Real Earnings and Human Migration in the United States

Cebula, Richard

Jacksonville University

7 March 1981

Real Earnings and Human Migration in the United States

Richard J. Cebula
Emory University

Most empirical studies of migration determinants regress migration rates against a variety of economic variables, such as unemployment rates, per capita income and median income. Recently, the trend in the migration literature has been to include in these regressions various quality of life variables, such as pollution, crime, congestion and climate.[1] Except for Rabianski (1971), however, no major effort has been made in the empirical migration literature to allow for geographic living cost differentials.[2]

When Rabianski (1971) addressed the problem of how to introduce living costs into an empirical migration model, he chose to use price indices to deflate nominal earnings into real earnings. Dealing with a model of 1955–60 gross migration among some 11 Standard Metropolitan Statistical Areas (SMSA), Rabianski compared the results of two migration regressions. One regression included nominal earnings, as well as certain other explanatory variables; the second regression differed from the first solely by its inclusion of real rather than nominal earnings.

Comparison of these two regressions led Rabianski (1971:191–192) to conclude that:

[1] *See, e.g.,* Cebula (1975) Cebula and Vedder (1973), Hinze (1977), Graves (1979), Renas (1975) and Sommers and Suits (1975).

[2] Fields (1979) uses real income as a causal factor in migration decisions. Overall, his results — which deflate money income by living costs — find real income to be a somewhat significant determinant of migration. Unlike the present note, no effort is made to include living costs as a separate variable or to determine whether deflation yields stronger results than does a model which omits living costs altogether.

> First, the sign of the coefficient for the earnings ration in both the nominal and the real earnings model is as expected from theory. Second, in both models the T-ratios for the earnings ratios are significantly different from zero at the .01 level... However, the inclusion of the interregional cost of living deflator did not significantly improve the models based upon nominal earnings.

Thus, Rabianski effectively found living cost differentials to exercise no real impact over geographic mobility.

The present article offers an alternative empirical analysis of the migration impact of living cost differentials and deals with net (as opposed to gross) migration to some 25 (as opposed to just 11) SMSAs over the 1960–70 rather than the 1955–60 time period. The results presented here indicate that, in sharp contrast to Rabianski (1971), living cost differentials do significantly affect geographic mobility, *i.e.*, improve the regression results.

EMPIRICAL ANALYSIS

The empirical analysis deals with the following three regressions:

$$(1)\quad Mi = a_0 + a_1\, Yi + a_2\, UI + a_3\, Di + \mu_1$$

$$(2)\quad Mi = b_0 + b_1\, (Yi/Ci) + b_2\, Ui + b_3\, Di + \mu_2$$

$$(3)\quad Mi + c_0 + c_1\, Yi + c_2\, Ui + c_3\, Di + c_4\, Ci + \mu_3$$

where Mi = net migration to SMSAi, 1960–70, expressed as a percentage of SMSAis 1960 population [3]

a_0, b_0, c_0 = constants

Yi = 1966 per capita income in SMSAi

Ui = 1960 average unemployment rate in SMSAi

Di = annual degree days in SMSAi, 65°base (based on the period 1941–70)

[3] This is a fairly common definition of the "net migration rate" [*See, e.g.*, Kohn (1976), Renas (1980), Cebula (1975) Cebula and Vedder (1979), Sommers and Suits (1975) or Vedder and Cooper (1974)].

Ci = annual average cost of living in SMSAi for a four person family, 1966, in current dollars.
μ_1, μ_2, μ_3 = error terms

The model is specified in linear terms because a logarithmetic specification could not deal with net inmigration, given that the latter is negative in several cases. The data sources for this study were *The Statistical Abstract of the United States, 1968* (Tables 275 and 507 and pp. 871–909); the *County and City Data Book, 1962* (Table 3); and the *County and City Data Book, 1972* (Table 3). The living cost data are expressed in current dollars (unlike Rabianski (1971), where such data are converted to an index) and are so compiled by the U.S. Bureau of Labor Statistics as to be, to a large degree, comparable among all 25 SMSAs in this study.[4] The year 1966 is the first year for which such geographically comparable data are available for more than 20 SMSAs.

