

State-level employment, accessibility and rurality

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Abstract

Employment and economic growth in rural areas as a policy issue has been recently highlighted by the federal government. In August 2011, the White House released a report entitled "Jobs and Economic Security for Rural America". While the document listed various programs and policies that have reportedly benefited rural America, it also stated that rural communities are still facing many challenges. For example, many rural communities have lower incomes and higher poverty rates than more urban areas. One possible reason for rural communities being at a disadvantage compared to urban areas involves transportation, especially in terms of journey to work. Thus, one can ask how employment rates vary with accessibility, as measured by journey to work times, as well as location (rural versus urban). Using 2007 state level data, OLS analysis is used to examine the relationship between employment rates and journey to work times and rurality. The analysis confirms that employment rates decrease with increased journey to work times. However, measures of rurality were only marginally significant and the negative coefficient on each measure indicates that employment rates decrease with greater urbanization. Improving accessibility between (very) rural and larger areas might improve employment opportunities. Although weighing the benefits of such (reduced unemployment) against the costs of providing better highways or public transit might lead to a different conclusion.

1. Introduction

In August 2011, the White House Rural Council (WHRC) released a report entitled *Jobs and Economic Security for Rural America*. While the document listed various programs and policies that have reportedly benefited rural America, it also stated that: "...[R]ural America still faces significant challenges. Many rural communities have lower incomes, higher poverty rates, worse health outcomes, and lower educational attainment than urban and suburban areas" (WHRC, 2011: 4).

One possible reason for rural communities being at a disadvantage compared to urban areas involves transportation, especially in terms of journey to work. Based on data from 2000, Partridge and Rickman (2006) report that nearly fourteen percent of rural commuters had journey to work commute times of 45 to 90 minutes. They also find that a lack of public transportation (e.g. buses, light rail) increases reliance on the automobile. In a study of employment of single mothers, Baum (2009) concludes that car ownership increases the likelihood of employment in both urban and rural areas. Shelton et al (2002), in a survey of rural employers, determine that transportation issues ranked second on a list of problems in hiring "welfare-to-work" employees, behind lack of "soft skills".

Recently, Partridge, Ali, and Olfert (2010) looked at Canadian commuting patterns and report that one type of rural area that has grown in North America is rural communities that are bedroom communities to larger urban ones. This in turn might mean that local (rural community) population growth becomes "decoupled" from local employment growth. Goetz et

al (2010) examine regional economic growth in the context of commuting networks. They note that improvements in “connectivity” can increase interaction between rural areas, not just between rural and urban areas, citing increased off-farm employment by farm families as evidence of such. On the other hand, LeSage and Pace (2008) determine that population flows were negatively related to the percent of employment in farming.

Thus one can ask how employment rates vary with accessibility, as measured by journey to work times, as well as with location (rural versus urban). Since much transportation policy is set at the state level, examining state level data makes sense from a policy-determining perspective. Using 2007 state level data, OLS analysis is used to study the relationship between employment rates and journey to work times and rurality. The analysis confirms that employment rates decrease with increased journey to work times. However, unexpectedly, employment rates are shown to decrease with greater urbanization.

2. Theory and Model

Mono centric urban models can be a place to begin modeling rural-urban interactions, assuming that all employment is found in the region’s central business district (these models are reviewed in Richardson (1977)). Workers are assumed to trade off commuting time for housing. An example of a “newer” version of these models is found in Glenn, Thorsen, and Uboe (2004). Partridge, Ali, and Olfert (2010) essentially extend these ideas, incorporating concepts from Central Place Theory (CPT) to examine a worker’s residence relative to both the next largest urban area as well as the “largest” city in the region. CPT is covered thoroughly by Stimson, Stough, and Roberts (2006). Following on these arguments, one could specify the following function:

$$(1) \quad EMP/POP = f(JTW, HINCOME, EDBS07, TAXRATE, RURAL)$$

In the model described in Equation (1), *EMP* is total employment in a state in 2007 (in thousands of workers), *POP* is the size of a state’s population in 2007 (in thousands of workers), *JTW* is average travel time in the journey to work in a state (in minutes), *HINCOME* is average household income in a state in 2007 (in dollars), *EDBS07* is the percent of adult population with a bachelor’s degree in 2007, *TAXRATE* is the average tax rate in a state in 2007, and *RURAL* is a measure of “rurality” of a state. The dependent variable, *EMP/POP*, reflects the employment-to-population ratio (employment rate) in a state in 2007.

Two measures of rurality (*RURAL*) are used in the analysis. First, is *METMIC*, which is the percentage of a state’s population living in metropolitan and “micropolitan” areas. Second is *POPDEN*, which is the state’s population density. Since the two rurality measures are highly correlated, two sets of regressions are estimated. This gives the following two models:

$$(1a) \quad EMP/POP = f(JTW, HINCOME, EDBS07, TAXRATE, METMIC)$$

$$(1b) \quad EMP/POP = f(JTW, HINCOME, EDBS07, TAXRATE, POPDEN)$$

It is expected that the employment-to-population ratio would increase as average household income (*HINCOME*) rises. This is assuming that as the average individual worker maximizes her utility, the substitution effect dominates the income effect, leading to an upward sloping supply curve of labor. As commuting times rise, however, so should the cost of commuting, reducing the desirability of employment. Thus, *JTW*’s coefficient is expected to be negative. Finally, as a state becomes more “rural,” lack of transportation alternatives (as discussed above) may reduce employment opportunities for job seekers.

