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Social Science & Medicine 64 (2007) 1420–1424

SOCIAL SCIENCE & MEDICINE

www.elsevier.com/locate/socscimed

Business cycles, migration and health

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Available online 28 December 2006

Abstract

We investigate the proposition that illness poses as an obstacle to one's ability to use migration to hedge the business cycle. We employ data on migration, regional unemployment rates and health status from 10 years (1984–1993) of the US Panel Study of Income Dynamics. Our results provide considerable for support this proposition. The evidence is the strongest for men, but we also find weaker evidence for married women. These results suggest that—*ceterus paribus*—aggregate health outcomes in an area should improve when the regional economy expands.

Keywords: Recessions; Health; Migration

Introduction

Blanchard and Katz (1992) show that one of the primary ways that people cope with the vagaries of the business cycle is migration. However, a person's ability to migrate as a means of heading against macroeconomic fluctuations may depend crucially upon their health status since illness often acts as an impediment to migration. In particular, it might be reasonable to expect that unhealthy people are unable to migrate out of economically depressed regions to other areas where the opportunities are better. To paraphrase Deaton (2002), in such a scenario, the sick will be doubly cursed.

To investigate this, we employ variables on intra-national migration within the United States, self-reported health status (SRHS) and county-level unemployment rates from 10 years of the Panel Study of Income Dynamics (PSID). Our results indicate that the healthy are much better able to migrate in response to the business cycle than the unhealthy. This result is the most pronounced among men. This suggests that aggregate health should improve when the economy expands holding all other factors equal.

The balance of this paper is organized as follows. The first section describes the data, we then formulate our identification strategy, and then give a summary of our results. The paper concludes with a discussion of how our results relate to recent work by Ruhm (2000, 2005) on the relationship between recessions and health.

Data

We use data on geographic mobility, SRHS, county-level unemployment rates and other control variables from the PSID. Because SRHS is not available prior to 1984 and unemployment rates are

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doi:10.1016/j.socscimed.2006.11.007

not available beyond 1993, our data cover the years 1984–1993. We restrict our analysis to household heads and their spouses (if they are married) since the PSID only has SRHS information on these individuals. Because we are interested in migration as a means of coping with employment shocks, we further restrict our sample to working-age people which we define to be younger than 65.

We include the Survey of Economic Opportunity (SEO), a sub-sample of economically disadvantaged people, in our analysis. It is important to note that the profession has not reached a consensus about the appropriate way of dealing with the SEO. Lillard and Willis (1978) recommend dropping the SEO as the selection into it is endogenous, while others such as Hyslop (1999) and Meghir and Pistaferri (2004) include the SEO. We also include it because we estimate a rather complicated regression equation in this paper with a large number of interaction terms which requires a substantial number of observations for precise estimation.

Table 1 reports the descriptive statistics from our sample. Our migration variable is a dummy variable indicating that the individual has changed states between the previous and the contemporaneous survey years. This migration variable is commonly used in the literature on internal migration within the US. We refer the reader to Gabriel and Schmitz (1994) and Borjas, Bronars, and Trejo (1992) for two examples. Our measure of health status is SRHS: a categorical variable that takes on integer values between one and five. One corresponds to the best category and five to the worst category. While these data are subjective measures, there is an extensive literature that has shown a strong link between SRHS and more objective health outcomes such as mortality and the prevalence of disease (Idler & Kasl, 1995; Kaplan & Camacho, 1983; Mossey & Shapiro, 1982; Smith, 2003).

