Location-Specific Amenities, Equilibrium, and Constraints on Location Choices

By

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RESEARCH PAPER 2004-11

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Presented at the 43rd Annual Meetings of the Southern Regional Science Association, New Orleans, LA, March 11-13, 2004

ABSTRACT: This research considers how preferences for location-specific attributes might constrain migration destination choices. In particular, if, at any given time, most people are consuming their desired location-specific attributes, then unwillingness to give up these attributes may influence the decision to migrate. *For those who migrate*, these desired attributes might significantly constrain the locations they would consider. This perspective differs substantially from the normal approach that assumes people move toward "good attributes" and away from "bad attributes." The research provides an initial test of a "constrained destination choice" hypothesis by considering "locational attribute constraints" in the context of aggregate place-to-place migration flows for U.S. metropolitan areas during the 1995-2000 time period.

ACKNOWLEDGEMENT: I wish to acknowledge the Regional Research Institute at West Virginia University for supporting this research. I especially thank my graduate research assistant, Kerry King, for her diligent work.

I. Introduction

A substantial literature has debated the relative importance of economic opportunities versus amenities as determinants of migration decisions. Ample empirical evidence supports both perspectives: (1) individuals are most strongly attracted by improved economic opportunities and (2) individuals are most strongly attracted by better amenities. As this debate evolved, it eventually was couched in terms of equilibrium/disequilibrium analysis. In equilibrium, labor, housing, and other markets adjust so that utility for like individuals and profits of firms are equalized across locations. In equilibrium, there is no tendency for individuals to relocate. Migration occurs when this system is thrown into disequilibrium, either by a change in demand for labor that alters relative economic opportunities across locations or a change in demand for locational attributes, which ultimately affects the supply of population across locations.

An integral part of this equilibrium/disequilibrium perspective is the notion that, over time, individuals tend to sort themselves based on their preferences for locational attributes. Unusually beneficial economic opportunities may temporarily pull individuals away from desirable locational attributes. Over time, however, people tend to gravitate back toward preferred attributes. This basic perspective has even been extended to consider changing preferences for locational attributes, perhaps related to life-cycle events or technological changes. Key to this is what we mean by "preferred attributes."

Most migration research views locational attributes as either ("good") amenities that attract migrants or ("bad") disamenities that repulse migrants. For example, it is common to hypothesize that people prefer moderate climates, coastal areas, or proximity to mountains. The constant tendency to move toward an equilibrium in which people sort themselves by preferences for locational attributes suggests a broader way of thinking about these attributes. From an equilibrium perspective, these locational attributes can be viewed as factors that constrain migration choices. An individual already consuming his most desired locational attributes will (a) be more resistant to moving and/or (b) tend to constrain the choice set of destinations to places with location-specific attributes similar to those at the origin. Migration research has already incorporated (a) – origin characteristics affect migration decisions, with

"good" characteristics hypothesized to hold population and "bad" characteristics to drive them away (turn them into migrants). The literature has not incorporated (b).

The equilibrium perspective suggests that, at any given time, many (perhaps most) individuals likely reside where they can consume desired locational attributes. If so, then, of those individuals who choose to move, many may be attracted to locations with attributes similar to those at the origin, rather than what researchers might define as "better" attributes. For example, even though migration research suggests that people prefer moderate or warm climates, a migrant from a location with significant seasonal differences, including snowy winters, may limit his destination choice set to only include locations with significant seasonal differences, including snowy winters. This would reflect a well-established personal preference – the reason this person resided in a location with a relatively variable climate in the first place. The standard way of modeling amenities in migration research cannot capture this behavior. Effectively, standard models constrain all members of a group to have the same preferences for amenities. If our empirical estimates show that a warmer climate has a positive effect on inmigration, then we would predict that everyone in the sample is attracted to a warmer climate, all else equal. Essentially, origin characteristics may give us additional information about an individual's choice set. Ignoring this information may lead to inappropriate conclusions regarding the connection between location-specific characteristics and migration.

