Economic Diversity in Appalachia

Statistics, Strategies, and Guides for Action

February 2014

Prepared for the Appalachian Regional Commission

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ABOUT THIS REPORT

This report is one of four documents prepared as part of an extensive analysis of economic diversity for the Appalachian Regional Commission by the University of Illinois at Urbana-Champaign's Regional Economics Applications Laboratory and the Center for Regional Economic Competitiveness, with assistance from the RUPRI Center for Rural Entrepreneurship and EntreWorks Consulting. Project leaders were Edward Feser, Ken Poole, Mark White, and Geoffrey Hewings, with Troy Mix serving as Project Manager.

Authors of this report were Edward Feser, Troy Mix, Mark White, and Ken Poole. Deb Markley and Erik Pages contributed to the case studies. William Cook and Erol Yildirim were primarily responsible for building the web tool.

In addition to this report, the documents include a guide to the web tool (*A Practitioner's Guide for Planning and Analysis with the Appalachian Economic Diversity Web Tool*), a detailed synopsis of case studies (*Case Studies in Economic Diversification in Appalachia*), and a technical report detailing methods, data, and additional findings (*A Statistical Portrait of Economic Diversity in Appalachia*). All reports associated with the project can be found here: http://economicdiversityinappalachia.creconline.org/Report/.

EXECUTIVE SUMMARY

Diversification is a worthy local economic development objective. Other things equal, diverse economies tend to be more stable because they are less dependent on single industries or firms. The broader mix of economic activities in a place means that decline in one sector may sometimes be offset by growth in another. At the same time, diversity does not guarantee faster growth, higher incomes, or more widely shared prosperity. Sometimes a community may appear economically diverse because a major economic growth engine—a large manufacturing plant, a mine, a military base—has closed, reducing the level of specialization. Dependence on one or a few sectors yields positive economic outcomes when those sectors are growing. Dependence is a source of vulnerability when key sectors find their competitive position threatened.

Diversification is not a valuable strategy because there is a simple link between diversity and economic outcomes. There is not. Instead, pursuing diversity as a goal helps economic development practitioners and community stakeholders better detect and understand economic opportunities and threats. Understanding why a community has a high or low level of diversity; comparing different types of economic diversity, such as industrial or occupational; benchmarking a community's diversity against appropriate peers and investigating the causes of observed differences; juxtaposing the diversity of a particular community against the diversity of the broader economic region of which it's a part; and digging deeper to connect diversity levels to competitive opportunities and threats that industries, occupations, and firms face are all valuable forms of economic intelligence gathering that can inform a comprehensive development strategy.

This report, commissioned by the Appalachian Regional Commission, does three things. First, it offers a quantitative portrait of economic diversity trends in Appalachian counties and sub-regions, benchmarked to U.S. trends. The portraits draws on four complementary indexes of diversity: industrial, functional, occupational, and knowledge, with the first two based on the mix of industries in a place and the latter two based on the mix of occupations. Second, the report summarizes diversity trends, economic development practices, and diversification strategies in ten Appalachian counties. The ten cases offer insights into economic development practitioners' understanding of what economic diversity means for their communities; describe how a diverse or non-diverse local economic structure can aid or thwart economic development planning efforts; and identify particular diversification approaches that are meeting with success in the Appalachian region. Third, the report offers general lessons about what diversity means for economic development practice.

An especially important accompaniment to the report is a website— economicdiversityinappalachia.creconline.org—which supplies data and maps along with interactive tools for exploring diversity trends in Appalachia and the U.S. The site enables an economic development practitioner to compare his or her county's level of diversity against a range of comparison options, including any U.S. county or selection of counties, counties identified as most similar to the developer's county through economic and demographic profiles, and counties of similar levels of urbanization. The site also joins diversity indexes with basic industry and occupational mix information to

support analyses that "look behind" the level of diversity to understand its origins in the specific characteristics of industries and labor force. Tips for using the information and tools—*A Practitioner's Guide for Planning and Analysis with the Appalachian Economic Diversity Web Tool*—is available on the website.

Also accompanying the report are two additional documents. The first—*A Statistical Portrait of Economic Diversity in Appalachia*—provides additional details and analysis of the diversity metrics. The second—*Case Studies in Economic Diversification in Appalachia*—provides extensive narratives of the research conducted in the ten case study counties.

The analysis contained in this report offers several lessons for local economic development practice. First, a competitive regional economy, and one that is also diverse in comparison to other regional economies of similar levels of development and scale, is likely to be comprised of multiple competitive specializations. A diversification goal should not be simply to somehow encourage the emergence and expansion of a generically diverse mix of economic activity, but rather to support the competitiveness and growth of a number of specializations or clusters that can serve as the multi-legged foundation for the local economy. Put differently, a good diversification strategy is a matter of implementing many successful specialization strategies simultaneously.

Second, the local economic developer should seek to fully assess and understand the "risk" associated with the existing economic base of his or her locality. A highly specialized economy may face comparatively little risk of significant decline over a foreseeable future if robust demand for its goods and services is certain. Alternatively, a diverse economic base can be under threat if multiple industries face significant disruption. An important role for the local economic developer is to fully understand the competitive factors underpinning the economic base and use this knowledge to anticipate possible disruptions that might be countered through development strategies.

Third, the developer should scan for economic opportunities—whether through business expansion, entrepreneurship, or attraction strategies, or other economic development initiatives—that might be nurtured through appropriate public sector actions. Regional economic diversification is not akin to financial portfolio diversification; a region cannot choose to actively divest itself of a particular segment of its economy (although it can allow a segment to founder or languish). Instead, it can shift its economic mix primarily by encouraging new industries and activities. In this sense, diversification strategies build on fundamental principles of economic development more broadly.

Fourth, the pursuit of an appropriate level of regionalism in economic development is a good strategy because local and regional diversity are rarely independent of one another. The understanding of a community's particular economic role within its larger labor market area and region can help to clarify the necessity and potential content of regional arrangements. In order to compensate for local gaps in factors such as workforce skills or infrastructure, individual communities might seek to highlight their

ties to nearby communities; business recruitment or cluster strategies may be more successful if they highlight the region's resources, not just those of individual communities; local economic development goals may be advanced more rapidly by partnering on major infrastructure projects; and so on. The larger region may offer significant avenues for diversification that are well beyond the reach of a smaller locality.

Fifth, overall, the best diversification strategy is a sound, well-balanced economic development strategy. Communities that successfully implement diversification strategies share several common traits. They develop their strategies on a solid foundation of analysis and research. They think and operate regionally so as to maximize the resources and assets available to them. Their development professionals work across silos to create broader networks and coalitions and to leverage networks and expertise. They put the right leaders and staff in place to ensure effective implementation. And they have a process in place for developing and implementing their strategies and for incorporating new leaders. Economic diversity is a legitimate economic aspiration and goal, but like all economic development goals, it is only accomplished if area leaders and stakeholders thoughtfully and effectively implement their economic development strategies.

INTRODUCTION

Many rural Appalachian areas have long depended on a few dominant industries, such as manufacturing, mining, and forestry. Considerable research suggests that this dependence is closely tied to negative economic outcomes (Bradshaw, 1992; Freudenburg and Wilson, 2002; Stedman, Patriquin, and Parkins, 2011). Likewise, Appalachia's urban regions also rely on a few industries. For example, large, vertically-integrated steel producers propelled the economies of Youngstown, Ohio and Pittsburgh, Pennsylvania for many decades. As U.S. steel manufacturing declined, the regions faced many difficulties in adapting to an increasingly service-oriented economy due to the steel industry's institutionalized labor practices and corporate structures (Hoerr, 1988; Safford, 2009).

Prompted in part by Appalachia's legacy of low economic diversity and the lack of practical guidance available for pursuing diversification strategies, the Appalachian Regional Commission (ARC) sponsored research aimed at better understanding economic diversity in Appalachia and identifying common diversification strategies. Begun in November 2012, this research consisted of three major components: 1) the assembly of a quantitative portrait of economic diversity in Appalachia and the United States; 2) the compilation and assessment—through focused case studies—of views of economic diversity and common regional development strategies related to diversification in the Appalachian region; and 3) the development of guides for local economic development practitioners in the use of the data and strategy findings.

This report summarizes those research findings, with a focus on extracting lessons that offer the most potential for informing local and regional economic development efforts across Appalachia.[1] Accompanying the report is a website—economicdiversityinappalachia.creconline.org—which provides interactive data, maps and other analytical tools for exploring diversity trends in Appalachia and the U.S.[2]

Following a synopsis of previous research on diversity and regional development, the report outlines and applies several approaches to defining economic diversity. Each diversity definition yields an index that provides a different and complementary lens for viewing and understanding the economic challenges and opportunities facing local communities in Appalachia. The definitions recognize different features of local economies, including their industrial make-up, the major roles or "economic functions" they play in their larger regional contexts, and the characteristics of their workforces. Applying the definitions to varying geographic scales—county versus multi-county

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[1] Detailed findings and methods from the data analysis and case study components of this project can be found in two additional technical reports: *A Statistical Portrait of Economic Diversity in Appalachia* and *Case Studies in Economic Diversification in Appalachia.* Both reports are available at http://economicdiversityinappalachia.creconline.org/Report/.

[2] A manual for development professionals—*A Practitioner's Guide for Planning and Analysis with the Appalachian Economic Diversity Web Tool*—is also available on the website.

commuting shed—lends additional insight into a locality's level of diversity and implications for growth and development.

The empirical analysis is followed by summaries of diversity trends, economic development practices, and diversification strategies (if underway) in ten Appalachian counties. The ten counties selected for case study analysis are either highly concentrated in a particularly specialty (i.e., not diverse) or have pursued tangible strategies to increase their level of economic diversity. The aim of the case study work was to generate insights into economic development practitioners' own understanding of what economic diversity means for their communities; to better understand how a diverse or non-diverse local economic structure can aid or thwart economic development planning efforts; and to discover what diversification approaches are meeting with success in the region.

The report concludes with a discussion of several general lessons for economic development practice. Diversity is certainly a complicated phenomenon; it is not unambiguously associated with strong economic performance. Indeed, in many regions, an increasing level of diversity may be associated with the decline of previously successful industrial specializations or clusters. A place may become more diverse because its longstanding economic engine is sputtering. The pattern of diversity and growth in regions unfolds in complex ways over long periods of time and through a continuous process of economic structural transition and evolution, the net effect of ongoing new business locations, new business formations, firm expansions and contractions, and firm re-locations and closures. In this context, targeting economic diversity as a narrow economic development goal is less useful than using it as one of a suite of metrics informing regular economic development strategizing and planning.

Systematic investigation into why a community either lacks economic diversity or has become diverse over time can uncover useful insights, such as: the level of cyclical or structural risk the community faces given its existing economic mix; the importance of the community's economic linkages to larger regional, national, and global economies; opportunities for growth in emerging industries or industries that align with local workforce strengths; and possible investments, policies, or initiatives that can assist a structural transition from a vulnerable set of industries. Recognizing that diversity is not simply a matter of how many industries are present in place, but also the characteristics of those industries, their linkages to the wider economy, and the skills and knowledge characteristics of the workers they employ, offers a much richer picture of economic strengths and vulnerabilities. Likewise, understanding that a locality's diversity depends not only on its own economic mix but the mix of its larger region, can reveal previously unknown opportunities for grown and development through the leveraging of regional assets and creation of innovative inter-jurisdictional partnerships.

RESEARCH ON DIVERSITY AND REGIONAL DEVELOPMENT

Regional development practitioners often cite economic diversification as a desirable goal for the purported benefits it can provide in reducing exposure to economic downturns and opening up potential avenues for economic growth. Considerable scholarship has accompanied this practical focus, with much of the attention on devising and evaluating methods for measuring regional economic diversity and testing the relationships among economic diversity and regional growth and stability (Attaran, 1986; Conroy, 1975; Dissart, 2003; Frenken, Van Oort, and Verburg, 2007; Jackson, 1984; Mack, Grubesic, and Kessler, 2007; McLaughlin, 1930). Existing research is organized around investigating three major claims: 1) that economic diversity enhances the stability of regional employment levels; 2) that increased economic diversity results in increased employment growth rates; and 3) that regions' particular industry specializations play a significant role in determining regional employment stability.

ECONOMIC DIVERSITY AND REGIONAL STABILITY

Scholars and practitioners have long advanced the common sense notion that economic diversity can reduce the impact of economic shocks on a region's employment. Dissart (2003) referred to economic diversity as an "averaging process: the greater the variety of industries in a region, and the more dispersed the regional employment among these industries, the less likely a region is to suffer severe…economic decline" (p. 424). Put differently, diverse regions are expected to be more stable since "their fortunes are not tied to the fortunes of a few industries" (Chinitz, 1961, p. 281).

There is considerable, though not unequivocal, empirical evidence of a positive relationship between regional economic diversity and stability. In a review of the economic diversity literature since 1930, Dissart (2003) reported that a majority of some 40 studies have found a positive relationship between the diversity and stability of regional economies, and that larger economies tend to be both more diverse and more stable than smaller economies. Malizia and Ke (1993) found a relationship between increased U.S. metropolitan area diversity and both less unemployment and more employment stability. Conroy (1975) also reported a significant, positive relationship between metropolitan area diversity and economic stability. In a recent study of employment in regions of the Netherlands, Frenken et al. (2007) found a negative relationship between the diversity of regional employment across major industry sectors and the growth of unemployment in those regions.

In one example of a contrary study, Attaran (1986) found no relationship between economic diversity and employment stability across U.S. states. While Hammond and Thompson (2004) reported a negative relationship between economic diversity and employment volatility, they present other findings that question the wisdom of pursuing simplistic diversification policies in order to seek stability. In particular, they found that increased local spending on education and increased educational attainment had a significant, positive impact on employment volatility, likely due in part to the increased mobility that tends to accompany a more educated workforce (Hammond and Thompson, 2004, pp. 537-539). That finding highlights a potential tradeoff between

policies that seek economic stability and policies that seek to improve long-term growth rates in ways that can exacerbate regional employment volatility, such as investments to improve education.

ECONOMIC DIVERSITY AND REGIONAL GROWTH

Presumably, three connections could exist between economic diversity and growth. First, the presence of more industries in a region could create opportunity for growth by providing for support services (e.g., accounting and legal services) that increase the incentive for firms to locate and expand in a region. Second, a greater variety of sub-industries within a larger industry may offer growth opportunities by multiplying the number of possible productive linkages among existing and prospective new firms. For example, a community dominated by the production of an agricultural commodity may enjoy immediate employment growth as the economy diversifies through the addition of industries aimed at processing those commodities. Later, the increased regional income associated with the addition of that processing activity might result in increased employment in local-serving industries such as retail trade and personal services (Watkins, 1963). Third, a diversity of industries in a region may increase growth through innovation by improving "opportunities to interact, copy, modify, and recombine ideas, practices and technologies across industries" (Frenken et al., 2007, p. 687).

The empirical evidence evaluating the relationship between diversity and growth is more mixed than it is for the relationship between diversity and stability. In the words of (Dissart (2003)), "the evidence regarding the relationship between economic diversity and employment growth is less conclusive [and]…research on the relationship between economic diversity and income levels and growth yields contradictory results" (p. 434). For example, Wagner and Deller (1998) found a positive relationship between economic diversity and growth in per capita incomes, while Attaran (1986) found a negative relationship between those variables. Refining the notion of the type of diversity that is important for economic growth, Frenken et al. (2007) reported a significant positive relationship between the diversity of employment by industry within major economic sectors and the rate of employment growth.

INDUSTRIAL SPECIALIZATIONS AND REGIONAL GROWTH AND STABILITY

While economic diversity is often measured in an industry-blind manner, many scholars stress the differential impacts of certain specializations. Employment in durable goods manufacturing—an industry thought to suffer from similar cyclical downturns—has been studied for its relationship to economic stability and considerable attention has been paid to the negative economic impacts of specialization in some extraction-based industries.

For example, Malizia and Ke (1993) and Hammond and Thompson (2004) found that employment in mining reduces economic stability. Freudenburg and Wilson (2002) reviewed approximately 300 studies on this topic, finding that about half reported negative economic impacts from mining employment, with the remainder finding mostly mixed or neutral impacts. Where positive impacts were found, they tended to

relate mining employment to income growth, not regional employment growth. In related work, Auty (2000) reported that, since the 1960s, developing resource-abundant countries have experienced slower growth than have relatively resource-poor countries. Papyrakis and Gerlagh (2007) tested this relationship in a developed country context and found that resource-abundant states in the United States experienced slower growth than less endowed states.

Scholarship on the development of staple-based economies has sought to explain the stunted growth that often accompanies resource-based industries (Watkins, 1977). This literature advances the "staple trap" model for explaining the vicious economic cycle that keeps resource-dependent regions from diversifying. One iteration of this model specifies that, in regions with significant natural resources, industrialization is delayed since significant profits can be enjoyed through resource extraction; less urbanization occurs; a less skilled workforce results; and government intervention is called upon to create jobs and protect industries—reducing the competitiveness of extractive industries in the process (Auty, 2000, 2001).

SUMMARY

Academic research is mixed on the precise nature of the relationships between economic diversity, stability, and growth in employment and incomes in localities and regions. In general, more diverse places tend to be more stable; however, they are not always fast growing. On the one hand, the variation in findings across studies is due to differences in time periods and locations under study, as well as differences in research designs and methods. On the other hand, the lack of consensus in the research literature is more fundamental: the growth and development implications of the level of economic diversity at any given point in a region's economic trajectory are influenced by many factors, including the specific industry mix, trade and other linkages to other regions, the characteristics of the labor force, the broader regional context, and the legacies that existing industries bring to local civic culture and leadership.

