2000, 2005) focus on adults aged 18 and older, and Ruhm (2003) uses data on persons aged 30 and over. Charles and DeCicca (2008) focus on 24–59-year-old men, and Lusardi et al. (2010) examines individuals between the ages of 18 and 65. A separate focus on the elderly is also warranted given important differences in their labor force attachment and sources of health insurance coverage compared to the working age population.

3. Analysis of state-level mortality rates

3.1. Data and methods

To examine the relationship between unemployment and elderly mortality, we obtain annual state-level mortality rates from the National Cancer Institute's Surveillance Epidemiology and End Results (SEER) program. We merge age-adjusted mortality rates in the age 65 and older population to annual state-level unemployment rates from the Bureau of Labor Statistics as well as annual state-level characteristics commonly used as controls in past analyses of recessions and mortality. These include the shares of the population that are black, female, and Hispanic, shares of the age 25 and older population employed in construction and manufacturing, plus shares of the age 25 and older population with less than a high school degree, with some college education, and with

¹ As noted by Ruhm (2008), a few other studies fail to find that health behaviors improve during recessions. Bockerman et al. (2007) report that higher unemployment rates increase BMI among Finnish adults, and DeSimone (2004) finds that although higher unemployment reduces obesity in high school boys, it has no effect on obesity among high school girls. Note that unlike Ruhm (2000, 2005) and Charles and DeCicca (2008), these other studies examine populations other than U.S. adults.

² Tefft (2011) also finds evidence that mental health is procyclical using data on internet searches for the terms “depression” and “anxiety.”

³ Ruhm (2003) also shows that several measures of individual physical health improve during recessions.

⁴ Two studies of state-level data from the Medicare program suggest that hospital discharge rates increase as the unemployment rate rises. Ruhm (2007) finds that higher unemployment rates increase discharge rates for coronary angiography, coronary artery bypass grafting, and percutaneous coronary interventions among Medicare fee-for-service beneficiaries. McInerney and Mellor (2012) report that unemployment is positively associated with medical discharge rates, surgical discharge rates, and inpatient days per decedent in the last six months of life.

⁵ We also selected 1994 as the start of our period because the MCBS uses a consistent sample design starting in that year (Lo et al., 2003).

⁶ Two exceptions are Charles and DeCicca (2008), which uses data from 1997 to 2001, and Lusardi et al. (2010) which uses survey data from 2009.

⁷ Only two studies in the recessions and health literature (Ruhm, 2007; McInerney and Mellor, 2012) have focused exclusively on the population aged 65 and up, and neither study uses microdata.

⁸ Some studies examine subgroups of older adults as part of a larger analysis of particular health behaviors. Hyypä et al. (1997) study Finnish adults aged 60 and older and find that the use of sleeping pills increases during economic recessions but overall sleep times do not change. Ruhm and Black (2002) report that seniors are more likely than younger adults to stop drinking alcohol during recessions.

a college degree or more. These measures are all constructed using the IPUMS-CPS (see King et al. (2010)). Like prior studies, we use the natural log of the mortality rate as the dependent variable, we include state and year fixed effects in the models, and we examine the robustness of our findings to the inclusion of state-specific time trends. State-specific time trends can account for time-varying influences on mortality that are not explicitly controlled for with the demographic variables described above.

Since we include state fixed effects it is important that sufficient within-state variation exists in our time period. To establish this, we first regress annual state-level unemployment on year fixed effects alone; the R^2 from this regression is only 0.173 in the 1994–2008 period. Second, we regress unemployment on year and state fixed effects; the R^2 from this regression is 0.709 in the 1994–2008 period. Thus, national trends explain less than 20% of the variation in state unemployment rates, and nearly 30% of the variation in state unemployment rates cannot be explained by either national trends or permanent state differences.⁹

3.2. Results

The results from our mortality rate regressions are presented in Table 1. In column (1) we report results using as close to the 1972–1991 time period used by Ruhm (2000) as possible, given that we use a BLS unemployment rate series that starts in 1976. Nonetheless, our point estimate of -0.0047 in the specification with state-specific time trends is very close to the estimate of -0.0054 from Ruhm (2000). Similarly, our estimated unemployment coefficient from 1978 to 1991, shown in column (2), is comparable to prior results from elderly mortality rate regressions for that period (Stevens et al., 2011). Finally, our estimates in columns (1) and (2), like those reported in prior studies, are robust to the inclusion of state-specific time trends.