This paper considers potential "locational attribute constraints" in the context of aggregate place-to-place migration flows for U.S. metropolitan areas during the 1995-2000 time period. The study focuses on destination choices of movers. The empirical analysis employs a standard migration model, but incorporates "locational attribute constraint" effects and tests for the validity of the "constrained destination choice" hypothesis.

II. The Literature

A handful of key migration articles stand out as particularly pertinent to this study. The economic opportunity perspective of migration is generally traced to Sjaastad's (1962) human capital theory of migration. It has received support from hundreds of published articles, but is probably most strongly championed by Muth (1971) and Greenwood and Hunt (1984, 1989).

Migration research more focused on amenities/locational attributes is often traced back to the "consumption theory of migration" developed by Graves and Linneman (1979). In their model, locational preferences result from location-specific (non-traded) goods. Since location-specific goods cannot be traded between areas, people must migrate in order to meet any change in demand for these goods.[1] Graves and Linneman discuss the sources of change in a household's demand for non-traded goods, as well as factors that change the supply of such goods. They also discuss compensating differentials, whereby a household forced to consume a nonoptimal amount of the non-traded good, due to limited supply, must be compensated with greater consumption of other goods (perhaps through higher wages) in order for the equal utility constraint to hold – required for equilibrium. Since Graves and Linneman (1979), many authors have focused extensively on location-specific attributes, for example, Linneman and Graves (1983), Cushing (1987), and Clark, Knapp, and White (1996).

Mueser and Graves (1995) nicely synthesize the economic opportunity and consumption theory perspectives. Their theory, supported by empirical work, suggests that the consumption theory of migration drives long-term migration patterns, while the human capital/economic opportunity theory dominates short-term fluctuations in the long-term patterns. Their discussion of equilibrium and the adjustments to different sources of disequilibrium provides the theoretical basis for the research proposed here.

III. A Model of Metropolitan Destination Choice

The empirical migration model developed below follows directly from household utility maximization. Households maximize utility,

(1) $U = U(X, Q)$,

subject to a budget constraint,

(2) $Y = PX$,

where X represents all goods and services for which households pay, P is the price of these goods and services, and Q represents nontraded goods such as location-specific amenities. A

[1] Individuals will also migrate in response to a change in supply of a location-specific good at the origin, which prevents them from consuming their optimal quantity of the good.

household's utility may vary by location due to spatial variation in income potential, traded goods prices (i.e., the cost of living), and availability of nontraded goods. A household will move from location *i* if the expected discounted stream of utility at some other location exceeds that at location *i* by more than the cost of relocation. Extending the household model to an aggregate migration model yields

(3) $M_{ij} = M(Y_i, Y_j, Q_i, Q_j, P_i, P_j, t_{ij})$,

where M_{ij} is the volume of migration from *i* to *j* and t_{ij} is the cost of relocating from *i* to *j*. M_{ij} varies directly with Y_j, Q_j, and P_i, and inversely with Y_i, Q_i, P_j, and t_{ij}. Locations having characteristics generally associated with higher utility levels disproportionally attract migrants (or inhibit outmigration). High migration costs mute a potential destination's attraction.

Equation (3) provides the basis for the allocation rate model used in this paper. The allocation rate is defined as the number of persons moving from origin *i* to destination *j* during the migration period, divided by the total number of outmigrants from origin *i* during the migration period. One can think of an allocation rate model as a conditional migration model that only considers the distribution of those who actually migrate, without regard for those who do not migrate. It fits this study's focus on destination choice of those who move. As shown in Cushing (1989), the origin characteristics, Y_i, Q_i, and P_i, wash out of the basic form of the allocation rate model, leaving

(4) $A_{ij} = A(Y_j, Q_j, P_j, t_{ij})$,

where A_{ij} is the allocation rate from *i* to *j*. In (4), the allocation rate is only a function of destination characteristics and the distance from *i* to *j*. Cushing (1989) allows for a more general specification that includes interaction effects between the origin and destination. This could justify inclusion of ratios or differences between destination and origin characteristics. As discussed below, the more complex specification would still not address the main hypothesis of this paper. As such, I employ the basic specification in (4). Greenwood (1969), Levy and Wadycki (1974), Wadycki (1974a, 1974b), Kau and Sirmans (1976), Goss and Chang (1983), and Cushing (1986, 1987) have used allocation rate models of migration.

