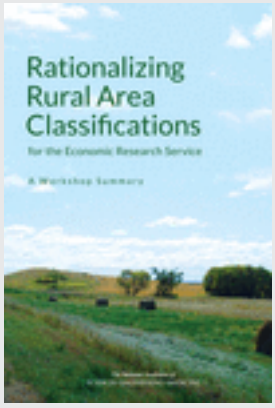

Rationalizing Rural Area Classifications for the Economic Research Service: A Workshop Summary

DETAILS

190 pages | 6 x 9 | PAPERBACK
ISBN 978-0-309-38056-0 | DOI: 10.17226/21843

AUTHORS

Gooloo S. Wunderlich, Rapporteur; Committee on National Statistics; Division of Behavioral and Social Sciences and Education; National Academies of Sciences, Engineering, and Medicine

Rationalizing Rural Area Classifications for the Economic Research Service: A Workshop Summary

Gooloo S. Wunderlich, *Rapporteur*

Committee on National Statistics

Division of Behavioral and Social Sciences and Education

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

THE NATIONAL ACADEMIES PRESS
Washington, DC
www.nap.edu

THE NATIONAL ACADEMIES PRESS 500 Fifth Street, NW Washington, DC 20001

This activity was supported by Award No. AG-32SB-C-14-0026 from the U.S. Department of Agriculture Economic Research Service. Support for the Committee on National Statistics is provided by a consortium of federal agencies through a grant from the National Science Foundation (award number SES-124012). Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of any organization or agency that provided support for the project.

International Standard Book Number-13: 978-0-309-38056-0
International Standard Book Number-10: 0-309-38056-1

Additional copies of this report are available for sale from the National Academies Press, 500 Fifth Street, NW, Keck 360, Washington, DC 20001; (800) 624-6242 or (202) 334-3313; http://www.nap.edu.

Printed in the United States of America

Suggested citation: National Academies of Sciences, Engineering, and Medicine. (2016). *Rationalizing Rural Area Classifications for the Economic Research Service: Workshop Summary.* G.S. Wunderlich, *Rapporteur*, Committee on National Statistics. Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

The National Academies of
SCIENCES • ENGINEERING • MEDICINE

The **National Academy of Sciences** was established in 1863 by an Act of Congress, signed by President Lincoln, as a private, nongovernmental institution to advise the nation on issues related to science and technology. Members are elected by their peers for outstanding contributions to research. Dr. Ralph J. Cicerone is president.

The **National Academy of Engineering** was established in 1964 under the charter of the National Academy of Sciences to bring the practices of engineering to advising the nation. Members are elected by their peers for extraordinary contributions to engineering. Dr. C. D. Mote, Jr., is president.

The **National Academy of Medicine** (formerly the Institute of Medicine) was established in 1970 under the charter of the National Academy of Sciences to advise the nation on medical and health issues. Members are elected by their peers for distinguished contributions to medicine and health. Dr. Victor J. Dzau is president.

The three Academies work together as the **National Academies of Sciences, Engineering, and Medicine** to provide independent, objective analysis and advice to the nation and conduct other activities to solve complex problems and inform public policy decisions. The Academies also encourage education and research, recognize outstanding contributions to knowledge, and increase public understanding in matters of science, engineering, and medicine.

Learn more about the **National Academies of Sciences, Engineering, and Medicine** at **www.national-academies.org**.

STEERING COMMITTEE FOR RATIONALIZING RURAL AREA CLASSIFICATIONS FOR THE ECONOMIC RESEARCH SERVICE: A WORKSHOP

DAVID L. BROWN (*Chair*), Department of Development Sociology, Cornell University
JAMES D. FITZSIMMONS, Population Division, U.S. Census Bureau
STEPHAN J. GOETZ, Division of Agricultural Economics, Sociology, and Education, Pennsylvania State University, and Northeast Regional Center for Rural Development
MARK D. PARTRIDGE, Division of Agricultural, Environmental and Development Economics, Ohio State University
DAVID ALLEN PLANE, School of Geography and Development, University of Arizona
BRIGITTE S. WALDORF, Department of Agricultural Economics, Purdue University

NANCY J. KIRKENDALL, *Project Director*
GOOLOO S. WUNDERLICH, *Senior Program Officer*
MARY ANN KASPER, *Senior Program Assistant*

COMMITTEE ON NATIONAL STATISTICS

Reviewers

This workshop report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the Report Review Committee of the National Academies of Sciences, Engineering, and Medicine. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the charge. The review comments and draft manuscript remain confidential to protect the integrity of the process.

We wish to thank the following individuals for their review of this workshop summary: Bo Beaulieu, Center for Regional Development and Extension Community Development Program, Purdue University; Jeff Hardcastle, Nevada State Demographer, Nevada Department of Taxation, Reno, NV; Keith Mueller, Department of Health Management and Policy, College of Public Health, University of Iowa; Michael R. Ratcliffe, Geography Division, U.S. Census Bureau; and Mildred Warner, City and Regional Planning, Cornell University.

Although the reviewers listed above provided many constructive comments and suggestions, they did not see the final draft of the workshop summary before its release. The review of this report was overseen by Alicia Carriquiry, Department of Statistics, Iowa State University. Appointed by the National Academies of Science, Engineering, and Medicine, she was responsible for making certain that an independent

examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the author and the institution.

Contents

Appendixes

1

Introduction[1]

The U.S. Department of Agriculture's Economic Research Service (USDA/ERS) maintains four highly related but distinct geographic classification systems to designate areas by the degree to which they are rural. Three were developed for research purposes, but have been adopted by some federal agencies (not USDA) for delineating areas eligible for rural programs. USDA programs use a variety of other definitions of rural eligibility not covered by the ERS codes.

The ERS rural-urban codes all derive from or add to metropolitan-nonmetropolitan county distinctions of the U.S. Office of Management and Budget (OMB) and the U.S. Census Bureau's definition of urban, including urbanized areas or urban clusters:

- The Rural-Urban Continuum Codes (RUCC—also known as the Beale Codes) are county-level codes originated by ERS in conjunction with the 1970 Census of Population. They classify nonmetropolitan counties by population size of urban area and adjacency to a metropolitan area.
- The Urban Influence Codes (UIC), first developed in the 1990s, are similar, but they also (a) distinguish between nonmetropolitan counties that are in micropolitan areas as designated by OMB

[1]Much of the information in this chapter is excerpted from the contract statement of task and from the presentation of Mary Bohman, administrator of the Economic Research Service, in the introductory session of the workshop.

and those that are outside such areas, or "non-core" (micropolitan areas contain core counties with at least one urban cluster of at least 10,000 and less than 50,000 persons and counties with extensive commuting to the core); and (b) further distinguish nonmetropolitan counties according to whether they are adjacent to a metropolitan area with a large or small population size.

- The Rural-Urban Commuting Area Codes (RUCA) apply metropolitan and adjacent-to-metropolitan concepts to census tracts. They were sponsored in part by the U.S. Department of Health and Human Services (DHHS), which wanted to identify places likely to have poor access to health services but found counties to be too large as units.
- The "Frontier and Remote" (FAR) zip code areas are delineated according to size of place and distance from larger urban places. This classification takes advantage of Geographic Information System (GIS) features that allow identification of distance in terms of road travel time.

As noted by Mary Bohman, ERS administrator, the original urban-rural code scheme was developed by ERS in the 1970s. Rural America today is very different from the rural America of 1970 described in the first rural classification report. At that time, migration to cities and poverty among the people left behind was a central concern. The more rural a residence, the more likely a person was to live in poverty, and this relationship held true regardless of age or race. Since the 1970s, the interstate highway system was completed and broadband was developed. Services have become more consolidated into larger centers. Some of the traditional rural industries—farming and mining—have prospered, and there has been rural amenity-based in-migration. Many major structural and economic changes have occurred during this period.

At the same time, rural and urban areas have become commingled. Because of this phenomenon, more people in rural-density habitats live within metropolitan area boundaries than in nonmetropolitan areas. The decline of the rural population in nonmetropolitan areas and the commingling with urban areas are clearly a challenge for rationalizing rural-urban classifications.

These factors have resulted in a quite different rural economy and society since 1970. For instance, poverty is no longer strongly associated with a more rural residence, but access to services remains a problem. There is now a tremendous richness in data for rural classification and analysis and in the ability to use the data through computing to answer questions. In 1970, due to data limitations, the Census Bureau defined urban outside of densely settled urbanized areas as any place

with a population of at least 2,500 and less than 50,000. ERS also based its rural-urban delineation on proximity to an urban area. Those limits were largely defined by the available data and technology.

Today, GIS methods are applied to delineate urban clusters in rural areas and rural clusters in urban areas. Data alone, however, cannot solve all the issues related to defining "rural." The economy, society, and nature of rural areas need to be taken into account. Understanding the nature of contemporary rural America and its integration into the broader economy is the foundation for considering what would be a meaningful classification.

To begin to address these issues, ERS requested the Committee on National Statistics (CNSTAT) at the National Academies of Sciences, Engineering, and Medicine to convene a public workshop to deliberate how rurality can best be conceptualized and measured in today's economy and society. The statement of task is as follows:

> An ad hoc (steering) committee will organize a public workshop on data, estimation, and policy issues for rationalizing the multiple classifications of rural areas currently in use by the Economic Research Service (ERS) of the U.S. Department of Agriculture. The workshop will provide background on the origins, rationales, uses, underlying data, and methods for the four highly related but distinct geographic classification systems currently maintained by ERS to designate areas by the degree to which they are rural. Workshop sessions will cover the criteria for a desirable classification going forward, including: consistency with OMB and Census Bureau definitions; utility in identifying socioeconomic/demographic variation as it is affected by size of place and degree of urban proximity; utility to stakeholders in delineating program eligibility; and such attributes as a reasonably small number of categories with analytic and "face" validity in terms of plausible breakpoints. Papers will be commissioned for discussion at the workshop on the properties and pros and cons of alternative classification schemes. A workshop session will also consider trade-offs given that no single classification system is likely to satisfy all requirements.

The main purpose of the workshop was to help ERS make decisions regarding the generation of a county rural-urban scale for public use, taking into consideration the changed social and economic environment.

WORKSHOP ORGANIZATION

In response to USDA's request, CNSTAT appointed a six-member steering committee to plan a public workshop to explore research on how rurality can best be conceptualized and measured in today's economy and

society. The steering committee, working by teleconference and email, planned the workshop to cover the questions of interest in the statement of task and a list of more detailed questions provided by ERS, included as Appendix A. The two-day workshop included nine sessions. The steering committee identified potential speakers for each topic based on members' knowledge of individuals who conduct state-of-the-art research or have unique expertise in that topic and selected a group of speakers with a range of disciplines and viewpoints.

The Workshop on Rationalizing Rural Area Classifications was held on April 16-17, 2015. The workshop began with a welcoming session chaired by David Brown, Cornell University and chair of the steering committee. This session included a welcome on behalf of the National Academies of Sciences, Engineering, and Medicine by Constance Citro, CNSTAT director, and an introduction to the topic of the workshop and ERS needs by Mary Bohman, ERS administrator. The remaining eight sessions are summarized in Chapters 2 through 9 of this report. Each session included time for open-audience discussion. To set the context and provide background information, a paper on the *Historical Development of ERS Rural-Urban Classification Systems* was prepared by John Cromartie, ERS, which appears in Appendix B and is presented in Chapter 2. The steering committee commissioned four papers to more carefully address topics to be covered during the workshop. These papers served as the basis of the authors' presentations: Waldorf and Kim (2015) is discussed in Chapter 3, Woods (2015) is discussed in Chapter 5, Murray (2015) is discussed in Chapter 7, and Goetz and Han (2015a) is discussed in Chapter 8.[2]

The workshop agenda and the list of participants appear in Appendix C. Biographical sketches of steering committee members appear in Appendix D.

STRUCTURE OF THIS REPORT

This report is a summary of the workshop presentations and the discussions flowing from those presentations. Each of the following eight chapters is dedicated to one of the workshop sessions (excluding the welcome session). Following the Introduction, Chapter 2 sets the context and provides brief descriptions of the historical development of rural area classification systems used by the Census Bureau, OMB, and ERS. Chapter 3 describes how rural area classification is done elsewhere in the United States, Europe, and other developed countries. Chapter 4 discusses changes in society and the economy that have contributed to the

[2]The commissioned papers are available at http://sites.nationalacademies.org/DBASSE/CNSTAT/DBASSE_160632 [October 2015].

need for reconsidering rural area classification systems. Chapter 5 presents different ways to conceptualize rural areas in metropolitan society. Chapter 6 discusses how the current rural area classification systems are used in research and in program design and administration. Chapter 7 assesses the impact of changes in social science data and methods on rural area classification. It also looks into the availability and quality of data from various sources. Chapter 8 focuses on evaluating the reliability and validity of rural area classifications. The final chapter summarizes closing remarks of members of the steering committee and the sponsor.

This report was prepared by a rapporteur as a factual summary of what transpired at the workshop. The steering committee's role was limited to planning and convening the workshop. The views contained in the report are those of the individual workshop participants and do not necessarily represent the views of nonparticipants, other workshop participants, the steering committee, or the Academies.

2

Official U.S. Rural Area Classification Systems

The purpose of the second session of the workshop, as summarized in this chapter, was to set the context and briefly describe the historical development of current rural classification systems developed by the U.S. Census Bureau, U.S. Office of Management and Budget (OMB), and Economic Research Service (ERS) of the U.S. Department of Agriculture (USDA). James Fitzsimmons (U.S. Census Bureau) described the Census Bureau and OMB classification systems. John Cromartie (ERS) described the four rural classification systems developed by the ERS. Stephan Goetz (Pennsylvania State University) moderated the session.

STATEMENT BY JAMES FITZSIMMONS

Fitzsimmons described two statistical area classifications that provide context for the ERS classifications that are the subject of this workshop: the Census Bureau's urban and rural classification and OMB's metropolitan and micropolitan statistical areas classification. These classifications have been part of the federal statistical system landscape for many decades, and both have often been parts of the same conversations as the ERS classifications.

The Census Bureau and OMB classifications yield several kinds of statistical entities. First, the urban and rural program provides two entities: urbanized areas and urban clusters. Currently, there are 486 urbanized areas in the United States and 3,087 urban clusters. Based on the 2010 decennial census, they accounted for 80.7 percent of the U.S. population

and about 3 percent of the land area of the country, with the remaining area population and land area classified as rural.

By comparison, the OMB classification currently features 381 metropolitan statistical areas and 536 micropolitan statistical areas.[1] These areas accounted for a larger share of the 2010 population than did the Census Bureau's urbanized areas and urban clusters—approaching 94 percent versus about 81 percent. The big difference is in the amount of land area accounted for: more than 47 percent for metropolitan and micropolitan statistical areas in the OMB systems, compared to 3 percent for urbanized areas and urban clusters.

Key Program Similarities and Differences

According to Fitzsimmons, a first point in common between the Census Bureau and OMB classifications is that the period leading up to the 1950 census and the period preceding the 2000 census were formative for both. Also, areas delineated for both classifications are based on Census Bureau data, and the Census Bureau tabulates and publishes data for urbanized areas, urban clusters, and rural areas, as well as for metropolitan and micropolitan statistical areas. In addition, the decennial calendar plays a key role in both programs by establishing their basic rhythm. The underlying criteria are reviewed in the years leading up to the decennial census. The new criteria are then published and used with data from that decennial census to provide new delineations. Other points in common are that the two classifications are maintained solely for statistical purposes, delineate specific statistical areas, and are reflected in the ERS classifications. Further, the Census Bureau's urban-rural classification provides the cores for the OMB's core-based metropolitan and micropolitan statistical areas. In other words, the urban-rural classification provides part of the foundation of metropolitan and micropolitan statistical areas.

There are also differences between the two programs, Fitzsimmons pointed out. Administrative responsibility for the programs has been based in two separate agencies: the Census Bureau and OMB. Also, the OMB metropolitan and micropolitan statistical areas program is a federal statistical standard, and the Census Bureau urban and rural program is not. The latter classification is widely used by the Census Bureau, but the metropolitan and micropolitan program also receives use across the federal statistical system. The two programs have fundamentally different conceptual foundations: urbanized areas and urban clusters are

[1]Additional types of statistical areas are delineated under the OMB classification, including combined statistical areas, metropolitan divisions, and New England city and town areas.

morphological, or footprint, classifications, essentially identifying where the densely settled population is. Metropolitan and micropolitan statistical areas are the products of a functional area classification. They rest on densely settled cores, but how far they extend derives from a functional measure, namely, journey to work or commuting. Finally, although the decennial calendar plays a key role in both classifications, the actual update schedules for the two are different.

Program Histories and Delineation Basics

The urban-rural classification program started at the Census Bureau in the late 19th century, Fitzsimmons explained. The first delineations required a minimum population of 8,000—and later 4,000—within an incorporated place. By the 1910 census, the minimum population needed to be urban was 2,500. From 1910 through 1940, the Census Bureau definition of "urban" was incorporated places of at least 2,500 population. Everywhere else was rural. The first delineation of urbanized areas came in preparation for the 1950 census. The year 2000 was also an important time for this program, as urban clusters made their first appearance in areas delineated with 2000 census data.

Urbanized areas and urban clusters, collectively known as "urban areas," are delineated using published criteria. Each decade, the criteria associated with the previous census are evaluated, and changes are made based in part on comments received. The Census Bureau published the "Urban Area Criteria for the 2010 Census" in 2011 and then applied those criteria with 2010 census data to produce updated urban area delineations.[2]

Urban areas, both urbanized areas and urban clusters, are densely settled. Using census tracts and census blocks as geographic components, urban areas extend as far as a minimum population density of 500 people per square mile warrants. If within the entity delineated there is a minimum population of 50,000, that entity qualifies as an urbanized area; an entity with a population of 2,500 to 49,999 qualifies as an urban cluster. These areas are blind to administrative boundaries and extend as far as the minimum density threshold indicates. A pre-2000 change is that urban areas are re-delineated in association with each decennial census. Formerly, delineations started with the previous decade's urbanized area and evaluated whether territory qualified to be added. Now the areas are delineated in an automated fashion, starting with a blank slate each time.

[2]U.S. Census Bureau. (2011). Urban Area Criteria for the 2010 Census. *Federal Register*, Vol. 76, No. 164, August 24. Available: http://www.census.gov/geo/reference/ua/urban-rural-2010.html [October 2015].

With the 2010 decennial census, there are many more urban clusters (3,087) than urbanized areas (486). Much more of the U.S. population, however, is in the fewer, bigger areas: 71.2 percent of the population is within urbanized areas, and 9.5 percent is within the smaller urban clusters.

The years leading to 1950 were formative for both programs, according to Fitzsimmons, but especially for the metropolitan and micropolitan classification, which was created in that period. Standard metropolitan areas, as they were called then, were first delineated for the 1950 census. Later the areas became known as standard metropolitan statistical areas, and then metropolitan statistical areas. But the late 1940s was not the first time agencies had the idea for a statistical entity that would capture more than the incorporated place and instead capture something at a broader scale. Before then, in 1905, the Census Bureau delineated industrial districts for use in the Census of Manufactures, and in 1920 the agency delineated metropolitan districts, used for the decennial census through 1940.

The year 2000 was important for both programs. In the case of the metropolitan and micropolitan classification program, the 2000 standards introduced micropolitan statistical areas, combined statistical areas, and metropolitan divisions. These areas were first delineated using 2000 decennial census data. Just as the 2010-based urban areas were delineated using the "Urban Area Criteria for the 2010 Census" referred to earlier, metropolitan and micropolitan statistical areas based on that census were delineated according to the "Standards for Delineating Metropolitan and Micropolitan Statistical Areas."[3] The standards were evaluated in the years leading up to the decennial census. A *Federal Register* notice in 2009 indicated provisional conclusions from OMB and the interagency committee that advises OMB on this program, then final standards were issued in 2010.[4] Those were the standards applied with 2010 census data to produce the core-based statistical areas—comprising metropolitan and micropolitan statistical areas—announced in 2013.

Delineation of core-based statistical areas starts with a core provided by the urban and rural program, whether an urbanized area or urban cluster. One or more counties associated with a core urban area (of at least 10,000 population) become the central counties of the core-based statistical area, and counties surrounding the central counties are added (or not)

[3]U.S. Office of Management and Budget. (2010). 2010 Standards for Delineating Metropolitan and Micropolitan Statistical Areas. *Federal Register*, Vol. 75, No. 123, June 28. Available: http://www.census.gov/population/metro/ [October 2015].

[4]U.S. Office of Management and Budget. (2009). Recommendations from the Metropolitan and Micropolitan Statistical Area Standards Review Committee to the Office of Management and Budget Concerning Changes to the 2000 Standards for Defining Metropolitan and Micropolitan Statistical Areas. *Federal Register*, Vol. 74, No. 28, February 12.

depending on their commuting ties with the central counties. A minimum of 25 percent commuting with central counties brings a county into the metropolitan or micropolitan statistical area as an outlying county.

The distinction between metros and micros is based on the size of the core population. Metropolitan statistical areas have a core population of at least 50,000, or an urbanized area. Micropolitan statistical areas have cores of 10,000 to 49,999 population, or an urban cluster. (Some urban clusters do not precipitate micro areas, namely, those urban clusters that have populations from 2,500—the floor for urban clusters—up to 9,999.) Metros and micros are updated after decennial censuses, but also throughout the decade. The most common kind of updating between decennial censuses is the creation of new micropolitan statistical areas as areas grow in population, and occasionally a micropolitan statistical area will graduate to a metropolitan statistical area.

The inventory of areas generated by the metropolitan-micropolitan program in 2010 shows many more micros than metros. Paralleling the pattern presented by the urban-rural classification, much more of the population is in the fewer, larger areas: 85 percent of the U.S. population in 2010 resided in the 381 metropolitan statistical areas containing 1,167 counties, whereas 8.8 percent of the population was in 536 metropolitan statistical areas containing 641 counties. The very largest metropolitan statistical areas based on the size of the core—those that have an urbanized area of at least 2.5 million—can be divided into smaller units called metropolitan divisions. In 2013, 11 of current metropolitan statistical areas with a minimum core size of 2.5 million population were divided into 31 metropolitan divisions.

According to Fitzsimmons, another big change that took place in 2000 was that, for the first time, the classification featured a nationally consistent base unit for metro and micro areas, namely the county. Prior to that, New England metropolitan statistical areas were delineated using cities and towns, or minor civil divisions (MCDs). In recognition of that delineation history and the continuing importance and availability of data at the city and town level in New England, the classification provides a second, parallel set of MCD-based areas for that region. There are also currently 38 New England city and town areas.

Area Delineations Comparison[5]

Looking at how metro-micro status crosses with urban-rural status, based on the 2010 decennial census, 88.3 percent of the population in

[5]For the purpose of this section's discussion, metropolitan and micropolitan statistical area delineations used are those that preceded the 2013 update. The 2013 delineations are used in other parts of the presentation.

metropolitan statistical areas is urban according to the Census Bureau's urban and rural classification, which still means that 11.7 percent of the population in metropolitan statistical areas is rural. Fitzsimmons noted that micropolitan statistical areas are almost evenly split between urban and rural, and in the territory that is in neither a metro or micro area—outside core-based statistical areas—75 percent of the population is rural. From the other direction, even within territory outside of both metro and micro areas, 25 percent of the population is urban.

Focusing on the Census Bureau's urban-rural classification to see how it intersects with metro-micro status, 24.6 percent of the rural population is not in a core-based statistical area, while another quarter of the rural population is in micropolitan statistical areas, and fully half of the rural population of the United States is in metropolitan statistical areas. Fitzsimmons said this means that programs that use the label "rural" in referring to counties that are not in metropolitan statistical areas are missing half of the nation's rural population, according to the two classifications.

Purposes and Uses of Areas

Fitzsimmons noted that a recent OMB bulletin[6] pertaining to the metropolitan and micropolitan statistical areas program offered the following advisory on use of these areas:

> In periodically reviewing and revising the delineations of these areas, OMB does not take into account or attempt to anticipate any nonstatistical uses that may be made of the delineations, nor will OMB modify the delineations to meet the requirements of any nonstatistical program.

Both the urban-rural and metropolitan-micropolitan statistical area classifications are used extensively in Census Bureau tabulations and publications. Metros and micros also are used across the federal statistical system. But, despite the OMB admonition, both classifications are used heavily in other, nonstatistical programs as well, Fitzsimmons said.

Transportation programs are prominent among nonstatistical users of the urban-rural classification. Metropolitan statistical areas are used across a wide spectrum of nonstatistical programs, ranging from those in public health, banking, education, and housing to antiterrorism planning. So it is not a great surprise, according to Fitzsimmons, that a significant share of

[6]U.S. Office of Management and Budget. (2013). Revised Delineations of Metropolitan Statistical Areas, Micropolitan Statistical Areas, and Combined Statistical Areas, and Guidance on Uses of the Delineations of These Areas. *OMB Bulletin No. 13-01*, February 28.

the cost of administering the urban-rural and metropolitan-micropolitan programs is associated with taking inquiries of one kind or another about nonstatistical concerns. These inquiries typically focus on qualification of localities and counties for funding programs.

General Observations

Fitzsimmons noted that a major consideration in making decisions about the design of a classification system is its purpose. Beyond that concern, he said, a first question centers on the geographic components, or building blocks. Immediately following that question will come another concerning the basis for determining the extent of the geographic areas and when it becomes appropriate to view neighboring areas as joined instead of as separate areas.

These questions all arose in reviews of the metropolitan-micropolitan program in which Fitzsimmons participated, reviews that might offer insights for an evaluation of ERS area classifications. For example, he said, counties can be unwieldy area components, especially in some parts of the country. But the metro-micro program is a statistical standard, and many statistical programs do not provide data in more precise geography. In the reviews of the metro-micro program in the 1990s and 2000s, the purpose of a statistical standard and the limitations of some statistical programs meant focusing on counties again, as the classifications had since 1950.

Criteria for determining the geographic extent of areas go to the conceptual basis of a statistical area program. The conceptual underpinnings translate into selection of population density for the urban-rural program, but for the metropolitan or micropolitan statistical areas—a functional areas classification—it means journey to work.

Fitzsimmons said a derivative of the issue of geographic extent that has provoked many of the thorniest issues when reviewing approaches to statistical area delineations comes in determination of when very large areas might be taken apart or shorn of their components, or when neighboring areas might be merged into the larger area. Fitzsimmons stated these two issues have galvanized more expressed opinion and various public comment campaigns than any others in classification reviews with which he is familiar.

Finally, he said, most programs face the issue of consistency with past practice. Classifications that have been in the public realm for an extended time need to balance concerns of coherence and stability with concerns about agility and staying current.

Summary

In summary, Fitzsimmons said the Census Bureau's urban and rural classification and OMB's metro and micro classification are prominent statistical area programs that provide part of the context for ERS area classifications. Both the Census Bureau and OMB classifications delineate individual statistical areas. These statistical areas have titles or names, depending on the classification; the areas also have specific geographic boundaries. Both of these programs have served their statistical purposes for many decades. The programs have been stable, and the areas they provide have served many tabulation and publication needs. The intended purposes of a classification system determine measures and procedures used in delineation, but classification systems also find themselves serving additional, nonstatistical roles. These additional roles have brought with them extra scrutiny and pressures.

OPEN DISCUSSION OF FITZSIMMONS' PRESENTATION

John Logan (Brown University) commented that the dependence of these classification systems on data had not been stressed enough, noting that they are almost entirely decennial census driven. Although there could potentially be other sources of data, there are limited data consistent across the country, resulting in restrictions in the ways the data can be organized and therefore what kinds of areas can be created. He said an associated issue is the quality of the data for a small area, for which sample sizes may be small. The smaller the area that is considered a basis for creating classifications, the larger the uncertainty. While using smaller areas as the basis for a classification system has potential, he said it is also limited by the data quality for those small areas.

Fitzsimmons noted the metropolitan and micropolitan classification does not use only decennial census data. The commuting measures are from the American Community Survey. He said use of Census Bureau data reflects not just a concern for consistency across the nation, although that consideration played a key role, but also concerns regarding the openness, transparency, and accessibility of data. If different, nonfederal data were used, responsible agencies would face the issue of ensuring that those data were available to all users so that they could replicate the delineations.

David Plane (University of Arizona) asked about changes anticipated for 2020 in both classifications. Fitzsimmons responded that the Geography Division at the Census Bureau is responsible for the urban and rural classifications, and Michael Ratcliffe, who is responsible for this program, would address the workshop later in the agenda (see Chapter 7). The con-

cern heard most frequently about the metropolitan-micropolitan program relates to combined statistical areas, Fitzsimmons noted. These areas were offered as an extra service for data users, and they afford agencies larger, more encompassing areas to work with than individual metro and micro areas. Combined statistical area designations, however, have confused some users because not all individual metropolitan and micropolitan statistical areas qualify to be parts of combined statistical areas. He stated that this concern probably needs to be resolved before the next decennial review and updating. If the issue is primarily a communication challenge, he said, then a better job of education is needed. Alternatively, OMB could think about other approaches to defining the areas.

David McGranahan (ERS/USDA) observed that, at one point, "urban character" was used to determine whether a county was part of a metropolitan area. After it was dropped, many more counties were included in metropolitan areas. Fitzsimmons explained that the standards preceding 2000 used a sliding scale in determining outlying county qualifications. Commuting patterns were taken into account, but the weaker the commuting ties displayed, the more the measure of "metropolitan character" played a role. He said that measures of metropolitan character were based on estimates of population growth, population density, and percentage of the population that was urban. In an earlier time, an estimate for the percentage of the population in agricultural occupations was also used.

Fitzsimmons said that a key concern for OMB and the interagency committee that advised that agency on the standards for the 2000 round of review was to clarify and simplify conceptually the basis for outlying county qualification. The committee and OMB debated this issue at length, and public comment was taken into account. In the end, the standards provided for much more strongly functional areas, based on commuting ties for determination of outlying county qualification, and discarded other measures. As a result, the standards became more conceptually consistent, simpler, and shorter, Fitzsimmons said.

STATEMENT BY JOHN CROMARTIE[7]

Cromartie outlined the goals of his presentation: to provide descriptions of each ERS rural-urban classification system and its historical context; highlight differences and key similarities in criteria, data choices, and geography; and discuss the reasoning behind key decisions in the development of each classification system.

Cromartie focused much of his presentation on the key differences among the four ERS rural-urban classification codes (see Table 2-1). He

[7]Cromartie (2015) prepared a paper for the workshop summary (see Appendix B).

TABLE 2-1 Economic Research Service (USDA) Rural-Urban Classification Codes

Name	Geography	Categories	Criteria	Initial Release
Rural-Urban Continuum Codes (RUCC)	Counties	9 categories: 3 metro 6 nonmetro	For metro counties: Population of metro area For nonmetro counties: Total urban population and adjacency to metro areas	1975
Urban Influence Codes (UIC)	Counties	12 categories: 2 metro 10 nonmetro	For metro counties: Population of metro area For nonmetro counties: Size of largest city, adjacency to metro areas by size of metro area, and micropolitan status	1997
Rural-Urban Commuting Area (RUCA) Codes	Census tracts; results used to create a version based on zip code areas	10 primary codes: 3 metro 7 nonmetro 30 secondary codes	Primary codes: Urban area size; size and direction of largest commuting flow Secondary codes: Size and direction of 2nd largest commuting flow	1998
Frontier and Remote (FAR) Codes	1/2 x 1/2 kilometer grid cells; results aggregated to zip code areas	4 (nested) levels	Travel times by car to edges of nearest urban areas by size, based on posted speed limits	2012

SOURCE: Prepared by John Cromartie for his presentation. Based on data from the USDA Economic Research Service. Available: http://www.ers.usda.gov/topics/rural-economy-population/rural-classifications.aspx [October 2015].

noted they differ in terms of geography, number of categories, criteria used, and initial release dates.

Though the four classifications are very different, he pointed out their key similarities. First, they are anchored to the metropolitan concepts and the metro-nonmetro dividing line. Rural equals nonmetro; thus, the 50,000 population threshold is a key dividing line, making the Census Bureau's urbanized areas a key construct. Urbanized areas form the basis of metro areas, and they form the beginning points for all ERS classifications. Second, within nonmetro areas, there are two dimensions to the rural-urban continuum—size and proximity. Counties are classified in terms of their own urban size and by their proximity to nearby metro areas. These two dimensions are also part of all four classifications.

Rural-Urban Continuum Codes (RUCC)

The Rural-Urban Continuum Codes (RUCC), commonly known as the Beale Codes, are a nine-level county classification first created for an ERS report (Hines, Brown, and Zimmer, 1975). This report documented socioeconomic changes for nonmetro areas during the 1960s. The 1960s were the last period of massive rural to urban migration, Cromartie said, which fueled increasing metropolitan dominance, increasing rural diversity, declining farm towns, and increases in new growth centers. This report provided one of the few rationales for the transition to looking at the world from a metropolitan lens and why that was happening. One rationale behind these codes, he noted, was to differentiate diverging types of nonmetro space, such as farm areas where towns and villages were declining versus new growth centers proximate to metro areas.

In the RUCC, two dimensions characterize nonmetro counties: urban size and metro proximity. The dimensions of rural America have changed over time along this continuum, and the RUCC has been successful in explaining socioeconomic conditions in rural America. Changes in settlement patterns and criteria for defining census-based urban areas and metro areas have reduced the number of nonmetro counties by roughly one-quarter from 1970 to 2010, from 2,700 to 2,000. As expected with more metro counties, accessibility of the rural population to metro areas has increased: the share of adjacent counties has gone from 39 to 52 percent within the nonmetro category of counties.

Urban Influence Codes (UIC)

Cromartie next described a similar 12-level county-based classification system, called Urban Influence Codes (UIC), created in the 1990s by ERS staff. The initial six-level version was developed for an ERS report

documenting the rural crisis of the 1980s, similar to the report prepared in the 1970s documenting what had happened in the 1960s.

He identified four differences between the UIC and the RUCC/Beale Codes:

1. The UIC emphasizes adjacency to metropolitan areas. Adjacency drove nonmetro population growth in the 1980s to a greater degree than during the previous two decades.
2. The population size of the adjacent metro area was added as a key component of the UIC based on ERS research that showed that just adjacency to metro area was not enough. Distinctions by size drove population and job growth.
3. The UIC incorporates a size threshold for population of 1 million to classify counties in large and small metropolitan areas. In addition to a population size threshold of 1 million, the RUCC also used a smaller size threshold (under 250,000) for counties in metropolitan areas.
4. Size of the largest city was used to develop urban size categories instead of total urban population. This change provided alignment with central-place principles showing employment opportunities and service provision varying by city size.

The updated UIC classification based on the 2000 decennial census has 12 categories, 2 for metropolitan counties and 10 for nonmetropolitan counties. (See background paper in Appendix B for a description of the 12 categories; see also Table 2-1.) Categories 3 to 7 are all adjacent to metro areas, and the rest are not. The UIC is complex and not as popular as the Beale Codes, Cromartie said, but it offers a different perspective.

Rural-Urban Commuting Area (RUCA) Codes

The Rural-Urban Commuting Area (RUCA) code scheme is the first nationwide subcounty classification system widely adopted for research and policy. It was developed in the 1990s as part of an interagency agreement between ERS and the Office of Rural Health Policy of the Department of Health and Human Services (HHS). Counties were too large, especially in the West, to adequately target rural health programs or identify places that needed hospitals or help with providing health care. This classification system has 10 primary codes and 30 secondary codes.

In the 1990s, there was a growing need for a subcounty classification system in order to look at rural issues in more detail. In this period of urban sprawl and fragmentation, Cromartie said, there was a growing need to capture the increasing complexity of hierarchical relations and

patterns of shared influence. The Census Bureau and OMB sponsored papers and convened a "Metro 2000"conference in the 1990s to rethink underlying concepts of metro areas. Two of the four sponsored papers, Morrill (1995) and Frey and Speare (1995), proposed subcounty classifications. Building on this work, ERS collaborated with geographer Richard Morrill to develop the RUCA codes, through funding from the Office of Rural Health Policy.

Part of the complexity of the codes was because Morrill and ERS had different goals for these codes, Cromartie said. ERS was interested in the basic question of what metro areas would look like if one tried to adhere closely to the criteria but used census tracts instead of counties as building blocks. Morrill was interested in the idea that places have different functions, with an overlapping nature to rural and urban. According to Cromartie, Morrill thought that there was a hierarchy but that it was overlapping. For example, a little town outside a metro area could be both a bedroom community and its own employment center. As a result, a more complex classification was adopted, providing flexibility for researchers interested in analyzing a variety of settlement patterns and functional relationships between areas.

Cromartie explained the method used in developing the codes as follows: Replace counties with census tracts, and aggregate tracts to form urban area approximations; then, using data from a special tabulation of tract-to-tract commuting flows prepared by the Census Bureau, analyze commuting flows between rural tracts and urban areas. Ten primary codes were identified based on the direction of largest commuting flow. Thirty secondary codes were identified based on the direction of the second-largest commuting flow to depict the overlapping nature of the urban-rural hierarchy. (See background paper in Appendix B for a listing of the primary codes. The methodology is also documented in Morrill, Cromartie, and Hart [1999].)

Frontier and Remote (FAR) Codes

As Cromartie highlighted, the Frontier and Remote Codes is a four-level grid-based classification developed in the 2000s. Grid analysis is a new approach using data that have been downcast to very small ½ x ½ kilometer grid cells. After analysis, results are aggregated up to larger geographic units. Accessibility/remoteness is defined in relation to the time it takes to travel by car to the edges of nearby urban areas and not by adjacency. It describes territory characterized by some combination of low population size and a high degree of geographic remoteness.

The motivation for the development of FAR Codes was twofold, he said. First, demand for a geographically detailed delineation of frontier

areas grew in federal policy circles, especially among rural health specialists, as programs emerged with the legislative mandate to improve access to health care in frontier areas. Second, research by Mark Partridge and others (Partridge et al., 2008a, 2008b, 2008c, 2008d) showed the economic and demographic costs of remoteness were increasing, and the variability of rural well-being was still strongly tied to the structure of the urban hierarchy. It was not just remoteness from any city, but the size of the city mattered, which led to creating levels of remoteness.

The methods for creating these levels of remoteness are fairly straightforward, according to Cromartie. For each of the approximately 25 million grid cells covering the entire United States, the census urban area designation and 2010 block-level population were added to the data record, along with the road network and posted speed limits. For each grid cell, distance was calculated as travel time by car to the edge of a nearby urban area in four urban population size classes: 2,500–9,999; 10,000–24,999; 25,000–49,999; and 50,000 or more. Four FAR levels were identified at the grid level, based on different urban classes, then aggregated to zip code areas based on population.

These concepts come from central place ideas, explained Cromartie, so FAR-1 represents frontier areas with access to high-end services, while FAR-4 represents the most remote areas based on access to low-end central services, with two intermediate codes. The codes nest, in that all FAR-4 areas are also FAR-3, FAR-2, and FAR-1 areas; all FAR-3 areas are also FAR-2 and FAR-1 areas; and all FAR-2 areas are also FAR-1 areas.

Once the grid level analysis is done, grids are aggregated to zip codes. FAR-1 areas have a majority of their populations living 60 minutes or more from urban areas of 50,000 or more. Based on decennial census 2010 data, FAR-1 represents 52 percent of the land area, but just 4 percent of the population. These percentages are down quite a bit from the ERS analysis in 2000 because of the addition of new urbanized areas.

The FAR-2 level adds a 25,000 population threshold and a 45-minute drive: these zip code areas have a majority of population living 60 minutes or more from urban areas of 50,000 or more people *and* 45 minutes or more from urban areas of 25,000–49,000 people. The FAR-3 level adds a 10,000 population threshold and a 30-minute drive: it includes zip code areas with the majority of population living 60 minutes or more from urban areas of 50,000 or more people; 45 minutes or more from urban areas of 25,000–49,999 people; *and* 30 minutes or more from urban areas of 10,000–24,999 people.

The FAR-4 level adds the smallest towns of 2,500 or more people, with a 15-minute drive: it includes zip code areas with the majority of population living 60 minutes or more from urban areas of 50,000 or more people; 45 minutes or more from urban areas of 25,000–49,999 people; 30 minutes

or more from urban areas of 10,000–24,999 people; and 15 minutes or more from urban areas of 2,500–9,999 people. It has 1 percent of the population but 35 percent of the land area.

