AMENITIES AND COUNTY-LEVEL MIGRATION: DOES DIVERSITY MATTER?

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ABSTRACT

This paper examines inter-county migration within metropolitan statistical areas (MSAs) with a special focus on the role of amenities and racial diversity. Household migration patterns are analyzed using allocation rates and the spatial equilibrium approach. Contiguous counties within Kentucky, Tennessee, Mississippi, and Alabama MSAs are examined. The parameters of an inter-county allocation model are estimated with 1995-2000 migration data from the 2000 Census of Population and Housing and a spatial equilibrium amenity index. The results indicate that the residual-based amenity measure explains county-to-county migration within MSAs and that racial diversity may be viewed as an amenity for this region. **JEL Classification:** R13, R23, I31

INTRODUCTION

Money magazine annually reports the best places to live in America and Forbes.com reports fastest growing U.S. counties. Desirable residential locations are quite newsworthy for would be migrants. Not surprisingly, amenities are consistently among the factors used to explain such growth. Amenities represent the tangible and intangible features that increase the relative attractiveness and value of real estate and residential structures. In a similar report, American City Business Journal uses twenty statistical indicators to rank 3,141 counties and independent cities across the United States. Mobile American households, seeking a better quality of life, are increasingly referring to such reports when assessing potential relocation destinations. Their choice of destination has implications for both origin and destination counties since large population shifts and their associated problems can generate economic and political concerns for many metropolitan statistical areas (MSAs). Frumkin (2002) discusses urban sprawl and its impact on health (such as mental health, air pollution, vehicle crashes and fatalities, etc.) in metropolitan areas. The aforementioned issues can negatively impact counties when local governments are unable to effectively plan to accommodate such large population shifts.

The purpose of this study is to gain a better understanding of county-level migration issues such as suburbanization and urban gentrification. The data obtained in this study were collected from the *2000 Census of Population and Housing,*

U.S. Census Bureau, and State and Metropolitan Area Databooks. We investigate the relationship between amenities and inter-county migration within an MSA. We analyze the causal relationship between amenities and migration decisions using 1995-2000 migration data from the *2000 Census of Population and Housing* and a spatial equilibrium amenity index. We develop an amenity-based index in order to investigate the causal link between county level amenities and inter-county migration decisions within U.S. MSAs, and address the following question: Do amenities affect inter-county migration decisions within an MSA? And, is racial diversity viewed as an amenity?

Allocation rate models have been used in regional migration analysis, however to our knowledge there is no known study that has developed an allocation rate model with a spatial equilibrium measure for valuing amenities appropriate for county level migration analysis. Developing a county level allocation model will broaden our knowledge of migration between counties and thus has implications for households, entrepreneurs, local governments, city planners and businesses. Households may gain better insight for relocation decisions and entrepreneurs for business location decisions. Local governments, city planners and businesses can better assess the future needs of an area to mitigate political, social and economic issues.

This study contributes to migration literature by providing empirical evidence on the impact of amenities on county-level migration within MSAs located in the East South Central region of the U.S. The results indicate that the effect of amenities on migration is increased when the move is to an urban county. Also, the parameter estimates suggest that the residual-based amenity measure does explain county-to-county migration within MSAs and that urbanization is more dominant than suburbanization in the East South Central region of the U.S. In addition, high amenity counties tend to attract a disproportionate number of migrants within this region's metropolitan statistical areas. And, racial diversity is viewed as an amenity in our sample. Overall, the results of this study suggest that amenities significantly influence county-level migration as they do regional migration. The results can assist county officials, households, businesses and other stakeholders in planning for inter-county moves within MSAs.

The remainder of this paper is organized as follows. In the second section, we review the relevamt literature. The third section discusses the theoretical model. The fourth section includes the data, theory and empirical model, as well as the empirical methodology and main variable of interest. We report parameter estimates of our empirical specifications of allocation rate, amenity, and racial diversity models in the fifth section. The last section concludes the paper.