The starting point for a model reflecting "constrained destination choice" is the notion that the utility function shown in (1) surely differs across individuals. For example, some people

strongly prefer mild winters, even accepting hot summers if necessary. Others may have a strong preference for mild summers, even accepting cold winters if necessary. Still others may give priority to cold, snowy winters. If winter climate is one of the components of Q, this suggests that the relationship between Q and M in (3) or between Q and A in (4) may not be straightforward. The work of Mueser and Graves (1995) leads to an appropriate way of modeling this. Once again, consider the idea that, over time, people tend to migrate to locations with desired location-specific characteristics. Thus, at any given time, many will reside in places with optimal (or close to optimal) location-specific characteristics. If so, then the allocation rate in (4) will be a function not only of Q_j, but also of some measure of how Q_j differs from Q_i, such as $|Q_j - Q_i|$. If the "constrained destination choice" hypothesis is valid, then a smaller difference would result in a higher allocation rate, i.e., a greater proportion of migrants from *i* would choose destination *j*.

Note the difference between this specification and a standard ratio or difference model. In the latter, migrants are assumed to evaluate the destination characteristics relative to those at the origin, but the relationship with the allocation rate is unidirectional. For example, in a ratio model, the allocation rate would always be higher for destinations with a higher winter temperature ratio (attraction to milder winters). In the model to be used here, while the allocation rate might generally be higher for destinations with milder winters, the attraction will be increasingly muted as the absolute difference between the destination and origin climate increases – many migrants may be looking for a winter climate similar to that at the origin.

The Empirical Model

The empirical model focuses strictly on intermetropolitan migration. It excludes migration between metropolitan and nonmetropolitan areas, as well as between two nonmetropolitan areas. These exclusions could be problematic for some purposes. With the wide range of location-specific amenities in the metropolitan sample, however, this analysis should still provide a reasonable test of its primary focus - the "constrained destination choice" hypothesis.

The dependent variable, ALLOCATE, is the number of persons, five years of age and over, residing in metro area *j* on April 1, 2000, who resided in metro area *i* on April 1, 1995, divided

by the total number of persons, five years of age and over, who resided in metro area *i* on April 1, 1995, but in another metro area on April 1, 2000. The data is derived from the "County-to-County Migration Flow Files," from the *United States Census of Population and Housing, 2000*. The explanatory variables, defined in Table 1, include economic/social/demographic characteristics of destinations, indicators of spatial relationships of metro areas, and measures of location-specific amenities.

The recent level of employment growth (EMPGROW; +), the unemployment rate (UNEMPLOY; –), and per capita personal income (INCOME; +) represent general economic conditions of the destination metropolitan area during the migration period. Relatively good economic conditions should attract more inmigrants.

The cost-of-living (COST; –), population density (DENSITY; +?), and relative population size represent other social/ economic/demographic characteristics. All else equal, migrants should be repulsed by higher living costs. Greater population density may indicate a better and wider variety of social, cultural, and economic opportunities, but also may capture some effects of urban disamenities, such as more congestion, alienation, and pollution. Initially, more populous cities may tend to attract migrants due to benefits (agglomeration economies) such as more cultural activities and more diverse employment opportunities. At some point, however, the benefits of increased city size are likely to be more than offset by the costs resulting from agglomeration diseconomies, such as more costly public services. POP (+) and POPSQ (–) capture this quadratic effect.

The isolation variable (ISOLATE; ?) is a somewhat subjective index of relative isolation of a metro area from other population centers. It ranges in value from 0 (spatially proximate to other metro areas) to 3 (extremely isolated from other metro areas). Like population size, the degree of isolation of a metropolitan area may have a quadratic effect. All else equal, even individuals who prefer to live in large cities may dislike concentrations of metropolitan areas, where there is little access to low-density areas for relaxation and outdoor activities. Extreme isolation of a metropolitan area, however, is probably viewed as undesirable by most urban dwellers.