Summary

In closing, Cromartie listed some questions that he said need to be addressed:

- Is it important to maintain the different perspectives offered by the two ERS county-level classifications?
- If not, which elements should be given priority?
- Are there ways to simplify the RUCA Codes and still maintain the multilevel, overlapping hierarchy they represent?
- Should ERS consider applying the grid-based methodology, currently used to define very remote areas, to a more comprehensive classification system?
- Are there broader applications for the measurement of distance using detailed travel-time analysis?
- What is the historical context today that is relevant in terms of design? For example, there is a lot of talk about growing spatial inequalities in rural areas. How can ERS capture that? There is the emergence of new trends in big-city downtowns, which will have an impact on migration trends for rural areas, such as people considering city centers as viable retirement places.

OPEN DISCUSSION OF CROMARTIE'S PRESENTATION

David Brown (Cornell University) provided background to the ERS report referred to by Cromartie (Hines, Brown, and Zimmer, 1975). For the 1950 decennial census, Duncan and Reiss (1950) described social characteristics of urban and rural areas. For the 1960 decennial census, a census monograph, Hathaway, Beegle, and Bryant (1968), served the same purpose. For the 1970 census, there were no plans for a census monograph series. ERS was asked to develop a publication that showed how various aspects of social and economic structure had changed across the nation's geography. According to Brown, this was important because there was no intention at that time to develop a classification scheme for any other purpose than that publication. He noted that the authors were surprised when many people and agencies started to use the scheme. He explained the scheme became known as the Beale Codes because after the original publication, Calvin Beale, updated the codes with new data, distributed it, and answered questions about it.

Brigitte Waldorf (Purdue University) observed the two dimensions in Rural-Urban Continuum Codes, size and adjacency, are continuums; in the coding, she asked why size had priority over adjacency in the 1970s when the codes were developed. She also asked Cromartie to explain how grid sequences are aggregated to zip code levels in the FAR coding.

Cromartie responded that FAR coding is done with population and road layers overlaid on the grid. Initially, 2010 census population at the block level is downcast to grids using weighted area interpolation. Each grid is given a population, so that the total is equal to the total U.S. population. Then each grid is identified by whether it meets the criterion for the FAR-1 code. Then these FAR-1 grid cells are aggregated to zip code areas, overlaying those on the grids and simply tabulating the populations of the FAR-1 grids that fit into each zip code.[8] This gives a percentage of the population that is FAR-1 for each zip code. A vast majority of zip codes are either all FAR-1 or not. Those zip codes with less than 100 percent and more than 50 percent FAR-1 population are also considered FAR-1 zip codes. This analysis is repeated to identify zip code areas that satisfy the criteria for the other three FAR levels. The state summary populations that ERS provides are for the total zip code population in each FAR category.

Ken Johnson (University of New Hampshire) asked about the stability of zip code boundaries in remote rural areas and asked about using the grid instead. Cromartie responded that a major reason is that it is hard to share data for 25 million grid cells. One can share maps, which ERS is considering. Although not currently on the ERS data product website, a link to an interactive map will allow users to look at the grid results. He said it would be fairly straightforward to devise a system whereby an address can be typed in to see whether it is FAR-1 or not, based on grid-level analysis.

Cromartie pointed to a problem with post offices closing, which leads to changes in zip code boundaries every year. Census tracts also change, but only once every 10 years. Although there are comparability checks between the two, there are issues, he said. ERS uses census tracts for RUCA Codes, but some communities of interest need to base their data on something different. Zip codes are useful for survey data because people know their zip codes but not their census tracts. On the other hand, he said, census data are easier to use with census tracts. Zip codes and census tract data are both useful, he concluded.

Thomas Johnson (University of Missouri) commented that the FAR and several other codes describe a geography, and it is possible to tally the population in that geography. He asked about other kinds of data

[8]ERS is also considering publishing the FAR Codes for other geographies, such as census tracts and Zip Code Tabulation Areas (ZCTAs), the census approximation for zip codes.

associated with such geographies, and suggested that the process of estimating population solves the problem of preserving anonymity. He queried whether it would be possible to report data like income and other variables for those geographies. Cromartie responded that ERS does not report data for grids in particular. Other research projects at ERS have used this method, and they may have downcast some data on housing and food. He said he was not familiar with the level of accuracy but expressed concern about trying to downcast data for geographic units smaller than census blocks.

Mark Shucksmith (Newcastle University) referred to Fitzsimmons' point that these classifications were to be used purely for statistical purposes. He said that he sees at least two purposes for which classifications might be used: for policy and for analysis. In thinking about how classifications might change, it is important to consider both uses, he said. Shucksmith said he was also struck by Cromartie's point that in the 1959 and 1969 data, there was a very strong correlation of rurality with poverty, which is disappearing now. He noted the question that follows is the usefulness of rurality in analyzing inequality and poverty, or if other variables better reflect inequality that should be considered in classification systems.

John Pender (ERS/USDA) asked about considering income level, or income per capita of a proximate city, when thinking about access or market potential. He suggested that an area close to a wealthy city, even controlling for population size, might have more economic opportunities than one close to a poor city. Cromartie responded that the area of focus he saw in the 1990s was total population size and how that size affected the impact of adjacency and population change. He noted that rapidly growing metro areas would have a bigger impact than ones not growing as fast. He said he had not looked at income, but employment opportunity might be another variable to consider. Employment opportunities would attract more people from rural areas.

Michael Woods (Aberystwyth University) noted the definition of FAR areas is parallel to work done in Wales. He said that the Welsh government defined "deep rural areas" as more than 30 minutes travel from a settlement of 10,000 people. Those areas were analyzed through a household survey conducted across rural Wales. He reported one of the key differences the survey found was that levels of dissatisfaction with both public and private services were significantly higher in deep rural areas than they were across the rural country as a whole. According to Woods, this illustrates the definition of "deep rural areas" picks up something useful.

Referring to a point by Partridge about space and accessibility, Woods asked to what extent it is important to start thinking about Internet,

broadband, and telecommunications access when thinking about accessibility. He observed he has not seen this type of access drawn into any classifications of rurality or prerurality. Cromartie observed that work on broadband accessibility is under way, as businesses are not attracted to an area without it. He said that the issue of different ways of looking at metro areas—including media markets, newspaper circulation, and TV—has been on the table for some time.

Partridge commented that using Canadian data, he and Rose Olfert looked at the cause of spread effects—namely, rural areas near urban areas that were growing, or potentially growing, taking advantage of urban-led growth. They found that population size was first order, growth and employment opportunities were second order, but third order was whether income growth spreads out wealth. He reported that in a statistical sense, the spread effect was significant, but in terms of the magnitude, the income effects were rather small.

Danielle Rhubart (Pennsylvania State University) observed analysts use much data from the five-year American Community Survey estimates. She observed that most of the data are not at the zip code level, and wondered whether the FAR Codes could be aggregated into a dataset at the county level. She asked about any available dataset that provides the proportion of a county that lives in a FAR area and a proportion of county land that is designated as a FAR area. Cromartie responded that on the analysis file, ERS currently has four geographies, and the plan is to aggregate to census tracts, ZCTAs, and counties, as well as to zip codes. The question is how to design a data product that is not too confusing. Now ERS provides zip code-level data. One can download a zip code file and have the FAR identification for those areas. He asked whether ERS should also put out county-level, tract, and ZCTA files, or whether confusion would become a problem. He said he sees value in providing all of these geographies.

Goetz referred to Cromartie's comment about the relationship between FARs and their applications in the health sector. In a region where he works, he said, there are many concerns about rural areas treated differently because of where they fall on the continuum. Looking at the FAR Codes, he said, the West dominates. He asked about conditions under which a FAR Code would be applicable in the Northeast, which also has rural areas, but where, except for northern Maine, they seem to be disappearing. Cromartie noted a region in northwest Pennsylvania identified as FAR-1. He said one thing he likes about FAR Codes is that there are frontier areas in the East. He noted that with standard definitions of frontier that use county-level measures of density, no counties in the East qualify. When the FAR Codes were first released, he said, ERS got some protest from people in the West not used to sharing the frontier

area designation with Eastern states. He noted the conditions of roads in many places make a difference.

Logan stated he was surprised at the use of census tract commuting data because of a lack of confidence in the quality of the data. He said that if the data were used to determine programs needed in a particular census tract, he would not trust them because the standard errors are huge, although he added he does not see a problem if the purpose is to get a general idea about patterns. An advantage of the FAR scheme, he said, is that the distances are accurate and easy to calculate for very small areas. To him, the downside is that the FAR relies on the assumption that accessibility to services is totally dependent on distance. On average this may be true, he said, but perhaps not for any particular area. If the goal is to draw programmatic conclusions for particular areas, deciding whether an area gets program money or not, he said he worried about the assumption that distance translates into accessibility to services. Cromartie responded that this distinction is helpful for ERS, which provides an overview or analysis of conditions in rural areas. Urbanized areas are key to all of these classifications, he said, and they also form the basis of the main USDA definition that is used for rural development programs.

Plane wondered whether the federal government is really the entity to be defining what is meant by rural, given that the country has different historical settlement and regional patterns, and yet a federal definition has to be consistent across the country. It was certainly an issue with the old metropolitan definitions, which got quite complicated, Plane said. Coming up with a consistent definition is a challenge, he added.

3

Other Rural Area Classification Systems Used in the United States and Internationally

This chapter summarizes the third workshop session, which introduced rural area classification as done elsewhere in the United States and internationally. The session began with a presentation by Brigitte Waldorf (Purdue University) of the commissioned paper *Defining and Measuring Rurality in the United States: From Typology to Continuous Indices* (Waldorf and Kim, 2015). Leif Jensen (Pennsylvania State University) described labor market area (LMA) delineations in the United States. Paolo Veneri (OECD) described the OECD rural classification system and the adaptation of that system in the European Union, and provided an example of a classification used in Italy. Keith Halfacree (University of Swansea) provided a social constructionist critique of rural area classification systems. Mark Partridge (Ohio State University) was the moderator.

STATEMENT BY BRIGITTE WALDORF[1]

Waldorf first introduced Ayoung Kim, who co-authored her presentation and the commissioned paper. Waldorf discussed in general terms what rurality is, and how it might be measured, coded, ranked, or delineated. She said that most definitions in the literature are either vague or nonexistent. As a result, analysts sometimes code and classify something that is not defined. However, analysts agree that rurality is a multidimensional concept, and that multidimensionality raises methodologi-

[1]This presentation is based on Waldorf and Kim (2015).

cal issues and requires priority-setting and subjective decision making. Multidimensionality also raises questions about what these dimensions are, how they are measured, and what their relative importance is. For example, the Rural-Urban Continuum Codes (RUCC) have at least two dimensions, size and adjacency, calling for a subjective decision regarding their relative importance. In this case, priority was given to size and adjacency followed (see Chapter 2).

Methods to Measure, Code, and Rank Rurality

Waldorf stated that, in general, the existing methods for classifying multidimensional concepts can be divided into two groups: (1) typologies or classifications, which are further divided into either threshold-based or similarity-based; and (2) aggregate indices.

Threshold-Based Typologies

In the United States, almost all rural typologies use the Census Bureau's delineation of urban areas, the core-based statistical areas of the Office of Management and Budget (OMB), or both. The rural typology suggested by Isserman (2005) is an example of a typology that utilizes the Census Bureau's definition of urban areas but does not use the OMB delineation. An example of a typology that relies both on the Census Bureau and the OMB delineations is the Rural-Urban Continuum Code of the Economic Research Service (ERS). The rural-urban classification of the National Center for Health Statistics uses the OMB but not the Census Bureau delineations. Finally, an example of a typology that uses neither the Census Bureau nor the OMB delineation is the OECD typology for the United States, discussed in a subsequent presentation.

She noted that the Census Bureau and the OMB typologies are also used as criteria in rural-urban typologies for spatial objects different from counties. These typologies vary in terms of what they are classifying, such as blocks and tracts. The typology can also refer to a single location that can be classified as being rural or urban. Looking at the various criteria used in rural-urban typologies, size and density are the most frequently used dimensions.

Similarity-Based Typologies

As an alternative to using thresholds, similarity indices can be used to create a classification, Waldorf explained. The n objects—counties, tracts, or zip codes, for example—are assigned to k types, using m variables or criteria. Unlike with the threshold-based typologies, similarity-based

typologies group objects on the basis of similarity within this *m*-dimensional space. The *m* dimensions are defined by criteria such as size and density, and similarity is measured by distance in *m*-dimensional space. There are different ways of measuring distance, and the selection of the distance measure is a subjective decision. But once that subjective decision is made, then the classification procedure becomes very mechanical and data-driven. This method is rarely used, although it is easily implemented and can be applied to spatial objects of any scale.

Aggregate Indices

An alternative to typologies is the aggregate index. As Waldorf described, aggregate indices are similar to typologies in that they select *k* criteria or variables to capture multidimensionality. They are different because they do not require thresholds that divide the multidimensional space into discrete compartments but, instead, collapse the multidimensional space into one-dimensional space. Within the one-dimensional space, a rurality aggregate index would rank objects (counties or tracts, for example) by increasing rurality. As such, the aggregate index does not answer the question of what is rural versus urban, but is a relative measure that allows comparison of areas by their degree of rurality. It is responsive to changes in any of the underlying dimensions. She pointed out that both the threshold-based typologies and aggregate indices are based on very critical subjective decisions: the choice of thresholds in the case of threshold-based typologies, and the functional specification for the collapse of the multidimensional into one-dimensional space in the case of aggregate indices.

The United Nations designed a successful aggregate index with its Human Development Index (HDI). A similar procedure can be applied to create an aggregate index of rurality. Waldorf (2006, 2007a, 2007b) designed such a continuous threshold-free index of rurality, the Index of Relative Rurality, which ranges between 0 (most urban) to 1 (most rural) for 3,108 counties, excluding Hawaii and Alaska. She and Kim updated the Index of Relative Rurality for 2000 and 2010 for 3,141 counties, including Alaska and Hawaii. She said the design consisted of four steps: (1) identifying the dimensions of rurality—population size, density, built-up area, and remoteness; (2) selecting measurable variables to adequately represent each dimension—population size, population density, percent urban, and network distance to the closest metropolitan area; (3) rescaling the variables onto a comparable scale—the bounded interval [0,1]; and (4) selecting a function that links the rescaled variables so that multidimensionality is reduced into one-dimensionality—in the absence of theoretical guidance, the unweighted average was used.

Concluding Comments

Waldorf closed by noting most delineations of rural-urban areas use threshold-based typologies. In her view, thresholds create artificial similarities and dissimilarities, and, in most cases, threshold choices are not well justified. They are dependent on a fixed spatial scale to be classified. Every time a different spatial scale is used, different thresholds are needed. However, she said, one advantage of threshold-based classifications is their simplicity.

An alternative is the Index of Relative Rurality, an aggregate index such as the HDI of the United Nations. Compared to threshold-based typologies, its main advantages include being threshold-free, continuous, and scale-independent. Moreover, it is a relative measure so that spatial objects can be ranked by their degree of rurality, and even subtle changes in the underlying dimensions over space and time can be revealed. Finally, the index is analytically more easily handled than categories of a typology. With all these advantages, the Index of Relative Rurality is a useful addition to the set of existing threshold-based classifications, but it is not a substitute, Waldorf said.

STATEMENT BY LEIF JENSEN

Jensen introduced his collaborators Danielle Rhubart and Chris Fowler. He acknowledged a new cooperative agreement with ERS, as well as National Institutes of Health support for the Population Research Institute at Pennsylvania State University and his own involvement with Regional Research Project W-3001, which is looking at the impacts of the Great Recession on small town and rural area demographic change.

Labor Market Areas—Definitions and Methodology

Jensen focused on LMAs, defined as economically integrated geographic areas within which individuals can reside and find employment within a reasonable distance, or can readily change employment without changing their place of residence. An alternative definition is a geographic area encompassing both the place of work and the place of residence of a local population.

LMAs were first considered in the early to mid-1980s with a collaborative project between the Rural Labor Market Section of ERS and Regional Research Project S-184, "Labor Markets and Labor Differentiation in Nonmetropolitan America." He noted that project had considerable leadership from Charles Tolbert, then at Florida State University, and Calvin Beale at ERS (Tolbert and Killian, 1987).

Key outcomes from the project were the delineation of 382 LMAs and the preparation of the PUMS-D by the Census Bureau. PUMS-D was a public-use microdata sample from the 1980 decennial census long-form questionnaires that contained individual-level and household-level data. For each individual it identified the LMA of residence. In a follow-on Regional Research Project S-229, "The Changing Structure of Local Labor Markets in Nonmetropolitan Areas," many of the same researchers conducted research on LMAs and arranged for an updating with the 1990 decennial census data that was called the PUMS-L.

The rationale for this effort was recognition of the inadequacy of individual counties as units to understand an area's economy, Jensen said. As stated by Tolbert and Killian (1987, p. 1), "A local economy and its labor force are not bounded by the nearest county line, but by interrelationships between buyers and sellers of labor": hence, a labor market. These researchers also recognized the inadequacy of nonmetro areas in capturing the diversity of rural America. Jensen said they were motivated by the need for a geographic standard to capture labor markets, and, more generally, to better understand the implications of context for individual outcomes, and in particular the effects of characteristics of labor markets on the circumstances of people living within them.

The methodology that they followed drew on counties and county equivalents as the building blocks, using journey-to-work data and population size of these places. Subsequently, ERS subdivided LMAs into metro and nonmetro. The method relies on proportional flow measures—basically, the total number of commuters exchanged by two counties divided by the size of the smaller county's labor force. He said this approach emphasizes the reciprocity between counties rather than assuming that nonmetro counties and outlying areas rely solely on metro areas. These proportional flow measures go into a symmetric matrix of proportional flows, basically, a county-to-county flow matrix, which is then subject to hierarchical cluster analysis. He said this is an iterative process of aggregating counties based on the strength of their relationship of the proportional flows of commuters.

The process aggregates counties into one large cluster. A dendrogram is used to decide where to stop the process and, thus, where the clusters best define labor markets. This process also led to the formation of commuting zones. Jensen pointed out that one of the goals of the Regional Research Projects was to work with the Census Bureau to produce special subsamples. For example, the PUMS-D had LMAs within them, but because the Census Bureau was sensitive to making sure that these areas had at least 100,000 residents in order to protect the confidentiality of the census data, a last step in the process was to aggregate commuting zones into somewhat larger LMAs. He noted Beale was involved in this part of the process.

Research Applications

Jensen said that regional research projects and other users of the PUMS-D and the subsequent PUMS-L were interested in the effect of context, notably, the implications of rural LMA characteristics for individual outcomes. They examined relationships between LMA characteristics and such variables as returns to human capital, gender and household labor supply, determinants of off-farm employment, income packaging among the poor, and race-ethnic differences in unemployment. These kinds of questions remain important in view of changing rural landscapes, Jensen pointed out.

Jensen stated a goal of their current project is to review, replicate, and evaluate the prior methods; to update the LMA delineations with more recent data; and ultimately to design a new set of functional LMAs that reflect current population settlement and commuting using the most appropriate recent data. They are replicating the past work but with more advanced hardware and software, and will be able to analyze the entire flow matrix for all counties simultaneously and take advantage of other software advances. They are updating with contemporary data from the American Community Survey (ACS), but also exploring the use of the Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES[2]) data.

Jensen noted one drawback of the current methodology is that it was based entirely on the decennial census, conducted in April every 10 years.[3] This raises issues of seasonality that perhaps the ACS can overcome. On the other hand, the ACS has a smaller sample size and greater margins of error. Because of the 10-year cycle of the census, the data cannot capture economic cycles, a limitation that using ACS data may also address. Finally, the current approach results in monocentricity or places being dominated by large counties. Jensen and his colleagues plan to solve this problem by replacing the proportional flow method and continuing with hierarchical agglomerative clustering methods. He observed that there are a variety of ways to describe the connection between two counties. He noted that proportional flows is a good measure, but it emphasizes connections to counties with large workforces and builds a monocentric representation of commuting patterns.

[2]Available: http://lehd.ces.census.gov/data/ [October 2015].
[3]Journey to work data are now only available from the ACS.

Future Research and Implications for Defining Rurality

Jensen highlighted the questions he and his colleagues hope to illuminate in their research project:

- How does the geography of LMAs change using constant methodology applied across years?
- How have the characteristics of urban and rural LMAs changed over time, using the most recent LMA definition applied to previous years?
- How have the implications of LMA context for individual-level outcomes changed over time?

Jensen said that using data available through Pennsylvania State University's Census Research Data Center (RDC) will provide access to internal Census Bureau versions of data files to see how commuting has changed within LMAs independent of how places are grouped. They will evaluate within-LMA commuting patterns of different population groups by type of employment.

While this research has been to define LMAs, Jensen said it has implications for defining rurality. He observed the persisting need to understand rural labor markets outside of metropolitan areas, and that using LMAs can help to appreciate this rural diversity. He said he hopes an analysis of the richer data available in the Census Bureau's RDC will allow for a better understanding of the links between rural and urban labor markets and will also support exploration of some of the limitations of the ACS. More generally, Jensen indicated that he and his colleagues are interested in whether "rural" can be defined more accurately and more meaningfully using subcounty delineations.

STATEMENT BY PAOLO VENERI

Veneri described how rural area classification is done outside the United States, focusing on Europe and other countries in the OECD. He noted that reflecting on the definition of rural is very timely because the OECD is also currently discussing how to update its own urban-rural classification, how to improve the classification with new data, and how to address emerging issues. Veneri described the OECD regional typology, including extensions to the typology by the European Union, and provided an example of a different classification approach used by Italy.

The OECD Official Databases

The OECD publishes databases at three spatial scales that are validated by the 34 OECD countries and national statistical offices. Most of the data are at the national level, called Territorial Level 1 (TL1). A regional database relates to large regions and small regions. Large regions (TL2) are usually the first government layer after the national/federal one, such as U.S. states. The small regions (TL3) often correspond to administrative entities. In the United States, small regions are Economic Areas as defined by the Bureau of Economic Analysis.

The current OECD classification of rural areas is applied to TL3 regions, but the building blocks used to build the classification are "local administrative units," such as counties, wards, or municipalities. A population density criterion identifies three categories of regions: predominantly urban, predominantly rural, and intermediate. The predominantly rural regions are further divided into those that are close to a city or rural remote, based on distance to cities, Veneri explained.

OECD Method

Veneri reiterated that local administrative units are the building blocks of the OECD method. Local units are counties in the United States, wards in the United Kingdom, and usually municipalities in other countries. The issue of comparability is key because local units in different countries may have very different sizes. However, this compromise was reached in order to have an international urban-rural classification adopting a consistent method.

The OECD method starts by classifying local units along the urban-rural continuum, as follows:

- Local units are classified as rural if their population density is below 300 inhabitants per square kilometer.
- Regions are classified as rural based on the proportion of the population living in rural local units. If the proportion is higher than 50 percent, then the region is classified as predominantly rural.
- Regions are classified as intermediate if the proportion of the population living in rural local units is between 15 and 50 percent.
- Finally, regions are classified as close to a city if driving time to a city is less than one hour for at least 50 percent of the population.

Adjustments are made based on the size of city: a region becomes intermediate or urban if it contains a city of at least 200,000 or 500,000 inhabitants, respectively.

Revising the OECD Classification and the European Union Approach

Veneri said that the OECD is currently discussing how to update and revise its territorial classification for two main reasons. First, there are purely statistical needs to update the current classification, based on 2001 census data, using the most recent population census data for all countries. Second, a revision could make use of currently available information, methods, and data, such as high-resolution grid cells and Geographic Information System elaborations, that might support a more precise and comparable urban-rural classification across OECD countries.

He noted that the first consideration in revising the classification system is to ask why the OECD classifies space along the urban-rural continuum. The main reason is to compare territories across countries for research purposes, which requires comparability across countries. A second objective is to have policy-relevant units of analysis within each country, to the extent possible.

As one option, he said the OECD could adopt the extension proposed by the European Union, already in use. In most European countries, the new rural codes coincide with OECD TL3 regions. The main innovation used in constructing the EU classification is the use of grid cells of one square kilometer as building blocks, instead of local administrative units. Another important difference is how the proximity to a city is measured. The EU approach uses the OECD definition of Functional Urban Areas,[4] which are also consistent across countries, to take into account the presence of cities and the distinction between the rural regions close to a city and remote rural regions.

The EU methodology classifies clusters of contiguous 1-km^2 cells along the urban-rural continuum according to their population density, Veneri said. The classified cells can then be used to classify other geographies of interest, such as local units (municipalities, counties, etc.) or regions. In other words, he said, the use of grid cells allows comparability across countries to be maximized (grid cells have the same 1-km^2 across all countries) and the result can be applied for the classification of any larger region of interest.

Cells are classified based on their population density and size into one of three types: urban centers (or high-density clusters), urban clusters, and rural grid cells. The first two are basically the urban space. The urban centers are those clusters of contiguous cells with high density of at least 1,500 inhabitants per square kilometer, and 50,000 in population size. Urban clusters are groups of contiguous cells with a population density higher than 300 inhabitants per square kilometer. Finally, rural grid cells

[4]See OECD (2012).

are cells not included in the other two types. This method has not been applied to the United States, only to Europe.

Veneri said the main advantage of this method is that the classification is fully comparable across all countries that have data about the population in each grid cell. Additionally, the method can be used to create classifications for any larger geography of interest, whether relevant for policy purposes, or for research and analysis.

The Example of Italy

Veneri described a different classification system used in Italy as an example of the classification of rural areas based on policy objectives.

In Italy, "Inner Areas" are territories characterized by "a not adequate access to essential services to assure a certain level of citizenship among population."[5] The intention is to measure lack of access to health care, education, and transportation. This classification is driven by policy purposes: It supports a policy package to foster local development and improve opportunities by improving access to services.

"Service Centers" are defined as municipalities that have inside their territories an exhaustive range of secondary schools, at least one highly specialized hospital, and a railway station, approximating the presence of minimum services for education, health care, and transport. All Italian municipalities have been classified according to the distance (travel time) from these Service Centers. For example, if this distance is higher than 75 minutes, they are identified as Inner Areas, which are the object of these policies.

Concluding Comments

Veneri said the extension of the OECD urban-rural classification proposed by the European Union could be fairly easily applied in the United States. It would allow consistent comparisons with other developed countries. He observed that population density probably remains the most straightforward criterion on which to base urban-rural classifications, especially when these are done across different countries or for very large and different territories. However, he observed the Italian Inner Areas example demonstrates that other classifications are possible based on proximity criteria only. He said this can make sense when the objective of the classification is for policy purposes rather than solely for analysis.

[5]See Ministry of Economic Development (Italy) (2014).

STATEMENT BY KEITH HALFACREE

Halfacree presented a critique of the idea of producing rural classifications. He noted producing these classifications is a useful exercise as long as the context in which it is undertaken is recognized.

Halfacree explained rural geographer Paul Cloke constructed an index of rurality for England and Wales based on census data (Cloke, 1977). It produced a plausible and understandable map of rurality in England and Wales. London and the southern cities of Wales stood out as very urban, and the most remote areas in Wales, southwest of England, and the north of England stood out as rural. The classification using census data was very much in the spirit of the times, Halfacree said, and was plausible and influential. However, Cloke repudiated his index (Cloke, 1994), stating that it was an inappropriate way of addressing the idea of what and where is rural and that selecting a number of variables to represent "the rural" predetermined the outcome. According to Halfacree, Cloke and others said they made an assumption that "the rural is there" and all that was needed was to find the right sort of measures to express it, instead of considering exactly what was meant by rural.

Recognizing "Rural" as Socially Constructed

Halfacree recognized the central importance of classification, categorization, or taxonomy as a central practice of human life. However, he said, it deserves critical reflection.

People produce categories, he said. Taxonomic practices or putting things into boxes minimizes ambiguity and vagueness in the world, brings things into the open, and provides simple, clear, communicable, controlled consensus on meaning (Bourdieu, 1990). But, he said, taxonomies are not without problematic aspects.

Another term used to articulate what is involved within taxonomic practices is the process of discrimination. Here, Halfacree said, "natural" may be distinguished from "more-than-natural" entities. Discriminating natural phenomenon such as species of animals or plants may be fairly easy. However, doing so for more-than-natural entities, such as rural taxonomy, is more challenging.

Halfacree considered the rural as a social representation of space, noting that Moscovici (1984) talked about dealing with the world's perpetual complexity by simplifying and formalizing into social representations. He said social representations have three functions: to organize, understand, and interact with the world. All are part of the central cognitive stages of everyday life.

In earlier work (Halfacree, 1993), he said he argued that rural could be

seen as one example of social representations, namely a social representation of space. He cited Copp (1972) for describing rural as an important rhetorical device of intractable popular significance. In terms of a social representation, Halfacree said the rural according to Moscovici's theory would have a relatively stable core, a figurative nucleus, and more transient associated elements. It would be a combination of concrete images and abstract concepts. He said that Moscovici saw these social representations as social, very much encultured, and not inherently as individual constructs.

To apply a social construction and social representation perspective, he identified two principal tasks. The first is to discover how space is socially represented among a particular group of people or in a region to find out how they imagine the space around them. The second task is to discover place and prominence of the rural within this process, using ordinary language that indicate which categories stand out, how people imagine and talk about the space around them, and how they organize it and use it. He asked a series of questions: Where does the "rural" fit in that? Who shares each of these social categories? If the rural does feature strongly, does it feature for everyone or does it feature for particular groups in society? Which social delineation (class, ethnicity, etc.) seems to be most important?

It is also important to think about historical and geographical variations, Halfacree stated. Historical variation is often captured by culture and cultural change. How does rurality, or people's ideas about rurality, change over time? How does the concept of rurality vary between different countries, for different types of physical geography, or different physical climactic environments?

Questions About Rural in the United States

Halfacree questioned how the concept of rurality in the United States is based on the impact of British ideas of rurality. Second, he asked about the validity of seeking one way to define rural. Is there a reason to make allowances for regional variations, he asked, noting his question also applies to the OECD quest for global definitions of rural. His third critical question related to the legitimacy or value of the term "rural" beyond the academic or policy arena. In other words, how much do people on the street recognize and use the term? There may be a need to investigate this assumption through surveys and other methods, he suggested. His fourth critical question was, if rural is accepted as a key concept, what is its figurative nucleus? He questioned the place and importance today of more traditional ideas of the rural such as agriculture, isolation, and

remoteness versus more "novel" elements such as use in leisure and recreation, amenity value, and scenic beauty.

In closing, Halfacree stated that he would argue that the social construction and the social representation idea of the rural has proved very influential, certainly in British rural studies and beyond from the 1990s into the 2000s. As a result, he said he believes the concept of "the rural" as something socially constructed by groups and from experiences is important. However, the current trend is to consider the rural a bit more broadly. The physical reality of the world also needs to be taken into consideration when constructing any indices or measures of rurality. However, he concluded, that is beyond the scope of the present talk.

OPEN DISCUSSION

Mark Partridge (Ohio State University) opened the discussion with a suggestion directed to Jensen. He said if LMAs are defined and ERS puts them online, people will use them; they will not look at the documentation or caveats. Recently, he said, people who do not normally conduct regional and urban research are using LMAs without understanding them. The other issue is that a classification system is designed to cover the whole territory, and each part of it has some number attached to represent its LMA. As a result, some marginal areas are included that have very little connection with the other parts of the region, especially at the edges. He suggested a special designation for areas with only a weak attachment to their assigned LMA as a way to remind users of the caveats.

John Pender (ERS) asked about dimensions that go into alternative classification systems, noting that Cromartie earlier summarized those dimensions for the ERS classification systems (see Chapter 2). There could be an aspect of validation involved with getting people's opinions of "rural" to identify the kinds of dimensions that might be involved. He asked about other work validating the dimensions that might go into a classification scheme.

He noted that an issue related to thresholds is that it is not clear how they are set. He suggested that thresholds could be set to maximize explanatory power for a set of outcome variables, such as poverty or industrial composition, by comparing how well different threshold levels stack up in terms of the share of the variance that is explained by different thresholds. He suggested that a research opportunity might be to look at validation of thresholds so they do not seem arbitrary.

Waldorf observed that the most important underlying issue is the way dimensions are selected. They also seem to be selected in an arbitrary way, or at least one not perfectly justified, she said. Theoretically, there are an infinite number of typologies, with a typology for every additional

dimension and threshold. The question is what is rurality and how a definition can be validated without typologies. She said she believes it is impossible, but robustness checks can be made by following up with different types of rurality measures.

Michael Ratcliffe (Census Bureau) said Census Bureau staff are trying to understand the origin of the 2,500 threshold. At the end of the 19th century or early 20th century, Census Bureau geographers felt that places of 2,500 contained the kinds of services and functions typically urban at that time. He observed that he discussed with Cromartie, Fitzsimmons, and others whether 2,500 is still meaningful, noting 50,000 was used in some earlier definitions of urban areas in the early 20th century and was adopted as the starting point for cities and urbanized areas. In 1950, part of the decision about the threshold was driven by resources and limitations on the ability to manipulate data for the country. With automation, it would be possible to consider any threshold, but these thresholds are enshrined in programs and legislation. Every time they try to change a threshold, someone is impacted negatively, Ratcliffe said.

Michael Woods (Aberystwyth University) referred to Figure 5 of the workshop-commissioned paper (Waldorf and Kim, 2015, p. 16) in which the authors showed areas with decreasing rurality and areas with increasing rurality between 2000 and 2010. He said that his meta-analyses suggest that rural is becoming urbanized. He asked Waldorf if her areas of increasing rurality are another way of saying these areas are losing population. He asked whether changes over time indicate that areas are becoming more or less rural, or whether the nature of rurality is changing, which he said also links to Halfacree's presentation.

David Brown (Cornell University) proposed two reasons for partitioning geography and the population into urban and rural areas. One is for scholarly research, to figure out if, net of other factors, living in a place called "rural" makes a difference to outcomes such as poverty. The second reason is for policy, to determine if structural differences between areas require different service delivery approaches or a need for different eligibility criteria. He observed that a different way to phrase the question is, "Does rural make a difference either in certain outcomes or in terms of public policy?"

Brown referred to one of Halfacree's questions about how a hybrid combination can underpin the necessary task of mapping rural. He asked if by hybrid, Halfacree meant a combination of structural approaches and a more social constructive approach. He went on to ask how these threads could be brought together. Halfacree responded that hybridity was partly as Brown described. The whole idea of validation and checking on the terms used is central. It is imperative to think carefully about defining "rural" areas. In that respect, many so-called definitions of rural

are constructed, he said. They are not really definitions of rural, but rather definitions of a particular problem, such as isolation or remoteness. A more comprehensive idea of rural space needs to make allowances for what people understand and utilize as the concept of rural space.

Robert Gibbs (ERS) commented that not only is the concept of rural socially constructed, but also the social construction is infused with power. If the social constructions of rural are infused with power, then those who develop classifications are exercising power, he said. The question is, what are the consequences, who gains and who loses? There are different ways the construction and the labeling of things as rural might have consequences, he said. He noted the purposes of classification had been discussed, but not the consequences, except in terms of providing health care facilities and such.

Tom Johnson (University of Missouri) commented that the discussion of dimensionality of rural suggests two research questions: what are the dimensions and what weight should be attached to each dimension? Researchers would not want to limit themselves either in dimensionality or in the weighting of those dimensions, he said. Instead, it is important to look at the relationship between density, remoteness, and the outcome variables. The concept of rurality is more one of communication and explication of these issues following the research.

Gregory Hooks (McMaster University) commented on the discussion of power and social construction. He said the first OECD classification would never apply to a country based on Anglo-Saxon settler societies, like Canada, the United States, or Australia. Rural does not mean the same in all places across a continent, and remote areas may be overrepresented with indigenous peoples, he stated. The idyllic image of what rural means may vary depending upon historical processes and their legacies. The variation in U.S. and world history, Hooks said, brings into sharp relief that very precise measures of rurality are not the same.

4

Changes in Society and Economy and Their Impact on Rural Area Classifications

This chapter summarizes the fourth session of the workshop, which was a panel discussion on the the changes in society and economy during the past few decades that have transformed the nation's settlement system and contributed to the need for reconsidering rural-urban classifications systems. Panelists were Bruce Weber (Oregon State University), David Plane (University of Arizona), David Brown (Cornell University), Linda Lobao (Ohio State University), and Jeff Hardcastle (University of Nevada, Reno, and Nevada state demographer). After the panelists' statements, they responded to each other. The panel discussion was followed by an open floor discussion. James Fitzsimmons (U.S. Census Bureau) moderated the session discussions.

STATEMENT BY BRUCE WEBER

Weber stated that rural classification systems are created to help characterize how context varies across space and how spatial development patterns affect social and economic outcomes. He noted that a rural classification system should be able to capture both urban hierarchy and the spatial aspects of these patterns. The system should show how these patterns relate to the social and economic consequences that policy makers care about: jobs and income, poverty, regional inequality, and economic mobility.

Forces/Changes Affecting Cost of Distance and Spatial Development Patterns

Weber said that four forces affect both cost of distance and spatial development patterns: (1) Changes in information and communication technology that facilitate speedy and inexpensive transfer of ideas across space; (2) innovations in production technology and productivity-enhancing investments that are embedded in the innovations and concentrate production spatially; (3) transportation investments that speed transfer of people and products and movement of innovation across space; and (4) agglomeration economics that favor concentration of people and production across urban space.

These four forces have resulted in globalization and changes in urbanization across the rural and urban continuum, he noted. To organize his perspectives a little differently, information and communication technology (ICT), innovations in production technology, and transportation investments have reduced the cost of distance and fostered global trade and development, which results from the interaction between technology and transportation investments. These same forces, he said, have led to urbanization and rural depopulation. ICT and transportation investments have reduced costs of distance and fostered urbanization but have also contributed to urban deconcentration and rural depopulation. According to Weber, the country has moved from technology to spatial development patterns.

As Weber explained, spatial development patterns have consequences and may generate socioeconomic outcomes that vary across places:

- Urban size, the place in the urban hierarchy, and distance from urban centers lead to differential job and income growth and diversification (Partridge et al., 2007b).
- Spatial development patterns also affect variations in poverty, income inequality, and intergenerational economic mobility.
- Census data, as well as research by Chetty et al. (2014), show cross-regional disparities in income and wealth and that upward mobility varies across space.
- Research by the Economic Research Service (ERS) has shown that food insecurity varies across space.

A useful rural-urban classification system would help illuminate spatial patterns and how socioeconomic outcomes vary with them, Weber said.

Implications for a Rural Classification System

Weber said that policy makers and citizens want to know whether spatial variation in key socioeconomic outcomes across urban-rural space is consistent with social norms regarding fair distribution of resources, equality of access, and opportunity. Providing policy-relevant information about rural-urban differences in resources, access, and socioeconomic outcomes requires a rural-urban classification that conforms to common understandings of rural and urban characteristics; is rich enough to capture important spatial patterns in urban and rural development; and captures rural-urban differences in key social and economic outcomes.

He stated that these needs basically lay out the key features of a desirable rural classification system that can distinguish urban and rural areas along such key dimensions as size of population, density, and remoteness from urban centers. Further, he said, it is important for a classification system to capture important spatial development patterns such as urbanization, urban deconcentration, and rural depopulation. Finally, it is also important to accurately characterize rural-urban and spatial differentials in the key social and economic outcomes of interest.

He observed that the ERS Rural-Urban Continuum Codes (RUCC) have some of these features. The RUCC allow one to observe interesting spatial differentials on intergenerational upward mobility, for example. On average, absolute upward mobility appears to be higher in more rural areas. It is highest in small-town nonadjacent nonmetro counties and completely rural nonadjacent nonmetro counties, Weber noted. Within metro areas, absolute mobility is lowest in medium-sized metro areas.

In closing, Weber noted that Isserman (2005) observed that (1) core-based statistical areas (CBSA) capture integration of rural and urban in an urban-centered system, and (2) the Census rural-urban classification system captures separation of urban and rural. According to Weber, this led Isserman to conclude that CBSA and metro/nonmetro classifications were fundamentally misguided as a way of capturing "rural." He said Lichter and Brown (2011), Irwin et al. (2009), and others have noted that the boundaries between urban and rural space have blurred as the functions of urban and rural space become increasingly overlapping.

He reminded the audience about Halfacree's observation (see Chapter 3) that perhaps the idea of locating rural in space does not make sense. He said these cautions are important to keep in mind as classification systems are reevaluated.

STATEMENT BY DAVID PLANE

Plane focused on the geographer's concepts of place and situation. He said he would deconstruct the topic of rural areas (or rural classification systems) from these two different locational concepts.

