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Employment Growth and Commuting Patterns in Rural Labor Markets

by

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Abstract (50 words)

We estimate a county-level labor market model for Minnesota in order to decompose employment growth into labor force, commuting, and unemployment changes. Preliminary results suggest that 1990-2000 employment growth was accommodated by increased in-commuting and labor force growth, with in-commuting more important in metro than rural counties.

Employment Growth and Commuting Patterns in Rural Labor Markets

While the national economy expanded during much of the 1990s, many rural communities faced challenges due to declining employment in key industries and changes in commuting and migration patterns. Frequently, the response to these challenges has been economic development policies that focus on job creation and industrial recruitment. The impact of job growth on a local community, however, depends in large part on whether the new jobs are taken by local residents or by newcomers. Employment growth is often the goal of economic development programs, yet whether the jobs are associated with new in-migrants (population growth), less out-commuting, or more in-commuting has important implications for local demographic and fiscal impacts. The relationship between job growth and both changes in demand for local public services and in tax revenues depends on the distribution of jobs amongst current residents versus new ones (Bartik 1991). Rural counties also may experience spillover effects in terms of population growth (and commuting) due to job growth in neighboring urban areas.

This paper uses county-level data from Minnesota to analyze adjustments to labor market demand shocks in rural versus urban parts of the state. We estimate a county-level model in order to decompose county employment growth into changes in the size of the labor force, in-commuting, out-commuting, and unemployment.[1] Workers are increasingly mobile, with both frequency and distance of commuting increasing over the past decade (Fisher 2003). The main objective of the analysis is to quantify the size of

each of these changes in order to examine how local labor markets in Minnesota have adjusted to employment shifts.

Recent studies have estimated models of labor market adjustments in a number of southern states, and find that the majority of employment change is accounted for by changes in commuting flows (Renkow 2003a, 2003b). In contrast, state-level analyses conclude that over the long run, most new jobs go to new residents (Bartik 1993, Blanchard and Katz). Clearly, both the time period and the level of spatial aggregation matter in assessing the impact of job creation strategies. Determining the allocation of new jobs between changes in labor force and commuting behavior is critical to understanding the impact of these changes on local fiscal and economic outcomes.

Model and estimation strategy

Employment in a county includes both the workers who live and work in that county, and workers who live outside the county and commute to work there (in-commuters). The local labor force of a county includes those who live and work in the county, those who out-commute to another county, and unemployed residents. Thus any labor demand shock might result in a change in population (labor force) due to migration, changes in commuting, or a change in the number of workers who are unemployed. Specifically, increases in employment in a county can be divided into increases in labor force and in-commuting, plus decreases in out-commuting and unemployment:

$$\Delta E = \Delta LF + \Delta IN - \Delta OUT - \Delta UN, \qquad (1)$$

[1] Commuting is defined for this study as crossing a county line to work.

where E= number of jobs in the county, LF= labor force size, IN=number of in-commuters, and OUT=number of out-commuters. Following the method proposed by Renkow (2003b), we estimate a system of four equations, with one equation for each of the labor market adjustment components: in-commuting (IN), out-commuting (OUT), labor force (LF) and unemployment (UN).

Changes in labor force and unemployment in the county are a function of changes in employment, relative wages and housing costs. We also control for changes in employment and labor force in the commuting zone (excluding the county itself). We expect, for example, that an increase in employment in the other counties in the same commuting zone will increase out-commuting in a given county. Changes in (both in- and out-) commuting are likely to be affected by changes in local employment, labor force, relative wages, relative housing costs, and other county-level characteristics such as local amenities. We are particularly interested in differences in labor market adjustments in rural versus urban counties, and so include a dummy variable and interaction terms to control for metro differences. Metropolitan status (in 1990) is defined by the type of commuting zone (metro or nonmetro) the county is in, based on the categorization of Tolbert and Sizer.