BRIEF REVIEW OF LITERATURE

Previous studies have focused on the relationship between amenities and regional migration decisions (Treyz, Rickman, Hunt, and Greenwood, 1993; Gale, Pack, and Potter, 2001; Whisler, Waldorf, Mulligan, and Plane, 2008) or have examined the effects of various amenities on county/city migration patterns (Rupasingha and Goetz, 2004; Chen and Rosenthal, 2008; and Ulrich-Schad, 2015) in net-migration models. There exists a scarcity of research on the relationship between amenities and county-level migration patterns within metropolitan statistical areas.

The spatial equilibrium approach to measuring amenities as used by Glaeser et al. (2001) was employed in this study to develop an amenity index. Glaeser et al. demonstrate that in urban metropolitan areas, the residuals that result from an OLS regression of median housing prices on median incomes reflects demand for local amenities and exhibit a positive correlation with population growth and likewise a negative correlation with population reduction. We expect a similar relationship with net migration which is a key component of population change. Roback (1982), Glaeser et al. (2001), and Granger and Price (2008) assert that the amenities valued by an individual in a particular location in equilibrium can be captured by the residuals of an amenity-adjusted housing price and an amenity adjusted wage OLS regression analysis.

The rationale for migration being influenced by amenities follows directly from the household utility maximization model. Similar to Liu (1975) and Schachter and Althaus (1982), among others, our model is based on the assumption that a household's expected utility is driven by consumption of housing, wages, and location specific amenities. Here, both housing and wages are implicitly influenced by amenities. When contemplating a move, the household weighs the cost of relocating against the benefits of the amenities in the alternate location. If the benefits exceed the costs, it is expected that the household will migrate.

Our allocation rate model is based on the theoretical work of Sjaastad (1962), Glantz (1975), Goss & Chang (1983), Odland and Ellis (1988) and Cushing (1989, 2005) among others who have asserted that household migration follows a form of utility maximization behavior and thus can be explained using allocation rates which indicate that the household expects to be better off in the new location than in the original one.

Many studies have considered the role of racial diversity in regional migration decisions. Frey and Liaw (2005) use racial attraction as one of the explanatory variables in their multivariate statistical model to determine destination choice for inter-state migration within the U.S. Their findings indicate that at the state level, co-ethnicity helps to retain as well as attract migrants. Zheng (2014) finds that among other factors, younger people are attracted by a diverse population because of the increased variety in the supply of goods and services, which they value. Racial diversity has also been considered in neighborhood choice. Hwang & Sampson (2014) explore the relationship between race and gentrification in Chicago and find that neighborhoods with higher percentages of low-income are less likely to receive poverty-reducing benefits from gentrification. Using neighborhood racial composition as one of the determinants in their dynamic model of neighborhood choice, Bayer, McMillan, Murphy, and Timmins (2016) find a positive and significant relationship between the percentage of whites in a neighborhood and migrants' willingness to pay for a 10 percent increase in amenities.

THEORETICAL MODEL

As in Roback (1982) and Blomquist, Berger, and Hoehn (1988), we formally assume identical households across locations, with indirect individual utility given by $V(r,p,s)$, and the cost function $C(w,r,s)$, where r is the rental cost of land, p is the cost of housing (h), s is the quantity of the location-specific amenity bundle, and w is the wage

rate. In spatial equilibrium, individual consumers' wages and rents equalize utility. Let V_s be the partial derivative of the indirect utility function with respect to a change in location-specific amenities $(V_s \succ 0)$, and V_w be the partial derivative of the indirect utility function with respect to a change in the wage rate $(V_w \succ 0)$, in equilibrium the demand for location-specific amenities is P_s^*, which via Roy's identity is:

$$P_s^* = V_s / V_W = h(dp/ds) \quad (dw/ds) \tag{1}$$

Where: *h(dp/ds)* is the housing premium induced by the location-specific amenities, and *dw/ds* is the wage premium induced by the location-specific amenities.

As in Blomquist et al. (1988) we allow amenity values to vary within urban areas. Thus, in spatial equilibrium, the value of all amenities for an individual in a given location is the difference between amenity-adjusted housing prices and amenity-adjusted wages/incomes. As noted, the rationale for migrating depends on the effect of amenities on equation (1), which is indeterminate a priori. If the household perceives that expected utility, given the cost of moving, is higher in the new location than in the current location, the household will migrate. Equation (1) indicates that the value assigned to amenities, depends on both the income opportunity and housing cost in the new location. However, before the migration decision can be made, the cost of moving must be considered. The relocation/moving cost is assumed to be proportional to distance between the current location and the new location.