In contrast, our results from mortality rate models estimated for the 1994–2008 period show a significant *positive* relationship between unemployment and mortality in the specification without state-specific time trends. When we include state-specific time trends, the coefficient on unemployment becomes negative, but is very small (-0.0003) and imprecisely estimated. The influence of the state-specific time trends is notable since prior estimates of the unemployment coefficient are robust to their inclusion; we suspect that the large rise in state unemployment rates during the Great Recession may explain this. Between 2007 and 2008, unemployment rates rose in all but three states, and the average increase among states that experienced higher unemployment was 1.05 percentage points (from a base unemployment rate of 4.32 in 2007). In contrast, mortality rates remained fairly flat: the average change in state mortality rates between 2007 and 2008 was just 0.24%. Thus, the inclusion of state time trends may weaken the link since both unemployment and mortality trend downward during most of the 1994–2007 period, and the steep departure of 2008 unemployment rates from trend is not associated with a similarly-sized departure from trend in mortality rates.

To further investigate this, we estimate the mortality rate regressions excluding 2008 from our sample period; results are reported in column (4) of Table 1. Consistent with the above

Table 1
Effects of unemployment on mortality among persons age 65 and up.

	1976–1991 (1)	1978–1991 (2)	1994–2008 (3)	1994–2007 (4)	1994–2006 (5)	1995–2007 (6)	1995–2006 (7)
Panel A: no state-specific trends							
Unemployment	-0.0027^{***} (0.0005)	-0.0029^{**} (0.0006)	0.0049^{***} (0.0010)	0.0059^{***} (0.0011)	0.0062^{***} (0.0011)	0.0056^{***} (0.0011)	0.0060^{***} (0.0012)
Panel B: with state-specific trends							
Unemployment	-0.0047^{***} (0.0005)	-0.0047^{***} (0.0005)	-0.0003 (0.0012)	0.0024^* (0.0013)	0.0020 (0.0014)	0.0033^{**} (0.0014)	0.0029^* (0.0015)
Observations	778	714	765	714	663	663	612

Notes: The dependent variable is the natural log of the age adjusted mortality rate for the age 65 and older population. All models include the shares of the population that are black, female, and Hispanic, the shares of the age 25 and older population employed in construction and manufacturing, and the shares of the age 25 and older population with less than a high school degree, with some college education, and with a college degree or more, plus year and state fixed effects. Observations are weighted by the square root of the total population for the state and year.

* Statistical significance for 0.10 level.

** Statistical significance for 0.05 level.

*** Statistical significance for 0.01 level.

⁹ Ruhm (2000) suggests another check on whether sufficient within-state variation exists. He shows that regressing each state's annual unemployment rate on the national unemployment rate from 1972 to 1991 yields only three states with an R^2 from this model in excess of 0.9, 14 states with R^2 in excess of 0.75, and 20 states with R^2 below 0.5. In 1994–2008 the comparable numbers of states are 0, 7, and 19, so the data from our time period perform well by this benchmark.

explanation, the unemployment rate coefficient remains positive and statistically significant when we include state time trends and omit the 2008 data. In columns (5) through (7) we examine the sensitivity of our results to other one- or two-year decreases in the time period (i.e., excluding 2007, 1994, or both). The sign and size of the unemployment coefficient is robust to the exclusion of these data, and the coefficients usually retain their statistical significance when state-specific trends are included. These results show a robust positive relationship between unemployment and mortality that runs counter to prior published estimates.

4. Analysis of MCBS data

4.1. Data and methods

To examine individual-level data on seniors' health, health behaviors, and healthcare use, we use data from the MCBS, a nationally representative sample of Medicare beneficiaries conducted by the Centers for Medicare and Medicaid Services (CMS). Each year, approximately 10,000 Medicare beneficiaries are surveyed as a part of a rotating panel.¹⁰ The annual survey portion of the dataset consists of responses to questions from an in-person interview and includes information on demographic and household characteristics, residential location, general health, the presence of chronic conditions, smoking, body mass index, and some measures of routine medical care (e.g., flu shots and mammograms).¹¹ Since we use the MCBS Cost and Use data, which link survey responses to Medicare administrative claims data, we can construct additional utilization measures that are more accurate than self-reports of healthcare use.