Place-Based Perspectives

Plane noted that one way to define a geography uses the perspective that places have meaning; they are derived from their setting or milieu, or the totality of their physical and cultural attributes. A traditional place-based perspective on rural includes a spectrum, and he said he would focus on three aspects. First is simply that a rural settlement has low density, which seems to play a major role in many definitions. A second aspect is that rural economies traditionally have featured resource-based, primary-sector livelihood systems. The third is that rural people, as distinct from urban people, are "local people." In some parts of the world, this characteristic may be still true, but in the United States, it may be disappearing, Plane said.

Plane noted that it is time to reconceptualize how density is measured. Density has always been a property of areal units, but other options are now possible. It is possible to start from a location, go out to some threshold such as 50 or 100 miles, and calculate the density at that point on the Earth's surface, as demonstrated by the ERS approach to Frontier and Remote Area (FAR) Codes. He observed that a time threshold, such as driving time, might be even better than a mileage threshold. A threshold is needed to calculate a density, but the result could be aggregated up on a per capita basis, he suggested.

In terms of livelihoods, rural areas are not all about agriculture anymore. In the United States, many manufacturing companies seek out rural areas. Plane referred to a map from the Chicago Federal Reserve Bank that showed the locations of auto assembly plants in rural areas in the South as an example. Plane observed people are not fixed geographic points, though the Census Bureau still uses the concept of the master address file. People move around, and he suggested rural people's activity spaces may be larger than those of urbanites. He commented that a metro area is defined to be a place where a lot of people's activity patterns overlap. Plane also noted many people have multiple residences and operate their lives out of multiple locations, something that will be more common in the future.

From a place-based perspective, both a strength of, and a problem with, federal rural definitions is the requirement for consistency, Plane said. The United States has different historical settlement patterns, and

these settlement patterns, the space economy, and political geographies are highly variable across regions. Rural definitions, in contrast to urban, are largely not place-based or defined as separate rural areas. They are either rurality or leftover nonmetro territory, and he asked what would constitute a meaningful definition of rural. People in rural areas do not necessarily identify with a single place in the same way that people in a metropolitan area do, he said.

Plane said most rural classification systems do not use the regionalization methods of formal, uniform, homogeneous regions versus functional, nodal, spatial interaction-based regions to the extent that they could in coming up with definitions, with some exceptions over the decades:

- Formal regions: The State Economic Areas were a collectively exhaustive/mutually exclusive county-based classification based on economic structure.
- Functional regions: The Bureau of Economic Analysis Economic Areas, now used only by OECD, are nonmetro portions of urbanized area hinterlands, plus nonmetro-centered nodal regions that predated the micropolitan area concept.
- Micropolitan Areas: Micropolitan areas are an attempt to define less-than-metro areas. However, Plane stated that they do not result in a uniform class of entities. In the East, they are leftover spaces between the interstices of metro areas. In the West, a micropolitan area could be an important central place with its own fairly big hinterland.

Situation-Based Perspectives

The metro concept is about an overlay of individual's daily activity spaces, Plane said. He referred to his work with Daoqin Tong (Tong and Plane, 2014), which looks at people's activity patterns regardless of where they are going, rather than as a relationship between a core and a periphery. The key conceptual theory to rural people's activity patterns, Plane said, is central place theory (Christaller, 1933), which concerns the situational aspects of rural households with respect to a hierarchy of other places. According to Huff (1976), rural consumers obtain their goods and services differently depending on where their homes are located within the hierarchically nested meshes of market areas. Moreover, Plane said, real-world activity patterns of rural people are even more complex than in the optimal world of Christaller's 1933 central place theory. Where a person is located matters in terms of his or her likely activity patterns. If anything, he said, central place theory understates the number of places

that rural people go as part of their daily lives, either in person or by telephone.

In closing, Plane stated that a revival of delineations based on place-based rural areas would be useful, as well as more research on situation-based rural regions and rural residents' activity spaces. He noted many federal definitions do not embed critical concepts of hierarchies. People live within nested hinterlands of multiple places, he said, whereas definitions are trying to get a mutually exclusive, collectively exhaustive set of regions that are only one level of the hierarchy. Plane stressed people live at multiple scales in terms of their relations with places up the hierarchy. He suggested a revival in interest in central place theory, with more research to identify current critical functions since the thresholds, market areas, ranges, and other characteristics are likely to be very different than when Christaller first did his work.

STATEMENT BY DAVID BROWN

Brown stated the issues discussed throughout the workshop are about people and not just places. He focused on increased diversity of the U.S. rural population. Brown referred to Louis Wirth's "Urbanism as a Way of Life" (Wirth, 1938). He said Wirth provided a sociological definition of the city, with three defining attributes being large, dense, and heterogeneous. By implication, rural areas were smaller, less dense, and less diverse. Brown noted size and density have been discussed, and he said he would discuss diversity as measured by population composition by race, ethnicity, and age.

Race and Ethnicity

Brown noted that historically, the overall nonmetropolitan U.S. population has been less racially and ethnically diverse than the metro, although not across the board. Two examples are in the nonmetro South (African Americans) and parts of the nonmetro Southwest (Hispanics). There has been a lot of redistribution of race and ethnic groups in recent years, including in rural or nonmetropolitan areas. Overall, the Native American population has grown faster than whites or Blacks in nonmetro areas since 1980, especially in particular regions. Hispanic populations increased dramatically in the Midwest, Southeast, and Pacific Northwest through immigration and higher fertility among in-migrants. Since 2000, racial and ethnic minorities have become a larger share of the population in over 80 percent of nonmetropolitan counties.

A redistribution of Hispanics from the Southwest into other parts of the nonmetropolitan United States does not mean increased integration

between Hispanics or other racial and ethnic minorities and the majority population, Brown said. Research by Duncan (2000) and Pfeffer and Parra (2009), for example, indicates that ethnic minorities and Anglos often live in separate social and institutional worlds. Research by Parisi et al. (2011) demonstrates enduring residential segregation in nonmetro America.

Age Composition

Changing age composition is another aspect of increasing nonmetro diversity, Brown said. Clearly the nonmetropolitan population is aging along with the rest of the nation, but according to the 2005-2009 American Community Survey (ACS), the nonmetro population is aging more rapidly than the metro. About 12 percent of the metro population is 65 years and above, compared to 15.8 percent in nonmetro areas. However, for non-core areas, the percentage is even higher—14.8 percent in micropolitan areas and 16.5 percent in non-core-based areas.

There are two different contexts for extreme nonmetropolitan population aging, Brown said: places that are destinations for older migrants and natural population decrease. Natural population decrease has become much more prevalent in the United States in both metro and nonmetro areas. Brown noted that retirement destinations can become natural-decrease counties if older in-migration is not accompanied by the in-migration of younger people.

Areas of natural decrease represent a diverse category, he said. They occur in a variety of geographic locales, with a heavy concentration in the Plains but spreading widely throughout the nation, in both metropolitan and nonmetropolitan areas. According to Johnson (2013a, 2013b), natural decrease is much more prevalent in nonmetropolitan areas than metropolitan areas.

Natural decrease occurs in various places at different historical times. Two different pathways lead to natural decrease: (1) chronic out-migration of young adults and their children produces a distorted age structure, resulting in more deaths than births even if the fertility rate of those people is at or above average; and (2) net in-migration of older people without concurrent or subsequent in-migration of persons of childbearing age. In much of Europe, low fertility rates are a main cause of natural population decreases, but age composition is the issue in the United States. The model situation for U.S. nonmetropolitan areas is out-migration at younger ages and in-migration at older ages. That is certainly the case with natural decrease counties, and more so the longer and more persistent the natural decrease is over that period of time. But the natural decrease category, like any other category, is very heterogeneous, noted Brown, and examining the heterogeneity within these categories is important.

Natural population decrease is not necessarily a problem unless it persists for a significant period of time, Brown said. In such instances, it can undermine an area's potential for future population growth, and it may reduce a community's ability to retain essential institutions and economic activities. Brown said it is important to recognize that natural decrease is the result of chronic out-migration of young adults and long-term population decline. Hence, from a policy perspective, chronic demographic decline would be a more appropriate target variable than natural decrease, which is itself an outcome of long-term decline and distorted age structure.

Conclusion

Brown highlighted four conclusions and questions:

1. Nonmetropolitan regions are increasingly diverse. They were never as homogeneous as originally imagined.
2. The increasing diversity of the nonmetropolitan population reflects economic transformations, increased longevity, and changes in opportunity structures. Dynamic global-local relationships expose nonmetro areas to new challenges and offer new opportunities in areas such as capital, labor mobility, and information technology. The increasing diversity also reflects increased longevity, and changes in life course processes.
3. Differing social and economic aspects of life in rural America are not mutually exclusive. An important question is how to recognize this lack of mutual exclusivity in statistical systems that categorize areas.
4. Statistical geographies that appear to be homogeneous, such as the natural decrease areas of the United States, are often highly diverse. How can within-variability be minimized and between-variability be maximized in substantively meaningful ways?

STATEMENT BY LINDA LOBAO

Lobao summarized some major changes that have occurred over the past several decades that would contribute to the need for reconsidering rural classification systems. She noted the following changes with different subnational geographic expressions/rural implications across the nation:

- Economic structure: Continuing rounds of restructuring are reflected in the quality and quantity of employment. Some exam-

ples are long-term declines in manufacturing and coal mining; growth in some rural areas in the new energy economy from the oil and gas industry; growth in care-work, such as personal services, health, education, and social services; and growth in the financial sector. These changes have varying spatial expressions. For example, services such as care-work are less spatially varied than the financial sector, coal mining, and oil/gas mining.

- Changes in the state: Continuing decentralization has occurred where responsibilities are passed downward to subnational governments. She said this has increased the importance of state and local governments in influencing growth and redistribution across places and populations, but also creates a patchwork of inequality due to the varying capacities of these governments and hence in the nation's social safety net. Local governments are particularly critical to the well-being of places and populations. If size of government is measured by employment, local governments are about 63 percent of all government employment.
- Institutional arrangements: Institutional arrangements have changed dramatically over the past several decades. Examples are shifts in the balance of power between business and labor, declines in unionization, attempts to dismantle public sector unions, and the weakening ability of the state to protect its citizens with the social safety net.
- Continuing growth of income inequality and other economic polarization: As noted by Andrew Cherlin (2014), the ability of the traditional working class to generate income sufficient for family livelihoods and family stability has declined.

Lobao said that these changes are conceptualized by some social scientists as a package that defines the current period of national development. Social scientists characterize this as the "neoliberal period," a period in which state and market relationships have changed to some degree fundamentally.

Major Changes: Local Governments and Geographic Diversity

Lobao pointed to research on the growing importance of subnational governments in many nations besides the United States. The United States historically has had a more decentralized governance system when compared to Europe, but she said some analysts see increasing trends toward "fend for yourself" federalism. As noted above, local governments are already about 63 percent of all civilian government employment. Counties were the fastest-growing general purpose governments, at least up to the

recession. If the size of government is measured by employment, county governments are larger than the federal civilian government.

There are disparities across local governments in fiscal and administrative capacity and public service provision. This results in stratification of the U.S. population into places that offer high-capacity, expert government with better protection from poverty and downturn versus places that do not. For example, she said, even though county governments tend to be the major government for unincorporated areas, rural county governments have less capacity and provide fewer services.

She said variations across local governments appear to be increasing due to several factors:

- Declines continue in state and federal funding and the dumping of fiscal problems downward to localities.
- Localities become increasingly dependent upon own-source funds and facing specific fiscal problems, which makes it more difficult for local governments to provide public services.
- The fallout from the Great Recession likely has increased variations across governments. However, limited data, small sample studies, and focus on high-profile/often-urban governments may contribute to a delay in knowledge about this. No countercyclical response was seen in local government employment over the recession period, at least in much of the data. According to Dadyan and Boyd (2013), almost half-million local government employees were lost within two years after the recession. Analysts are debating if this is the "new" normal for local governments as opposed to coping with decline as "normal." She said some researchers find that local resource scarcity is long term and ongoing and it has been for 30 years or more (Perlman and Benton, 2015).
- Partisan polarization has added to variations across local governments, she said. Local infrastructure requires federal intervention, she stated, but partisan polarization has disrupted the U.S. system of fiscal federalism (Kettl, 2015). If the federal level cannot deal with serious governmental issues, what will happen at the local level, she asked. Local governments are confronting these issues in different ways. Immense geographic diversity is seen in the capacities, the resources, and the specific issues that local governments face.
- The outcomes of the future system of intergovernmental relations are debated by scholars and policy makers. Some see the prom-

ise of more autonomous local governments, such as the policy school of "progressive federalism." Others stress the difficulties in local governments' ability to provide equity and growth functions; they see problems escalating across the nation with harm to places and populations.

Local Governments and Rural-Urban Variability: Counties Across the United States

Lobao reported on results from primary data from a survey conducted in 2007/2008 in collaboration with the National Association of Counties (NACo). Even though the data were collected at the cusp of the recession, they are still the most generalizable data available on nonmetro and metro counties. The survey focused on the 46 contiguous states with county governments (Connecticut and Rhode Island lack county governments), and data were collected from county commissioners and other county officials. The survey is unique for its high response rate of 60 percent. Contrasts were presented between metro and nonmetro counties. Within nonmetro counties, comparisons also were made between micropolitan and noncore counties and between metro-adjacent and nonmetro-adjacent counties. She summarized the findings:

- Government capacity: For a list of 28 county services, there are significant metro/nonmetro variations in all but eight services.
- Economic development policies: Metro counties use more overall and a greater mix of policies that span business attraction, local business support, and workforce development. Marketing a county as a site for a prison is reported more frequently by micropolitan counties compared to other counties.
- Barriers to economic development: Metro counties report fewer barriers, except for school quality. Micropolitan (relative to other noncore and metro-adjacent counties) were less likely to report limited employers as being a problem.
- Resource shortages: Nonmetro governments have always been more limited. They report lower rises in service demands and less pressures to reduce taxes, but greater pressures from loss of state revenues. More dynamic metro governments are more likely to cut back, privatize, and use hiring freezes. Metro governments provide greater services overall, and hence when resource shortages occur, they have greater capacity to make adjustments.

Concluding Comments and Implications for Revised Rural Classification

Lobao concluded that local governments are increasingly important for analyzing and understanding the path of development across the subnational United States. Extensive diversity exists among them. This warrants more of a spatially sensitive subnational approach beyond binary rural and urban categories. However present metro-nonmetro classifications do yield some systematic patterns. Lobao indicated that their data suggest micropolitan status seems to capture some unique attributes of rural counties.

Counties, perhaps even more important than in the past in analyzing key subnational changes, combine policy-making units with population aggregates and capture some conceptualizations of "place" in terms of administrative unit, local social system, and community bond, culture, or place identification. For counties, total government and population size, distance from metro areas, and presence of a larger urban area appear to have some relationship with policy choices. She noted a caveat: These relationships may vary when different control variables are added in multivariate models. As units of analysis, administrative units can be expected to have increasing importance for national well-being. Municipalities, too, may offer an important lens.

Lobao said continuity and change exist in structural forces influencing rural America and in their geographical expression. Updating classifications with an eye to recent changes playing out across the entire subnational United States would be useful to researchers.

STATEMENT BY JEFF HARDCASTLE

Hardcastle focused his remarks on his experience in Nevada. There, he said, rural still matters, but the question is how to talk about it.

Aging of the Population

Aging is an issue in Nevada, Hardcastle said. Based on median age from the 1990, 2000, and 2010 decennial censuses, Nevada's population is aging faster than the U.S. population. The two most aged counties are Esmeralda and Mineral Counties, which are adjacent to each other and the most isolated in the state. Douglas County has an older aging population and probably the next highest median age, but it is an amenity county attracting wealthy seniors.

Nevada's population is changing. Hardcastle said. There are different perspectives regarding population density in the state. Populations within

the counties are very dispersed around the state and in some cases have very small population concentrations. Nevada is the least densely populated state in the country, but at the same time one of the most urbanized, although that does not quite hold on a county-to-county level. Nevada cities are growing, while rural counties are losing population. Defining populations as urban and rural based on population density does not always account for the issues discussed at the workshop, he said.

Definitions Matter

Is a county urban, rural, frontier, micro, or metro, Hardcastle queried. He observed these definitions arise in his work, and they matter. They can be analytical or operational for research purposes. They can be administrative, such as how to classify a unit of government and collect taxes. They can be programmatic, such as for grants or other programs. They can be colloquial, such as how people refer to themselves and see their place in the universe. Hardcastle said these definitions may conflict or complement each other. Someone may have a perception of being rural, but that perception may not necessarily match up to the micropolitan, metropolitan, official, or research-oriented definitions for their community. Distance and density may not always be a good indicator of ruralness or rurality.

How important is the geographic unit, Hardcastle asked. Talking about rural characteristics, he gave as an example a call he received when his population estimates were released. A reporter wrote as the headline about the estimates, "Nevada City Is Growing, Rural Counties Are Getting More Rural." He noted the reporter's implication that because counties were losing population and shrinking, they were becoming more rural.

He contrasted this to an idea by Popper and Popper (1987) and Popper et al. (1993) about the idea of Buffalo Commons for the Great Plains. They described the loss of population, but also the potential revival of that area through going back to a natural, more steady-state ecosystem where more of the natural grassland is reestablished. Loss of population and rural characteristics can have different interpretations, Hardcastle said. Losing population does not have to mean that the community is lost.

Hardcastle said that Warren (1978) talked about a community's institutions being vertically and horizontally integrated. How those two points intersect is how an institution or a community is seen and what makes it unique. For instance, a hardware store could be locally owned and operated responding to local needs (horizontal integration) but get goods through a national or regional distribution chain (vertical integration). That can be compared to a national chain that establishes national

goals for the sale of goods and controls distribution (almost total vertical integration).

Governance, Knowledge, and Skill Capacity

Hardcastle noted that governance does not just mean local governments, but the larger institutional political system within a community. At times, older entrenched interests in communities have to address changing economies, economic situations, or even environmental situations. For example, he said, in one rural county, water is being depleted through mining while people still hold onto agricultural watering. There is an imbalance between the older agricultural interest and the mining interest. Also, local governments tend to have small staff and limited resources and are serviced by volunteers. They are often frustrated by having to deal with federal or state regulations, he observed.

Regarding the economy for local rural communities, Christaller (1933) talked about the idea of an intercepted economy. Some Nevada communities are isolated, but some also are intercepted, said Hardcastle, such as Elko, which is trying to grow between Salt Lake City and Reno. Those two very large economies are competing for any services that get in there. The other communities are going to be intercepted between them. In economies that boom and bust over time, as seen in the western region, overcapacity from the boom has to be reabsorbed over time.

Culture, Technology, Identity

Hardcastle noted that changing tastes or markets often influence movement of people, such as senior citizens returning to central cities. That is an indication that preferences are changing. To market themselves, for example, some locations look at instituting public art to draw people in and get them out of their cars. Other areas sell themselves as being patriotic and a place to visit.

Hardcastle talked about looking at Nevada's counties through four definitions of rural and urban: the National Center for Frontier Communities, the National Center for Health Statistics, the Office of Management and Budget, and the USDA's Rural-Urban Continuum Codes (RUCC). Micropolitan areas classified as frontier are on average 47 percent rural and have an RUCC of 6. Non-core frontier areas are on average 71 percent rural, with an RUCC of 8. Micropolitan areas are less dependent on resource extraction, but extraction remains a very prominent sector. The biggest difference is that they have larger heath care, retail, and tourist sectors. Micropolitan areas serve as service centers for the surrounding region, he explained.

The outlying county in this analysis, according to Hardcastle, was Storey County with 93 percent of its population classified as rural. It is classified as medium metro, not a frontier county with a 2 RUCC designation because it is part of the Reno metropolitan statistical area. It is also the site for the Tesla gigafactory with 6,500 direct jobs. Local agencies have been looking at the plant and its impact on the region. Some comparisons for the potential impact of agglomeration economics have been made to other metropolitan statistical areas, such as Provo, Utah. More appropriate comparisons might be to combined statistical areas because the Reno-Carson City-Fernley, Nevada, combined statistical area captures the region that will be impacted. He said this project illustrates two points by other panel members: location matters for agglomeration, and impact depends on the specific location. For example the impact of the Tesla plant would be different if it had been sited in Washoe County with different multiplier effects. Also, as David Plane pointed out, there are different levels of hierarchies, and the combined statistical area concept is one of those hierarchies.

Hardcastle addressed some issues relating to technology and change. For example, mining is often thought of as building tunnels or digging holes, but technological changes have increased production and lowered the cost per worker. In contrast, cable television was developed first for the rural part of the country in especially mountainous regions. That technology has become ubiquitous and has impacted the delivery of information across the country. It is interesting, he noted, that rural areas are now getting broadband.

PANEL DISCUSSION

Brown asked Plane about reconceptualizing density by changing the denominator so rather than a geographic unit, it would be a measure of time such as travel time, and then asked about the numerator. He suggested thinking about density as the number of social interactions or transactions or something else that expresses the reality of the social and economic life that occurs in geographic regions. Plane responded that traffic might be an interesting variable. However, he observed, one needs something that can be measured.

Brown observed that Barry Wellman, a network analyst, has worked on the density of social interactions to show how people in social relationships in metropolitan areas have changed over time; what appeared to be a loss of locality was a more extensive locality within the metropolitan areas (Wellman and Hampton, 1999). Plane commented that much big data research is very much in that mode.

Hardcastle asked Lobao if school employment was included in her

figures on total county government employment. She clarified respondents were asked to exclude school employment.

OPEN DISCUSSION

Brigitte Waldorf agreed with Plane's observations that people's activities should be viewed in both space and time, but said she sees challenges because it affects both the denominator and the numerator of an indicator. An example of where activity in space and time becomes very important is a labor market area because people often have two or three jobs. Plane responded that the single-minded focus on commuting time is the key issue. It has its problems, but asked if there are data to go beyond that. For example, he said, people migrate because it is a constrained world and they are likely to move to places where they can find jobs. He added for other kinds of activities, maybe the actual market areas for different goods and services to identify spatiality should be looked at. Lobao pointed out the policy-making unit is also important. To influence policy makers, there should be a focus on people's lives. She commented because of decentralization, counties and municipalities are increasingly important to making policy.

Steven Turner (Southern Rural Development Center) commented on the barriers to economic development faced by counties as shown in Lobao's survey. He noted the respondents in the most nonadjacent, nonmetropolitan category saw no problem with the quality of their public schools. He said that is clearly their perception rather than the outsider's perception. Lobao responded that quality was not the real issue. This is similar to a quality-of-life measure, with subjective versus objective measures. County administrators subjectively assess their schools as good.

Gregory Hooks (McMaster University) observed that pressures for funding formulas and policy call for an answer. He said he has started to wonder how often it is useful to reduce a multidimensional concept to a zero-one variable.

Hardcastle referred to an analysis of workforce development in underserved rural communities conducted by a colleague. It was hard to find data at the county level and to relate a range of ruralness and urbanness to anything meaningful about workforce development. Sometimes, definitions need to be cleaned up for policy discussions so that conceptually there is a clearer, common sense theme that people who write grants, for example, could utilize.

Weber observed that rural classification systems need to assess the impact of context on outcomes. The context people live in affects whether they are poor and whether they have a job. Density affects outcomes and distance; remoteness affects outcomes. While it is not possible to change

remoteness, density can be changed a little. What else can be changed about context? A classification system that would identify places that need investment to change undesirable outcomes would be invaluable, he suggested.

Michael Ratcliffe commented that the Census Bureau receives many questions, challenges, and complaints about where boundaries are drawn. These challenges are made because the line that defines urban may keep a community from achieving a programmatic goal. For example, in examining the criteria for urbanized areas for the 2010 Census, they were considering the correct distance for jumping across low-density, intervening territory that separates two areas of high density, the core and an outlying urban use. They adopted 2.5 miles in 2000, but a 1.5-mile distance had been used from 1950 through 1990. One community wanted it to remain at 2.5 because that maximized their urban area for funding purposes. In contrast, the rural health community favored 1.5 miles so that they could minimize the urban area, drop below 50,000, and get the funding that they felt they deserved.

Ratcliffe observed these thresholds are fairly arbitrary. He suggested a continuum that allows geographers to say whether places are definitely urban or definitely rural would be useful. Flexibility is needed from a policy standpoint, he said, so that communities can find where they fit, and policy makers and decision makers can find a way to say that a mixed area might qualify a little bit for both. He said after 25 years of dealing with challenges, he does not think the dichotomy is working anymore.

Robert Gibbs commented that he found it interesting that Brown began his presentation quoting from Wirth (1938). He recalled that in the 1960s, in the United Kingdom, the urban-rural continuum was confounded when researchers in London found all characteristics that were supposed to apply to rural communities in urban areas, and vice versa. The idea of mapping a continuum from urban to rural crumbled. He said that he was attracted to the way Lobao looked at the changing role of the state, noting the importance of trying to understand the challenges and how they might change in different places.

He asked about work on the social relations that characterize different rural places, such as *The Differentiated Countryside* (Murdoch et al., 2003). That work identified different types of rural places according to the dominant social relations, such as the paternalistic countryside where large landowners held the power, the clientelistic countryside where the state held the power and people tried to get money from the state, and the contested countryside where urban income was moving in and disrupting established social relationships and norms. While they would be different in the United States, social relations differ in different parts of the rural United States, and the relationship with poverty would be key.

Ken Johnson, referring to James Fitzsimmons' earlier presentation, remarked that he appreciated the problems the federal agencies face related where the rural/urban line is drawn. He questioned whether any set of definitions could actually satisfy all users. He referred to a statement that the classifications are intended for statistical purposes only. John Cromartie responded the reason for the concern is that definitions have consequences for funding. But he suggested better communication about the fact that rural classifications, especially in the United States, are fuzzy.

Hardcastle ended the session with a suggestion that something like health care services provided in a region be included in a definition to make the concept broader and more usable. He said that he picked health care because funding seems to revolve around it, and health care can vary by both size of place and by area.

5

Different Ways to Conceptualize Rural Areas in Metropolitan Society

This chapter summarizes the fifth session of the workshop on different ways to conceptualize rural areas in metropolitan society. The session was organized in two parts. The first part began with a presentation of a commissioned paper, *Conceptualizing Rural America in a Metropolitan Society*, by Michael Woods (University of Aberystwyth), followed by two discussants and open discussion. John Logan (Brown University) provided an urban sociologist's point of view. Gregory Hooks (McMaster University) presented a regional inequality point of view. The second part of the session focused on the urban-rural interface as a space of integration rather than of separation, with views presented by Daniel Lichter (Cornell University) and Mark Partridge (Ohio State University). This was also followed by open discussion. David Plane was the moderator.

STATEMENT BY MICHAEL WOODS[1]

Woods stated that the distinction between urban and rural is one of the oldest forms of organization in history in terms of the special organization of human society. While relatively simple in the past, the precise definition of rural and urban has not always been straightforward and has become increasingly complex with the rise of metropolitan society.

He said that Landis (1940) captured the problem of fitting rural society into metropolitan society and recognized that rural America is not

[1]This presentation is based on Woods (2015).

homogeneous. The problem of defining rural and urban and thinking about where rural fits into metropolitan societies is something that has been debated for some time. Part of the reason why it is problematic, he observed, is because throughout much of history, rural has been defined predominantly from an urban perspective. This can be seen in a number of ways:

- Residual definitions (i.e., remnants of urban definitions based on population size or type of land use): rural is the residual place beyond those places.
- Rural is defined in terms of accessibility to urban areas.
- Rural is defined in terms of functions performed for urban areas. Rural space provides for urban areas, whether for provision of food, fuel, or recreation.
- Rural is defined by level of development relative to urban areas, such as provision of services or issues of poverty and equality.

Wood said that each of those contexts considers the rural relative to the urban, creating methodological and conceptual problems. Apart from the methodological problems of defining the areas, the units of assessment and the problem of setting thresholds are conceptual problems of an urban perspective being predominant.

First, he said, this approach overemphasizes the homogeneity of rural areas, especially when using residual definitions, seeing rural as the residue of an urban category.

Second, he said, this approach suggests that the urban environment is the default or climactic state—defining urban land use in terms of buildings, roads, canals, and quarries implies that the only true rural land use is undeveloped. With this approach, rurality is nothing more than the state of transience between the wilderness and the city.

Third, he said with the increasing integration of rural and urban economies, cultures, and social structures, defining rural from an urban perspective leads to describing that process as urbanization because that high state of development is viewed as an urban feature. The term "urbanization of rural" is used, even though these processes may have consequences that are just as transformative in cities as they are in the country. Woods said a number of conceptual issues arise from having a predominantly urban perspective on what it means to be rural.

Analytically, he said, it presents a challenge in terms of trying to identify what the use of the rural as an analytical category was. The integration of rural and urban economics, cultures, and social structures are commonly described as "urbanization," even though consequences may be as transformative in cities as they are in the country. This led

some geographers and others writing in the 1980s and 1990s to question relevance of the term.

Woods said it is premature to "write off" the rural. Rural still has meaning; it still has power as a brand that attracts people to buy goods because they are rural in nature. It is a category that encourages people to invest money in buying property and moving for lifestyle reasons and is a source of identity for many people. In some cases, it can lead to political mobilization to defend rural cultures and interests. There is still a potency to rural even though analysts struggle to define exactly what that rural might be.

A Rural Perspective

Woods said that he was asked to think about the place of rural in metropolitan society from a rural perspective. As Keith Halfacree said earlier in the workshop (see Chapter 3), it makes sense to start from the perspective of thinking about rural as a social construction and representation. He said these are invented categories articulated through what might be called lay discourses. Each definition is a particular discourse of reality, with public policy and media representations.

To approach this divide from a rural perspective, Woods cited Jones (1995, p. 38), who called lay discourses of rurality "all the means of intentional and incidental communication, which people use and encounter in the processes of their everyday lives, through which meanings of the rural, intentional and incidental, are expressed and constructed." In other words, he asked, how do people who live in the countryside and engage in the countryside understand the place in which they live to be rural on an everyday basis?

Woods said that he reviewed a range of studies and reports to try to identify lay discourses of rurality and to pull out features that people refer to in order to describe the context in which they live as being rural. This is not as straightforward as statistical analysis because there is not much data. Woods said that he pulled together evidence from academic papers and studies from a number of countries, as well as journalistic accounts and exercises by foundations and interest groups. These sources present extracts from surveys of people in rural areas talking about what rural means to them; words and phrases that survey respondents felt described rural America. By definition, much of this evidence is qualitative. Few of these studies have tried to present a more quantitative summary of these statements. Focusing on some of these qualitative data, Woods identified key themes.

Landscape and Environment

The first theme is around landscape and environment, which shows some correspondence with official functional definitions. People might characterize a rural area because it is a small town, a village, or has ample space. There is also correspondence with residual definitions of rurality in terms of people seeing local areas as rural because of the absence of certain urban features from that landscape.

He said perhaps a more interesting observation is the positive associations of the things people see in a landscape, which to them makes it rural. To quote one rural resident in England, "the woods, the fields, the plowed fields, the sheep, the cows, the walks I go on, et cetera." It is not necessarily just the presence of these certain features and landscape that makes something rural to the respondents, Woods pointed out. For some respondents, to be truly rural is for the respondent to have a particular knowledge of the landscape and its features. For others, the characterization of the place as rural is about being in a village, often tied to the kinds of facilities and services existing in that village. As an illustrative device, a word cloud of the relevant quotations is shown in Figure 5-1.

Agriculture and Agrarian Society

A second theme, according to Woods, is an association with agriculture and agrarian society, corresponding with some of the more formal definitions. The presence of farms, livestock, and fields were cited as why a place is rural. It goes beyond features being visible in a landscape; it is also about understanding agriculture, Woods said. As noted by a respondent to one survey,[2] "Rural is as much a state of mind as an actual place. It is an acceptance and understanding of people and things living in a mainly agricultural area, the practices and traditions." Particularly people who live on farms and work in agriculture see rural in terms of agriculture because that is the nature of their everyday lives. Woods observed that rural residents who may not have a direct involvement in agriculture talk about their encounters with agriculture as evidence that they live in a rural area. Others noted the infusion of farming through rural society. Woods noted the correspondence or resonance with the ideas of new agrarian writers in the United States about the nature of connections to the soil as the basis for rural identity, and the threat to rural identity that can come through things like the industrialization of agriculture.

[2]Woods (2005, pg. 12) is quoting from Countryside Alliance, a British pressure group that represents prohunting and profarming rural interests. In 2002, they asked their members what it meant to be rural. This quote was one of the answers.

FIGURE 5-1 Word cloud summarizing responses to "What is a rural landscape?" SOURCE: Prepared by Michael Woods (2015) for his presentation at Rationalizing Rural Area Classifications Workshop.

Community

Woods stated that a third theme identified in his analysis is about community, reflecting the importance of people and the interactions between them. It is the nature of rural society with everybody knowing everybody, everybody caring for everyone. Evidence of rural character of a place is often presented through anecdotes of social interactions and reference to involvement in community organizations and activities. These references can be a proxy for population size, but it is not the size of the population that makes a place rural. It is the form of social interactions and attributes such as feeling safe, he said.

The sense of social interaction is also associated with sets of traditions and values. People are still doing the same things in that society as 50 years ago. But community has also been associated with persistence of certain values, such as patriotism and religious values. On the other hand, he said, another narrative associates rurality with isolation and self-reliance. There is also an association in terms of tranquility and a slower pace of life. It is about peacefulness and the absence of noise.

Relative Rurality

Woods added that although people are making distinctions between rural and urban, there is recognition of relative degrees of rurality. Some places are more rural than others, and some places become less rural over time. The latter is often associated with the decline of agriculture and the dilution of community life.

The diversity of rural places means that these perspectives may be viewed differently by different people and social groups. Rural perceptions of the city emphasize crowdedness, busyness, pollution, noise, crime, and consumerism. Many long-term rural residents say that in-migrants perceive the country differently from them. But evidence suggests that difference between urban and rural perspectives is more a question of emphasis.

There are also complex mobilities of contemporary rural residents. Many people spend time moving between urban and rural space. Often when questioned, people talked about their experiences of rurality with reference to their experience of living in a city and how things were different.

Finally, Woods suggested that when talking about the urbanization of the countryside, it may be useful to think about the ruralization of the city, for example, people who work in the city during the week in order to support a lifestyle that involves going to a recreation hobby farm on the weekend. It may be useful to think about how certain urban areas or master planned estates can define themselves as villages to replicate some of the defined features of rural life in a mobile urban context. It may also be useful to think about the revival of urban agriculture, an effort that has been going on in places like Detroit, he said.

Conclusion

In conclusion, Woods questioned what happens if the attempt is made to define rural from a distinctively rural perspective. At one level, he said, there is little persuasive evidence that rural residents define the rural in significantly different ways than urban residents or urban agencies. He noted rural understandings of being rural go beyond simple definitions or lines on a map. Rural is understood primarily as a lived experience, including in ways that are more than representational. That creates a challenge in terms of translating some of this into metrics for defining rural and classifying the urban and rural. Woods concluded that the complexity of rural-urban entanglements in metropolitan society should be read not as the urbanization of the rural, but as a more complex mixing of urban and rural across space.

STATEMENT BY DISCUSSANT JOHN LOGAN

Logan provided a discussion from an urban sociologist's point of view. He started by saying that the questions about the urban/rural continuum or how to categorize urban, rural, and the transitions between them does not have much interest for urban sociology other than from a policy perspective. The central issue for him applies equally to rural and urban areas: that is, what kinds of local environments people live in and with what consequences for their lives. He referred to earlier comments by David Plane about spatial differentiation (see Chapter 4). Localities may differ in terms of the resources and the services available, costs, access to labor market, schools, opportunities for young people, and rates of infant mortality. He said he is interested in the kinds of spatial variation that exist, and how this variation developed.

Neighborhoods

Logan said that for an urban sociologist, the neighborhood is a central concept, and the ability to measure and compare neighborhoods is crucial. Urban sociologists demand data for neighborhoods, often census tracts, and link the data to information about individuals, as in the growing neighborhood effects literature.

Logan asked about neighborhoods in rural areas. He noted the different contexts in which people live, grow up, interact, and get to know each other. However, he asked, is there anything that he would recognize as a neighborhood? For example, does spatial inequality exist on a different scale in rural from urban areas?

Logan illustrated this question by comparing research he and a colleague carried out in an urban area in Chicago with a parallel project in a rural area in Duplin County, North Carolina, organized by Barbara Entwisle. The purpose was to examine how systematic social observation can be used in each context to document the social conditions faced by residents at the "neighborhood" level. Logan noted that a key interest was in the spatial scale of neighborhood conditions, whether the neighborhood is a single street segment, an extended group of segments, a census tract, or a whole zone of the city. His project considered that the effective scale of a neighborhood is the range for which neighborhood characteristics remain roughly similar. What stood out in the Chicago study was the extent of spatial variation at very small scales, a few blocks at most.

He again questioned whether the kinds of observations in a dense urban neighborhood can also be meaningful in a rural area. The North Carolina team noted that Duplin County is a rural area, with a sparse road network and not many people. They had to decide on the unit of

observation. Unlike in the city, in a rural area one cannot just look at a street segment. One approach was to use a length of rural road as a unit for areas outside small towns. In this county, 28 percent of the rural roads from intersection to intersection are more than half mile, and more than 10 percent are more than a mile. Nevertheless, even at this large scale, an area an urbanist would not recognize as a neighborhood, there was much spatial heterogeneity.

Logan asked if these road units are the equivalent of neighborhoods in rural areas, even if "neighbors" are well out of sight of each other. What is the scale at which people's local context matters? Logan noted a strong differentiation between the urban clusters and areas outside of a town boundary in these rural areas. The urban clusters can be identified by observing that the Census tracts are small because they have higher population density. The people are poorer, and there are higher percentages of Latinos or blacks than in the surrounding areas. The gap between the urban cluster and the rest is very significant, Logan said. Therefore, town/not town is a very important way to describe people's living environments and opportunity structures. To some extent, if the town has its own government and tax services, the political boundary reinforces the distinction.

On the other hand, a single school district may cover the whole county and differentiation by educational opportunity is the key to local opportunity structures. In much of the country, he noted, rural counties have a single school district and maybe only one school. Probably the closest equivalent to a neighborhood in rural areas is the county because it is a meaningful political decision-making and public service unit, with boundaries that are consequential to people's lives. But, he asked, if the county becomes the basis of community and social networks, which is the other important aspect of the neighborhood for an urban sociologist? These issues are relevant to the policy problem of how to define and categorize rural areas, he said. To understand rural America, how people live and what resources they count on, it is important to know the scale of local livelihoods and local community. If rural categories do not help in the study of such issues, they do little to advance knowledge.

STATEMENT BY DISCUSSANT GREGORY HOOKS

Hooks provided a discussion from a regional inequality point of view. He discussed challenges presently confronted by Native Americans, with a focus on reservations in rural areas.

Hooks said that American Indians and Alaska Natives fall between the cracks in federal data collection efforts. In calling attention to this failure and the organizing efforts to address it, he noted the National Congress

of American Indians makes reference to the "Asterisk Nation."[3] Neither the decennial census nor the American Community Survey (ACS) provide satisfactory information because of the difficulty of contacting individuals and high rates of nonresponse, and he said data collected by the Bureau of Indian Affairs is even worse. Tribal administrators lack information to administer programs and deliver services to tribal members and to other American Indians living in proximity to the reservation. Policy and/or social researchers have the unsatisfactory choice of excluding Native Americans from a sample or including them in a nonwhite category.

Hooks then reported on the work he and his students did assisting the Nez Perce tribe with data collection. The Nez Perce were attempting to gather data because federal data collection was so poor. The Nez Perce reservation is located in Western Idaho. The tribe serves approximately 3,500 tribal members and descendants, as well as approximately 2,100 American Indians living near the reservation who are not members of the tribe. With a relatively small population spread over a large area, the decennial census has been of little use. However with the creation of "Tribal census tracts," the 2010 Census took initial steps to address these deficits.

His students reviewed the Bureau of Indian Affairs (BIA) biennial *Indian Labor Force Report* and reported to the Nez Perce the methodology that the BIA employed in their data collection efforts. The BIA was charged by Congress in the early 1980s to conduct a survey to obtain information on the number of American Indians and their needs for purposes of developing funding formulas and other things. The data suggested improbable demographic and labor force stability over the period for the Nez Perce tribe. This was not uncommon for other tribes, he noted.

The BIA effort was based on calls to about 500 federally recognized tribes. The person answering the phone was asked how many Indians lived on the reservation, how many of them had a job, and other questions. If a respondent refused to participate or hung up the telephone, the BIA used numbers from a survey conducted two years earlier. Hooks characterized this as remarkably poor survey design. In 2009, the BIA reported that the survey did not meet federal data quality standards and began discussing strategies to improve data collection. However, since 2009, they have not published an Indian *Labor Force Report*.

