DEFINING AND MEASURING RURALITY

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INTRODUCTION

"Rural Development" is a phrase much in the news and literature. Both the terms rural and development are used somewhat ambiguously, though the niceties of having quantitative measures for each term are readily recognized by researchers. Although what constitutes development and how it should be measured is a very important question, the focus of this paper is on the term rural.

Importance of the Problem

Expressions of concern for rural Americans center around two generalized observations. The first is that rural persons as a group are not as well off, economically, as persons in urban areas. The second is that as people have left rural areas to become "better off", the urban areas to which they migrated have become "worse off". Whether persons who move from rural to urban areas are better or worse off for having moved, and whether persons who remain in rural areas lose or gain from the exodus, has not been well established. It seems implied, given the existing situation, that it may be beneficial to both urban and rural areas to slow or even reverse the rural to urban flow of people.

Senator Talmadge [11], in his presentation to the Senate of the Conference Report on the Rural Development Act of 1972 said;

> "...with respect to no other provision was the range of difference between the Senate bill and the House bill any greater than in the upper limit placed upon the definitions of rural areas specifying where the programs provided by the bill will be effective."

Senator Miller [11] of Iowa, ranking minority member of the Senate Committee on Agriculture and Forestry, on the same occasion stated;

> "One of the main areas of difficulty was the definition of a rural area, and Senators often do have differences of opinion about what constitutes a rural area."

The need for a definitive measure of rurality (or its converse, urbanity) seems clear. It is difficult to develop policies or prescribe programs which will effectively stem the rural to urban migration unless the two types of areas can be appropriately differentiated. Once the rural-urban character of an area is quantified, a basis for description, analysis, and evaluation is established.

Purpose and Procedure

The purpose of this paper is to report the results of research conducted to evaluate existing definitions of ruralness, and to develop a new measure of rurality that is better suited to current needs. The probable criteria that distinguished rural from urban are first identified, and then objectively measurable variables which reflect such criteria are examined. The variables that are selected are processed through the techniques of factor analysis to yield a rural-urban index of continuous values. To provide empirical content to the process, data for Georgia counties were used wherein each of the 159 counties served as an observational unit.

Existing Definitions of Rural

The English word rural comes from the Latin word RURALIS, meaning of or relating to the country or to open land, as distinguished from a city

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or town. Urban comes from the Latin word URBANIS, meaning of or belonging to a city. Country is redundantly defined as a rural region or regions, as opposed to a city or town. A town is any large, closely populated place or a cluster of houses regarded as a distinct place. A city, in turn, is any important town.

When the circularity of such definitions is removed, there remain the notions of open land associated with rural, and the clustering of people and houses associated with urban. These same notions are probably the principal elements in most subjective definitions of rural and urban today, though they may differ over both time and space. What is "rural" to the urban ghetto dweller may be "urban" to a Utah sheepherder. What a Georgia farm boy once thought "big city" may now be "small town" if he went from a South Georgia farm to the University of Georgia at Athens, and now lives in Atlanta.

Probably the most commonly used definition of rural is that of the Bureau of the Census wherein every place that is not defined to be urban is considered rural. In the Census, the urban population generally consists of all persons living in urbanized areas and in places of 2,500 or more outside urbanized areas. The Farmers Home Administration defines rural areas to include open country and those places with a population of not more than 5,500 which are rural in character and not closely associated with urban areas. The Rural Development Act of 1972 generally defines rural areas as open countryside, villages, towns and small cities up to 10,000 in population. Exceptions exist for certain provisions of the Act, the most important relating to industrial and business loans and grants where the upper limit on population is 50,000.

