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Are Recessions Good for Everyone's Health?
The Association Between Mortality and the Business Cycle by Race in the U.S.

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Are Recessions Good for Everyone's Health? The Association Between Mortality and the Business Cycle by Race in the U.S.*

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Abstract

In this paper we study the effect of the business cycle on the mortality rate of the major racial groups in the U.S. Using county-level data from 1999 to 2005, we find that the unemployment rate is negatively related to mortality for whites and latinos but that there is not a statistically significant relationship for blacks. Moreover, the magnitude of this relationship is larger for latinos than for whites. Finally, the relationship becomes more pronounced for latinos and whites as the proportion of population of that race increases. Taken together, these findings suggest that the procyclical association between mortality and the business cycle identified in previous studies of the general U.S. population may vary by race.

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1 Introduction

An important aspect of public health policy is the effect of the business cycle on general and specific causes of mortality. Studies of the U.S. (Rhum 2000, Tapia Granados 2005a), Germany (Neumayer 2004), a group of five European countries (McAvinchey 1988), Spain (Tapia Granados 2005b), advanced OECD countries (Gerdtham and Ruhm 2006) and Mexico (Gonzalez and Quast 2008) find a procyclical relationship between mortality and the business cycle. That is, mortality tends to increase (decrease) during periods of economic expansion (contraction).

However, the aforementioned U.S. studies analyze how economic fluctuations affect mortality rates for the general population only. It is perhaps unlikely that the relationship found for the general population is constant across racial groups. For example, existing studies (e.g., Freeman 1973, Bradbury 2000) have shown that racial groups are impacted differentially by the business cycle. Further, racial groups may have varying levels of access to health care and these potential differences could be magnified during periods of economic growth or contraction.

The purpose of this paper is to investigate whether the procyclical nature of mortality found in the U.S. general population is also present for whites, blacks and latinos. We construct a data set at the county level from 1999 to 2005 that contains overall and race-specific mortality rates, as well as the unemployment rate, a measure of health care infrastructure, federal assistance to individuals and crime. We estimate panel regressions with county and year fixed effects. We analyze all counties as well as subsets of the counties based on the racial proportion of the population.

We obtain three main results. First, we find that the procyclical relationship between the business cycle and mortality found for the general population also holds for whites and latinos, but not blacks. Second, this relationship appears to be more

pronounced for latinos than for whites. Finally, for latinos and whites, the procyclical relationship strengthens as the proportion of the population of that race increases.

These results suggest that the procyclical relationship for the general U.S. population found in earlier studies may differ by race. Thus, public health policy may be improved by recognizing the potential for business cycles to affect mortality differently across racial groups.

The paper is organized as follows. The next section describes the data and the empirical specification. The third section presents and discusses the results. The final section concludes.

2 Data and empirical specification

The dependent variable in our analysis is the annual county-level mortality rate. These data were obtained from the Compressed Mortality database maintained by the U.S. Centers for Disease Control (CDC). The mortality rate is the number of deaths per 100,000 residents and is adjusted to account for the distribution of ages in the county. In addition to the mortality rate for the entire county (hereafter referred to as the overall mortality rate), the mortality rate is available for whites in most counties and blacks in some counties. The white mortality rate includes latinos.

The explanatory variable of interest is the county unemployment rate obtained from the Local Area Unemployment Statistics published by the Bureau of Labor Statistics. Control variables are employed to account for other factors that may affect mortality. We also include county and year fixed effects are in the regressions. While these fixed effects control for any time-invariant factors that are present in a given county as well as any factors that affect all counties in a particular year, this approach comes at a cost. The control variables must vary over time within and across counties, which limits the number of potential variables that we can use.

One factor that is likely to influence mortality is the health care infrastructure. As a proxy for this, we include the number of physicians per capita reported by the American Medical Association as a control variable.[1] The number of violent crimes per capita

[1] As the number of physicians is only available for 2003 forward, the 1999 through 2002 values are linearly extrapolated. As a robustness test, the regressions were estimated without this variable and

is also included as a control variable and was obtained from the U.S. Department of Justice. In addition to accounting for the potential physical harm from criminal activity, this variable can also be thought of as a rough proxy for the education level. Finally, government transfers may influence mortality, as payments to individuals will affect their income level. Two types of federal payments published by the U.S. Census are included: payments for retirement and disability and payments for other reasons (such as Medicare, food stamps, and other forms of federal assistance).

The sample period is 1999 through 2005[2] and cover 3140 counties. However, 566 observations were deleted because the mortality data was either missing, suppressed, or deemed unreliable by the CDC. Seven additional observations for Louisiana in 2005 are dropped because unemployment data are not available due to Hurricane Katrina. The final sample for all counties consists of 21,407 observations.