APPALACHIAN DIVERSITY: A STATISTICAL PORTRAIT

Traditionally, a diverse local or regional economy is viewed as one which has a varied mix of industries and the absence of dominance of any one industry in terms of employment or income. Researchers have devised a variety of metrics—from simple univariate indices to more complex indicators developed from analogies to portfolio theory—to capture this commonsense perspective and study the relationships between diversity, growth, and stability. However, from the perspective of the economic development professional who is charged with identifying, advocating, and implementing strategies and programs to support local job and wealth creation, what "economic diversity" means is considerably more complex.

DIVERSITY IS *WHAT*, *HOW*, AND *WHY*

In fact, economic diversity is best understood as a multidimensional concept: as a varied mix in what a place *makes* (its private sector firms and other employers); as a varied mix in what a place *does* (the skills and capabilities of its workforce); and as a varied mix in the *reasons* there is demand for—and supply of—the goods and services that a community's employers and workers produce. Goods and services are **what** a local economy produces; the nature of the human capital in a place shapes **how** a local economy is able to produce; and the sources of demand and reasons for supply of goods and services reveal **why** a local economy is able to compete in the global marketplace.

Some places are a better fit for certain economic activities than other places. This notion of comparative advantage has long been part of economists' toolbox for explaining regional differences and the essential lessons can contribute to understanding regional economic diversity. The advantage of a place for particular industries might come from the presence of certain natural resources, the existence of a workforce with the requisite skills to perform a particular activity, or the presence of a finance and business support services network that has long catered to the needs of a particular industry sector. In addition to benefitting incumbent firms, existing industry specializations may grow as those advantages attract new, related firms to the region. Approaching economic diversity from the point of view of development practice often means investigating the factors that make a region attractive or unattractive to particular industries and then analyzing the demand, workforce, technology, and locational characteristics of its economic specializations.

DIVERSITY IS ALSO *WHERE*

Geography influences the diversity of a place in two key senses. First, in an increasingly global economy, the fate of local industries is tied to the fates of distant industries, consumers, and markets. The geography of the economic linkages of a region with other regions may either increase or decrease its effective economic diversity, and concomitantly alter the risk of economic decline or possibilities for opportunity capture and growth. Other things equal, industries that serve few and/or highly volatile markets, or trade with few and/or vulnerable partners, reduce economic diversity and increase the risk of decline.

Second, a specific locality's diversity is contingent on both the economic base of its immediate jurisdiction and the economic base of the larger functional economic area of which it is a part. A given jurisdiction can be nominally non-diverse in its own industry base but be tightly linked to a region with a highly diverse industry base. Likewise, a jurisdiction with a diverse local economic mix may still face considerable risk if it is tied to a broader region that depends on one or a few industries, markets, suppliers, skill sets, or technologies.

MEASURING DIVERSITY

Ideally, a measure of local diversity will take into account the number and distribution of different kinds of economic activities present because more economically diverse places have a larger variety of activities, other things equal. At the same time, the measure will be flexible enough to be applied to a range of variables that capture the different kinds of diversity described above.

One such indicator takes the shares of each type of activity in the local economy, multiplies them by the logarithms of their inverses, and sums up the values.[3] The mathematical details are less important than the result: the measure yields a higher value for places with a broader and more even mix of economic activities, and it registers as zero in the hypothetical case of a location with only a single type of economic activity. The value will be quite low for a community with just a few industries that account for most economic activity. Conversely, the value will be high for a community with more balanced employment across many industries.

Altering the ways *economic activity* is defined creates a suite of indexes reflecting the multiple dimensions of economic diversity described above. The following are four key ways to define economic activity:

1) As employment in different individual industries in the North American Industrial Classification System (NAICS). This produces a measure of *industry-based economic diversity* (which the report refers to as **industrial diversity**).

2) As employment in eleven broad *groups* of industries, with the groups reflecting different functions (or roles) local economies play in their larger regions or the national economy. Examples of such roles are when a place serves as a center for health services delivery (e.g., the location of a regional hospital), as a higher education center (e.g., a college town), as a center for technology-intensive manufacturing (e.g., Silicon Valley), or as a government center (e.g., a state capital city). The result is a measure of *function-based economic diversity* (or **functional diversity**).

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[3] This is called an entropy measure of diversity. A more detailed description of the methods and findings summarized in this section is provided in the companion technical report *Statistical Portrait of Economic Diversity in Appalachia*.

3) As employment by occupation. This produces a measure of *occupation-based economic diversity* (or **occupational diversity**).

4) As employment in twelve broad groups of occupations, with the groups reflecting the different types and levels of knowledge required for success in various professions. This produces a measure of *knowledge-based economic diversity* (or **knowledge diversity**).

Calculating the four basic metrics for counties as well as the multi-county regional economies in which they sit offers a rich picture of local diversity that can inform economic development practice, particularly when benchmarked against appropriate comparison counties and regions and supplemented with additional data on the specific industries and occupations present (and absent) in the place. The notion of appropriate comparison is important. Very large places—urban counties and metropolitan areas— clearly will be more diverse than very small places, simply because the former can support a much larger variety of economic activities. Accordingly, the analysis below describes Appalachian diversity for urban versus rural places.

APPLYING THE MEASURES

Measures of industrial, functional, occupational, and knowledge diversity were calculated for U.S. counties and a variety of other geographies using detailed employment data for 1999, 2009, and 2012.[4] *Industrial diversity* is measured for the 1,000+ six-digit NAICS industries. *Occupational diversity* is measured for 96 occupational groups defined in the 2000 Standard Occupational Classification (SOC) system.[5] *Functional* and *knowledge* diversity are calculated by first grouping industries and occupations into relevant clusters and then recalculating the measures. In the case of functional diversity, the 1,000+ NAICS industries were grouped into the eleven clusters reported in Table A1, with each cluster representing a distinct and broad type of economic activity that tends to concentrate in particular locations and which represents a major economic function or role (manufacturing center, government center, etc.). In the case of knowledge diversity, the 96 occupations were grouped into the twelve clusters reported in Table A2, with each cluster constituting occupations that require the same types of knowledge of the workers that hold them.

Counties are the basic units of analysis, with county diversity indexes reported as standardized scores or qualitative rankings based on the relationship of individual measures to average diversity levels. To standardize the diversity measures, each county's raw diversity score was divided by the average score across all U.S. counties, resulting in a standardized scale where 1.0 represents the average and values greater

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[4] Sources of the employment data are county-level estimates prepared by Economic Modeling Specialists International (EMSI) for 2009 and 2012, and *County Business Patterns* data for 1999 that were suppression-adjusted following the methodology in Isserman and Westervelt (2006).

[5] Estimates of employment by occupation in each county were developed by assuming that national average industry staffing patterns (as revealed in the Bureau of Labor Statistics' *National Staffing Patterns Matrix*) hold in each county.

than 1.0 represent above average diversity. Diversity scores were then classified into one of six categories ranging from "Very Low" to "Very High," according to nearness to the mean diversity score and the overall distribution of diversity values. For example, a diversity score located more than two standard deviations above the mean value is a "Very High" level of diversity while a score less than one standard deviation below the mean is a "Below Average" score.

Diversity indexes were generated for all U.S. counties; for the Appalachian region as a whole; for five sub-regions designated by the Appalachian Regional Commission (see Figure 2; and for U.S. Census Regions. Diversity levels are compared for counties of four types—Urban, Mixed Urban, Mixed Rural, or Rural—defined by Isserman (2005). The Isserman urban/rural typology (see Figure 5) takes into account the population density of a county and the relative size of urban and rural areas within it. Each county's unique region was identified using 2006-2010 commuting data from the American Community Survey; for a given county, nearby counties are defined as part of its labor market area if they are either senders or receivers of at least five percent of the core county's workforce.

ECONOMIC DIVERSITY ACROSS THE U.S. AND APPALACHIA

In 2012, *industrial* diversity in U.S. counties ranged from a minimum in Chattahoochee County, GA—where the measure was only 23 percent of the average level—to a maximum in Orange County, CA—where the measure was nearly 25 percent over the average value. Between those extremes, more than half of all U.S. counties have a level of industrial diversity no more than ten percent above or below the national average. Although counties with above average industrial diversity are more common than those with below average diversity, there are some extremely low diversity counties in the country.

Table 1 summarizes industrial, functional, occupational, and knowledge diversity rates by U.S. Census region and Appalachian sub-region. There are minor regional differences in economic diversity of all types. On average, counties in the U.S. Northeast tend to be

Table 1: Economic Diversity by Region, 2012

		Industrial		Functional		Occupational		Knowledge	
Index benchmarked to overall U.S. average									
		Lowest	Average	Lowest	Average	Lowest	Average	Lowest	Average
Region	Counties	county	county	county	county	county	county	county	county
United States	3,142	0.23	1.00	0.16	1.00	0.68	1.00	0.77	1.00
Midwest	1,055	0.41	0.99	0.37	0.99	0.68	0.99	0.77	1.00
Northeast	217	0.79	1.11	0.80	1.10	0.95	1.02	0.94	1.02
South	1,423	0.23	0.99	0.29	0.99	0.76	1.00	0.82	1.00
West	447	0.26	0.99	0.16	0.98	0.77	1.00	0.83	1.00
ARC counties	420	0.74	1.02	0.62	1.03	0.89	1.01	0.90	1.01
Northern	86	0.79	1.08	0.78	1.08	0.95	1.02	0.95	1.02
North Central	63	0.77	0.98	0.67	1.03	0.95	1.01	0.95	1.01
Central	82	0.74	0.95	0.74	0.99	0.89	0.99	0.95	1.00
South Central	85	0.75	1.03	0.62	1.05	0.95	1.01	0.90	1.01
Southern	104	0.82	1.03	0.71	1.03	0.94	1.01	0.94	1.00

more diverse, reflecting the higher overall urban density of that region of the country. The least diverse counties in the U.S. tend to be found in the nation's highly agricultural and rural mid-section, the Great Plains, central Appalachia, and selected mountain and southwestern states (see Figure 1).

Figure 1: U.S. Industrial Diversity, 2012

Industry-based Economic Diversity in U.S. Counties, 2012.
Data Source: Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012.
Notes: 1. 6-digit NAICS aggregation used for Entropy measure 2. Entropy measures categorized based on distance from mean value as measured by standard deviations (Z)
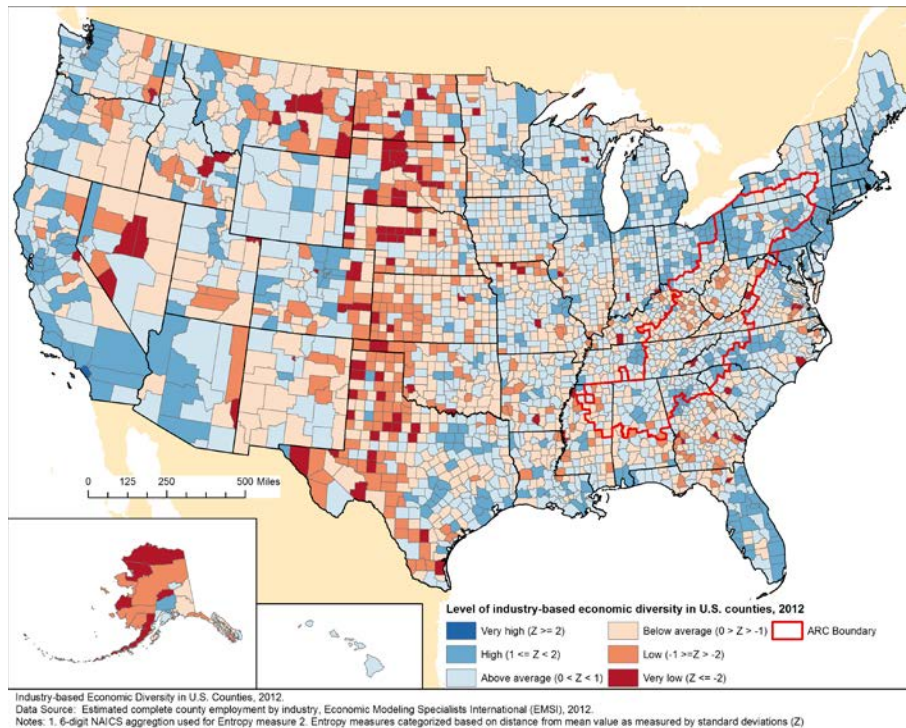
The 420 counties in Appalachia as defined by the Appalachian Regional Commission are, on average, slightly more diverse than the U.S. average. However, there are important sub-regional differences. Figure 2 maps the sub-regions and Figure 3 plots the distribution of each type of diversity by sub-region, showing maximum and minimum values and the range of values in the middle 50 percent of the distribution. The wider the box for a given sub-region in Figure 3, the greater is the range of diversity across those counties that are 25 percent above and below the national average (the middle half of counties). Looking at the top panel in the figure, most counties in the Northern and Southern Appalachian sub-regions have above average levels of industrial diversity, while most counties in the Central sub-region have below average levels of industrial diversity.

Several findings are evident from a scan of the four panels in Figure 3. First, diversity levels vary much more for industrial and functional diversity than for occupational and knowledge diversity. In Appalachia, occupational and knowledge diversity tend to be very similar and are generally near the national average. At the same time, there is some variation, with the Central sub-region posting the lowest levels of occupational and knowledge diversity, consistent with its below average industrial and functional diversity. Second, Appalachia generally fares well in its level of functional diversity when

Figure 2: Appalachian Sub-regions
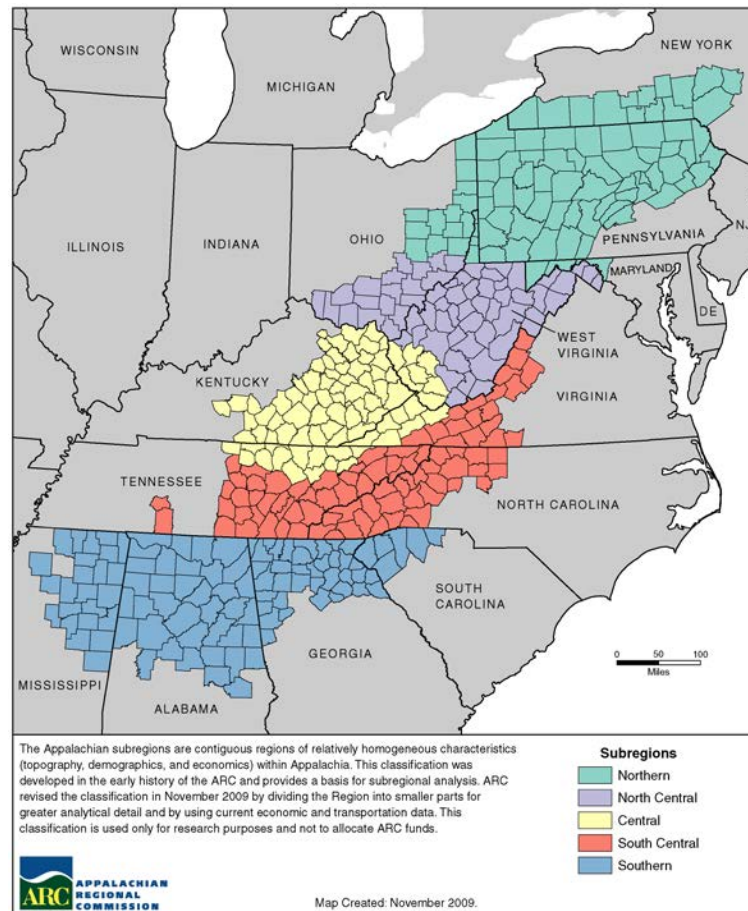
compared against the U.S. average benchmark. That is because Appalachia is relatively more manufacturing-intensive than many U.S. counties, particularly those in the sparsely populated national mid-section, and fewer counties in Appalachia are deeply specialized in particular functions like government services, health services, tourism, and the like. Third, some counties in Appalachia post very low levels of industrial and functional diversity, even if the region as a whole is broadly more diverse than the U.S. average. Such counties are usually heavily dependent on extraction activities—examples are Boone, Calhoun, and Doddridge counties in West Virginia—and economic development planning to counter the potential negatives associated with reliance on just one or a few sectors is particularly critical.

Figure 3: Distribution of Diversity, by Appalachian Region
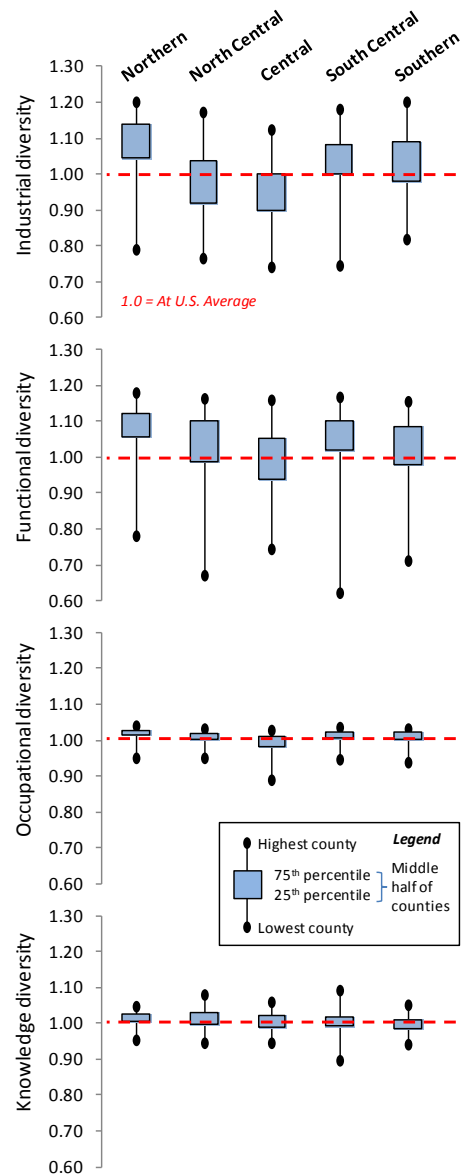
URBANIZATION AND SPECIALIZATION

Very broadly, the more urban the county, the more economically diverse it tends to be. Table 2 and Figure 4 summarize diversity levels for counties of four types in Appalachia: urban, mixed urban, mixed rural, and rural. Figure 5 maps county types in the region. Industrial and occupational diversity decline the more rural the county. Functional diversity tends to be higher in mixed urban and mixed rural counties. Mixed urban/rural counties are usually either the suburban counties of metropolitan regions or they are home to the modestly urbanized centers of sparsely populated areas. Hence, they are neither highly specialized in a few urban functions—such as advanced business services—as can be common in the core counties of metropolitan areas, nor do they tend to be dependent on agricultural or extractive industries, as is typical of many highly rural counties.

