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Employment Growth and the Allocation of New Jobs: Evidence from the South

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Abstract

A county-level labor market model is estimated for the 13 southern states. The model accounts for inter-county commuting, migration, and within-county adjustments to labor demand shocks. Econometric results indicate that most employment growth during the 1990s was accommodated by changes in commuting flows. The results also suggest that labor force growth and, by extension, population growth and associated fiscal impacts are sensitive to employment growth in nearby counties. These results highlight two opposing forces related to spatial spillovers that are usually neglected in analyses of the economic and fiscal impacts of employment growth.

Keywords: *Commuting; Local labor markets; Spatial spillovers*

JEL classification: J61; R11; R23

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1. INTRODUCTION

> *"As important as prior transportation innovations have been, the car has had a more dramatic effect on the city than anything before it. Unlike the earlier transportation innovations, the car has radically reshaped cities because it eliminates walking almost entirely. . . Public transportation made it possible for consumers to live far from their work, but they still needed to live at high densities. Cars have changed that and as a result, inalterably changed city living forever."* Glaeser and Kahn (2003, p. 3).

The passage quoted above appeared in a National Bureau of Economic Research paper entitled "Sprawl and Urban Growth" (Glaeser and Kahn 2003). The paper provides strong support for the proposition that the root cause of deconcentration of urban centers – a.k.a. "sprawl" – is the significant cost efficiency of automobiles and trucks *vis-à-vis* alternative forms of commercial and human transport (e.g., railways, buses, and ferries). Other popular explanations such as inappropriate government policy or bad urban planning are found to be of minor significance at best in explaining the ubiquitous nature of sprawl in America.

That cost advantages associated with a cornerstone technology (automobile-based transportation) are at the root of a widely observable and hotly debated social phenomenon (sprawl) is a finding that comes as little surprise to most economists. However, the inexorability of sprawl implied by Glaeser's and Kahn's research – at least up until such time as more cost efficient transportation alternatives emerge and/or the individual preferences of consumers and workers change – is likely disconcerting to those seeking policy- or planning-based approaches to urban development.

A defining characteristic of population deconcentration has been a broadening of the geographical extent of local labor markets as workers travel ever greater distances between home and workplace. One very important implication of this is that employment growth in one locality may generate significant spillovers of economic and fiscal impacts to nearby localities. Recent research from South Carolina and North Carolina suggests that non-residents – in-migrants and in-commuters from nearby communities – account for the bulk of adjustment of labor supply to employment shocks (Barkley, Henry, and Warner 2002; Renkow 2003).

The analysis presented below extends this line of research to encompass the 13 states comprising the southern United States.[1] I estimate a county-level labor market model to quantify the spatial partitioning of employment growth during the 1990s. The labor market model features structural equations for in-commuting, out-commuting, labor force size, and local unemployment, relating these variables to employment changes and

[1] Those states include Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Virginia, and West Virginia.

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. As such, it explicitly accounts for movement of workers across county lines – as well as within-county labor market adjustments – when an employment shock takes place. The model thus allocates newly created jobs between residents of nearby counties and local residents, the latter group comprising both residents currently working outside the county and new entrants into the local labor force (including in-migrants).

The model is estimated in first differences using a two-period panel of data for the 1,112 southern counties in 1990 and 2000. Econometric results indicate that between 60 and 90 percent of the adjustment of labor supply to new employment opportunities is accounted for by changes in commuting flows and that the remainder is accounted for by changes in the size of the labor force and changes in unemployment. Taken as a whole, these results suggest that the fiscal impacts of employment growth associated with changes in residential demands for publicly provided services and residential provision of property tax revenues will be substantially smaller than is commonly supposed.

Significant rural-urban differences are found to exist as well, particularly with regard to commuting flows.[2] The econometric results suggest that a much greater share of new jobs in metro counties are filled by (non-resident) in-commuters than is the case for rural counties, while employment growth in rural counties appears to be accommodated to a much greater extent by reductions in out-commuting. Furthermore, it is found that employment growth has a significant impact on migration into nearby counties. Thus, while employment growth within a given county may lead to smaller fiscal impacts than is often supposed, employment growth in nearby counties represents an important countervailing factor that also tends to be overlooked in economic and fiscal impact analyses.

The paper is organized as follows. The next section briefly summarizes data on the changes in spatial dispersion of population and employment, and trends in commuting flows in the southern states during the 1990s. Following this, an analytical framework capable of partitioning employment growth among different types of workers is suggested. Next, an empirical model is proposed for implementing the analytical framework. Following discussions of data used, estimation results are presented and discussed. Some concluding remarks are found in the final section.

2. DECONCENTRATION AND WORKER MOBILITY IN THE SOUTH

That population and employment have become more spatially dispersed over time can be seen in Figure 1, which plots the coefficient of variation of county population and employment on a state-by-state basis. Two factors motivate the choice of the county as the basic observational unit. First, the county is the smallest geographical unit for which

[2] Throughout this article, I use the delineation of metro and rural counties defined by the U.S. Department of Commerce's Bureau of Economic Analysis.

complete data detailing where workers live and work is available. Second, and more importantly, county governments are on the front lines of current debates over sprawl and land-use planning policies – in large part because county governments pay for public services and develop the land-use plans that underpin observed development patterns in most places (especially in rural areas).