We focus on Medicare beneficiaries age 65 and older enrolled in Medicare for the entire year and with available state of residence identifiers. Pooling observations from all 15 years yields a sample of 130,443 individuals, which we use to examine health and health behaviors (missing values of the dependent variables reduce the estimation samples slightly). To examine healthcare utilization, we restrict the sample to Medicare beneficiaries with traditional fee-for-service (FFS) coverage and not enrolled in Medicaid (since claims-based measures of healthcare are not available for persons in managed care plans or on Medicaid) and to persons enrolled in both Medicare Parts A and B (this allows us to use the annual utilization summaries).¹² The resulting sample consists of 90,828 beneficiaries. In some analyses we examine specific types of physician office visits using data from the Medicare claims; here we restrict the sample to 79,125 beneficiaries with valid physician claims information and any physician office visit. Appendix Table A illustrates the sample construction process.¹³

¹⁰ Respondents remain in the panel for no more than four years.

¹¹ In comparison, another commonly-used survey of seniors, the Health and Retirement Study (HRS) surveys respondents on health and health-related behaviors every other year.

¹² In the MCBS, Medicare utilization summary measures are derived from claims data for the calendar year associated with the survey year processed through June 29 of the subsequent year. If the beneficiary used no Medicare services or was enrolled in a Medicare managed care plan, the utilization summary variables are empty or zero-filled. The claims-based measures are more accurate since self-reports are subject to recall bias. Medicare utilization also comprises the vast majority of all utilization for the senior population. In addition, a focus on Medicare sidesteps possible business cycle effects on private supplemental insurance, Medicaid eligibility, or income, wealth, and out-of-pocket spending.

¹³ We investigated whether selection into the sample varies with the business cycle. Using respondents age 65 and older with available data on explanatory variables, we regressed binary indicators for meeting sample inclusion criteria on the unemployment rate (including all of the controls from the main models and state-specific time trends). The unemployment rate had no significant effect on full-year

As in the mortality rate analysis, the key explanatory variable is the annual state unemployment rate from the Bureau of Labor Statistics, which we merge to individual records using the state of residence identifier. In all analytic samples, mean unemployment is just over 5% and state unemployment ranges from a low of 2.3 to a high of 8.7. We estimate the effects of the unemployment rate on a large set of dependent variables measuring health status, smoking, obesity, underweight, and healthcare use; depending on the nature of the dependent variable we employ either OLS, linear probability models (LPM) or Poisson models for count data. In addition to year and state fixed effects, all models include a large number of controls for individual and household characteristics.¹⁴ We report robust standard errors clustered by state.

In our preferred models we include state-specific time trends to account for unobserved factors that change within states over time and affect health outcomes, health status, and healthcare.¹⁵ To the degree that such factors are correlated with the unemployment rate, their omission can bias its coefficient estimate. A drawback is that the inclusion of these trends may result in multicollinearity if the relationship between the unemployment rate and the state-specific trends is strong. To investigate this, we regressed state unemployment on state and year fixed effects and state-specific trends. The R^2 from this model was 0.8743, suggesting a variation inflation factor or VIF equal to 7.96. Since the standard rule of thumb for detecting multicollinearity is a VIF of 10, we are less concerned about multicollinearity. Nonetheless, we consider its potential role by reporting models both with and without these trends.

4.2. Results

Panel A of Table 2 reports the estimated coefficient on the state unemployment rate from models of general health as measured in the MCBS. The first measure is based on a survey question that asks: "in general, compared to other people your age, would you say that your health is excellent, very good, good, fair or poor?" We define a binary indicator equal to one if self-reported general health is fair or poor and zero otherwise. The second general health measure is based on the survey question: "how much of the time during the past month has your health limited your social activities, like visiting with friends or close relatives? Would you say none of the time, some of the time, most of the time or all of the time?" We define a binary indicator equal to one if the respondent's health limited his or her activities most or all of the time in the past month, and zero otherwise.¹⁶ The results from these models are highly sensitive to the choice of specification. Excluding state-specific time trends, results suggest that higher unemployment improves health, but the coefficients are insignificant; including state-specific time trends, results suggest that higher unemployment worsens health and the coefficients are statistically significant.¹⁷

Medicare enrollment, facility residence, or on satisfying the criteria for inclusion in the healthcare utilization sample.