Even if data collection were done well, providing accurate and up-to-date information on Native American populations would be challenging, Hooks said. For Native American reservations, the service population refers to American Indians, who by treaty rights have a set of services

[3]See http://www.ncai.org/policy-research-center/initiatives/data-quality [November 2015].

to which the federal government has committed, but not all American Indians live on their reservations. Until the 1930s, American Indians could not leave the reservations, he pointed out. Since that time, a number of American Indians have moved around. As noted above, in the case of the Nez Perce reservation, there are about 3,000 on the reservation and approximately 2,000 American Indians who are not Nez Perce who rely on the Nez Perce tribe for a range of goods and services, including food, education, and other federally mandated services. This creates considerable challenges for Native American tribes as they lack even basic information about the population they are expected to serve.

Given the paucity of information, neither tribal administrators nor social researchers have access to the most basic of information or trends over time. There are no valid data about population, poverty, labor market activity, and other characteristics. As long as the underlying data remain imprecise, American Indians and Native Americans, especially those residing on and near rural reservations, will remain the "Asterisk Nation," Hooks stated.

Hooks noted that although his comments are specific to American Indians and Alaska Natives, rural classification schemes can obscure other dimensions of inequality. He referred to Lichter et al. (2007), who shed light on underbounding, a process that leaves rural hamlets, typically populated by people of color and limited economic means, with diminished political voice and lacking access to basic infrastructure. This imprecision makes it difficult to study environmental inequality and other phenomena that rely on spatial precision, as he said there is reason to believe these underbounded areas face heightened environmental exposures. Another example he identified is the disproportionate building of new prisons in rural areas, distorting congressional districts by mass incarceration of urban youth who are deprived of the right to vote during and after their time in prison. Similarly, there are difficult and ongoing challenges confronting efforts to keep track of the migrant labor force in rural areas.

Hooks' concluding message was that when thinking about rural classification, think about these populations. One of the reasons they are not counted is that their civic and political citizenship are compromised, he said. He urged that in the coming revisions to rural area classifications schemes, some of these difficult, troubling, and perverse problems can also be considered.

OPEN DISCUSSION

Woods said that what struck him with this discussion is that analysts may become a prisoner of terminology, for example, thinking about

neighborhoods. Listening to Logan, he said he was reminded of an earlier paper (Jones and Woods, 2013), in which he and his co-author focused on locality as an object of analysis with imagined coherence. They have to be meaningful to the people who live there as a community and as a space with which people identify. They have to have organizational coherence in that there is a functional space that people can use and an institutional space through which they can act. He said that made him think about neighborhoods and how the concept translates to a rural context.

In response to Woods' presentation, Logan said his impression is people's conceptions of rural or urban primarily reflect culture, rather than the reality of a situation, especially as rural areas become more and more heterogeneous. While there are some real divisions between rural and urban, ideas such as "everybody knows everybody" may also be true in urban neighborhoods. He said he would like a better sense of the extent to which these are cultural conceptions versus actual social interactions.

Hooks noted that a survey of what prisoners in Angola, Louisiana, would say about rural would be different from what Woods described. For Native Americans, he said rural may mean the quasi-genocidal consequences of the conquest of this continent. He also pointed out a distinction in Native American communities between urban Indians and the people who live on a reservation. Logan said the idea of a survey using word clouds was very interesting and noted it could be used to compare very small populations with the total rural population.

Woods responded that starting with the perspective of lay discourses, a diversity of opinions can emerge. He said much of what he presented was based on mainstream groups. They were strongly informed by popular culture rather than lived experience. He said that different age groups, ethnic groups, income brackets, or Native American tribes represent people with different levels of ability and experience, and these people may have very different perspectives. This indicates that there may not be a homogeneous view of what is rural. However, it is still useful to ask what makes rural important to people who live in rural areas, he said.

Ken Johnson noted some ambiguity in urban neighborhoods. Logan responded that they are not so well defined in advance. However, he said the notion of where to look for spatial boundaries, structures, and people's opportunities in a dense urban environment is clearer than in a rural environment. Brown observed that based on his work, trying to study the factors associated with the probability of being poor in the context of rural environments, concepts such as hyper-segregation and the more sociological aspects of the buffering of social relationships, do not travel very well. The question of what is the meaningful social context that has an impact on people's chances is very important and a challenge

for rural scholars, he said. Though there is no perfect answer in urban areas, it is easier than in a rural environment.

Halfacree noted his interest in which groups are included among rural populations, such as migrant workers. He said there are mixed responses to temporary versus permanent residents. However, he observed, the mobilities paradigm is increasingly influential in recent studies. Temporary workers living in rural areas have needs for local services and deserve to be counted, he said. At the other end of the scale is an issue about second homeowners and leisure homeowners in rural areas. They, too, are often not seen as part of a rural population, although many of them invest time and effort into rural locations. He said that today's more fluid ideas about residency and temporariness raise questions about who should be included as the rural population.

Robert Gibbs noted that he does not know what the unit would be in U.S. rural communities to identify differences in life chances, but one of the functions of available data is to enable researchers to identify that unit. In looking at data available in rural England, hamlets are the smallest settlements and almost entirely colonized by the richest people. They have the highest life chances, and poor groups are increasingly being excluded from them. Calling it a neighborhood would be seen as the wrong term by anybody living in a rural area, he said.

STATEMENT BY DANIEL LICHTER

Lichter said he would discuss how the sociological concept of boundaries applies to the rural-urban interface, evaluate how spatial boundaries change, and highlight implied lessons for rural-urban classification systems.

Lichter quoted Lamont and Molnar (2002): "Social boundaries are objectified forms of social differences manifested in unequal access to and unequal distribution of resources (material and nonmaterial, nonmaterial being the cultural side) and social opportunities." He applied this quotation to rural areas. Some examples of social boundaries are class boundaries, such as rich versus poor; racial boundaries, such as black versus white; disciplinary boundaries, such as economics versus sociology; and spatial boundaries, such as rural versus urban.

Changing Boundaries

Lichter described how boundaries can shift, cross, or blur:

Shifting—People move from one side of the boundary to the other, or the boundary or border changes. In the area of race, for example, there

is a large literature about white Hispanics or that Hispanics are the "new Italians." Italians used to be defined as nonwhite but are now defined as white, he said. The white-nonwhite boundary shifted—it moved to incorporate Italians. A similar process may be under way for Hispanics, Lichter suggested.

Crossing—Boundary crossing refers to people, organizations, or places that interact with other people, organizations, or places on either side of a boundary. The boundary itself does not change but is permeable. For example, he said, some people "marry up." They cross class boundaries by marrying someone of another class.

Blurring—The boundary between groups can become more or less bright (i.e., distinctive, or clearly defined). For example, black-white interracial marriage may result in mixed-race progeny, and the children blur the boundary between black and white. They are in a sense associational bridges between both blacks and whites. They are not easy to put on either side of the boundary.

Application to Rural-Urban Boundaries

Lichter then applied this concept to rural-urban boundaries.

Shifting—Rural is redefined as urban. This is part of the reclassification of nonmetropolitan counties and people into metropolitan counties without moving. People, by virtue of big cities gobbling up the hinterland, get redefined from rural to urban. The reclassification of rural places into urban places may occur through population growth or annexation. The people do not move or change but are redefined as part of the metropolitan population.

Crossing—Rural (and urban) people "cross" the urban-rural divide, such as commuting between rural and urban areas and interacting between the rural fringe and the urban areas. One can think of rural or urban places as "places of consumption," where shopping, entertainment, recreation, and owning a second home take place. People cross back and forth between rural and urban areas to engage in these activities.

Urban-rural economic networks also include urban absentee owners of industry, such as coal, natural resources, or urban agriculture. He also pointed to interactions with rural areas being an urban dumping ground for hazardous waste and human populations.

Migrants are cultural carriers, Lichter said. From 2010–2013, 276,000 more people moved out of nonmetropolitan areas than moved in. It is an example of crossing rural-urban boundaries or the ruralization of urban life, or in many places the urbanization of rural life. The migration of Hispanics to new immigrant destinations is part of a global rural community.

Blurring—The line separating rural and urban areas is not clearly defined when talking about the rural-urban fringe or exurbia. Population and economic growth at the periphery make fuzzy the rural-urban divide or boundary. It is also important to talk about a regional economy and regional government where interconnected rural and urban places are part of a highly connected regional rather than just their own local economy. The boundaries between rural and urban are blurred, Lichter said.

Lessons for Rural Classification

Lichter described how the ideas of shifting, crossing, and blurring affect rural classifications. He said that it is important to note that urban influence does not just mean spatial proximity, density, or heterogeneity. Urbanism is a cultural dimension that is changing rural communities. Communities have different shares of recent in-migrants from urban areas that change the character of the community. It is important for analysts to identify the number and shares of areas (e.g., counties and places) and people who are being reclassified in either direction.

Lichter said that crossing means changing patterns of commuting between spatial categories (e.g., rural and urban). It is also possible to quantify migration between traditional spatial categories and new ones: the percentage of the population that originated from urban areas over the previous few years.

As a spatial concept, urban-rural blurring requires analyses at smaller levels of geography. At the rural periphery, different spatial units based on the Geographic Information System, such as blocks or block groups, and maps can be employed. Lichter concluded that the rural-urban boundary in the United States is dimming and becoming more ambiguous. Urbanization and urban growth continue across America, and some people argue whether there is any rural left. Rural sociology departments in universities have been redefined as development sociology or community departments. With permeable boundaries and rural and urban people operating on both sides of the spatial divide, this is an important consideration when analyzing "urban influence." In measuring rural and urban, Lichter urged moving beyond a rural-urban continuum and talking about heterogeneity across and within each of these categories.

STATEMENT BY MARK PARTRIDGE

Partridge provided his interpretation of urban-rural interface as a space of integration rather than of separation, noting that popular opinion tends to base "rural" on landscape, density, or whether it "feels" rural. Such measures of rurality can be used for many things and various

research topics. However, he said, most regional scientists and regional/urban economists focus on behavioral economic relationships/linkages in functional economic areas such as the effect of job growth on reducing poverty rates, incomes, employment rates, and other outcomes. This type of research needs rural classifications based on economic functions or what the "people are doing," he said.

He provided the following example of two counties that look similar but are very different in terms of what people are doing. He noted that using a landscape measure, most of Pima County, Arizona (the non-Tucson part), and Custer County, Montana, would be observationally equivalent in terms of density, the desert, agriculture, and other characteristics. But the people behave very differently. In any population-weighted measure, virtually the whole "Census rural" population of Pima County works, shops, and acquires services in Tucson, an urban-metro cluster. For the most part, rates of growth are highest further away from urban clusters in metropolitan functional areas in the exurban and peri-urban areas. In most of Pima County, growth *spreads* out from the urban core. He referred to this as "low-density suburbs" in that they behaviorally act more like suburbs than rural areas. In Custer County, there are no links to urban growth. This is remote rural, he explained. Policy solutions are very different in these two areas. For economic development, urban-led economic development probably makes the most sense for residents of Pima County. For Custer County, other strategies aimed at building capacity are called for.

Partridge said rural-urban interdependence and associated spillovers are important for understanding governance, economic, cultural, and public service provision relationships. Economic linkages are well approximated by labor market commuting. If a person can commute, there are likely similar patterns for shopping, service provision, and other activities. Conceptually that means that as far as this line of research is concerned, the metropolitan area definition of the Office of Management and Budget (OMB) makes sense, he said. Metropolitan areas are based on what people are functionally or actually doing. Partridge noted that most related work is at the county level because of the need to link place-of-work data (which does not make sense at lower levels of geography) with other spatial indicators. There is also the notion that Census tracts are not functional governments for policy, while counties generally are. Partridge said he also would like to see the definition of rural on a continuum from very rural to very urban. Then a question could be where to draw the line.

Observations on Rural-Urban Interdependence and Data

Partridge repeated that conceptually, OMB's metropolitan area delineations are reasonable saying that in a French labor market study, he and colleagues found that the OMB definition worked the best of those considered in defining rural and urban labor markets.

However, he said the U.S. commuting threshold used in constructing the current OMB metropolitan area definition, 25 percent, seems low. Canada's official definition[4] uses a commuting threshold of 50 percent, although he said that seems high, because it misses "low-density suburbs" that are functionally urban. Partridge suggested a better threshold is between 25 and 50 percent. He noted that there are also multiple commuting destinations, meaning current coding is somewhat arbitrary in putting counties in one metropolitan statistical area.

Partridge said that in his work in Canada, he had successfully used Statistics Canada's Metropolitan Influence Zones (MIZ).[5] He suggested that ERS might consider something like the MIZ, for example:

i. For every metropolitan/micropolitan county, create measures of moderate/strong metro area influence with a couple of delineations between 25–50 percent commuting and > 50 percent. He said this is not as arbitrary as saying all counties are equally affected by a given metro area with either an *in or out* criteria currently used.
ii. For every metropolitan/micropolitan area, create measures of weak metro area influence with a couple of delineations between 10–25 percent of commuting for nearby nonmetro counties.
iii. Those with less than 10 percent commuting to any metropolitan/micropolitan area would have little/no influence from a single metro/micro area.
iv. Nonmetro counties with less than some arbitrary low commuting threshold to all metropolitan/micropolitan areas (say 10 percent) would be classified as no urban influence.

In summary, i–iv would be all inclusive of all U.S. counties. Partridge noted that this approach can be extended to zip codes or tracts. Finally, nonmetro counties with at least 10 percent commuting to at least two micro/metro areas would also be listed as influenced by multiple urban areas in which the specific metro/micro areas would be listed.

[4]Statistics Canada census metropolitan area and census agglomeration definitions are described at http://www.statcan.gc.ca/pub/92-195-x/2011001/geo/cma-rmr/def-eng.htm [November 2015].

[5]Statistics Canada MIZ Codes are defined at http://www.statcan.gc.ca/pub/92-195-x/2011001/other-autre/miz-zim/def-eng.htm [November 2015].

He noted Stabler and Olfert (2002) found that rising agglomeration thresholds that define the urban tiers in the hierarchy suggest similar-sized communities are serving lower levels of services than generations ago. He said it is important for research to assess whether the population threshold for defining metropolitan areas is changing over time. His sense is that a population of 50,000 no longer approximates a real agglomeration that should be classified as a metropolitan area, but rather the threshold should be raised to 75,000 or even 100,000 as Canada now does.

Multiple Tiers of Influence

Partridge stated that traditional ERS urban influence codes for nonmetropolitan counties have served researchers well. They are based on adjacency to metropolitan areas of varying sizes and their populations.[6] The limitation of the traditional measures is they are arbitrary and do not reflect access to multiple levels of the urban hierarchy like central place theory. They reflect labor markets only indirectly through viewing metropolitan areas as labor markets, he noted.

One important exception is the recent ERS Frontier and Remote Area (FAR) Codes. He said the FAR Codes are good for measuring access to services at different small nonmetropolitan tiers. He said that his simple recommendation would be to aggregate the FAR to the county level so they can be more widely used.

Partridge noted that his work with Olfert, Rickman, and others used an approach to capture multiple tiers of metropolitan areas. He said that adjacency or even distance to the nearest metropolitan area misses the multiple dimensions of how agglomeration affects outcomes. It also misses how agglomeration effects attenuate over space. He said that their contribution (1) reflects that different tiers of the urban hierarchy have independent influences on outcomes and (2) reflects spatially varying distance penalties. Their example was something akin to "it matters whether you are equidistant to 10 cities of 200,000 people versus one city of 2 million" in terms of access to services, and that the distance matters as well. Partridge noted that they found that many outcomes, such as employment growth, population growth, poverty, wages, and housing/land costs, are differentially affected by access across the entire urban hierarchy. Distance penalties were rising over time through the prerecession period. He stated that it appears that "tyranny of distance" is more about firm productivity than household amenities (Partridge et al., 2010b; *RSUE*).

[6]Partridge stated that a good example of a study of urban influence using these measures is Wu and Gopinath (2008).

To recap, Partridge noted the importance of functional/people-based notions of determining rural when conducting economic/behavioral research. He provided his personal recommendations: augment ERS indicators to account for the threshold shortcomings in the current OMB definitions of metropolitan areas; move toward capturing differing degrees of urban influence due to labor market linkages; and create measures that reflect access across the entire urban hierarchy to capture central place theory or access beyond the reach of labor market commuting.

OPEN DISCUSSION

Woods commented that while he agreed with much of the presentations, he wondered whether the session focused on last century's rather than this century's questions, such as changes and linkages resulting from globalization. He asked about other kinds of relationships of areas and widened connectedness, whether to multiple metropolitan centers or to other rural areas around the world. Plane concurred, noting the interest in the 1960s about network accessibility to the rest of the whole system is important in a globalized age.

Partridge commented distance was used in multiple dimensions. He observed, as a statistical concept, that if distances became less important, they would be seen as mattering less and less over time. However, this is not the case, and analysts have found that proximity matters more and more. On the firm side, productivity issues are driving these things; firms cannot compete in rural areas, he said.

Jeffrey Hardcastle noted that, over time, retail and service patterns change, and as times change, commuting flows change. These patterns are not always static.

In terms of thresholds, Cromartie noted in 1900, the population threshold was set at 2,500. In 1950, the population threshold was moved to 50,000, which made sense given the speed of urbanization. The United States has continued urbanizing, and he said that perhaps 100,000 is not too high.

Tom Johnson agreed that the commuting threshold is very important, but noted commuting is probably becoming less important as a way of indicating the degree to which places are linked than it has in the past. He noted that it might be useful to consider the influence of where people's second homes are located. Second homes have an important impact on the cultural connections between rural and urban.

Partridge responded that it depends on the topic of study. He noted that if he were trying to come up with an urban influence indicator, he would be interested in commuting because it proxies for many things.

However, amenities are important in describing why certain areas perform better than others.

Logan asked Lichter to respond to Partridge's presentation about the rural-urban boundary. To Logan, the implication of the presentation is that places that are distant enough from each other have much stronger boundaries. The growth of the economies or populations are not much interconnected. Logan asked Lichter if he believed that much of rural America actually could be described as totally disconnected from urban enough to salvage the urban-rural boundary. Lichter responded that the rural-urban boundary is important, but he is trying to figure out how the sociological concept of boundaries shifting, crossing, and blurring can inform these definitions.

Partridge pointed out that he was trying to say that the commuting variable is a continuum, and a threshold could be set anywhere: 25 percent, 35 percent, and 50 percent. It would be a service if the data were available to assess the performance of different thresholds.

6

Uses of Current Rural Classification Systems

This chapter summarizes the sixth session of the workshop, in which a panel discussed uses of current rural classification systems in research and program design and administration. The panelists were Douglas O'Brien (White House Domestic Policy Council), Timothy Parker (Economic Research Service of the U.S. Department of Agriculture [ERS/USDA]), Thomas Johnson (University of Missouri), Kenneth Johnson (University of New Hampshire), and Rose Olfert (University of Saskatchewan). The panel discussion was followed by open floor discussion. Brigitte Waldorf (Purdue University) moderated the session.

STATEMENT BY DOUGLAS O'BRIEN

O'Brien said that his focus is policy rather than research, but he follows both rural policy and research closely.

The Purpose of Defining Rural

O'Brien summarized the USDA Rural Development's (RD) report to Congress (2013), required by the 2008 Farm Bill, which described how RD defines rural and why. He explained that national programs and private investors often bypass rural investment because of low capacity and a desire for high return on investment. In rural places, resources are scarce and policy makers have decided to set aside special funds for them, so a way to delineate eligibility for funding is needed. The U.S. Congress

found over time that total population is the simplest criterion. The 2008 Farm Bill required that RD assess the various definitions used within the agency, describe the effect of the variability of definitions on program effectiveness, and make recommendations for better targeted spending.

Assessing Various Definitions of Rural

O'Brien said RD starts all application reviews with eligibility determination. RD has about 40 different programs, about 10 of which are for housing. For most business development programs, the default definition of rural area used to determine eligibility is less than 50,000 in total population and nonadjacent/contiguous to such a municipality, but lower population caps are used for water and community facility programs. Generally, housing programs use a threshold of 20,000; however, the rules can be complicated. RD's infrastructure programs use a threshold of 10,000. He said RD uses about 15 different definitions.

As exceptions to the default, the undersecretary has exemption authority, such as "rural in character." If the undersecretary determines that an area is rural in nature, then it is eligible, even if not eligible according to the default. For example, in an urbanized area, a project would be eligible for a guaranteed loan if the undersecretary determined that the specific address was rural in character. However, O'Brien said exemptions are rare.

O'Brien described a few, relatively new programs for which the "rural area" eligibility criteria are not used. The Rural Energy for America Program (REAP) helps to finance small renewable energy and energy efficiency projects. The Rural Electrification Act is another, as is the Food Deserts Program, now called Health Food Financing, which finances projects that help provide fresh food to areas that lack such access, whether rural or urban. Some of these programs provide a subsidy, often a loan subsidy to help grow the economy or provide economic opportunity for rural people. However, he said, in some situations, the best way to use federal dollars would be to invest them in an urban area because the urban area would create expanded markets for people in rural places. He said he would like to help policy makers make this kind of determination.

An RD application must qualify on three fronts to be eligible for funding: the applying individual or entity must be eligible for the particular program, the proposed activity must be an eligible activity for that particular program, and the location of the proposed activity must be eligible for that particular program.

In O'Brien's view, variability in population thresholds is bad for project effectiveness. It creates arbitrary barriers to regional strategies and perpetuates community isolation and less cost-effective economic

and community development practices. Many times the different definitions make it difficult for communities to figure out which programs apply. The more nuanced and different definitions make it hard for potential recipients to understand the reason why the policy exists.

Recommendations for Ways to Better Target RD Funds

O'Brien said that the report recommended that RD make use of a common population threshold—any place outside of a city of 50,000—which would vastly simplify eligibility requirements. But on top of that, priority points, such as those in RD's water program, could be used. In that program, a region gets points if it is far below the threshold in population, and there is a median income or poverty indicator that can also provide priority points.

He said with this approach, communities could be prioritized because they are in more remote areas or in areas of greater poverty. He also pointed out reasons why the government provides subsidies to people who live in rural areas. Rural places have relatively low capacity and they may have the greatest need.

When considering how to improve a rural definition, an analyst should consider the purpose of that classification. Understanding regions with the greatest need is one thing, but the other question is where federal dollars can make the biggest impact. In 2009 and 2010 when there was pressure to create jobs using the American Recovery and Reinvestment Act, he pointed to debate about whether to put the dollars in places that were going to create jobs, or to put them where there was huge need.

O'Brien noted that work on rural area classification has a lot more application than a change in legislation. However, he noted, a change in legislation, regulation, or program implementation is an important consideration. He also noted the status quo of a definition of eligibility for RD programs has incredible momentum. Those who are currently eligible may have a lobby to continue the current definition, while those not currently eligible do not generally organize to provide input. Even if there were good reasons to change an eligibility criterion, there might not be much public support.

O'Brien observed that if the goal of research around rural area classification is to change behavior, then it is important for the definition to be simple enough so stakeholders will understand it, act on it, and organize around it.

STATEMENT BY TIMOTHY PARKER

Parker explained that one of his responsibilities at ERS is to receive inquiries and complaints about the Urban Influence Codes (UIC) and the Rural-Urban Continuum Codes (RUCC). He focused his presentation on the use of rural area classifications in program design and administration by many federal programs.

Parker said that rural classifications serve two main purposes: to identify underserved rural areas where distance from urban centers and low-population density leads to shortages of critical services such as health care and banking; and to identify and target federal assistance to distressed rural areas where distance from urban centers and low population density lead to a lack of economic opportunity. Many government agencies look at both, he said.

Underserved Rural Areas

Several health services programs primarily concerned with underserved areas use ERS rural area classification codes in combination with other indicators. They are as follows:

- Federal Office of Federal Health Policy in the Department of Health and Human Services (DHHS) uses the Rural-Urban Commuting Area (RUCA) Codes to administer grant programs to build rural health care capacity, and coordinate funds.
- Centers for Medicare & Medicaid Service also use the RUCA Codes for payment purposes, such as cost reimbursement for Critical Access Hospitals. This is important, he said, because a considerable amount of money goes to rural hospitals.
- Office of Rural Health in the Department of Veterans Affairs has recently begun using the RUCA Codes to determine "highly rural areas" in order to target telemedicine and tele-video technologies to address distance, and for telephone care management.

Distressed Rural Areas

In addition, other agencies use these classifications in distressed rural areas. For example, the Corporation for National and Community Service uses the county-based RUCC, the UIC, and subcounty RUCA Codes to identify rural areas and award funds. AmeriCorps uses the RUCA Codes and the RUCC to identify needy areas, and Senior Corps connects people aged 55+ with volunteer organizations that need their job skills and expertise. The Social Innovation Fund awards grants to innovative community-

based nonprofit organization focused on youth development, economic opportunity, and healthy futures, and the Volunteer Generation Fund supports voluntary organizations in addressing critical community needs.

The Consumer Finance Protection Bureau uses the UIC under its new regulations to meet escrow requirements for financial institutions. Several rules have provisions that relate to mortgage loans made by creditors operating predominantly in rural and underserved counties or made in rural counties. For example, requirements under the Truth in Lending Act rule require certain creditors to create escrow accounts for higher priced mortgage loans, but rural and underserved counties are exempt from this requirement. In addition, ability to repay and Qualified Mortgage Standards under the Truth in Lending Act rule allows exceptions for mortgage loans with balloon payments that do not meet the qualified mortgage standard.

Parker also summarized why the ERS rural area classifications may not be used in other programs. First, some rural definitions used in federal programs preceded the ERS classifications, and it is hard to change codes, which may require congressional legislation. Second, county-level classifications can be too big for targeting rural assistance, particularly in the West. Third, the ERS county and subcounty classifications are complex and difficult for nonresearchers to understand.

STATEMENT BY TOM JOHNSON

Johnson focused his presentation on policy research and assessment, and on its relationship with policy development and delivery. He said that definitions have consequences. They make money and cost money for people, which provides incentives for people to change, influence, and have an opinion about them. Many programs use and depend on these definitions. Rural policy research and assessment must explicitly consider the effect of rural definitions on program eligibility and impacts. For policy assessment and analysis, real data must be synced with those definitions. As in any type of spatial research, rural policy research is constrained by data availability, he commented. The plethora of definitions and classifications frequently compounds the data availability problems.

Johnson noted many federal agencies define rural, including the Census Bureau, Office of Management and Budget (OMB), and ERS/USDA. Many programs use and depend on these definitions. From a policy analyst's point of view, it is important to understand the goals of each program. For instance, to a transportation official, rural means low-volume roads with long distances between intersections, with high rates of single-car accidents and fatalities. It is not hard to understand why every

program has to distinguish rural from urban, he noted, and each of them is going to need a slightly different definition. To illustrate:

- The Federal Highway Administration uses a modified and flexible version of the Census definition of rural.
- The U.S. Department of Education's National Center for Education Statistics uses its own Local Codes system, similar to the RUCC, to classify school districts.
- The National Center for Health Statistics in the Centers for Disease Control and Prevention developed and uses a variation of the OMB metro/nonmetro classification.
- The USDA/RD uses unique criteria to determine eligibility for their programs, as discussed above.
- The Department of Housing and Urban Development (HUD) has three ways of defining rural areas based on population, including small places within metro counties.

Johnson pointed out RD blurs the line between urban and rural definitions. It turns out that many of the rural development programs qualify applicants in metro counties. In the Business and Industry Loan Guarantees and Rural Business Development Grants Programs, for example, he found most investments were close to the metro center but just across the line.

Using HUD and USDA programs as examples, Johnson said every program is different for good reason but asked if it is possible or desirable to reduce, simplify, or harmonize definitions. Each policy program is designed to address an issue or problem which is often, at least partially, related to population density, distance to urban services, land use, and access to infrastructure. The goal is frequently to change economic outcomes in these areas. Each of these geographic features is affected by policy. If rural definitions were designed around these geographic features, fewer systems may be necessary, he suggested.

Johnson reiterated the political economy of rural definitions mentioned earlier. These classifications determine program eligibility, and eligibility generates economic rents. Potential economic rents generate incentives to influence and change eligibility criteria. Discrete classes, as opposed to graduated scores, lead to anomalous spatial outcomes. If the definitions are not right, outcomes are very different than what the program was designed for.

The challenge, he said, is to determine a set of simple definitions that line up with a number of different programs, suggesting ERS could work with each of the agencies that needs and uses these definitions. Many

definitions are needed, but perhaps the number should be reduced to the simplest set that meets as many needs as possible, he said.

STATEMENT BY KENNETH JOHNSON

Kenneth Johnson focused on rural definitions used in research. He said from a researcher's point of view, a rural classification system must reflect contemporary rural America, but it also has to recognize the importance of longitudinal compatibility. His work with Al Nucci and Larry Long at the Census Bureau (Johnson et al., 2005) and recent updates compared county metropolitan classifications in 1963 to those in 2013. He found that 752 counties identified as nonmetropolitan in 1963 had been redefined as metropolitan by 2013. These reclassified counties contained 64 million people in 2013, and their transfer from nonmetropolitan to metropolitan areas accounted for the gain in the proportion of the U.S. population that was metropolitan between 1963 and 2013. In contrast, there was no change in the proportion of the U.S. population who resided in counties that were metropolitan in 1963 and remained metropolitan in 2013. Thus, all the growth in the proportion of the population that is metropolitan has come from reclassification of nonmetropolitan counties to metropolitan status. Reclassification, he said, is an important issue.

In recent work, Johnson used a combination of USDA-ERS codes and his own judgment to group rural and urban counties. He noted distinct demographic differences between the core counties of large metropolitan areas of 1 million or more and their suburbs. There were also differences between population redistribution patterns in these large urban areas and those in smaller metropolitan areas. In rural areas, nonmetropolitan adjacent and nonadjacent counties also exhibited critical demographic differences from one another.

Johnson said that the population and land area distribution of the United States in 2014 show that nonmetropolitan areas included 72 percent of the land area and 14.5 percent of the population of the United States. These nonmetropolitan areas also produce most of the country's food, timber, water, and clean air, so they represent important sources of ecosystem services to the nation.

Rural America continues to experience significant demographic change, he stressed. A rural classification system must facilitate tracking this change. In order to understand the redistribution of the American population, a timely set of demographic information is also needed. For example, data from the most recent population estimates show dramatic variability in population change in rural America. To understand the details of both short-term and long-term demographic change, data are needed on the components of population change (natural increase and

net migration). Just looking at population change does not explain how a county is changing. Counties are the lowest level of geography for which birth and death data needed to calculate natural increase and net migration are available. Only some states have birth and death records for cities and towns. Thus, to understand population redistribution in the United States, county-level data are imperative. To him, this underscores the need for county-based rural classification systems.

To understand recent demographic trends, it is useful to view them in historical context, Johnson said. In the 1990s, rural America reflected the very familiar pattern of nonadjacent counties growing less than adjacent counties, primarily because they received less net migration. In contrast, a distinct slowdown in rural demographic growth is clearly evident in the 2000s. He provided information on rural demographic change using the Census Bureau's 2014 demographic estimates for adjacent and nonadjacent counties for four time periods: the early 2000s; the economic boom; the recession; and the post-recessionary trends. These data reflect a dramatic slowdown in migration to rural America, leading to an actual rural net migration loss in recent time periods. They also reflect the rare phenomenon of adjacent counties growing less than nonadjacent counties in the most recent time period. To see this, contemporary data on natural increase and net migration are essential, he said. Clearly, whether considering long-term, intermediate, or short-term trends, good data and a consistent classification system are important to making comparisons between the urban and rural areas of the United States.

Rural America is a simple term describing a very complicated place, Johnson observed. A rural classification system must reflect this complexity. He said he is not convinced that any one rural-urban classification system can reflect the variability, and rural classification systems must be multidimensional and used in combination. For example, recreational and retirement counties are the fastest growing parts of rural America, but other rural areas contain slower growing agricultural and manufacturing counties. Manufacturing counties were the focus of rural economic development programs for decades and were expected to be where most new rural growth would occur. They did experience significant population growth for several decades, but recent data show population growth in manufacturing counties has sharply diminished. Farm counties continue to grow slowly, as they have for decades. He noted an urban-to-rural classification system based solely on population density cannot reflect this variability and need more than a single dimension to reflect the complexity and spatial diversity of rural America. Fast-growing recreation and retirement counties often exist in close spatial proximity to manufacturing and farming counties, which cannot be captured on a simple rural-urban continuum.

Classification systems are important because they inform policy making, Johnson stated. The policy implications of rural demographic change vary across county types. For example, recreational counties have experienced a large influx of older adults that is accelerating through time. In contrast, rural farm counties have been losing young adults for decades. These trends and their policy implications cannot be addressed by a simple straightforward rural-urban continuum, no matter how sophisticated. He said a multidimensional view of what is happening in rural America is important to facilitate understanding by researchers and policy makers.

In addition, long-term trend data are essential to capture the movement of people over time. For example, the inflow of older adults—the baby boomers—to recreational counties slowed because of the recession, but Johnson said he expects the growth to resume. Such areas will need to deal with the implications of population growth, the environmental impacts of such growth, and the need for services for an older population. And, because many of these older migrants from urban America are experienced in dealing with bureaucracies, he said they will exert considerable influence on rural policy.

Summary

Johnson summarized the importance for a rural classification system to reflect contemporary rural America but recognize the importance of longitudinal compatibility; facilitate the timely analysis of demographic trends over both the short and long term; reflect the complexity and growing diversity of rural America; and be useful for policy making and for research, such as by providing continuum measures for researchers and categorical classification systems for policy makers.

STATEMENT BY ROSE OLFERT

Olfert focused on data requirements for rural classification.

Rural Economics Research Questions

Olfert described key research questions. An old, still useful question is the size and role of rural communities, she said. Size and role remain important for people in rural areas, researchers, and policy makers. However, she said, the ways in which size and role have been approached has changed over time.

Closely related to identifying rural communities is investigating the reasons for rural population change—growth, decline, and migration patterns. There is a very rich literature on migration patterns, she noted. One

reason for population redistribution over space is the location decisions of individual firms. Areas with more economic activity are more likely to draw new industries, which results in more employment or income-earning options in a spatial context. The relationship between urban/metro areas and the surrounding rural areas also remains a very important area of research, she said. Researchers want to better understand to what extent urban or metro growth benefits the surrounding rural areas, or whether there are negative effects.

Most of the research that comes out of the empirical investigation of these questions has very strong policy implications, Olfert said. One may consider *whether* policies are required. If they are required, what kinds of policies? Do they seek to influence or do they seek to accommodate the changes that are going on?

Geographic Units for Economic Analysis

Olfert stated meaningful geographic areas are essential for this economic analysis. She noted functional economic areas, once a fairly popular concept, appear to have come back into vogue. Functional economic areas are areas that are relatively "closed" in that people both live and work in the area. They earn and spend their incomes in the same area, and they access public and private services and amenities within it, although it does not mean those boundaries are absolutely closed. These functionally cohesive regions compete globally for economic activity and population, within a province or state, within the country, and in global terms.

The regional or the functional economic area population size and characteristics, its economic structure, the industry structure of that area, and the amenities will be the determining influences for growth/decline in population and employment through migration patterns. A natural increase in population is also important, she said, but that increase will be very closely related to the age structure of the population that is on net attracted to the region.

Population size and characteristics will determine whether critical mass is being achieved within the region so that the demand thresholds to support various kinds of economic activity or population service are met. They will also determine whether there is the access to markets required to attract firms to the area and the potential for some urban agglomeration economies to be realized within the area to achieve higher productivity and lower costs of production, including knowledge spillovers. She said these areas are also the appropriate policy targets as they include both the costs and the benefits of infrastructure development and service delivery. Ideally, the population in these areas are both the taxpayers and the recipients of a bundle of goods and services, making it easier to persuade them

to participate in economic development if they are also going to realize the benefits in terms of employment or income-earning opportunities.

Area Classification Requirements

Olfert noted it is essential for researchers to have classifications that can be used to approximate these functional economic areas. Metropolitan statistical areas for the most part achieve this for urban-centered areas, she observed. Commuting sheds are a reasonable approximation. Economic activity and population are increasingly concentrating in metro and urban areas. The best rural development strategy for nearby rural communities is urban-centered growth.

The metropolitan statistical areas rely on commuting sheds, which Olfert argued is a reasonable approximation for functional economic areas. Only commuting flows are being measured, but those commuting flows represent many other things that demonstrate the economic dependency within the commuting sheds around urban cores of metropolitan statistical areas. The larger and more diverse the metro core, the larger will be the population and commuting sheds. That also represents a greater market size, and the fact that these metropolitan statistical areas probably have the highest order of services, such as full-service dentists or lawyers, within the area.

Olfert suggested an advantage to flexibility in outlying areas to be included in terms of the percentage commuting for counties near the borders that are included in the metropolitan statistical areas. As noted earlier, Canada uses a 50 percent commuting rate threshold to attach counties to core areas; the U.S. threshold is 25 percent. Maybe the right threshold lies someplace in between, she suggested, but the information to conduct analysis with either tighter commuting sheds or relatively more generous commuting sheds needs to be available.

Metropolitan areas are similarly useful, Olfert said. Outside the metropolitan statistical areas, these areas are defined by their economic bases and distances from the metropolitan statistical area. Distance from the metropolitan statistical area has been shown by empirical research to be important; for example, even if an area is heavily dependent on mining oil and gas, a company may need an accountant, lawyer, or other service. She said it is probably not only distance to the nearest urban center or a metropolitan area that is important, but also distance to the top of the hierarchy, the largest center.

That is the first level of area classification that is important. Within that, Olfert said, the heterogeneity within the metropolitan statistical areas needs to be recognized and, in that context, where a rural-urban distinction is important. The population density of the counties and the distance

from the core will determine the infrastructure needs and transportation costs. There is a need to have some recognition of that heterogeneity within the metropolitan statistical areas, and she said maybe rural-urban definitions that recognize density and size are important.

Beyond the metropolitan statistical areas, rural and urban distinctions are very useful in terms of population size, density, and distance. She commented that the 2,500-population cutoff was adequate at the time that it was initiated, but asked what population threshold size now represents a size to support the full range of urban activities. The answer will probably help define what is now urban. Referring to Ken Johnson's presentation about the research need to compare areas over time, she said a current definition can be observed back through time and a historic definition can be moved forward through time. Counties are added to metropolitan statistical areas over time as the definitions change at each decade, she pointed out. At each decade, what seem to be more "rural" populations and counties are becoming dependent upon an urban core for employment. Even though a county may look rural, it may not be in the sense of economic dependency and integration with the urban core.

Summary

Olfert summarized by saying that functionally integrated urban centered regions, differentiated by rural and urban especially at the periphery, are required as spatial units for data analysis. The nonmetro regions should be defined by their economic base. Some current definitions probably approximate what is needed, but there is fine-tuning to consider in terms of threshold commuting percentages and dated definitions of rural and urban. She noted consistency or comparability over time is important for research.

Olfert observed the empirical research to address the research questions and issues raised throughout the workshop are very data intensive. She noted she is impressed with the quantity and the quality of the data available. Requirements for data will likely become more onerous as statistical techniques become more sophisticated.

OPEN DISCUSSION

Waldorf said the presentations demonstrate the difficult task of the workshop. On the one hand, applied researchers want more simplicity and authenticity. Other researchers want more specific details such as recreation and retirement communities. Both groups stressed issues related to suburban, metropolitan, and internal heterogeneity.

Mark Partridge observed that as an outsider, he thinks Congress

needs to write language in legislation that targets their issues of interest. O'Brien commented there should be a continual feedback loop, where every five to seven years previous issues or problems are addressed in the Farm Bill or other legislation. From his experience with rural definitions in the Farm Bill, it is difficult to make changes.

James Fitzsimmons remarked the diversity of classifications, while it causes confusion, is a success in that there is no single classification that can be manipulated to fit everybody's needs. Fitzsimmons said that maybe it makes more sense to consider program-specific classifications, perhaps with a smaller number of classifications as suggested by Tom Johnson.

O'Brien commented his statement sounded like nothing changes, but changes do occur. That is why, in his view, it is critical that policy makers have the right information when things change. He noted the RD report recommended one definition, but with a way to prioritize projects in different programs based on a set of variables.

David Brown observed that when the workshop steering committee designed this session, members had an idea that researchers, policy makers, and program administrators should be in conversation and should be integrating their efforts. He also asked why none of the eligibility thresholds discussed is based on changes in the number of households. Parker responded that he did not know of any, but it would be interesting. Particularly in rural areas, he has seen families moving in with other families or multiple families in a single household.