We estimate the model in first-differences, eliminating all time-invariant county differences such as amenities (assuming these are fixed over time), using Census and BEA data from 1990 and 2000 for all counties in Minnesota (and counties in neighboring states in overlapping commuting zones). The data on number of (in- and out-) commuters are from the Journey-to-Work files of the decennial census in each of the two years. These data are combined with county-level data on labor force, unemployment and wages

from the Bureau of Economic Analysis Regional Economic Information System (REIS) and the Minnesota Department of Employment and Economic Development. The system of equations is estimated using three stage least squares, where changes in in-commuting, out-commuting, labor force, unemployment and employment are treated as endogenous. Exogenous variables include the baseline characteristics of the county, including 1990 population, population density, housing cost, relative wage, and commuting zone level measures of employment and labor force.

Given the identity expressed in equation 1, the estimated coefficients must be constrained so that the changes in labor force, in- and out-commuting, and unemployment will sum to the total change in employment. Two cross-system restrictions are imposed. For the first constraint, the estimated coefficients on employment in each of the four equations (in-commuting, out-commuting, labor force and unemployment) are constrained such that $\beta_{IN} - \beta_{OUT} + \beta_{LF} - \beta_{U}$ equal 1. The second constraint ensures the partition sums to one for metro counties by constraining the four coefficients and the coefficients on the interaction term between employment and metro status such that $\beta_{IN} + \gamma_{IN} - \beta_{OUT} - \gamma_{OUT} + \beta_{LF} + \gamma_{LF} - \beta_{U} - \gamma_{U}$ equal 1 (where the β's are the coefficients on employment and the γ's are the coefficients on the metro-employment interaction terms in each of the four equations).

Table 1 presents summary descriptive statistics for key variables, with means show for metro and nonmetro counties separately. Table 2 provides background on changes in employment, commuting and population in Minnesota during the decade between 1990 and 2000. Employment grew considerably during this time period, with metro counties averaging a 32 percent increase in employment, and nonmetro counties,

20 percent. The labor force size increased, both as the population grew and as more residents entered the labor force. The number of unemployed workers also declined. Nonetheless, employment gains were not evenly distributed across the state: certain counties experienced declines in population, labor force, and employment.

Commuting patterns shifted as well over the decade of the 1990s, as both commuting distances and frequency increased (Fisher 2003). In the metro counties, in-commuting increased from 22 to 24 percent of employment, while in nonmetro counties, it rose from 11 to 14 percent. Out-commuting also increased: as a percent of the labor force. Out-commuting represents more than one third of the labor force in metro areas, and nearly a quarter in nonmetro areas. Clearly, the employment growth of the 1990s has been accompanied by major shifts in commuting, labor force participation, and population change in Minnesota.

Estimation Results

The key findings from the estimation are shown in Table 3. Each column represents one of the dependent variables in the system of equations: in-commuting, out-commuting, labor force, and unemployment. As anticipated, increases in the number of jobs (employment) in a county increases in-commuting into that county, whereas increases in the county labor force are associated with decreased in-commuting. Relative wages and housing costs do not have a statistically significant relationship with in-commuting in nonmetro counties, though both interaction terms between the metro dummy and housing and wages are negative and significant.

Out-commuting is positively related to growth in the county labor force and to increased employment in the local commuting zone. The estimated coefficient on county

employment has a positive sign, which is surprising, but the estimate is not significantly different from zero. As was the case for in-commuting, relative wage and housing costs are significant in metro counties, but not in the nonmetro ones.

Job growth also is positively associated with labor force growth. The labor force may increase due both to in-migration and to people entering the paid labor force (who had been in school or taking care of children, perhaps). Increases in the number of jobs in the surrounding commuting zone also are associated with labor force growth. Most of the other variables are not statistically significant. For the unemployment equation, only commuting zone employment is statistically significant (and that only at the 10 percent level).

One of the objectives of this study was to examine the composition of employment changes in rural areas compared to urban areas. As noted above, the inclusion of the metro dummy interacted with the employment, wage and housing variables allows the estimates to differ between metro and nonmetro areas. Table 4 summarizes the key findings for metro and nonmetro areas by decomposing changes in employment into changes in in-commuting, out-commuting, labor force and unemployment. The numbers in the nonmetro column are the estimated coefficients for county employment (multiplied by 100) in each of the four equations from table 3. For the metro counties, the coefficients on county employment and the county employment x metro dummy interaction are summed.

