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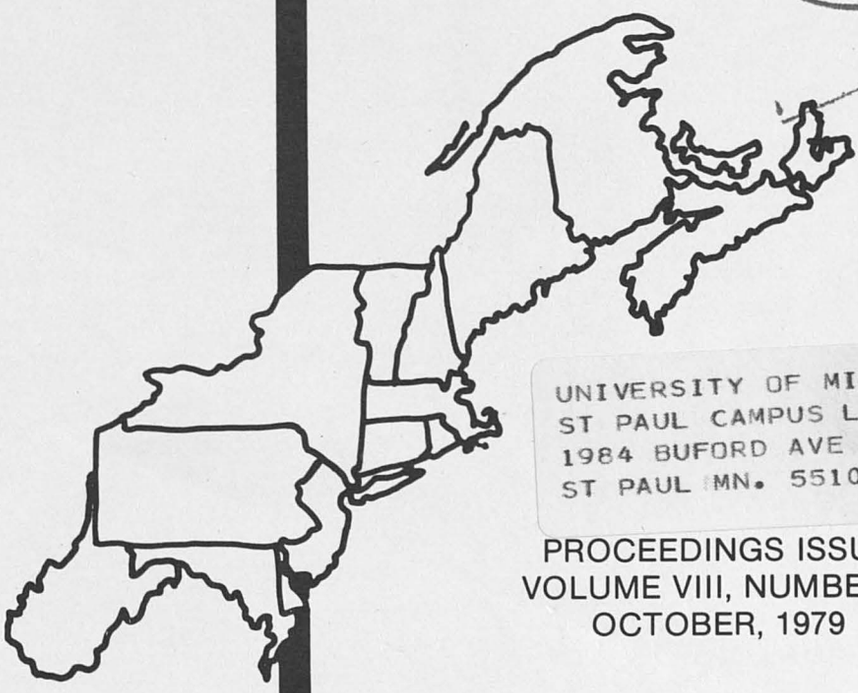

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LABOR FORCE CHARACTERISTICS OF A RURAL COUNTY'S COMMUTERS

Roger J. Beck

Research which is designed to evaluate the strength and mix of factors which tend to initiate and sustain economic growth must provide methods of measuring these factors. If one of these factors is taken to be the availability of labor as the Committee on Economic Development in the Northeast (1977) suggests, then methods of measuring the availability of labor need to be developed. Articles by Bonnen (1972) and Gardner (1975) have provided researchers with an incentive to do a better job of operationalizing and measuring the concept of labor availability.

In an article which provides a framework for measuring the concept of 'labor supply,' Jansma and Goode suggest there are three central issues involved with operationalizing the concept of labor availability; namely, (1) commuting behavior, (2) labor force participation,[1] and (3) jobs created. This study concentrates on the first of these issues, that of examining some social and economic characteristics of a rural county's commuters.

To define the relevant variables in a manner so as to capture the necessary characteristics when examining commuter behavior,[2] the following information is needed: (1) place of origin of work trip (residence); (2) place of work trip destination (place of employment), (3) relevant social and economic characteristics[3] about the individual initiating the work trip, and (4) standard industrial classification of employment[4] at the place the work trip is terminated.

The objective of this study, then, is to examine some of these characteristics of a rural county's commuters. That is, the question is, whether there are differences in the intracounty commuters and the intercounty commuters. If residences are assumed to be fixed, but if alternative places of employment are examined, what are the social and economic characteristics of the group who tend to terminate a work trip in one place versus those who terminate the work trip in an alternative place?

This information is potentially useful if commuter sheds are to be developed for various classes of commuters. For example, the factors that influence the distance a machine operator is willing to drive for employment

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may be quite different than for the executive of a communications firm. Using the county boundary as an arbitrary delineation[5] comparisons are made of the rural county commuters. That is, the commuters are divided into two groups - those who terminated their work trip within the county of residence and those who commuted outside the county of residence. By this method three of the four pieces of information described above are used in this study. The place of residence is taken to be the county. The place of employment is taken to be a place within the county of residence or outside the county boundaries. Some social and economic characteristics of the individuals initiating the work trip are included. The fourth piece of information, classification of employment, is not included.

Data

Census data provide information on gross flows of individuals from the county of residence to places of employment, but since census records are aggregated to form estimates by some geographically defined area, information about the characteristics of the individuals is not available. Since census of population data are place of residence data and data exist which are establishment data, some estimates can be made of the distribution of employment by residence and by place of employment, but information capable of addressing the question is still lacking. Edwards, et al. (1977) recognize this data gap, but suggest that it would be prohibitively expensive to seek to close this data gap because a user wanted to compare the characteristics of the household with the characteristics of the place of employment. This study, then, because such data were available for a single county chose to analyze these very characteristics.