John Logan said the session clarified for him the dilemma for ERS to have a reasonable, rational classification system, but one that can be applied to programs. He referred to O'Brien's point that certain kinds of areas, given their character, have concentrated unmet needs, and they do not have the governmental or fiscal capacity to meet those needs. Logan said it was curious that need and capacity are not measured directly and that the concept of the urban-rural dimension is very loosely associated with those two criteria. Logan also asked about spatial scale, such as counties, towns, or small populated areas. He said as a researcher that would be the first thing he would want to know. He referred to discussion earlier in the workshop about the county level, but asked about the scale for different problems. Until the answer to that question is known, Logan does not think there will be a lot of clarity about how to deal with it.

He said measurement issues are familiar in urban and rural America. The first issue is to measure need and fiscal capacity at the level of governmental units. He suggested counties are probably the relevant government units. For the issue of urban services, he suggested parts of a county are relevant to measure in some places, but municipalities in others. The division of responsibility between government units is very significant, he

stressed. It may be that in rural America, it is usually the county. However towns and townships may matter in terms of governmental capacity in some parts of the country.

Logan said in terms of need, the county seems like a large unit, but subcounty units are very small. For small areas, the only available data are from the American Community Survey (ACS). He said he has become wary of ACS data. He said that if subcounty-level estimates of need are to be used, he would base them on the 2000 Census.

Michael Ratcliffe observed the discussion has centered on geographic areas and specific types of data, but not management of data. He commented on the computing power, database structures, and ability to store vast amounts of metadata about units at all levels of geography that would support building whatever level of complexity and dimensionality is appropriate.

Mark Shucksmith commented on O'Brien's point about the tension between need and having an impact, which varies greatly among the countries in the European Union. They have developed a series of concepts related to territorial cohesion, territorial potential, and territorial capital to try to get around the direct issue. In terms of political realities, he asked if the classifications are supporting the status quo in terms of political constituents as the constituencies are organized around the classification. To him, this seems to be a circle that prevents change. He suggested that to change the classifications, it is important to consider the constituencies that are not organized and address how they could be organized to allow changes to the classifications. He wondered whether that might be driven by the questions of needs, unmet needs, or impact.

Michael Woods commented on the ERS Natural Amenity Scale[1] definitions. He said as an outsider looking in, that classification seems to address issues related to the diversity of rural areas, and economic drivers of difference between disadvantaged and rural areas

Marca Weinberg (ERS) remarked that missing from this discussion is a mention of ERS resource constraints. The agency has three people who work on this and it is only part of their positions. She also said as a statistical agency, ERS does not develop definitions or statistics to serve political purposes. ERS measures its performance by whether or not it is having impact and helping to inform decisions. Weinberg said that ERS is lucky to have a positive relationship with O'Brien, and they appreciate when their work gets used. What she said she would like is a classification system that is statistically reliable, justifiable, based on the best available science, and useful. It is critical for ERS to understand how the system

[1]See http://www.ers.usda.gov/data-products/natural-amenities-scale.aspx [November 2015].

will be used, but its development should not necessarily driven by the constituents and the politics.

O'Brien praised the workshop and his partnership with ERS while at Rural Development in USDA and at the White House Rural Council. He noted the White House Rural Council includes all domestic agencies that do rural work and he offered to be a conduit to the other agencies. If the work on developing a new or revised rural classification scheme moves forward and ERS wants immediate feedback, he could pull together a small group of federal policy implementers.

He added the move toward evaluation-based budgeting and policy making has been a long time coming, but is coming with development of greater data tools. From his experience, rural programs and policy making are slower than others on performance-based budgeting and policy making.

O'Brien concluded that one of the great challenges of government is that resources should go to places that are making an impact or are moving policy in the right way. But in rural places with a lack of capacity to measure or even apply for programs, there is a huge fear of a downward spiral, which he characterized as central to the workshop conversation.

7

Changes in Social Science Data and Methods

This chapter summarizes the seventh session of the workshop, which addressed changes in social science data and methods and their impact on rural classification. Alan Murray (Drexel University) prepared a commissioned paper, *Evolving Spatial Analytics and Rural Area Classification,* for the workshop.

He summarized changing analytical possibilities, including Geographic Information System and spatial statistics, and increasingly powerful computing and advancement of technology. Sarah Low (Economic Research Service [ERS]) also described changing analytical possibilities, Richelle Winkler (Michigan Technological University) spoke about the availability and quality of data from the American Community Survey (ACS), and Michael Ratcliffe (Census Bureau) discussed more frequent availability of local-level data at lower levels of geographic scale. James Fitzsimmons was the moderator for this session.

STATEMENT BY ALAN MURRAY[1]

Murray stated that rural or rurality is a vague concept, but context and the purpose of the study matter. He pointed out there are many different perspectives and rationales motivating why analysts look at rurality and what that means for people in rural areas. For example, air service

[1]This presentation is based on Murray (2015).

subsidies for rural airports define rural in a very different way than has been discussed at this workshop.

Categories of Data Sources

Murray said that there are more sources of data than from the U.S. Census Bureau. Some are government agency generated, including national and local. National products, in addition to those from the Census Bureau, include those from ERS, other U.S. Department of Agriculture agencies, and others. Local products encompass parcel and structure-oriented data. Private vendors may also scrape various sources. For example, he noted, the National Establishment Time-Series is scraped from Dun and Bradstreet. Private vendors may take published data, perhaps from the Internet, and make it available in a digital source. Geolibraries and geoportals include the U.S. General Services Administration's data.gov, as well as volunteer geographic information user-generated products such as Wikimapia, Openstreet, and others. Data are available from sensing platforms such as GPS, satellite imagery, aircraft, drones, and red-light cameras/videos. Sensing platforms include Google Street View in Google Maps, as well as cameras and traffic counters. User-generated sources include volunteer geographic information (VGI), where people add information that has a spatial orientation. There is also unintentional user-generated information, he noted. If a GPS is turned on in a person's phone, it is tracking where the person is going. The person is generating data, but may not realize it. At Drexel, clothes are made with embedded radio frequency identification devices (RFID). The wearers do not realize they are generating data about their activities, body temperature, and bio-characteristics.

It is useful, he said, to think about how these varied sources might be used to derive characteristics of rural areas, although some of the sources, such as VGI, may have issues related to data quality. That can be problematic in various ways, Murray said.

Spatial Analytics

Murray defined spatial analytics as any of the quantitative methods to support analysis, policy, planning, and management involving geographic space. They support the systematic analysis of geographic data and are similar to and consistent with definitions of quantitative geography and geocomputation. They include Geographic Information System (GIS), remote sensing, measures and metrics, statistics, simulation, optimization, regional economics, and geovisualization. Spatial analytics could be used in a map-based product to summarize objects or in some

analytical environment where a map and other graphic and nongraphic methods are used to derive insights.

Over time, there has been not only increasing computational capabilities, but also richer spatio-temporal information than was available in the past. There are also different conceptualizations of geographic space. Simple abstractions of geographic space have been replaced by more explicit and detailed analyses, he noted. The digital environment supports these enhancements. Nevertheless, Murray pointed out, the information available in a digital environment is an abstraction of reality, with uncertainties and other issues in terms of data quality, position, attributes, and change over time.

GIS

Murray defined GIS as a particular form of information system. It collects geographically (spatially) referenced and nonspatial attribute data. It is a system of hardware, software, and procedures designed to support geographical decision making through the capture, management, manipulation, analysis, modeling, and display of spatially referenced data.

He referred to a few GIS components to highlight issues important for rural classification and rural analysis. He reminded the audience that in a digital environment, the real world has been simplified. Murray said that analysts can do a lot with digital information through GIS, but there is also uncertainty and potential error in the process of digitizing, and using on-screen or other devices. Data can be converted from one source to another, but in that conversion process, spatial and other errors may be introduced.

Geocoding is the process of giving geographic coordinates to an address to identify its location on the surface of the Earth. However, there are quality issues in geocoding as well, such as spatial accuracy and matching success.

Murray said that data in a digital environment comes from some source by some process. It has data quality issues in terms of the attributes derived and in terms of the positional accuracy. The mainstay of GIS is an ability to manipulate digital information by simplification, aggregation, disaggregation and interpolation, transformation, and projection. GIS supports many analyses, but users should be aware of the potential for error and uncertainty.

Unlike in the past, there are many ways to measure distance, including rectilinear distance or along a network, rather than only considering the proximity between two places. Further, it can done with spatial objects. Murray suggested the population centroid of a county may not

make as much sense as in the past. The capabilities of GIS have implications for rural classification.

Murray noted that spatial autocorrelation, which was developed in the 1990s, reflects the notion of evolution. Ten years ago, analysts began to represent geographic space in terms of the weights related to who is a neighbor. There are many way to do this, and the measure is very sensitive to that specification, he said, and leads to the question of what is a neighborhood relationship. Work is continuing to focus on what that specification should be.

Spatial optimization and simulation are sensitive to data specification, error, and uncertainty. If a measure of spatial autocorrelation is computed, there is some uncertainty in the data in terms of the units used, the spatial scale, or some of the attributes. An analyst may or may not detect spatial autocorrelation. Alternatively, the areas themselves might change based upon this uncertainty. This is known as the so-called modifiable areal unit problem or framed dependence. That is to say, the method is dependent upon this underlying spatial specification.

Murray closed by saying that sources of data, particularly spatial data and spatial analytics, have evolved over time and are very promising. However, many errors and uncertainty remain with little understanding of their implications for studying issues in rural areas or urban areas.

STATEMENT BY SARAH A. LOW

Low said she approached the topic of changing analytical possibilities as a representative of the next generation of regional scientists and rural researchers. She agreed with other presenters about the unlikelihood of developing a universal definition of rural. But she said she would like to see a better definition that is more widely used. With the data and methods available, it is about getting people to adopt a slightly better definition in research. She said she would discuss what she termed the county trap or the "nonmetropolitan equals rural trap." Adoption is the problem, in her view. ERS has a great reputation in the research community, especially the rural research community. If ERS adopted an improved definition, she said, it would go a long way toward encouraging wider adoption.

She said her generation has always had access to GIS, big data, and geocoding. The point is that spatial analysis methods and data are not new. The methods allow creative researchers to define rural or enterprise zones, but they usually use someone else's definition. Many times, metropolitan-nonmetropolitan is used as a proxy for rural-urban because analysts are busy, she stated.

Low noted that Isserman (2005) talked about a trap in which metropolitan becomes the most widely used definition of urban. But, as

James Fitzsimmons pointed out earlier in the workshop (see Chapter 2), 40 percent of the U.S. land area is either metropolitan or micropolitan. Considering how concentrated the population is in this country, a lot of the land area is core. She referred to John Cromartie's explanation that ERS codes are based on a metropolitan/nonmetropolitan breakdown. In Low's view, it is a bit of an abuse to consider everything in a metropolitan area as urban.

As Low pointed out, Isserman (2005) lamented that researchers and policy makers refer to metropolitan counties as urban and nonmetropolitan as rural, which he said misleads the public and policy makers. In 2000, most counties were both rural and urban. Metropolitan counties contain over half of the U.S. rural population. Low briefly explained Isserman's rural-urban density typology. He defined counties by their character. He defined rural counties as having more than 90 percent of the population in rural areas, with a population density of less than 500 people per square mile, and the size of the largest urban area less than 10,000 people. Urban counties were defined as counties with more than 90 percent of the population in urban areas, an urban population of at least 50,000, and a population density of more than 500 people per square mile. He also defined mixed urban and mixed rural counties as those that were in between. If the population density was less than 320 people per square mile, the county was mixed rural; if the population density was more than 320, the county was mixed urban.

She said that if a density-based typology such as this were more widely adopted, it would have the potential to clarify definitions as well as an understanding of rural.

Data and Methods and the Future of Defining Rural

Low explained that big data, GIS, and spatial analysis allow analysts to make appropriate definitions for the task at hand. She asked if defining rural is more of a policy question than a research question. Spatial econometrics does not require a cutoff, and research increasingly operates on a rural-urban continuum. GIS allows for a proximity focus, such as driving time and distance, as well as useful aggregations, such as labor market areas or commuting zones. The results are more intuitive and make more sense than at the county level.

Low said that it is important for analysts to continue to advocate for better data. Isserman (2005) made a strong case for better data, she noted. Publicly available data are comprehensive only at the county level, and data suppression to preserve confidentiality limits the utility of data for small areas. The subcounty data are limited, but they are becoming more available. It would be helpful to increase researchers' access to micro

data with remote access, lower cost, and increased data-sharing between federal agencies, she said.

Low said that the methods and data to implement a better definition of rural are available, but that data and analytics are ahead of the concept. She said that although a universally accepted definition of rural is not likely, a more useful definition than defining rural as not metropolitan would be valuable. As she noted earlier, ERS is in the position to posit a new definition and encourage its use in research and policy.

Low also challenged workshop attendees to better prepare graduate students in areas like computation methods and GIS so they will become more able researchers or policy makers. Both groups, whether they are sociologists, economists or planners, need to be comfortable with GIS and big data, and they need the resources to be able to do that, she stated.

STATEMENT BY RICHELLE WINKLER

Winkler spoke about the availability and quality of data from the American Community Survey (ACS). ACS is a data instrument that people who work in more rural areas are starting to learn more about and rely on, regardless of its flaws. Winkler pointed out there are other opportunities and alternative data sources to the ACS.

Winkler discussed information on the geographic units and the available variables of interest in the ACS, and the margins of error associated with ACS data and how they vary for different geographies and variables. Whether ACS provides high enough quality data for more rural areas depends on the variable of interest and the geographical unit of analysis, she explained.

ACS data are available at geographies down to the Census block group level. Those block groups nest within Census tracts, which nest within counties. Another option is the county subdivision. They are appealing in some ways because in the 12 minor civil division (MCD) states, these political units of analysis reasonably represent neighborhoods. However, this is only true in those 12 MCD states; in other states, county subdivisions seem fairly arbitrary, but they do nest within counties.

Winkler noted the host of variables in the ACS and suggested the variables that might be of interest in rural analysis. The ACS provides population and housing unit estimates that are updated annually, not just at the time of the decennial census. However, they are demographic estimates with some error associated with them. There are data on industry and employment, extractive industries, natural resource-based industries, agriculture, and migration. A question in the ACS about where the respondent lived one year ago allows an analyst to calculate multiple different measures of migration. It is possible to compute the percentage

of the population in a geographic region who moved in within the last year, or who moved in from a metro area within the last year. One way an analyst might recognize whether a more rural area is urbanizing is if people are moving there from a more urban area. The ACS also provides county-to-county flow files associated with the migration question to see where people are moving to or coming from. To Winkler, those data are not useful given the errors associated with them.

She said there are other variables in the ACS to consider. Commuting is important, she said. With data on commuting, an analyst can look at travel time and at how many people or what proportion of people leave their unit of analysis to work somewhere else outside the state or other area.

There also are county-to-county worker flow files created from the ACS data. These are of better quality than the migration flows files, she said. For the migration question, the sample size is smaller. People are asked whether they lived in the same house one year ago and, if not, where they lived. First, a person who moved has to be sampled. In contrast, with commuting, most people work, and it is more likely that a number of these workers will be included in the sample; with a larger sample, the data are better.

Winkler also noted that the Census Transportation Planning Products (CTPP) files come out of an agreement between the transportation planning community and the Census Bureau.

Winkler identified two critical temporal issues to consider to use ACS for rural area classification: the residence rule and the timing of counting people in the ACS, which is different than the decennial census. The ACS is an ongoing survey, while the Census counts the number of people on April 1 in their usual residence for the year. This is different from the ACS residence rule of two months. The ACS asks if a person will be in the same household for two months. If so, the person is counted as a resident.

Winkler said this matters because much of the seasonal population that the Census did not count is included in the ACS estimates. For example, in places with many seasonal residents, population density could vary quite a bit from the decennial Census count. This raises an interesting question, she said, about whether to count seasonal populations when considering population thresholds for rural classification.

She said that multiyear estimates are another important feature of the ACS. ACS data for small areas and more rural counties are only available as five-year averages. This creates challenges in interpreting change over time. At the time of the workshop, she noted, the most recent data available were for 2009–2013, which was released in January 2015.

Winkler pointed out the sample size associated with the decennial census long form was of one in six households. With the ACS, it is closer

to one in 40 each year. The ACS samples about 2.5 percent of households annually. She observed that for some units of analysis, some data are suppressed if there are not enough people in the sample to protect confidentiality. ACS estimates are also accompanied by margins of error, and the margins of error are larger for smaller geographies, smaller populations, and more rural areas. She said that one way to assess whether a margin of error is too high or not is to use the coefficient of variation (CV), the standard error times 100 divided by the estimate. A rule of thumb, she explained, is that if a CV is less than 12 percent, then it might be considered reliable. If the CV is greater than 40, the estimate has low reliability and is probably not very useful.

Winkler illustrated some of the quality and margin-of-error issues associated with using ACS data for rural area classification by presenting a case study of the Upper Peninsula of Michigan, a remote, mostly rural area. Winkler summarized the CVs for the case study at various units of analysis (county, county subdivision, census tract, and census block group) to demonstrate data quality for three key variables: population estimates, percent in-migration from a metro county, and percent who commute to a metropolitan county or a micropolitan city for work.

She said that for the population estimates, there were not any geographic units that displayed low reliability (CV > 40). All of the census tracts displayed high reliability (CV < 12), as did 67 percent of county subdivisions and 53 percent of census block groups. Overall, the CVs for this variable were reasonable for any of these geographic units, but tracts perform better than either county subdivisions or block groups.

However, she said, looking at in-migration, or the percentage of the population who moves in from a metro area within the last year, the median CVs for all geographic units (even counties) are greater than 40 percent. Only 18 percent of counties displayed high reliability and 0 percent of county subdivisions, tracts, or block groups had high reliability. Low reliability was observed in 36 percent of counties, 86 percent of county subdivisions, 60 percent of census tracts, and 88 percent of census block groups. In other words, for the migration variable, ACS data are not reliable enough to make meaningful classifications, even at the county unit of analysis. The data are even less reliable for small geographic units, she said.

Data on commuting are much better than on migration, she said, but not quite as good as population estimates. Still a significant proportion of the geographic units had low reliability, even at the county level (45% of counties). Census tracts performed better than counties, county subdivisions, or block groups, with 0 percent showing low reliability.

Winkler said the ACS is not an official population count or estimate, nor is it the basis for classifying urban or rural areas by the Census

Bureau, which is done with the decennial Census. Estimates vary in their accuracy or reliability based on both the variable considered and the geographic unit. She said the population estimates are quite good, but there is a question about seasonal residence. If an analyst does not want to include seasonal residents, she asked, then why not just use the decennial census? Winkler stated she would not trust using in-migration data even at the county level. Commuting data are mostly acceptable for overall patterns (not necessarily specific flows), and at the tract level, they are just as good as at the county level.

Winkler pointed to alternative data sources she has used. The Longitudinal Employer-Household Dynamics (LEHD)[2] origin-destination files for commuting are based on administrative data built on employer filings for unemployment insurance. They cover about 90 percent of all workers and are available quarterly back to 2000. For migration, Internal Revenue Service data[3] are available at the county level. These data are probably much more accurate than data from the ACS, she said. There is the National Land Cover Database (NLCD)[4] to look at where urban infrastructure exists on the ground. For MCD states, it is possible to look at the tax base for county subdivision levels.

STATEMENT BY MICHAEL RATCLIFFE

Ratcliffe noted that Mark Perry, Census Bureau, collaborated with him to prepare this presentation about frequent availability of local-level data at lower levels of geography and geographic scale.

The history of urban-rural classifications and especially the Census Bureau's urban-rural classifications since the late 19th century has been one of response to improvements in spatial resolution of data, increased amounts of data, and improved technology. Applying more data at lower levels of geography more frequently does not necessarily produce a better definition of urban and rural, he said.

Ratcliffe focused his presentation on the period from 1950, when urbanized areas of 50,000 or more population, based partly on population density, were introduced. They were used through 1990. That was a period of manual delineation, when urban was defined using planimeters and paper maps, calculating the population densities and the land area of the small enumeration districts and then drawing the boundaries by hand.

In 1990, interactive GIS-based delineation began. The Census Bureau's

[2]See http://lehd.ces.census.gov/ [November 2015].
[3]See https://www.irs.gov/uac/SOI-Tax-Stats-Migration-Data [November 2015].
[4]See http://www.mrlc.gov/nlcd2011.php [November 2015].

Geography Division built a GIS and interactively delineated about 660 potential urban areas, with 22 people working for six months looking at block-level densities and drawing boundaries around areas that qualified. When density-based urban clusters of 2,500–50,000 people were added, they moved to an automated, GIS-based delineation system to meet the time requirements. That is how they did it in 2010 as well.

After the 1990 delineation, one of the concerns was that nonresidential urban land uses on the fringes of urban areas were not being accounted for. There were rules within the criteria for accounting for low-density employment centers, downtowns, industrial parks, office parks, and other areas surrounded by high residential density areas. But if the office park or other urban use were on the edge of the urban area, there was not an enclave of low density surrounded by high density. There was an urban land use, perhaps with high densities on one side and low densities on the other. If only looking at population density, the profile of the industrial park looked like the rural land adjacent to it. The Census staff sought other data to help reach those decisions. For the 2010 delineation they used the National Land Cover Dataset (NLCD) impervious surface layer as a proxy to identify nonresidential urban land uses.

Other Datasets for Defining Rural and Urban

There are various other datasets, Radcliffe pointed out, as discussed throughout the workshop. In addition to the NLCD, the Census Bureau's Longitudinal Employer-Household Dynamics (LEHD) is another source. It is annually updated with block-level data on employed persons from the ES202 files from the states, he explained. It is a synthesized dataset to avoid disclosure. There are some perturbations, but it warrants additional use.

He said that broadband maps are available at the census block level, as well as cellphone and parcel data. There is a lot of good information within the parcel data about the parcel and about the structures on the parcels. Zoning information shows what that parcel can be used for in the future.

He noted the abundance of data on small geographic areas—census blocks, block groups, tracts, grid cells, zip codes/zip code tabulation areas, pixelated data, latitude/longitude coordinates for structures, and GIS and database technologies to manage and manipulate large quantities of data. These provide the ability to measure distances between structures and other data points. It is possible to get down to the individual level with some data now available.

Ratcliffe next described the change in the urban population as a percentage of total from 1790 to 2010. In thinking about the rural definitions,

Ratcliffe and Perry broke the data into three eras, starting with a relatively flat trend, then a steep trend, and then another flattening trend. At the early stages in the United States, rural was the norm, and urban consisted of cities, smaller towns, and towns with more than 2,500 people that served as market centers for a larger rural region. It made sense to start to think of what is urban as distinct from the rural landscape, he said. The industrialization period was characterized by rural to urban migration, increasing suburbanization, and a separation of urban from rural. An urban area had a distinctive footprint on the landscape. The third era is the post-industrial era: suburban, with exurban growth. Urban is the norm, he said. With 81 percent of the population urban, the question he posed is what is rural?

Considering the Data "Landscape"

In closing, Ratcliffe raised several questions. He noted that it is possible to measure the landscape and define urban and rural with great precision, but to what purpose? Does the application of more data at lower levels of geography improve the ability to define rural? Is it meaningful for analysis and policy, he asked. He said he saw these things as integrated, and that good research is needed to inform policy.

He said that rural was once defined as physical isolation. But in an increasingly connected society, is rural really social isolation? He suggested it is time to rethink what is meant by rural, and perhaps to define rural with urban as the residual, not just in terms of a geographic and proximity, but perhaps sociologically and economically.

OPEN DISCUSSION

Michael Partridge referred to Isserman's classification and said for the kinds of analysis he does, it is conceptually correct to use nonmetropolitan as rural. In his studies, he said, rural is where the people are not functionally integrated with an urban center. He raised a few concerns he had with the classification as related to his studies. Low responded that she pointed out that one definition of rural and urban is not going to work. Part of the problem with the current metropolitan definition, she said, is there are too many counties very rural in character that are now classified as metropolitan, especially in the last 2000 and 2010 censuses. If the definition of metropolitan and nonmetropolitan were a little different, she said she would be more content with metropolitan-nonmetropolitan as a proxy for rural-urban, which is why she would like to see an alternative.

Bruce Weber suggested a classification system that deals with prox-

imity to the urban places. Low suggested the ERS codes that take both density and proximity into consideration are a happy medium.

Jon Pender commented that in some research, density is of concern. He suggested separate measures if the purpose is to find out what effect commuting has versus what effect being in a dense area has. He said they do not have to be all compounded into one unit.

David Plane asked Murray about his research into rural air service. Air service is one of the critical functions of proximity and access, he observed. Murray responded that in looking at the essential air service subsidies system, a lot was based upon evaluation of the measures of success of this historical legacy program. Some of these measures have nothing to do with spatial proximity. For example, in the air services case, nothing about what they are doing has to do with spatial proximity. It is focused on performance, being within a rural area and therefore eligible for the program, and then continuing to get funding.

David McGranahan asked Ratcliffe about cellphone data. Ratcliffe responded that information collected through cellphones is being used to locate individuals in space and in time. Researchers are starting to work with data collected from the GPS units of cellphones, tracking people's daily movements within and across urban-rural areas, within cities, and so on, looking at densities. He described it as an emerging area of interest among big data researchers. People generate an incredible amount of information every day that could be accessed from many different sources, although questions remain about the accuracy, volume, and velocity.

Ratcliffe noted that when he and his colleagues were looking at the redefinition of metropolitan areas in 2000, they asked about the frequency of updating. They concluded that every year is too fast because by the time of an update, they would be issuing a new definition. Five years seemed the right amount of time, he said, but he was not sure if OMB will choose to conduct updates every five years.

Murray expressed concern that many new data sources, such as from cellphones, collect individual data without a person's knowledge. People do not have control over their data, and it is not clear whether people's identities will be protected if the data are released.

Hardcastle commented that with the cellphone and even employment data, there are coverage issues. Some carriers want to provide the data or enter into agreements to provide the data, but not all carriers will. There is also the issue of who uses cellphones. Related to employment data, there are differential coverage rates across time and jurisdictions from Bureau of Economic Analysis versus Bureau of Labor Statistics data. The coverage fluctuates. There are also coverage issues with cellphone data.

8

Evaluating the Reliability and Validity of Rural Area Classifications

This chapter summarizes the workshop's eighth session, which focused on evaluating the reliability and validity of current rural area classifications. Stephan Goetz and Yicheol Han (Pennsylvania State University) prepared a commissioned paper, *Evaluation of Rural Area Classifications Using Statistical Modeling*, for the workshop. Goetz described their results, and Mark Shucksmith (New Castle University) presented on evaluating the validity and reliability of the classifications via "ground-truthing." The discussant was Carlianne Patrick (Georgia State University). Her discussion was followed by open floor discussion. The moderator was Mark Partridge (Ohio State University).

STATEMENT BY STEPHAN GOETZ[1]

Goetz noted he and Yicheol Han conducted an evaluation of the Rural-Urban Continuum Codes (RUCC), the Urban Influence Codes (UIC), the Rural-Urban Commuting Area (RUCA) Codes, and the Frontier and Remote (FAR) Codes using statistical modeling. They also constructed a measure of their own and evaluated it in a similar way. Their analysis asked the following questions:

- Are existing classifications still useful or should they be changed?
- Are there an optimal number of categories?

[1]This presentation is based on Goetz and Han (2015a).

- Are statistical methods useful for assessing the classification systems?
- Should alternative outcome measures, other than population growth and poverty, be considered for use in defining classifications and evaluating them?

Goetz and Han also explored whether there are now better tools for classifying counties in terms of their status along the rural-urban continuum. In particular, they applied principles from network science to start thinking about counties differently.

Statistical Performance of Existing Codes

Goetz stated that he and Han applied the adjusted R-square values as "goodness of fit" criterion for 1990, 2000, and 2010, and evaluated how well RUCC, UIC, RUCA, and FAR fit various dependent variables. The goal was to compare the individual codes against one another and also to compare them over time. Following the regional typology of the OECD, Goetz and Han focused on the employment/population ratio, an important variable that is correlated quite highly with poverty status. Using this ratio also results in a more dynamic measure of population. They found that the RUCA Code does reasonably well on existing (OECD) outcome measures. Perhaps not surprisingly, he commented, the UIC does well on the employment/population ratio but the goodness of fit values declined somewhat over time. Goetz observed that this might be one of the concerns that motivated this particular workshop.

He suggested that the decline over time in the fit of these regressions may be due to the fact that the nature and geographic distribution of the outcome variables are changing, rather than that the classification code is no longer relevant. To examine this possibility, Goetz and Han plotted the poverty rates obtained from the Small Area Income and Poverty Estimates (SAIPE) Program for the years 1989–2013, and the 2013 RUCC. They found the nation did quite well in reducing poverty in the period through most of the 2000s. At that time, poverty was mostly a rural problem. However, poverty has increased since 2007 and 2008. The point is that poverty has tended to shift. It has risen in urban areas and is now also prevalent in suburban areas.

Goetz said that evaluation using a few other variables showed that RUCA Codes perform very well on outcome measures such as population density, percentage rural population, and percentage farm area.

Optimal Classification of Codes

Goetz next explored whether any of the existing classification codes could be collapsed into fewer categories to generate a more simple classification scheme. He said he and Han concluded that collapsing the codes is not going to work consistently across variables and will not work consistently across time. Different socioeconomic variables would require a different reclassification, and such reclassifications would also have to change across time. The message, therefore, is that the codes are working well the way they are now, and collapsing them into fewer categories would not be straightforward. For these reasons, he suggested that reducing the number of categories of the classification codes is not feasible.

Alternative Classification Approach

Goetz and Han also explored a potential new classification system by applying network principles to community-level data to try to improve fit. He said that counties are positioned within commuting and potentially other networks in terms of information, commuter, resource, and other flows. He asked about the availability of better measures of access to economic opportunities, such as jobs and income, and diversity of labor markets.

Goetz reported that they used the 3,141 × 3,141 county matrix of commuting flows for the entire United States, based on Census Bureau data from 1990, 2000, and 2010, to develop two measures. Unlike the current measures, which allocate each county into a single labor market area (LMA), their measure allowed a county to belong to multiple LMAs, through the commuting links, and took the number of such LMAs into account.

One way is to calculate the number of distinct LMAs to which a county is connected, while allowing for the fact that LMAs may overlap. Using commuting data, one can calculate the number of LMAs to which a county belongs. Moreover, membership in more LMAs through commuting flows would provide more diverse economic opportunities and more stability over time. With their approach a county can be classified in terms of how many different LMAs it belongs to, and using a portfolio approach the hypothesis would be the larger the number of LMAs it belongs to, the more robust the economy might be. This is the *Diversity* measure.

The second way to look at labor markets is proximity to potential jobs as possibly introducing more economic opportunity to commuters. Higher gross payroll in a commuting destination ensures access to more potential income (jobs) and a larger scale of economic opportunities. Goetz and Han adopted a gravity model to measure a county's access to

total earnings through commuting to other counties (i.e., total employment weighted by wages). This is referred to as the *Proximity* measure.

Developing a Network-Based County Code

Goetz said overlapping LMAs can be evaluated using network principles. For example, with the definition of the LMA that is currently used, the City of New York is classified as belonging to a single LMA, but in reality the City of New York is part of multiple overlapping LMAs. When labor markets overlap, it is possible to consider the membership of a particular county in different LMAs. The more two counties send workers to the same kinds of counties, like adjacent counties, the more similar they are.

As a next step in their exploratory analysis, Goetz and Han converted diversity and proximity, two dimensions of economic access to employment, into a single measure that can be viewed as a rural area classification code. They tentatively called it the Network-Based County Code (NBCC). Consistent with network terminology, they used three categories or types of counties. The top category, the Hub, includes counties connected to at least 12 other LMAs. The middle range, Hybrid, has between 7 and 12 LMAs. The Hinterland counties are those with connections to 1 through 7 LMAs. Lastly, there are the isolated counties with small potential earnings in terms of the gravity model and no proximity to other LMAs.

Goetz reiterated that they are using neither population, adjacency, nor metropolitan/nonmetropolitan status to develop their code. Their code is based purely on commuting flows.

Comparative Evaluation of NBCC

Goetz and Han compared the fit of the NBCC with existing outcome measures, as well as new measures not included in the previous comparison. Goetz said that their general conclusion is that the NBCC is not consistently better in terms of existing outcome measures. It does better for some variables, such as employment to population. The fit generally still declines over time for most variables, including employment, population, and population growth, as well as percent rural population and farm area code. One exception is population density.

Looking at the fit of the NBCC to other outcomes measures points to the question of what is being measured. For example, NBCC does well predicting social capital and quite well predicting poverty change. These dynamic measures are perhaps better explained or accounted for by the NBCC than the four ERS codes, Goetz said. Looking at economic mobility measures, it turns out that the most remote rural areas do better at

allowing children to move up the income ladder. The NBCC also does better than other existing measures in terms of correlation with the teenage birth rate, economic upward mobility, child poverty rate, and change in child poverty.

Goetz stated their conclusion is that the existing ERS measures continue to perform well. They could be tweaked, but tweaking would depend on the outcome measure selected. Their alternative measure, the NBCC that considers counties' positions in the network, may offer a better goodness of fit, especially for measures of economic mobility or perhaps some dynamic measures such as poverty change.

STATEMENT BY MARK SHUCKSMITH

Shucksmith discussed an evaluation of the validity of rural area classification via "ground-truthing." He noted there is no objective definition of rural and for some areas, current rural area classifications do not make sense. As examples, the Grand Canyon is classified as a metropolitan region, and the city of Inverness in Scotland is classified as rural, while the island of Arran is classified as an urban area. Shucksmith explained that issues of scale, boundaries, and data availability give rise to these problems. These issues are especially problematic when undertaking a cross-national analysis such as in the European Development Opportunities in Rural Areas (EDORA) project. The overarching aim of EDORA was to examine the process of delineation of rural areas across the 28 countries of the European Union (EU), in order to better understand how EU, national, and regional policy could enable these areas to build upon their specific potentials to achieve "smart, sustainable and inclusive growth" (Copus and Hornstrom, 2012). Developing a rural typology across the EU faced the challenge that each country has its own cultural idea of what rural is, their own definition of rural, and diversity in the data and variables available in national datasets. In practice, the analysis used a three-dimensional framework rather than a one-dimensional classification. The three dimensions were (1) urban/rural (remote/accessible), (2) economic structure (diversification), and (3) accumulation–depletion (performance). Each dimension had four categories.

Shucksmith summarized the results along the economic structure dimension. The four structure types were intermediate and predominantly rural (agrarian), consumption countryside, diversified with strong secondary sector, and diversified with strong market sector. The analysis revealed that the least successful areas were those most dependent on agriculture, while those doing best in terms of economic performance were the consumption countryside and those where the tertiary sector now dominates. Shucksmith explained this study used case studies to

investigate in more depth the issues facing each structure type and its stability and to confirm validity.

Shucksmith said the study leads to the question, relevant to this workshop, of whether mixed methods might be helpful, which he illustrated further citing a study of ward-based classification of rural housing markets in England (Shucksmith et al., 2012). This analysis adopted a theory-based approach, deciding a priori that demand, supply, and existing local housing opportunities would be modeled as three axes in a GIS-based principal components analysis. These were used to derive and map a typology of rural housing markets, the validity of which was then tested through qualitative case studies, undertaken by independent researchers. These case studies confirmed the analysis, while also adding depth and understanding of the processes: The different types of areas had very different problems, which required different policy responses.

Shucksmith noted the two fundamental questions about what is rural and what is the purpose of the classification have come up throughout this workshop. He described a 2004 effort by the Department for Environment, Food and Rural Affairs (DEFRA) to introduce a new rural-urban classification of census output areas (units of about 300 people) based on two axes: settlement size and sparsity of population, each of which is easy for the public to understand. Moreover, using these two dimensions of settlement size and sparsity was much more analytically precise, and often revealing or surprising. For example, housing is systematically less affordable as settlement size reduces. However, if a combined "rural" variable had been used, this relationship would have been masked by an offsetting sparsity effect. The simple two-dimensional rural classification/definition proved much more helpful in understanding rural areas' characteristics, and in raising questions about underlying processes of change. This rural definition was also useful in many other spheres, he said, such as in many official datasets by the Commission for Rural Communities and in annual reports titled *The State of the Countryside*.

Shucksmith questioned the course of action if an analysis contradicts ground truths. Does it make the analysis invalid, he asked, or, on the contrary, might an analysis that runs counter to perceived wisdom be iconoclastic "myth-busting"? Shucksmith reiterated that the role of research is to challenge and reveal power-infused discourses, not only to confirm them.

He closed with the following thoughts about the validity of rural classifications. First, he suggested mixed methods to triangulate and enrich analysis. Second, he said to engage in knowledge exchange by conducting research *with* rural communities and respecting their forms of knowledge alongside the expert knowledge of scientists. Third, he suggested exploring all three dimensions of rural space—localities, representations, and

everyday lives. Finally, he urged being critical and reflexive, remembering that all knowledge is power-infused, and ask who gains from any suggested rural classification scheme.

STATEMENT BY CARLIANNE PATRICK

Evaluating Statistical Systems

Patrick said that a statistical study to evaluate the validity and reliability of classification methods should inform whether the classification system provides a valid and reliable measure or categorization of counties' urban or rural status. The parameters of evaluation thus depend critically upon what is meant by valid, reliable, urban, and rural, she said. In other words, what is the purpose of the classification system?

She reiterated that the purpose is one of the critical points to answer before redesigning a classification system. As has been discussed, she noted it is unlikely that one classification system will serve everyone's purpose all the time. If the purpose of the classification system is simply to refine and further characterize urban-rural according to Census definitions of integration with economic agglomerations of various sizes, then the current classification systems do that. If instead, it is supposed to be valid or reliable in that it captures a general sense of rurality or of urbanization, that is something different, although probably highly correlated with types and intensity of land use.

If the classifications are valid and reliable and describe a group of counties similar at the time of measurement with respect to things usually thought of when describing rural or urban, then evaluation can be viewed in one particular sense. If instead there is a belief that classifications are valid and reliable if they describe a group of counties that behave in a similar way with respect to changes in population and population characteristics, employment, and economic structure, this might be a slightly different set of characteristics, she said. It is very possible that places that look the same at one point in time also change in a similar way. But she said it is possible that places that look the same at a particular point in time due to one measure, like population size, behave differently over time based upon one of these other factors.

When thinking about an evaluation using statistical modeling, the selection of the dependent variables is very important because they address different concepts of "validity" and "reliability," Patrick said. The Goetz and Han study evaluates the correlation between current classification systems and a necessarily small set of potential dependent variables. Some of these are single point in time variables, others are change variables. Some might be thought of as outcomes, rather than descriptions

of rural and urban status. That leads to the question, she said, whether these variables represent the things the classification system is intended to explain, and whether they capture the desired degrees of rural and urban. The idea behind using a statistical model is that these things are going to be a function of the information captured by the classification system. Each dependent variable is describing somewhat different concepts of rural and urban.

Alternative Classification Evaluation Methods

Patrick pointed out that Goetz and Han created the NBCC as an alternative classification system and compared its performance against the current classification systems. One strength of their classification, she said, is that it is based on county-networked labor markets, making it a very county-centric rather than metro-centric concept. The measure also incorporates information on proximity to earnings, defined by commuting patterns and distance. One of the things she said she was not clear about is the construction of the proximity measures. Specifically, she asked about earnings as the appropriate metric.

The NBCC rural and urban categories are based upon labor market and proximity thresholds, and she asked how the thresholds were chosen. Evaluation of this type does not necessarily illuminate whether other thresholds could do better or how many categories are optimal. If it is agreed that they are the right dependent variables to describe rural/urban, then this analysis could be considered a baseline for comparing alternatives, perhaps ones with other thresholds to try to construct measures in order to get more explanatory power.

She pointed out other methods for evaluation using statistical methods include calculating parametric estimates of current and proposed components of classification systems to determine relative explanatory power, or doing nonparametric work and letting the data speak. If the purpose can be articulated in terms of what the classification is to explain and the variables to be predicted, then nonparametric methods like kernel density estimation or locally weighted regression can be used, she suggested. Alternatively, with the same understanding, one could do a maximum likelihood grid search.

Patrick said that nonparametric techniques could help determine where the natural groupings of different types are, the relationships between variables used to define rural and urban, and the important outcomes to change. It would be possible to create categories based on the thresholds identified by these natural groupings and inflection points. Then, she said, an analysis similar to that of Goetz and Han could see if these grouping perform better.