The first measure of rurality, *METMIC*, is the percentage of a state’s population living in metropolitan and “micropolitan” areas, so the difference between *METMIC* and 100 percent represents people living in “very” rural areas. The second measure, *POPDEN*, is persons per

square mile. Presumably, states with lower densities will be less urban than other states. Since increases in both measures imply greater urbanization, one would expect the *RURAL* coefficient to be positive, so long as *ex ante* employment rises with urbanization.

3. Data

JTW data are found in the U.S. Bureau of the Census (www.census.gov), Table GCT0801. State population (*POP*) and population density (*POPDEN*) are also from the Census web site, Table GCT-T1. *METMIC* is from the *Statistical Abstract of the United States: 2009*, Table 23. *EMP* is from Table 573 in the 2009 *Abstract*. *HINCOME* is from the Census web site, "2007 American Community Survey One Year Estimates." *TAXRATE* is calculated as state income tax divided by average personal income. State income tax is from the *Statistical Abstract of the United States: 2009*, Table 278. Summary statistics are given in Table 1.

All fifty states are included in the analysis. Data is from 2007, which was the last year before the onset of the "Great Recession," and therefore 2007 data should still reflect healthy labor markets. Data beyond 2007 would reflect atypical labor markets, and therefore would not provide reliable results.

Variable	Mean	Std. Deviation	Maximum	Minimum
EMP/POP	0.494589	0.031987	0.557994	0.424170
JTW (minutes)	23.11400	3.487822	31.20000	16.00000
HINCOME (\$)	61713.84	9657.343	82404.00	44769.00
EDBS07 (%)	26.740	4.687107807	37.9	17.3
TAXRATE (%)	5.7708	9.626734848	53.32	0
METMIC (%)	88.95800	9.965289	100.000	65.90000
POPDEN (persons/sq. mi.)	190.54	256.5182	1171.000	1.200000

Table 1: Summary Statistics

One complication with using state-level data is the implicit assumption that almost all employment and commuting occurs within individual states, that is, there are few or no cross-border journey to work flows. For some states, such as New Jersey with commuters travelling to Philadelphia and New York, this assumption is probably inaccurate.

4. Results

Equations (1a) and (1b) were estimated via ordinary least squares (OLS), controlling for heteroskedasticity. Table 2 reports estimation results using *METMIC* (Equation (1a)) to measure rurality, while Table 3 reports results using *POPDEN* (Equation (1b)).

Dep. Variable: EMP/POP			
Variable	Coefficient	Std. Error	p-level
Constant	0.503577	0.0218991	<0.00001***
JTW	-0.00588445	0.000863535	<0.00001***
HINCOME	1.55458e-06	5.64259e-07	0.00850***
EDBS07	0.00364925	0.000799276	0.00004***
TAXRATE	-0.256555	0.092242	0.00794***
METMIC	-0.000700747	0.000323093	0.03554**
F-statistic	65.02787***		

Note: Adjusted R-squared = 0.867. * = significant at ten percent; ** = significant at five percent; and *** = significant at one percent.

Table 2: OLS Estimation Results of Equation (1a)

Dep. Variable: EMP/POP			
Variable	Coefficient	Std. Error	p-level
Constant	0.437499	0.0240196	<0.00001***
JTW	-0.00553973	0.000790196	<0.00001***
HINCOME	1.69603e-06	4.94343e-07	0.00132***
EDBS07	0.00335849	0.00076574	0.00007***
TAXRATE	-0.234005	0.0656034	0.00089***
POPDEN	-2.12724e-05	1.06654e-05	0.05231*
F-statistic	70.916***		

Note: Adjusted R-squared = 0.877. *=significant at ten percent; **=significant at five percent; and ***=significant at one percent.

Table 3: OLS Estimation Results of Equation (1b)

The coefficients of *HINCOME*, *JTW*, *EDBS07*, and *TAXRATE* are significant in both estimations and with their expected signs. The regressions find positive relationships with employment rates for household income and education. Negative relationships with employment rates are found for journey to work distances and state income tax rates. However, both measures of rurality have unexpected signs and are only marginally significant. Each measure, *METMIC* and *POPDEN*, show a negative relationship with employment rates suggesting that employment rates decrease with increased urbanization. This may be an indirect confirmation of a result from Partridge, Rickman, and Li (2009), who found that new jobs in rural counties are usually filled by residents of the county where the new jobs are located. In the case of *METMIC*, which captures both large as well as smaller urban areas, the latter might include what might otherwise be perceived as rural ("small town") labor markets, creating a wash in the analysis. Workers living outside of *METMIC* areas are therefore living in "very" rural communities and their behavior might be reflective of Partridge, Rickman, and Li's (2009) results. Previous studies have found that exurban counties (including those found in *METMIC*) have higher income levels than other rural counties (see, for example, Jelavich (1995)).

The correlations between *HINCOME* and *POPDEN* (0.593452) and *HINCOME* and *METMIC* (0.444844) may corroborate the argument of Ciccone and Hall (1996) that urbanization and its resulting agglomeration lead to higher labor marginal productivities and with such, higher wages.

The coefficients of determination are not high, but the F-statistics are significant for all each regression. Multicollinearity does not appear to be a problem in these estimations, with the highest correlation being between *JTW* and *METMIC*, at 0.696.

5. Conclusions

As expected, at the state level, greater journey to work distances lead to lower employment rates, *ceteris paribus*. The analysis; however, shows that greater urbanization leads to lower employment rates. Improving accessibility between (very) rural and larger areas might improve employment opportunities, although weighing the benefits of such (reduced unemployment) against the costs of providing better highways or public transit might lead to a different conclusion.

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