Several recent reports have discussed the problem of defining rurality and suggested or presented schemes for classifying areas into rural and urban categories. Bluestone [2] used a two-dimensional concept incorporating percent urban (census definition) and population density to create six degrees of urban orientation for all counties of the United States. Edwards, Coltrane, and Daberkow [7] applied Bluestone's scheme to multi-county areas but ended up with only five groupings as no fully rural multi-county areas were identified. They also developed an agglomeration index which was construed to be a measure of the urbanness of each multi-county area. Twelve variables were used in the construction of the index. These were a mixture of both the character and the effect of rurality, and included several variables that are widely accepted as measures of economic well-being. In a *Print* by the Senate Committee on Agriculture and Forestry [10], all counties in the United States were classified as urban employment centers or as "other". Urban counties were those with 25,000 or more urban population or 10,000 or more nonfarm wage and salary jobs as of 1970. The "other" counties were called commuter if ten percent or more of all workers commuted to jobs located in urban counties in 1960, otherwise they were labeled noncommuter. These "other" counties were referred to as rural counties, the ones in the noncommuter category presumably being the most rural

Shortcomings of Existing Definitions

A principal shortcoming of most rural-urban definitions is that they result in a very limited number of classifications that obscure too much of the variation in rurality that actually exists among areas. They are in most cases highly arbitrary and confound the character of rural areas with the effects of rurality. For example, one might say that an area has low incomes because it is rural, but it is not appropriate to say that an area is rural because it has low incomes. Another major shortcoming of most existing rural-urban definitions is their obvious naivete. What differentiates rural from urban areas in the minds of most people is more complex than one- or two-dimensional approaches can encompass.

THE RURAL-URBAN INDEX

Components of the Index

Nine factors were used in the construction of the index. Eight of these were from the 1970 population census and the other was developed from the 1940 and 1970 censuses [13]. These factors are shown as the row headings of Table 1, and were selected to reflect "ruralness" at one end of their range, and "urbanness" at the other end.

Total population density, percent of persons living in rural areas, and percent living on farms are factors whose relationships to the rural-urban continuum are clear. The rate of change in population during the 1940-70 period is included because the tendency to lose population is a reflection of rurality, and growth in population is a characteristic of urbanity. Percentages of persons employed in four occupational and industry groups are included in the index because they effectively differentiate between rural and urban areas, at least at the extremes of their ranges. It is characteristic of rural areas to have proportionately fewer people employed in the medical and dental professions, in the service fields, and in the entertainment and recreation fields than

are employed in urban areas. Percent of persons employed in agriculture, forestry, fisheries, and mining is included as a variable because they are generally thought of as "open space" industries.

Methodology

Component analysis, a member of the family of techniques included under factor analysis, was used in the construction of the rural-urban index. The computational procedure assigns weights to each factor such that the variance of the resulting index is maximized. The purpose of this approach is to make the index as discriminating as possible with respect to the characteristic it purports to measure, given the combination of variables selected for the construction of the index.

Harman's book [9] contains a comprehensive treatment of the techniques of factor analysis. A succinct description of the method actually used in the present study was written by F. V. Waugh and appeared as an appendix to Zimmer and Manny [14]. Hagood and Price [8] and Tintner [12] also described the methodology and application of factor analysis. Other studies which focus on the application of factor analysis and related techniques to matters of rural or regional growth, development, and economic well-being are found in [1,3,4,5, and 6].

Results

The initial output of the computer program yielded the weights shown in the second column of Table 1. This first set of weights is a measure of the importance of each factor relative to population density, the most important factor in the nine factor set. The least important factor is the percent of persons employed in service work as it is only 59.52 percent as important as population density.

The third column of Table 1 contains the coefficients of simple correlation between each of the nine factors and the rural-urban index itself. These are simple scalars of the weights in the second column, and show the relationship of each factor to the index. Since the correlation coefficients are scalars of the first set of weights, the highest coefficient is again associated with population density, and the lowest with percent of persons employed in service work (except private household).

The weights in the last column of Table 1, when applied to the raw values for the nine factors for each county in Georgia, yielded an index which ranged from -272 for the most rural to 630 for the most urban county. The raw data weights were scaled so that the index would equal 100 at the population-weighted mean values of the factors for the state as a whole. Each raw data weight indicates how the value of the index varies as the level of each factor varies. For example, for each one point increase in the average annual percent change in population over the period 1940 to 1970, the index increased by 7.396 points. Similarly, for each one point increase in percent of persons living on farms the index decreased by 2.753 points and (vice-versa).

The median value of the index was -32, and the mid-point of the range was 179. Thus the distribution of counties was heavily skewed to the lower values of the index, as shown in Table 2. The first five intervals of the index range contained only 14 counties, while the bottom half of the range encompassed the remaining 145 counties.