Another possibility she suggested is to use maximum likelihood grid search methods to identify threshold values. This involves iterating through every possible threshold value. The value of the likelihood functions can be used to determine which threshold best fits the data. This process can be repeated for any number of groupings. Comparing specifications for different numbers of thresholds, it is possible to see how much additional explanatory power comes from adding categories and choosing the optimal number of groupings. Ground-truthing and qualitative methods could verify validity of thresholds identified by nonparametric and grid source methods.

Patrick added that she would expect the outcomes evaluated in the workshop discussion thus far (e.g., population growth, employment to population ratios, poverty, social capital outcomes, and other outcomes) to behave similarly as technology and preferences change for places that are characterized by similar population size and density and the degree of connection and access. In addition, analysts might consider alternative ways in which connection and access might be captured. Research suggests connection and access might be captured by distance to agglomerations of a particular size or density to reflect access to different functions and specialties that might be available within those agglomerations. In addition to commuting patterns, or perhaps even instead of commuting patterns, analysts might think about input/output relationships as one measure of access to these types of goods and services.

OPEN DISCUSSION

David Brown asked Shucksmith to explain co-production of data. Shucksmith responded that he discussed co-production of knowledge, rather than co-production of data. He explained it as academic experts recognizing the complementary expertise of people living in rural or urban areas. Working together helps the process of producing results, he said.

John Logan commented on the value of a session about ground-truthing and validation, but he pointed out Patrick's observation that validating a classification requires knowing what variable it is going to have to be ground-truthed against. He referred to Douglas O'Brien's earlier point that the government uses classifications to target resources to places that have needs and a lack of capacity to support themselves. He expressed concern about the accurate measurement of needs for all counties and subcounty areas, and a lack of clarity about the concept of government capacity. There are many sources of data, not necessarily at a national level, for some parts of the country. Rurality may be defined based on on size and density because they can be measured, or

it may be because people believe size and density reflect some concept of rurality. Logan said that he does not think the important question is whether size and density, connectiveness, or other characteristics are highly associated with rurality. He said the question should be if they are highly associated with need and capacity so that the government can provide services to people. Or, from his own perspective, given where people live, what resources are available and what are the opportunity structures? Shucksmith responded there is a lot of qualitative research on the elements of capacity, but the question is whether data are attached to the research. He cautioned against the danger of going where the data lead regardless of relevance.

Stephan Goetz suggested that measures such as social capital pick up some of these factors. He referred to Linda Lobao's comment that while costly, it is possible to get measures of capacity for all counties. He observed O'Brien also alluded to the difficulty of showing impact in communities. It is not just the need and the lack of government, Goetz commented, it is also how to show that a new water system or other investment pays for itself.

John Pender commented it is important to distinguish between a concept of interest and what is thought that concept or construct affects. He said O'Brien's hypothesis is that being in rural areas means less access to needed goods or services. That may be true at one point but could change over time. It could be that poverty may have been greater in rural areas 50 years ago than it is today.

David Plane said that he liked the Goetz and Han (2015b) nonmutually exclusive view of commuting patterns. In previous work in New England, he found a typical New Englander in the 1970 Census lived in the commuting sheds of four to seven major metropolitan areas. He suggested that perhaps Goetz should try using a different data source, for example the Longitudinal Employer-Household Dynamics (LEHD) database. He noticed from Goetz's analysis that big counties, if they had bigger places in multiple directions away from them, tended to score high and smaller counties did not have that possibility. If that could be downscaled to individuals, he said he wondered about the impact. He said that one of his concepts about rurality is that people who live in rural areas have to go to multiple places to obtain what they need, including work.

Goetz referred to an earlier comment that there may not be many gains in going down to smaller geographies. He said he is intrigued by the prospect of looking at commuting by industry. He said another opportunity is based on central place theory in terms of commuting flow or migration flow. He asked what additional insights might be gained by using some of the tools available for network analyses that are applied in cental place theory. Rose Olfert observed she and her colleagues looked

at commuting sheds around different places in the urban hierarchy in the prairies. They found systematically larger commuting sheds around lower-order places.

David Brown said almost all the quantitative analysis discussed at this workshop has used aggregate-level data. In looking at things like commuting, a question about using microlevel data is if people who move from urban to rural areas keep their jobs in the urban areas. Brown also said the issue of retirement migration is about life course transitions, which he said has been missing from the discussion. He asked how understanding microprocesses at the household and individual level fit into changing macro social structures. Goetz commented that he and Han had not done analysis at the individual level, but they have looked at overlapping commuting and migration networks. He asked about people's motivation. If researchers had individual data, it would be even better, but he and Han think they can tease some of that out with migration data.

Michael Ratcliffe stated he and Alan Murray both mentioned the use of cell phone data as indicators of individuals and their movements. Some navigation companies are making their data available, and it is possible to get data at the individual level.

Lobao pointed to a tension that she felt throughout this workshop. Demographers are focused on settlement processes. In one way, like urban and rural codes, they historically have looked at settlement processes, population flows, and movements across the subnational United States. She noted a secondary, or perhaps even a primary, question raised during the workshop: Why are settlement patterns being measured? Is it to measure distress, poverty, or gaps in resources? She suggested that this question be elevated.

As a follow-on, Brown noted the workshop was motivated by a belief that context matters; where a person lives and works affects his or her life chances and opportunities. Brown stated what is needed is to figure out whether it makes a difference where a person lives. Responding to these comments, Richelle Winkler identified two different purposes. One is to know about the purpose of a classification scheme, which should be to measure capacity and need. On the other hand, a measure of density and proximity may help understand whether a variable is related to need or capacity, and how the relationshop changes over time. She said that the current classification systems are set up to address these two fundamentally different things.

9

Closing Remarks

This chapter is a summary of the final session of the workshop providing brief closing remarks by members of the steering committee and Economic Research Service (ERS) sponsors. Panelists were asked to identify what they saw as unresolved questions and challenges. Panelists were John Cromartie (ERS), James Fitzsimmons (U.S. Census Bureau), Stephan Goetz (Pennsylvania State University), David McGranahan (ERS), Timothy Parker (ERS), Mark Partridge (Ohio State University), David Plane (University of Arizona), and Brigitte Waldorf (Purdue University). The panel discussion was followed by open discussion. McGranahan provided closing remarks.

PANEL REMARKS

Cromartie said he found very disarming Keith Halfacree's statement that ERS is good at measuring remoteness, population size, and density, but then wondered why it should be labeled "rural." If it is correct that applying the label is an obscuring last step, he asked how ERS can be more careful to keep in touch with what they are measuring. He also noted that Ken Johnson requested that ERS make available the continuous measure of remoteness, percent commuting, size of the largest city, and so on. Cromartie said that he agrees but doing so is a resource issue.

Fitzsimmons commended ERS for sponsoring this workshop. He said he thinks that the most difficult task facing ERS will be deciding on the purpose of any revision to rural area classifications. He said the workshop

discussions show some uncertainty about the issues. He asked if there is dissatisfaction with any or all of the ERS four classifications or whether ERS has a fundamental commitment to search for the best measure. He suggested that once the goals have been clearly articulated, coming up with a revision might not be difficult. He said that in preparation for the workshop, he looked at files from the late 1940s to figure out what ultimately became standard metropolitan areas. Reading minutes of meetings from 1946, he said he was struck by the fact that the committee had four classifications and they did not know how the four would fit together, whether they should fit together, or whether all should be replaced. The committee came up with an answer, metropolitan statistical areas, that has proven very useful.

He said his basic message was one of optimism. ERS needs to carefully articulate the goal, whether trying to come up with an additional or a single or a smaller number of classifications. Once that decision is made, Fitzsimmons said coming up with the classification would not be difficult. He noted that at the workshop, there has been talk about the ambiguity of some of the thresholds. He suggested that perhaps a group of people could work through the strengths and weaknesses of current and proposed measures.

Fitzsimmons posed one last question. He noted Plane had pointed out the advantages and disadvantages to federal classifications because of the requirement for consistency across the United States. If one were not constrained by this requirement, he asked about the possibility of coming up with a single classification system, and what might it look like.

Goetz remarked that this question is also something that motivated this workshop. What outcome variable should be targeted with this indicator, he asked. He noted that in the past it was poverty, and that has been very important. Is the outcome variable going to be a level measure, or a dynamic measure? For example, will places that have high poverty be targeted, or places that have high growth in poverty? Places where poverty is rising may be very different from those that already have high poverty. Or, he asked, will areas be targeted that are a combination of high poverty and high growth in poverty? Goetz suggested child mobility as an interesting variable to consider, as it is related to the prospects of future consumers and residents of a country. He said that perhaps disproportionately targeting mobility of younger people might help people move up the income ladder in place rather than having to move to cities in order to prosper. In the larger context, everyone is aware that inequality and widening gaps in income distribution are becoming a major concern, he said.

Going back to a point made by Mary Bohman in the opening session, McGranahan reminded the group that poverty rates are no longer higher in more rural counties as was observed in Hines, Brown, and Zimmer

(1975). Using county data from the five-year American Community Survey (2009–2013), he said it is apparent that this relationship no longer holds. Poverty has gone down in more rural counties and up in more urban counties, with little difference across these county groups. This disappearance holds using today's rural-urban codes or the original one.

McGranahan stated that at least four major changes have occurred. First, farming has become a lucrative and complicated business. Many rural counties now have relatively high education levels as less well-trained farmers have left. Second, the decline in two-parent families has become a major cause of poverty, particularly among children. Single-parent families, more prevalent everywhere, are much less likely to have earnings that yield above-poverty incomes. Third, the recession was much harder on manufacturing than other industries, and manufacturing is relatively rare in more rural counties. Finally, Social Security payments rose considerably in the 1970s, lifting many people over age 65 out of poverty. More rural counties have always tended to have relatively large proportions of elderly. He said that the bottom line is that rural-urban codes no longer identify areas of low economic well-being.

Parker remarked he usually tends to be narrowly focused on the current codes. This workshop has given him many new ideas, but questioned how the small group of people in ERS can undertake the work.

Brown observed ERS did not receive questions about rural classification in the 1970s. To some extent, it is a response to the early efforts to develop a framework to look at geographic variability and many social measures.

Partridge stated that he has approached the possibility of producing rural-urban influence codes and labor market areas in a practical sense. His advice would be to first think of the main characteristics that should be captured with these measures, while culling others of lower priority. He noted that to the extent that economic features are a priority, one needs to have measures that are behavioral in their design such as commuting and the use of functional economic areas. He said ERS will need to get advice on the importance of compatibility over time. They might come up with a better measure, but if it is incomparable with the current measures, it may just cause confusion and a long transition period.

Plane observed the late Ken Bolding once said "knowledge is always gained by the orderly loss of information." He noted that the workshop did not include a discussion of real estate trends. He stated that he disagreed about the idea of defining rural and then taking urban as the residual because urban areas are undergoing a regime of real change. There has been a trend in migration back to downtown areas, and he commented on the transformation of the suburbs in the decades ahead.

Plane suggested that analysts might think more about the dichotomy

between urban and rural. In fact, the two were getting closer together in the last few decades. However, he suggested that as the United States becomes more like Britain or other places with a more village kind of structure, the countryside and the city may become more distinct.

Waldorf suggested consideration of a context-specific definition of classification. She said it is important for a classification system not to mix up the concept itself with the causes and consequences. This may be related to the whole issue of validation, she said.

She referred to a point made by O'Brien about rural places having low capacity. Policies directed toward rural places have to look at their effectiveness at creating jobs, for example. Looking at classifying rurality through that lens means that causes, concept, and consequences are being mixed up. She suggested that for these kinds of policy questions, it might be better to identify an index of neediness as opposed to an index of rurality.

Waldorf also observed that analysts all agree that rurality is a multidimensional concept. During this workshop there has been talk about size, density, proximity, internal connectedness, and other factors. Waldorf concluded that she likes the concept of rurality and would like to have a definition of rurality and a classification. But she said she is at a loss to suggest any that would satisfy everybody.

Brown stated that in planning the workshop, he was very interested in making sure that the agenda included presenters from the United Kingdom, which he said might help to provide engagement among qualitative and quantitative researchers. He asked how qualitative information about the nature of rural community, community, economy, and society can be merged with quantitative information to develop conceptions of rural structure and rural change.

Shucksmith spoke about co-production of knowledge. He asked if qualitative information simply for evaluating the accuracy of quantitative analysis or does it have intrinsic information. Does it yield intrinsically important information that needs to be considered in a more thoughtful development of knowledge about rural and urban?

COMMENTS AND OBSERVATIONS

Constance Citro (Committee on National Statistics) observed that ERS and the U.S. Department of Agriculture in general need ways to categorize rural areas and the people living in them to carry out their mission. A good classification scheme helps bring order to that mission. She observed classifications get taken up for various programmatic purposes and tend to develop a life of their own, which can make it hard to implement revisions. According to Citro, the basic concept seems right that something

about rurality remains applicable, certainly to a country like the United States with its diverse geography and population. One could imagine some countries becoming totally urban and suburban for which a rurality concept would have little to offer. In the United States, in which some people live differently enough from urban and suburban living arrangements, it makes sense to have a way to characterize those areas.

Citro said if it were really true that there were no differences in the consequences of living in a rural area as opposed to an urban or suburban area for such important socioeconomic dimensions as poverty or inequality, then one might ask why have a rural classification. But, she said, prima facie, rural areas differ from other areas. Consequently, some kind of a rurality classification will continue to make sense. When cross-classified by other social indicators, such as single-parent family poverty, a rurality classification will help illuminate to what extent rural areas are becoming more like or unlike urban and suburban areas, Citro said.

Similar to poverty measurement, she said it could be useful to have several measures of rurality. In the case of poverty, one can use an income measure, such as the official U.S. measure, ask people what they think a poverty level is, or look at deprivation measures. Each of these measures enriches the story in different ways that can be useful for research and policy issues. Similarly, she said, developing several concepts of rurality, including how people themselves feel about it, could be very useful.

Responding to McGranahan's statement about rural poverty, Partridge said that the Urban Influence Codes were designed in 1970s and they fit the world well then. But the world has changed, and now other indicators may be more informative.

Michael Woods made three observations about statements he heard. He referred to a point by Cromartie that these classifications are produced for statistical purposes only. The second statement was that ERS does not produce classifications for political purposes. The third was Tom Johnson's remark about the political economy of definitions, and that each definition makes people money and costs money. Woods suggested that one challenge is to square those three statements.

He said using a rural definition, classifying areas as rural, and using those categories for research or for funding programs is making a political decision. They should not be political decisions, he said, because the evidence heard during this workshop is that the term "rural" is meaningless. It is about accessibility, proximity, density, and so on. To bundle those things and call the result rural is a political decision, Woods said.

He said ground-truthing is where qualitative research comes in. One way of asking whether the measures that are produced make sense statistically and quantitatively is to see if people qualitatively feel an area is rural or urban. Woods also suggested a distinction between classifying

populations and classifying territories. He noted that both have a special geographic expression, but there are examples of urban populations potentially living on rural land, and perhaps vice versa. Current methods have identified areas with mixed land use and mixed populations. Woods noted that these are tricky to work with, both for analysis and policy. Qualitative research is very important to understanding what is happening in most mixed areas and whether it makes more sense to align them with urban or with rural.

Woods suggested that if the outcome of the workshop is how rural areas are viewed for the next 40 years and beyond, then the way forward needs to be future-proof. To describe future-proof, Woods referred to the presentations on GIS, sensing, and new technologies. He said those techniques are the future of how to define a measure. There are all kinds of data now available that may go beyond the limited public data previously available. What would happen in 40 years' time, he asked, if there were no decennial U.S. census? Woods said future-proofing is also about the process of change. What does it mean to be rural, not in a metropolitan society, but in a global society where connectedness means different things; where people may be commuting on a temporary fly-in fly-out basis to work, not necessarily to the largest nearest city; or where food-processing plants in rural areas are effectively recruiting from a continental labor market, not a regional labor market? Woods suggested pursuing a mixed-methods approach for combining quantitative and qualitative evidence to work through the likely dynamics of rural America over the next 30 or 40 years, the time frame for which a useful classification system would be robust.

In terms of ground-truthing, Pender suggested a simple survey with one question: Do you live in a rural area? Responses could be georeferenced and compared with what different classification systems indicate. Qualitative research with focus groups could find why some people may classify a given area as rural and others may classify it as urban.

Bruce Weber pointed to earlier statements about context and whether to define rural in terms of density and proximity. He said his reading of the regional science literature has convinced him that proximity and density are important in terms of development patterns and outcomes. It has also convinced him, he said, that place in the hierarchy is important, and when suburbs of the major metropolitan areas were taken out of the rural urban continuum codes, something was lost in terms of what the Brookings Institution calls the largest segment of the population.

Daniel Lichter observed his frustration about the lack of workshop discussion about the link between changes in race and ethnicity and the U.S. system of resettlement, referring to Census Bureau projections that the United States will be a majority/minority society by 2043 if current

trends continue. The concept of segregation, for example, has mostly been concentrated in urban metropolitan neighborhoods, but the same issues exist in rural America, such as in the Delta, Indian reservations, or Lower Rio Grande Valley. What are the economic transitions from those areas? Lichter stated race is fundamental to the U.S. settlement system beyond big city populations and metropolitan areas. He and his colleagues worked to characterize every place in the United States from big to small. The only place that white people are moving to are areas or places that have an established white population, he said. The suburbs are becoming minority and immigrant. Whites are either moving further out or back into the cities. He said that he knows race is not a concept typically considered in an analysis of rurality but it seems fundamental.

In his final remarks, McGranahan stated that his original thought was to get five or six people together in a room to talk about how ERS might change the codes. He said the idea grew into the two days of discussion at this workshop. He said ERS learned about different variables and contexts for rurality and saw examples of other rural classification systems in a very wide-ranging discussion. He noted ERS needs to look broadly to assess the current definitions before it can decide on next steps. Although the discussions at the workshop did not provide specific ideas for developing a new or revised coding system, he commented, they did provide thoughtful insights and the workshop has been quite valuable. He said he views developing a code as a demographic effort to determine the extent to which place, size of population, and distance constrain and permit economic activity, access to services, resilience to problems, and so on. He thanked all the participants and presenters for their contributions.

Bibliography

NOTE: This bibliography contains all references made by participants to the workshop, and other references identified by steering committee members or participants as providing useful background information.

Adamchak, D.J., Bloomquist, L.E., Bausman, K., and Qureshi, R. (1999). Consequences of population change for retail/wholesale sector employment in the nonmetropolitan Great Plains: 1950-1996. *Rural Sociology, 64*(1), 92-112.

Adams, J.S. (1995). Classifying settled areas of the United States: Conceptual issues and proposals for new approaches. In D.C. Dahmann and J.D. Fitzsimmons (Eds.), *Metropolitan and Nonmetropolitan Areas: New Approaches to Geographical Definition*. Washington, DC: U.S. Bureau of the Census.

Adams, J.S., VanDrasek, B.J., and Phillips, E.G. (1999). Metropolitan area definition in the United States. *Urban Geography, 20*(8), 695-726.

Ahn, Y.-Y., Bagrow, J.P., and Lehmann, S. (2010). Link community reveals multi-scale complexity in networks. *Nature, 446*(7307), 761-764.

Albrecht, D.E. (1993). The renewal of population loss in the nonmetropolitan Great Plains. *Rural Sociology, 58*(2), 233-246.

Aldstadt, J., and Getis, A. (2006). Using AMOEBA to create a spatial weights matrix and identify spatial clusters. *Geographical Analysis, 38*(2006), 327-343.

Ali, K., Olfert, M.R., and Partridge, M. (2011). Urban footprints in rural Canada: Employment spillovers by city size. *Regional Studies, 45*(2), 239-260.

Alonso, W. (1993). *The Interpenetration of Rural and Urban America: A Conference Proceedings*. Report No. AGES-9324, 23-28. Washington, DC: U.S. Department of Agriculture Economic Research Service, Agriculture and Rural Economy Division.

Anselin, L. (1995). Local indicators of spatial association—LISA. *Geographical Analysis, 27*(2), 93-115.

Anselin, L. (2012). From spacestat to CyberGIS twenty years of spatial data analysis software. *International Regional Science Review, 35*(2), 131-157.

Anselin, L., Murray, A.T., and Rey, S.J. (2013). Spatial analysis. In T.D. Little (Ed.), *The Oxford Handbook of Quantitative Methods* (Vol. 2). Oxford: Oxford University Press.

Atav, A.S., and Darling, R. (2012). Comparison of coding schemas and birth outcomes as exemplars. *Online Journal of Rural Nursing and Health Care, 12*(1).

Atchley, R.C. (1967). A size-function typology of cities. *Demography, 4*(2), 721-733.

Ayres, J., Waldorf, B., McKendree, M., and Hoelscher, L. (2012). *Defining Rural Indiana—The First Step*. West Lafayette, IN: Purdue Center for Rural Development.

Bailey, C., Jensen, L., and Ransom, E. (Eds.). (2014). *Rural America in a Globalizing World*. Morgantown: West Virginia University Press.

Baldwin, L.-M., Chan, L., Andrilla, C.H.A., Huff, E.D., and Hart, L.G. (2010). Quality of care for myocardial infarction in rural and urban hospitals. *The Journal of Rural Health, 26*(1), 51-57.

Barber, C.E. (2013). Perceptions of aging-friendly community characteristics: Does county rurality make a difference? *Online Journal of Rural Research & Policy, 8*(2).

Beale, C.L. (1984). Poughkeepsie's complaint, or defining metropolitan areas. *American Demographics, 6*(1), 28-31.

Bell, M.M. (1994). *Childerley: Nature and morality in a country village*. Chicago: University of Chicago Press.

Benton, J.E. (2002). *Counties as Service Delivery Agents*. Westport, CT: Praeger.

Benton, J.E. (2005). An assessment of research on American counties. *Public Administration Review, 65*(4), 462-474.

Berke, E.M., West, A.N., Wallace, A.E., and Weeks, W.B. (2009). Practical and policy implications of using different rural-urban classification systems: A case study of inpatient service utilization among veterans administration users. *Journal of Rural Health, 25*(3), 259-266.

Berry, B.J.L. (1970). Labor market participation and regional potential. *Growth and Change, 1*(4), 3-10.

Berry, B.J.L. (1977). *The Changing Shape of Metropolitan America: Commuting Patterns, Urban Fields, and Decentralization Processes, 1960-1970*. New York: Ballinger.

Berry, B.J.L. (1995). Capturing evolving realities: Statistical areas for the American future. In D.C. Dahmann and J.D. Fitzsimmons (Ed.), *Metropolitan and Nonmetropolitan Areas: New Approaches to Geographical Definition*. Washington, DC: U.S. Bureau of the Census.

Berry, B.J.L., and Kim, H.-M. (1993). Challenges to the monocentric model. *Geographical Analysis, 25*(1), 1-4.

Berry, W. (2009). *Home Economics: Fourteen Essays*. Berkeley, CA: Counterpoint.

Berube, A., Singer, A., Wilson, J., and Frey, W. (2006). *Finding Exurbia: America's Fast-Growing Communities at the Metropolitan Fringe*. Washington, DC: Brookings Institution Press.

Bourdieu, P. (1990). *The Logic of Practice*. Stanford, CA: Stanford University Press.

Bradley, J., and Katz, B.J. (2013). *The Metropolitan Revolution*. Washington, DC: Brookings Institution Press.

Brenner, N. (2004). *New State Spaces: Urban Governance and the Rescaling of Statehood*. Oxford: Oxford University Press.

Brenner, N. (2009). Open questions on state rescaling. *Cambridge Journal of Regions, Economy, and Society, 2*(1), 139.

Brezzi, M., Dijkstra, L., and Ruiz, V. (2011). *OECD Extended Regional Typology: The Economic Performance of Remote Rural Regions* (OECD Regional Development Working Papers, 2011/06). Paris, France: OECD.

Brown, D.L., Cromartie, J.B., and Kulcsar, L.J. (2004). Micropolitan areas and the measurement of American ubanization. *Population Research and Policy Review, 23*(4), 399-418.

Bryant, L., and Pini, B. (2011). *Gender and Rurality*. New York and Abingdon: Routledge.

Bunce, M. (1994). *The Countryside Ideal: Anglo-American Images of Landscape*. London, UK: Routledge.

Carolan, M.S. (2008). More-than-representational knowledge/s of the countryside: How we think as bodies. *Sociologia Ruralis, 48*, 408-422.

Caschili, S., De Montis, A., and Trogu, D. (2015). Accessibility and rurality indicators for regional development. *Computers, Environment and Urban Systems, 49*, 98-114.

Cayo, M.R., and Talbot, T.O. (2003). Positional error in automated geocoding of residential addresses. *International Journal of Health Geographics, 2*(10).

Center for Rural Affairs. (2015). *Love Letters to Rural America.* Available: http://dearrural.tumblr.com/ [November 2015].

Cherlin, A. (2014). *Labor's Love Lost: The Rise and Fall of the Working Class*. New York: SAGE.

Chetty, R., Hendren, N., Kline, P., and Saez, E. (2014). Where is the land of opportunity? The geography of intergenerational mobility in the United States. *The Quarterly Journal of Economics, 129*(4), 1553-1623.

Christaller, W. (1933). *Die zentralen Orte in Suddeutschand.* Gustav Fischer, Jena.

Church, R.L., and Murray, A.T. (2009). *Business Site Selection, Location Analysis, and GIS*. New York: Wiley.

Clapson, M. (2003). *Suburban Century*. Oxford: Berg.

Cloke, P. (1977). An index of rurality for England and Wales. *Regional Studies, II*, 31-46.

Cloke, P. (1994). (En)culturing political economy: A life in the day of a rural geographer. In P. Cloke, M. Doel, D. Matless, M. Phillips, and N. Thrift (Eds.), *Writing the Rural*. London, UK: Paul Chapman.

Cloke, P., and Little, J. (Eds.). (1997). *Contested Countryside Cultures*. London, UK: Routledge.

Cloke, P., and Milbourne, P. (1992). Deprivation and lifestyles in rural Wales: II. Rurality and the cultural dimension. *Journal of Rural Studies, 8*(4), 359-371.

Cloke, P., Marsden, T., and Mooney, P. (Eds.) (2006). *Handbook of Rural Studies*. London, UK: SAGE.

Coburn, A.F., MacKinney, A.C., McBride, T.D., Muller, K.J., Slifkin, R.T., and Wakefield, M.K. (2007). Choosing rural definitions: Implications for health policy. *Rural Policy Research Institute Health Panel* (Issue Brief Number 2, March 2007).

Conlan, T., Posner, P.L., and Lopez-Santana, M. (2014). *Unsafe at Any Speed? The Emergence of Variable Speed Federalism in the United States and the European Union*. Paper presented at the American Political Science Association 2014 Annual Meeting, Washington, DC.

Cooke, T., and Marchant, S. (2006). The changing intrametropolitan location of high-poverty neighbourhoods in the U.S., 1990-2000. *Urban Studies, 43*(11), 1971-1989.

Copp, J.H. (1972). Rural sociology and rural development. *Rural Sociology, 37*(4), 515-533.

Copus, A., and Hornstrom, L. (Eds.). (2012). *The New Rural Europe: Towards a Rural Cohesion Policy*. Stockholm, Sweden: Nordregio.

Cromartie, J.B. (1993). Nonmetro population grew slowly during the 1980s. *Rural Conditions and Trends, 4*(3), 12-15.

Cromartie, J.B. (1998). Net migration in the Great Plains increasingly linked to natural amenities and suburbanization. *Rural Development Perspectives, 13*(1), 27-34.

Cromartie, J.B. (2006). Metro expansion and nonmetro change in the south. In W.A. Kandel and D.L. Brown (Eds.), *Population Change and Rural Society* (pp. 233-252). Dordrecht, The Netherlands: Springer.

Cromartie, J. (2015). *Historical Development of ERS Rural Urban Classifications Systems*. Paper presented at the Workshop on Rationalizing Rural Area Classifications, April, National Academies of Sciences, Engineering, and Medicine, Washington, DC. Available: http://sites.nationalacademies.org/DBASSE/CNSTAT/DBASSE_160632 [November 2015].

Cromartie, J., and Bucholtz, S. (2008). Defining the "rural" in rural America. *Amber Waves, 6*(3), 28-34.

Cromartie, J., and Nulph, D. (2015). *Frontier and Remote Area Codes*. Available: http://www.ers.usda.gov/data-products/frontier-and-remote-area-codes.aspx [March 2015].

Cromartie, J.B., and Swanson, L.L. (1996). Census tracts more precisely define rural populations and areas. *Rural Development Perspectives, 11*(3), 31-39.

Cromartie, J., Nulph, D., and Hart, G. (2012). Mapping frontier and remote areas in the U.S. *Amber Waves, 10*(4), 3-1D, 2D, 3D.

Cromartie, J., Nulph, D., Hart, G., and Dobis, E. (2013). Defining frontier areas in the United States. *Journal of Maps, 9*(2), 149-153.

Dadyan, L., and Boyd, D.J. (2013). The depth and length of cuts in state-local government employment is unprecedented. *Independent Research on America's State and Local Governments* (January). Available: http://www.rockinst.org [November 2015].

Dahmann, D.C., and Fitzsimmons, J.D. (Eds.). (1995). *Metropolitan and Nonmetropolitan Areas: New Approaches to Geographical Definition*. Washington, DC: U.S. Census Bureau. Available: https://www.census.gov/population/documentation/POPWP.pdf [September 2015].

Davis, D., and Weinstein, D. (2008). A search for multiple equilibria in urban industrial structure. *Journal of Regional Science, 48*(1), 29-65.

De Montis, A., Caschili, S., and Trogu, D. (2012). *Accessibility, Rurality and Remoteness: An Investigation on the Island of Sardinia, Italy. In Planning Support Tools: Policy Analysis, Implementation and Evaluation.* Paper presented at the Proceedings of the 7th International Conference on Informatics and Urban and Regional Planning.

Decker, P.R. (1998). *Old Fences, New Neighbors*. Tucson: University of Arizona Press.

Desmet, K., and Fafchamps, M. (2005). Changes in the spatial concentration of employment across U.S. counties: A sectoral analysis 1972-2000. *Journal of Economic Geography, 5*(3), 261-284.

Dijkstra, L., and Ruiz, V. (2010). *Refinement of the OECD Regional Typology: Economic Performance of Remote Rural Regions*. Paris, France: OECD.

Dobkins, L.H., and Ioannides, Y.M. (2001). Spatial interactions among cities. *Regional Science and Urban Economics, 31*(6), 701-731.

Domina, T. (2006). What clean break?: Education and nonmetropolitan migration patterns, 1989–2004. *Rural Sociology, 71*(3), 373-398.

Donahue, J.D. (1997). Tiebout? Or not Tiebout? The market metaphor and America's devolution debate. *The Journal of Economic Perspectives, 11*(4), 73-81.

Duenckmann, F. (2010). The village in the mind: Applying q-methodology to re-constructing constructions of rurality. *Journal of Rural Studies, 26*(3), 285-295.

Duncan, C. (2000). *Worlds Apart: Why Poverty Persists In Rural America*. New Haven, CT: Yale University Press.

Duncan, O.D., and Reiss, A. (1950). *Social Characteristics of Urban and Rural Communities*. New York: John Wiley & Sons.

Duranton, G., and Jayet, H. (2011). Is the division of labor limited by the extent of the market?: Evidence from French cities. *Journal of Urban Economics, 69*(1), 56-71.

Duranton, G., and Puga, D. (2005). From sectoral to functional urban specialisation. *Journal of Urban Economics, 57*(2), 343-370.

Dwyer, R.E. (2013). The care economy? Gender, economic restructuring, and job polarization in the U.S. labor market. *American Sociological Review, 78*(3), 390-416.

Edmondson, J. (2003). *Prairie Town: Redefining Rural Life in the Age of Globalization*. Lanham, MD: Rowman and Littlefield.

Englund, H. (2002). The village in the city, the city in the village: Migrants in Lilongwe. *Journal of Southern African Studies, 28*(1), 137-154.

Eurostat. (2013a). Territorial typologies. *Eurostat Statistics Explained*.

Eurostat. (2013b). Urban-rural typology update updated urban-rural typology: Integration of NUTS 2010 and the latest population grid. *Statistics in Focus, 16*.

Eurostat. (2015a). Territorial typologies for European cities and metropolitan regions. *Eurostat Statistics Explained*.

Eurostat. (2015b). Urban-rural typology. *Eurostat Statistics Explained*.

Federal Highway Administration. (2001). *Planning for transportation in rural areas*. Available: http://www.fhwa.dot.gov/planning/publications/rural_areas_planning/ [October 2015].

Feeding America. (2014). *Child food insecurity 2013*. Available: http://www.feedingamerica.org/hunger-in-america/our-research/map-the-meal-gap/child-food-insecurity-executive-summary.html [September 2015]

Fischer, M.M., and Getis, A. (Eds.). (2009). *Handbook of Applied Spatial Analysis*. New York: Springer.

Flint, A. (2006). *This Land: The Battle Over Sprawl and the Future Of America*. Baltimore, MD: The Johns Hopkins University Press.

Florida, R., Gulden, T., and Mellander, C. (2008). The rise of the mega-region. *Cambridge Journal of Regions, Economy, and Society, 1*(3), 459-476.

Forsyth, A. (2012). Defining suburbs. *Journal of Planning Literature, 27*(3), 270-281.

Frey, W.F., and Speare, Jr., A. (1995). Metropolitan areas as functional communities. In D.C. Dahmann and J.D. Fitzsimmons (Eds.), *Metropolitan and Nonmetropolitan Areas: New Approaches to Geographical Definition*. Washington, DC: U.S. Bureau of the Census.

Frey, W.H. (2011). *Melting Pot Cities and Suburbs: Racial and Ethnic Change in Metro America in the 2000s*. Washington, DC: Metropolitan Policy Program at the Brookings Institution.

Fuguitt, G., Brown, L., and Beale, C. (1989). *Rural and Small Town America*. New York: SAGE.

Fuguitt, G.V. (2005). Some demographic aspects of rurality. *Research in Social Stratification and Mobility, 22*, 73-90.

Gallagher, L. (2014). *The End of the Suburbs: Where the American Dream Is Moving*. New York: Penguin Group.

Gallardo, R., and Scammahorn, R. (2012). Determinants of innovative versus non-innovative entrepreneurs in three southern states. *The Review of Regional Studies, 41*(2, 3), 103-117.

Getis, A. (2015). Analytically derived neighborhoods in a rapidly growing West African city: The case of Accra, Ghana. *Habitat International, 45*(Part 2), 126-134.

Ghelfi, L.M. (1993). Metro-nonmetro distinction primary: Finer classifications add depth. *Rural Conditions and Trends, 4*(3), 6-11.

Ghelfi, L.M., and Parker T.S. (1997). A county-level measure of urban influence. *Rural Development Perspectives, 12*(2), 32-41.

Glasgow, N., and Brown, D.L. (2012). Rural ageing in the United States: Trends and contexts. *Journal of Rural Studies, 28*(4), 422-431.

Goetz, S.J., and Han, Y. (2015a). *Evaluation of Rural Area Classifications Using Statistical Modeling*. Paper presented at the Workshop on Rationalizing Rural Classifications, April, National Academies of Sciences, Engineering, and Medicine, Washington, DC. Available: http://sites.nationalacademies.org/DBASSE/CNSTAT/DBASSE_160632 [November 2015].

Goetz, S.J., and Han, Y. (2015b). *Identifying Labor Market Areas Based on Link Communities.* Paper presented at the AAEA Annual Meeting, San Francisco, CA.

Goetz, S.J., Davlasheridze, M., and Han, Y. (2014). County-level determinants of mental health, 2002-2008. *Social Indicators Research*. Available: http://link.springer.com/article/10.1007%2Fs11205-014-0792-6#page-1 [September 2015]

Goodchild, M.F. (2007). Citizens as sensors: The world of volunteered geography. *GeoJournal, 69*, 211-221.

Gorber, M., and Behr, M. (1982). Central cities and suburbs as distinct place types: Myth or fact? *Economic Geography, 58*(4), 371-385.

Gray, F., and Duncan, S. (1978). Etymology, mystification and urban geography. *Area, 10*(4), 297-300.

Grubesic, T.H., and Murray, A.T. (2004). Waiting for broadband: Local competition and the spatial distribution of advanced telecommunication services in the United States. *Growth and Change, 35*(2), 139-165.

Grubesic, T.H., and Murray, A.T. (2008). Sex offender residency and spatial equity. *Applied Spatial Analysis and Policy, 1*(3), 175-192.

Grubesic, T.H., Matisziw, T.C., and Murray, A.T. (2013). A strategic approach for improving rural air transport in the United States. *Transport Policy, 30*, 117-124.

Haartsen, T., Groote, P., and Huigen, P.P.P. (2003). Measuring age differentials in representations of rurality in The Netherlands. *Journal of Rural Studies, 19*(2), 245-252.

Halfacree, K. (1993). Locality and social representation: Space, discourse and alternative definitions of the rural. *Journal of Rural Studies, 9*(1), 23-37.

Halfacree, K. (1994). The importance of 'the rural' in the constitution of counterurbanization: Evidence from England in the 1980s. *Sociologia Ruralis, 34*(2-3), 164-189.

Halfacree, K. (1995). Talking about rurality: Social representations of the rural as expressed by residents of six English parishes. *Journal of Rural Studies, 11*(1), 1-20.

Halfacree, K., and Rivera, M.J. (2012). Moving to the countryside… and staying: Lives beyond representation. *Sociologia Ruralis, 52*, 92-114.

Hall, M., and Lee, B. (2009). How diverse are U.S. suburbs. *Urban Studies, 47*(1), 3-28.

Hanlon, B. (2009). A typology of inner-ring suburbs: Class, race, and ethnicity in U.S. suburbia. *City & Community, 8*(3), 221-246.

Harvey, D. (2005). *A Brief History of Neoliberalism*. Oxford: Oxford University Press.

Hathaway, D.E., Beegle, J.A., and Bryant, W.K. (1968). *People of America*. Washington, DC: U.S. Government Printing Office.

Heflin, C., and Kathleen, M. (2012). The geography of need: Identifying human service needs in rural America. *Journal of Family Social Work, 15*(5), 359-374.

Henderson, J.W., Kelly, T.M., and Taylor, B.A. (2000). The impact of agglomeration economies on estimated demand thresholds: An extension of Wensley and Stabler. *Journal of Regional Science, 40*(4), 719-733.

Hines, F., Brown, D.L., and Zimmer, J. (1975). *Social and Economic Characteristics of the Population in Metro and Nonmetro Counties, 1970*. Washington, DC: U.S. Department of Agriculture, Economic Research Service.

Hoggart, K. (1990). Let's do away with rural. *Journal of Rural Studies, 6*(3), 245-257.

Hooks, G., Mosher, C., Rotolo, T., and Lobao, L. (2004). The prison industry: Carceral expansion and employment in U.S. counties. *Social Science Quarterly, 85*(1), 35-57.

Huang, Q., Parker, D.C., Filatova, T., and Sun, S. (2014). A review of urban residential choice models using agent-based modeling. *Environment and Planning B: Planning and Design, 41*(4), 661-689. Available: http://www.envplan.com/abstract.cgi?id=b120043p [September 2015]

Hubach, R.D., Dodge, B., Cola, T., Battani, P.R., and Reece, M. (2014). Assessing the sexual health needs of men who have sex with men (msm) residing in rural and mixed rural areas. *The Health Education Monograph Series, 31*(2), 33-39.

Huff, J.O. (1976). A hierarchical migration model of population redistribution within a central place hierarchy. *Geographical Analysis, 8*(3), 231-254.

Ingram, D.D., and Franco, S.J. (2012). NCHS urban-rural classification scheme for counties. National Center for Health Statistics. *Vital and Health Statistics, 2*(154), 1-65.

Ingram, D.D., and Franco, S.J. (2014). 2013 NCHS urban-rural classification scheme for counties. National Center for Health Statistics. *Vital and Health Statistics, 2*(166).

Irwin, E.G., Bell, K.P., Bockstael, N.E., Newburn, D.A., Partridge, M.D., and Wu, J. (2009). The economics of urban-rural space. *Annual Review of Resource Economics, 1*, 435-462.

Irwin, E.G., Isserman, A.M., Kilkenny, M., and Partridge, M.D. (2010). A century of research on rural development and regional issues. *American Journal of Agricultural Economics, 92*(2), 522-553.

Isserman, A.M. (2005). In the national interest: Defining rural and urban correctly in research and public policy. *International Regional Science Review, 28*(4), 465-499.

Isserman, A.M. (2007). Getting state rural policy right: Definitions, growth, and program eligibility. *Journal of Regional Analysis and Policy, 37*(1), 72-79.