Regression (1) includes three "standard" migration-determining variables, one of which is the nominal value of per capita income. In regression (2), the per capita income level is deflated (by the cost of living) into real terms; otherwise, it is identical to regression (1). In regression (3), all of the explanatory variables from (1) are expressly included; however, the cost of living is also included — as an entirely separate explanatory variable. The formulation in equation (3) merely represents an alternative way [to equation (2) and Rabianski (1971)] to introduce living costs into a migration model; presumably, this formulation allows for the possibility that some migrants — such as the elderly — may be more interested in living costs *per se* than in real income since they are largely on fixed money incomes.

Aside from the income and living cost variables, each regression

[4] The 25 SMSAs studies were Atlanta, GA; Baltimore, MD; Buffalo, N.Y.; Chicago, IL; Cincinnati, OH; Cleveland, OH; Dallas, TX; Denver, CO; Detroit,MI; Honolulu HI; Houston, TX; Indianapolis, IN; Kansas City, MO; Los Angeles, CA; Milwaukee, WI, Minneapolis, MN; Nashville, TN; New York, NY; Philadelphia, PA; Pittsburgh, PA: St. Louis, MO; San Francisco, CA; Seattle, WA; Washington, D.C.; and Wichita, KS. This is the complete set of SMSAs for which all needed data were available.

includes the unemployment rate and the annual degree days in the SMSA studies. In accord with the "convential wisdom", net in-migration is expected to be inversely related to an area's unemployment rate. The annual degree days in an area are a measure of that area's cold weather. As so many studies in recent years have found [*See, e.g.,* Cebula and Vedder (1973), Graves (1979), Kohn (1976), Hinze (1977) and Renas (1980)], migrants on the average prefer warm or milder climates to colder climates. Accordingly, we would expect the coefficient on variable Di to be negative.

The OLS estimates of equations (1), (2), and (3) are provided in rows (1), (2), and (3), respectively, of Table 1. In row (1), it is clear that all three coefficients have the expected ("correct") signs. In addition, two of the three coefficients are statistically significant at the .05 or beyond. Only the coefficient for the nominal income variable fails to be significant at an acceptable (*i.e.,* .05) level.

In row (2), where the money income variable is deflated into real terms, all three coefficients have the correct signs. Moreover, all three are significant at the .01 level. Contrasting the results in rows (1) and (2) of the Table reveals that: a) the coefficient for the nominal income variable in (1) is not significant at even the .10 level, whereas the coefficient on the real income variable in (2) is significant at the .01 level; b) the R^{-2} in (1) is only .37, compared to an R^{-2} in (2) of over .50; c) the F-ratio in (2) is considerably higher than that in (1); and d) the coefficients for both Ui and Di have higher t-values in (2) than in (1). Thus, in contrast to the results in Rabianski (1971), these results indicate that geographic living cost differentials do significantly impact upon migration; inclusion of the living cost variable in point of fact improves the model perceptibly.

Now consider the results in row (3). In this case, all four coefficients have the expected signs; moreover, all four coefficients are significant at the .025 level or better. Contrasting rows (1) and (3) of Table 1 indicates the following: a) the coefficient on the income variable is insignificant at even the .10 level in (1), while it is significant at the .025 level in (3); b) the R^{-2} in (1) is merely .37, whereas the R^{-2} in (3) is over .54; c)the F-ratio in (3) is markedly higher than that in (1); d) the t-values for the coefficients on both Ui and Di are higher in (3)

TABLE 1

OLS ESTIMATES FOR EQUATIONS (1), (2) AND (3)

Variable:	Yi	Yi/Ci	Ui	Di	Ci	R^{-2}	F-ratio
Regression (1) coefficient	+0.0000002		-3.36776	-0.0000002		0.3706	4.12204
(t-value)	(+0.60)		(-2.48)	(-1.91)			
Regression (2) coefficient		+79.7011	-3.51663	-0.0000002		0.5025	7.06954
(t-value)		(-2.45)	(-2.91)	(-2.59)			
Regression (3) coefficient	+0.0000008		-3.38095	-0.0000002	-0.0000008	0.5444	5.97454
(t-value)	(+2.27)		(-2.85)	(-2.67)	(-2.76)		

than in (1); and e) the regression summarized in (3) contains an additional explanatory variable, the cost of living, which is significant at the .01 level. In sum, we once again find that geographic living cost differentials do significantly influence geographic mobility. Like the results in row (2), those in row (3) thusly run counter to the findings in the Rabianski study (1971).