Across all southern counties, the coefficient of variation for population increased while that of employment fell during the 1990s. That is, for the region as a whole, population became more dispersed spatially while the spatial distribution of employment became more concentrated. Substantial differences across states are evident. Coefficients of variation for population actually fell in eight of the thirteen southern states over the period considered. That the aggregate variability in population dispersion increased is clearly attributable to the strong influence of a few states (Georgia, Virginia, and North Carolina). These changes in the spatial distribution of both employment and population are not inconsistent with a general weakening of links between place of residence and place of work.

Comparison of commuting data from 1990 and 2000 supports this contention. During the decade of the 1990s, average one-way commute times in the southern states increased by 11 percent to just over 26 minutes per worker (Table 1). The share of workers traveling less than 30 minutes each way to work declined in each state; correspondingly, the proportion of workers spending over one hour per day commuting to and from work increased in all states (from 28 percent to nearly 34 percent for the region as a whole).

The increase in time spent commuting is no doubt due to a combination of greater congestion (inclusive of road quality changes) and longer distances traveled. Difficulty in measuring congestion precludes a precise breakdown of the relative importance of these two factors. However, comprehensive data exists on the amount of cross-county commuting; these indicate that the share of workers crossing county lines to go to work every day increased substantially during the 1990s. Figure 2 illustrates cross-county commuters' share of the workforce in southern states for 1990 and 2000. In 2000 (black bars), more than 29 percent of workers in the South worked in a county other than the one in which they resided, up from 25 percent in 1990. These figures range from 17 percent of workers in Florida to over 40 percent of workers in Georgia and Virginia.

The broadening of the geographic extent of local labor markets suggested by this commuting data has a number of important implications, not the least of which is that employment growth in one location is likely to generate significant spillovers to nearby locations. In particular, employment growth in one county may generate significant spillovers to nearby counties, both in the form of economic benefits to workers in those counties and increased fiscal costs to the local governments of those counties due to greater demands for publicly provided services. It is to this issue that we now turn.

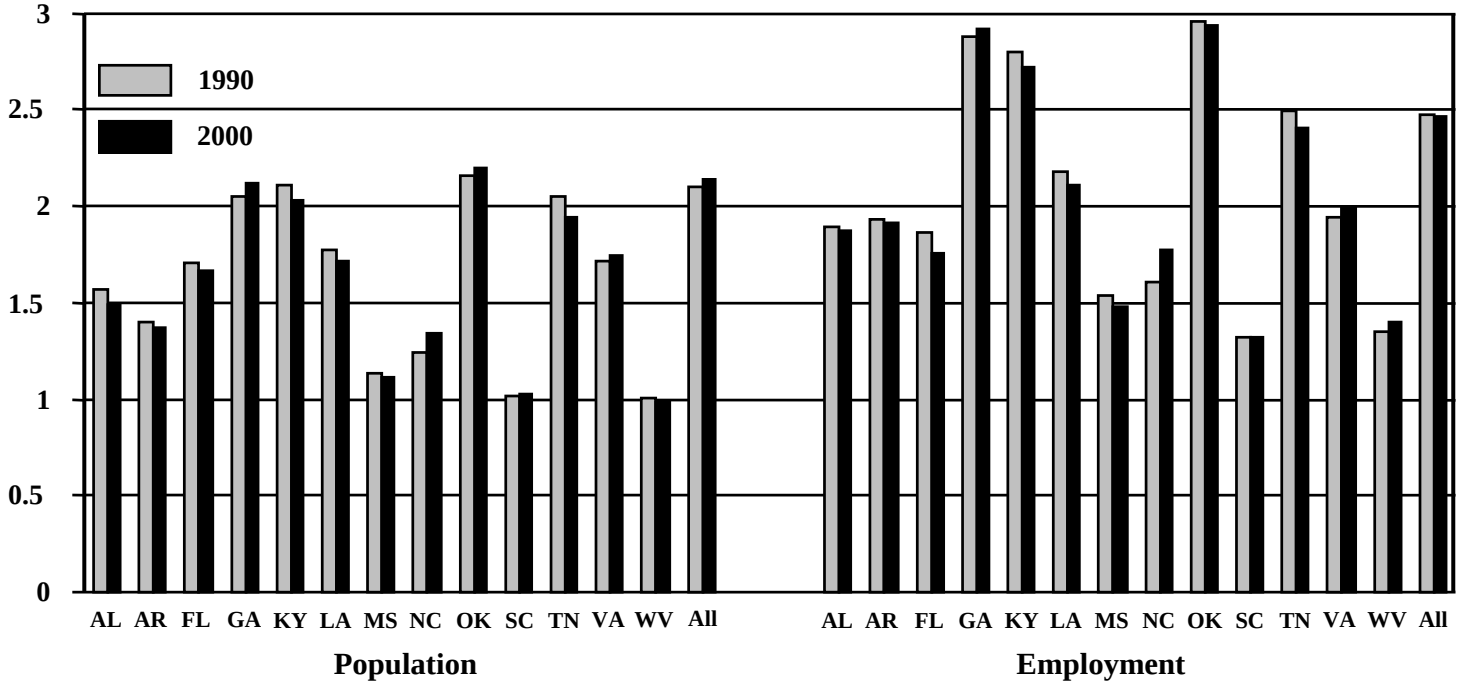

FIGURE 1. Coefficient of Variation of State Population and Employment across Counties, 1990 and 2000