¹⁴ See the notes below Tables 2 and 3 for details. In models of healthcare utilization, we follow prior studies (e.g., Ruhm, 2003) and include a control variable equal to one if the respondent has any chronic condition, and zero otherwise.

¹⁵ These might pick up state-specific trends in insurance coverage or household composition. Ruhm (2000, 2003, 2005) includes state-specific time trends; Charles and DeCicca (2008) do not, but their study period is much shorter (1997–2001).

¹⁶ We interpret these measures as indicators of physical health. A number of studies show that similar self-reported general health predict mortality (e.g., Benyamini and Idler, 1999; Mossey and Shapiro, 1982).

¹⁷ In results not shown, we also examined the impact of the unemployment rate on the likelihood a respondent reports good, fair, or poor health. Coefficient estimates are similar in sign and magnitude to those reported in Table 2, but they are not statistically significant.

Table 2

Effects of unemployment on general health and health behaviors.

Dependent variable		Mean	Coefficient on unemployment rate		n
			No state-specific trends	With state-specific trends	
		(1)	(2)	(3)	(4)
Panel A: measures of general health					
Poor or fair health	LPM	0.221	−0.001 (0.003)	0.005* (0.003)	128,683
Health limits activity	LPM	0.134	0.002 (0.002)	0.007** (0.003)	128,852
Diagnosed with mental disorder in past year (1999–2008 only)	LPM	0.078	0.004 (0.003)	0.009** (0.003)	85,027
Panel B: health behaviors					
Current smoker	LPM	0.104	−0.003 (0.003)	−0.001 (0.004)	128,974
BMI	OLS	26.3 (4.99)	0.030 (0.029)	−0.076** (0.034)	128,107
ln (BMI)	OLS	3.25 (0.19)	0.001 (0.001)	−0.003** (0.001)	128,107
Underweight (BMI < 18.5)	LPM	0.031	−0.001 (0.001)	0.003* (0.001)	128,107
Normal weight (18.5 ≤ BMI < 25)	LPM	0.398	0.002 (0.004)	0.007** (0.004)	128,107
Overweight or obese (BMI ≥ 25)	LPM	0.571	−0.002 (0.003)	−0.010** (0.003)	128,107
Obese (BMI ≥ 30)	LPM	0.191	0.003 (0.002)	−0.001 (0.003)	128,107
Severely obese (BMI ≥ 35)	LPM	0.052	0.002* (0.001)	0.0004 (0.0019)	128,107

Notes: All models also include controls for age and age squared, highest educational attainment, sex, race or ethnicity, veteran status, marital status, urban residence, household composition, and an indicator for facility residence. Models also include year and state fixed effects. Robust standard errors clustered by state are reported in parentheses.

* Statistical significance for 0.10 level.

** Statistical significance for 0.05 level.

*** Statistical significance for 0.01 level.

Because respondents may differ in their knowledge of health problems or their perceptions of what is healthy (Thomas and Frankenberg, 2002), we use an additional health measure defined from a question about whether the respondent was diagnosed with a psychiatric or mental condition in the past year. We find that a one percentage point rise in the unemployment rate is associated with a 0.4 to 0.9 percentage point (or 5–12%) increase in the likelihood of having a mental health diagnosis in the last year.¹⁸

In Panel B of Table 2 we report results from models of smoking, BMI and its natural log, and binary indicators of underweight (BMI < 18.5), normal weight (18.5 ≤ BMI < 25), overweight/obese (BMI ≥ 25), obese (BMI ≥ 30), and severely obese (BMI ≥ 35).^{19,20} In the model of smoking, the unemployment rate coefficient is not statistically significant whether or not state-specific trends are included.²¹ We find some evidence that unemployment affects weight-related measures, typically when state-specific time trends are included. The unemployment coefficient is negative and statistically significant in the BMI, ln (BMI), and overweight/obese models, and positive and statistically significant in the models of underweight and normal weight. However, a one percentage point rise in unemployment has relatively small effects on BMI (a decrease of 0.29% from the mean) and overweight/obesity (a