Identification

Our identification strategy rests upon the equation:

$$\begin{aligned} M_{i,t} = {} & \alpha + B_{i,t}\beta + G_{i,t}\gamma + U_{i,t}\phi_0 + U_{i,t-1}\phi_1 \\ & + U_{i,t} * B_{i,t}\eta_0 + U_{i,t-1} * B_{i,t}\eta_1 + U_{i,t} * G_{i,t}\varphi_0 \\ & + U_{i,t-1} * G_{i,t}\varphi_1 + X_{i,t}\theta + \varepsilon_{i,t}. \end{aligned}$$

$M_{i,t}$ is the indicator for having changed states across time periods $t-1$ and t. $B_{i,t}$ is a dummy variable indicating that SRHS is either four or five at time t. $G_{i,t}$ is dummy variable indicating that SRHS is either one or two at time t. The omitted SRHS category is three. For the balance of this paper, we refer to $B_{i,t}$ as bad health and $G_{i,t}$ as good health. Provided that healthier people are more mobile, we would expect to see that $\beta<0$ and $\gamma>0$. $U_{i,t}$ is the unemployment rate in the individual's county of residence at time t. We include the unemployment rate at times t and $t-1$. If migration is used to hedge the impact of the business cycle, then we should observe that $\phi_1>0$ and $\phi_0<0$, so that people are migrating from places with high unemployment to places with low unemployment. To address any potential confounding omitted variables, we include $X_{i,t}$ which contains other control variables such as age, functions of lagged labor income and gender d, race d, education d, year d and state dummies. We use functions of lagged income to address the possibility that current migration decisions will affect future income. We estimate these models using ordinary least squares (OLS) and adjust all standard errors for clustering on individuals to allow for serial correlation in the residual within individuals. We also have a set of results that use Probit estimation which we do not report as they are very similar.

The interaction terms allow migratory responses to economic shocks to vary by health status. If healthier people are better able to use migration to buffer the impact of a regional economic lull, then we should see that $\varphi_0<0$ and $\varphi_1>0$ and that $\eta_0>0$ and $\eta_1<0$. To aid us in quantifying these effects, we define the following marginal effects:

$$\left.\frac{\partial M_t}{\partial U_t}\right|_{G_t=1} = \phi_0 + \varphi_0, \quad \left.\frac{\partial M_t}{\partial U_{t-1}}\right|_{G_t=1} = \phi_1 + \varphi_1,$$
$$\left.\frac{\partial M_t}{\partial U_t}\right|_{B_t=1} = \phi_0 + \eta_0 \quad \text{and} \quad \left.\frac{\partial M_t}{\partial U_{t-1}}\right|_{B_t=1} = \phi_1 + \eta_1.$$

We can now identify how a movement from bad health to good health impacts a person's ability use migration to hedge against the business cycle by calculating

$$\left.\frac{\partial M_t}{\partial U_t}\right|_{G_t=1} - \left.\frac{\partial M_t}{\partial U_t}\right|_{B_t=1} = \varphi_0 - \eta_0 \quad \text{and}$$
$$\left.\frac{\partial M_t}{\partial U_{t-1}}\right|_{G_t=1} - \left.\frac{\partial M_t}{\partial U_{t-1}}\right|_{B_t=1} = \varphi_1 - \eta_1.$$

Our hypothesis can now be formalized by H_0: $\varphi_0 - \eta_0 = 0$ versus H_a: $\varphi_0 - \eta_0 < 0$ and H_0: $\varphi_1 - \eta_1 = 0$ versus H_a : $\varphi_1 - \eta_1 > 0$. If both of these alternative

Table 1
Descriptive statistics

Variable	Definition	Mean (standard deviation)
Migration indicator	= 1 if individual moved between the previous and the contemporaneous time periods	0.034 (0.181)
SRHS	Self-reported health status: a category variable between one and five	2.366 (1.084)
Good health	= 1 if SRHS is one or two	0.568 (0.495)
Bad health	= 1 if SRHS is four or five	0.146 (0.353)
Unemployment rate	Unemployment rate in individual's county of residence	6.355 (2.524)
Age	Individual's age	38.153 (11.447)
Labor income	Individual's labor income in 1983 dollars	13435.900 (16254.060)
Sex	= 1 if female	0.534 (0.499)
No college experience	= 1 if the individual never attended college	0.622 (0.485)
College degree	= 1 if the individual has a college degree	0.204 (0.403)
White	= 1 if the individual is white	0.648 (0.478)
Black	= 1 if the individual is black	0.300 (0.458)

hypotheses are true then a movement from bad health to good health will increase a person's ability to migrate in response to the business cycle.