Table 2: Economic Diversity by County Character, 2012

		Industrial		Functional		Occupational		Knowledge	
		Lowest	Average	Lowest	Average	Lowest	Average	Lowest	Average
Region	Counties	county	county	county	county	county	county	county	county
United States	3,142	0.23	1.00	0.16	1.00	0.68	1.00	0.77	1.00
ARC counties	420	0.74	1.02	0.62	1.03	0.89	1.01	0.90	1.01
Urban	5	1.14	1.17	0.90	0.99	1.02	1.03	1.00	1.02
Mixed Urban	29	0.95	1.13	0.89	1.06	0.95	1.02	0.98	1.01
Mixed Rural	146	0.89	1.07	0.81	1.08	0.94	1.02	0.90	1.01
Rural	240	0.74	0.97	0.62	1.01	0.89	1.00	0.94	1.01

Index benchmarked to overall U.S. average

Note: County character defined using U.S. Census 2010 data.

These patterns suggest that a more appropriate benchmark for indexing diversity is the national average for counties of similar levels of urbanization or "character" (urban counties base-lined to the U.S. urban average, mixed urban counties base-lined to the U.S. to mixed urban average, and so on). Tables 3 and 4 and Figures 6 and 7 summarize diversity rates and distributions with the indexes for each county benchmarked in this manner. The general picture is one of variation across Appalachia, with higher diversity in the more industrialized Northern and South Central sub-regions and lower diversity in the Central and North Central sub-regions. Overall, once one controls for the large number of rural and mixed rural counties in Appalachia, most of Appalachia is more diverse than the national average, regardless of diversity type (industrial, functional, occupational, knowledge) or sub-region. This is clearest in Figure 6, at least with respect to industrial and functional diversity. For example, roughly three-quarters of rural counties in Appalachia are more industrially and functionally diverse than their rural counterparts nationwide.

  Certainly regional comparative economic advantages make certain locations more suitable for activities linked to particular economic functions. For example, the presence of significant mineral resources and forest stands make some regions more suitable as a location for natural resources-based processing industries. While significant employment in natural resources industries is not synonymous with a lack of functional or industrial diversity, related factors such as the topography associated with mineral

Figure 4: Distribution of Diversity, by Appalachian County Character
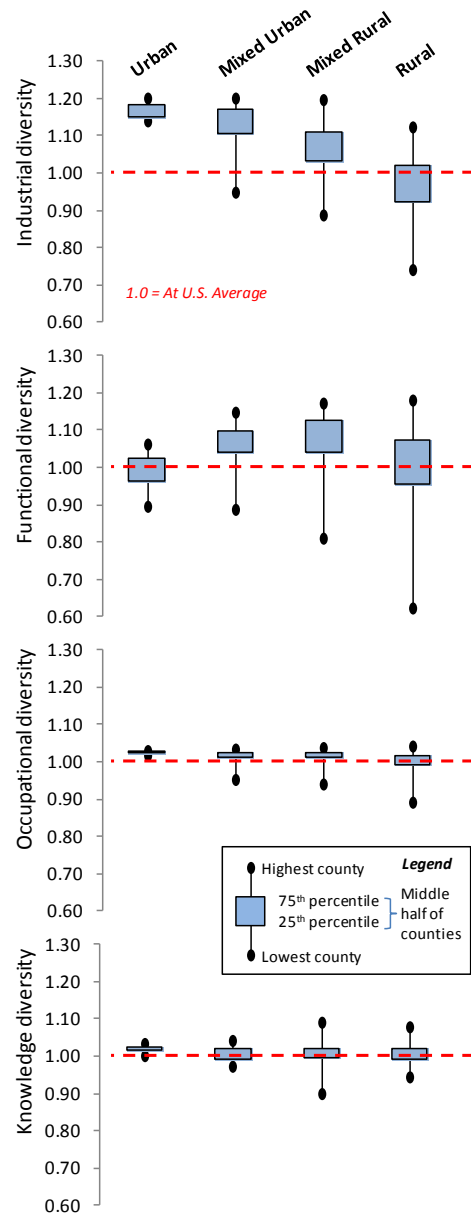
resource deposits and the large land areas that agricultural and forestry activities consume may inhibit attracting and sustaining a diverse set of industries or functions in such places.

In fact, economic mix of the least diverse regions in Appalachia tend be oriented toward agricultural and resource extraction activities. Table 5 summarizes functional

Figure 5: Rural-Urban County Types in Appalachia

Rural/Urban County Character in Appalachia, 2010.
Data sources: U.S. Census 2010 data on total population, population density, and urban and rural population by county
Note: Rural/Urban typology adopted from Isserman (2005).
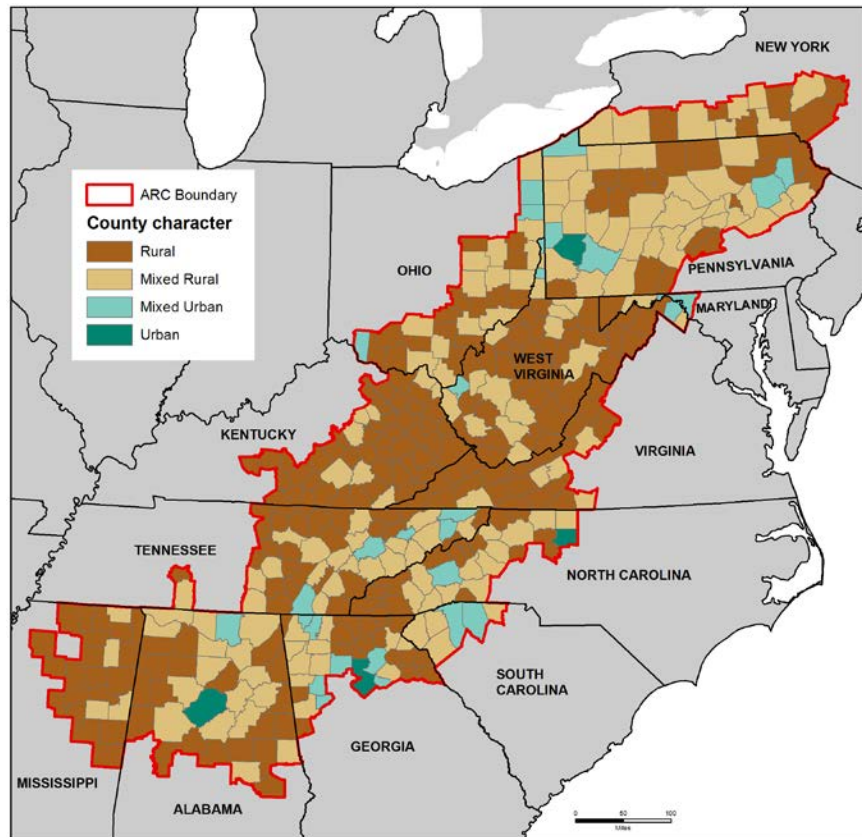
specializations in the region.[6] Just over 40 percent of Appalachian counties are specialized in agriculture and resource extraction; about one-third are specialized in capital-intensive manufacturing. The least common specializations in Appalachia are knowledge-intensive business services and corporate management and administration.

The agriculture and resource extraction complex of industries is a specialization in nearly three-quarters (72 percent) of the 82 counties of the comparatively low diversity Central sub-region, with capital-intensive manufacturing and healthcare the next most prevalent—but yet relatively uncommon—specializations. In the highest diversity Northern sub-region, the mix of specializations is much broader, with agriculture and resource extraction, capital-intensive manufacturing, healthcare, and higher education all relatively common specializations. Likewise, multiple specializations are relatively typical in the Southern, South Central, and North Central sub-regions.

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[6] Details on the identification of functional specializations by county are available in *A Statistical Portrait of Economic Diversity in Appalachia*, available at http://economicdiversityinappalachia.creconline.org/Report/.

Table 3: Economic Diversity by Region, 2012

Index benchmarked U.S. urban, mixed urban, mixed rural, & rural averages

Region	Counties	Industrial		Functional		Occupational		Knowledge	
		Lowest county	Average county	Lowest county	Average county	Lowest county	Average county	Lowest county	Average county
United States	3,142	0.24	1.00	0.17	1.00	0.68	1.00	0.77	1.00
Midwest	1,055	0.44	1.00	0.39	1.00	0.68	1.00	0.77	1.00
Northeast	217	0.85	1.05	0.74	1.06	0.97	1.01	0.94	1.02
South	1,423	0.24	0.99	0.31	1.00	0.75	1.00	0.82	1.00
West	447	0.28	0.99	0.17	0.98	0.79	0.99	0.83	1.00
ARC counties	420	0.79	1.02	0.67	1.03	0.90	1.01	0.90	1.01
Northern	86	0.84	1.05	0.86	1.05	0.97	1.01	0.95	1.02
North Central	63	0.82	1.00	0.67	1.04	0.97	1.01	0.95	1.01
Central	82	0.79	0.99	0.71	1.01	0.90	1.00	0.95	1.00
South Central	85	0.80	1.03	0.79	1.04	0.95	1.01	0.90	1.01
Southern	104	0.83	1.03	0.71	1.02	0.93	1.01	0.94	1.00

Table 4: Economic Diversity by County Character, 2012

Index benchmarked U.S. urban, mixed urban, mixed rural, & rural averages

Region	Counties	Industrial		Functional		Occupational		Knowledge	
		Lowest county	Average county	Lowest county	Average county	Lowest county	Average county	Lowest county	Average county
United States	3,142	0.24	1.00	0.17	1.00	0.68	1.00	0.77	1.00
ARC counties	420	0.79	1.02	0.67	1.03	0.90	1.01	0.90	1.01
Urban	5	0.99	1.02	0.95	1.01	0.99	1.00	1.00	1.02
Mixed Urban	29	0.84	1.00	0.82	1.00	0.94	1.00	0.98	1.01
Mixed Rural	146	0.83	1.01	0.73	1.01	0.93	1.00	0.90	1.01
Rural	240	0.79	1.03	0.67	1.05	0.90	1.01	0.94	1.01

Note: County character defined using U.S. Census 2010 data.

Figure 6: Distribution of diversity, by Appalachian region (Index benchmarked to county character)
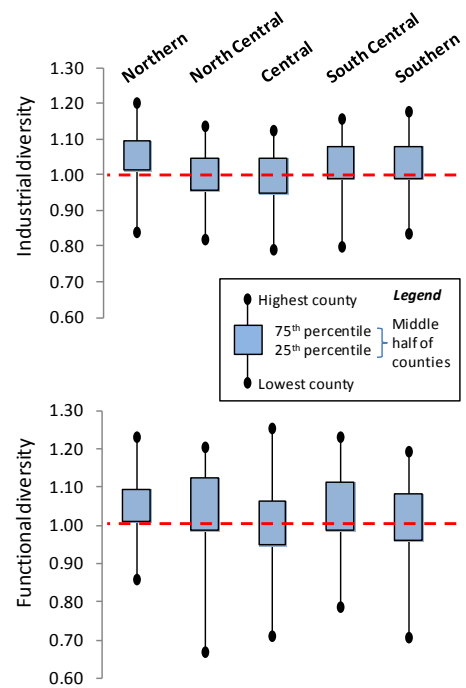
Figure 7: Distribution of diversity, by Appalachian County Character (Index benchmarked to county character)
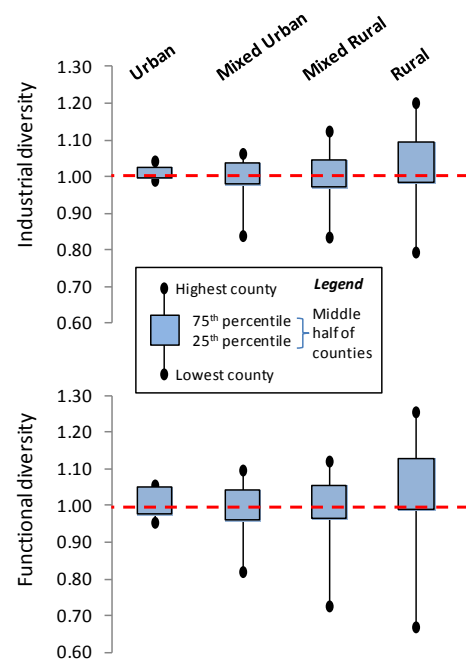
Table 5: Percent of Appalachian Counties with Particular Functional Specializations, 2012

| Functional specialization | Total | Appalachian Sub-region | | | | |
		Northern	North Central	Central	South Central	Southern
Number of counties	420	86	63	82	85	104
Agriculture & resource extraction	40.2	27.9	61.9	72.0	31.8	19.2
Capital-intensive manufacturing	32.9	34.9	4.8	14.6	42.4	54.8
Healthcare	5.7	9.3	6.4	6.1	5.9	1.9
Higher education	5.0	8.1	3.2	2.4	7.1	3.9
Engineering-intensive manufacturing	4.1	4.7	4.8	1.2	5.9	3.9
Government	3.8	4.7	11.1	3.7	0.0	1.9
Distributive services	3.6	4.7	3.2	0.0	1.2	7.7
Finance, insurance & real estate	1.9	1.2	1.6	0.0	0.0	5.8
Media, entertainment & recreation	1.9	3.5	3.2	0.0	3.5	0.0
Knowledge-intensive business services	0.7	0.0	0.0	0.0	2.4	1.0
Corporate management & administration	0.2	1.2	0.0	0.0	0.0	0.0

DIVERSITY AND ECONOMIC OUTCOMES

The Appalachian Regional Commission categorizes counties into one of five categories based on their relative economic status: distressed, at-risk, transitional, competitive, or attainment.[7] Economically distressed counties in Appalachia have the lowest levels of industrial diversity among the five county types (see Table 6). Yet their level of functional diversity is relatively high in comparison to more prosperous counties. One interpretation of this paradox is that the relatively even spread of employment across eleven broad functional economic categories in distressed counties reflects the inability of such places to nurture competitive specializations. In counties that demonstrate more robust economic outcomes, the characteristics that contribute to their economic vitality may make them attractive for the growth of linked industries and industry clusters; the result is often higher industrial diversity given the presence of more industries but lower functional diversity given the presence of several specializations among those industries. This suggests that economic diversity more broadly is not the absence of specializations, but the presence of multiple, competitive specializations or clusters.

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[7] See http://www.arc.gov/appalachian_region/CountyEconomicStatusandDistressedAreasinAppalachia.asp for details on the Appalachian Regional Commission's economic status designations

Table 6: Diversity by County Economic Status, Appalachia, 2012

Level of Economic Diversity	Total	Economic Status				
		Distressed	At-Risk	Transitional	Competitive	Attainment
Number of counties	420	98	99	208	12	3
Industrial Diversity						
% High diversity	15.0	3.1	9.1	22.6	25.0	33.3
% Above average diversity	47.6	40.8	51.5	49.5	41.7	33.3
% Below average diversity	30.5	46.9	29.3	23.6	25.0	33.3
% Low diversity	6.0	9.2	8.1	3.4	8.3	0.0
% Very low diversity	1.0	0.0	2.0	1.0	0.0	0.0
Functional Diversity						
% High diversity	15.5	10.2	19.2	16.8	8.3	0.0
% Above average diversity	55.2	50.0	51.5	61.1	41.7	0.0
% Below average diversity	22.1	31.6	18.2	18.3	33.3	66.7
% Low diversity	6.2	7.1	8.1	3.9	16.7	33.3
% Very low diversity	1.0	1.0	3.0	0.0	0.0	0.0

The occupational mix of Appalachian counties also tends to be dominated by skilled and semi-skilled labor, whereas competitive and attainment counties have a greater proportion of higher skilled service workers such as medical science and health professionals. It is also the case that business establishments in Appalachia's distressed and at-risk counties tend to be larger than establishments in more prosperous counties. The dominance of a few large businesses in a region may make the place more vulnerable to periodic economic downturns while also reducing the supply of entrepreneurs.[8]

There is little evidence that diversity can be linked to economic growth. In fact, some regions have experienced the opposite situation: diversity associated with economic decline. Table 7 compares employment and industrial diversity change for the periods 1999-2009 and 2009-2012, for the U.S. as a whole and Appalachia. Counties are grouped into four categories, including those which: experienced a significant increase in industrial diversity (i.e., changes in diversity more than one standard deviation above average); a modest increase in diversity; a modest decrease in diversity; a significant decrease in diversity (i.e., a reduction in diversity more than one standard deviation below average).