The last four variables represent location specific amenities. The migration literature strongly suggests that locations with moderate climates attract more migrants. Colder climates have more heating-degree-days (HEATDEG; –)); hotter climates have more cooling-degree-days (COOLDEG; –). The literature and casual observation suggest that coastal areas (COAST; +?) may attract relatively more migrants, all else equal. Proximity to mountains (MOUNTAIN; ?) has a more ambiguous effect. For each of these four variables, the empirical model includes a measure of how the origin and destination differ. In particular,

$HEATDIF = |HEATDEG - HEATDEGO_O|$,

$COOLDIF = |COOLDEG - COOLDEG_O|$,

$COASTDIF = |COAST - COAST_O|$,

$MOUNTAINDIF = |MOUNTAIN - MOUNTAIN_O|$,

where the subscript, o, indicates the value for the origin metropolitan area. A negative coefficient for these difference variables would support the "constrained destination choice" hypothesis.[2]

At the time the *2000 Census* was conducted, the US Bureau of the Census officially defined 331 metropolitan areas. Using the *2000 Census*, place-to-place migration for these metropolitan areas must be constructed from the *County-to-County Migration* file. Unfortunately, this presents a problem for the New England metropolitan areas, which, unlike other metropolitan areas, are not defined on a county basis. This study uses the "New England County Metropolitan Areas," an alternative county-based definition that government agencies often use to report data for New England. The study excludes Anchorage, AK and Honolulu, HA. It also excludes five small, relatively new metropolitan areas because of missing data for one or more explanatory variables, leaving 309 metropolitan areas. Since the model focuses only on destination choice of movers, migrants can select from among 308 destinations. With 308 possible migration flows from each of 309 origin metro areas, the regression uses a total of 95,172 observations. [***Alert to Nancy:*** *Since this issue did not come up until the data had been put together, the results below exclude the New England metro areas – they will be added to the study once all of the required data is put together. As a result, this version considers just 297 metropolitan areas, thus leaving*

[2] It should be equally valid to model the absolute difference in ratio form as $|(Q_j/Q_i) - 1|$.

296 choices and a total of 87,912 observations.] The model is estimated using ordinary least squares.

IV. Empirical Results

Table 1 presents the empirical results. All of the estimated coefficients are statistically significant at the one percent level, though COOLDEG and COAST have signs that do not match initial expectations. The R^2 equals 0.24, respectable for a model attempting to explain place-to-place migration flows among nearly 300 locations.

As expected, the coefficients of the four difference variables are all negative, supporting the "constrained destination choice" hypothesis. This model estimates that these four factors have a substantial effect on destination choice. The estimated coefficient of MOUNTAINDIF suggests that this factor reduces the allocation rate (percentage of an area's outmigrants who select a specific destination) by about 36 percent. Taken together, the four coefficients estimate that the allocation rate would be reduced by about 58 percent.

Of the remaining explanatory variables, cost-of-living has, by far, the largest impact on the allocation rate. For every one percent increase in the cost-of-living measure, the allocation rate decreases by about 1.2 percent – the only elastic response to a change in an explanatory variable. With an elasticity of about 0.6, the impact of population size on the allocation rate also stands out, compared with the effect of most explanatory variables. Together with the effect of the squared population, the model implies that greater urban size attracts migrants up to a size of about 8.2 million people. Only the New York and Los Angeles metropolitan areas clearly exceed this size. The Chicago metro area roughly approximates this size. Though the two isolation variables are statistically significant, this effect is not significant in practical terms. The coefficients suggest that some degree of spatial isolation attracts migrants, but not too much. Solving the quadratic yields an optimal degree of isolation that turns out to be basically no spatial isolation at all. The results indicate that locations with lower unemployment rates, higher incomes, and warmer climates attracted moderately more migrants. More mountainous areas and coastal locations appear to be less attractive. Though statistically significant, employment growth and population density appear to have had little effect on migration patterns.