Results

We report our results in Table 2. In the top panel of the table, we report the coefficients on health, unemployment and their interactions. In the interest of saving space we do not report the coefficient estimates for the other controls. In the bottom panel of the table, we report marginal effects and their *t*-statistics. In the first two columns of the table, we estimate the equation using both men and women. In the next two columns, we estimate it separately by gender. The last two columns further separate the sample into married and single women.

In all six columns, the coefficients on the health and unemployment variables are basically as we expected. They indicate that healthier people are more likely to migrate and that people tend to move from areas with high unemployment to areas with low unemployment. Some readers may note that the *t*-statistics on the unemployment coefficients are low. However, it is important to emphasize that many of the marginal effects in the bottom panel are significant at high levels.

We now test our statistical hypotheses. To do this, we calculate the marginal effects, $\partial M_t/\partial U_t|_{G_t=1} - \partial M_t/\partial U_t|_{B_t=1}$ and $\partial M_t/\partial U_{t-1}|_{G_t=1} - \partial M_t/\partial U_{t-1}|_{B_t=1}$, and their corresponding *t*-ratios. In the first two columns, we see that the estimates of the former effect are both negative and highly significant so that moving from bad health to good health increases the likelihood that somebody migrated to

Table 2
OLS estimates

	(1)	(2)	(3)	(4)	(5)	(6)
Good health	0.013	0.013	0.010	0.016	0.016	0.025
	(3.70)	(3.60)	(1.81)	(3.28)	(2.82)	(2.37)
Bad health	−0.004	−0.004	−0.006	−0.002	0.006	−0.017
	(−1.11)	(−1.03)	(−1.02)	(−0.46)	(0.97)	(−1.87)
Unemployment rate at t	−0.002	−0.002	−0.003	−0.002	−0.002	−0.002
	(−1.74)	(−1.79)	(−1.62)	(−1.07)	(−0.95)	(−0.67)
Unemployment at $t-1$	0.002	0.002	0.002	0.002	0.002	0.001
	(1.46)	(1.64)	(1.30)	(1.14)	(1.18)	(0.40)
Good health*	−0.001	−0.001	0.001	−0.003	−0.002	−0.004
Unemployment rate at t	(−0.87)	(−0.81)	(0.25)	(−1.35)	(−0.90)	(−0.97)
Good health*	0.000	−0.000	−0.001	0.001	0.000	0.001
Unemployment at $t-1$	(0.02)	(−0.04)	(−0.58)	(0.47)	(0.19)	(0.19)
Bad health*	0.003	0.003	0.007	−0.000	0.002	−0.003
Unemployment rate at t	(1.50)	(1.54)	(2.37)	(−0.23)	(0.58)	(−0.78)
Bad health*	−0.002	−0.002	−0.006	0.001	−0.003	0.005
Unemployment at $t-1$	(−1.27)	(−1.31)	(−2.22)	(0.35)	(−1.09)	(1.52)
Year and state dummies?	No	Yes	Yes	Yes	Yes	Yes
Genders?	Both	Both	Men	Women	Women	Women
Married or single individuals?	Both	Both	Both	Both	Married	Single
Marginal effects						
$\left.\frac{\partial M_t}{\partial U_t}\right\|_{G_t=1}$	−0.003	−0.003	−0.002	−0.004	−0.004	−0.005
	(−3.54)	(−3.35)	(−1.50)	(−3.36)	(−2.66)	(−2.02)
$\left.\frac{\partial M_t}{\partial U_{t-1}}\right\|_{G_t=1}$	0.002	0.002	0.001	0.003	0.003	0.002
	(1.76)	(1.81)	(0.64)	(1.94)	(1.73)	(0.58)
$\left.\frac{\partial M_t}{\partial U_t}\right\|_{B_t=1}$	0.001	0.001	0.004	−0.002	−0.000	−0.005
	(0.52)	(0.45)	(1.77)	(−1.40)	(−0.14)	(−1.84)
$\left.\frac{\partial M_t}{\partial U_{t-1}}\right\|_{B_t=1}$	−0.001	−0.000	−0.004	0.002	−0.001	0.006
	(−0.45)	(−0.28)	(−1.78)	(1.56)	(−0.28)	(2.44)
$\left.\frac{\partial M_t}{\partial U_t}\right\|_{G_t=1} - \left.\frac{\partial M_t}{\partial U_t}\right\|_{B_t=1}$	−0.004	−0.004	−0.006	−0.002	−0.004	−0.001
	(−2.45)	(−2.42)	(−2.38)	(−1.11)	(−1.49)	(−0.25)
$\left.\frac{\partial M_t}{\partial U_{t-1}}\right\|_{G_t=1} - \left.\frac{\partial M_t}{\partial U_{t-1}}\right\|_{B_t=1}$	0.002	0.002	0.005	0.000	0.003	−0.005
	(1.39)	(1.37)	(1.91)	(0.10)	(1.35)	(−1.23)
R^2	0.015	0.025	0.028	0.025	0.026	0.040
Individual-time observations	81868	81861	38053	43808	30157	13633