As seen in table 4, the contributions of commuting, labor force, and unemployment changes to employment growth are fairly similar in metro and nonmetro counties in Minnesota. Close to 60 percent of employment growth is accounted for by

increases in in-commuting in metro counties compared with nearly 50 percent in nonmetro. Increases in the labor force account for nearly 40 percent in metro versus 55 percent in nonmetro counties. Only a small fraction is due to decreased unemployment (less than 5%). In both metro and nonmetro counties, the sign on out-commuting is the opposite of expected – increased employment in the county is associated with more out-commuting. However, the estimated coefficient is not statistically significant from zero. Thus, while both in-commuting and increased labor force are important in metro and nonmetro counties, in-commuting is relatively more important in metro counties, and increased labor force is more important in the nonmetro counties. [2]

The findings from this study are similar to the results from a study in North Carolina (Renkow 2003b), but in-commuting plays a larger role in both metro and nonmetro Minnesota than in the south (table 5).[3] The metro-nonmetro differences are more dramatic in North Carolina than in Minnesota, and both decreased out-commuting and decreased unemployment were much more important in North Carolina than in Minnesota. In both states, in-commuting is more important in metro than in nonmetro counties.

The Twin Cities metropolitan area of Minneapolis and St. Paul dominates the economy of Minnesota, and commuting flows may be different compared to the smaller cities within the state. In order to test whether the Twin Cities metro area experienced different commuting and labor force changes from other metro areas, we also estimated

[2] We also estimated a model using the BEA definition of metro in order to check whether the definition affected the results. With the BEA definition of metro, there are only 18 metro counties, compared to 28 metro counties using the commuting zone definition. However, the estimated coefficients and resulting decomposition were nearly identical using the two definitions of metro.

[3] Renkow (2003a) finds overall results similar to North Carolina in a study of 13 southern states combined, but the state-level results are not presented.

the model dividing metro counties into two groups. Seven metro counties were included in the Twin Cities group, and an additional interaction term (Twin Cities dummy x employment) and constraint were included in the three-stage least squares estimation.

The summary of results separating the Twin Cities from other metro counties is shown in Table 6. The proportion of employment growth accounted for by commuting flows and labor force changes are similar for the Twin Cities and for other metro areas. The proportion accounted for by in-commuting is slightly higher in the Twin Cities (69 versus 61 percent). Increases in the labor force are slightly higher in the metro areas outside the Twin Cities (36 versus 32 percent), but still far below the proportion in nonmetro counties (55 percent). Decreases in unemployment are more important in the Twin Cities and in nonmetro counties than in smaller metro counties. Overall, however, the results are not dramatically different when the Twin Cities metro is grouped separately from the rest of metro.

Conclusion

The results suggest that the pattern of labor market adjustment differ considerably in counties in Minnesota than found in studies in states in the southern region of the U.S. This raises questions for further research to investigate the reasons for differences in local labor market adjustments. Adjustments in both commuting and migration play an important role in allocating employment growth. However, in Minnesota, the results suggest that in-commuting and increased labor force are the two major factors in labor market adjustments. This result contrasts with findings from North Carolina, which suggest that out-commuting and unemployment adjustments play a larger role in both

metro and rural areas. Ongoing research investigating factors that may lead to different labor market adjustments includes incorporation of other variables such as adjacency to major metro areas, finer gradations of metro/nonmetro status, and inclusion of additional variables such as education level of the labor force and locational amenities.