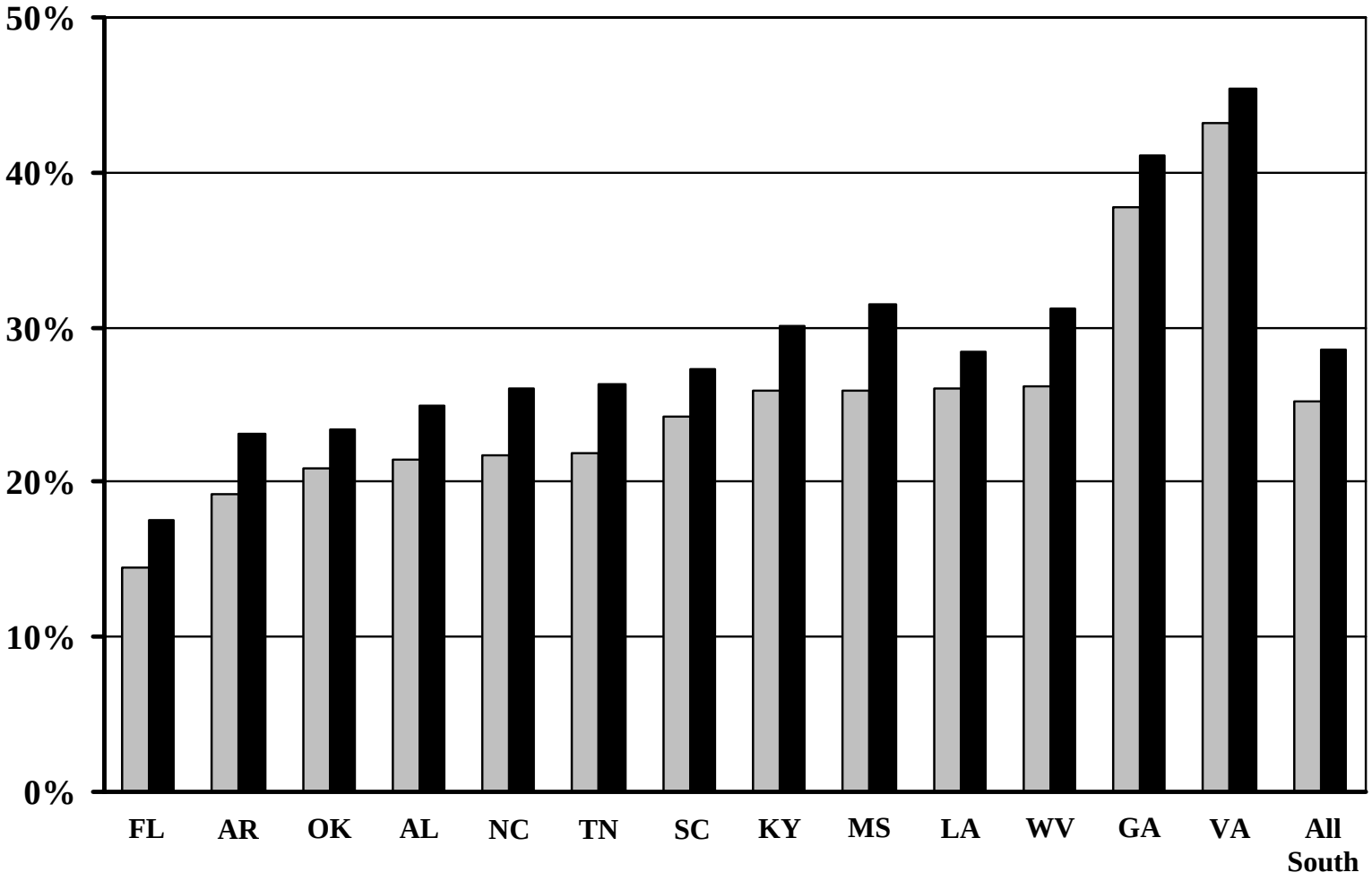

FIGURE 2. Cross-County Commuters as a Share of Employed Workers

TABLE 1

Average One-Way Commuting Time (in Minutes) and Proportion of Workers Commuting More Than 30 Minutes Each Way to Work, 1990 and 2000

	Average one-way commute time		Percent of workers commuting more than 30 minutes each way	
State	1990	2000	1990	2000
AL	23.3	25.5	27.9	32.3
AR	20.9	23.7	22.0	26.6
FL	23.9	27.0	30.2	37.3
GA	25.0	28.6	32.1	39.5
KY	22.7	24.6	24.8	28.9
LA	24.8	26.0	28.6	32.4
MS	22.9	25.1	24.9	30.1
NC	21.7	24.8	23.4	30.5
OK	21.2	23.3	22.2	25.6
SC	22.5	25.1	26.0	31.3
TN	23.6	25.4	27.4	32.4
VA	26.1	27.8	33.7	38.0
WV	23.2	26.7	26.3	32.8
All states	**23.6**	**26.2**	**28.0**	**33.8**

Source: U.S. Census Bureau

3. ANALYTICAL FRAMEWORK

Accurately modeling the local economic and fiscal impacts of employment growth requires knowledge of who actually gets those new jobs. While the great bulk of newly created jobs at the state level appears to go to in-migrants – at least in the long run (Blanchard and Katz 1992; Bartik 1993) – the situation is likely to be much more complex at a lower level of spatial aggregation.