Assume that in a given MSA, the difference between a household's expected utility in the potential new county l^1 and the current county l^0 can be expressed as follows where *M* represents the net utility value of the new county:

$$M = V^1 (r, p, s) \; C^1 \; V^0(r,p,s) \tag{2}$$

If $M \succ 0$, the household would be better off migrating, i.e., moving from l^0 to l^1. Alternatively, if M 0 then the household would be better off in its current location. It follows that an aggregate migration model which analyzes differences in the amenity bundles of contiguous counties within an MSA, and wages and/or housing cost, given the cost related to moving, is plausible. If $M^h_{0,1}$, where *h* = migrating households, reflects the number of households that migrate from the county of origin l^0 to destination county l^1. We would expect $M^h_{0,1}$ to vary directly with the destination county characteristics and inversely with origin county characteristics. Hence, locations with higher associated amenity levels should experience disproportionate levels of in-migration (Cushing 2005).

Since this study is limited to migration within an MSA, distance between counties is an important consideration in the location decision as it constrains the location choice. Thus, only contiguous counties within an MSA are included in our study and distance between counties has been included as an explanatory variable for allocation rates. In the model, we consider conditions in only the destination counties, and only

those residents that migrate. As in the allocation models used by Greenwood (1969), Wadycki (1974), Kau and Sirmans (1976), Goss and Chang (1983), and Cushing (2005), we calculate the number of migrants leaving the central city county $M^{C}_{S^{l}}$ and moving to each suburban county. We then divide the number of migrants that moved to each suburban county $M^{j}_{S^{l}}$ by the total number of out-migrants from the central city county. The resulting ratio $M^{j}_{S^{l}} \big/ M^{C}_{S^{l}}$ comprises the left side of the allocation flow model:

$$M^{j}_{S^{l}} \big/ M^{C}_{S^{l}} = {}_{1}(s) + {}_{2}(\ (w,r)) + {}_{3}(c) + ej \qquad (3)$$

The allocation rate is a function of county specific amenities ${}_{1}(s)$, income/earning opportunities measured by median household income, ${}_{2}(\ (w,r))$, and cost related to moving, measured by distance between counties ${}_{3}(c)$. Origin county-specific factors are no longer considered in the model because our focus is on the destination choice of migrants. Cushing (1989) shows that once an individual has made the decision to move, origin characteristics alone are no longer relevant, only destination characteristics and distance from the origin. The allocation rate is a conditional migration rate which only focuses on the subset of the population that actually migrates during the defined time period. The model is based on the theoretical work of Sjaastad (1962), Glantz (1975), Goss & Chang (1983), Odland and Ellis (1988) and Cushing (1989, 2005) among others who have asserted that household migration follows a form of utility maximization behavior and thus can be explained using allocation rates which indicate that the household expects to be better off in the new location than in the original one.

DATA, THEORY, AND EMPIRICAL MODEL

The sample includes householders age 23 and older, living in one of the U.S. Census defined East South Central MSAs in both 1995 and 2000. Only persons who moved within MSAs during the specified time period are included in the analysis. The dependent variable in the allocation model is an allocation rate of migration. The allocation rate reflects the percentage of all out-migrants from origin county *c* who chose county *c'* as their destination within the metropolitan area from 1995 to 2000. The explanatory variables include distance, direction of move, and an amenity valuation based on the spatial equilibrium approach as used by Glaeser, Kolko, & Saiz (2001). The empirical analysis includes county level migration and amenity value data for U.S. metropolitan statistical areas (MSAs). Data was collected from the *2000 Census of Population and Housing, U.S. Census Bureau, and State and Metropolitan Area Databooks.*

Recall that the objective of this study is to extend our knowledge of migration decisions by developing an allocation model of county level U.S. migration that uses the spatial equilibrium approach to measure amenity values for county level analysis of East South Central MSAs. The allocation rate is most commonly defined as the number of persons moving from the origin county indicated by *c* to destination county *c'* during the time period divided by the total number of out-migrants from

origin county *c* during the period (Cushing 2005). The allocation model attempts to explain the migration of households among alternative areas based on amenity values. Allocation models of migration have been developed for use in regional and state level analysis. However, as of today there is no known study that has developed an allocation migration model with a spatial equilibrium measure for valuing amenities appropriate for county level migration analysis. Developing a county level allocation model will broaden our knowledge of migration between counties and thus has implications for households, entrepreneurs, local governments, city planners and businesses.

