EXAMINING INTERDEPENDENCE BETWEEN LOCATION, EMPLOYMENT AND COMMUTING PATTERNS IN ALABAMA

Samuel Muguku, Department of Agribusiness
Alabama A&M University, Box 1042 Normal, AL 35762
Tel: 256-372-5414; Email: smuguku@aamu.edu

James O. Bukenya, Department of Agribusiness
Alabama A&M University, Box 1042 Normal, AL 35762
Tel: 256-372-5729; Email: james.bukenya@email.aamu.edu

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ABSTRACT

Since 1990, there has been over 17 percent increase in the number of in-commuters and 29 percent of out-commuters across counties in Alabama and its neighboring states. This paper examines the causal relationships and pattern of spatially distributed employment growth and commuter patterns in Alabama using a distance deterrence model. The findings suggest that as commuting distance increase the number of commuters from one region to another decrease.

***Keywords*:** Labor force, commuting, distance deterrence

INTRODUCTION

Alabamians have witnessed both improvements and declines in the metro and non-metro employment. A few counties have managed to keep pace with rural America in terms of job creation and wage measures. Metropolitan areas such as Birmingham and Huntsville have registered some considerable growth in employment while the economic situation in most of the other counties such as the Black Belt counties has worsened. The state continues to fall behind both the southern region and the United States as a whole, with regard to job creation and economic growth in general. In many communities job creation and income generation are the overriding economic development goals. Both municipalities and counties offer businesses a broad menu of location incentives ranging from infrastructure development to tax abatements; in hopes of creating new jobs for local residents. While local governments recognize these programs have costs, they are often justified on the grounds that they spur economic development, thus ultimately enhancing the well being of local residents (Shields and Swenson, 1999; Gabe and Krybill. 2002). It is not surprising therefore that the local governments in Alabama have embarked on a strong investment attraction campaigns targeting certain businesses.

This investment promotion approach has seen a number of local and foreign-based multinational automobile and high-tech firms (such as Mercedes Benz and Honda Corporation) establish assembly plants in Alabama. Other large firms such as Boeing Company and a number of computer firms have also followed suit and have various operations within the state. The general view is that residents of these counties home to the new firms reap benefits from the newly created jobs. Unfortunately this may not be the real outcome. Where local governments have implemented these programs there has been no guarantee that jobs provided by local growth have gone to local residents. Non-residents, including both commuters and migrants-fill many newly created jobs. Existing out commuters may also opt to take a local job instead of one out of town yielding only nominal economic benefits to the local economy. Public finance considerations are also important. Declines in the local tax base that occur when a major employment shock occurs can be devastating, particularly in an era in which a greater share of the overall burden of providing infrastructure and other public goods has been placed upon local governments (Yilmaz, Haynes and Dinc, 2002).

Commuting implies that creating jobs for a community's residents may not require bringing jobs into the community. Conversely bringing jobs into the community does not necessarily mean creating jobs for its residents. As such, the causal relationships and pattern of spatially distributed employment growth and commuter patterns in Alabama merit some exploration. These relationships are examined in this paper using a distance deterrence model. The analysis is based on county-level data (for Alabama and surrounding states) covering the periods 1990 and 2000. Understanding the nature of these relationships is necessary for local governments to develop sound employment policies that take into consideration the permeable job markets.

LITERATURE REVIEW

There is a lot of interest in trying to determine what really encourages economic growth at a local level. Shields (2003), has tied local taxes, market access, labor market characteristic, labor quality and industry agglomeration as factors that can lead to local economic growth. With this in mind Gabe and Krybill (2002) note that many states and local governments use economic development incentives as a mean of stimulating job creation and business growth. They estimate that the state's offering incentives to businesses report employment increase of 26.7 percent more jobs than they would promise if the incentives did not exist. Assuming that firms minimize their costs, higher local taxes might discourage business location and slow economic growth. Shields (2003) posit however, that this may not be the case, however, if firms find that the benefits of higher taxes (i.e. more or higher public services) outweigh the costs.

Shields and Swenson (1999) developed a framework where commuters are attracted to regions with relatively high wages, low unemployment and low housing costs. This is in an attempt to assess the impact commuters have on the level of demand for public services and how they are a source of income leakage in community. They wanted to assess who fills what kinds of jobs: commuters, immigrants or residents of a community. Like migration, commuting represents a response of relative economic incentives. The role of expected income in the household commuting decision depends on differential economic opportunities that consist of two parts, the expected wage, and the probability of receiving that wage. They noted that if communities were to understand the spillover effects that are a result of the incentives that one local government has implemented, sharing of the costs if these incentives would be of greater benefit to all.