Where significant changes to diversity did occur, *decreases* in diversity tended to be associated with significant increases in employment levels, while increases in diversity tended to be associated with either decreases in employment levels or relatively smaller employment increases. For example, the 31 counties in Appalachia that experienced a significant decrease in industrial diversity between 2009 and 2012 had an average increase in employment of 5.7 percent. Over the same time period, the 27 Appalachian counties that experienced a significant increase in industrial diversity had an average

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[8] Detailed statistics on counties' occupational mix and establishment size trends are available in *A Statistical Portrait of Economic Diversity in Appalachia*, available at http://economicdiversityinappalachia.creconline.org/Report/.

Table 7: Industrial Diversity and Employment Growth

Change in industrial diversity	1999 - 2009			2009 - 2012		
	Number of counties	Percent change in employment	Percent change in diversity	Number of counties	Percent change in employment	Percent change in diversity
Significant increase (diversification)						
U.S. counties	162	43.0	108.0	219	-0.8	3.0
ARC counties	21	16.4	96.3	27	-3.0	2.7
Modest increase (diversification)						
U.S. counties	1,460	33.7	13.7	944	1.5	0.5
ARC counties	174	19.4	12.5	131	1.6	0.5
Modest decrease (specialization)						
U.S. counties	1,432	46.0	-10.8	1,725	2.8	-0.7
ARC counties	225	25.4	-9.8	239	2.3	-0.8
Significant decrease (specialization)						
U.S. counties	80	315.5	-43.7	254	8.7	-3.5
ARC counties	8	88.2	-36.7	31	5.7	-3.2

decrease in employment of 3 percent. In the case of changes between 1999 and 2009, counties that experienced increases in diversity averaged significantly smaller rates of employment increase than did counties that experienced decreases in diversity.[9]

DIVERSITY AND GEOGRAPHY

For most counties, their economic base depends on the economic activity that takes place in nearby jurisdictions. Workers commute to job centers in adjacent counties, households shop and purchase services outside the county, and firms draw workers from neighboring communities. The average Appalachian county loses more workers via out-commuting than it gains through in-commuting. Comparing own-county industry-based diversity against commuting shed diversity indicates that more diverse counties attract workers from surrounding counties. In all regions of Appalachia, the average ratios of county industrial and functional diversity to regional (commuting shed) industrial and functional diversity are below 1.0 (see Table 8). Regions, by virtue of their larger scale, are generally more diverse. Any particular county's diversity must be viewed in the context of its labor market area.

Figure 8 maps the functional specializations of county commuting sheds across the Appalachian states. While an individual county's functional specialization only accounts for employment within that county, the functional specialization of a county's

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[9] One of the more notable recent examples of diversification and decline occurred in Clinton County, Ohio, where DHL closed a major distribution hub that employed 7,000 people. The loss contributed to one of the largest county-level increases in industrial diversity recorded between 2009 and 2012. Within Appalachia, a large increase in diversity occurred in Whitfield County, Georgia where the carpet manufacturing industry continued to shed jobs, reducing the specialization and leaving local serving industries with no replacement for the region's most significant exporting industry.

Table 8: Ratio of County to Commuting Shed Economic Diversity by Region, 2012

Region	Counties	Industrial		Functional	
		Lowest county	Average county	Lowest county	Average county
United States	3,142	0.21	0.90	0.19	0.91
Midwest	1,055	0.39	0.90	0.33	0.91
Northeast	217	0.68	0.95	0.68	0.97
South	1,423	0.21	0.89	0.25	0.90
West	447	0.26	0.92	0.19	0.93
ARC counties	428	0.68	0.90	0.58	0.92
Northern	86	0.68	0.93	0.71	0.94
North Central	63	0.76	0.89	0.58	0.91
Central	83	0.68	0.87	0.63	0.87
South Central	92	0.74	0.90	0.67	0.92
Southern	104	0.72	0.91	0.65	0.93

commuting shed accounts for employment in all those counties identified as that county's major commuting partners. Neighboring counties are much more likely to share the same commuting shed functional specialization than they are to share the same functional specialization for employment within their own boundaries. For example, Pennsylvania State University and other colleges and universities in central Pennsylvania create an identifiable hub of higher education activity at the commuting shed level that tends to be obscured when functional specializations are investigated on a county-by-county basis. Similarly, the prevalence of finance, insurance and real estate and knowledge-intensive business services specializations demonstrate the often far-flung impacts of cities—such as Atlanta, Birmingham, New York City, and Philadelphia—on their surrounding regions. Similarly, the significant number of corporate management and administration specializations in southwestern Ohio and northern Kentucky demonstrate the impact of Cincinnati's industry mix on the region. The commuting shed perspective on functional specializations also suggests that many counties in Appalachia rely on economic activities that occur outside ARC's official regional boundary. For example, New York City is part of the commuting shed for Monroe County in northeast Pennsylvania. The knowledge-intensive business services specializations emerging from Atlanta in northwestern Georgia seem to demonstrate a similar phenomenon of significant activity crossing the ARC boundary.

Figure 8: Functional Specializations in Appalachian Commuter Sheds
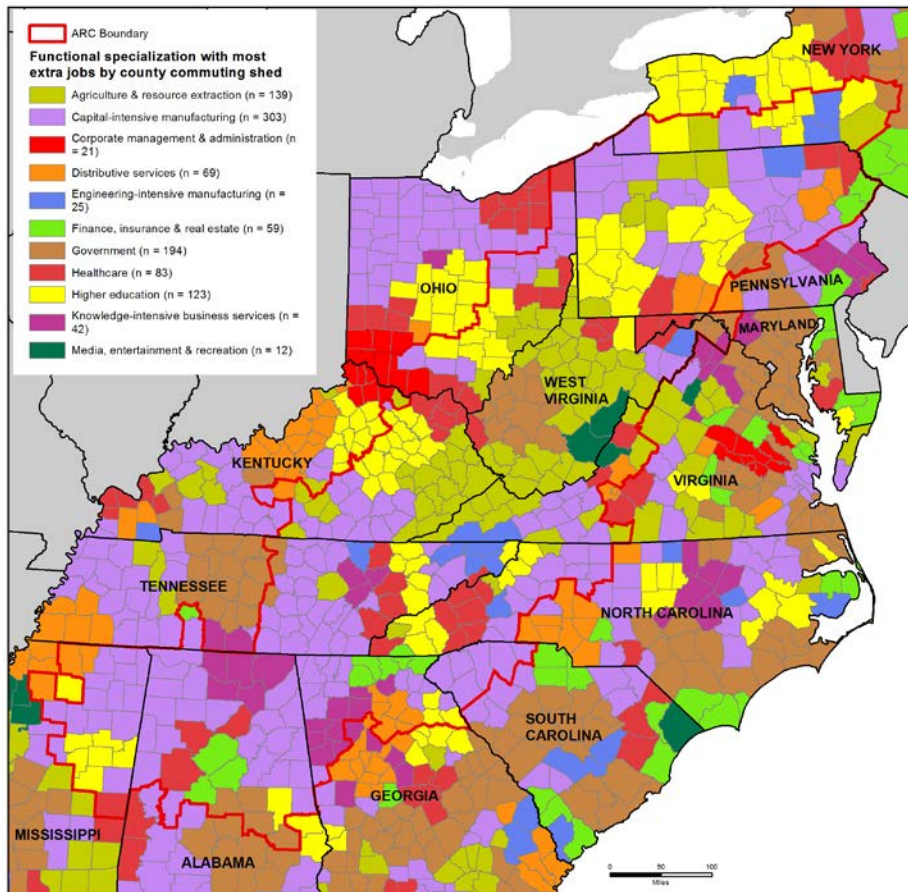
Functional Specializations in Appalachia's Commuting Sheds, 2012. Data Sources: 1. Estimated complete county employment by industry, EMSI, 2012 2. U.S. Census American Community Survey, 2006-2010 Note: Extra jobs equivalent to number of jobs in functional category for a commuting shed minus expected jobs based on the share of total US employment accounted for by this category (see Appendix)

ILLUSTRATIVE EXAMPLES OF DIVERSITY IN CONTEXT

Brief explanations of the examples listed in Table 9 shed further light on the nature of economic diversity across a sample of Appalachian counties[10]. Located in metropolitan Atlanta, Cherokee County, Georgia has a high level of industrial diversity and smaller than average establishment sizes. Reflecting a common pattern in many rural and exurban counties, the local school system represents the county's largest employer with many small establishments in retail trade and finance, insurance and real estate sectors. Cherokee depends heavily on the surrounding region for economic opportunities, with more than 40,000 resident workers commuting outside the county for work. Garrett County, Maryland—another county with a high level of industrial diversity—has above average levels of employment in agriculture and resource extraction, capital-intensive manufacturing, and recreation-related industries tied to the nearby Pittsburgh and Washington metropolitan areas. As with Cherokee, Garrett has a diverse set of smaller-than-average sized establishments that contribute to its industrial diversity.

Table 9: Illustrative Examples—Appalachian Economic Diversity and Outcomes, 2012

Level of industry-based economic diversity	County characteristics				
	County character (2010)	Economic status	Level of estimated average establishment size	Functional specialization with most extra jobs	Net commuting flow (2006-2010)
High					
Cherokee, GA	Mixed Urban	Competitive	Below average	Finance, insurance & real estate	-42,031
Garrett, MD	Rural	Transitional	Below average	Agriculture & resource extraction	-357
Below average					
Montour, PA	Rural	Competitive	Very large	Corporate management & administration	5,081
Martin, KY	Rural	Distressed	Above average	Agriculture & resource extraction	285
Low					
Centre, PA	Rural	Transitional	Large	Higher education	7,290
McDowell, WV	Rural	Distressed	Above average	Agriculture & resource extraction	481

Montour County, Pennsylvania is a competitive county with below average industrial diversity. There is a large concentration of employment connected to the corporate headquarters of a large, regional medical center, and a large proportion of residents' earnings are attributable to relatively high wage corporate and healthcare sector jobs. In

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[10] Extra jobs represent the difference between actual employment in a functional category and expected employment in a functional category if this category accounted for the same percentage of county employment as it did for U.S. employment. See the Appendix for more details on extra jobs and the assignment of functional specializations.

Martin County, Kentucky—a distressed county—jobs associated with coal mining and a federal penitentiary accounts for approximately one quarter of total employment.

Both Centre County, Pennsylvania and McDowell County, West Virginia have low levels of industrial diversity, larger than average establishment sizes, and an identifiable, dominant industry. Centre is home to the main campus of Pennsylvania State University, which accounts for more than 24,000 employees and is a significant regional employment draw. McDowell contains significant employment in the mining industry that pays higher wages than many other jobs in the county. This concentration of earnings in McDowell likely contributes to the county's distressed status, with those not employed in mining earning relatively low wages. In Centre, on the other hand, earnings are distributed relatively more evenly and the county enjoys transitional status.

DIVERSITY AND DEVELOPMENT STRATEGY IN APPALACHIA

Mines and mills dominated the economies of many Appalachian communities for years. The dependence that many communities had on these dominant industries and employers left many communities highly vulnerable to economic shocks. When those industries declined, communities had few options for charting a new economic trajectory. In light of this, many communities now identify a more diversified economy as a key economic development goal. In doing so, they hope to better position themselves to either mitigate economic risk or leverage new economic growth opportunities. Much like investors seeking a diversified portfolio, communities feel more secure when they can rely on a variety of employment and wealth generators.

However, demonstrating a clear connection between increased diversity and specific diversity strategies can prove difficult. To understand this issue in a more in-depth manner, the project team sought to identify the key features of strategies in diverse communities, or communities that have experienced increases in diversity and economic growth. This research included site visits and telephone interviews with key stakeholders in an effort to develop case studies about ten counties located in different areas of the Appalachian region. This section summarizes the findings from the case study research.[11] First, the report provides a brief review of the process used to select the ten case studies. Then, the report summarizes the findings from that research as well as the common themes and trends that emerged from the case studies.

CASE STUDY SELECTION

The project team began by using measures of diversity, growth, and economic distress, as defined earlier in this report, to identify a short list of potential case study counties. As part of the effort to narrow the candidates, researchers examined the economies of these counties and conducted preliminary research about the economic development policies that different counties employed. This provided insights about whether the county or its broader region had identified economic diversity as an issue, or if the county or region were involved in initiatives to strengthen and diversify the county or region's economic base. The subsequent selection criteria considered the following factors:

- Whether the county or its surrounding region had a current economic development strategy;
- Whether the county leaders were engaged in some kind of meaningful economic development efforts;
- Whether the county was participating in current multi-county, regional initiatives.

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[11] A more detailed description of the case studies, and the methods used to select the cases, can be found in the companion technical report *Case Studies in Economic Diversification*.

Based on this preliminary research and consultation with ARC staff, the research team selected ten counties for case studies. It is important to note that these case studies are not necessarily examples of best practices; some case studies feature counties with very high levels of economic diversity while others have very low diversity. The ultimate goal was to select a set of case studies that spoke to a wide range of diversity-related issues. The project team conducted the case study research through a series of site visits and phone interviews conducted in April and May of 2013. During the course of these case studies, the project team spoke with numerous stakeholders including local economic development and planning organizations, educational institutions, community groups, county and local government, and representatives from the business community. These stakeholders provided information about their community's economic development activities, and the role that economic diversity goals played in motivating those activities.

CASE STUDY FINDINGS

The ten case study counties evidence a number of diversity-related issues. As noted above, the research team sought counties that had diverse economies, were lacking diverse economies, or had a recent change in diversity. The team also sought to include cases from both urban and rural counties throughout the ARC region. Additionally, the case studies represented a mix of functional specializations, so the selected counties had economies driven by different industries, including manufacturing, education, or extractive industries, as well as some places with no explicit dominant specialization. Listed below are the selected case study counties:

- Tioga County, NY
- Lycoming County, PA
- Garrett County, MD
- Upshur County, WV
- Knott County, KY
- Washington County, VA
- Rutherford County, NC
- Pickens County, SC
- Lauderdale County, AL
- Oktibbeha County, MS

The case analyses focus primarily upon how each community approaches the issue of diversity in economic development strategy and policy, as well as the actions taken to achieve greater economic diversification. The cases also highlight many key issues or lessons learned from each county's individual experience.

TIOGA COUNTY, NEW YORK

Tioga County, NY is a rural county in New York State's Southern Tier. Its largest community is Owego, NY, but given that it is situated between Binghamton, Ithaca, and Elmira, it largely serves as a bedroom community to those relatively larger metro areas. The county has a long history of relying heavily on single, large employers beginning

with Endicott Johnson, then IBM, and now Lockheed Martin. This dependence has created both great opportunity and great risk. Lockheed Martin recently employed as many as 4,000 employees in relatively high-paying jobs, but lost nearly 1,600 jobs due to the loss of the Marine One Presidential Helicopter contract. These job losses highlighted the extent to which the county relies upon this one employer, and in a sense shows the county's crisis of diversity.

The future of Lockheed Martin's facility lies with decisions being made by Congress and Lockheed Martin's corporate leadership. Shrinking defense budgets have forced Lockheed Martin to make a number of strategic corporate site location decisions in recent years. Local leaders have very limited influence on these external factors. In essence, the locus of control over activities that could significantly alter the region's economic trajectory is found outside of the county and outside of the region.

In spite of these forces, local policymakers and practitioners have identified local strategies to advance Tioga County's diversification and economic development goals. Many of these efforts rely on practitioners operating in a collaborative manner. Tioga is a small county and lacks the resources to pursue extensive business recruitment and attraction—activities that might not necessarily be appropriate for a small, rural county anyway. Instead, county economic development stakeholders focus on strengthening relationships both locally and regionally. Continuous efforts are made to build cohesion among local service providers (e.g., Tioga County Department of Economic Development and Planning, the Tioga County Industrial Development Agency, the local Chambers of Commerce, or the Small Business Development Center at nearby Binghamton University in Broome County) so that businesses receive seamless delivery of services. Building these connections has also helped to support entrepreneurial efforts. For instance, potential entrepreneurs can receive mentoring from SCORE (Service Corps of Retired Executives) representatives.

Local leaders have also made efforts to leverage broader regional connections. These opportunities have come through regional information sharing with stakeholders in Broome County (Binghamton) to the east and Chemung County (Elmira) to the west. As a result, local officials feel that they have avoided wasteful beggar-thy-neighbor activities by not providing incentives to companies that are staying in the region, but just changing their address. Tioga County has further applied a regional lens by looking at opportunities available in neighboring Pennsylvania. While New York State currently bans the fractured drilling ("fracking") for natural gas, Tioga County is home to about a dozen support companies that are involved in Marcellus Shale drilling in Pennsylvania counties immediately to the south. Tioga has also embraced its role as a bedroom community and has invested in making itself an appealing place for workers in neighboring counties.

The challenge with many of these more locally-based diversification efforts is that they tend to represent approaches that are far more incremental in nature than the problems they are meant to address. Ten or twenty new entrepreneurs per year, for instance, cannot outweigh the loss of 1,600 good paying manufacturing jobs at Lockheed Martin. This conundrum is a real issue facing many places like Tioga County

that rely heavily on one large employer or industry, as those economic pillars cannot be easily replaced.

LYCOMING COUNTY, PENNSYLVANIA

Lycoming County is home to 117,000 residents, with Williamsport being its largest community. Its economic base has traditionally focused around activities such as lumber production and manufacturing. More recently Lycoming County and Williamsport, PA have become a major activity center for the natural gas industry. Direct jobs in natural gas have grown from 140 in 2009 to over 1,800 in 2012.[12] This growth has been evident not only in industries that directly support natural gas, such as trucking, but also more indirectly in industries such as retail and accommodations. Consequently, the creation of a new regional economic specialization (natural gas) has helped to diversify the existing economic base.