To model the market level response of labor demand shocks, I employ the analytical framework used by Renkow (2003), which in turn drew on the fiscal and economic impact models of Johnson, Scott, and Ma (1996); Swenson and Otto (2000); and Yeo and Holland (2000). Consider a spatial labor market composed of mobile workers living in a multi-county commutershed. Workers are assumed to be able to move between counties in response to changes in employment and residence opportunities within the multi-county area. Thus, a working person may choose to live and work in the same county, or s/he may live in one county and commute to another.[3]

[3] Throughout the balance of this paper, the term "commuting" will refer to crossing county lines to go to work.

Within a given county, total employment at time t (EMP_t) is accounted for by individuals who both live and work within the county (L_t) plus workers who commute in from nearby counties ($INCOM_t$):

$$(1) \qquad EMP_t = L_t + INCOM_t.$$

The labor force (LF_t) within a given county is composed of individuals who both live and work in the county, workers who live in the county but work in a different county ($OUTCOM_t$), and unemployed persons ($UNEMP_t$):

$$(2) \qquad LF_t = L_t + OUTCOM_t + UNEMP_t.$$

Combining these expressions yields an identity partitioning a county's labor force:

$$(3) \qquad LF_t = EMP_t - INCOM_t + OUTCOM_t + UNEMP_t.$$

Taking first differences of each of the variables in equation (3), and re-arranging, makes it clear that aggregate labor market responses to an employment shock in a particular county can take a variety of forms, including changes in the number of in-commuters and out-commuters, changes in the size of the labor force, and changes in the level of unemployment:

$$(4) \qquad \Delta EMP = \Delta LF + \Delta INCOM - \Delta OUTCOM - \Delta UNEMP.$$

Equation (4) demonstrates the multiplicity of effects that may accompany employment shocks within a given county. The size of the labor force might change due to migration response and/or changes in participation rates. Unemployment rates may change, and adjustments in the volume of both out-commuting and in-commuting may occur. In-commuting adjustments are of particular interest. In the context of standard economic impact analysis, they represent "leakages" that would attenuate the impact of changes in labor demand on final demands. In the context of fiscal impact analysis, the in-commuting adjustments would tend to reduce both the demands for publicly provided services and the contribution of tax revenues (especially property tax revenues) associated with labor demand shocks.

The empirical analysis that follows is oriented toward quantifying these adjustments. Differentiating equation (4) with respect to ΔEMP yields

$$(5) \qquad 1 = \frac{d\Delta INCOM}{d\Delta EMP} - \frac{d\Delta OUTCOM}{d\Delta EMP} + \frac{d\Delta LF}{d\Delta EMP} - \frac{d\Delta UNEMP}{d\Delta EMP}$$

Equation (5) represents a cross-equation restriction that can be imposed on a system of four structural equations relating changes in the four right-hand variables in equation (4) to changes in local employment and other relevant variables. Imposing this restriction

amounts to a partitioning of the proportion of observed changes in local employment to changes in in-commuting, out-commuting, labor force size, and unemployment.

4. EMPIRICAL MODEL

I posit the following set of equations describing changes in in-commuting, out-commuting, labor force size, and unemployment within a given county *i*.

$$(6) \qquad \Delta INCOM_i = f^I(\underset{+}{\Delta EMP_i}, \underset{?}{\Delta LF_i}, \underset{+}{\Delta CZLF_i}, \underset{+}{\Delta RWAGE_i}, \underset{+}{\Delta RHOUSE_i})$$

$$(7) \qquad \Delta OUTCOM_i = f^O(\underset{-}{\Delta EMP_i}, \underset{?}{\Delta LF_i}, \underset{+}{\Delta CZEMP_i}, \underset{-}{\Delta RWAGE_i}, \underset{-}{\Delta RHOUSE_i})$$

$$(8) \qquad \Delta LF_i = f^L(\underset{+}{\Delta EMP_i}, \underset{+}{\Delta CZEMP_i}, \underset{+}{\Delta RWAGE_i}, \underset{-}{\Delta RHOUSE_i})$$

$$(9) \qquad \Delta UNEMP_i = f^U(\underset{?}{\Delta EMP_i}, \underset{+}{\Delta LF_i}, \underset{-}{\Delta CZEMP_i}, \underset{?}{\Delta RWAGE_i}, \underset{?}{\Delta RHOUSE_i})$$

where

$CZLF_i$ = labor force in other counties within county *i*'s commuting zone;
$CZEMP_i$ = total employment in other counties within county *i*'s commuting zone;
$RWAGE_i$ = the wage in county *i* relative to other counties within the same commuting zone; and
$RHOUSE_i$ = the cost of housing in county *i* relative to the cost of housing in other counties within county *i*'s commuting zone

The expected signs of the first derivatives are given underneath the individual variables. The employment variables *EMP* and *CZEMP* are taken to be proxies for labor demand within the county and within the larger commuting zone within which the county is located.[4] Hence, a positive shock to within-county employment (ΔEMP) is expected to have a positive impact on in-commuting and a negative impact on out-commuting, while a positive change in *CZEMP* is expected to have a positive effect on the number of out-commuters.[5] Changes in both employment variables (ΔEMP and $\Delta CZEMP$) are further expected to be positively related to changes in the size of the labor force through effects on in-migration and participation rates. The likely impact of ΔEMP and $\Delta CZEMP$ on unemployment are ambiguous, depending on whether employment growth causes the labor force size and/or labor force participation to grow by more than the number of new jobs created.