CONCLUDING REMARKS

This note has attempted to ascertain the potential migration impact of geographic living cost differentials. An earlier study, by Rabianski (1971), found such differentials to have no consequential impact on gross migration, 1955–60, among some 11 SMSAs. However, the present study obtains very different results when dealing with net migration to some 25 SMSAs over the 1960–70 time period. In particular, in an otherwise "standard" migration model, this study finds that geographic living costs do in fact significantly affect mobility. This is found to be true regardless of whether the living cost variable is used to deflate money income or whether it is used as a separate explanatory variable.[5] Moreover, it should be added that such results have been obtained by the author in over a dozen alternative migration models.

These findings imply that future research should, whenever possible (*i.e.*, whenever appropriate data are available), take living cost differentials expressly into account. Failure to do so may well result in a seriously misspecified model.

In closing, two possible limitations of this study should be pointed out. First, the analysis examines migration to a small number of cities. This small sample size was dictated strictly by the availability of data. There are, for example, only 39 cities *en toto* for which comparable living cost data are available. The number of cities then declines to 25 because of the unavailability of other needed data.

[5] In this study the responsiveness of net immigration to nominal income plus the cost of living does not appear to differ in a highly significant way from the responsiveness of net immigration to real income.

Clearly, this relatively modest sample size may raise questions as to the strength of inferences one can make from the study. On the other hand, as limiting as a sample of only 25 different cities may be, it may still be viewed as superior to the sample of merely 11 different cities in Rabianski (1971). In point of fact, the larger number of cities used in the present study may, in part, account for the vastly different results obtained here and in Rabianski (1971).

The second possible limitation of this study relates to the living cost data *per se*. In particular, the living cost data examined in this study are geographically comparable in view of the high degree of comparability of the market baskets of consumer goods among areas. Nevertheless, it is not clear that the living cost data control adequately for location-specific commodities or quality differences among areas in the market baskets of consumer goods. Thus, although geographically comparable in a general, overall sense, the living cost data are not perfectly comparable. Hence, these data may be somewhat crude and imprecise.[6]

[6] In addition, local taxes such as the property tax are included by the Bureau of Labor Statistics in the budget figures (living cost levels). Thus, the level of such taxes directly impacts on the cost of living. There is an implicit assumpation in the living cost data that there are no benefits from higher tax burdens. This problem also contributes to the crudeness of the living cost data.

REFERENCES

Cebula, R.J.
1975 "Analysis of Net Interstate Migration: Comment", *Southern Economic Journal*, 41(1):690—693.

Cebula, R.J. and R.K. Vedder
1973 "Migration, Economic Opportunity and the Quality of Life", *Journal of Regional Science*, 13(2):205—211.

Courchrene, T.J.
1970 "Interprovincial Migration and Economic Adjustment", *Canadian Journal of Economics*, 3(4):550—576.

Fields, G.S.
1979 "Place to Place Migration: Some New Evidence", *Review of Economics and Statistics*, 61(1):21—32.

Graves, P.E.
1979 "Income and Migration Revisited", *Journal of Human Resources*, 14(1): 112—121.

Hinze, K.E.
1977 *Causal Factors in the Net Migration to Metropolitan Areas of the United States, 1960—70*. Chicago: University of Chicago.

Kohn, R.
1976 "Local Government Policies and Migration: Comment", *Public Choice*, 26(1): 65—68.

Rabianski, J.
1971 "Local Earnings and Human Migration", *Journal of Human Resources*, 6(2):185—192.

Renas, S.M.
1980 "An Empirical Note of the Tiebout-Tullock Hypothesis: Comment", *Quarterly Journal of Economics*, 84(3):693—697.

———.
1975 "More on Welfare and Migration", *Review of Business and Economic Research*, 12(3):90—91.

Sommers, P.M. and D.B. Suits
1973 "Analysis of Net Interstate Migration", *Southern Economic Journal*, 39(3): 193—201.

Vedder, R.K. and D. Cooper
1974 "Nineteenth Century English and Welsh Geographic Mobility: Some Further Evidence", *Annals of Regional Science*, 7(2):131—139.