DO MIGRANTS RESPOND TO REAL LABOR MARKET CONDITIONS?

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Introduction

A large number of studies have appeared in recent years which examine the economic and noneconomic determinants of migration (many of the studies for the United States are reviewed in the survey article by Greenwood [4]). Although income and the rate of change in income (in money terms) are frequently included in models used to explain migration behavior, the cost of living and the rate of change in the cost of living are usually not included (Liu [5], Renas and Kumar [9], and Cebula [1] are among the few authors who do consider cost of living variables). We surmise that cost of living variables are typically omitted from migration studies because data for these variables are available for only a limited number of SMSAs, and hence, inclusion of such variables in a migration study would generally reduce sample size, in some cases substantially. As Renas and Kumar [9] have shown, however, cost of living is an important determinant of migration, and omission of this variable from migration equations represents a misspecification which can seriously bias the parameter estimates of other variables in the regression, especially the money income variable.

It may be presumed that "rational" individuals would be concerned with real income and the rate of change in real income in different areas in formulating their migration decisions. Although several researchers consider cost of living variables in addition to money income variables as separate determinants of migration, no one has explicitly considered the question whether migrants respond to real labor market variables. For example, the issue whether proportional change in money income and the cost of living (or equal changes in the rate of change in money income and the rate of change in the cost of living) would lead to a change in migration has not been investigated. This issue is examined empirically in this paper.

Model

The basic model which is used in this study may be expressed as follows:

$$M_i = B_0 + \overset{(+)}{B_1} \ln (Y69_i) + \overset{(-)}{B_2} \ln (C69_i) + \overset{(+)}{B_3} YCH_i + \overset{(-)}{B_4} CCH_i + \overset{(-)}{B_5} U60_i + \overset{(+\text{or}-)}{B_6} ED60_i + \overset{(-)}{B_7} DD_i$$

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where

M_i = net number of migrants into SMSA i between 1960 and 1970 expressed as a percentage of the 1960 population;

$Y69_i$ = median family income in SMSA i in 1969;

$C69_i$ = annual cost in SMSA i of an intermediate budget for a four person family, Spring 1969;

YCH_i = annual rate of change of median family income in SMSA i between 1959 and 1969, expressed in percentage terms;

CCH_i = annual rate of change in the cost of living in SMSA i expressed in percentage terms (based on the change in the annual cost of an intermediate budget for a four person family between Spring 1967 and Spring 1970);

$U60_i$ = unemployment rate of the civilian labor force in SMSA i in 1960;

$ED60_i$ = median school years completed in 1960 for the population, 25 years old and over in SMSA i;

DD_i = annual degree days, 65° base in SMSA i (based on 1941-70).[1]

The hypothesized signs of the parameters are found in parentheses over each of the parameters in the equation. The sign of B_1 is expected to be positive on

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[1]Data Sources:

Variable	Source
M	U. S. Bureau of the Census, Census of Population and Housing: 1970, General Demographic Trends for Metropolitan Areas, 1960 to 1970, Final Report PHC (2)-1, United States, 1971, Table 11.
Y69, YCH	U. S. Bureau of the Census, Statistical Abstract of the United States: 1972, Section 33--Metropolitan Area Statistics
C69	U. S. Bureau of Labor Statistics, Three Budgets for an Urban Family of Four Persons, 1969-70, Supplement to Bulletin 1570-5, 1972, Table B-1.
CCH	U. S. Bureau of Labor Statistics, Three Standards of Living for an Urban Family of Four Persons, Spring 1967, Bulletin 1570-5, Table 1 and U. S. Bureau of Labor Statistics, Three Budgets for an Urban Family of Four Persons, 1969-70, Supplement to Bulletin 1570-5, Table A-2.
U60, ED60	U. S. Bureau of the Census, County and City Data Book: 1962, Table 3.
DD	U. S. Bureau of the Census, Statistical Abstract of the United States: 1975, Table 332 and NOAA data.

the grounds that people are likely to be attracted to and not so likely to leave an SMSA in which income is high. Median family income is expressed in natural log form since individuals typically perceive income changes in percentage terms. A given change in migration is likely to result from a given percentage change in income. Perhaps a more basic justification for using the log of income is diminishing marginal utility of money. A given absolute change in income is likely to result in a greater change in utility and, consequently, migration when income is initially low than when it is initially high. The logarithmic specification reflects this phenomenon. The anticipated sign of B_2 is negative. C69 is the amount of money which is necessary to maintain a family of four (an employed husband, age 38, a wife not employed full-time outside the home, an eight year old girl, and a 13 year old boy) at an "intermediate" standard of living in a given location. It includes allowances for food, housing, transportation, clothing, personal and medical care, insurance, occupational expenses, personal income taxes and social security taxes, and other expenses. It is hypothesized that a high cost of living would discourage net in-migration into an area. Cost of living is expressed in natural log form for basically the same reasons that median family income is expressed in this form.[2] The expected signs of B_3 and B_4 are positive and negative respectively since individuals are likely to be attracted to and are not so likely to leave an area in which money income is increasing rapidly (see Cebula and Vedder [2] and Pack [7]) and in which the cost of living is increasing slowly.[3]