2% decrease from the mean), and a much larger increase in the likelihood of being underweight (nearly 10% from the mean).²² Combined, these results suggest that recession-induced declines in BMI are occurring at the low end of the BMI distribution.²³

In summary, Table 2 results tell a different story about the effect of economic downturns on the health of the elderly. Past studies of working age adults show that physical health and health behaviors improve as the unemployment rate rises; we see some hints of deteriorations in physical health during bad economic times and no evidence of improvements. Consistent with the prior literature, we find that mental health deteriorates. Prior studies show significant declines in smoking and obesity; we see no significant effect on smoking and some evidence that higher unemployment decreases BMI for persons in the low range of the BMI distribution (although the BMI results are sensitive to the inclusion of state trends).

Table 3 reports coefficients of the unemployment rates in models of healthcare use among the older population. From questions on the MCBS survey, we construct measures of preventive care similar to those used in Ruhm (2003), such as receiving mammograms, pap smears, digital rectal exams, and flu shots. We find no consistent evidence of a significant relationship between unemployment and these measures either with or without state-specific time trends. We next examine inpatient hospital admissions, defined in the MCBS administrative summary records (referred to as RIC A in the MCBS documentation). There is some evidence that higher unemployment rates increase inpatient care utilization. Without controlling for state-specific trends, a one percentage point increase in the unemployment rate results in a 0.6 percentage point (or 3.2%) increase in the likelihood of having an inpatient stay. When we include state trends, the unemployment coefficient

¹⁸ In results not shown, we also defined a binary dependent variable for whether the respondent has at least one of the chronic conditions included in the MCBS survey (arthritis, rheumatoid arthritis, emphysema, Alzheimer's disease, broken hip, cancer, skin cancer, Parkinson's disease, partial paralysis, diabetes, heart attack, and stroke). The unemployment rate coefficient is not statistically significant, and the 95% confidence interval suggests that any effects would be small, ranging from just a 0.8% decrease to a 0.4% increase.

¹⁹ The indicator for current smoking equals one if the respondent said that he or she smoked cigarettes, cigars, or pipe tobacco at the time of the survey, and zero otherwise.

²⁰ Many prior studies also examine the effects of recessions on alcohol use and alcohol-impaired driving (e.g., Evans and Graham, 1988; Wagenaar and Streff, 1989; Ruhm, 1995; Ruhm and Black, 2002). Because the MCBS Cost and Use data do not include information on alcohol consumption, we cannot examine drinking behaviors.

²¹ We caution that the effects of unemployment are imprecisely estimated in the models of smoking and obesity. The 95% confidence intervals range from an 8.8% decrease to a 6.4% increase in the case of smoking, and a 3.8% decrease to a 2.7% increase in the case of obesity. These wide confidence intervals could allow for the types of effects observed in the prior literature.

²² We estimated the health status and health behavior models using the smaller sample of observations with available data on our healthcare measures; the signs and magnitudes of the unemployment rate coefficients were comparable to those reported in Table 2 (although in some cases, the coefficient estimates were less precisely estimated).

²³ We estimated another model of underweight using an alternate definition of BMI below 23.5, since some groups suggest that a higher cutoff is appropriate in an older population (e.g., American Dietetic Association, 2009). Our findings are qualitatively similar when we use this alternative definition of underweight.

Table 3
Effects of unemployment on healthcare utilization.