Empirical Methodology

Econometrically, regression analysis is employed to examine the effect of amenities on allocation rates in 23 East South Central U.S. MSAs. To the extent that the allocation rates are subject to unobserved heterogeneity, perhaps due to omitted variables, regression-based parameter estimates that do not account for unobserved heterogeneity produce biased parameter estimates (Abdulai and Tietje, 2007). As such, we estimate both conventional OLS and fixed effects parameters. The fixed effects parameter estimates are identified under the assumed form of heterogeneity and measure casual effects. A comparison of OLS and fixed effects parameter estimates provides a better determination of the robustness of a particular model specification. With respect to migration, it is likely that there is considerable heterogeneity among individuals regarding how they optimize with respect to amenities, introducing some bias in parameter estimates. Thus, a comparison of OLS and fixed effects parameter estimates enable a determination as to how important amenities are for the within MSA migration decision, as well as their magnitude and significance in the presence of heterogeneity.

The Amenity Variable

The main parameter of interest in this study is the effect of amenities, as measured using the spatial equilibrium approach, on inter-county migration within East South Central metropolitan statistical areas. The spatial equilibrium approach to measuring amenities as used by Glaeser et al. (2001) was employed in this study to develop an amenity index. Glaeser et al. demonstrate that in urban metropolitan areas, the residuals that result from an OLS regression of median housing prices on median incomes reflects demand for local amenities and exhibit a positive correlation with population growth and likewise a negative correlation with population reduction. We expect a similar relationship with net migration which is a key component of population change. Roback (1982), Glaeser et al. (2001), and Granger and Price (2008) assert that the amenities valued by an individual in a particular location in equilibrium can be captured by the residuals of an amenity-adjusted housing price and an amenity adjusted wage OLS regression analysis. U.S. Census data was used to determine county-level median housing prices and income. The residuals from the OLS regression of median housing prices on median household income levels were used to measure amenity values for each county within an MSA. Data from the National Association of Counties and Geobytes, Inc. was used to determine the

distance between the central cities in each county. The amenity values and distance are used as explanatory variables in our allocation rate model. The allocation rate is used as the measure of migration between counties.

RESULTS

Migrants between counties within the 23 East South Central United States metropolitan statistical areas (MSAs) as defined by the 2000 U.S. Census constitute the sample for the empirical analysis. Migration data were constructed using the 2000 Census of Population County-to-County Migration file. Data on county-level median housing prices and median household income were also gathered from the U.S. Census. Distance between counties was calculated using data published by the National Association of Counties and the City Distance Tool provided by Geobytes, Inc. The study excludes small metropolitan areas comprised of only one county. The model focuses on the destination choice of migrants within each MSA. As such, the sample consists of all combinations of possible moves between 93 counties resulting in 416 observations.

Table 1 provides the measurement of the variables and the data source, while Table 2 provides a summary of the statistical data. The dependent variable, ALLRATE equals the number of persons five years of age and over, residing in county c' (destination county) on April 1, 2000, who resided in county c (origin county) on April 1, 1995, divided by the total number of persons, five years of age and over who resided in county c on April 1, 1995 or another county within the MSA on April 1st 2000. The independent variables employed in the model are:

$AMENITY_{c'}$ = Amenity value calculated for county c', the destination county
DISTANCE = Mileage between the county seat of county c and that of c'

An amenity index was developed using the spatial equilibrium approach as used by Glaeser et al. (2001) and discussed above. The model includes each of the contingent counties within a particular East South Central U.S. MSA as a possible destination. The gross migration from each of the other MSA counties was analyzed using the allocation rate as a dependent variable and the calculated amenity values, distance, and type of move as explanatory variables.