[4] I employ the 1990 delineation of commuting zones established by Killian and Tolbert (1991).
[5] Similarly, the size of the labor force in other counties within the commuting zone is indicative of the pool of potential workers; hence $CZLF_i$ is expected to be positively related to $INCOM_i$.

The inclusion of the labor force change variable (ΔLF) in the two commuting equations captures the relationship between commuting and migration. The sign of its coefficient is indeterminate *a priori*; it depends on whether commuting and migration are substitutes or complements (Evers 1989). An example of substitution between commuting and migration is the case in which positive local labor market shocks were to simultaneously lower the propensity of households to out-commute and increase the rate of in-migration – i.e., when a strong local economy *pulls in* new residents and new workers. In this event, the sign on the migration variable would be negative in the out-commuting equation and positive in the in-commuting equation. Coefficients would be of the opposite sign when commuting and migration are complements – e.g., when net in-migration into a county reflects exurbanization.

Changes in relative wages are expected to exert a positive influence on in-commuting and a negative influence on out-commuting. *Ceteris paribus*, higher relative wages may be expected to draw in workers from nearby counties and make employment opportunities in other counties comparatively less attractive to out-commuters. Higher wages are also expected to have a positive impact on labor force size by stimulating both in-migration and greater labor force participation rates.[6] Their effect on unemployment is ambiguous, however, depending on whether the positive impacts on labor force size cause more laborers to enter the market than can be accommodated by greater employment opportunities underlying wage increases.

Changes in relative housing prices are also included in the four structural equations. An increase in the relative cost of housing in a county is expected to increase the likelihood that individuals employed within that county choose to live elsewhere. Thus, the sign of the coefficient on the housing cost variable ($\Delta RHOUSE$) is expected to be positive for the in-commuting equation and negative for out-commuting and labor force equations.

5. DATA AND VARIABLE CONSTRUCTION

The empirical model was implemented using 1990 and 2000 county-level data for 13 southern states. The analysis also employed data from a handful of counties in adjoining states that belong to commuting zones also containing southern counties. These include 2 counties in Illinois, 6 counties in Indiana, 10 counties in Kansas, 9 counties in Maryland, 10 counties in Missouri, 14 counties in Ohio, 2 counties in Pennsylvania, 9 counties in Texas, and the District of Columbia.

The commuting and employment data came from the Journey-to-Work files of the Census Bureau. County-level data on population, unemployment, labor force size, and

[6] Strictly speaking, labor force participation is a function of the real wage within the county and its relationship to the average reservation wage of the county's workers. The proxy for the relative wage used here – the mean county wage relative to the commuting zone average – will pick up this effect, since a change in our constructed wage variable will be dominated by within-county wage movements.

average yearly wages were taken from the BEA's Regional Economic Information System. Employment and wages apply to individuals' main source of employment by place of work, while labor force and unemployment data are by place of residence.[7] Commuting zone employment (*CZEMP*) for each county was calculated as the total employment in all other counties within the county's commuting zone. Commuting zone labor force (*CZLF*) data was similarly constructed. Designation of metro and rural counties is based on the BEA's 1990 definition. By this definition, the South is composed of 310 metro counties and 802 rural counties.

Relative wages were based on the county average earnings per worker reported by the BEA. The relative wage variable ($RWAGE_i$) was computed as the ratio of the average earnings per worker in county *i* to the commuting zone average. This is similar to the procedure used by Tokle and Huffman (1991) for measuring relative wages in their study of male and female labor force participation.

Relative housing costs were computed using Census data on the median price of a single family house in each county. Each county's median house price was divided by the weighted average of median prices for all counties within the relevant commuting zone (the weights being the number of housing units in each county).

Table 2 presents summary statistics broken down by metro and rural counties. These indicate substantial variation in all workforce and population size components, and considerably less spatial variation in wages and housing prices. Not surprisingly, all figures are larger for metro counties than for rural counties; t-tests confirmed that these differences are significant.

6. RESULTS

Equations (6) - (9) were estimated by three stage least squares. An advantage of estimating the model in first difference form is that it effectively eliminates time-invariant county fixed effects that are difficult to measure. Endogenous variables in the system included the first differences (2000 – 1990) of the four dependent variables – in-commuting ($\Delta INCOM$), out-commuting ($\Delta OUTCOM$), labor force size (ΔLF), and unemployment ($\Delta UNEMP$) – as well as employment changes (ΔEMP).[8] The instrument set

[7] The Census Bureau appears to use an individuals' main job (if s/he has more than one) in aggregating individual census responses to generate county-to-county worker flows contained in the Journey-to-Work files. This precludes consideration of multiple job holding.

[8] Wu-Hausman tests unequivocally rejected the null hypothesis that ΔEMP was exogenous. However, the exogeneity of $\Delta RWAGE$ could not be rejected.