Table I: Summary statistics - by racial majority

Table I summarizes the sample data for all counties and for counties that have a racial majority[3]. Note that while the population data contains information regarding the number of latinos, the mortality data do not include a specific category for latinos. However, according to the racial categories in the 2000 Census, over 92% of latinos are classified as white (U.S. Census 2002). Thus, the white mortality data can, to some extent, be thought of as primarily consisting of non-latino whites and latino whites. In the analysis below, we use the white mortality rate as a rough proxy for the latino mortality rate in counties with relatively high latino population proportions. The explanatory variables indicate significant differences exist across counties by racial majority. The unemployment rate and crime are significantly higher in black- and latino-majority counties than in white-majority counties. The number of physicians per capita is higher in black-majority counties and lower in latino-majority counties.

The regression coefficients are estimated via ordinary least squares. The natural log of the mortality rate is used as the dependent variable and the observations are

the results were largely unchanged.

[2]County-level unemployment data are not available before 1999, while county-level mortality data are not available after 2005.

[3]We define a county as having a racial majority if the proportion of residents of that race is over 50% for every year in the sample period

weighted by the square root of the state population. The estimating equation is:

$$\begin{aligned} ln(mort_{i,t}) =& \beta_0 + \beta_1 unemploy\_rate_{i,t} + \beta_2 phys\_percap_{i,t} + \beta_3 crimes\_percap_{i,t} \\ &+ \beta_4 pmts\_retdis_{i,t} + \beta_5 pmts\_other_{i,t} + \gamma_t + \eta_i + \epsilon_{i,t} \end{aligned} \tag{1}$$

where i indexes the county and t indexes the year. The γ_t terms are the year fixed effects, the η_i are the county fixed effects, and $\epsilon_{i,t}$ is the error term. The error terms are clustered at the county level to account for the possibility of correlated disturbances within a given county.

3 Results

The regression results are provided in Table II. The table is divided into three sample subsets: all counties, counties where the racial proportion is at least 25%, and counties where the racial proportion is greater than 50%.[4] The three columns correspond to the dependent variable used in the regression: the overall mortality rate, the white mortality rate, and the black mortality rate. Within each cell, the top number is the coefficient on the unemployment rate in that regression, the middle number is the standard error of the coefficient and the bottom number is the sample size.[5]

Table II: Effect of unemployment rate on mortality

In the regression for all counties in which the dependent variable is the overall mortality rate, the coefficient on the unemployment rate is -.0015 and is statistically significant at the 10% level. This implies that a one percentage point increase in the unemployment rate is associated with an average decrease of 0.15% in the mortality rate. At the sample average of the overall mortality rate, this translates to a decrease of 1.4 deaths per 100,000 residents. This result is consistent with the procyclical relationship found in existing studies of the general U.S. population.

[4] An alternative approach would be use the entire sample and interact the unemployment rate with the various racial proportions. However, this approach implies that the relationship between all of the explanatory variables and the mortality rate does not vary across counties. In the estimates where the sample is subset, the relationships does vary significantly and thus the use interaction terms may be inappropriate.

[5] The estimates for all explanatory variables from the various regressions are available from the authors upon request.

However, column (1) reveals interesting contrasts when the regressions using the overall mortality rate are subset by the county racial proportions. While the coefficient for the 25% white counties is equal to the coefficient for all counties, the -.0035 coefficient for the 25% latino counties is more than double. The magnitude of the coefficient increases when the sample is further limited to those counties in which the proportion of latinos is greater than 50%. At -.0062, the coefficient is more than four times as large as the coefficient for all counties. The coefficient for the black majority counties is also nearly four times as large as for all counties, but the coefficient is not statistically significant.

Column (2) of Table II contains the unemployment rate coefficient estimates when the white mortality rate is used as the dependent variable. The procyclical relationship increases in magnitude when the white mortality rate is used as the dependent variable. The -.0018 coefficient for all counties is roughly 20% larger than when the overall mortality rate is used. Furthermore, the link between white mortality rate and unemployment becomes more pronounced as the proportion of the residents of a specific race in the county increases. For instance, the coefficient in the 25% white county counties is -.0021, while in the 50% white counties it is -.0025. The corresponding increases are even larger for black (from -.0022 to -.0118) and latino (from -.0043 to -.0067) counties.

In contrast, when the black mortality rate is used as the dependent variable, the coefficients are relatively small and all are statistically insignificant. In fact, as shown in column (3), three of the seven coefficients have a positive sign. However, the samples for the regressions in the white and latino counties in which the black mortality rate is used as the dependent variable are significantly smaller than those in which the white mortality rate is used. This can potentially reduce the power of the tests of these coefficients. Selection issues may also arise if the counties for which the black mortality rate is available are fundamentally different than those for which it is not.