* t-statistics are reported in parentheses. All standard errors cluster on individuals. All regressions contain a quadratic in age and lagged income, a dummy indicating that lagged income was zero, a gender dummy when necessary, race dummies and education dummies. We control for gender in the first two columns.

an area with low unemployment. The estimates of the latter effect in both columns are positive, as we would expect if the alternative hypothesis was true, but they are not significant at conventional levels. Turning to the next two columns, we see that these effects are far more pronounced among men than women. Indeed, we reject both null hypotheses for men. However, we cannot reject any of the null hypotheses for women. Finally, in an earlier draft of this paper, we experimented with an alternative specification that used lags of health rather than health from the contemporaneous period. Our conclusions were unaffected.

Why might these effects be more pronounced among men? To further explore this, we report the results of estimating the model separately for married and single women in columns 5 and 6, respectively. What we see for married women is that the estimates of $\partial M_t/\partial U_t|_{G_t=1} - \partial M_t/\partial U_t|_{B_t=1}$ and $\partial M_t/\partial U_{t-1}|_{G_t=1} - \partial M_t/\partial U_{t-1}|_{B_t=1}$ are consistent with our alternative hypotheses and they are both larger in magnitude than in column 4 where we pooled married and single women. However, we still see that neither marginal effect is significantly different from zero. Turning to single women in the last column, we now see that illness is no longer an impediment to migrating to hedge the business cycle. To better see this, note that the marginal effects $\partial M_t/\partial U_t|_{G_t=1}$ and $\partial M_t/\partial U_t|_{B_t=1}$ are both negative and significantly different from zero at the 10% level. In contrast, $\partial M_t/\partial U_{t-1}|_{G_t=1}$ and $\partial M_t/\partial U_{t-1}|_{B_t=1}$ are both positive with the t-ratio on the latter effect (2.44) being far greater than that on the former (0.58). The observation that both healthy and unhealthy single women migrate to hedge the business cycle is what underlies the differences in our results across genders. However, we concede that this observation poses an additional puzzle to us that we are unable to resolve as of the completion of this paper.

Discussion: recessions and health

The results in this paper shed an interesting light on recent work by Ruhm (2000) that has documented that mortality tends to rise during good economic times. The explanation that Ruhm provides for this empirical result is that recessions tend to be accompanied by improvements in health-related behaviors since economic lulls tighten budget constraints, thereby, restricting the amount of money that can be spent on tobacco and alcohol and relax time constraints, thereby, increasing the amount of time that people can use to exercise. Indeed, Ruhm (2000, 2005) provides evidence for these "healthy living" mechanisms. In contrast, this paper suggests that the relationship between recessions and health should be the opposite to what Ruhm has documented, *ceterus paribus*. Nevertheless, our results are not necessarily at odds with Ruhm's, but if it is the case that health does improve during a recession, the postulated "healthy living" - mechanism must be sufficiently strong to overpower the selective out-migration of healthy people from depressed regions.

Acknowledgments

We would like to thank the editor and three anonynous referees for excellent comments. In addition, we would like to thank Chris Paxson and Chris Ruhm for useful conversations.

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