Lycoming County took advantage of the Marcellus Shale boom not only because of its proximity to this natural resource, but also because it made investments in several ready-to-use industrial sites that positioned the county for opportunities as they arose. Recognizing the transformative potential of the natural gas industry, area stakeholders wanted to ensure that they were adequately prepared. Once it became clear that these activities were going to significantly accelerate the regional economy, this planning began in earnest. As part of this preparation, approximately 10 area stakeholders went to Fort Worth, TX to see how that community had been affected by rapid natural gas development. They sought to understand not only how the gas boom would affect economic development, but also the area's schools, public services, health care providers, and infrastructure among other areas. In short, they wanted to learn from the Fort Worth experience to minimize the development's unintended consequences.

The natural gas boom helped Lycoming County grow, even during the recession. Yet as noted above, county leaders continue to emphasize the importance of promoting economic diversity and not becoming over-reliant on natural gas.[13] There is a clearly stated desire to ensure that Williamsport remains more than just a gas town. The Williamsport/Lycoming Chamber of Commerce has emphasized business retention and expansion efforts as a foundation for maintaining and improving the county's economic diversity. As a result, the Chamber invests significant time into meeting with non-gas companies to ensure that their needs are being met, and investments in those firms are not crowded out by the current interest in natural gas. Even though natural gas has been vitally important to growth, other industries are critical for the region's overall stability.

The natural gas boom is fostering a stronger interest in broadening the industrial base, and other efforts are also underway to ensure that the region leverages that growth

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[12] Data provided by Economic Modeling Specialists International (www.economicmodeling.com)

[13] http://www.williamsport.org/pdf/PlanofAction.pdf (Page 3)

while limiting its over-reliance on natural gas as an economic engine. Local leaders also have made efforts to diversify the area workforce's skill base. Pennsylvania College of Technology (Penn College) has made great efforts to prepare the area workforce for the gas boom, but the College has also done this with diversity in mind. Since 2009, Penn College has trained approximately 10,000 people for natural gas-related activities. The College has used customized, non-degree programs extensively to provide much of this training. When Penn College sought to invest in new degree programs, they intentionally avoided creating programs that were specifically dedicated to natural gas. Based on a regional workforce needs analysis, they instead sought to develop programs that were not only relevant to the natural gas industry, but also had broader applicability to the workforce needs of other industries. As a result, they put resources into developing new programs in mechatronics (which also supports area manufacturers) and emergency management (which also supports public services and utilities).

GARRETT COUNTY, MARYLAND

Garrett County is the State of Maryland's western most county and is known for being home to Deep Creek Lake, a prominent Mid-Atlantic resort area. The Garrett County experience represents a strong example of how a community can respond to a diversity crisis. In 1996, Bausch and Lomb closed its glasses factory in Oakland (the county's largest community) and relocated 600 jobs to San Antonio, TX. The closure's economic shock to this relatively rural county served as the impetus for leaders to initiate a strategic planning process that successfully focused efforts on creating a stronger, more diverse economy.

The loss of Bausch and Lomb created a crisis atmosphere that spurred community action. The community responded with an honest assessment of the county's existing strengths, weaknesses, opportunities and threats (SWOT), and that discussion led to the development of a short, concise strategic plan focused on leveraging investments in the county's existing assets and infrastructure for the purpose of growing and diversifying the Garrett County economy. Since its adoption, the plan has been routinely updated with significant input and consensus from five key Garrett County organizations, including the Garrett County Economic Development Department, Garrett County Development Corporation, Garrett County Chamber of Commerce, Garrett County Community Action Committee, and Garrett College.

Over the past 20 years, the county has grown and diversified by becoming a destination for second-home buyers and tourists. The area has been quite effective at leveraging its proximity to the Washington, DC metro area to attract weekend visitors, vacation-home buyers, and retirees. In addition to connecting to these regional sources of demand, the county—through its economic development planning process—has consistently sought to understand the issues facing companies in multiple sectors such as manufacturing, retail, real estate, tourism, and agriculture and national resources. By regularly speaking with firms in these sectors, county stakeholders have crafted strategies to overcome impediments to business growth. The community has also worked to improve the environment for entrepreneurs by expanding the county's broadband infrastructure

through the efforts of the One Maryland Broadband Network and support from the Appalachian Regional Commission. The County has embarked on several workforce development initiatives led by the President of Garrett College. One of these initiatives has been the Garrett Promise, which provides Garrett County high school graduates and GED completers with scholarships with full tuition payment in their graduation year.

It is important to note that designing strategies to achieve growth and diversification means little if those initiatives are not effectively implemented. Garrett County exemplifies the benefits of an ongoing planning process. Garrett County's current Economic Development Plan—updated in 2013[14]—is a broad-based and detailed plan that has wide community support. First and foremost, systematically updating the plan through an engagement process designed to build leadership consensus ensures more effective implementation. As part of this effort, leaders identify and agree on ways to measure the strategies' outcomes as a way to demonstrate progress, and provide accountability. By revisiting their strategy every few years, Garrett County leaders also seek to ensure that the plan continues to meet community needs and responds to changing economic conditions. Ultimately, this proactive "plan and do" process results in an economic development approach that is more proactive and less ad hoc.

UPSHUR COUNTY, WEST VIRGINIA

Upshur County, WV is a small, rural county located in the Alleghany Mountain foothills, with its largest community being Buckhannon, WV. Upshur County's economy relies heavily on natural resources as the county possesses a wide array of resources ranging from lumber to coal and natural gas deposits. These activities, combined with a long-standing manufacturing base, have been the county's historical economic drivers. Given this history, the county has consistently maintained diversification as an economic development goal. In those efforts, the county focuses on regionally-oriented economic development efforts in three key sectors— agriculture, hardwood products, and tourism.

The county currently participates in a regional Rural Jobs and Innovation Accelerator grant (sponsored by multiple Federal development agencies) that focuses on promoting local foods and growing its agriculture sector. This grant provides support for creating and strengthening food value chains between area firms and others throughout the state. For instance, one current local effort—led by a local "agripreneur"—helps local organic growers produce for homes and restaurants and creates a community kitchen for food processing. The region is also seeking to grow its forest products industry through a regional Hardwood Alliance Zone established to capture value-added timber product activities. The region has abundant natural hardwood resources as well as the local sawmills and other services needed to grow the region's value-added production. This regional collaboration focuses on marketing and investing in the infrastructure needed to attract value-added hardwood companies. Regional leaders have also sought

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[14] http://www.garrettcounty.org/resources/economic-development/pdf/GCED-2013-Strategic-Plan-Refresh-Process.pdf

to promote and grow the tourism sector. Three counties—Randolph, Lewis, and Upshur—recognized that each county alone does not provide sufficient activities for tourists, but the counties together can bundle their events and attractions to appeal to overnight visitors. As a result, leaders are creating a tourist corridor and marketing the activities as "33 Things To Do Along Route 33."

This spirit of collaboration has emerged within Upshur County itself. Significant private sector leadership, particularly in the town of Buckhannon, has advanced "CreateBuckhannon"—a locally driven effort designed to upgrade the county seat's amenities. Local volunteers with no formal organizational structure are managing the effort. The group conducts a regular weekly lunch meeting open to all to identify projects and manage their implementation. Through this venue, the community secured a USDA grant to build the farmers' market, a grant to create a downtown park, provided new raised beds at the senior center, restored a Civil War-era home, and built bike and walking trails throughout town. By making the community a more appealing place to live and work, local leaders hope to create an environment more conducive to entrepreneurs and skilled workers. The work of this informal group has brought energy to community residents and created a positive image for those outside the community.

KNOTT COUNTY, KENTUCKY

Located in the eastern Kentucky coalfields, Knott County is a distressed rural county. It is currently home to 16,124 residents and has a long trend of out-migration and population decline. Mining is the county's single largest employing sector and employment in this sector has declined from almost 1,500 jobs to just under 900 jobs between 2009 and 2012. The mining job losses contribute greatly to an unemployment rate that, at 15.9 percent,[15] remains almost twice the state and U.S. rate. This dependence on mining has led to a local economy that lacks diversity. This is an issue identified by the region, and within Knott County efforts to address this issue are based around using the county's assets to promote activities like tourism.

Several large initiatives form the foundation of the County's tourism development efforts. One key piece of this effort was the creation of the Kentucky School of Craft which was funded in part by the State of Kentucky's Community Development Initiative (CDI) and operated as part of Hazard Community and Technical College (HCTC). The idea behind the school was to offer residential opportunities for people to train to become master craftsmen in Appalachian crafts. The strategy also included the establishment of the Kentucky Appalachian Artisan Center and incubator on Hindman's Main Street as a potential retail outlet for artisanal work. The school was launched with CDI support but, for a number of reasons—including staff turnover, lack of housing opportunities for students, and limited demand for long-term residential programs—it has not yet had the expected economic impact. In spite of this, the CDI process helped local residents witness the power of collaboration and engagement among local citizens.

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[15] U.S. Bureau of Labor Statistics Local Area Unemployment Statistics, June 2013.

One of the outgrowths of the CDI experience was local leadership focused on adventure tourism. Knott County's relative isolation does not bode well for the recruitment of outside industry, but the county does have entrepreneurial spirit in the region's "hollows" and the emphasis on tourism is designed to capitalize on that spirit. While the School of Craft combined with the focus on heritage tourism was aided by the state's CDI, energy for adventure tourism came from county leadership, public and private. In 2006, county leaders made a priority of creating an adventure tourism park. As a legacy of the county's dependence on natural resource extraction, there are thousands of acres of reclaimed strip mine and forest lands uniquely suited to a range of outdoor recreational activities. In 2007, Mine Made Paradise Park opened – a partnership between a prominent regional coal company, local residents and the county. The park covers over 43,000 acres and has 100 miles of trails for off-road biking and additional horseback riding trails and stables.

The tourism-focused efforts in Knott County offer the potential for diversifying the economy, or at the very least replacing some of the jobs lost in the coal industry. The School of Craft effort has experienced some difficulty because it has not been closely linked to other tourism activities. The grassroots adventure tourism effort has helped to increase in the number of visitors (a key metric for tourism activities). Furthermore, this success has helped to support local efforts to expand facilities and trails at the park. But much like the School of Craft effort, the adventure sports park has much more room to grow. As it currently operates, the park is relatively self-contained with park visitors camping on the grounds rather than staying in lodging off-site. This limits the potential impact the park might otherwise have on the broader county and regional economies. As the county's tourism efforts continue to grow, they are more likely to create greater diversification, as more visitors will likely create greater opportunities in other activities such as lodging, restaurants and retail. A broader regional effort designed to create an adventure and heritage tourism brand and destination would further increase the economic impacts.

WASHINGTON COUNTY AND BRISTOL CITY, VIRGINIA

Washington County, VA and the independent city of Bristol, VA are located along the Interstate 81 corridor in southwest Virginia. Bristol is on the Virginia-Tennessee Border which runs down the city's Main Street. Washington County has not been overly dependent on a single industry, although it has historically been a manufacturing dependent area. Development efforts are seeking to capture a number of different opportunities, and several locational factors such as the interstate corridor, several downtown areas, and access to multiple cultural and outdoor amenities have largely shaped these economic development strategies. As a result, the area's economic development strategies have three relatively distinct focus levels—County, City, and region.

Led by the county commission and the county economic developer, Washington County has focused its economic development activities on commercial and industrial development along the I-81 corridor. The County seeks to attract not only projects related to manufacturing and distribution, but they are also looking for 'destination'

retail like Bass Pro Shop or Cabela's. To date these efforts have been largely successful; development at one of two major interchanges along I-81 is almost complete and significant new development is planned for the second.

The economic development focus within the area's two largest cities—Bristol and Abingdon—differs significantly from the county, and instead focuses on downtown revitalization, supporting small business owners and tourism. There is a growing recognition, particularly in Bristol, that entrepreneurial and small business support services are needed to help local businesses actually succeed in their main street locations. Bristol also has an active Main Street program—Believe in Bristol—driven primarily by private sector leadership. Private sector leaders frequently play a catalytic role in advancing Bristol's tourism development and main street projects. This has been most evident through the construction of the *Birthplace of Country Music* museum where support for the construction of this museum came from the private sector and not local government.

Complementing these local efforts, multi-county tourism efforts have helped to achieve important successes including the completion of the *Birthplace of Country Music* museum. Furthermore, Washington County has benefited from the Crooked Road, a southwest Virginia music heritage trail that bisects the county. Other multi-county efforts benefiting Washington County include 'Round the Mountain'—southwest Virginia's artisan network. These types of regional efforts allow communities to connect the economic value generated from existing assets with potential external demand. To further support these efforts, Heartwood opened in 2010 as an artisan center located along I-81. Heartwood, funded with ARC and state tobacco trust funds, serves as the region's gateway to heritage and cultural tourism.

The three elements of the area's economic development— commercial and industrial development, main street development (in both Bristol and Abingdon) and tourism— serve as the basis for developing a more diverse regional economy. However, the efforts have resulted from independent action that may require much greater participation and a more cohesive shared vision to be successful in the future. Despite the inherent difficulties in getting very different sets of actors to collaborate in the region, aligning the industrial development, Main Street, and tourism strategies through a regionally cohesive vision could help ensure more impactful economic outcomes.

RUTHERFORD COUNTY, NORTH CAROLINA

Located in North Carolina on its South Carolina border, Rutherford County lies in the midst of the area between Asheville, Charlotte, and Greenville-Spartanburg. A distressed county, Rutherford has lost employment over the previous decade and has an unemployment rate of 12.7 percent that remains well above average compared to both the U.S. and North Carolina.[16] Rutherford County traditionally relied on manufacturing to provide local jobs. This area included a number of textile mill towns like

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[16] U.S. Bureau of Labor Statistics Local Area Unemployment Statistics, June 2013.

Rutherfordton, Forest City and Spindale, but the jobs they offered disappeared to China during the first decade of the 2000s, well before the Great Recession of 2008-2009.

Even so, manufacturing remains an important part of the county's economy. Yet, the county's leaders understand that they must find alternative sources for local employment. For instance, the county has attracted several data centers—most notably Facebook. The county also has a growing in-migrating retiree population, particularly around Lake Lure and Chimney Rock in the western part of the county.

Given the once dominance of textiles in the mill towns of Rutherford County, it is no surprise that county leaders consider economic diversification as an important goal in the region's Comprehensive Economic Development Strategy (CEDS). The Isothermal Planning and Development Commission, in particular, provides leadership for Rutherford and its neighboring counties[17] in designing and implementing strategies that encourage new industry development. As a result of the CEDS process, regional leaders are now implementing several key initiatives to transform the regional economy from its traditional reliance on textile manufacturing to prepare for other industries. For instance, the county is working to upgrade several older, obsolete industrial buildings. The Region C Workforce Development Board (representing Rutherford, McDowell, Cleveland, and Polk counties) is partnering with two neighboring workforce boards on a regional literacy initiative and is promoting greater usage of worker certifications (e.g., ACT WorkKeys) among employers and workers, sponsoring job shadowing programs, and facilitating efforts to communicate employer skills requirements to students and other potential workers. As part of this effort, the Rutherford County EDC is also seeking to better connect area firms to available services such as those offered by the SBTDC, Industrial Extension Service, Community College, or local utilities.

Rutherford County also seeks to diversity its sources of wealth as well as its employment base. For example, the county has support retirement attraction efforts that leverage several natural assets (e.g., the Blue Ridge Mountains, Lake Lure). These new retiree residents bring new money into the community through the spending of their retirement savings, Medicare payments and/or Social Security income. This spending supports other economic activities such as construction, local retail, and recreational facilities like golf courses or equestrian facilities. Further efforts are being made to grow Rutherford County's attractiveness as a retirement destination by improving health care services, broadband access and housing options.

PICKENS COUNTY, SOUTH CAROLINA

Pickens County is located in Upstate South Carolina and is part of the Greenville-Spartanburg MSA. Local economic developers often refer to three different parts of Pickens County: 1) a western section focused on the city of Clemson and Clemson University—South Carolina's land grant university, 2) a central section that remains very rural and focused on agriculture, and 3) an eastern section that serves as a bedroom

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[17] The service area of the Isothermal Planning and Development Commission includes Rutherford County, as well as Cleveland, McDowell and Polk counties.

community to Greenville, SC. Historically, the Pickens County economy relied on cotton and textile manufacturing to drive the county's economy. More recently, Clemson University and urban sprawl form Greenville-Spartanburg have become much more important economic drivers.

Competitiveness issues, more so than diversification, motivates Pickens County economic development efforts. The county's economic development efforts focus on growing industry clusters such as automotive, plastics and metal working, and medical devices and pharmaceuticals. To support this cluster development, Pickens County— under the auspices of the county government and Alliance Pickens (the county's public/private economic development arm)—pursues an economic development strategy focused largely on attracting new firms, primarily manufacturers. Pickens County's primary selling points have been its lower labor and business costs, but it has also sought to leverage its proximity to the automotive manufacturing cluster located around Greenville/Spartanburg. Like many other communities in the southern Appalachians, Pickens County also tries to capitalize on its natural beauty to attract tourists and retirees. Complementing the county's business attraction efforts, local economic developers describe the high-end residential and resort communities as assets that appeal to visiting corporate executives.

Pickens County also clearly benefits from the presence of Clemson University and its economic ripple effects. For instance, not only is Clemson University a major employer in the county, but also faculty, staff and student spending represents significant drivers for the county's retail activity and real estate market. However, the collaboration between the county and Clemson University currently appears relatively limited, providing many opportunities to more fully leverage economic spin-offs from the university.

Similarly, Pickens County benefits from its proximity to the nearby Greenville job center and the region's automotive manufacturing cluster. The spillover effects of being located in Upstate South Carolina near the BMW automotive cluster has helped spur growth in a broad array of related industries (e.g., construction, retail, etc.). This has widened the county's economic base so that it is not completely reliant on the university or the region's legacy textile mills for jobs and economic activity. However, greater, and more formal, interaction with regional business leaders and the university are essential foundations for enhancing the region's economic diversity.