TABLE 2

Sample Statistics

Variable	Mean	Coefficient of Variation	Minimum	Maximum
	Metro counties (N = 310)			
2000 Labor force	81,546	1.40	3,481	980,632
2000 Employment	78,844	4.54	1,506	952,664
2000 In-commuters	23,316	1.71	490	446,780
2000 Out-commuters	21,170	1.25	1,673	233,701
2000 Unemployment	4,348	1.66	129	85,728
2000 CZ employment	471,212	1.15	41,954	2,573,125
2000 Population	166,048	1.42	6,926	2,253,362
2000 Real wage[a]	26,463	0.18	17,725	51,716
Δ Real wage 1990-2000[a]	3,269	0.74	-7,835	21,600
2000 Real median house price[a]	101,690	0.52	47,100	673,100
Δ Real house price 1990-2000[a]	17,596	2.11	-84,242	413,655
	Rural counties (N = 802)			
2000 Labor force	11,558	0.86	792	67,833
2000 Employment	9,824	1.06	314	65,569
2000 In-commuters	2,383	1.09	73	22,822
2000 Out-commuters	3,367	0.75	194	24,479
2000 Unemployment	750	0.87	24	5,013
2000 CZ employment	127,987	1.64	2,965	2,573,125
2000 Population	26,506	0.81	2,077	139,277
2000 Real wage[a]	21,834	0.15	14,396	41,252
Δ Real wage 1990-2000[a]	2,504	0.74	- 7,967	15,444
2000 Real median house price[a]	63,474	0.38	20,800	295,700
Δ Real house price 1990-2000[a]	20,771	0.82	-3,400	238,667

[a] Wages and housing price expressed in 1999 dollars using the U.S. Department of Commerce's GDP deflator

included 1990 values of county population and county density, along with the other exogenous variables in the system (Δ*RWAGE*, Δ*RHOUSE*, Δ*CZEMP*, and Δ*CZLF*).[9]

A primary point of interest here is ascertaining whether there are rural-urban differences in how local labor markets accommodate employment growth. For this reason, separate systems were estimated for rural and metro counties. State dummies were included as regressors in all cases to account for policy differences and other state-level fixed effects conditioning local labor market outcomes. Finally, to guard against potential heteroskedasticity due to errors in more populous counties being systematically larger

[9] F-test statistics for the first stage regressions (reported in Tables 3A and 3B) confirm the viability of the instrument set. Note further that inclusion of the commuting zone variables (Δ*CZEMP* and Δ*CZLF*) and construction of Δ*RWAGE* and Δ*RHOUSE* on a commuting zone by commuting zone basis obviate concerns with spatial lags and spatial autocorrelation among counties.

than errors in less populous counties, all variables (save Δ*RWAGE* and Δ*RHOUSE*) were deflated by 1990 population of working-aged individuals (aged 16-64).

The system was constrained to satisfy the identity partitioning changes in county employment into its component parts (equation 5). This meant imposing the cross-equation restriction $\beta_I - \beta_O + \beta_L - \beta_U = 1$, where β_I, β_O, β_L, β_U are the coefficients on Δ*EMP* in the in-commuting, out-commuting, labor force, and unemployment equations, respectively.

Tables 3A and 3B present the regression results for metro and rural counties. The data fit the model reasonably well, as indicated by system-weighted R^2s of .276 and .165, respectively. In the main, parameter estimates were significant and of the hypothesized sign. The few exceptions are found in the rural regressions and may well reflect unobserved amenities that are not explicitly captured by the empirical model.[10]

Comparison of the regression results in Tables 3A and 3B indicates that substantial rural-urban differences exist in the response of the commuting variables to changes in employment. The positive impact of increased employment on in-commuting is about 10 percentage points greater for metro counties than rural counties. In other words, a relatively greater fraction of new jobs in metro counties are filled by (non-resident) in-commuters than is the case for rural counties. In contrast, the negative relationship between out-commuting and employment is much more pronounced in rural areas.

Both of these findings are consistent with the strong complementary relationship between commuting and migration reported by Renkow and Hoover (2000) – a phenomenon that they attribute to growing exurbanization of rural counties located close to metropolitan centers. The fact that the response of rural out-commuting to labor force growth is more than double that for in-commuting is similarly supportive of this complementarity.

The results also suggest that metro counties are substantially affected by employment growth in nearby counties. Positive and significant coefficients on Δ*CZEMP* in both the out-commuting and labor force equations suggest in-migration into metro counties followed on the heels of employment growth in other locations within the commuting zone. Presumably, the great bulk of this is attributable to commuting from one metro

[10] These exceptions include a negative and (marginally) significant coefficient on Δ*CZLF* in the rural in-commuting equation, a negative and (marginally) significant coefficient on Δ*RHOUSE* in the rural labor force equation, a negative and significant coefficient on Δ*CZEMP* in the rural unemployment equation, and a positive and significant coefficient on Δ*RWAGE* in the rural out-commuting equation. With regard to this latter result, I ran separate regressions for rural counties that are adjacent to metro counties and those that are non-adjacent. These estimates suggest that it is in rural adjacent counties that the significantly positive relationship between Δ*RWAGE* and out-commuting. This is likely an artifact of the larger numbers of commuters of all types in adjacent counties (in- and out-) coupled with generally higher wages in rural adjacent counties.