Johnson, K. (2013a). *Deaths Exceed Births in record number of U.S. Counties.* (Fact Sheet No. 25. Durham: University of New Hampshire Carsey Institute.

Johnson, K. (2013b). Demographic trends in nonmetro America: Implications for land use development and conservation. *Vermont Journal of Environmental Law, 15*, 31-50.

Johnson, K.M. (1993). When deaths exceed births: Natural decrease in the United States. *International Regional Science Review, 15*(2), 179-198.

Johnson, K.M., and Fuguitt, G.V. (2000). Continuity and change in rural migration patterns, 1950-1995. *Rural Sociology, 65*(1), 27-49.

Johnson, K.M., and Rathge, R.W. (2006). Agriculture dependence and changing population in the Great Plains. In W.A Kandel, and D.L. Brown (Eds.), *Population Change and Rural Society* (pp. 197-217). Dordrecht, The Netherlands: Springer.

Johnson, K.M., Nucci, A., and Long, L. (2005). Population trends in metropolitan and nonmetropolitan America: Selective deconcentration and the rural rebound. *Population Research and Policy Review, 24*(5), 527-542.

Johnson, K.M., Pelissero, J.P., Holain, D.B., and Maly, M.T. (1995). Local government fiscal burden in nonmetropolitan America. *Rural Sociology, 60*(3), 381-396.

Jones, M., and Woods, M. (2013). New localities. *Regional Studies, 47*(1), 29-42.

Jones, O. (1995). Lay discourses of the rural. *Journal of Rural Studies, 11*(1), 35-49.

Kandel, W., Henderson, J., Koball, H., and Capps, R. (2011). Moving up in rural America: Economic attainment of nonmetro Latino immigrants. *Rural Sociology, 76*(1), 101-128.

Katz, B. (2015). *Governing from the Ground Up: How Counties Contribute to the Metropolitan Revolution.* Available: http://www.brookings.edu/blogs/the-avenue/posts/2015/02/27-governing-counties-metropolitan-revolution-katz [February 2015].

Kaza, N. (2013). The changing urban landscape of the continental United States. *Landscape and Urban Planning, 110*(1), 74-86.

Kellogg Foundation. (2002). *Perceptions of Rural America*. Battle Creek, MI: Author.

Kettl, D. (2015). A fiscal train wreck: Bad intergovernmental relationships have put us on a collision course with the future. *Governing, 28*(February).

Kneebone, E., and Berube, A. (2013). *Confronting Suburban Poverty in America*. Washington, DC: Brookings Institution Press.

Kron, J. (2012). Red state, blue city: How the urban-rural divide is splitting America. *The Atlantic,* November 30. Available: http://www.theatlantic.com/politics/archive/2012/11/red-state-blue-city-how-the-urban-rural-divide-is-splitting-america/265686/ [September 2015].

Krugman, P. (1991). *Geography and Trade*. Cambridge, MA: MIT Press.

Kulcsar, L.J., and Curtis, K. (Eds.). *International Handbook of Rural Demography*. Dordrecht, The Netherlands: Springer.

Kusmin, L. (2014). *Rural America at a Glance. 2014 Edition*. Economic Brief No. 26. November. Economic Research Service. Available: http://www.ers.usda.gov/publications/eb-economic-brief/eb26.aspx [September 2015].

Lambert, D.M., Wilcox, M.D., Clark, C.D., Murphy, B., and Park, W.M. (2010). Is growth in the health sector correlated with later-life migration? In A. Paez, J. Gallo, R.N. Buliung, and S. Dall'erba (Eds.), *Progress in Spatial Analysis* (pp. 381-403). Berlin, Heidelberg: Springer.

Lamont, L., and Molnar, V. (2002). The study of boundaries across the social sciences. *Annual Review of Sociology, 28*, 167-195.

Landis, P.H. (1940). *Rural Life in Process*. New York: McGraw Hill.

Lane, B. (1994). What is rural tourism? *Journal of Sustainable Tourism, 2*(1-2), 7-21.

Lee-Chevula, C. (2012). *Upward Mobility? Classifying Low-Income Suburbs.* Paper presented at Association of Public Policy and Management Conference, November, Baltimore, MD.

Levernier, W., Partridge, M.D., and Rickman, D.S. (2000). The causes of regional variations in U.S. poverty: A cross-county analysis. *Journal of Regional Science, 40*(3), 473-497.

Lewis, P. (1983). The galactic metropolis. In R.H. Platt and G. Macinko (Eds.), *Beyond the Urban Fringe: Land Use Issues in Nonmetropolitan America* (pp. 23-49). Minneapolis: University of Minnesota Press.

Lichter, D., Parisi, D., Grice, S., and Tacquino, M. (2007). Municipal underbounding: Annexation and racial exclusion in small southern towns. *Rural Sociology, 72*, 47-68.

Lichter, D.T., and Brown, D.L. (2011). Rural America in an urban society: Changing spatial and social boundaries. *Annual Review of Sociology, 37*(565-592).

Lichter, D., Parisi, D., and Taquino, M. (2011). *The Geography of Exclusion: Race, Segregation, and Concentrated Poverty.* Paper presented at the Population Association of America.

Lobao, L.M., and Adua, L. (2011). State rescaling and local governments' austerity policies across the USA, 2001-2008. *Cambridge Journal of Regions, Economy and Society, 4*(3), 419-435.

Lobao, L., and Hooks, G. (2015). Development sociology at the subnational scale: Open questions about state and market processes across the United States. *Development Sociology, 1*(1), 43-76.

Lobao, L., and Kraybill, D. (2005). The emerging role of county governments in metropolitan and nonmetropolitan areas. *Economic Development Quarterly, 19*(3), 245-259.

Lobao, L.M., Hooks, G., and Tickamyer, A.R. (Eds.). (2007). *The Sociology of Spatial Inequality*. Albany: State University of New York Press.

Lobao, L.M., Jeanty, W.P., Partridge, M., and Kraybill, D. (2012). Poverty and place across the United States: Do county governments matter to the distribution of economic disparities? *International Regional Science Review, 35*(2), 158-187.

Lobao, L., Adua, L., and Hooks, G. (2014). Privatization, business attraction, and social services across the United States: Local governments' use of market-oriented neoliberal policies in the post-2000 period. *Social Problems, 61*(4), 644-672.

Long, L., and Nucci, A. (1998). Accounting for two population turnarounds in nonmetropolitan America. *Research in Rural Sociology and Development, 7*, 47-70.

Longley, P.A., Goodchild, M.F., Maguire, D.J., and Rhind, D.W. (2015). *Geographic Information Science and Systems* (4th edition). New York: Wiley & Sons.

Macfarlane, R. (2012). *The Old Ways: A Journey on Foot*. New York: Viking.

Mahon, M. (2007). New populations; shifting expectations: The changing experience of Irish rural space and place. *Journal of Rural Studies, 23*(3), 345-356.

Malecki, E.J. (2003). Digital development in rural areas: Potential and pitfalls. *Journal of Rural Studies, 19*(2), 201-214.

Mammen, S., Lawrence, F.C., Marie, P.S., Berry, A.A., and Knight, S.E. (2011). The earned income tax credit and rural families: Differences between non-participants and participants. *Journal of Family and Economic Issues, 32*(3), 461-472.

Maryland Rural Association. (2014). *Maryland's Changing Rurality at the Federal Level and Loss of Significant Funding*. Available: http://mdruralhealth.org/MdRurality.pdf [October 2015].

Masuda, J.R., and Garvin, T. (2008). Whose heartland? The politics of place in a rural-urban interface. *Journal of Rural Studies, 24*(1), 112-123.

McCormack, J. (2002). Children's understandings of rurality: Exploring the interrelationship between experience and understanding. *Journal of Rural Studies, 18*(2), 193-207.

McGranahan, D.A., and Salsgiver, J. (1992). Recent population change in adjacent nonmetropolitan areas. *Rural Development Perspectives, 8*(3), 2-7.

Mieszkowski, P., and Mills, E.S. (1993). The causes of metropolitan suburbanization. *Journal of Economic Perspectives, 7*(3), 135-147.

Mikelbank, B. (2004). Typology of U.S. suburban places. *Housing Policy Debate, 15*(4), 935-964.

Milbourne, P.E. (1997). *Revealing Rural Others*. London: Pinter.

Ministry of Economic Development (Italy), Department for Development and Economic Cohesion. (2014). *A Strategy for Inner Areas in Italy. Definition, Objectives, Tools and Governance*. Available: http://www.dps.gov.it/opencms/export/sites/dps/it/documentazione/servizi/materiali_uval/Documenti/MUVAL_31_Aree_interne_ENG.pdf [September 2015]

Morden, N.E., Berke, E.M., Welsh, D.E., McCarthy, J.F., Mackenzie, T.A., and Kilbourne, A.M. (2010). Quality of care for cardiometabolic disease: Associations with mental disorder and rurality. *Medical Care, 48*(1), 72-78.

Mormont, M. (1990). Who is rural? Or, how to be rural: Towards a sociology of the rural. In T. Marsden, P. Lowe, and S. Whatmore (Eds.), *Rural Restructuring*. London, UK: David Fulton.

Morrill, R.L. (1995). Metropolitan concepts and statistics report. In D. Dahmann and J. Fitzsimmons (Eds.), *Metropolitan and Nonmetropolitan Areas: New Approaches to Geographical Definition*. Washington, DC: U.S. Bureau of the Census. Available: https://www.census.gov/population/documentation/POPWP.pdf [September 2015].

Morrill, R.L., Cromartie, J.B., and Hart, G.L. (1999). Metropolitan, urban, and rural commuting areas: Toward a better depiction of the U.S. settlement system. *Urban Geography, 20*, 727-748.

Moscovici, S. (1984). The phenomenon of social representations. In R.M. Farr and S. Moscovici (Eds.), *Social Representations* (pp. 3-70). Cambridge, UK: Cambridge University Press.

Muhlenkamp, A., and Waldorf, B. (2008). Rural-urban income disparities among the highly-educated. In J. Poot, B. Waldorf, and L. van Wissen (Eds.), *Migration and Human Capital*. Cheltenham, UK; Northampton, MA: Edward Elgar.

Mulligan, G.F. (1984). Agglomeration and central place theory: A review of the literature. *International Regional Science Review, 9*(1), 1-42.

Mulligan, G.F., Partridge, M.D., and Carruthers, J.I. (2012). Central place theory and its reemergence in regional science. *Annals of Regional Science, 48*(2), 405-431.

Murdoch, J., Lowe, P., Ward, N., and Marsden T. (2003). *The Differentiated Countryside*. New York: Routledge.

Murray, A.T. (2010a). Quantitative geography. *Journal of Regional Science, 50*, 143-163.

Murray, A.T. (2010b). Advances in location modeling: GIS linkages and contributions. *Journal of Geographical Systems, 12*(3), 335-354.

Murray, A.T. (2015). *Evolving Spatial Analytics and Rural Area Classifications.* Paper presented at the Workshop on Rationalizing Rural Area Classifications, April, National Academies of Sciences, Engineering, and Medicine, Washington, DC. Available: http://sites.nationalacademies.org/DBASSE/CNSTAT/DBASSE_160632 [November 2015].

Murray, A.T., and Grubesic, T.H. (2012). Spatial optimization and geographic uncertainty: Implications for sex offender management strategies. In M. Johnson (Ed.), *Community-Based Operations Research* (pp. 121-142). New York: Springer.

Murray, A.T., Grubesic, T.H., Wei, R., and Mack, E.A. (2011). A hybrid geocoding methodology for spatio-temporal data. *Transactions in GIS, 15*(6), 795-809.

Murray, A.T., Liu, Y., Rey, S.J., and Anselin, L. (2012). Exploring movement object patterns. *Annals of Regional Science, 49*(2), 471-484.

Murray, A.T., Grubesic, T.H., and Wei, R. (2014). Spatially significant cluster detection. *Spatial Statistics, 10*, 103-116.

National Center for Education Statistics. (2013). *Common Core Data: Identification of Rural Locales*. Available: http://nces.ed.gov/ccd/rural_locales.asp [October 2015].

Neal, S. (2009). *Rural Identities: Ethnicity and Community in the Contemporary English Countryside*. Farnham, UK: Ashgate.

Nechyba, T.J., and Walsh, R.P. (2004). Urban sprawl. *Journal of Economic Perspectives, 18*(4), 177-200.

OECD. (2011). *OECD Regional Typology.* Directorate for Public Governance and Territorial Development. Available: http://www.oecd.org/gov/regional-policy/OECD_regional_typology_Nov2012.pdf [November 2015].

OECD. (2012). *Redefining "Urban". A New Way to Measure Metropolitan Areas*. Paris, France: Author.

OECD. (2013). *Rural-Urban Partnerships: An Integrated Approach to Economic Development*. Paris, France: Author.

Openshaw, S. (2014). Geocomputation. In R.J. Abrahart and L.M. See (Eds.), *Geocomputation* (2nd ed., pp. 1-21). Boca Raton, FL: CRC Press.

Openshaw, S., and Taylor, P.J. (1981). The modifiable areal unit problem. In N. Wrigley and R. Bennet (Eds.), *Quantitative Geography: A British View*. London, UK: Routledge and Kegan Paul.

Orfield, M. (2002). *American Metropolitics: The New Suburban Reality*. Washington, DC: Brookings Institution Press.

Osth, J., Clark, W.A., and Malmberg, B. (2014). Measuring the scale of segregation using k-nearest neighbor aggregates. *Geographical Analysis*, *47* (1).

Paniagua, A. (2014). Rurality, identity and morality in remote rural areas in northern Spain. *Journal of Rural Studies, 35*, 49-58.

Parisi, D., Lichter, D.T., and Taquino, M. (2011). Multi-scale residential segregation: Black exceptionalism and America's changing color line. *Social Forces, 89*(3), 829-852.

Partridge, M.D., Bollman, R., Olfert, M.R., and Alasia, A. (2007a). Riding the wave of urban growth in the countryside: Spread, backwash, or stagnation. *Land Economics, 83*(2), 128-152.

Partridge, M.D., Olfert, M.R., and Alasia, A. (2007b). Agglomeration or amenities: Canadian cities as engines of growth. *Canadian Journal of Economics, 40*(1), 39-68.

Partridge, M.D., and Rickman, D.S. (2008a). Distance from urban agglomeration economies and rural poverty. *Journal of Regional Science, 48*(2), 285-310.

Partridge, M.D., Rickman, D.S., Ali, K., and Olfert, M.R. (2008b). Employment growth in the American urban hierarchy: Long live distance. *The B.E. Journal of Macroeconomics, 8*(1), 1-38.

Partridge, M.D., Rickman, D.S., Ali, K., and Olfert, M.R. (2008c). Lost in space: Population growth in the American hinterlands and small cities. *Journal of Economic Geography, 8*(6), 727-757.

Partridge, M.D., Rickman, D.S., Ali, K., and Olfert, M.R. (2008d). The geographic diversity of U.S. nonmetropolitan growth dynamics: A geographically weighted regression approach. *Land Economics, 84*(2), 241-266.

Partridge, M.D., Rickman, D.S., Ali, K., and Olfert, M.R. (2009a). Agglomeration spillovers and wage and housing cost gradients across the urban hierarchy. *Journal of International Economics, 78*(1), 126-140.

Partridge, M.D., Rickman, D.S., Ali, K., and Olfert, M.R. (2009b). Do new economic geography agglomeration shadows underlie current population dynamics across the urban hierarchy? *Papers in Regional Science, 88*(2), 445-466.

Partridge, M.D., Ali, K., and Olfert, M.R. (2010a). Rural-to-urban commuting: Three degrees of integration. *Growth and Change, 41*(2), 303-335.

Partridge, M.D., Rickman, D.S., Ali, K., and Olfert, M.R. (2010b). The spatial dynamics of factor price differentials: Productivity or consumer amenity driven? *Regional Science and Urban Economics, 40*, 440-452.

Peck, J. (2014). Pushing austerity: State failure, municipal bankruptcy and the crises of fiscal federalism in the United States. *Cambridge Journal of Regions, Economy, and Society, 7*(1), 17-44.

Peng, Z.R., and Tsou, M.H. (2003). *Internet GIS: Distributed Geographic Information Services for the Internet and Wireless Networks*. New York: Wiley & Sons.

Perlman, B.J., and Benton, J.E. (2014). Devolutionary realignment: Shedding services, ad hoc collaboration, and political reconfiguration. *State and Local Government Review, 46*(3), 205-210.

Pfeffer, M., and Parra, P. (2009). Strong ties, weak ties and human capital: Latino immigrant employment outside of the enclave. *Rural Sociology, 74*(2), 241-269.

Pickard, J.P. (1967). *Dimensions of Metropolitanism*. Washington, DC: Urban Land Institute.

Pillarisetti, J.R., and van den Bergh, J.C.J.M. (2010). Sustainable nations: What do aggregate indexes tell us? *Environment, Development and Sustainability, 12*(1), 49-62.

Plane, D.A., and Henrie, C.J. (2012). The role of hierarchical proximity in migration and population growth: Urban shadow versus urban synergy effects. *Studies in Regional Science, 42*(1), 109-128.

Popper, D., and Popper, F. (1987). The Great Plains: From dust to dust. *Planning, 53*(December), 12-18.

Popper, D., Popper, F., Raebuck, F., Debres, K.J., and Wallach, B. (1993). The Buffalo Commons debate. *Focus, 43*, 16-27.

Provasnik, S., KewalRamani, A., Coleman, M.M., Gilbertson, L., Herring, W., and Xie, Q. (2007). *Status of Education in Rural America.* Available: http://nces.ed.gov/pubs2007/2007040.pdf [November 2015].

Reardon, S.F., Matthews, S.A., O'Sullivan, D., Lee, B.A., Firebaugh, G., Farrell, C.R., and Bischoff, K. (2008). The geographic scale of metropolitan racial segregation. *Demography, 45*(3), 489-514.

Renkow, M., and Hoover, D. (2000). Commuting, migration, and rural-urban population dynamics. *Journal of Regional Science, 40*(2), 261-287.

Ringholz, R.C. (1996). *Paradise Paved: The Challenge of Growth in the New West*. Salt Lake City: University of Utah Press.

Ripplinger, D., Beck, N., and Hough, J.A. (2008). *Urban-Rural Classification: Identifying a System Suitable for Transit*. Fargo: North Dakota State University, Upper Great Plains Transportation Institute.

Rogerson, P. (2010). *Statistical Methods for Geography* (3rd edition). London, UK: SAGE.

Rupasingha, A., Goetz, S.J., and Freshwater, D. (2006). The production of social capital in U.S. counties. *Journal of Socio-Economics, 35*, 83-101.

Rusk, D. (2013). *Cities without Suburbs: A Census 2010 Perspective*. Washington, DC: Woodrow Wilson Center Press.

Rye, J.F. (2006). Rural youth's images of the rural. *Journal of Rural Studies, 22*(4), 409-421.

Salamon, S. (2003). *Newcomers to Old Towns*. Chicago: University of Chicago Press.

Sherval, M. (2009). Native Alaskan engagement with social constructions of rurality. *Journal of Rural Studies, 25*(4), 425-434.

Shucksmith, M., Brown, D.L., Shortall, S., Vergunst, J., and Warner, M. (Eds.). (2012). *Rural Transformation and Rural Policies in the U.S. and UK*. London, UK: Routledge.

Shucksmith, M., Henderson, M., Raybould, S., Coombes, M., and Wong, C. (1995). *A Classification of Rural Housing Markets in England*. London, UK: HMSO.

Shyy, T.-K., Azeezullah, I., Azeezullah, I., Stimson, R.J., and Murray, A.T. (2014). Classification for visualizing data: Integrating multiple attributes and space for choropleth display. In R.J. Stimson (Ed.), *Handbook of Research Methods and Applications in Spatially Integrated Social Science* (pp. 265-286). Cheltenham, UK: Edward Elgar.

Slifkin, R.T., Randolph, R., and Ricketts, T.C. (2004). The changing metropolitan designation process and rural America. *Journal of Rural Health, 20*, 1-6.

Smith, D., and Phillips, D. (2001). Socio-cultural representations of greentrified Pennine ruralit. *Journal of Rural Studies, 17*(4), 457-469.

Solnit, R. (2010). *Infinite City: A San Francisco Atlas*. San Francisco: University of California Press.

Stabler, J.C., and Olfert, M.R. (2002). *Saskatchewan's Communities in the 21st Century: From Places to Regions*. Regina, SK: Canadian Plains Research Center, University of Regina.

Stewart, L.A., and Lambert, D.M. (2008). *Factors Determining Corn-Based Ethanol Plant Site Selection, 2000-2007.* Paper presented at the Risk, Infrastructure and Industry Evolution, Berkeley, CA.

Teaford, J.C. (2008). *The American Suburb: The Basics*. New York: Routledge.

Tobler, W.R. (1989). Frame independent spatial analysis. In M. Goodchild and S. Gopal (Eds.), *The Accuracy of Spatial Databases* (pp. 115-122). New York: Taylor and Francis.

Tolbert, C., and Killian, M. (1987). *Labor Market Areas for the United States* (No. Staff report No. AGES870721). Washington, DC: U.S. Department of Agriculture, Economic Research Service.

Tong, D., and Murray, A.T. (2012). Spatial optimization in geography. *Annals of the Association of American Geographers, 102*(6), 1290-1309.

Tong, D., and Plane, D.A. (2014). A new spatial optimization perspective on the delineation of metropolitan and micropolitan statistical areas. *Geographical Analysis, 46*, 230-249.

United Nations Development Programme. (2014). *Human Development Report 2014– Technical Notes*. New York: Author.

U.S. Department of Agriculture, Economic Research Service. (2013). *Measuring Rurality. ERS Briefing*. Available: http://www.ers.usda.gov/topics/rural-economy-population/rural-classifications.aspx [November 2015].

U.S. Department of Agriculture, Rural Development. (2013). *Report on the Definition of "Rural."* Available: http://www.rd.usda.gov/files/reports/RDRuralDefinitionReportFeb2013.pdf [November 2015].

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, and National Center for Health Statistics. (2012). *NCHS Urban-Rural Classification Scheme for Counties*. Washington, DC: Author.

U.S. Office of Management and Budget. (2000). *Standards for Defining Metropolitan and Micropolitan Statistical Areas; Notice*. Washington, DC: Author.

U.S. Office of Management and Budget. (2003). *Revised Definitions of Metropolitan Statistical Areas, New Definitions of Micropolitan Statistical Areas and Combined Statistical Areas, and Guidance on Uses of the Statistical Definitions of These Areas*. Washington, DC: Author.

Veneri, P., and Ruiz, V. (2013). *Urban-to-Rural Population Growth Linkages: Evidence from OECD TL3 Regions*. Paris, France: OECD.

Vias, A.C., Mulligan, G.F., and Molin, A. (2002). Economic structure and socioeconomic change in America's micropolitan areas, 1970-1997. *Social Science Journal, 39*(3), 399-417.

Vicino, T.J. (2008). The spatial transformation of first-tier suburbs, 1970 to 2000: The case of metropolitan Baltimore. *Housing Policy Debate, 19*(3), 479-518.

Vitek, W., and Jackson, W. (Eds.). (1996). *Rooted in the Land*. New Haven, CT: Yale University Press.

Waldorf, B. (2006). *A Continuous Multi-dimensional Measure of Rurality: Moving Beyond Threshold Measures.* Paper presented at the American Agricultural Economics Association Annual Meeting. Available: http://purl.umn.edu/21383 [November 2015].

Waldorf, B. (2007a). Measuring rurality. *INContext, 8*(1), 5-8.

Waldorf, B. (2007b). *What Is Rural and What Is Urban in Indiana?* Research report (No. PCRD-R-4). West Lafayette, IN: Purdue Center for Regional Development.

Waldorf, B., and Kim, A. (2015). *Defining and Measuring Rurality in the U.S.: From Typologies to Continuous Indices*. Paper presented at the Workshop on Rationalizing Rural Classifications, April, National Academies of Sciences, Engineering, and Medicine, Washington, DC. Available: http://sites.nationalacademies.org/DBASSE/CNSTAT/DBASSE_160632 [November 2015].

Waldorf, B., Florax, R.J.G.M., and Beckhusen, J. (2008). Spatial sorting of immigrants across urban and rural areas in the United States: Changing patterns of human capital accumulation since the 1990s. *American Journal of Agricultural Economics, 90*(5), 1312-1318.

Ward, D.P., Murray, A.T., and Phinn, S.R. (2000). A stochastically constrained cellular model of urban growth. *Computers, Environment and Urban Systems, 24*(6), 539-558.

Warner, M.E. (2006). Market-based governance and the challenge for rural governments: U.S. trends. *Social Policy and Administration, 40*(6), 612-631.

Warner, M.E., and Pratt, J.E. (2005). Spatial diversity in local government revenue effort under decentralization. *Environment and Planning C: Government and Policy, 23*(5), 657-677.

Warren, R. (1978). *The Community in America* (third edition). Boston, MA: Houghton Mifflin.

Weber, B., Miller, K., and Goetz, S. (2014). *Intergenerational Economic Mobility: Are Different Factors at Work in Rural America?* Paper presented at the North American Regional Council/Regional Science Association International Annual Meeting.

Weber, B.A. (2007). Rural poverty: Why should states care and what can state policy do? *Journal of Regional Analysis and Policy, 37*(1), 48-52.

Weeks, W.B., Kazis, L.E., Shen, Y., Cong, Z., Ren, X.S., Miller, D., Lee, A., and Perlin, J.B. (2004). Differences in health-related quality of life in rural and urban veterans. *American Journal of Public Health, 94*(10), 1762-1767.

Weisheit, R.A., Wells, L.E., and Falcone, D.N. (1995). *Crime and Policing in Rural and Small-Town America: An Overview of the Issues.* NIJ Research Report. Washington, DC: National Institute of Justice.

Wellman, B., and Hampton, K. (1999). Living networked on and off line. *Contemporary Sociology, 28*(6), 648-654.

Whatmore, S. (1993). Theoretical achievements and challenges in European rural gender studies. *Rural Society, 3*(4), 2-8.

Williams, R. (1973). *The Country and the City*. New York: Oxford University Press.

Wilson, W.J. (2009). *More than Just Race: Being Black and Poor in the Inner City*. New York: W.W. Norton.

Wirth, L. (1938). Urbanism as a way of life. *The American Journal of Sociology, 44*(1), 1-24.

Wong, D.W., and Shaw, S.L. (2011). Measuring segregation: An activity space approach. *Journal of Geographical Systems, 13*(2), 127-145.

Woods, M. (2005). *Rural Geography*. London; Thousand Oaks, CA: SAGE.

Woods, M. (2006). *Rural Geography*. London, UK: SAGE.

Woods, M. (2009). Rural geography: Blurring boundaries and making connections. *Progress in Human Geography, 33*(6), 849-858.

Woods, M. (2011). *Rural*. New York: Routledge.

Woods, M. (2015). *Conceptualizing Rural Areas in Metropolitan Society: A Rural View.* Paper presented at the Workshop on Rationalizing Rural Area Classifications, April, National Academies of Sciences, Engineering, and Medicine, Washington, DC. Available: http://sites.nationalacademies.org/DBASSE/CNSTAT/DBASSE_160632 [November 2015].

Wu, J., and Gopinath, M. (2008). What causes spatial variations in economic development in the United States? *American Journal of Agricultural Economics, 90*(2), 392-408.

Yao, J., and Murray, A.T. (2014). Locational effectiveness of clinics providing sexual and reproductive health services to women in rural Mozambique. *International Regional Science Review, 37*(2), 172-193.

Zhou, D., Xu, J., Radke, J., and Mu, L. (2004). A spatial cluster method supported by GIS for urban-suburban-rural classification. *Chinese Geographical Science, 14*(4), 337-342.

Appendix A

ERS Goals for Workshop on Rural Classifications

1. The workshop is intended to help ERS make decisions regarding the generation of a county urban-rural scale for public use. This scale need not satisfy every purpose, but it should be generally useful and have face validity. If it could be adopted both for research and policy, that would be ideal, but perhaps that is too much to shoot for.
2. Our current scales classify all counties, with a basic distinction between metropolitan and nonmetropolitan areas. We probably want to keep that distinction (or not?), but this still leaves a number of questions.
3. What is a reasonable number of categories? Too many, and one can get lost; too few, and one is not capturing enough.
4. For metropolitan areas,
   (a) Do we want to distinguish the most urban from the less urban counties? The original ERS version distinguished central from outlying counties, for metropolitan areas of 1 million or more residents (1M+). Over time, OMB widened the definition of central, leaving far fewer outlying counties. Now, one can use percent residing in urbanized areas to define central, or percent residing in rural areas to define outlying, or set a density threshold, or use other criteria.
   (b) Do we want to use such a distinction only for 1M+ counties? Over ¾ of the U.S. population are in these counties.

(c) Do we want to distinguish metro counties that have more than 50% population in rural density settings (as per Isserman).
(d) Do we collapse all counties in metropolitan areas of less than 1M population into one category, or are there important distinctions at other thresholds?

5. For nonmetropolitan areas,
   (a) Both of the current county codes classify nonmetro counties along two dimensions, proximity and size. For proximity:
      a. Should we shift from adjacency to estimated driving time to an urbanized area?
      b. Should we only consider proximity to 1M+ metro areas, or include smaller metros?
      c. How many distance/proximity categories are useful?
   (b) For size:
      a. How should we incorporate urban into the nonmetro side of the scale?
      b. Should we incorporate micropolitan, as is done in the Urban Influence Codes?
      c. How many urban size categories are useful for nonmetro counties? The Beale Codes have 1 proximity measure and 3 urban size measures. Perhaps it should be 2 and 2, as proximity may have gained salience.
6. Are there methodologies for helping to make these decisions, such as ability to distinguish across a set of socioeconomic characteristics? Past decisions regarding population thresholds and related criteria were made with little or no supporting research, e.g., the 2,500 urban threshold, the 50,000 metro threshold, the 500 people per square mile rural-urban boundary, the 25 percent commuting metro-nonmetro boundary.
7. ERS most likely will continue to define one or more subcounty classifications (tracts, ZIP codes). Most of the same questions apply.
8. Are there ways to tie together the subcounty and county classifications, conceptually and empirically? For instance, the FAR codes introduce a grid-based approach to classifying urban-rural settlement. Does this approach offer a way to unify the different classifications, that is, downcast data to grids, carry out analyses at the grid level, then aggregate results to needed geographic units?

Appendix B

Historical Development of ERS Rural-Urban Classification Systems

John Cromartie, USDA-ERS

ABSTRACT

Since the 1970s, the Economic Research Service (ERS) of the U.S. Department of Agriculture (USDA) has taken the lead in developing and maintaining multilevel, rural-urban classification systems. ERS currently maintains four such systems that are widely used in social science research, policy development, and program administration. This paper traces the development of the Rural-Urban Continuum Codes, the Urban Influence Codes, the Rural-Urban Commuting Area Codes, and the Frontier and Remote Area Codes. Similarities and differences in underlying concepts, methodologies, criteria, data, and geographical building blocks are highlighted. Several factors drove the evolution of these systems: changing spatial concepts; changing federal policy needs; modifications to underlying Census/Office of Management and Budget (OMB) definitions; the desire to take advantage of new data and advancing GIS capabilities; and the need to keep pace with rapidly evolving rural-urban space. This historical evaluation will aid in ongoing efforts to help ensure the future validity of these classification systems as research and policy tools and to improve their usefulness for ERS and the broader research community.

INTRODUCTION

The Economic Research Service (ERS), USDA currently maintains four geographic classification systems that divide U.S. territory along rural and

urban dimensions (see Table B-1). All four are tied to metropolitan (metro) area concepts from the Office of Management and Budget (OMB) and build directly on the U.S. Census Bureau's urban area definitions, especially the 50,000 population threshold as the basic "rural-urban" dividing line.[1] All four move beyond the metro-nonmetro dichotomy, using Census urban geography and other criteria to devise multiple levels of rurality below the 50,000 population threshold. Two are county-based classifications that directly maintain the metro-nonmetro distinction among counties but add additional categories using measures of proximity and urban size. Two are based on smaller geographic units and different criteria but are anchored to the metro area concept by use of Census urbanized areas as their starting points.

In this paper, each classification system is described in the order it was developed, highlighting the changing historical context and the reasoning behind key decisions in the selection of criteria and methodology. The four classification systems were published at different times over 37 years (1975 to 2012) using different data sources and new ways of measuring key concepts such as population size, population density, and urban proximity or remoteness. These differences reflect prevailing spatial concepts at the time each classification was developed and the desire to keep pace with new patterns of population distribution during these decades. Modifications to underlying OMB and Census Bureau definitions, such as the introduction of micropolitan areas in 2000, contributed to the development of new classification criteria, as did the availability of new data and advances in computer processing capabilities.

The two county-based systems were originally developed solely to facilitate policy-relevant research at ERS and elsewhere, but have since been adapted for policy and program uses in various federal agencies. The two subcounty classifications were developed in partnership with the Office of Rural Health Policy, Department of Health and Human Services, to meet both research and programmatic requirements. All four were designed to help answer basic research questions important to USDA policy making: What are the economic needs and opportunities in different rural areas? What factors underlie those conditions and how have they shifted over time in response to economic shocks, industrial restructuring, and demographic change?

ERS has undertaken an in-depth assessment of these rural-urban classification systems, beginning with insights derived from this workshop.

[1]The ERS topic page "What Is Rural?" describes how metro and nonmetro areas are defined and how they compare to Census urban and rural areas. See http://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/what-is-rural.aspx [November 2015].

TABLE B-1 Economic Research Service (USDA) Rural-Urban Classification Codes

Name	Geography	Categories	Criteria	Initial Release
Rural-Urban Continuum Codes (RUCC)	Counties	9 categories: 3 metro 6 nonmetro	For metro counties: Population of metro area For nonmetro counties: Total urban population and adjacency to metro areas	1975
Urban Influence Codes (UIC)	Counties	12 categories: 2 metro 10 nonmetro	For metro counties: Population of metro area For nonmetro counties: Size of largest city, adjacency to metro areas by size of metro area, and micropolitan status	1997
Rural-Urban Commuting Area (RUCA) Codes	Census tracts; results used to create a version based on zip code areas	10 primary codes: 3 metro 7 nonmetro 30 secondary codes	Primary codes: Urban area size; size and direction of largest commuting flow Secondary codes: Size and direction of 2nd largest commuting flow	1998
Frontier and Remote (FAR) Codes	1/2 x 1/2 kilometer grid cells; results aggregated to zip code areas	4 (nested) levels	Travel times by car to edges of nearest urban areas by size, based on posted speed limits	2012

SOURCE: Prepared by John Cromartie for his presentation. Based on USDA Economic Research Service. Available: http://www.ers.usda.gov/topics/rural-economy-population/rural-classifications.aspx [October 2015].

The purpose of the assessment is to help ensure the future validity of these classification systems as research and policy tools and to improve their usefulness for ERS and the broader research community. The following descriptions of the current classification systems and their historical development will help identify what considerations need to go into modifying existing rural-urban classifications and developing new ones (see http://www.ers.usda.gov/topics/rural-economy-population/rural-classifications.aspx [November 2015]).

COUNTY-BASED DEFINITIONS

ERS researchers and others who analyze conditions in "rural" America most often study conditions in nonmetropolitan (nonmetro) areas, defined on the basis of counties. Counties are the basic building block for economic data and thus for conducting research to track and explain regional population and economic trends. Estimates of population, employment, and income are available at the county level annually. They also are frequently used as basic building blocks for areas of economic and social integration other than OMB metro areas, such as ERS labor-market areas and commuting zones.

Nonmetro counties are counties not part of larger metropolitan areas—that is, they do not contain urbanized areas of 50,000 or more residents or have 25 percent or more of their workforce commuting to counties containing urbanized area of this size. Nonmetropolitan counties include some combination of

- open countryside,
- rural towns (clusters of dense population with fewer than 2,500 people), and
- urban clusters with populations ranging from 2,500 to 49,999.

In addition to conducting research that uses the basic metro-nonmetro dichotomy, ERS has developed multilevel county classifications to measure rurality in more detail and to assess the economic and social diversity of nonmetro America. They have subsequently been used to determine eligibility for federal programs that assist rural areas. Two are currently maintained as ERS data products and updated after each decennial census.

RURAL-URBAN CONTINUUM CODES

The Rural-Urban Continuum Codes (RUCC), also known as the Beale Codes, are a county-based scheme that distinguishes metro counties by

the population size of their metro area and nonmetro counties across two dimensions: the size of their urban population and whether they are adjacent to a metro area. Thus, official OMB metro and nonmetro categories are embedded in the codes, but subdivided into three metro and six nonmetro categories. Each county in the United States is assigned one of the nine codes (see Table B-2). The scheme allows researchers to break county data into residential groups for the analysis of trends in nonmetro areas that are related to urban population size and metropolitan accessibility.

Metro counties are divided into three categories according to the total population size of the metro area of which they are part: 1 million people or more, 250,000 to 1 million people, and below 250,000. Nonmetro counties are classified along two dimensions. First, they are divided into three urban-size categories (an urban population of 19,999 or more, 2,500 to 20,000, and less than 2,500) based on the total urban population in the county. Second, nonmetro counties in each of the three urban-size categories are subdivided by whether or not the county is adjacent to one or more metro areas. A nonmetro county is defined as adjacent if it physically adjoins one or more metro areas and has at least 2 percent of its employed labor force commuting to central metro counties. Nonmetro counties that do not meet these criteria are classed as nonadjacent (see http://www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx [November 2015].

TABLE B-2 Rural-Urban Continuum Codes

Code	Description
Metropolitan Counties:	
1	Counties in metropolitan areas of 1 million population or more
2	Counties in metropolitan areas of 250,000 to 1 million population
3	Counties in metropolitan areas of fewer than 250,000 population
Nonmetropolitan Counties:	
4	Urban population of 20,000 or more, adjacent to a metro area
5	Urban population of 20,000 or more, not adjacent to a metro area
6	Urban population of 2,500 to 19,999, adjacent to a metro area
7	Urban population of 2,500 to 19,999, not adjacent to a metro area
8	Completely rural or less than 2,500 urban population, adjacent to a metro area
9	Completely rural or less than 2,500 urban population, not adjacent to a metro area

SOURCE: USDA Economic Research Service. See http://www.ers.usda.gov/data-products/rural-urban-continuum-codes/documentation.aspx [November 2015].

The original RUCC were created in 1975 by Fred K. Hines, David L. Brown, and John M. Zimmer, for their ERS report, *Social and Economic Characteristics of the Population in Metro and Nonmetro Counties: 1970*. The report begins by noting the rapid demographic changes in rural America during the 1960s and the increasing diversity of economic prospects:

> The consequences of technological changes in agriculture and the resulting human exodus from farming have been devastating for many rural communities. . . . In contrast, many larger nonmetro cities have . . . adapted to technological changes by emerging as the providers of employment opportunities, services, and amenities to their own residents as well as to the residents of nearby smaller towns and rural areas (Hines, Brown and Zimmer, 1975, p. 3).

Rural retail activity was reorganizing around increasingly larger trade centers, leaving behind smaller towns that could not attract manufacturing or participate in a prospering recreation-retirement sector (Adamchak et al., 1999). Suburbanization was transforming once rural settings into bedroom communities integrated into rapidly expanding metropolitan regions. Commuting to metro centers was increasing rapidly even from nearby rural communities that were not yet experiencing suburban development (Cromartie, 2006). Urban scholars developed new concepts, such as commuter sheds and urban fields, to help describe and explain these decentralization processes (Berry, 1977; Pickard, 1967).

The ERS report was one of the few rural demographic publications at the time to explicitly recognize the rethinking of rural in terms of nonmetropolitan space and the growing inadequacy of the Census rural-urban definition for tracking and explaining socioeconomic change:

> New modes of transportation and communication permitted great cities to dominate smaller cities and other communities in their surrounding tributary areas. These outlying communities, heretofore relatively autonomous, became subordinate to the metropolis and integrated with it. Hence, not cities in general, but metropolitan cities in particular dominate contemporary American society (Hines, Brown and Zimmer, 1975, p. 3).

The RUCC succeeded in capturing the strong association at the time between levels of rurality and key demographic and socioeconomic variables. In the 1960s and early 1970s, fertility rates were still higher in more remote areas and declined monotonically with increasing urbanization. Migration off the farm peaked during the decade, thus net out-migration rates were higher in more rural areas. This caused higher population loss in more rural areas despite higher fertility rates. Poverty rates increased

and average educational attainment decreased with increasing rurality, especially for African Americans and other minority populations.