Two pilot studies have been undertaken which provide information on the commuting behavior of a rural labor force. The first study, described by Fink (1976) used school district data to measure commuter patterns at the minor civil division level. A second study used data obtained from a mail questionnaire[6] in order to attach social and economic characteristics to the commuters.

Analysis

The type of analysis used was to cross-classify the primary data according to the place of work trip termination (within or outside county of residence) and with respect to classifications of the variables of age, level of education, level of family income, employment status, and occupation, respectively. The chi-square statistic was used to test whether the classified variables were statistically independent with respect to place of work trip termination.

Age.

The question is whether there is a difference in location of employment among these age groups? Because the value of Chi-square at the .05

level of significance exceeds the Chi-square for these data, one does not reject the null hypothesis of independence between age and whether the work trip terminates within or outside the county of residence (Table 1).

Table 1

Distribution of Work Trip Terminations by Age and Whether Trips Terminate Within or Outside County of Residence

Age Classification	Work Trip Terminations By County of Residence					
	Within		Outside		Total Number of Work Trips[a]	
	No.	Pct.	No.	Pct.	No.	Pct.
18 - 24 years	66	69.5	29	30.5	95	7.3
25 - 45 years	491	72.7	184	27.3	675	51.8
46 - 65 years	378	76.5	116	23.5	494	37.9
over 65 years	33	84.6	6	15.4	39	3.0
All Age Levels	968	74.3	335	25.7	1303	100.0
Chi-square = 5.46	d.f. = 3					

a/ There were 26 missing observations because age information was not given.

Thus, even though one may have hypothesized that age would have an effect on the location of employment (the older members of the labor force more willing to remain within the county of residence for employment), from these data one concludes that age does not affect where the work trip terminated. The arbitrary nature of the county boundary must be kept in mind, however, since the definition of the work trip termination variable cannot be considered as a proxy for distance.

Education.

It is also useful to determine if the level of education affects the location of the work trip termination. The null hypothesis to be tested is whether the level of education of an individual is independent of the place of termination of his work trip. The alternative hypothesis is that there is a difference other than that which can be attributed to chance alone between educational attainment and the probability that an individual

terminates the work trip within the county of residence. Since the value obtained for Chi-square, from these data, exceeds the table value at the .01 level of significance, the null hypothesis is rejected (Table 2). This means there is a statistically significant difference in this set of data between those individuals who tend to terminate their work trips within their county of residence versus those who do not and the level of education.

That is, the test indicates that education and destination of work trip are not independent; but this test does not provide the information to conclude that those with a college education have a higher propensity to terminate a work trip outside the county than those who are not.

Table 2

Distribution of Work Trip Terminations by Level of Education and Whether Trips Terminate Within or Outside County of Residence

Level of Education	Work Trip Terminations by County of Residence					
	Within		Outside		Total[a/]	
	No.	Pct.	No.	Pct.	No.	Pct.
Not High School Graduate	191	81.6	43	18.4	234	17.8
High School Graduate	374	77.9	106	22.1	480	36.6
Some College	214	66.5	108	33.5	322	24.6
College Graduate	196	71.3	79	28.7	275	21.0
All Education Levels	975	74.4	336	25.6	1311	100.0
Chi-square = 21.6	d.f. = 3					

a/ There were 18 missing observations for education data.

Formulating a test of differences between proportions,[7] from Table 2, the proportion of those with college degrees going outside the county for employment is .29 while for those with a high school education the proportion is .22. This difference of .07 is statistically significant at the .05 level of probability, permitting one to conclude that college graduates have a greater propensity to go outside the county for employment than those with a high school education.

This finding is not contrary to what one would expect. Those with

higher levels of education are expected to have more opportunities for employment and those increased opportunities are probably to be found over a greater geographical "domain." One cannot rule out, however, that the location of the job opportunity may be fixed for some individuals and the rural county becomes the preferred residence location.

Income.

The income data were constructed from responses to the questionnaire requesting information on family income from all sources during the prior year (the survey was conducted in 1975).

The null hypothesis to be tested is if income levels and whether the individual terminated his work trip within the county of residence or went outside the county for employment are independent. The alternative hypothesis is that income levels and place of work trip terminations are related in some way. Since Chi-square is greater than the value of the Chi-square statistic at the .01 level of significance one rejects the null hypothesis of no difference between income level and whether the work trip terminated within or outside the county of residence (Table 3).