The sign of B_5 is hypothesized to be negative since individuals presumably would prefer an area in which the potential of finding employment is high rather than low. The expected sign of B_6 is indeterminate. On the one hand a high level of educational attainment in an area may indicate a concentration of growth industries in that area since growth industries usually employ large numbers of

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[2]Data on family budget costs are available for 1959 (20 cities), 1966 (39 cities), 1967 (39 cities), 1969 (39 cities) and 1970 (39 cities). Data on median family income by SMSA are available for 1959 and 1969. In order to insure an adequate sample size and in order to insure that median family income and the cost of a family budget are measured in the same year, 1969 was chosen as the year in which to measure both of these variables.

[3]CCH, the annual rate of change in the cost of living in an area, expressed in percentage terms, is based on the change in the annual cost of an intermediate budget for a four person family between Spring 1967 and Spring 1970. Normally, this variable would be based on changes over time in the Consumer Price Index for specific areas. However, although the city average CPI is based on data for at least 46 areas (46 cities for 1955 through 1963, 50 urban areas for 1964 and 1965, and 56 areas beginning in 1966), separate indexes are available for only 23 to 25 of them. Therefore, in order to insure an adequate sample size, change in the annual cost of an intermediate budget between Spring 1967 and Spring 1970 is used to estimate CCH since data on these two budget series are available for 39 SMSAs.

highly educated personnel. On this basis, the expected sign of B_6 would be positive since the expanding employment opportunities offered by growth industries would tend to increase net in-migration, Pack [7]. On the other hand, individuals with high educational attainment may have a higher propensity to migrate (out of an area) than those with less education. Evidence for this was found by Pursell [8] and Miller [6], among others. Individuals with high levels of education are likely to have more employment opportunities elsewhere and, consequently, are more likely to move than those with less education. In addition, such persons usually possess specialized skills which require them to move frequently in order to find employment. On this basis, an area in which educational attainment is high may experience a large amount of out-migration and, consequently, may have a low net in-migration rate, yielding a negative coefficient for B_6. Greenwood [3], however, suggests that individuals with high levels of education may have more employment opportunities at home as well as away. He also suggests, Pack notwithstanding, that individuals are neither attracted to nor repelled by areas with high levels of educational attainment. In any case, whether the sign for B_6 is positive or negative would depend on the relative strengths of the forces which influence it.

The expected sign for B_7 is negative. DD is the sum of the negative departures of the daily mean temperature for each day of the year from a base of 65°F. Days with average temperatures above 65°F do not add to or subtract from the yearly total. DD is used as an indicator of the relative amount of weather-related outdoor discomfort in different areas. Individuals are presumed to prefer areas which have mild climates to areas which have harsh (cold) climates.

If migration is truly determined by the level of real income in an area, then B_1 and B_2 would differ in sign but not in magnitude ($m \cdot \ln(\frac{Y69}{C69}) = m \cdot \ln Y69 - m \cdot \ln C69$, where m is a constant). If it is determined by the rate of change in real income in an area, then B_4 and B_3 would differ only in sign (the rate of change in real income, in percentage terms, is approximated by (YCH - CCH); $n \cdot (YCH - CCH) = n \cdot YCH - n \cdot CCH$, where n is a constant). In the next section, tests are performed to help determine whether these parametric relationships in fact hold.

Results

The equation in the last section is estimated in equation (1) in Table 1.[4]

[4]All of the regressions are based on 36 observations. Of the 39 areas for which cost of living data are available, three could not be used due to the fact that migration data are not available for them. The areas included in the sample are Atlanta, GA, Austin, TX, Bakersfield, CA, Baltimore, MD, Baton Rouge, LA, Buffalo, NY, Cedar Rapids, IA, Champaign, IL, Chicago, IL, Cincinnati, OH, Cleveland, OH, Dallas, TX, Dayton, OH, Denver, CO, Detroit, MI, Durham, NC, Greenbay, WI, Honolulu, HI, Houston, TX, Indianapolis, IN, Kansas City, MO, Lancaster, PA, Los Angeles, CA, Milwaukee, WI, Nashville, TN, Orlando, FL, Philadelphia, PA, Pittsburg, PA, St. Louis, MO, San Diego, CA, San Francisco, CA, Seattle, WA, Washington, DC, Wichita, KS, New York, NY, and Minneapolis, MN.