Their initial success in helping to describe and explain socioeconomic diversity in nonmetro areas led to wide usage of the RUCC in research and policymaking that continues to this day. They have been updated with each subsequent decennial census, with only two minor changes in criteria since 1970.[2] However, socioeconomic conditions and trends today are not as strongly correlated with the RUCC. In part, this is due to the substantial contraction of nonmetro space overall and the increasing urban influence found in the remaining nonmetro counties. Changes in the number of counties found in each RUCC category between 1970 and 2010 primarily come from two sources:

1. Actual changes in U.S. demographic trends and settlement patterns, including continued expansion of existing metro areas; emergence of new metro areas; and urban growth within remaining nonmetro counties.
2. Changes in the criteria for defining Census urban areas and OMB metro areas, including rules that tended to increase urbanized area populations; rules leading to more counties being identified as metro core counties; and rules allowing more counties to be included as outlying metro counties.

These two processes combined to reduce the total number of nonmetro counties by one quarter, from 2,682 in 1970 to 1,976 in 2010. The number of adjacent counties remained almost unchanged, from just under to just over 1,000, but they increased as a share of all nonmetro counties from 39 to 52 percent. Increasing urban influence during these decades is also reflected in the reduced number of completely rural, nonmetro counties, from 864 down to 644.

The spatial extent of metro areas with 1 million or more people stands out on a map of the current (2013) RUCC Codes, especially in the Midwest and South.[3] Smaller cities in this group—Columbus OH, Indianapolis, Nashville, Birmingham, Kansas City, Portland OR—now seem as region-

[2]First, the initial codes designated adjacency only where there was at least 1 percent commuting to a physically adjacent metropolitan area. In 1990, the commuting percentage was raised to 2 percent. Second, the original codes distinguished central and outlying counties of metro areas with 1 million or more people. OMB rule changes reduced the number of outlying counties identified within metro areas by 2000, thus the distinction was dropped and the number of Beale code categories fell from 10 to 9.

[3]The RUCC map is posted on the ERS website, see http://www.ers.usda.gov/data-products/rural-urban-continuum-codes/documentation.aspx [November 2015]. The black-and-white format of this report precludes its reproduction here.

ally dominant as Chicago, Atlanta, Dallas-Ft. Worth, and other much larger metro areas. Due to its much more concentrated settlement pattern, the intermountain West contains more highly urbanized nonmetro counties (20,000 or more people living in urban areas). These types of counties are also more likely to be remotely situated (nonadjacent) in the West compared with those in eastern states. Counties in the most rural-remote category are highly concentrated in the Great Plains and Alaska, with smaller clusters found along the Iowa-Missouri border in the Corn Belt, in the Ozarks and southern Appalachians, and in the northern Great Lakes region.

URBAN INFLUENCE CODES

ERS first developed the Urban Influence Codes (UIC) in the 1990s and further refined them following the delineation of micropolitan (micro) areas by OMB in the 2000s. UIC classify metro and nonmetro counties using county geography and concepts very similar to the RUCC. Differences can be seen in an initial, six-level version of the UIC used in the ERS report documenting socioeconomic conditions and trends in the nonmetro population during the 1980s.[4] For that analysis, metro areas were divided into two groups and nonmetro counties were divided into four groups (Ghelfi, 1993):

Metro

1. **Large:** counties in metro areas with 1 million or more people
2. **Small:** counties in metro areas with fewer than 1 million people

Nonmetro

3. **Adjacent to large metros**
4. **Adjacent to small metros**
5. **Nonadjacent with city:** contained all or part of a city of 10,000-49,999 people
6. **Nonadjacent without city**: no city of 10,000 or more people

Four changes to the RUCC can be detected here, providing a different perspective on urban influence that was intended to reflect prevailing economic opportunities and challenges:

1. **Adjacency emphasized.** Among the two defining nonmetro dimensions (adjacency and urban size), primacy was given to adjacency in constructing the continuum. With the RUCC, adjacency is nested within the urban size categories. Following the

[4]The report was published as a special issue of the ERS periodical *Rural Conditions and Trends*, Vol. 4, Issue 3, (1993), edited by Linda Ghelfi.

"rural population turnaround" of the 1970s, metropolitan growth and expansion was particularly strong during the 1980s. Population loss in non-adjacent counties was more widespread, thus adjacency drove nonmetro population growth to a greater degree than during the previous two decades (Cromartie, 1993).

2. **Size of adjacent metro added.** The RUCC do not distinguish between counties adjacent to large and small metro areas. A county adjacent to New York City fell in the same category as a similar-sized county next to Sioux City, Iowa. Research in the 1990s was beginning to show that such distinctions helped explain variations on population and job growth (McGranahan and Salsgiver, 1992).
3. **New urban size threshold.** The two RUCC cut-offs for urban population size within nonmetro counties (20,000 and 2,500) was replaced with one 10,000 population threshold. UIC were thus well placed to incorporate micropolitan areas into the post-2000 classification update. OMB created the micropolitan category in response to criticism that nonmetro territory remained undifferentiated. They distinguish nonmetro counties that are integrated with centers of 10,000-49,999 from those that are less urban, which are labeled "non-core" counties. Initial research showed that the micropolitan classification helped explain differential employment growth rates over time and differences in socioeconomic well-being (Brown, Cromartie, and Kulcsar, 2004; Vias, Mulligan, and Molin, 2002).
4. **Size of largest city used.** The RUCC delineated nonmetro categories based on the counties' total urban population size, meaning a county with three towns of 7,000 each would be placed in the highest urban category. Also, if a county contained 2,000 people from an urban area of 40,000 located mostly in a neighboring county, that county would nonetheless be classified in the lowest urban size category. Aligning with central-place principles showing employment opportunities and service provision varying by city size, the UIC identified counties by their inclusion (in whole or part) of cities of 10,000 or more people, rather than an urban population size of 10,000 or more.

This initial set of six codes was expanded to nine codes in the 1990s, then to its current number of 12 codes following the 2000 and 2010 censuses (see Table B-3). Metro counties are divided into the same two groups—those in "large" areas have at least 1 million residents and those in "small" areas have fewer than 1 million residents. Nonmetro counties are delineated as micropolitan or non-core using OMB's classification.

TABLE B-3 Urban Influence Codes

Code	Description
Metropolitan Counties:	
1	In large metro area of 1 million or more residents
2	In small metro area of less than 1 million residents
Nonmetropolitan Counties:	
3	Micropolitan area adjacent to large metro area
4	Non-core adjacent to large metro area
5	Micropolitan area adjacent to small metro area
6	Non-core adjacent to small metro area and contains a town of at least 2,500 residents
7	Non-core adjacent to small metro area and does not contain a town of at least 2,500 residents
8	Micropolitan area not adjacent to a metro area
9	Non-core adjacent to micro area and contains a town of at least 2,500 residents
10	Non-core adjacent to micro area and does not contain a town of at least 2,500 residents
11	Non-core not adjacent to metro or micro area and contains a town of at least 2,500 residents
12	Non-core not adjacent to metro or micro area and does not contain a town of at least 2,500 residents

SOURCE: USDA Economic Research Service. See http://www.ers.usda.gov/data-products/urban-influence-codes/documentation.aspx [November 2015].

Nonmetro micropolitan counties are divided into three groups distinguished by metro size and adjacency: adjacent to a large metro area, adjacent to a small metro area, and not adjacent to a metro area. Nonmetro non-core counties are divided into seven groups distinguished by their adjacency to metro or micro areas and whether or not they contain a town of at least 2,500 residents (see http://www.ers.usda.gov/data-products/urban-influence-codes.aspx [November 2015].

The UIC and RUCC use nearly identical concepts of urban size and proximity to characterize counties along an urban-rural continuum, thus the UIC map differs from the RUCC map only slightly in its general aspects.[5] Sprawling metro regions of 1 million or more people dominate most of the eastern United States, contrasting sharply with the remote and sparsely-settled Heartland. One major difference between the two maps

[5]The UIC map is posted on the ERS website, see http://www.ers.usda.gov/data-products/urban-influence-codes/documentation.aspx [November 2015]. The black-and-white format of this report precludes its reproduction here.

occurs because the UIC make a distinction between counties adjacent to large and small metros. As a result, it becomes easier to see the regional dominance of small metros in more remote sections of the country, such as in the Corn Belt (especially in Iowa and eastern Nebraska), and across the northern tier of states from Wisconsin to Idaho. These cities stand out because they are surrounded by very rural, remote counties with no sizeable town of their own (shown in bright yellow) that likely depend heavily on these cities for trade and services.

MOVING BEYOND COUNTY-BASED DEFINITIONS

In the 1980s and 1990s, an outmoded image of national settlement still prevailed among policy makers and the public, consisting of central cities, suburban rings, and undifferentiated rural hinterlands. Forces at work since World War II to disrupt this general pattern were peaking at the time, and concepts such as urban sprawl, edge cities, and polycentric urbanization began to dominate urban spatial theory (Berry and Kim, 1993; Mieszkowski and Mills, 1993; Nechyba and Walsh, 2004). At the 1992 ERS conference, *Population Change and the Future of Rural America*, William Alonso saw a need

> . . . to begin a process of rethinking the human geography of well-to-do nations. . . . The existing censal categories are misleading because they present a vision of the United States as a territory tiled with convex, continuous, mutually exclusive types of regions, while the reality is one of a great deal of interpenetration, much of it rather fine-grained (Alonso, 1993).

In this literature, the basic concepts for differentiating urban and rural were not necessarily being called into question. However, population size, density, and proximity had not been mapped and analyzed at a spatial scale detailed enough to fully capture increasingly complex U.S. settlement patterns. Fortunately, easier access to large Census data files and improving computer capabilities, especially the emergence of Geographic Information Systems (GIS), were making it possible to consider the use of smaller geographic units as building blocks for urban-rural classifications.

For many purposes, county units are somewhat clumsy as the basis for defining rural and urban. Particularly in the West, where counties are relatively large, there are many metropolitan county residents who live in sparsely settled areas relatively far from urbanized areas of 50,000 or more. In fact, most people who live in Census rural areas (i.e., outside of urbanized areas and urban clusters of 2,500 or more) live in counties defined as metropolitan by OMB. As a response to imprecisions inherent

in county-based definitions, ERS moved to define rural and urban areas using smaller geographic units, while adhering to basic OMB constructs.

RURAL-URBAN COMMUTING AREA CODES

The need to create a subcounty classification system had become acute in the 1990s, given the increasing integration of the rural economy with urban dominated U.S. and world economies, rapid employment growth occurring in suburban nodes, and the growing complexity of the rural-urban frontier. As part of a project called "Metro 2000," OMB commissioned four reports by urban experts who were asked to devise alternative statistical systems to the current metro-nonmetro system (Dahmann and Fitzsimmons, 1995). Only one retained counties as the fundamental building block, two used subcounty geography, and one opted for a combination of county and subcounty units. Building on the concepts and analysis presented in these papers, ERS began laying the groundwork for what would become the Rural-Urban Commuting Area (RUCA) Codes. Initial tests using three states demonstrated the feasibility of applying metro area concepts and criteria used in the RUCC to census tracts instead of counties (Cromartie and Swanson, 1996). In particular, the finer gradations brought into focus by the use of census tracts highlighted the role of metro-adjacent areas as complex transition zones between suburban and rural space.

Discontent with county-based classifications led the Office of Rural Health Policy in the Department of Health and Human Services (HHS) to help ERS develop the initial set of RUCA Codes with full national coverage (Morrill, Cromartie, and Hart, 1999). HHS faced complaints that remote, rural communities in large metro counties were not eligible for a number of their rural assistance programs, such as those supporting small community hospitals or ambulance services. The initial RUCA Codes, based on 1990 Census data, came out in 1998 and have been updated with each subsequent Census with only minor modifications. HHS continues to use them as part of their eligibility criteria and they have been adopted by other federal agencies and by researchers, especially for rural health studies (e.g., Baldwin et al., 2010; Morden et al., 2010; Weeks et al., 2004).

RUCA Codes closely follow the same concepts and criteria used by OMB, especially in the use of Census urbanized areas and urban clusters as the starting point for constructing metro and micro areas. OMB's metro and micro terminology is adopted to highlight the underlying connectedness between the two classification systems. Census tracts are used by RUCA Codes in place of counties because they are the smallest geographic building block for which commuting flow estimates are available from the

TABLE B-4 Secondary RUCA Codes, 2010

1	Metropolitan Area Core: Primary Flow within an Urbanized Area (UA)
1.0	No additional code
1.1	Secondary flow 30% to 50% to a larger UA
2	Metropolitan Area High Commuting: Primary Flow 30% or More to a UA
2.0	No additional code
2.1	Secondary flow 30% to 50% to a larger UA
3	Metropolitan Area Low Commuting: Primary Flow 10% to 30% to a UA
3.0	No additional code
4	Micropolitan Area Core: Primary Flow within an Urban Cluster of 10,000 to 49,999 (large UC)
4.0	No additional code
4.1	Secondary flow 30% to 50% to a UA
5	Micropolitan High Commuting: Primary Flow 30% or More to a Large UC
5.0	No additional code
5.1	Secondary flow 30% to 50% to a UA
6	Micropolitan Low Commuting: Primary Flow 10% to 30% to a Large UC
6.0	No additional code
7	Small Town Core: Primary Flow within an Urban Cluster of 2,500 to 9,999 (small UC)
7.0	No additional code
7.1	Secondary flow 30% to 50% to a UA
7.2	Secondary flow 30% to 50% to a large UC
8	Small Town High Commuting: Primary Flow 30% or More to a Small UC
8.0	No additional code
8.1	Secondary flow 30% to 50% to a UA
8.2	Secondary flow 30% to 50% to a large UC
9	Small Town Low Commuting: Primary Flow 10% to 30% to a Small UC
9.0	No additional code
10	Rural Areas: Primary Flow to a Tract Outside a UA or UC
10.0	No additional code
10.1	Secondary flow 30% to 50% to a UA
10.2	Secondary flow 30% to 50% to a large UC
10.3	Secondary flow 30% to 50% to a small UC

SOURCE: USDA Economic Research Service. See http://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/documentation.aspx [November 2015].

U.S. Census.[6] The classification contains two levels, with the primary level represented by whole numbers from 1 to 10 (see Table B-4). Just as OMB builds metro areas around Census urbanized areas (densely settled core

[6]The ZIP Code approximation is available that is drawn from the census tract analysis, see https://ruralhealth.und.edu/ruca [November 2015].

areas of 50,000 or more people), RUCA's metropolitan cores (code 1) are defined as census tract equivalents of urbanized areas. Micropolitan cores (code 4) are tract equivalents of urban clusters with 10,000-49,999 people and small town cores are tract equivalents of urban clusters of 2,500-9,999 people.[7] Tracts are included in urban cores if more than 30 percent of their population is in the urbanized area or urban cluster.

High commuting (codes 2, 5, and 8) identify tracts where the largest commuting share was at least 30 percent to a metropolitan, micropolitan, or small town core. Many micropolitan and small town cores themselves (and even a few metropolitan cores) have high enough out-commuting to other cores to be coded 2, 5, or 8; typically these areas are not primarily job centers themselves but serve as bedroom communities for a nearby, larger city. Low commuting (codes 3, 6, and 9) refers to cases where the single largest flow is to a core, but is less than 30 percent. These codes identify "influence areas" of metro, micropolitan, and small town cores, respectively, and are similar in concept to the "nonmetro adjacent" concept found in the county-based classifications The last of the primary level codes (10) identifies rural tracts where the primary flow is local or to another rural tract (see http://www.wea.usda.gov/data-products/rural-urban-commuting-area-codes.aspx [November 2015].

Whole numbers (1-10) offer a relatively straightforward and complete delineation of metropolitan and nonmetropolitan areas based on the size and direction of primary commuting flows. However, secondary commuting flows may indicate other connections among rural and urban places. Thus, the primary RUCA Codes are further subdivided to identify areas where classifications overlap, based on the size and direction of the secondary, or second largest, commuting flow. For example, 1.1 and 2.1 codes identify areas where the primary flow is within or to a metropolitan core, but another 30 percent or more commute to a larger metropolitan core. Similarly, 10.1, 10.2, and 10.3 identify rural tracts for which the primary commuting share is local, but more than 30 percent also commute to a nearby metropolitan, micropolitan, or small town core, respectively.

The classification contains 10 primary and 21 secondary codes. Few, if any, research or policy applications use the full set of codes. Rather, the system allows for the selective combination of codes to meet varying research and policy needs. Primary codes 1-2 provide a rough equivalent at the census tract level of OMB metro counties (see Figure B-1). Comparing the tract-based version (shown in dark gray) with the county-based areas (outlined in black) shows how RUCA Codes identify independent

[7]Urban clusters are identical in concept to urbanized areas but with populations less than 50,000. They are collectively labeled urban areas. The ERS topic page "What is Rural?" discusses how they are defined.

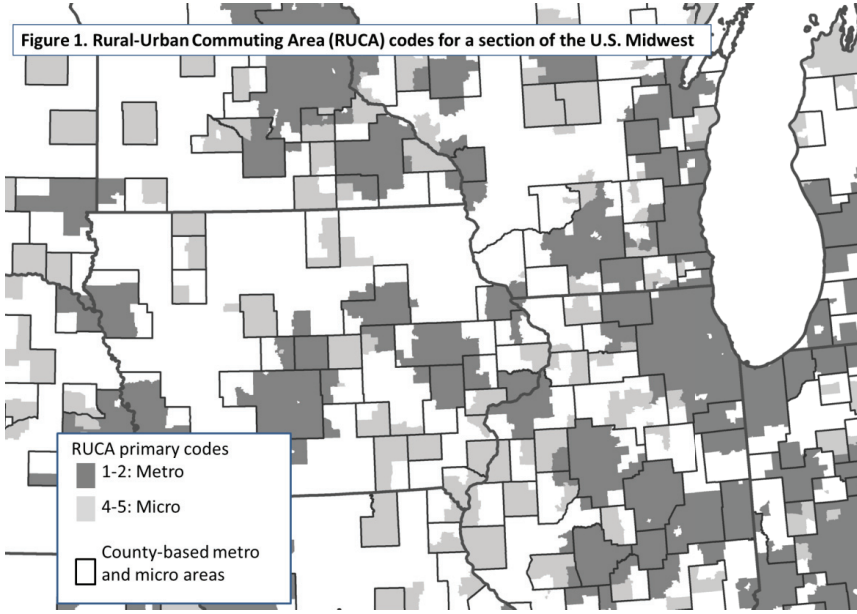

FIGURE B-1 Rural-Urban Commuting Area (RUCA) Codes for a section of the U.S. Midwest.
SOURCE: Prepared by John Cromartie for his presentation at Rationalizing Rural Area Classifications workshop. Based on USDA Economic Research Service data. See http://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes.aspx [October 2015].

rural areas, as measured by relatively low commuting that fall within metro counties. RUCA Codes also identify those parts of nearby non-metro counties that are highly connected to metro cores. The tract-based delimitation succeeds in identifying more precisely extent of micropolitan influence (shown in light gray), which in many cases does not include the entire county in which the core is located. In addition, the small size of census tracts allows for the identification of hundreds of smaller towns (with fewer than 10,000 people) and their local commuter sheds (not shown on map). The location and size of these much smaller spheres of economic influence cannot be detected with county-level classifications.

FRONTIER AND REMOTE CODES

The Frontier and Remote (FAR) Codes employ an increasingly popular, grid-based methodology in order to define proximity using travel time by car rather than by actual commuting flows. FAR areas are defined in relation to the time it takes to travel by car to the edges of nearby urbanized areas and urban clusters, which collectively are labeled urban areas (UAs). Travel time is measured at the ½ x ½ kilometer grid level, using routing algorithms applied to a road network that includes all federal, state, and county paved roads. The methodology departs significantly from the previous three classifications and the resulting classification focuses more exclusively on the far rural end of the urban-rural spectrum. However, the underlying concepts of urban size and proximity are the same.

The term "frontier and remote" is used here to describe territory characterized by some combination of low population size and a high degree of geographic remoteness. As with the RUCA Codes, demand for a geographically detailed delineation of frontier areas came from the Office of Rural Health Policy, to help administer HHS programs with the legislative mandate to improve access to health-care in frontier areas. Potential policy-relevant research applications spurred development of the FAR Codes as well. In the United States, remoteness has been linked with population loss and persistent net out-migration (Albrecht, 1993; Cromartie, 1998); an aging population and natural decrease (Johnson, 1993; Johnson and Rathge, 2006); and loss of retail and wholesale trade (Adamchak et al., 1999; Henderson, Kelly, and Taylor, 2000). In the late 2000s, research was beginning to show increased economic penalties associated with remoteness (Partridge et al., 2008, 2009).

A revival in research based on central place theory among economists, geographers, and regional scientists, following development of a New Economic Geography (Krugman, 1991), helped focus attention on unique issues facing remote areas. As described in an earlier article on the FAR Codes:

> Perhaps the defining challenge facing frontier communities is the increased per capita cost of providing services. Health care costs are a primary policy issue motivating this research, but remoteness increases costs in accessing groceries, household goods, child care, entertainment, and all types of publically provided social services, such as schools or fire protection. According to central place theory, the costs associated with providing higher-order services (appliances, motor vehicles, major trauma intervention) are higher than those associated with lower-order services (groceries, sporting goods, nursing care), thus they require a larger population to support them (Mulligan, 1984). . . . [R]ecent studies

> confirm that the variability of rural well-being is still very strongly tied to the structure of the urban hierarchy . . . (Cromartie, Nulph, and Hart, 2012).

In partnership with HHS, ERS created the first version of the FAR Codes in 2012, using 2000 Census data, then released a version in 2015 based on 2010 data. Four FAR levels were defined based on urban area size, with the notion that urban areas of different sizes offer different levels of services and different labor market opportunities. For each of 32.4 million grid cells, travel times to nearby UAs were examined and up to four pieces of information retained—the travel time in minutes to the edge of the nearest UA with a population in the following size ranges: 2,500-10,000, 10,000-24,999, 25,000-49,999, and 50,000 or more. These data allow for the four different FAR levels to be defined, based on adjusting the population size thresholds.

A key methodological innovation allowed with this approach is the ability to apply longer travel-time bands around larger UAs. The qualifying travel time (beyond which areas are considered to be frontier and remote) should be longer around larger UAs, because people tend to travel farther and less frequently for high-order services. For every grid cell, we calculate travel times to nearby UAs in the four population-size groups listed above, thus we can apply longer travel-time bands to larger population-size groups:

- **Level 1**—FAR areas consist of rural areas and urban areas up to 50,000 people that are 60 minutes or more from an urban area of 50,000 or more people.
- **Level 2**—FAR areas consist of rural areas and urban areas up to 25,000 people that are 45 minutes or more from an urban area of 25,000-49,999 people; and 60 minutes or more from an urban area of 50,000 or more people.
- **Level 3**—FAR areas consist of rural areas and urban areas up to 10,000 people that are 30 minutes or more from an urban area of 10,000-24,999; 45 minutes or more from an urban area of 25,000-49,999 people; and 60 minutes or more from an urban area of 50,000 or more people.
- **Level 4**—FAR areas consist of rural areas that are 15 minutes or more from an urban area of 2,500-9,999 people; 30 minutes or more from an urban area of 10,000-24,999 people; 45 minutes or more from an urban area of 25,000-49,999 people; and 60 minutes or more from an urban area of 50,000 or more people (see http://www.ere.usda.gov/data-products/frontier-and-remote-area-codes.aspx [November 2015].

A relatively large number of people live far from cities providing "high order" goods and services, such as advanced medical procedures, major household appliances, regional airport hubs, and professional sports franchises. Level 1 FAR Codes are meant to approximate remoteness from these types of activities, more likely to be present in urbanized areas of 50,000 or more residents. Driving times of more than one hour designate remoteness from centers of this size. A much smaller, but still significant, number of people find it hard to access "low order" goods and services, such as grocery stores, gas stations, and basic health care needs. Level 4 FAR Codes, defined as travel time from an urban cluster of 2,500 to 9,999 residents more closely coincide with this, much higher degree of remoteness. Here, a travel time of over 15 minutes is considered "remote." Other types of goods and services—clothing stores, car dealerships, movie theaters—fall somewhere in between in terms of likely center size, approximated by levels 2 and 3.

Once frontier categories are determined for each grid cell, frontier populations may be aggregated to larger, more useful geographic units, such as ZIP Code areas. For each ZIP Code area, the percent of the population defined as frontier was calculated. For ZIP Code areas containing a mix of frontier and nonfrontier populations, classification was based on the status of the majority of the population. The same analysis can be repeated for census tracts, counties, or other geographic units.

True to its "frontier" name, FAR territory is predominantly found in the West, from the Great Plains to the Oregon-California coast, and including almost all of Alaska.[8] This geographically detailed approach also identifies significant pockets of relatively high remoteness east of the Mississippi, such as in northern New England, the Upper Great Lakes, Appalachia, and the Deep South. Previous delineations of frontier areas, mostly relying on county-based methods, fail to identify many of these remote regions.[9] U.S. populations living in ZIP Code areas designated as FAR ranged from 12.2 million for level one down to 2.3 million for level four in 2010. These populations constitute just 3.9 and 0.7 of the total U.S. population, respectively. However, the share of land area classified as frontier and remote ranged from 52 percent for level 1 down to 35 percent for level 4. The fact that over one-half of U.S. territory is inhabited by just 12.2 million residents suggests in itself the very unique economic circumstances facing these communities and individuals.

[8]FAR maps are posted on the ERS website, see http://www.ers.usda.gov/data-products/frontier-and-remote-area-codes/documentation.aspx [November 2015].

[9]The Rural Assistance Center shows one such map and discusses alternative ways to define frontier areas, see https://www.raconline.org/topics/frontier [November 2015].

CONCLUSIONS

In reporting research results to USDA officials, ERS frequently aims to communicate an ongoing policy challenge: Rural America is diverse and complex. Not only do challenges such as job retention and service provision look different in rural than in urban areas, but they vary also within rural areas by measures of population size and remoteness. Since the 1970s, ERS has developed and maintained multilevel, geographic classifications to provide detailed measures of rurality and to assess the economic and social diversity of rural and small-town America. These classification schemes have also been used to determine eligibility for federal programs that assist rural areas.

Rural America is not just diverse and complex, but has rapidly evolved in the 40 years since the first county classification was introduced. In that time, urbanization reduced the rural share of population by more than a third, globalization and technology reshaped the rural economy, and immigration, aging, and amenity migration gave rural America a new demographic profile. The four classification systems that are the focus of this paper were developed independently, in different decades to address specific research agendas and policy needs. It's now helpful to step back and evaluate the group as a whole in light of changing realities on the ground, changing research priorities, and the changing policy landscape.

The information revolution has brought new data, new geographies, and new methodologies into play. Together they provide opportunities to improve geographic classifications, as well as major challenges in choosing the best solutions. For instance, the FAR classification measures urban access and remoteness using ½ kilometer grid cells, improving geographical accuracy for many applications. At the same time, county-level classifications will continue to be needed given data requirements. ERS faces the challenge of maintaining conceptual consistency at different geographic scales.

ERS will draw on results from this conference to identify what considerations need to go into modifying existing rural-urban classifications developing new ones. Key questions include How many categories can they contain without being overly complex? What thresholds should be used? Can data products be provided for different geographic building blocks in a consistent way? Or Are there inherent differences introduced when moving from one geographic level to another?

Modifications to existing classifications or the introduction of new schemes face several, often contradictory, demands. Ideally, they would be

- useful in identifying socioeconomic variation as it is affected by size of place and urban proximity;
- useful to policy makers in evaluating programs and delineating eligibility;
- useful to a broad range of stakeholders by being relatively easy to use, containing a reasonably small number of categories with discernable criteria;
- based on conceptually sound methodology, including justifiable breakpoints; and
- consistent with OMB and Census Bureau definitions.

It will not be possible to satisfy all these needs perfectly, so tradeoffs need to be considered. The workshop demonstrated that the desire to ensure the future viability and usability of these ERS products is a widely shared concern.

Appendix C

Agenda

Workshop on Rationalizing Rural Area Classifications
Committee on National Statistics
April 16-17, 2015
National Academies of Sciences, Engineering, and Medicine
Keck Center, Room 201
500 Fifth Street, NW, Washington, DC

Thursday, April 16

8:30–9:10 a.m.	**Session 1: Welcome** Moderator: David Brown, Cornell University, Chair, Steering Committee
8:35–8:50	**Welcome to the National Academies** Constance Citro, Director, Committee on National Statistics
8:50–9:10	**Welcome to workshop and description of workshop goals** Mary Bohman, Administrator, Economic Research Service, USDA
9:10–10:40	**Session 2: Historical development of current rural area classification systems** Moderator: Stephan Goetz, Pennsylvania State University
9:10–9:40	**Census and OMB classifications** James Fitzsimmons, Population Division, U.S. Census Bureau

9:40–10:20	**Classifications used by ERS** *(with background paper)* John Cromartie, Economic Research Service, USDA
10:20–10:40	**Open floor discussion**
10:40–11:00	**Break**
11:00 a.m.–12:30 p.m.	**Session 3: How rural area classification is done elsewhere in the U.S. and internationally** Moderator: Mark Partridge, Ohio State University
11:00–11:20	Non-ERS classifications in the U.S. Speaker: Brigitte Waldorf, Purdue University (*Commissioned paper* with Ayoung Kim, Purdue University)
11:20–11:40	Labor market area delineations in the U.S. Speaker: Leif Jensen, Penn State University
11:40 a.m.–12 p.m.	How rural area classification is done in Europe and other highly developed nations Speaker: Paolo Veneri, Organisation for Economic Co-operation and Development
12:00–12:15	A social constructionist critique of rural area classification Speaker: Keith Halfacree, University of Swansea
12:15–12:30	**Open floor discussion**
12:30–1:30	**Working lunch**
1:30–3:00	**Session 4: Panel discussion followed by open floor discussion: "The Big Picture": Changes in society and economy that have contributed to the need for reconsidering rural classification systems** Moderator: James Fitzsimmons, U.S. Census Bureau Discussion to include changing context: transformation of U.S. economy, information technology revolution, transformation of global-local relationships, population size and composition, etc. and changing organization of the intergovernmental system increasing the need for

	sociodemographic and economic information at state and local levels. Panelists: Bruce Weber, Oregon State University David Plane, University of Arizona David Brown, Cornell University Linda Lobao, Ohio State University Jeff Hardcastle, Nevada State Demographer
3:00–3:15	**Break**
3:15–5:00	**Session 5: Different ways to conceptualize rural areas in metropolitan society** Moderator: David Plane, University of Arizona
3:15–3:35	A rural view *(with commissioned paper)* Speaker: Michael Woods, University of Aberystwyth
3:35–3:45	Discussion from an urban demography/sociology point of view Speaker: John Logan, Brown University
3:45–3:55	Discussion from a regional inequality point of view Speaker: Gregory Hooks, McMaster University
3:55–4:05	**Discussion among speakers**
4:05–4:15	**Open floor discussion**
4:15–4:30	The urban-rural interface as a space of integration rather than of separation, first view Speaker: Daniel Lichter, Cornell University
4:30–4:45	The urban-rural interface as a space of integration rather than of separation, second view Speaker: Mark Partridge, Ohio State University
4:45–5:00	**Open floor discussion**
5:00	**Adjourn for the day**—David Brown

Friday, April 17

8:30–10:00	**Session 6: Panel discussion followed by open floor discussion: How the current rural area classification systems are used in research and in program design and administration** Moderator: Brigitte Waldorf, Purdue University Panelists: Douglas O'Brien, White House Domestic Policy Council Timothy Parker, Economic Research Service, USDA Thomas G. Johnson, University of Missouri, and a member of the RuPRI leadership team Kenneth Johnson, University of New Hampshire Rose Olfert, University of Saskatchewan
10:00–10:15	**Break**
10:15–11:45	**Session 7: Changes in social science data and methods and their impact on rural classification** Moderator: James Fitzsimmons, U.S. Census Bureau
10:15–10:35	Changing analytical possibilities including GIS and spatial statistics, increasingly powerful computing, etc. (*Commissioned paper*) Speaker: Alan Murray, Drexel University
10:35–10:50	Changing analytical possibilities Speaker: Sarah Low, Economic Research Service, USDA
10:50–11:05	Availability and quality of data from the American Community Survey Speaker: Richelle Winkler, Michigan Technological University and member of ACS Data Users Group National Steering Committee
11:05–11:25	More frequent availability of local level data at lower levels of geographic scale Speaker: Michael Ratcliffe, Geography Division, U.S. Census Bureau, with Marc Perry, Population Division, U.S. Census Bureau

11:25–11:45	**Open floor discussion**
11:45 a.m.–12:45 p.m.	**Working lunch**
12:45–2:00	**Session 8: Evaluating the reliability and validity of rural area classifications** Moderator: Mark Partridge, Ohio State University
12:45–1:05	Evaluation using statistical modeling Speaker: Stephan Goetz, Penn State University (*Commissioned paper,* with Yicheol Han, Penn State University)
1:05–1:20	Ground truthing Speaker: Mark Shucksmith, Newcastle University, UK
1:20–1:35	Discussant Speaker: Carlianne Patrick, Georgia State University
1:35–2:00	**Open floor discussion**
2:00–3:00	**Session 9: Panel discussion among members of the workshop's steering committee and ERS sponsors followed by open floor discussion: Alternate futures for rural area classification** Moderator: David Brown, Cornell University Panelists: John Cromartie, Economic Research Service, USDA James Fitzsimmons, U.S. Census Bureau Stephan Goetz, Pennsylvania State University David McGranahan, Economic Research Service, USDA Timothy Parker, Economic Research Service, USDA Mark Partridge, Ohio State University David Plane, University of Arizona Brigitte Waldorf, Purdue University **Closing remarks** David McGranahan, Economic Research Service, USDA
3:00	**Adjourn the workshop**—David Brown

LIST OF PARTICIPANTS

Mary Bohman, Economic Research Service, U.S. Department of Agriculture
Vince Breneman, Economic Research Service, U.S. Department of Agriculture
David L. Brown, Cornell University
Constance F. Citro, Committee on National Statistics, National Academies of Sciences, Engineering, and Medicine
John Cromartie, Economic Research Service, U.S. Department of Agriculture
Giang Do, CDFI Fund, U.S. Department of the Treasury
James Fitzsimmons, U.S. Census Bureau
Robert Gibbs, Economic Research Service, U.S. Department of Agriculture
Stephan Goetz, Penn State College of Agricultural Sciences
Keith Halfacree, Swansea University
Yicheol Han, Penn State University
Jeff Hardcastle, Nevada Department of Taxation
Steven Hirsch, National Advisory Committee on Rural Health and Human Services
Gregory Hooks, McMaster University, Ontario, Canada
Leif Jensen, Penn State University
Kenneth Johnson, University of New Hampshire
Tom Johnson, University of Missouri
Ayoung Kim, Purdue University
Nancy Kirkendall, Committee on National Statistics, National Academies of Sciences, Engineering, and Medicine
Daniel Lichter, Cornell University
Linda Lobao, Ohio State University
John Logan, Brown University
Sarah Low, Economic Research Service, U.S. Department of Agriculture
Peter Mateyka, U.S. Census Bureau
David McGranahan, Economic Research Service, U.S. Department of Agriculture
Brian McKenzie, U.S. Census Bureau
Alan Murray, Drexel University
David Nulph, Economic Research Service, U.S. Department of Agriculture
Douglas O'Brien, White House Domestic Policy Council
Jennifer Park, Office of Management and Budget, Executive Office of the President
Tim Parker, Economic Research Service, U.S. Department of Agriculture

Mark Partridge, Ohio State University
Carlianne Patrick, Georgia State University
John Pender, Economic Research Service, U.S. Department of Agriculture
Marc Perry, U.S. Census Bureau
David A. Plane, University of Arizona
Rose Olfert, University of Saskatchewan, Saskatoon, Canada
Michael Ratcliffe, U.S. Census Bureau
Danielle Rhubart, Penn State University
Michael Sellner (via Webex), U.S. Census Bureau
Shoshana Shapiro, Health Resources and Services Administration
Mark Shucksmith, Newcastle University
Steve Turner, Southern Rural Development Center
Paolo Veneri, OECD
Brigitte Waldorf, Purdue University
Bruce Weber, Oregon State University
Marca Weinberg, Economic Research Service, U.S. Department of Agriculture
Richelle Winkler, Michigan Technological University
Michael Woods, Aberystwyth University, Wales, UK
Gooloo Wunderlich, Committee on National Statistics, National Academies of Sciences, Engineering, and Medicine

Appendix D

Biographical Sketches of Steering Committee Members

David L. Brown *(Chair)* is professor and chair of the department of sociology at Cornell University and the co-director of the Community and Regional Development Institute. His areas of expertise are in demography, migration, urbanization, and community. His current projects include the political economy of rural and regional development in the United States and in ex-socialist eastern Europe; how social mobilities are reshaping the urban-rural periphery; commuting behavior among rural in-migrants in England and the United States; the process through which amenity-based areas become destinations for older in-migrants and maintain that status over time; and the social and economic implications of natural population decrease including the lived experience of residents of such areas and the association between natural population decrease and economic activity over time. He received his Ph.D. in sociology/demography from the University of Wisconsin–Madison.

James Fitzsimmons is assistant division chief in Geographic Studies and Information Resources, Population Division, U.S. Census Bureau. He leads the Census Bureau's analytical work on the geographic distribution of population, both in the United States and other countries. Current projects include preparation of subnational population data for countries outside the United States for use in humanitarian assistance following disasters. He served as chair of the Office of Management and Budget's (OMB) Metropolitan Area Standards Review Committee for the updating of standards in 2000 and 2013. This committee recommended the changes

to the definitions of metropolitan and micropolitan statistical areas that were adopted by OMB prior to the release of data from the decennial census. He has a Ph.D. in geography from the University of Minnesota, Twin Cities.

Stephan Goetz is professor of agricultural and regional economics at the College of Agricultural Sciences at Pennsylvania State University. As director of the Northeast Center, he provides leadership for economic and community development research and extension activities across 13 states. Part of this responsibility includes linking state activities to national and regional initiatives. An underlying theme of his research program is the role of markets and human capital in stimulating economic growth and development, and in reducing poverty. Current research interests include social network analysis, regional food systems, self-employment, and targeted economic development. He has a Ph.D. in agricultural economics from Michigan State University.

Mark Partridge is the C. William Swank chair of rural urban policy at Ohio State University and a professor in the agricultural, environment, and development economics department. He is also a faculty research affiliate of the City Region Studies Center, University of Alberta. Dr. Partridge's current research interests include investigating rural urban interdependence, why some communities grow faster than others, and innovations in regional policy and governance. He is co-editor of the *Journal of Regional Science* and is on the executive council of the Regional Science Association International. Dr. Partridge has consulted with the OECD, the Federal Reserve Bank of Chicago, various governments in the United States and Canada; and he is currently working a project for the European Commission. He has a Ph.D. in economics from the University of Illinois.

David Allen Plane is professor in the school of geography and regional development at the University of Arizona in Tucson. His research interests are population (migration), transportation, regional science, regional development, and quantitative modeling. His research focuses on population geography, U.S. migration and settlement patterns, the role of the life course in affecting mobility, and methods for modeling temporal change in spatial interaction systems. In 2001-2002 and again in 2011, he was a visiting researcher at the U.S. Census Bureau. He is a member of the National Academy of Sciences, Engineering, and Medicine's Panel on Addressing Priority Technical Issues for the Next Decade of the American Community Survey. He has a Ph.D. in regional science from the University of Pennsylvania.

Brigitte S. Waldorf is professor of agricultural economics at Purdue University. In her research, she combines a topical interest in population, urban and transportation issues with a methodological interest in spatial and quantitative analysis. Among her research topics are immigration, regional demographic change due to migration and fertility, the growth of a knowledge-based workforce, the urban-rural interface, and access to health care. She has an M.A. in geography and an M.A. in mathematics from the Heinrich Heine University in Dusseldorf, Germany, and a Ph.D. in geography from the University of Illinois.

COMMITTEE ON NATIONAL STATISTICS

The Committee on National Statistics was established in 1972 at the National Academies of Sciences, Engineering, and Medicine to improve the statistical methods and information on which public policy decisions are based. The committee carries out studies, workshops, and other activities to foster better measures and fuller understanding of the economy, the environment, public health, crime, education, immigration, poverty, welfare, and other public policy issues. It also evaluates ongoing statistical programs and tracks the statistical policy and coordinating activities of the federal government, serving a unique role at the intersection of statistics and public policy. The committee's work is supported by a consortium of federal agencies through a National Science Foundation grant.