Table 3

Distribution of Work Trip Terminations by Lvel of Family Income

Level of Family Income	Work Trip Terminations by County of Residence					
	Within		Outside		Total[a/]	
	No.	Pct.	No.	Pct.	No.	Pct.
Less than $5,000	76	83.5	15	16.5	91	7.3
$5,000 - $10,000	319	80.4	78	19.6	397	31.7
$10,001 - $15,000	253	70.7	105	29.3	358	28.6
$15,001 - $20,000	147	69.3	65	30.7	212	16.9
$20,001 - $25,000	54	63.5	31	36.5	85	6.8
Greater than $25,000	79	71.8	31	28.2	110	8.8
All Levels	928	74.1	325	25.9	1253	100.0
Chi-square - 22.2	d.f. = 5					

a/ There were 76 missing observations for income data.

Upon examining Table 3, as one moves to classes of higher incomes, the probability of going outside the county of residence for employment increases until the second greatest income class, income between 20 and 25 thousand is reached.[8] The greatest percentage change in work trip destination occurs when going from the 5-10 thousand class to the next highest income class. These data suggest that these individuals in the highest income class, $25,000 or greater, are more likely to remain within the county of residence than are those individuals in income classes from $10,000 to $25,000. Since the income data is income from all sources, one cannot assume a correlation between level of income and source of income, but a reasonable hypothesis is that those in the highest income category are receiving a substantial share of the income from property and capital ownership.

Only 7.3 percent of the respondents revealed their family income level as being less that $5,000, but the same respondent group provided information about the place of their work trip destination. Of that group, only 16.5 percent indicated they were traveling outside the county for employment compared with 25.9 percent for all income levels. The percentage of individuals in the lowest income category going outside the county for employment was less than half of the percentage going outside for individuals in the income category $20,001 to $25,000.

These results do not contradict those found when the variables of level of education and place of work trip termination were examined. These data suggest that those people with access to employment outside the county which results in higher levels of family income are taking advantage of those opportunities.

Employment Status.

For purposes of this study if the respondent to the questionnaire indicated he had worked 27 weeks or more the prior year, that individual was considered to be a full participant in the labor force. From Table 4, it is noted that 7.1 percent of the cases fell in the not fully employed category. Of that 7.1 percent, 90 cases, 41.1 percent traveled outside the county for employment. The test of differences between proportions on the fully employed going outside the county is a statistically significant difference at the .01 level. This means that those who are not full participants have a greater propensity to travel outside the county of residence for their employment opportunity than the full participants.

At first glance this result appears to contradict that found in the previous tests that showed that the better educated earning higher incomes had a greater propensity to go outside the county for employment. A problem of these tests is that they are not interactive, testing for the effect on one characteristic while holding another constant. Even so, this result suggests that the unemployed and underemployed (using the weeks worked definition) are those who are driving to their places of employment outside the county. Thus, a measure of intercounty commuting may not be an adequate measure of the labor available at those places. Conversely, this result suggests that measures of intracounty commuting is more likely to account for the fully participating members of the labor force.

Table 4

Distribution of Work Trips by Employment Status and Whether the Work Trip Terminated Within or Outside the County of Residence

Employment Status[a/]	Work Trip Terminations by County of Residence					
	Within		Outside		Total Number Work Trips[b/]	
	No.	Pct.	No.	Pct.	No.	Pct.
Fully employed	889	75.1	295	24.9	1184	92.9
Not fully employed	53	58.9	37	41.1	90	7.1
Both	942	73.9	332	26.1	1274	100.0
Chi-square = 10.56	d.f. = 1					

a/ Employment status is defined so that if the individual indicated that in prior year he was employed 27 weeks or more, that individual was placed in the fully employed category. Twenty seven or less weeks worked were placed in the not fully employed category.

b/ Missing observations were 55 because question was not answered in "weeks worked."

Occupation.

Overall, 71.8 percent of those giving a work trip destination indicated they were employed with the county (Table 5). Those occupations with greater than average percentage of work trips terminating outside the county were the semi-skilled blue collar (machine and transport operatives) and the professional, technical, managers and administrators group.