Dependent variable		Mean	Coefficient on unemployment rate		n
			No state-specific trends	With state-specific trends	
		(1)	(2)	(3)	(4)
Flu shot	LPM	0.710	0.002 (0.004)	0.002 (0.006)	89,710
Mammogram	LPM	0.473	−0.001 (0.005)	0.004 (0.007)	50,055
Pap smear	LPM	0.306	−0.014** (0.006)	−0.006 (0.006)	49,885
Digital rectal exam (1999–2008 only)	LPM	0.513	0.002 (0.008)	−0.005 (0.015)	25,877
Any inpatient stay	LPM	0.189	0.006*** (0.002)	0.004 (0.004)	90,828
# Inpatient stays	Poisson	0.299 (0.769)	0.034** (0.017)	0.032 (0.025)	90,828
Any physician visit	LPM	0.884	0.001 (0.003)	−0.004 (0.003)	90,828
# Physician visits	Poisson	6.631 (6.375)	0.0006 (0.010)	−0.006 (0.010)	90,828
Any new patient visit or consultation (conditional on claims information and any physician visit)	LPM	0.511	0.003 (0.003)	−0.004 (0.006)	79,125
# New patient visits or consultations (conditional on claims information and any physician visit)	Poisson	0.896 (1.200)	0.013* (0.008)	−0.004 (0.012)	79,125

Notes: All models also include controls for age and age squared, highest educational attainment, sex, race or ethnicity, veteran status, marital status, urban residence, household composition, an indicator variable for the presence of any chronic conditions, and an indicator for facility residence. Models also include year and state fixed effects. Robust standard errors clustered by state are reported in parentheses.

* Statistical significance for 0.10 level.

** Statistical significance for 0.05 level.

*** Statistical significance for 0.01 level.

remains positive, although smaller and less precisely estimated.²⁴ The effect of unemployment on the number of inpatient admissions is sensitive to the inclusion of state-specific time trends. Excluding the trends, a one percentage point increase in the unemployment rate increases the number of admissions by 3.4%, and including the trends increases the standard error of this coefficient.²⁵

In the remaining rows of Table 3, we report results from models of physician office visits. Because almost all MCBS respondents in our sample had at least one physician office visit, we model the likelihood and number of any physician office visit as well as the likelihood and number of new patient office visits or consultations.²⁶ In models of any physician office visits, the unemployment rate coefficients are imprecisely estimated, and we cannot reject the null hypothesis of a zero effect in any of the four models. In models of new physician office visits, there is some evidence that rising unemployment rates significantly increase the number of such visits, but the coefficient becomes smaller and changes sign when state trends are included. It is also highly imprecise in that specification, with a 95% confidence interval that ranges from −0.0285 to 0.0203, thus allowing for the positive effect observed without state time trends.

Overall, these findings differ from those of prior microdata studies which show a negative relationship between healthcare use and the business cycle. Our results suggest inpatient utilization is positively correlated with unemployment rates, complementing previous findings that aggregate Medicare utilization (measured by state-level discharge rates) is positively correlated with the state unemployment rate (Ruhm, 2007; McInerney and Mellor, 2012).²⁷

5. Analysis of data from the Community Tracking Study Physician Survey

To investigate why the effects of unemployment on healthcare might differ in the Medicare population compared to the working age population, we examine how healthcare suppliers respond to changes in the unemployment rate. Other studies have demonstrated that recessions reduce health insurance coverage in the population under age 65 (e.g., Cawley and Simon, 2005; Holahan, 2011) and slow the growth rate of private healthcare spending (e.g., Martin et al., 2011; Hartman et al., 2010). Providers also tend to experience excess demand for healthcare from publicly insured patients (e.g., Baker and Royalty, 2000; Tang et al., 2003). Thus, it may be that economic downturns ease capacity constraints on healthcare providers, allowing them to increase the services provided to Medicare patients.

To test for a supply-side response that may impact Medicare beneficiaries' access to care, we use restricted data from the Community Tracking Study (CTS) Physician Survey. The CTS is a national study designed to track the impacts of rapid health system change, and since 1996 the Physician Survey has been used to collect data from physicians in private practice, clinic, hospital, university and other settings in 60 sites around the U.S.²⁸ In addition to collecting information on time allocation, practice arrangements, and perceptions of healthcare delivery, the survey includes two questions relevant to the provision of physician services to Medicare patients. These are the share of practice revenue from Medicare patients as reported by the physician and whether the practice accepts new Medicare patients.