TABLE 1: Net Migration to SMSAs, 1960-1970

VARIABLE	Equation (1)	(2)	(3)	(4)	(5)
Constant	244.61	11.005	-33.934	271.52	-46.853
ln(Y69)	21.377* (1.33)			33.558** (2.17)	- 1.7111 (-0.13)
ln(C69)	-52.636** (-2.35)			-62.553*** (-2.75)	
$\ln(\frac{Y69}{C69})$		38.384*** (2.51)	27.159* (1.69)		
YCH	5.1886** (1.84)		6.5348** (2.37)		8.0085*** (3.06)
CCH	0.43501 (0.23)		-1.1874 (-0.71)		
(YCH-CCH)		2.4283* (1.53)		0.9829 (0.53)	
U60	-1.4535* (-1.54)	-2.0439** (-2.32)	-1.2383 (1.29)	-2.2822*** (-2.59)	-1.0283 (-1.06)
ED60[a]	2.8667* (1.93)	1.0173 (0.75)	2.1018 (1.46)	1.6748 (1.18)	3.3248** (2.28)
DD	-.00172*** (-3.02)	-.00206*** (-3.56)	-.00185*** (-3.24)	-.00195*** (-3.37)	-.00155*** (-2.63)
R^2	.65	.58	.62	.61	.58
$\bar{R}^2$	.57	.51	.54	.53	.51
S.E.E.	5.96	6.34	6.12	6.23	6.33
R.S.S.	994.5	1,204.7	1,084.4	1,127.0	1,203.0

Notes: t-values are given in parentheses below the respective coefficients. R^2 and $\bar{R}^2$ are the coefficient of determination and coefficient of determination adjusted for degrees of freedom, respectively. S.E.E. is the standard error of estimate, and R.S.S. is the residual sum of squares.

[a]Tests of significance on ED60 utilize a two-tail test; tests of significance on all other variables utilize a one-tail test.

*Significant at the .10 level.
**Significant at the .05 level.
***Significant at the .01 level.

Three different tests can be performed. First, we can test the hypothesis that people respond to the level of real income and to the rate of change of real income in different areas in formulating their migration decisions ($B_2 = -B_1$ and $B_4 = -B_3$). The test is an F test involving a comparison of the residual sum of squares (R.S.S.) in equation (1) with the residual sum of squares in equation (2), in which the restrictions under the null hypothesis are imposed.[5] The computed F statistic of 2.96 follows F(2, 28). Based on this result, the null hypothesis that $B_2 = -B_1$ and $B_4 = -B_3$ is rejected at the .10 level. We may instead test the hypothesis that only $B_2 = -B_1$. This test is conducted on the basis of a comparison of the residual sum of squares in equation (1) with the residual sum of squares in equation (3), in which the restriction $B_2 = -B_1$ is imposed. The computed F statistic of 2.53 follows F (1, 28). Based on this result, we do not reject the hypothesis that would-be migrants consider the level of real income in different areas. Finally, we may test the hypothesis that only $B_4 = -B_3$. The F statistic, based on a comparison of the residual sum of squares in equations (1) and (4), follows F (1, 28) and is equal to 3.73.[6] The hypothesis that $B_4 = -B_3$ is rejected at the .10 level.

Our results indicate (assuming a logarithmic specification for income and the cost of living) that individuals consider real income in different areas when making migration decisions. As a result, equation (3) is the preferred specification. The variables in this equation explain 62 percent of the variation in the dependent variable. The coefficient of determination adjusted for degrees of freedom, $\bar{R}^2$, is equal to .54. Whereas both U60 and ED60 are statistically significant in equation (1), neither is significant in equation (3).

In equation (5) a regression with no reference to cost of living conditions in different areas is estimated. It is interesting to note that ln(Y69) enters with the wrong sign and is not statistically significant in equation (5). This, no doubt, is due to the misspecification that results from failure to consider cost factors in the regression.

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[5] $$F = \frac{(\Sigma e_2^2 - \Sigma e_1^2)/m}{\Sigma e_1^2/ (N - k)}$$

follows the F distribution with m, N - k d.f. where

Σe_1^2 = residual sum of squares in the unrestricted regression

Σe_2^2 = residual sum of squares in the restricted regression

m = number of restrictions

k = number of parameters in the unrestricted regression

N = number of observations

[6] The null hypothesis $B_2 = -B_1$ and the null hypothesis $B_4 = -B_3$ could have been tested with either t tests or F tests. Since the null hypothesis $B_2 = -B_1$ and $B_4 = -B_3$ was tested with an F test (a t test is inappropriate), the other two null hypotheses were also tested with F tests.

Summary

The findings in this paper, which are based on the logarithmic specification for income and the cost of living in the migration equation, indicate that individuals consider the level of real income in different areas in formulating their migration decisions. This result suggests that money illusion is not present when potential migrants evaluate geographic income differentials. (If money illusion were present $B_1 > -B_2$. In fact, $\hat{B}_1 < -\hat{B}_2$. However, this difference is not statistically significant). On the other hand, whereas migration appears to be a f nction of the rate of change in income in different areas, it does not appear to be a function of the rate of change in the cost of living. It is possible that this conclusion is the result of the somewhat unusual way in which living cost changes are being measured, i.e., using family budget data rather than Consumer Price Index data. It is possible that if adequate CPI data were available, the results would be different.

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