Table 1: Sample Descriptives

Variable	Mean	Std. Dev.	Min	Max
Nonmetropolitan counties (N=59)				
Labor force, 1990	9,477	6,521	1,843	29,693
Labor force, 2000	10,833	7,765	1,656	35,151
Change in labor force, 1990-2000	1,356	1,964	-1,601	8,186
Employment, 1990	10,336	7,150	2,004	34,518
Employment, 2000	12,626	9,241	2,117	44,374
Change in employment, 1990-2000	2,290	2,469	-971	10,172
Unemployment, 1990	694	846	68	6,148
Unemployment, 2000	574	637	96	4,669
Change in unemployment, 1990-2000	-120	282	-1,479	526
Population, 1990	19,441	12,598	3,876	54,179
Population, 2000	20,727	14,268	4,123	57,244
Population per square mile, 1990	25.9	19.8	2.7	98.8
1990 Average annual wages	16,115	2,181	12,351	25,383
2000 Average annual wages	23,315	2,423	18,283	29,599
1990 Median housing cost	41,976	11,329	22,700	68,000
2000 Median housing cost	72,856	21,931	34,100	123,600
Metro counties (N=28)				
Labor force, 1990	65,223	123,152	3,496	613,442
Labor force, 2000	77,408	136,968	3,360	677,708
Change in labor force, 1990-2000	12,185	16,314	-136	64,266
Employment, 1990	75,094	176,596	3,645	901,440
Employment, 2000	93,171	206,797	3,622	1,060,451
Change in employment, 1990-2000	18,077	31,721	-23	159,011
Unemployment, 1990	2,715	5,003	179	25,081
Unemployment, 2000	2,053	3,485	104	17,287
Change in unemployment, 1990-2000	-662	1,540	-7,794	253
Population, 1990	115,816	209,240	7,516	1,035,132
Population, 2000	132,549	227,159	7,127	1,117,917
Population per square mile, 1990	278.3	661.0	5.0	3113.9
1990 Average annual wages	18,983	3,381	13,989	26,491
2000 Average annual wages	27,978	5,533	20,990	43,311
1990 Median housing cost	63,546	19,563	30,500	95,700
2000 Median housing cost	102,946	31,180	43,600	170,200

Table 2: Summary Statistics on Changes in Commuting, Labor Force and Employment in Minnesota

Variable	Mean	Std Dev	Min	Max
Nonmetropolitan counties (N=59)				
In-commuting as percent of employment, 1990	11.0	4.6	4.5	31.7
In-commuting as percent of employment, 2000	14.3	5.7	3.4	38.6
Percentage change in in-commuting, 1990-2000	61.3	45.8	-60.5	244.7
Out-commuting as percent of labor force, 1990	16.5	8.4	1.9	41.2
Out-commuting as percent of labor force, 2000	24.0	12.6	3.5	56.9
Percentage change in out-commuting, 1990-2000	62.3	27.5	-8.5	152.6
Percentage change in labor force, 1990-2000	12.9	22.0	-20.2	114.5
Percentage change in employment, 1990-2000	20.2	15.4	-10.7	60.5
Percentage change in unemployment, 1990-2000	-9.2	29.4	-69.4	163.9
Percentage change in population, 1990-2000	4.5	10.1	-13.1	34.1
Metro counties (N=28)				
In-commuting as percent of employment, 1990	22.0	9.9	9.2	44.1
In-commuting as percent of employment, 2000	24.0	9.5	8.9	43.3
Percentage change in in-commuting, 1990-2000	46.7	25.5	-0.3	107.0
Out-commuting as percent of labor force, 1990	34.3	17.2	4.5	62.4
Out-commuting as percent of labor force, 2000	39.9	17.7	4.5	65.6
Percentage change in out-commuting, 1990-2000	45.6	19.3	21.1	82.2
Percentage change in labor force, 1990-2000	21.7	15.8	-3.9	58.9
Percentage change in employment, 1990-2000	32.2	19.2	-0.6	71.9
Percentage change in unemployment, 1990-2000	-17.3	16.1	-41.9	31.1
Percentage change in population, 1990-2000	16.2	17.2	-6.4	56.3