4 Conclusions

In this paper we analyze the relationship between mortality and the business cycle by race, specifically for whites, blacks, and latinos. While previous studies of the U.S. have found a procyclical relationship for the general population, we find that important differences in this relationship may exist across these racial groups.

Our results suggest that for whites and latinos mortality is procyclical, while for blacks there is no discernable relationship. Furthermore, we find that the relationship is stronger for latinos than for whites. In addition, the relationship for whites and latinos appears to strengthen as the proportion of the population of that race in a county increases.

Our results should be taken with caution as further research is needed to confirm our findings. The analysis could be improved if mortality rates specifically for latinos were available. Moreover, additional control variables (especially regarding education and health care spending) and a longer sample period could strengthen our analysis. Therefore, our study may be extended as more county-level data become available.

References

[1] American Medical Association. Physician characteristics and distribution in the U.S., Chicago, IL (obtained via U.S. Census USA Counties website, `http://censtats.census.gov/usa/usa.shtml`, Nov. 14, 2008)

[2] Bradbury, K. 2000. Riding tides in the labor larket: To what degree do expansions benefit the disadvantaged? *New England Economic Review* May/June: 3-33.

[3] Freeman, R. 1973. Changes in the labor market for black americans, 1948-1972. *Brookings Papers on Economic Activity* 1: 67-131.

[4] Gonzalez, F., Quast, T. 2008. Do changes in income affect mortality? The case of Mexico, Sam Houston State University, Working Paper 08-07.

[5] Gerdtham U., Ruhm C. 2006. Deaths rise in good economic times: evidence from the OECD. *Economics and Human Biology* 4:298-316.

[6] McAvinchey I. 1988. A comparison of unemployment, income, and mortality interaction for five european countries. *Applied Economics* 20:453-471.

[7] Neumayer E. 2004. Recessions lower (some) mortality rates: evidence from Germany. *Social Science and Medicine* 58: 1037-1047.

[8] Ruhm C. 2000. Are recessions good for your health? *Quaterly Journal of Economics* 115(2):617-650.

[9] Tapia Granados J. 2005a. Increasing mortality during the expansions of the US economy, 1900-1996. *International Journal of Epidemiology* 34:1194-1202.

[10] Tapia Granados J. 2005b. Recessions and mortality in Spain, 1980-1997. *European Journal of Population* 21:393-422.

[11] U. S. Bureau of Labor Statistics 2008. Local area unemployment statitistics, `http://www.bls.gov/lau/home.htm`.

[12] U.S. Census. Federal assistance award data system. (obtained via U.S. Census USA Counties website, `http://censtats.census.gov/usa/usa.shtml`, Nov. 14, 2008)

[13] U.S. Census 2002. Modified race summary file - technical documentation, 2000 Census of Population and Housing.

[14] U.S. Center for Disease Control 2008. Compressed Mortality Rates 1979-2005.

[15] U.S. Department of Justice, Federal Bureau of Investigation, Uniform Crime Reporting Program, unpublished data, annual (obtained via U.S. Census USA Counties website, `http://censtats.census.gov/usa/usa.shtml`, Nov. 14, 2008)

Table I: Summary statistics - by racial majority

Variable	Mean	Std. Dev.	Min.	Max.
All counties ($n = 21,407$)				
Overall mortality rate	893.3	148.3	230.8	3331.2
White mortality rate[1]	879.4	139.2	232.2	2049.3
Black mortality rate[1]	1136.7	223.8	335.1	3985.8
Unemployment rate	5.3%	2.0%	0.7%	30.6%
Number of violent crimes (per 1000)	2.5	2.6	0.0	80.9
Number of physicians (per 1000)	1.5	3.3	0.0	167.5
Federal payments to individuals (retire. & dis.)	$2465	$741	$0	$16,279
Federal payments to individuals (other)	$1125	$448	$0	$7550
White (not Latino) majority ($n = 19,416$)				
Overall mortality rate	886.5	140.4	230.8	2768.1
White mortality rate[2]	878.6	137.9	232.3	2049.3
Black mortality rate[2]	1136.4	229.6	472.1	3985.8
Unemployment rate	5.1%	1.8%	0.7%	17.0%
Number of violent crimes (per 1000)	2.3	2.3	0.0	80.9
Number of physicians (per 1000)	1.5	1.6	0.0	28.2
Federal payments to individuals (retire. & dis.)	$2500	$736	$0	$16,279
Federal payments to individuals (other)	$1117	$437	$0	$7489
Black majority ($n = 622$)				
Overall mortality rate	1068.7	135.6	686.6	1548.0
White mortality rate[3]	954.6	153.1	539.6	1595.1
Black mortality rate[3]	1180.2	173.4	660.6	1891.1
Unemployment rate	7.8%	2.4%	2.6%	18.5%
Number of violent crimes (per 1000)	4.9	4.3	0.0	24.7
Number of physicians (per 1000)	3.1	17.4	0.0	169.2
Federal payments to individuals (retire. & dis.)	$2422	$677	$770	$5597
Federal payments to individuals (other)	$1424	$471	$303	$3479
Latino majority ($n = 329$)				
Overall mortality rate	809.4	130.9	362.3	1200.7
White mortality rate[4]	815.2	133.1	352.6	1201.4
Black mortality rate[4]	998.9	149.8	635.3	1321.1
Unemployment rate	8.5%	4.0%	2.8%	30.6%
Number of violent crimes (per 1000)	3.7	2.5	0.0	12.4
Number of physicians (per 1000)	1.0	0.9	0.0	4.0
Federal payments to individuals (retire. & dis.)	$1871	$561	$852	$4031
Federal payments to individuals (other)	$1057	$353	$512	$2555