V. Conclusion

This research set out to test a "constrained destination choice" hypothesis - if, at any given time, most people are consuming their desired location-specific attributes, then unwillingness to give up these attributes might significantly constrain the locations that migrants would consider. This perspective differs substantially from the normal approach that assumes people move toward "good attributes" and away from "bad attributes." The empirical work supports the hypothesis. It also indirectly adds to the empirical support for the "consumption theory of migration," proposed long ago by Graves and Linneman (1979), from which the constrained destination choice hypothesis naturally flows.

This research should only be considered an initial test of the hypothesis. Many additional steps are required before claiming strong support for the hypothesis. First, the empirical model needs a much stronger spatial context. Lack of distance or a similar spatial measure could have significantly altered the empirical results. Likewise, it may be important to jointly model other types of migration streams such as metro to nonmetro, nonmetro to metro, and nonmetro to nonmetro migration. Doing so would likely require a more complex estimation methodology. The research might also be a good candidate for spatial econometric methods. Continued support for the "constrained destination choice" model would further illustrate the need for more flexible and comprehensive modeling of migration choices.

Table 1: Definitions of Explanatory Variables

All variables represent destination place characteristics

EMPGROW	percentage change in total full-time and part-time employment (place of work), 1990-98 [REIS, US Bureau of Economic Analysis]
UNEMPLOY	mean annual average unemployment rate, 1994-96 (percent) [US Bureau of Labor Statistics]
INCOME	per capita personal income, 1995 (thousands of dollars) [REIS]
COST	cost-of-living score; 50 equals median for metropolitan areas [*Places Rated Almanac,* 1998]
DENSITY	population density, 1995 (thousands of people per square mile) [US Bureau of the Census]
POP	metropolitan area population, 1995 (thousands) [US Bureau of the Census]
POPSQ	the square of POP
ISOLATE	unity if the destination metro area is spatially isolated from other large population centers, equals zero otherwise [determined using maps]
ISOLATESQ	the square of ISOLATE
HEATDEG	average annual number of heating degree days, 1971-2000 (thousands of degree days) [National Oceanic and Atmospheric Administration]
COOLDEG	average annual number of cooling degree days, 1971-2000 (thousands of degree days) [National Oceanic and Atmospheric Administration]
COAST	equals 1 if located on or near a major coastline (Atlantic, Pacific, Gulf of Mexico, Great Lakes, or major bay), equals zero otherwise
MOUNTAIN	equals 1 if located in or near a major mountain range, equals zero otherwise
HEATDIF	$\lvert HEATDEG - HEATDEGO_O \rvert$
COOLDIF	$\lvert COOLDEG - COOLDEG_O \rvert$
COASTDIF	$\lvert COAST - COAST_O \rvert$
MOUNTAINDIF	$\lvert MOUNTAIN - MOUNTAIN_O \rvert$

Table 2: Empirical Results for Metropolitan Destination Choice: Elasticities at the Mean[a]

Variable	Elasticity at the Mean	t-statistic
EMPGROW	0.07	4.95
UNEMPLOY	-0.27	-188.70
INCOME	0.23	3.71
COST	-1.21	-52.68
DENSITY	-0.02	-14.37
POP95	0.56	49.75
POP95SQ	-0.09	-23.18
ISOLATE	0.04	3.79
ISOLATESQ	-0.07	-12.25
HEATDEG	-0.20	-13.46
COOLDEG	0.22	9.23
COAST	-0.25	-15.34
MOUNTAIN	-0.29	-15.37
HEATDEGDIF	-0.16	-12.81
COOLDEGDIF	-0.05	-16.17
COASTDIF	-0.22	-16.44
MOUNTAINDIF	-0.44	-172.35

[a]For the four binary dummy variables, COAST, MOUNTAIN, COASTDIF, and MOUNTAINDIF, the coefficient shows the percentage change in ALLOCATE when the dummy variable takes of value of 1.

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