However, the value of the Chi-square statistic is such (less than the value at the .05 level of significance) that it is not inferred that occupation affects the location of work trip terminations. The actual distribution

Table 5

Distribution of Work Trip Terminations
by Occupation

Occupation	Work Trip Terminations by County of Residence					
	Within		Outside		Total[a/]	
	No.	Pct.	No.	Pct.	No.	Pct.
Skilled blue collar[b/]	234	74.8	79	25.2	313	25.9
Semi-skilled blue collar[c/]	109	66.5	55	33.5	164	13.6
Skilled white collar[d/]	276	68.3	128	31.7	404	33.4
Semi-skilled white collar[e/]	113	76.9	34	23.1	147	12.2
Other occupations[f/]	135	75.0	34	23.1	147	12.2
Total, All Occupations	867	71.8	341	28.2	1208	100.0
Chi-square = 8.85	d.f. = 4					

a/ When farmers were deleted, 121 observations were not coded by occupation.

b/ Craftsmen and foremen

c/ Machine and transport operatives

d/ Professional, technical, managers and administrators

e/ Sales workers and clerical workers

f/ General service workers, and general laborers

is not significantly different from the expected distribution. Thus, from these data, in terms of occupation, the intracounty commuters are similar to those commuting intercounty. The test between proportions was used to determine whether the skilled blue collar group had a greater propensity to travel outside than other occupational groups. The test of the difference between the proportion of semi-skilled blue collar workers and the semi-skilled white collar workers, .34 minus .23, is statistically significant at the .05 level of probability. This suggests that the machine and transport operatives have a greater tendency to travel outside the county for employment than sales and clerical workers. When testing for the difference in the proportions going outside between skilled blue collar workers and skilled white collar, the difference of .07 is significant at the .05 level of probability. Thus, the professional, technical, managers, and administrators have a greater tendency to travel outside the county for employment than the skilled blue collar workers.

Thus, the test of differences between proportions permit statements to the effect that some occupations have a greater tendency to travel outside the county than other occupations, even though the Chi-square statistic implies a similar distribution of intracounty workers to intercounty workers.

Summary

The Chi-square statistic and the test of differences between proportions are used for tests of independence between location of work trip terminations and the variables of age, education, family income, employment status and occupation. These tests suggest there are differences in location of employment among the educational groups, the income groups, and the employment status groups. The Chi-square statistic suggested that there were not differences in place of work trip termination among the age and occupational groups. However, some occupations (skilled white-collar and semi-skilled blue collar) were found to have a greater propensity to travel outside the county for employment than other occupations.

Based on this data, and the interpretations given, one concludes that the intracounty commuting labor force is a somewhat different mix than the intercounty commuting force. In particular, in terms of fully participating in the labor force, the intracounty commuters are more inclined to meet that definition than those commuting outside the county.

Thus, when operationalizing and measuring labor availability at alternative employment sites, some differentiation of the commuters by social and economic characteristics would be consistent with findings of this study.

FOOTNOTES

[1]The percentage of the employable population that chooses to be in the labor force is a general textbook definition. The employable population and being in the labor force can be defined in alternative ways. The

definition used in this analysis is that the non-institutionalized population between the ages of 18 and 65 are defined as being the employable population and those who worked at least 27 weeks the prior year as having been in the labor force.

[2]Fink (1976) has completed a study which provides insights into the factors underlying the trip making behavior of individuals in rural areas. His analysis, however, did not address the issue of the social and economic characteristics of individuals initiating a work trip, or the classification of employment at the place the work trip terminated.

[3]Among others, these are age, sex, level of formal education, occupation, income level, and employment record.

[4]That is, whether the individual is employed for example, in manufacturing, wholesale or retail trade, finance or other such classifications of employment.

[5]Jansma (1976) has argued that if the county is used as the most appropriate size of unit because of data availability, then the results are a function of the data rather than an analysis of a problem.

[6]A description of the methodology employed is found in Beck's unpublished thesis. The "cleaned" data used in this analysis were those observations for which information existed for both place of residence and place of work. The number of useable observations is 1329. It should be noted that when the occupation given was "farming," if a second occupation was supplied that occupation was used in the analysis.

[7]This test is described in Freund (1967). Essentially, it involves large-sample test of the null hypothesis $p_1 = p_2$, on the statistic,

$$\frac{\frac{X_1}{n_1} - \frac{X_2}{n_2}}{p(1-p)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

with X_1 = number going outside county in category 1.

X_2 = number going outside county in category 2.

n_1 = total number in category 1.

n_2 = total number in category 2.

$$p = \frac{X_1 + X_2}{n_1 + n_2}$$

[8]As cautioned above, the Chi-square statistic is one of independence. But, when the conditional probability test is formulated, one notes from Table 3 that the probability of going outside the county for someone in the 20-25 thousand category is .37, while for someone in the 5-10 thousand category, the probability, is .20. The difference between these proportions is statistically significant at the .01 level of probability. This test allows one to conclude that those individuals in the 20 to 25 thousand income bracket have a greater propensity to travel outside the county for employment than those in the lower income bracket.

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