We use CTS Physician Survey data to estimate models of the share of practice revenue from Medicare and acceptance of new Medicare patients as a function of the unemployment rate. We

²⁴ The 95% confidence interval surrounding the coefficient estimate includes large positive effects (an increase of 1.1 percentage points) and small negative effects (a decrease of 0.3 percentage points).

²⁵ The 95% confidence interval includes large positive effects (8% increase in inpatient admissions) and small negative effects (1.6% reduction in the number of inpatient admissions).

²⁶ We use the administrative summary records to define any physician office visits and we use the BETOS codes on the physician claim (CMS, 2011) to identify records corresponding to new encounters.

²⁷ We conducted a number of sensitivity tests for the results in Tables 2 and 3. Given the pattern reported in Table 1, we confirmed that our results using microdata are not sensitive to the inclusion or exclusion of data from 2008. Signs and magnitudes of the unemployment rate coefficients were comparable to those reported

in Tables 2 and 3 (though in some cases, less precisely estimated). We confirmed that our estimates from linear probability models are qualitatively similar when we use probit models. To address concerns about overdispersion in our count data, we also estimated analogous negative binomial models, and results were qualitatively similar to the Poisson model results.

²⁸ The CTS Physician Survey was conducted under the direction of the Center for Studying Health System Change. For more information on the survey, see www.hschange.org.

Table 4

Effects of unemployment on physician revenue from Medicare patients and acceptance of Medicare patients.

Dependent variable		Mean (1)	Coefficient on unemployment rate		n (4)
			No state-specific trends (2)	With state-specific trends (3)	
Share of practice revenue from Medicare patients	OLS	34.46	−0.401 (0.344)	−0.262 (0.655)	31,348
Accepts all new Medicare patients	LPM	0.680	0.017** (0.008)	0.015 (0.018)	35,418
Portion of new Medicare patients accepted	OLS	3.44	0.037*** (0.014)	0.036 (0.037)	35,418

Notes: The variable “portion of new Medicare patients accepted” takes the value of 1 if the physician accepts no new Medicare patients, 2 if some, 3 if most, and 4 if all new Medicare patients. Models include dummies for specialty type, female, large MSA and small MSA (relative to rural), years in practice and its square, real practice income and its square, dummies for owner, board certification, foreign medical school graduate, small office, year and state effects and state-specific time trends. Observations are weighted by physician weights. Standard errors are clustered by state.

* Statistical significance for 0.10 level.

** Statistical significance for 0.05 level.

*** Statistical significance for 0.01 level.

pool data from rounds of the survey conducted in 1996–1997, 1998–1999, 2000–2001 and 2004–2005, and we merge physician records to the average unemployment rate in their state over the survey period in that round.²⁹ We exclude physicians with a primary specialty in pediatrics broadly defined or with another specialty focused on pediatric, child, or adolescent health (as in pediatric cardiology, child neurology, neonatal medicine, etc.), and we use only those observations for physicians whose responses to the two questions used to define dependent variables were not imputed. We control for gender, years in practice and its square, real practice income and its square, indicators of specialty type (medical, surgical, internal medicine, ob/gyn, and psychology, relative to family/general practice), indicators for whether the physician is board certified, foreign educated, or an owner of the practice, the size of the office, and location in a small or large MSA (relative to rural). We also include year (i.e., round) and state fixed effects, and we test for sensitivity to state-specific trends as in our other panel data analysis. All models are estimated with the physician survey weights provided in the dataset, and we report standard errors that account for clustering by state.

Results are presented in Table 4. In the models without state trends, the unemployment rate has a negative but insignificant effect on Medicare share of practice revenue, but a statistically significant positive effect on acceptance of new Medicare patients.³⁰ When state-specific time trends are included, the standard errors increase, but the point estimates are very similar. Given the potential for collinearity in the shortened time period used in this analysis, the reduced precision of the estimates when state trends are included is not surprising. The results from this analysis are thus supportive of a supply-side explanation behind the utilization patterns reported in our MCBS analysis and in prior aggregate studies using Medicare data.