Monchuck and Miranowski (2003) highlight the role of technological change and technology spillovers in employment growth drawing on current macroeconomic thinking, and the effect of knowledge and economic spillovers. They conclude that there exist considerable positive spillovers between counties in terms of employment growth. From a rural policy perspective, counties that wish to improve their employment situation should pay closer attention to what is happening in neighboring counties.

Hertzog, Schlottmann, and Johnson (1986) used a logit model to examine location determinants of high-technology industries by looking at the location (migration) decisions of workers with high technology occupations. They used a model of high technology worker migration decision that permits estimation of worker response to both personal and area characteristics. High-technology occupations have similar characteristics; they are labor intensive rather than capital intensive, they employ a large number of technicians, engineers and scientists than manufacturing industries. Their research and development inputs are much more important to the continued successful operation of high technology firms than other manufacturing industries (Hertzog, Schlottmann, and Johnson, 1986).

Renkow (2002) carried out a study of North Carolina on employment growth, worker mobility, and rural economic development. He used an estimated county level labor market model that explicitly accounts for movements of workers across county lines, in addition to within county labor market adjustments. His model features structural equations for in-commuting, out-commuting, labor force size, and local unemployment, relating these variables to employment changes and migration while controlling for spatial wage and housing price differentials and the spatial distribution of workers and employment opportunities within the larger regional labor market in which the county is located. The model allocates newly created jobs between residents of nearby counties and local residents. Local residents are comprised of both residents currently working outside the county and new entrants into the local labor force, in-migrants.

CONCEPTUAL MODEL

The reasons for commuting to work vary from person to person. Some of the major factors influencing the decision by a worker to commute include availability of jobs, higher wages and housing costs. The availability of public amenities also play a significant role in the decision making process in where to work and live. Public amenities also play a major role when in the firm's decision on where to set its plants or establishments. Due to the high mobility of today's labor force, a significant and growing proportion of workers commute substantial distances between home and work. Nationally, the proportion of individuals who cross county lines to go to work and back to their homes has drastically increased—due to increased importance of public amenities, decline in the cost of transportation, and the growth of dual income households.

In the current paper, spatial labor markets in Alabama, composed of mobile workers living in multi-county commuting zones, are examined. Workers are said to be able to move from county to county in response to changes in employment and residence opportunities within the commuting zone. People make three related choices regarding workplace and residence. They choose where to live, whether or not to be part of the labor force, and where to work. People in general are assumed to be mobile. They are able to move from one county to another in response to changes in employment and residence opportunities within a commuting zone.

Within a given county, total employment (EMP) is accounted for by individuals who live and work within the same given county (L), plus those who commute in from nearby counties (INCOM).

$$EMP = L + INCOM \tag{1}$$

The labor force (LF) within the county is composed of individuals who live and work in the county, those who live in the county but work in a different county (OUTCOM) and the unemployed.

$$LF = L + OUTCOM + UNEMP \tag{2}$$

Combining the above expressions yields an identity partitioning a county's labor force as follows:

$$LF = EMP - INCOM + OUTCOM + UNEMP \quad (3)$$

A labor market response to an employment shock in a particular county takes several forms, including changes in the number of in-commuters and out-commuters, level of unemployment, and labor force participation as shown below:

$$\Delta EMP = \Delta LF - \Delta INCOM - \Delta OUTCOM - \Delta UNEMP \quad (4)$$

The preceding equation demonstrates the multiplicity of effects that may occur when there are employment shocks in a given county. The size of the labor force may change due to migration response or changes in participation rates, all of which are influenced by distance between place of work and residence.

ECONOMETRIC APPROACH

A common application of spatial interaction models in the field of commuting and infrastructure evaluation is the following doubly constrained gravity model (Fotheringham and O'Kelly 1989), which will be the focus of our paper:

$$P_{ij} = A_i O_i B_j D_i F(d_{ij}) u_{ij} \, , \quad (5)$$

where P_{ij} denotes the number of commuters between region i and j. O_i denotes the size of the labor force in region i (origin), D_j denotes the number of employed workers in region j (destination) and $F(d_{ij})$ denotes the distance-decay, where F(F>0) is assumed to be a decreasing function of the distance d_{ij} between the regions i and j. A_i and B_j are balancing factors, which guarantee that the origin and distance totals are constrained. u_{ij} denotes random error that is independent and identically distributed. In the empirical application we assume that $F(d_{ij}) = d_{ij}^{\ b}$, hence:

$$P_{ij} = A_i O_i B_j D_j d_{ij}^{\ b} u_{ij} \, . \quad (6)$$

In the empirical literature, the first aim is to estimate b, the distance-decay parameter, which determines how the numbers of commutes depend on commuting distance (Thorsen and Gitlesen 1998). The main assumption of the model is that P_{ij} depends on factors related to region i (O_i *and* A_i), factors related to region j (D_j *and* B_j) and depends on factors which are related to both regions only through the commuting distance d_{ij}. The main aim here is to estimate b, the distance decay parameter, which determines how much commuters depend on commuting distance given the various factors that presumably influence commuting. To estimate the b parameter we linearize equation 6 to obtain equation 7, whereby the b parameter is a coefficient of the log of the commuting distance as follows:

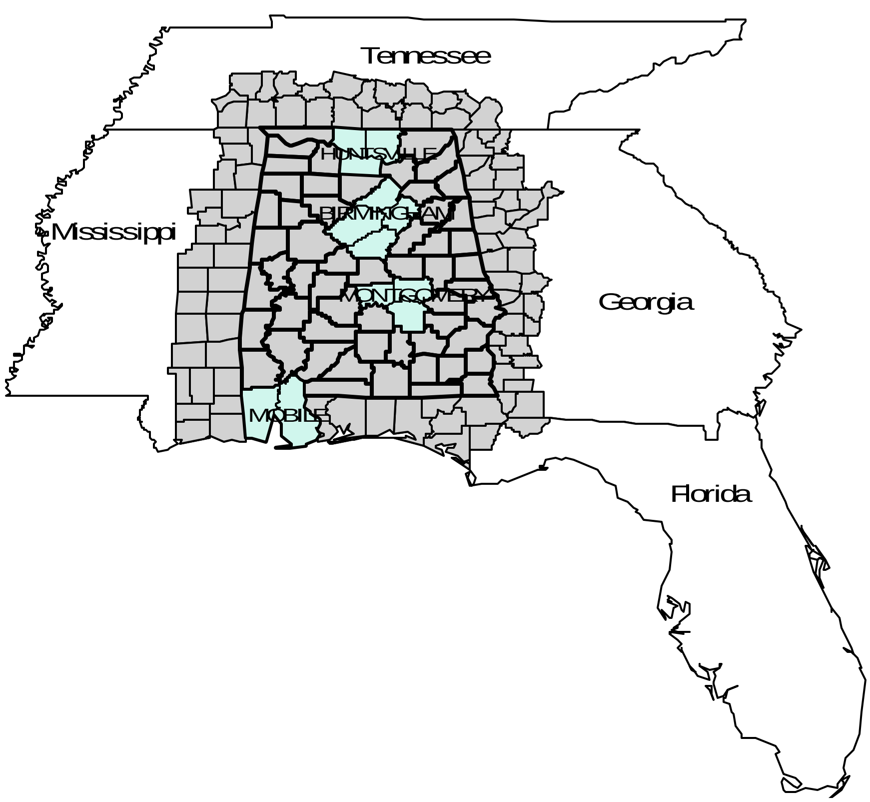
$$\ln(P_{ij}) + \ln(P_{ji}) - \ln(P_{ii}) - \ln(P_{jj}) = b(\ln(d_{ij}) + \ln(d_{ji}) - \ln(d_{ii}) - \ln d_{jj})) + e_{ij} + e_{ji} - e_{ii} - e_{jj}, \quad (7)$$

where; e_{ij} is independent and identically distributed. Equation 6 is estimated while following the linearization in equation 7.

DATA

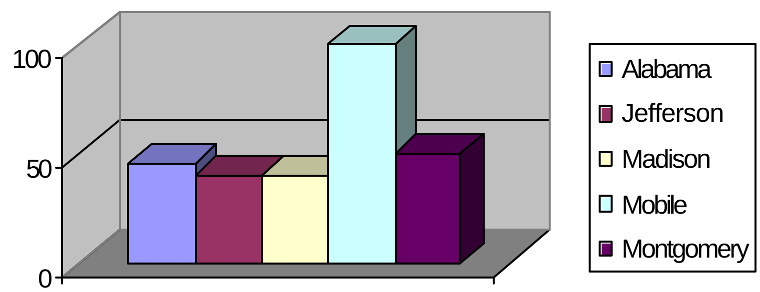
The analysis is based on county-level data extracted from the US Census Bureau for Alabama and the surrounding states (Figure 1). We have calculated regional commuting flows focusing on four metropolitan regions (Huntsville, Birmingham, Montgomery and Mobile) which have been identified as the major employment attraction centers in Alabama. The data have been extracted to fit a commuter shed. A commuter shed is defined to consist of counties in Alabama and adjoining counties in the surrounding states of Tennessee, Georgia, Mississippi and Florida.