Table 3: Estimation Results

	DEPENDENT VARIABLE			
	In-commuting	Out-Commuting	Labor Force	Unemployment
County employment	0.484**	0.0942	0.5650**	-0.0455
	(4.76)	(0.79)	(4.32)	(-1.5)
County labor force	-0.362**	0.2132**	--	--
	(-8.98)	(4.85)	--	--
Commuting zone employment	--	0.0118**	0.0218**	0.00088+
	--	(6.120)	(5.68)	(1.83)
Commuting zone labor force	0.005+	--	--	--
	(1.8)	--	--	--
Relative wage	2249.0	-423.1	5381.3	-1054.8
	(0.65)	(-0.11)	(0.64)	(-0.98)
Relative housing cost	711.48	818.2	-2184.5	
	(0.47)	(0.44)	(-0.63)	
Metro dummy	440.33	988.7+	1720.2	88.53
	(0.96)	(1.77)	(1.64)	(0.63)
County employment x metro	0.1157	-0.0554	-0.1747	-0.0035
	(1.16)	(-0.47)	(-1.34)	(-0.11)
Relative wage x metro	-16068.4**	-14441.1*	-8733.3	2590.8
	(-2.97)	(-2.29)	(-0.660)	(1.53)
Housing cost x metro	-6233.17**	-7302.2**	-3941.9	--
	(-2.92)	(-2.77)	(-0.82)	--
Constant	23.10	315.1	-93.7	-23.89
	(0.080)	(0.95)	(-0.18)	(-0.27)
R-square	0.9774	0.8952	0.904	0.8361
Observations	87	87	87	87

Estimated in first differences by three-stage least squares. t-statistics in parentheses. Significance levels are denoted by **, * and + for 0.01, 0.05, and 0.10 levels respectively. See appendix table for full definitions of variables.

Table 4: Contribution of Commuting, Labor Force and Unemployment to Employment Changes in Minnesota Counties

Proportion of employment growth due to	Nonmetro counties	Metro counties
Increased in-commuting	48.4%	60.0%
Decreased out-commuting	-9.4%	-3.9%
Increased labor force size	56.5%	39.0%
Decreased unemployment	4.5%	4.9%
Total	100%	100%

Table 5: Comparison of Results Across States

	Nonmetro counties		Metro counties	
Proportion of employment growth due to	Minnesota	North Carolina	Minnesota	North Carolina
Increased in-commuting	48.4%	32.4%	60.0%	51.5%
Decreased out-commuting	-9.4%	37.3%	-3.9%	28.4%
Increased labor force size	56.5%	1.7%	39.0%	1.7%
Decreased unemployment	4.5%	28.7%	4.9%	18.5%
Total	100%	100%	100%	100%

Source for North Carolina results: Renkow 2003b.

Table 6: Contribution of Commuting, Labor Force and Unemployment to Employment Changes in Minnesota with separate Twin Cities metro category

Proportion of employment growth due to	Nonmetro counties	Metro Not Twin Cities	Metro Twin Cities counties
Increased in-commuting	56.5%	60.9%	69.0%
Decreased out-commuting	-17.3%	2.7%	-6.7%
Increased labor force size	54.9%	35.5%	31.8%
Decreased unemployment	5.9%	0.9%	5.9%
Total	100%	100%	100%
Observations (N)	59	21	7

Appendix Table: Data Definitions and Sources

Variable	Definition	Source
County employment	Number of wage and salary jobs in county	Bureau of Economic Analysis REIS
County labor force	County residents working or looking for work	Minnesota Department of Employment and Economic Development, Workforce Center data
Out-commuting	Number of people residing in the county who work in another county	Journey-to-Work data, U.S. Census
In-commuting	Number of people who work in this county and live in another county	Journey-to-Work data, U.S. Census
County unemployment	Labor force minus employment, based on place of residence	Minnesota Department of Employment and Economic Development, Workforce Center data
Wage	Annual average earnings per job	Bureau of Economic Analysis REIS
Relative wage	County average earnings divided by average earnings per job in the commuting zone	Calculated
Housing cost	Median housing cost	U.S. Census
Relative housing cost	County median housing cost divided by commuting zone average (weighted by number of housing units	Calculated
Metropolitan	Counties are identified as metropolitan if they are located in a metropolitan commuting zone	Tolbert and Sizer (1996)
Twin Cities metro	Seven counties are included in the core Twin Cities metro area: Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington	

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