Table 2, which contains the variable summary statistics, reveals that approximately 20.9% of migrants moved to counties within the same MSA during the period of 1995-2000. The average distance between counties within an MSA is 33.85 miles. The variable of interest for this study, AMENITY, which examines the value that household which migrate place on the alternate county location has a mean value of $1323.96. The OLS parameter estimates assume a log-linear functional form. This model specification is appropriate for the data because only the dependent variable, ALLRATE, has a theoretical range of zero to 100 (Cushing, 2005). All explanatory variables appear in linear form. No violations were found in tests for use of the Classic Linear Regression Model (CLRM). A plot of the observed versus predicted values reflected a symmetrical pattern, thus non-linearity was not evident. Serial (auto) correlation was not an issue as the study uses cross-sectional rather than time series data. Robust standard errors were generated to correct for the presence of

heteroskedasticity in the data. Econometric theory shows that robust standard errors are unbiased and efficient when used on relatively large (greater than 50 observations) datasets. Normal probability plots of the residuals confirm normal distribution with no skewness or kurtosis. Thus, we have sufficient support for the log-linear functional form employed in the study.

Due to migration flows of zero in many instances, we eliminated 27 observations from the original 416, in order to use the log linear form, resulting in a final sample of 389 observations. The model includes the log of allocation rates as the dependent variable.

OLS Regression Results

The dependent variable under consideration is ALLRATE. The regression model includes AMENITY and DISTANCE as explanatory variables. The R^2 statistic indicates that the model explains approximately 15% of the variation in allocation rates. Both the AMENITY and DISTANCE variables are significant at the .001 level. Both coefficients (.0000167, and - .0340465) exhibit the expected signs. The model indicates that a one unit increase in amenity value results in a .00167% increase in allocation rate, which means that as the amenities in a particular area increase, a household is more willing to leave its origin county and relocate to a destination (new) county where amenities are greater. Allocation rates vary inversely with DISTANCE. The results indicate that a one mile increase in distance between origin and destination counties results in a 3.4% decrease in allocation rates. Recall, if the household perceives that expected utility, given the cost of moving, is higher in the new location than in the current location, the household will migrate. Equation (1) tells us that the value assigned to amenities, depends both on the income opportunity and housing cost in the new location. However, before a household decides to migrate, the cost of moving must also be taken into consideration. The DISTANCE variable serves as a proxy for relocation cost, which is assumed to be proportional to distance between the current location and the new location.

The R^2, F-statistics, t-statistics, and coefficient signs indicate that all of the explanatory variables are significant predictors of allocation rates at the .05 level or better between counties within East South Central MSAs. Additionally, the models indicate that the effect of amenities on migration is not the only variable that a household considers when moving between counties. In this context, the parameter estimates suggest that the residual-based amenity measure does explain a small percentage of variation (R^2=.1506) in county-to-county migration within MSAs in the East South Central region of the U.S.

Fixed Effects Regression Models

The OLS parameter estimates of the allocation model are identified only if the error term is orthogonal to the regressors. This is unlikely to be the case if; for example, migrants differ in how they optimize on particular amenities across MSAs. It is also possible that each MSA has some amenity, observable by individuals, but not by the econometrician, that matters. In either case, the regressors are not orthogonal

to the error term, which undermines identification of the effect that amenities have on within MSA migration.

To account for unobserved heterogeneity in the uniqueness of each MSA, we estimate the parameters of a fixed effects specification of the allocation model. To capture spatial variations in the uniqueness of each MSA, we allow the intercept to vary but assume that the slope coefficients for the remaining variables are constant across MSAs.

The Fixed Effects version of the allocation model is specified as:

$$Y_i = B_{0i} + B_1 X_{1i} + B_2 X_{2i} + u_i$$

The inclusion of the subscript on the intercept term suggests that the intercepts of the 23 MSAs may be different. The differences in each MSA may be due to spatial variations in social, economic, or environmental factors.

Fixed Effects Regression Results

Parameters were estimated for the fixed effects allocation rate model with individual MSA effects. The fixed effects specifications assume fixed MSA effects with a log-linear functional form. This model specification is appropriate for the data because only the dependent variable, ALLRATE has a theoretical range of zero to 100. All explanatory variables appear in linear form.

The sample consists of 389 observations and 23 MSA groups. Again, we note that 27 county-to-county combinations reflected zero migrants and were therefore eliminated from the sample. The fixed-effect parameter estimates suggest that amenities are important. When compared to the OLS parameter estimates which do not control for unobserved heterogeneity, the fixed effects parameter estimates are quite similar, thereby confirming that the residual-based amenity measure explains county-to-county migration within East South Central MSAs.