TABLE 3A

Three-Stage Least Squares Estimates for Metro Counties (N = 310)

	Dependent Variable			
Variable	In-commuting	Out-commuting	Labor Force	Unemployment
County employment	0.362***	-0.248*	0.417***	0.027
	(2.59)	(1.65)	(4.99)	(0.53)
County labor force	0.052	0.676***	—	0.002
	(0.52)	(6.21)		(0.04)
Commuting zone employment	—	0.002***	0.007***	-0.000
		(4.69)	(5.56)	(1.26)
Commuting zone labor force	0.065*	—	—	—
	(1.81)			
Relative wage[b] ($\times 10^6$)	5.320***	-0.540	3.805	-0.177
	(2.25)	(0.22)	(1.21)	(0.21)
Relative housing price	0.016	-0.007	-0.001	0.006
	(1.19)	(0.51)	(0.02)	(1.28)
Intercept	0.017*	0.028***	0.035	-0.007**
	(1.66)	(2.61)	(0.33)	(2.01)
F-value (first stage regressions)	104.0***	145.1***	45.5***	8.2***

a. t-values are in parentheses. ***, **, and * denote significance at the .01, .05, and .10 levels, respectively. System weighted $R^2 = .276$. All variables are first differences (2000 value less 1990 value), deflated by 1990 population 16-64 years of age. Parameter estimates for state dummies omitted for brevity.

b. County mean value divided by the mean value for the commuting zone within which the county is located. See text for details

county to another, since the amount of metro-to-rural commuting is relatively small in the sample (Renkow 2004).

The key empirical result of interest here lies in a comparison of the relative size of the response of the dependent variables to changes in employment. Given the cross-equation restriction forcing the employment coefficients to sum to one (as indicated in equation 5), the relative magnitudes for rural counties can be read directly off the first row of Tables 3A and 3B. The implied responses of changes in in-commuting, out-commuting, labor force size, and unemployment to employment growth are summarized in Table 4. There it will be observed that the bulk of labor market adjustment to employment growth – 61 percent in metro counties and 91 percent in rural counties – is

TABLE 3B

Three-Stage Least Squares Estimates for Rural Counties (N = 802)

Variable	Dependent Variable			
	In-commuting	Out-commuting	Labor Force	Unemployment
County employment	0.266***	-0.644***	0.204***	0.114***
	(2.64)	(7.69)	(2.70)	(3.08)
County labor force	0.407***	1.160***	—	-0.159***
	(2.92)	(15.67)		(5.73)
Commuting zone employment	—	0.000	0.003***	0.000*
		(0.43)	(5.30)	(1.75)
Commuting zone labor force	-0.121*	—	—	—
	(1.70)			
Relative wage[b] ($\times 10^6$)	7.956***	4.886***	-1.230	-1.340**
	(4.89)	(2.86)	(0.52)	(2.15)
Relative housing price	-0.025	-0.020	0.064*	0.014*
	(1.04)	(0.79)	(1.67)	(1.71)
Adjacent to metro county dummy	-0.002	-0.003	0.029***	0.005***
	(0.51)	(0.62)	(3.75)	(2.79)
Intercept	-0.005	0.014	0.028*	-0.013***
	(0.62)	(1.30)	(1.80)	(3.83)
F-value (first stage regressions)	327.2***	97.5***	28.5***	14.1***

a. t-values are in parentheses. ***, **, and * denote significance at the .01, .05, and .10 levels, respectively. System weighted R^2 = .165. All variables are first differences (2000 value less 1990 value), deflated by 1990 population 16-64 years of age. Parameter estimates for state dummies omitted for brevity.

b. County mean value divided by the mean value for the commuting zone within which the county is located. See text for details

accounted for by changes in commuting flows. Changes in labor force size – in-migration plus any increases in labor force participation – are twice as important in metro counties as they are in rural counties (41.7 percent to 20.4 percent). This latter result suggests that migration response to employment growth is a much more important phenomenon in metro counties *vis-à-vis* rural counties.

Interestingly, the results additionally indicate a positive association between employment growth and unemployment, particularly in rural counties – a result similar to that found by Barkley, Henry, and Warner (2002) in South Carolina. One interpretation of this is that there is some "over-shooting" in the adjustment of labor force to new employment opportunities. One possible source of this over-shooting would be in-migrating dual worker households whose migration resulted from a job opportunity for

TABLE 4

Proportion of Employment Growth Accounted for by Different Activities

	Metro Counties	Rural Counties
Increased in-commuting	36.2%	26.6%
Decreased out-commuting	24.8%	64.4%
Increased labor force size	41.7%	20.4%
Increased unemployment	2.7%	11.4%

only one of the household's workers. Another interpretation, consistent with the arguments of Blanchard and Katz (1992) and Bartik (1993), is that different localities have their own equilibrium unemployment rate related to structural labor market characteristics and amenity factors. In this event, positive employment shocks would be accompanied by corresponding unemployment growth to restore that equilibrium.

These findings have important implications for assessing the economic impact of employment growth within a county. The fact that between one-quarter and one-third of new jobs are accommodated by increased in-commuting suggests that leakages associated with employment shocks are substantial. Failure to take account of these leakages translates into overstatement of increases in final demands for the county in which the shock occurs. Of course, were the spatial unit of observation to expand from county to, say, commuting zone, the magnitude of this overstatement would be attenuated.