DISCUSSION

Fulton and DeKalb counties, at the center of the Atlanta SMSA, had the highest index values. Of the twelve other counties with index values in the upper half of the range (150 or more), nine are also in a 1970 Census SMSA. These counties are certainly highly urbanized. On the other hand, the eleven counties in the last two groups (index values of -150 or less) are clearly rural by almost any standard. It is in the -149 to +149 range that a great deal of arbitrariness in any definition of rural would be encountered. Thus, the advantage of a continuous index is clear. The range of values can be partitioned into any number of sets simply by specifying the intervals felt to be appropriate. It would be premature to make any such suggestions here, and the intervals given in Table 2 are for illustrative purposes only.

The rural-urban index does a good job of discriminating between the most urban and the most rural counties of Georgia. Most Georgia counties are basically rural in character. Perhaps there is a combination of factors that would make the preponderance of counties look urban, but it is doubtful that these would correspond to commonly held notions of what differentiates rural from urban areas. Further work is contemplated wherein other indexes will be constructed based on these and other groups of factors. Proximity to urban centers and work commuting patterns immediately come to mind for later study. The nine used in this study may not be the best possible selection, either in terms of their qualitative reflections of rurality or their quantitative relationship to the index.

The range of the rural-urban index was based on a value of 100 at the mean values of the factors for the state as a whole. The index could be pegged at any other base value, or at some given value at either end, with every other observation scaled accordingly.

Table 1. FACTORS MEANS, WEIGHTS, AND CORRELATIONS BETWEEN EACH FACTOR AND THE RURAL-URBAN INDEX.

Factor	Factor means[a]	First set of weights adjusted[b]	Correlation of factors to the index	Raw data weights[c]
Population density (persons per square mile)	79.0	1.0000	.8043	0.145
Percent of persons living in rural areas	39.70	-.9657	-.7766	-1.005
Total population (1,000 persons)	28.87	.9229	.7421	0.391
Percent employment in agriculture, forestry, fisheries, and mining	4.77	-.8579	-.6899	-2.939
Percent of persons living on farms	5.50	-.8539	-.6867	-2.753
Average annual percent change in population, 1940-1970	1.60	.8504	.6840	7.396
Percent employment in medical and dental professions	1.81	.8274	.6655	29.280
Percent employment in entertainment and recreation services	0.58	.6446	.5185	41.982
Percent employment in service work (except private households)	9.52	.5952	.4787	6.012

[a]These are population-weighted means, developed by weighting each factor in each county by the population in the county.

[b]These are the initial program output weights, proportionately scaled to 1.0 at the largest value encountered (1.0835 for population density).

[c]These are the weights to be applied to the raw data in the units shown to yield the value of the rural-urban index for any county. When applied to the factor means an index value of 100 is obtained.

The weights could also have all been made to be positive, insuring that all values of the index would be positive. The principal advantage of such manipulations is to make it simpler to compare index values among counties.

The Rural Development Act of 1972 is now law, but funding, administrative interpretation, and local implementation of the Act remain to be fully accomplished. The more precisely rural areas are defined and identified, the more pointed our efforts to develop rural America will be. When those characteristics that are critical to rural well-being are related to a definitive measure of the level or degree of rurality, priorities can more effectively be drawn where time, talents, and funds are limited.

Table 2. **FREQUENCIES OF VALUES OF THE RURAL-URBAN INDEX FOR GEORGIA COUNTIES.**

Range of index values	Number of counties in each interval	Number of counties cumulative total	Percent of counties in each interval	Percent of counties cumulative total
> 549	2	2	1.26	1.26
450 to 549	0	2	0.00	1.26
350 to 449	4	6	2.52	3.78
250 to 349	5	11	3.14	6.92
150 to 249	3	14	1.89	8.81
50 to 149	24	38	15.10	23.91
-49 to 49	57	95	35.85	59.76
-149 to -50	53	148	33.33	93.09
-249 to -150	10	158	6.28	99.37
< -249	1	159	0.63	100.00
TOTALS	159	159	100.00	100.00

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