[1] The sample sizes for the white and black mortality rates are 20,944 and 7534, respectively.

[2] The sample sizes for the white and black mortality rates are 19,102 and 6323, respectively.

[3] The sample sizes for the white and black mortality rates are 599 and 608, respectively.

[4] The sample sizes for the white and black mortality rates are 328 and 43, respectively.

Mortality rates are age-adjusted and measured as the number of deaths per 100,000 people.

Unless otherwise noted, variables are calculated on a per capita basis.

Table II: Effect of unemployment rate on mortality

	Dependent variable - mortality rate		
Sample	Overall	White[1]	Black
	(1)	(2)	(3)
All counties	-.0015*	-.0018**	-.0012
	(.0009)	(.0009)	(.0018)
	21,407	20,944	7534
Counties with more than 25% racial representation			
White	-.0015*	-.0021**	-.0010
	(.0009)	(.0009)	(.0019)
	20,997	20,627	7408
Black	-.0017	-.0022	-.0037
	(.0017)	(.0023)	(.0023)
	2770	2727	2679
Latino	-.0035*	-.0043**	.0007
	(.0019)	(.0018)	(.0061)
	1322	1313	365
Counties with more than 50% racial representation			
White	-.0021***	-.0025***	-.0007
	(.0007)	(.0007)	(.0022)
	19,416	19,102	6323
Black	-.0055	-.0118**	.0001
	(.0034)	(.0050)	(.0035)
	622	599	608
Latino	-.0062**	-.0067**	.0157
	(.0029)	(.0030)	(.0194)
	329	328	43

[1]The white mortality rate includes both hispanics and non-hispanics.

The top number in each cell is the coefficient estimate on the unemployment rate, the middle number is the standard error of the coefficient estimate, while the bottom number is the sample size for that regression.

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level

Regressions also include the following control variables: number of doctors per capita, number of violent crimes per 1000 residents, and federal payments to individuals (retirement and disability and other). Regressions also include county and year fixed effects.

Standard errors are clustered at the county level.

Table for reviewers only

The following table is provided for the reviewers' use only and is not to be published with the paper. The table displays the results of various econometric specifications where the overall mortality rate is used as the dependent variable and is included to indicate the robustness of the results presented in the main text.

The first column contains the estimates using all of the control variables as specified in Equation (1). The second column reports the coefficients when doctors per capita is excluded as a control variable. The third column contains the coefficient estimate on the unemployment rate when only that variable is used as an explanatory variable. The fourth column details the estimates when the full model is estimated as a linear equation, and the fifth column shows the estimates from the log-linear model without fixed year effects.

Table III: Robustness checks for regressions for all counties using the overall mortality rate

Explanatory variable	(1)	(2)	(3)	(4)	(5)
Unemployment rate	-.0015*	-.0017*	-.0018*	-2.034***	-.0043***
	(.0009)	(.0009)	(.0011)	(.6812)	(.0006)
Number of physicians	-.0074			-5.393	-.0157**
	(.0047)			(3.676)	(.0066)
Number of violent crimes	.0029**	.0029**		2.035*	.0028**
	(.0013)	(.0013)		(1.214)	(.0013)
Federal pmts - retire. & dis.	.0579***	.0582***		40.16***	-.0601***
	(.0103)	(.0103)		(8.230)	(.0079)
Federal pmts - other	-.0006	-.0012		-8.519	-.0879***
	(.0136)	(.0136)		(9.249)	(.0110)
Year fixed effects	Yes	Yes	Yes	Yes	No
Specification	Log-linear	Log-linear	Log-linear	Linear	Log-linear
R-squared	0.442	0.441	0.429	0.403	0.318
Number of observations	21,407	21,407	21,407	21,407	21,407

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level

[1]The white mortality rate includes both hispanics and non-hispanics.

Standard errors are clustered at the county level.