Racial Diversity as an Amenity

As the amenity residuals are based on explicit household migration decisions, the regression informs the extent to which households actually view diversity as an amenity for which they are willing to migrate. To determine whether racial diversity matters for attracting migrants in our sample, we estimate the following equation:

$$AMENITIES = f(RACE)$$
$$AMENITIES = B_0 + B_1 \% WHIITE + u_i$$

Accordingly, we regress the percentage of white households on the amenity variable. The results indicate that that the %WHITE variable explains approximately 1.12% of the variation in amenities ($R^2 = .0112$) and that the variable (-7931.246) is significant at the .05 level, (t=2.17). The negative sign on this coefficient indicates that as the percentage of white households in a county increases, the amenity value decreases. Thus, there is an inverse relationship between the percentage of white

households and the amenity value. The results suggest that racial diversity is viewed as an amenity.

CONCLUSION

Cities, counties, and metropolitan areas are regularly being compared based on amenities that households presumably value. This study considered the extent to which household county-to-county migration decisions within MSAs can be explained by amenities. We estimated the parameters of a population and migration allocation model with data for household moves between 389 counties within East South Central U.S. metropolitan statistical areas. OLS and fixed effects parameter estimates revealed that amenities appear to be a determinant of household migration decisions. As our amenity measure is based on how households value amenities in spatial equilibrium, our results are an improvement over traditional approaches to amenity measurement that attempt to itemize explicitly what amenities households desire. Our amenity measure captures the value of all amenities—whatever they are—with the idea that in spatial equilibrium, housing price and incomes capitalize the value of whatever households desire in the location to which they are relocating.

Our parameter estimates suggest that amenities do indeed matter for within MSA county-to-county household migration decisions. This effect also seems to be robust and well-identified in our parameter estimates, as it is positive and significant in OLS and fixed effects regression specifications of the migration allocation model under consideration. Additionally, our estimates indicate that households value racial diversity as an amenity that affects their migration decisions.

Our results are potentially important to policy makers, entrepreneurs, and regional planners to the extent that preferences for amenities tend to drive household and firm migration decisions, thereby influencing local growth, economic opportunities, and economic development. To the extent that counties desire to be viewed as livable places that are attractive to households, our results suggest that they should examine the amenity characteristics of those counties which are attracting substantially greater migrants. While our amenity measure does not itemize which specific amenities households desire, its construction suggests that households are willing to pay for them through some combination of higher home prices and/or lower wages/incomes. Thus, city planners and policymakers may determine what amenities matter for county level migration decisions by simply estimating comparative suburban/urban hedonic home pricing and income models to determine what particular amenities (e.g., school quality, air quality, traffic congestion) are relatively important.

A notable limitation of this study is that the results are based on county-to-county migration within East South Central MSAs. Future research can explore migration using county-to-county data in other regions of the U. S. Furthermore, the Great Recession and subsequent recovery have likely affected migration patterns throughout the U.S. Examining the interaction between amenities and business cycles may provide additional insight into our understanding of household migration decisions.

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TABLE 1 – VARIABLE DEFINITIONS AND DATA SOURCES

Variable Name	Description	Source
ALLRATE	The number of persons moving from origin county *c* to destination *c'* between 1995 and 2000 divided by the total number of out-migrants from origin *c* to another MSA county during the period	U.S. Bureau of the Census 2000 U.S. Census of Population and Housing
AMENITY	The residuals that result from an OLS regression of median housing prices on median incomes	U.S. Bureau of the Census
DISTANCE	Mileage between the county seat of county c and that of c'	National Association of Counties and Geobytes, Inc. City Distance Tool
% WHITE	Racial diversity measured as the percentage of residents that identify as white alone	U.S. Bureau of the Census

TABLE 2 – VARIABLE STATISTICS

Variable	Observations	Mean	Standard Deviation	Minimum Value	Maximum Value
ALLRATE	416	.209	.265	0	.986
AMENITY	416	1323.961	11324.18	-35009.93	25595.92
DISTANCE	416	33.849	18.534	8	101