LAUDERDALE COUNTY, ALABAMA

Located in northwest Alabama, Lauderdale County is home to over 92,000 residents. More than 40 percent of these residents live in the city of Florence, which along with Muscle Shoals in Colbert County form the core of the two-county Florence-Muscle Shoals MSA. Also located in Lauderdale County, the University of North Alabama plays an important role in supporting the county's workforce and entrepreneurial development efforts. The broader Shoals region has a long historical connection with the Tennessee Valley Authority (TVA). The Shoals region, Lauderdale County In particular, have long served as one of Alabama's leading manufacturing centers. For

many years, Tennessee River shipping access and low-cost TVA-provided power have provided the region with the competitive advantage required to attract and retain several major manufacturing facilities. However, like many parts of the traditional "Rust Belt," the local economy suffered major setbacks when Northwest Alabama manufacturers were so hard hit in the 1980s. This experience laid the foundation for an economic development strategy focused on broadening and diversifying the region's base.

Concerns about economic diversity do not explicitly drive local economic development strategies, but those efforts tend to be framed and implemented within a broader regional context. For instance, the Regional leaders established the Shoals Economic Development Authority (SEDA) in 1986 to serve as the region's primary business recruitment arm. SEDA became Alabama's first multi-county industrial recruitment entity. While many of the resulting investments are made outside of Lauderdale County, these successful new business locations create much needed employment opportunities for county residents. Since 2007 the region has also operated an independent Shoals Industrial Development Committee. The Shoals Industrial Development Committee is composed of public and private sector leaders and oversees a large "deal-closing" fund for prospective economic development projects. The Northwest Alabama Council of Local Governments (NACOLG)—the area's Local Development District—is another regional development organization that represents the public sector in this broader region. NACOLG manages a number of federal and state-backed business loan programs. The collaboration between and within these regional organizations facilitates more effective economic development practice throughout the region, as it facilitates scale and coordination of economic development activities.

While manufacturing remains an important part of the regional economy, efforts are underway to leverage many of Lauderdale County's broader regional assets in order to develop other industry sectors. For instance, Florence has emerged as a major regional retail center, attracting numerous shoppers from Northern Alabama, Mississippi and Tennessee. Florence is also a regional medical hub and is home to ECM Hospital system, one of the region's largest employers with more than 1,200 employees. Tourism is another area of emphasis. Spurred by organizations like the Lauderdale County Tourism and Downtown Florence United, Lauderdale County leverages many of its broader regional assets to support its tourism industry. For instance, the region's place on the Robert Trent Jones Golf Trail makes the region a golfing destination more so than any single golf course would. Similarly, there are efforts underway to capitalize on the Muscle Shoals region's musical heritage. While the area hosts many local events and festivals (e.g., the W.C. Handy Music Festival), there are also efforts to develop these assets in a broader regional strategy. The Americana Music Triangle is a proposal to link five states (AL, AR, LA, MS, and TN) along a tourist trail that introduces visitors to key spots in the development of American roots music.   Along with Nashville and New Orleans, the Shoals would be a key stop within the Triangle. Once again, marketing these tourism assets in a unified and strategic manner is more likely to draw tourists than promoting multiple attractions individually. Moreover, by leveraging these broader

regional assets Lauderdale County is better positioned to capture some of the opportunities that these assets create.

OKTIBBEHA COUNTY, MISSISSIPPI

Located in East Central Mississippi, Oktibbeha County is home to nearly 48,000 residents many of who live in the City of Starkville. It is also home to Mississippi State University (MSU)—Mississippi's land grant university—and its 20,000 students. MSU serves as the county's largest economic engine, but the dominance of the university also means that Oktibbeha County lacks economic diversity. The county's leaders have sought to create greater balance by focusing the county's economic growth on two fronts. The county is leveraging the university to develop complementary economic activity while also successfully implementing more traditional industrial recruitment and retention activities to attract new activity to locate in the county.

Local economic development leaders acknowledge that MSU's recent growth has driven Oktibbeha County's economy. While new employment and population growth has strained the on-campus infrastructure and tightened affordable housing options around Starkville, this growth has also expanded markets for local businesses. Local initiatives, such as those sponsored by Main Street Starkville, have smartly sought to capitalize on these new opportunities to diversify the economic base.

However, the town and gown relationship is key for both the university's long-term growth and the community's ability to leverage that asset. This relationship often depends on a more proactive engagement by MSU senior leadership, a relationship has not always been a high priority for the university. Under current leadership, MSU and Starkville are enjoying a renaissance in their partnership. For instance, community leaders are pro-actively seeking to link the community to many of the MSU-related activities like football games. In branding Starkville as "Mississippi's College Town", Local leaders hope to turn Starkville into a destination for football fans or parents of MSU students. Success in these efforts should create more opportunities to grow other activities such as tourism and retail.

Continued efforts to attract visitors to Starkville are also a top priority. Starkville and MSU are currently collaborating to develop a hotel and convention center that should help attract more visitors to the community. Besides making Starkville a destination, the community's leadership also hopes to better connect the community with the campus. Consequently, the Starkville Main Street program promotes local shops and community districts—like the popular Cotton District—to the campus community (faculty, staff and students) so that they are more likely to see these areas as attractive destinations for shopping and nightlife.

The other major plank of Oktibbeha County's economic development strategies focuses around more traditional business attraction and retention efforts. However, these economic development activities are being undertaken in an increasingly regional context. Oktibbeha County is part of a larger region known as Mississippi's Golden Triangle, which also encompasses Clay and Lowndes Counties. Several economic

development organizations serve these three counties, with the newest being the Golden Triangle Development LINK (GTDL). GTDL is the region's primary business attraction and marketing agency. Key economic development partners are now working to attract new industries—particularly manufacturers—to the broader Golden Triangle region as opposed to focusing on their individual county. These initiatives further link Oktibbeha County to the wider regional economy by connecting the intellectual assets and talent based at MSU to emerging manufacturing centers in both Clay and Lowndes County.

COMMON THEMES AND TRENDS

The 10 case studies profiled in this report offer both lessons and cautionary tales. This section seeks to identify the common themes and findings that emerged from these case studies. The goal is not only to improve practitioners' understanding of diversity as a motivating factor in economic development, but also to give those same practitioners insights that might help as they develop their own economic diversification strategies.

DIVERSITY IS MORE OFTEN A GOAL THAN AN ARTICULATED STRATEGY

Many communities identify a more diverse economy as a goal or a value, but diversity is less likely to motivate individual economic development strategies. As a consequence, diversity does not tend to drive strategy development in the same way as a concept like competitiveness. Competitiveness-driven strategies are not necessarily mutually exclusive with regional efforts to diversify, but they do lead to different sets of priorities and types of strategies. A focus on competitiveness can often lead places to select specific clusters around which to focus energy and resources. This, in turn, may limit their activities to only those that support those clusters, foregoing potential opportunities in other non-core activities.

Diversification does not necessarily need to be seen as a goal in itself to be an important concept in framing decisions about economic development strategy. Instead, explicit consideration of diversification within a strategic planning process may help reveal different kinds of strategies and also lead to the implementation of programs or policies that ultimately help diversify the community's economic base. As a result, diversification as a priority might encourage leaders to consider developing a broader array of skills or focusing on finding new sources of wealth rather than just emphasizing job creation. Thinking carefully about diversity can be helpful for many places, even as leaders consider other goals.

Where diversity does drive thinking, it is usually the result of crisis (e.g., the loss of a major employer or major industry) or the recognition that a crisis might be imminent because the community is overly reliant on a single industry or employer. The justification for seeking economic diversity often centers on mitigating risk and/or capturing opportunity. For those places that rely on a single plant, industry or government facility, there is a need to protect themselves against the potential consequences of losing a large employer (Lockheed Martin in Tioga County, NY) or experiencing a downturn in a key industry (e.g., coal mining in Knott County, KY;

furniture and textiles in Rutherford County, NC). As a result, leaders in these places seek additional economic activities to both replace lost jobs in declining industries and reduce the extent to which the community depends on those firms or industries viewed as "declining" or "at-risk" of eventual loss due to global economic forces.

While economic crises may lead communities to seek greater diversity, those same events may also tie leaders' hands in terms of how best to achieve diversity goals. A crisis environment may limit the extent to which places can be intentional about how they pursue their economic development objectives. Rather than being strategic about their efforts, the crisis itself may force leaders to adopt a "beggars can't be choosers" mindset and, as a result, pursue any available opportunity instead of focusing their efforts on quality opportunities.

Capturing greater opportunities is another motivating factor behind diversity-driven strategies. Places with dynamic economies that continuously develop new economic activities and are constantly in a state of transformation are more likely to weather economic storms and raise overall regional prosperity. However, in order to do so, places must be able to maximize their assets to capture current and future opportunities. These "opportunistic" strategies might focus on investing in state-of-the-art infrastructure (e.g., Corridor H in Upshur County, WV), building market relationships with nearby growth centers (e.g., Garrett County, MD's links to Pittsburgh and DC), or effectively connecting firms to local sources of innovation like major research universities (e.g., Clemson University, Mississippi State University) and/or national research laboratories (e.g., Oak Ridge National Laboratory in TN, National Energy Technology Laboratory in WV).

The data show that places that diversify more quickly are those that experience a sudden loss of a major employer or industry. By contrast, the case studies demonstrate that places that achieve more positive economic diversity tend to do so in smaller numbers and over an extended period of time. Therefore, places seeking to implement diversity-driven strategies must show patience and commitment to those efforts. This requires building consensus around diversity as a goal within the area's long-term economic vision.

DIVERSIFICATION THAT CONTRIBUTES POSITIVELY REQUIRES MANY YEARS

In fact, like making a fine wine, economic diversity requires time to develop local roots and support before its fruit can bear prosperity. Diversity that occurs too rapidly often reflects significant economic weaknesses from a community overly reliant on a single company or industry. These are the stories of crisis and distress that so many regions encounter. While greater diversity may result, its rapid occurrence leads to dislocation among workers and interdependent businesses alike.

The most successful places can expect their efforts to bear positive economic fruit after many years of sustained effort. Several of the case profiles included in this analysis developed their initial plans in the 1990s and pursued that plan's implementation (with appropriate modifications along the way) for 15 years before realizing success. In these

cases, the community's citizens (not just its leaders) were committed to a long-term investment strategy. For some, that community commitment may have occurred only after a significant event—a major company downsizing or relocation, meaning that the road back to prosperity was probably much longer and more challenging.

However, this long-term commitment often resulted from a common realization that the community's future had to be built on leveraging one or more unique local assets (a university, a major new highway, or a unique natural geography such as a body of water or mountain) as well as a bit of luck. These assets provided the lynchpin, but the singular focus on a common plan provided the course for the community's new economic trajectory. Identifying those lynchpins and then building local consensus around the plan to leverage those assets are the most challenging tasks—and ultimately the key to success.

DIVERSIFICATION CAN BE ACHIEVED THROUGH A VARIETY OF ECONOMIC DEVELOPMENT STRATEGIES

Economic diversity results from a variety of strategy choices. Communities with varying economic experiences and situations will pursue those strategies that the community supports and that local partners have the capacity to implement. When asked about how they are working to diversify their economy, practitioners identified a wide range of activities including traditional business recruitment, retention and expansion, workforce development, entrepreneurial development, promoting tourism, leveraging university capabilities, investing in infrastructure, and many others. As noted earlier, all these strategies are typically designed to achieve one of five goals:

- Create collaborative regional planning and implementation systems,
- Build an ecosystem capable of supporting a diverse array of economic activities,
- Connect local and regional assets to external markets,
- Develop skills and talent needed in a wide range of industries, and
- Encourage local reinvestment of wealth.

However, at the most basic level practitioners often seek an "anything that works" approach to diversification. Clearly, there are multiple ways to achieve diversity, and several practitioners pointed out that just as the community should not rely on one employer or one industry, nor should the community rely on any single economic development strategy. Much like diversity itself, undertaking multiple strategies allows practitioners to protect themselves against failed or ineffective initiatives while at the same time increasing the likelihood that one of those strategies will succeed. Moreover, many strategies create jobs in relatively small numbers; undertaking multiple strategies can also increase the overall impact of the broader community efforts.

Another influence over selecting preferred economic diversification strategies is the extent to which strategy outcomes can be controlled locally. Practitioners most commonly identified workforce development and entrepreneurial support efforts as actions they could impact locally. In both instances, these strategies involve building the

capacity of people who are already located and/or tied to the local community. In other instances, local efforts to foster diversity focused on giving people already living in the community a reason to stay, either through local educational or career opportunities. Traditional business retention and expansion activities also seek to capture and retain investment in the region, but for many businesses, their fate is determined externally as part of far-flung corporate headquarters' decisions or by global market forces.

Ultimately, the most significant challenge to overcome is that most diversification strategies result in creating jobs in the fives or tens over a sustained period of time, whereas an economic event can result in the loss of a major employer or industry and hundreds of jobs at a single moment in time. As demonstrated in the case studies, many Appalachian communities are looking toward tourism development strategies to help diversify their economies and replace past economic drivers. These tourism strategies, however, are often more about replacing lost jobs than diversifying the local economy. While the tourism industry provides jobs for relatively low-skilled workers, the new jobs do not pay those same workers as much as industries like coal or manufacturing once did. Consequently, tourism alone will not lead to greater diversity, but instead must be viewed as but one element of broader economic development strategies.

In this context, the appeal of significant business attraction efforts becomes clear. The attraction of a 200-employee manufacturing plant can make a greater impact on the community than helping a small business grow from 5 employees to 10 employees. While business attraction efforts have a place in many comprehensive economic development strategies, these kinds of investments are made sporadically and a focus on these types of projects can be risky. Most notably, there are few relatively large projects seeking new locations, and it is probably unrealistic for communities lacking significant assets to expect to win these types of large projects. Many growth companies are also looking to locate in fast-growing, diverse metropolitan areas, closer to their customer base. The projects that are looking for more rural locations often tend to need a low-cost and relatively low-skilled workforce. These kinds of projects are intrinsically mobile and their employment levels are not always sustainable over a long period of time. As a result, this is an area where local forces are least likely to exert real influence over outcomes.

EFFECTIVE DIVERSIFICATION REQUIRES MORE THAN JUST DIVERSIFYING THE EMPLOYMENT BASE

The case studies demonstrated that approaching diversity issues requires communities and practitioners to take a broader perspective and approach. This broad thinking is required in two ways—in how community leaders and economic developers define diversity as well as in how they go about pursuing strategies to promote greater economic diversity. Most practitioners conceptualize a diverse economy as one with a wide array of industries, but this is a relatively narrow way to define diversity. Since wages paid by area employers are not the area's only form of wealth generation, diversity should take into account more than just local employment. Therefore, broader definitions of diversity can lead to outcomes beyond just a diverse employment base.

For instance, communities might consider thinking about developing a more diverse set of wealth generators. As shown in places like Rutherford County, NC, retiree attraction efforts can diversify an area's wealth generation capacity. These retirees bring money from outside the region in the form of their retirement accounts as sources of wealth. This wealth can then be re-circulated in the region to support activities like construction and retail. Similarly, Medicare payments (which also originate external to the community) can also generate demand for activities such as those related to health care.

Diversity in the ownership of locally-based companies is another consideration, and specifically whether owners are based inside or outside of the community. Locally-based and headquartered companies are more apt to remain and invest in the area than are firms where the locus of decision making is external to the region. As the Tioga County case study demonstrates, when decisions about a local firm's future are made external to the region, there can be great uncertainty about the region's economic future. In order to mitigate this risk, many places pursue entrepreneurship strategies that promote greater local ownership and control. The case study counties provide numerous examples of entrepreneurial strategies including promoting entrepreneurship to students, recruiting entrepreneurs to the region, connecting entrepreneurs to existing support services, and/or investing in key infrastructure like broadband capacity and business incubators. By growing the number of locally-based firms, communities are more able to exert control over their economic trajectory.

Skills diversity is another area of consideration. Workforce development represents another area that local practitioners identified as a real challenge, but also one where they felt as though local action could make a real impact. Many former mill towns possess a talent pool that has a relatively narrow range of skills that may not translate well to emerging new industries. This relative lack of skills slows these communities' ability to take on new and different activities and thereby diminishes their capacity to diversify their economies. While there may be a desire to focus training efforts around the region's dominant industry, this can prove risky if that industry experiences significant decline. By contrast, a broad and flexible base of skills is required to support a diverse economy and respond to rapidly changing demand for skills. The Lycoming County case study provides an excellent example of a diversity-driven workforce initiative. In this instance, Penn College intentionally sought to invest in training programs that met the needs of the natural gas industry, but also provided workers with skills that are of use to firms in other industries such as construction, utilities and advanced manufacturing. Therefore, diversifying the skill base can allow communities to better take advantage of opportunities as they present themselves.

These distinctions are important as they force consideration of issues such as the diversity of wealth and ownership, as well as the workforce's ability to respond to changing economic conditions. Consideration of these different forms of diversity also influences strategy design and how outcomes are measured. These different definitions of diversity are not contradictory or mutually exclusive. Broadly defining diversity can lead to the need for a diverse portfolio of development strategies, which in turn can

allow communities to not only achieve multiple objectives, but also increase the chances of strategies proving successful.

ECONOMIC DIVERSITY INFLUENCED BY REGIONAL CONTEXT

Communities must also approach diversity with broader geographic considerations. The case studies showed that diversity is a scale-dependent issue. Workers often think regionally when looking for employment, and so too should communities when seeking future opportunities for wealth creation. Understanding the broader regional context can help communities better understand the range of available opportunities and potential risks. For instance, a community like Tioga County, NY will never be a major jobs center but by making themselves an attractive place to live they are able to attract people with good paying jobs in nearby job centers like Ithaca or Binghamton. By contrast, downturns in the Washington, DC or Pittsburgh economies might have negative consequences for a place like Garrett County, MD. Understanding the regional context can therefore help to shape the parameters for strategy development as it helps communities more fully understand the threats and opportunities they face.