FIGURE 1. Commuter shed



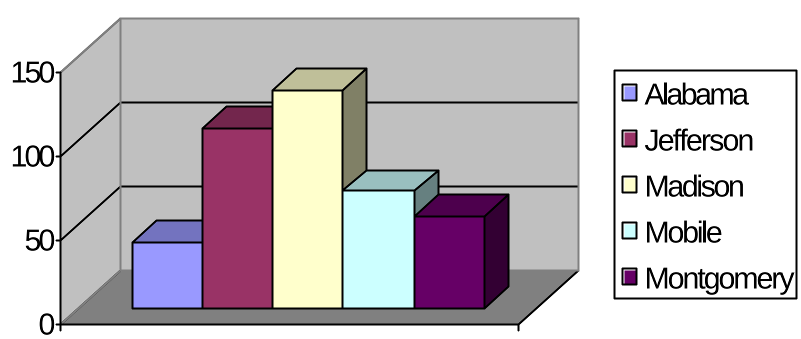
In-commuting: Defined as the number of workers who commute to another county to work. There are several reasons or attributes that lead people to commute to work; ranging from search for better paying jobs to prestige in the type of jobs that are available outside a county of residence. Overall, the average change in commuting in Alabama was 46 percent over the ten-year period. Amongst the four regions that are defined in this study, Mobile metropolitan region has the highest change in the number of in-commuters (Figure 2).

FIGURE 2. Percentage Change in In-commuting, 1990-2000



Out-commuting: Defined as the movement of workers from a county of residence to another county where jobs are available. Contributing factors, just like those responsible for in commuting are better paying jobs, and cheaper housing in the county of residence. Surprising, Alabama's average out-commuting percentage change is fairly low compared to that of the four metropolitan regions that are studied (Figure 3).

FIGURE 3. Percentage Change in Out-commuting, 1990-2000



Distance Matrix

The relation between the size of commuting flows and the distance between regions is a central issue in this paper. The average distance of these trips from one region to another is considered to be the distance between these regions. In the current application, we have used the Euclidian distance between county of residence and place of work, which overestimates the average commuting distance for most commuting flows. The average commuting distance by car was our first choice for the distance variable but several data points were missing. Since the distance matrix is based on the straight line distance between regions, our commuting data do not distinguish travel mode. We generate our distance matrix using ArcView GIS software by computing the Euclidian distance between county of residence and place/county of work centroids. The place of work was defined as any of the four metropolitan regions in the state.

RESULTS

This section provides estimates of OLS model on 1990 cross-section data in order to determine distance deterrence behavior in Alabama. In other words, the largest flow that departs from region i is the flow to this same region. Since net commuting determines regional unemployment, and the flow from *i* to *i* is cancelled out in this quantity, we are not really interested in this flow. We would thus have the undesirable situation that our estimates are dominated by a quantity that is irrelevant to the regional labor market model.

We also include a dummy equals one only for flows to adjacent states. Commuting flows that cross Alabama borders can still be over very short distances. Therefore, adjacent states have an exceptional position in the estimation, which is controlled for by means of this dummy. Since not every commuting flow is non-zero, we add one to all flows. We use weights that correct for the heteroskedasticity introduced by the transformation (Sen and Soot, 1981).

The estimated coefficient for the labor force is significantly positive. However, it is lower than the expected value of one. The negative significant coefficient for the dummy for adjacent regions/states indicates that a smaller share of commuters work in an adjacent region or state. Finally, the distance deterrence coefficient is negative and highly significant.

TABLE 1. Estimated Distance Deterrence Model for Alabama

Variable	Coefficient	T-statistics
Labor force	0.6294	3.213
Dummy adjacent region	-0.0311	1.941
Distance deterrence	-2.028	1.650
R-square (Adj)	87% (83%)	

CONCLUSION

We estimated the model using 1990 cross-section labor force data for Alabama. A substantial deterrence to commuting distance is found. We conclude this paper by pointing to some lines of research for improvement of the commuting model. It has been shown that household composition strongly affects commuting behavior. For example, one-person households commute over relatively short distances. The long-term scenarios of the regional labor market model include household characteristics. It would thus be interesting to incorporate these characteristics in our model.

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