The implications for assessing fiscal impacts of employment growth are perhaps even more striking. There has been a tendency in the impacts literature to assume that employment growth translates into population growth at least as large as the number of new jobs (or greater to the extent that workers have dependents). The results here offer a starkly contrasting view, indicating that in-migration accounts for at most 20 percent of rural employment growth and 42 percent of metro employment growth.[11] As such, fiscal impacts associated with changes in both residential demands for publicly provided services (e.g., schools) and residential provision of tax revenues (e.g., property taxes) will in fact be quite a bit smaller than is usually supposed.

[11] Note that this is an upper bound that takes any increase in the size of the labor force to be the result of in-migration. Any positive impact of employment growth on labor force participation rates will reduce this estimate. Bartik (1993) finds that about 80 percent of labor force growth is due to new residents, while the remainder is due to increased labor force participation by local residents. Thus, there is a large, but not one-to-one, correspondence between labor force growth and in-migration. Likewise, an increase in multiple job holding would also reduce the role of in-migration in employment growth.

At the same time, however, the results here also point to substantial spatial spillovers accompanying employment growth. The greater responsiveness of metro in-commuting and rural out-commuting to employment growth that was noted earlier suggests that rural counties may in fact bear a larger share of these spillovers. The extent to which metro employment growth stimulates population growth and associated increases in residential development in nearby rural counties has potentially important implications for local public finance in those rural counties. While employment growth in rural counties may lead to smaller fiscal impacts than is often supposed, employment growth in nearby counties represents an important countervailing factor – one that also tends to be overlooked in economic and fiscal impact analyses.

7. CONCLUDING REMARKS

In this paper, a county labor market model has been estimated that explicitly accounts for movements of workers across county lines – in addition to within-county labor market adjustments – when a labor demand shock takes place. The model allocates newly created jobs between residents of nearby counties and local residents, the latter group comprising both residents currently working outside the county and new entrants into the local labor force (primarily in-migrants). The model was estimated using county-level data from 13 southern states for the period 1990-2000.

The econometric results indicate that roughly one-quarter of new rural jobs and one-third of new metro jobs are filled by (non-resident) in-commuters. Failure to take account of these "leakages" in economic impact analysis would lead to significant over-statement of changes in final demands resulting from employment shocks. The empirical results further indicate that between 60 and 90 percent of the adjustment of labor supply to new employment opportunities is accounted for by changes in commuting flows (including both increased in-commuting and reduced out-commuting). It was also found that labor force growth – the great bulk of which is likely attributable to in-migration – accounts for about 20 to 40 percent of local labor market response to employment growth. From this, it is reasonable to conclude that fiscal impacts associated with residential demands for publicly provided services (e.g., schools) and residential provision of tax revenues (e.g., property taxes) will in fact be quite a bit smaller than is usually supposed.

Significant rural-urban differences were found to exist in labor market adjustments to employment growth. A relatively greater fraction of new jobs in metro counties are filled by (non-resident) in-commuters than is the case for rural counties, while employment growth in rural counties appears to be accommodated to a relatively greater degree by reductions in out-commuting. These findings are consistent with the growing exurbanization that has accompanied a geographic expansion of urban labor markets in the South to encompass nearby rural areas. The fiscal impacts on rural counties affected by this exurbanization can be substantial. Finally, the results also suggest that metro counties are substantially affected by employment growth in nearby counties.

It thus appears that while employment growth within individual counties may lead to smaller fiscal impacts than is often supposed, employment growth in nearby counties – especially nearby urban counties – represents an important countervailing factor, one that also tends to be overlooked in economic and fiscal impact analyses. The relative size of these two sources of "measurement error" will vary depending on the geographic unit of observation.

The analysis that has been presented here highlights a growing connectedness of different communities via spillovers from economic growth. This is a mixture of good and bad news for local government officials seeking to enhance the economic well-being of their constituents. On the one hand, some substantial amount of the direct, income generation effects of industrial recruitment and other local job creation strategies will likely end up in the pockets of residents of other jurisdictions. On the other hand, some communities – notably rural communities located near fast-growing urban counties – may be able to free ride on the success of others communities' industrial recruitment efforts. A key implication here is that old assumptions about the economic and fiscal impacts of employment growth are no longer tenable. Individual communities' ability to capture the benefits of new industries and businesses is clearly much reduced relative to the past and in some instances may be quite small.

The findings that have been reported here also carry an important message for county governments worried about providing – and paying for – public services for local residents. A growing body of empirical evidence from studies of the fiscal costs of providing community services studies demonstrates that residential land uses, on average, represent a net drain on local fiscal resources and that commercial land uses tend to subsidize residential development (Dorfman and Nelson 2001). The fact that a significant amount of urban economic growth translates into substantial residential development in nearby communities poses a difficult fiscal challenge to local officials in those communities – at least up to such time as occurs the commercial development that often accompanies residential development.

Creative strategies will be required of rural communities seeking solutions to the economic development and public finance challenges associated with continuing population deconcentration. Two mechanisms that one hears mentioned with increasing frequency by local government officials and planners are regional economic development strategies and zoning. Both are heavily laden with political baggage – zoning because it runs counter to longstanding traditions of landowner independence, and regionalism because it entails elected officials addressing the interests of constituencies other than the ones that elect them. However, the increasing number of communities experimenting with "smart growth" initiatives and multi-jurisdictional partnerships indicates that the perceived economic benefits of these sort of public policy experiments may be beginning to outweigh their political costs.

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