Specialized counties that contribute to a broader, more diverse region are more likely to diversify over time. Building stronger regional connections can enable communities to leverage a greater number of assets, and thereby open up greater economic opportunities. For instance, proximity to large universities can prove beneficial not only for the immediate area, but also surrounding communities. If leveraged properly, large universities, such as MSU in Oktibbeha County or Clemson in Pickens County, can be a source of innovative research and talented workers for area companies, as well as a source of demand for local food producers or retailers. While this is important for all counties, it is especially important for more rural communities that lack depth of assets. However, these regional connections do not always occur naturally and both the university and the community must be willing to work together in order to maximize these opportunities.

Regional thinking can also help create assets. For communities seeking to develop tourism, the whole is greater than the sum of the parts, and they are best served by linking these attractions together in the minds of potential tourists and promoting the entire region as a single destination. By thinking regionally, Lauderdale County, for example, has not only made itself a regional retail center but also a destination for golfers through its place in the Robert Trent Jones Golf Trail. These kinds of economic opportunities would not be available had Lauderdale County acted independently to promote its golf courses or its tourist attractions. Similarly, the tourism and infrastructure initiatives underway in Upshur County and its surrounding region would not have succeeded had those counties operated independently of one another. By contrast, Knott County's efforts to establish itself as a center for adventure sports has yet to fully materialize in part because the initial efforts have been independent of one another and not yet connected to a broader regional effort.

BROAD ENGAGEMENT ACROSS SILOS INCREASES POTENTIAL FOR SUCCESSFUL DIVERSIFICATION STRATEGIES

Similarly, broad engagement with a wide array of stakeholders can also help move diversification efforts forward. Effective strategies engage practitioners from economic development, workforce development, higher education, planning, tourism development, as well as the private sector. Practitioners in each of these arenas bring unique, but sometimes overlapping, networks. These networks offer access to knowledge, resources and expertise. For instance, workforce developers may have access to training funds or training programs that would benefit companies in industries that economic developers seek to promote. Similarly economic developers meet regularly with area companies, and can in turn convey information from these conversations to educators who can then use that information to develop curriculum.

As noted above, regional approaches and regional collaboration is often ideal, but local collaboration is the minimum required for implementing effective strategies. Top down initiatives are not always effective as they often end up being neither regional nor collaborative. Instead, some of the more effective collaborative initiatives emerge from grass roots efforts where local organizations come together to form a partnership to address an issue where there is a consensus need. Economic developers often lead these efforts, but the most effective ones are those that see their primary role as one of a connector. By connecting different regional actors and networks, they are able to gather support and resources to advance regional initiatives. This kind of local collaboration often emerges in places where there are open networks, and grassroots initiatives are able to surface from a wide array of actors.

Opportunities are fewer in places where the practitioners remain within the walls of their silos. The case studies suggest that the communities with the most coherent diversification strategies have overall economic development strategies that are not driven by local economic developers alone. As in the case of Garrett County, MD, these successful strategies involve multiple stakeholders and enjoy broad-based community support. In these instances, area economic developers see that they have a role beyond just industrial recruitment and retention and are willing to embrace their role as a regional connector or facilitator are more apt to be successful in furthering broad based regional initiatives that seek to promote economic diversity.

RESEARCH CAN GUIDE EFFECTIVE STRATEGY DEVELOPMENT AND IMPLEMENTATION

Strategies are more likely to be successful if they are based on a foundation of data-driven research. However, this is an area where many economic development practitioners often lack capacity. These research skills are needed for economic development practitioners to track regional growth and progress, undertake effective market analysis, understand how to harness creativity and entrepreneurship, and keep up with trends about how technology is re-shaping economic advantage. Many places lack this research capacity, but creative and enterprising practitioners can access these

capabilities by looking beyond their silos and partnering with other regional organizations that are capable of performing this research.

At the most basic level, communities should have a basic understanding of the economic trends that are shaping their economy. This baseline analysis is an important component in undertaking an honest appraisal of the community's strengths and weaknesses and is often captured in regional Comprehensive Economic Development Strategies. Understanding these economic trends allows communities and regions to better identify and prioritize key issues as well as determine which strategies are realistic, which are not, and which are likely to yield the greatest impact. For instance, local leaders may seek to turn their community into a tourist destination, but if the community has no hotels or restaurants and lacks highway access or appealing tourist attractions, then this effort will likely experience difficulty gaining traction. Undertaking this kind of honest appraisal allows places to remove less optimal options from consideration and instead focus on diversification strategies that are more appropriate for their circumstances.

In addition to considering their internal strengths and weaknesses, successful places also consider external risks and opportunities. This can be done by better understanding how local firms and industries are connected to external markets, and how growth or decline in other places may affect the local economy. If communities are able to identify comparable places then they might be able to learn from their situation. Similarly, community leaders might also seek to learn from other places that have experienced significant shocks or been presented with similar opportunities. For instance, the Lycoming County case study showed how that community was able to learn from another community—Fort Worth, TX—that had been affected by the natural gas boom, and was better able to prepare for the multitude of impacts arising from these developments.

Research and analytical capacity can also play an important role in monitoring and evaluating strategy progress. By tracking outcomes, places can better identify those strategies that are not performing as hoped and either eliminate them or develop new, more effective tactics for the future. Moreover, tracking outcomes and performance allows stakeholders to demonstrate their progress and impact which is important for enlisting additional support or securing funding.

LEADERSHIP MATTERS

As noted above, there is no single economic development strategy that alone can lead to greater economic diversity. Many different kinds of strategic actions must be undertaken to achieve this goal. However, none of this matters if the strategies are not effectively executed. Successful implementation often comes down to the people involved. For a community to effectively diversify its economy, it must first and foremost have people who see economic diversification as a priority. If diversification proves to be a community priority, then it must also have community leaders and stakeholders who are open to working regionally, collaborating across silos, thinking opportunistically about resources, and willing to take risks in order to make the

investments necessary to see diversification strategies through to completion. Moreover, communities need different people in different roles to implement these strategies. At the most basic level, there are two roles that need to be filled—a leadership role and a staff role.

Leadership is crucial for any economic development effort. Local leaders are needed to articulate, and build consensus for, a community vision. They are also needed to serve as champions for strategies and enlist support from the community to help implement those strategies. In several of the cases studies, the research team saw that the private sector could play an important catalyzing role for many strategies. This was especially true for Washington County, VA, where private sector leadership drove the completion of the Birthplace of Country Music Museum. In Oktibbeha County, MS, engaged and committed leadership from both the community and the Mississippi State University administration make it possible for the community to increase the economic impact of the campus community on the local economy. However, for many smaller and more rural Appalachian communities, this kind of strong private sector leadership is not always available, and as a result they often lack the capacity to coalesce local business leadership for true public-private efforts in economic development. In these places, government can be a critical actor in rural local economic development in Appalachia (and elsewhere).

But no matter where this local leadership may come from, there is also a need for multiple leaders. Many of the diversification strategies laid out in the case studies will require long-term commitment before they begin to yield significant and sustainable benefits for the community. Many of the initiatives underway in Lauderdale County began in the mid-1980s and they continue to yield benefits because there has been a long-term commitment to see them continued. Sustaining long-term economic development and diversification efforts therefore requires a depth of leadership. The Knott County, KY case study showed that when there has been significant leadership turnover, it is difficult to maintain the momentum behind these efforts. The loss of a strong, persuasive and visionary leader can derail efforts unless there is a deep leadership bench and broad buy-in to a common vision. As demonstrated by the Garrett County, MD case study, the county's economic development planning process—which has been ongoing for over 15 years—has been an effective means for on-boarding new leaders into the process and ensuring consensus for the economic development vision.

Leadership alone cannot guarantee successful implementation of economic development and diversification strategies. Strong leaders often succeed when they are supported with great staff. For many leaders, particularly private sector leaders, these kinds of initiatives are well outside of their core professional responsibilities. Therefore, economic development practitioners are needed to do much of the work involved with seeing these strategies through to completion. This may involve work such as organizing meetings and doing the research. Practitioners also play a hugely important role in organizing stakeholders and preparing applications needed to secure state and federal funds that help kick start many of these initiatives. This is not to say that economic development practitioners themselves are not key leaders in their

communities. In most instances, they are quite active in many of the core leadership responsibilities (e.g., building a consensus vision, recruiting support) in which private sector leaders should also be engaged. However, rarely can a community truly transform its economy without significant support from business leaders and elected officials and without important support from their economic development practitioners.

It should also be noted that working both collaboratively and regionally requires a great deal of trust among stakeholders. Repeated interaction often leads to greater trust and comfort, so continuously seeking regional and collaborative projects is one way to build these loose coalitions (even if the efforts are not always successful in attracting external funding). The importance of having these coalitions in place cannot be understated. For instance, the existence of ongoing partnerships can allow regions to respond quickly and effectively to funding opportunities as they arise. Just like diversity itself, these coalitions allow places to capture more opportunities and mitigate the risk involved in undertaking new initiatives.

MUTLIPLE AVENUES FOR ACHIEVING DIVERSIFICATION

The case studies demonstrate that diversity represents an oft-articulated goal for pursuing economic development strategies, but it is seldom the only goal (or even the most important goal) of these plans. In fact, places often identify diversity as a goal only if they have experienced some kind of crisis (like the loss of a major employer loss), fear an imminent crisis, or are frustrated by a long-term lack of growth in their industrial base. In essence, leaders are motivated to diversify for two primary reasons:

1) To mitigate the risk associated with being too dependent on a given employer or industry or
2) To capture greater opportunity by being involved in a wider array of economic activities.

When asked about their diversification efforts, local economic development leaders and practitioners typically point to a wide array of strategies employed. For instance, several practitioners cite their business attraction and retention efforts as a key plank of the diversification plan. Perhaps most commonly, practitioners look to activities—like agriculture and tourism—that leverage available assets that they currently control – their land, their people, or their proximity to natural or man-made amenities. These toolbox of development activities are similar to any other economic development goal, but the efforts often focus more on replacing what exists rather creating new growth opportunities. But, replacement efforts rarely serve to actually transform the regional economy. Often, they simply seek to find activities to employ those dislocated in the short term, and many communities have learned that this is a futile effort.

For those communities that are seeking to avoid a crisis (or have accepted the crisis and moved beyond it), the focus tends to be different—emphasizing the possibilities tied to attracting or creating new economic activities rather than retaining the old. For these communities, the economic development toolbox is also the same, but the emphasis may differ. Leaders in these communities are more likely to focus their attention and energy on initiatives designed to encourage new economic activity that will likely have

the potential for longer term pay-off in terms of jobs and wealth creation. This long-term view is likely to be more successful in the long run and is also likely to rely on identifying new competitive advantages the community or region should seek.

Some places understand and describe economic diversity in terms that look beyond simply having firms and workers in multiple industries. These communities emphasize the need for also diversifying their talent base and growing locally-owned firms (that can control their own destiny) through entrepreneurial support efforts. In other instances, local efforts stress initiatives designed to diversify sources of wealth generation by attracting people (e.g., retirees) or developing new assets. Moreover, diversified communities also find effective ways to leverage a broader set of assets beyond those within their own borders in order to further their economic development efforts. In short, no one method for diversifying a local economy and successful diversification efforts involve multiple strategies.

LESSONS FOR DEVELOPMENT PRACTICE

The results of the empirical and case study analyses suggest several lessons about the nature, characteristics, and implications of economic diversity for local and regional economic development in Appalachia and elsewhere in the U.S. These lessons may be viewed as guides for development practice, whether or not the aim is to pursue a concerted diversification strategy.

GROWTH OCCURS THROUGH SPECIALIZATION

Other things equal, a local and regional economic base that is diverse in its mix of economic activity is likely to be more stable over time; as given industries, markets and technologies change, other economic activities have already taken root and are in place to absorb labor and capital released through restructuring. However, significant regional growth is rarely, if ever, driven by the balanced expansion of a broad mix of industries. Rather, growth tends to coalesce around—and be driven by—particular industries, which often drives growth in related industries through firm in-migration, business start-ups, and existing firm expansions. This "unbalanced" growth phenomenon leads to the formation of industry clusters, a focus of local economic development practice and strategy since the early 1990s. Rapidly growing places, particularly those of small or medium size, are likely to appear non-diverse even as their expansion yields abundant job and wealth-creation opportunities.

It follows that a competitive regional economy, and one that is also diverse in comparison to other regional economies of similar levels of development and scale, is likely to be comprised of multiple competitive specializations. The goal should not be simply to somehow encourage the emergence and expansion of a diverse mix of economic activity, but rather to support the competitiveness and growth of a number of specializations or clusters that can serve as the multi-legged foundation for the local economy. Put differently, a diversification strategy is a matter of implementing many successful specialization strategies simultaneously. Those strategies will typically be focused around industries that have already gained a toehold in the place; by doing so, they have created a kind of "revealed competitive advantage." If the location of truly new activities in a region is rare, then the rapid, large-scale location of truly new activities in a region is even more rare.

The complex relationships between diversity, specialization, and growth, and their evolution over time in the context of a specific region's development path, produces "snapshots" of relative diversity that can appear counterintuitive on their face. An example is the finding that a common phenomenon in Appalachia is the nominally diverse county that is growing more slowly or declining faster than less diverse peer counties. What is often happening in such places, particularly those that are small, is that a non-competitive specialization—one that long dominated the mix of employment opportunities—is in decline. What is left is an apparently diverse set of unrelated sectors, some of which constitute stand-alone export-oriented industries and others of which provide business support services to the declining specialization or local services

to the remaining population base. In this case, then, a diverse economic structure may well be the reflection of "what's left," or, in essence, an absence of competitive clusters.

DIVERSIFICATION STRATEGY AS RISK ASSESSMENT AND OPPORTUNITY CAPTURE

The diversity-specialization-growth dynamic suggests two key roles for the local economic developer who wishes to pursue a general goal of building a diversified economic base. The first is to fully assess and understand the "risk" associated with the existing economic base of his or her locality. A highly specialized economy may face comparatively little risk of significant decline over a foreseeable future if robust demand for its goods and services is certain. Alternatively, a diverse economic base can be under threat if multiple industries face significant disruption. An important role for the local economic developer is to fully understand the competitive factors underpinning the economic base and use this knowledge to anticipate possible disruptions that might be countered through development strategies.

The second key role is to scan for economic opportunities—whether through business expansion, entrepreneurship, or attraction strategies, or other economic development initiatives—that might be nurtured through appropriate public sector actions. Regional economic diversification is not akin to financial portfolio diversification; a region cannot choose to actively divest itself of a particular segment of its economy (although it can allow a segment to founder or languish). Instead, it can shift its economic mix primarily by encouraging new industries and activities. In this sense, diversification strategies build on fundamental principles of economic development more broadly.

REGIONALISM SUPPORTS DIVERSIFICATION

The fact that local and regional diversity are rarely independent of one another is one among many cases for regionalism in economic development policy and strategy. For most communities there is at least some value in regional partnerships for economic development. The examination of functional county roles within a larger labor market area and region can help to clarify the necessity and potential content of these arrangements. In order to compensate for local gaps in factors such as workforce skills or infrastructure, individual communities might seek to highlight their ties to other communities in their region that play different functional roles. In the same vein, business recruitment or cluster strategies may be more successful if they highlight the region's resources, not just those of individual communities—an approach that could potentially highlight a variety of workforce and infrastructure resources of interest to a wider variety of businesses. Communities might also benefit from partnering on major infrastructure projects.

For example, a bedroom community with close economic ties to a regional work center may find it in its interest to cooperate with the work center and other surrounding counties in funding transit improvements. As part of regional branding efforts, individual communities and the region as a whole may benefit by highlighting the functional distinctions among the jurisdictions. For example, a campaign that highlights the vibrant

urban centers, peaceful bedroom communities, and outdoor recreation opportunities in a region might be attractive to a diverse workforce and, thus, attractive to employers seeking to provide employees with a high quality of life.

DIVERSIFICATION IS SUPPORTING THE FUNDAMENTALS

Overall, the best diversification strategy is a sound, well-balanced economic development strategy. The case analyses showed that communities that successfully implement diversification strategies often share several common traits. First, they develop their strategies on a solid foundation of analysis and research. Second, they think and operate regionally so as to maximize the resources and assets available to them. Third, practitioners work across silos to create broader networks and coalitions and to leverage networks and expertise. Fourth, successful places put the right leaders and staff in place to ensure effective implementation. As a result, leaders and stakeholders commit to a common vision and goals, display patience, and take selected, calculated risks. Finally, successful places have a process in place not only for developing and implementing their strategies, but also for incorporating new leaders. Economic diversity is a legitimate economic aspiration and goal, but like all economic development goals, it is only accomplished if area leaders and stakeholders thoughtfully and effectively implement their economic development strategies.

Conversely, good diversification strategy is not a single-shot game or narrow focus on business attraction. True industrial recruitment coups are rare. Most growth in employment, whether by existing businesses or new establishments, tends to complement the incumbent economic base in a region while drawing upon regional assets. The 1992 location of a BMW assembly plant in Greenville-Spartanburg provides an illustrative example of growth building on existing assets. While $130 million in state and local government incentives served as the popular explanation for BMW's decision, this focus belied the importance of other factors.