6. Conclusion

This study offers three lessons for the literature on recessions and health. First, we show that evidence of procyclical mortality among the elderly does not hold up in more recent years. In contrast, during most of 1994–2008 period we find that mortality in the age 65 and older population is countercyclical. Our findings are

consistent with those by Stevens et al. (2011), who examine data from 1976 to 2006 and note that “adding 15 years of data cuts the estimated coefficient on the unemployment rate in half... which suggests that the overall effect of the business cycle on mortality may not be as large as previously thought” (p. 6). While our study cannot explain why this pattern exists, we highlight this change as an avenue for future research.

The second lesson comes from our finding that seniors respond to economic downturns in different ways than suggested by prior studies. Specifically, our results for general physical health, smoking, and obesity do not mirror findings from prior studies of younger adults. There are two possible explanations for this. One is that, as in the mortality analysis, there is something different about the time period under study. Partial support for this explanation is that our findings on mental health and underweight are comparable to findings by Charles and DeCicca (2008) who use data from a time period that overlaps with ours. Another explanation is that seniors are different in their exposure to economic downturns; in particular, the time-use hypothesis that explains healthier living by younger adults in bad times seems not to apply to them (not surprisingly). Perhaps the economic stress hypothesis described by Charles and DeCicca (2008) is more relevant since economic downturns can raise concerns about the security of retiree income from public programs and returns on private investments. Future microdata studies comparing the responses of both populations to the same economic shocks are needed to resolve this issue.

The third lesson from our study follows from our findings on healthcare. Seniors also appear different from the working age population in terms of the effect of economic downturns on their healthcare use. Unlike younger adults who seem to use less healthcare as unemployment rates rise, seniors use more inpatient care, consistent with prior studies of state-level Medicare discharge rates. This suggests two areas for additional work. First, it may be worth examining whether increases in hospital admissions are driven by elective or non-elective care, and for which diagnoses. Results from such studies would also help evaluate the potential benefits of any increased utilization that we document. Second, it is worth examining how suppliers contribute to this pattern. We doubt that demand-side factors explain this rise since we see no effect of unemployment rates on supplemental health insurance or labor force participation in the MCBS data.³¹ We also see little difference in our estimated unemployment coefficients in Table 3 when we omit the control variable for any chronic condition from the models, suggesting that at least general measures of health do not explain the observed association between unemployment and healthcare. Instead we show evidence that the rise in healthcare use

²⁹ Survey fielding lasted for 13–16 months in each round and no information is available on the specific interview date; for this reason, we use the average monthly unemployment rate across the months that fielding took place.

³⁰ We report results from models of a binary indicator equal to one if the physician's practice accepts all new Medicare patients and a categorical dependent variable where higher values correspond to acceptance of more new Medicare patients. The possible responses to this question are no new Medicare patients (6.3%), some (11.4%), most (14.3%) or all (68%).

³¹ Results from these models are not shown but are available upon request.

may be tied to an increased willingness of healthcare providers to accept Medicare patients.

This last finding suggests there might be important supply-side responses to higher unemployment. For the most part, the recessions and health literature has overlooked the role of physicians, hospitals and other providers (Stevens et al., 2011 is a notable exception). More research in this area could lead to a better understanding of variation in healthcare costs, as well as an understanding of how access by seniors is related to healthcare demand by working age adults. For example, if higher unemployment rates increase inpatient use by Medicare beneficiaries and increase provider willingness to accept Medicare patients (as our results suggest), would improving economic conditions and expansions of health insurance for the under 65 population reduce Medicare patients' access and utilization? Our work suggests these questions are important directions for the recessions and health literature.

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Appendix A. Sample construction

Sample	Observations remaining
Sample used to model health and health behaviors	
All MCBS respondents 1994–2008	186,270
Exclude respondents under age 65	154,858
Exclude those for whom cannot match state unemployment rate (missing state)	152,393
Exclude those who are missing information on age, schooling, race/ethnicity, veteran status, marital status, household composition	139,056
Exclude those who are not enrolled in Medicare for entire year	130,443
Sample used to model healthcare utilization	
Keep only those enrolled in Medicare Fee for Service	107,275
Keep only those enrolled in Medicare Parts A and B	104,512
Exclude those enrolled in Medicaid	90,828
Individuals with valid physician claims information and any physician office visit	79,125

Appendix B. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.jhealeco.2012.06.002>.

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