Since the late 1950s, Greenville-Spartanburg had consciously sought to compensate for its declining, domestic textiles industry by attracting foreign investment—focusing first on manufacturers of equipment for the textiles industry and later on a broad assortment of industries ranging from chemicals to automotive supplies. By the time of BMW's site selection decision, the region had become one of the nation's per-capita leaders in attracting foreign investment, with German companies including Michelin, Bosch, and Bertelesmann AG calling the region home (New York Times, 1992; Saporito and Solo, 1992). In addition to creating a friendly business environment for foreign investment, state and regional leaders had made significant investments in infrastructure, particularly a regional airport, and technical education and workforce training programs that proved attractive to BMW (Eichel, 1992; Kanter, 2003). The well-known and much heralded Research Triangle Park in North Carolina serves as an additional example of an economic development success that resulted from at least fifty years of sustained public policy effort, much to the consternation of economic developers seeking to easily replicate the success enjoyed in that region (Feldman and Desrochers, 2003).

DIVERSIFICATION NEEDS INFORMATION

Good information fuels good economic development strategy and, by extension, effective diversification strategy. The local economic developer provides an important economic intelligence function—gathering and interpreting data on economic trends, diagnosing the vulnerability of the local economy based on the market and technological trends buffeting local industries, and working effectively with local businesses to identify bottlenecks and constraints to growth and competitiveness that could be resolved with appropriate policy actions or public sector investments. Diversity metrics like those outlined in this report can be valuable tools if they are used to ask useful questions about the nature of the local economic base. Useful questions are most often revealed by benchmarking local conditions against other places of similar type or character, or which represent "aspirational" targets for local economic development. The web tool that accompanies this study is intended to facilitate this kind of exploratory analysis and benchmarking.

Diversity metrics have to be interpreted carefully, however. If the aim is to have a high diversity score, then diversity metrics are certainly biased in favor of larger, more urban communities. The chief technical underpinning of this tendency is the positive relationship that exists between the number of industry sectors in a region and that region's diversity level. In smaller places, the maximum diversity is limited by the natural tendency for there to be fewer sectors present. Practitioners should consider the natural bias of diversity for larger places and benchmark regional diversity to regions similar in size and urban population characteristics. This approach will allow for the identification of real differences in economic diversity that are not primarily due to size differences. Benchmarking against counties of similar size and character will allow practitioners to identify realistic goals for economic progress, though it may still be beneficial for comparisons to be made with larger places in order to track progress on more ambitious, transformative economic development goals.

Just as it makes sense to benchmark a county's diversity to regions with similar urban or rural characteristics, benchmarking to the right places in terms of similar functional specialization can help to make realistic comparisons that at least partially account for differences in diversity due to the structure of counties' economic specializations. Comparing several counties with similar specializations but very different characteristics related to factors such as economic outcomes and the tenure of economic specializations can also help to assess the trajectory of a region's development, and might provide opportunities for gaining policy insights from the experiences of peer counties.

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APPENDIX: DATA AND METHODS

This appendix provides additional detail on the measurement of economic diversity based on industries, functions, occupations, and knowledge clusters; the geographies used to calculate and aggregate measures of diversity; and the linkages among counties based on commuting ties.

BASE DATA AND METHODS FOR CALCULATING ECONOMIC DIVERSITY

Most of the diversity calculations conducted for this report rely upon county employment estimates acquired from Economic Modeling Specialists International (EMSI). The particular datasets used were "complete" employment estimates for 2009 and the third quarter of 2012, along with "covered" employment estimates for 2009 and 2012.[18] Each dataset provides an individual row of data for each six-digit North American Industrial Classification System (NAICS) industry within a county, with these rows detailing the estimated employment and earnings in the industry and county in question. Based on the Bureau of Labor Statistic's Quarterly Census of Employment and Wages, the covered employment dataset contains estimates for jobs covered by federal or state unemployment insurance systems. In addition to earnings and employment estimates by industry, the covered employment dataset provides estimates of the number of establishments by industry and county, although the 2012 dataset includes establishment estimates from 2011. For this report, the covered employment dataset was only used to conduct analyses that relied upon establishment estimates.

The complete employment dataset includes all employment in the covered dataset along with wage-and-salary employment exempt from unemployment insurance coverage—such as military and railroad employment and employment as a real estate or insurance agent—and self-employment that accounts for all or a portion of an individual's income. For both datasets, EMSI relies upon a variety of data sources from the Bureau of Economic Analysis, U.S. Census Bureau, and Bureau of Labor Statistics and proprietary algorithms to produce estimates of employment that do not suppress employment and earnings numbers for any county or industry. With a considerable number of employment statistics suppressed to prevent the release of confidential firm information, these datasets allow for a more complete analysis of county employment than allowed for by standard federal data releases (Isserman and Westervelt, 2006).

ENTROPY MEASURE OF ECONOMIC DIVERSITY

The entropy measure of diversity was used to calculate industry-, function-, occupation-, and knowledge--based measures of economic diversity across U.S. counties and a variety of other geographies (Malizia & Ke, 1993). These metrics were calculated according to Formula 1:

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[18] See http://www.economicmodeling.com/data/ for more information on these datasets

$$(1) \quad ENTR = \sum_{i=1}^{k} (p_i) \ln\left(\frac{1}{p_i}\right)$$

where there are i=1 to k industries and p_i is the share of economic activity (i.e., employment) in the ith industry. The products of industry shares of economic activity and the natural log of the inverse industry shares of economic activity are summed to arrive at the final entropy index measurement. The index has a minimum value of 0 when all economic activity is within one industry, and the value increases as the number of industries increases and the distribution of economic activity across these industries becomes more equal.

Where entropy measures were calculated for non-county geographies (e.g., the United States as a whole or individual states), the employment data was summed by industry and the geography in question before the entropy calculation was performed. Unless otherwise noted, economic diversity statistics cited in this report were calculated based on the entropy values of individual counties located within a geography or aggregation of interest—they do not represent the calculation of entropy based on all economic activity within a given geography. For example, the average entropy by ARC subregion represents the mean value of all county entropy values within each subregion, not the calculation of entropy across all economic activity in the subregions.

MEASURING INDUSTRY-BASED ECONOMIC DIVERSITY

Industry-based economic diversity calculations depend upon EMSI's complete employment dataset. This section details the procedures used to calculate measures describing industry-based economic diversity.

BASE DIVERSITY OF EARNINGS AND EMPLOYMENT

The entropy measure serves as the base metric of industry-based economic diversity. Measures were calculated for employment, with employment by six-digit NAICS industry serving as the share of total economic activity (p_i) specified in Formula 1.

ANALYZING CHANGES IN DIVERSITY

This analysis relies upon 2009 and 2012 complete employment estimates from EMSI and 1999 suppression-adjusted employment data prepared by Isserman and Westervelt (2006) to calculate changes in industrial diversity. Diversity changes were examined for the periods 2009-2012 and 1999-2009. For the 1999-2009 analysis, the industries included with the 1999 dataset were used as the baseline for comparison when accounting for differences between the Isserman and Westervelt (2006) and EMSI datasets.

MEASURING FUNCTION-BASED ECONOMIC DIVERSITY

A region's economic function or functions represent the collection of broad economic activities that the region's workforce and firms engage in. Practically, functions can be

identified by grouping industries together into categories that are broadly similar on factors such as inputs, outputs, and/or the technological or skill requirements necessary to perform the work customary to these industries. Grouping industries according to function, rather than simply accepting the NAICS industry categories, can help to broadly characterize the economic roles a county plays in its region; provide insight into the economic relationships and similarities counties have with other regions; identify factors that make regions comparatively better fits for certain economic activities; and speak to the broader economic and demographic forces that are likely to impact a county's economic prospects.

This section describes the methods used to classify industries into functional groupings, categorize counties according to their functional specialization, and calculate county-level, function-based economic diversity.

CREATING FUNCTIONAL INDUSTRY CLASSIFICATIONS

One purpose of a functional industry classification is to broadly define the types of work that are prevalent in a region. For example, Thompson and Thompson (1987) suggest grouping industries and occupations into functional classes to identify regional specializations in "routine work, precision operations, central management, research and development, and entrepreneurship" (p. 558). In an examination of the rise of services as a proportion of employment, Noyelle (1983) advanced a functional classification system for services "based on the type of outputs (intermediate or final outputs) and the institutional setting under which services are provided (private, public, or nonprofit sectors)" (p. 282). Lawrence (1984) classified manufacturing industries on the basis of the primary end use of the product (e.g., intermediate goods; consumer durables; producer durables; consumer nondurables) and the necessary inputs to the industry (e.g., research and development expenditures; scientists and engineers; capital-, labor-, and resource-intensive).

This analysis draws primarily from the work of Lawrence (1984) and Noyelle (1983) to categorize industries according to functional types. In an effort to focus on the economic base of counties, industries that often serve local populations, such as retail trade, personal services, doctor's offices, local government, and construction, were excluded from the analysis of functions. Eleven functional categories were delineated and Table A1 lists the category titles and selected examples of industries within each class.

Table A1: Functional Categories with Selected Industry Examples

Functional industry category NAICS code and title		
Agriculture & resource extraction		
11 Agriculture, Forestry, Fishing and Hunting	21 Mining Quarrying, and Oil and Gas Extraction	
Capital-intensive manufacturing		
311 Food manufacturing	312 Beverage and tobacco product manufacturing	313 Textile mills
314 Textile product mills	315 Apparel manufacturing	316 Leather and allied product manufacturing
321 Wood Product Manufacturing	322 Paper Manufacturing	323 Printing and Related Support Activities
327 Nonmetallic Mineral Product Manufacturing	331111 Iron and steel mills	332116 Metal stamping
333414 Heating equipment (except warm air furnaces) manufacturing	335212 Household vacuum cleaner manufacturing	336111 Automobile manufacturing
Corporate management & administration		
551111 Offices of Bank Holding Companies	551114 Corporate, Subsidiary, and Regional Managing Offices	561110 Office Administrative Services
Distributive services		
22 Utilities	42 Wholesale trade	48-49 Transportation and warehousing
517110 Wired telecommunication carriers	517410 Satellite telecommunications	518 Data processing, hosting, and related srevices
Engineering-intensive manufacturing		
324110 Petroleum refineries	325110 Petrochemical manufacturing	331311 Alumina refining
332994 Small arms manufacturing	333291 Paper industry machinery manufacturing	333314 Optical instrument and lens manufacturing
334 Computer and Electronic Product Manufacturing	335121 Residential electric lighting fixture manufacturing	336411 Aircraft manufacturing
Finance, insurance & real estate		
52 Finance and insurance	53 Real estate and rental and leasing	
Government		
901149 U.S. postal service	901199 Federal civilian, except U.S. postal service	902999 State government, excluding education and hospitals
92 Public administration		
Healthcare		
621511 Medical laboratories	622110 General medical and surgical hospitals	622210 Psychiatric and substance abuse hospitals
623110 Nursing care facilities	902622 Hospitals, state government	903622 Hospitals, local government
Higher education		
611310 Colleges, universities, and professional schools	902612 Colleges and universities, state government	903612 Colleges and universities, local government
Knowledge-intensive business services		
541110 Offices of Lawyers	541330 Engineering services	541810 Advertising agencies
Media, entertainment & recreation		
511 Publishing Industries (except Internet)	512 Motion Picture and Sound Recording Industries	515 Broadcasting (except Internet)
519 Other Information Services	71 Arts, Entertainment, and Recreation	721120 Casino hotels

CATEGORIZING COUNTIES BASED ON FUNCTIONAL INDUSTRY SPECIALIZATION

The concept of extra jobs quantifies specializations in terms of the absolute number of jobs employed in a particular category above or below the national average. To assign a single functional industry specialization to all counties, an extra jobs value was calculated for the groups of industries comprising each functional category in each county. The functional category with the largest number of extra jobs was assigned as the functional industry specialization for the county in question.

For each county, extra jobs were calculated for each functional category as shown in Formula 2:

$$\text{(2)} \ Extra_i = \left(\frac{E_{ic}}{E_c} - \frac{E_{in}}{E_n} \right) E_c$$

where E_{ic} is employment in the functional category of interest (*i*) for a county (*c*), E_c is total employment in the county of interest, E_{in} is the nation's employment in the functional category of interest, and E_n is total national employment.

CALCULATING FUNCTION-BASED ECONOMIC DIVERSITY

The entropy measure was used to calculate function-based economic diversity. The metric was calculated for each county with employment by functional category serving as the share of total economic activity (p_i) specified in Formula 1.

MEASURING OCCUPATION-BASED ECONOMIC DIVERSITY

Understanding what a region "does"—in addition to what a region "makes"—can help an analyst to better gauge the adaptability and suitability of a region to shocks and opportunities (Feser, 2003; Thompson and Thompson, 1987). In part, knowing what a region "does" requires data on the occupations of workers employed in the region's industries and the skills required to perform those occupations. This section reviews the methods used to estimate county-level employment by occupations. These occupational employment estimates are then used as the basis for the calculation of an occupation-based measure of economic diversity.

DEFINING OCCUPATION GROUPS AND CALCULATING OCCUPATION-BASED ECONOMIC DIVERSITY

Occupation-based economic diversity uses the 96 minor occupational groups defined in the Bureau of Labor Statistics' 2000 Standard Occupational Classification[19] as the units of analysis in the calculation of entropy, with employment by minor occupational group serving as the share of total economic activity (p_i) specified in Formula 1. According to the Bureau of Labor Statistics, occupations are grouped based on similarity of "work performed, skills, education, training, and credentials." Example occupational groups including agricultural workers, life scientists, secretaries and administrative assistants, and top executives. To estimate employment by minor occupational grouping, data from the Bureau of Labor Statistics' national Staffing Pattern Matrix were used to translate county employment by industry data to county-level employment by occupation.

MEASURING KNOWLEDGE-BASED ECONOMIC DIVERSITY

To estimate the diversity of workforce knowledge at the county level, occupation-based knowledge clusters were derived and employment across these clusters provided the

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[19] See http://www.bls.gov/soc/2000/socguide.htm

basis for an additional entropy calculation. Knowledge clusters are 12 groups of occupations categorized based on similarities in the type and level of knowledge required to work in these professions. Feser (2003) details the procedures used to identify these clusters. Again, the Bureau of Labor Statistics' national Staffing Pattern Matrix were used to translate county employment by industry data to county-level employment by knowledge cluster. Employment in government industries, including military employment, is not accounted for by these knowledge clusters. Employment by knowledge cluster serves as the share of total economic activity (p_i) specified in Formula 1. Table A2 lists the 12 knowledge clusters and provides examples of common occupations and average education or training levels associated with them.

Table A2: Illustrative Descriptions of Knowledge Clusters

Agricultural & life sciences
Common professions in this cluster include veterinarians, veterinary assistants and technicians, medical and clinical laboratory technicians, and supervisors of farming, fishing, and forestry workers. On average, these jobs require just over 3 years of post-secondary education—the 3rd highest average among the 12 knowledge clusters.

Arts, entertainment & spectator sports
Common professions in this cluster include photographers, musicians, actors, writers, fine artists, and reporters. On average, these jobs require just less than 2 years of post-secondary education—ranking 7th highest among the 12 knowledge clusters.

Construction & specialized mechanical
Common professions in this cluster include carpenters, maintenance workers, construction laborers, and automotive service technicians and mechanics. On average, these jobs require less than 1 year of post-secondary education—ranking 10th among the 12 knowledge clusters. The average length of on-the-job training required for

Education, counseling & therapy
Common professions in this cluster include teachers, fitness trainers, clergy, physical therapists, and social workers. On average, these jobs require nearly 3.5 years of post-secondary education—the highest average among the 12 knowledge clusters.

Engineering, architecture & natural resource science
Common professions in this cluster include civil, mechanical, and industrial engineers, electricians, architectural drafters, architects, and chemists. On average, these jobs require approximately 3.25 years of post-secondary education—the 2nd highest average among the 12 knowledge clusters. The average length of on-the-job training

Information technology & communications
Common professions in this cluster include computer support specialists, software engineers, systems analysts, and database and network administrators. On average, these jobs requires just less than 3 years of post-secondary education—the 4th highest average among the 12 knowledge clusters.

Legal, clerical & administrative
Common professions in this cluster include office clerks, cashiers, bookkeepers, secretaries, lawyers, and financial advisors. On average, these jobs require just over 1 year of post-secondary education—ranking 8th among the 12 knowledge clusters.

Management & finance
Common professions in this cluster include general managers, accountants, first-line supervisors, real estate agents, and securities sales agents. On average, these jobs require nearly 2.5 years of post-secondary education—the 6th highest average among the 12 knowledge clusters. The average length of on-the-job training required for these

Medical science & health services
Common professions in this cluster include nurses, nursing aides, physicians, dental assistants, and pharmacists. On average, these jobs require just over 2.5 years of post-secondary education—the 5th highest average among the 12 knowledge clusters.

Semi-skilled service
Common professions in this cluster include retail salespersons, customer service representatives, waiters and waitresses, stock clerks, child care workers, and food preparation workers. On average, these jobs require less than 1 year of post-secondary education—ranking 9th among the 12 knowledge clusters.

Skilled, semi-skilled labor & machine operation
Common professions in this cluster include janitors, laborers, landscapers and groundskeepers, farmworkers, and welders. On average, these jobs require less than 1 year of post-secondary education—ranking 11th among the 12 knowledge clusters.

Transportation, distribution, law enforcement & safety
Common professions in this cluster include truck drivers, security guards, and pilots. On average these jobs require less than 1 year of post-secondary education—the lowest average among the 12 knowledge clusters.

CATEGORIZING COUNTIES BASED ON KNOWLEDGE CLUSTER SPECIALIZATION

Modeling the methods used to classify counties by functional specialization, counties were also categorized by knowledge cluster specialization. For this application, the 12 knowledge clusters substitute for the category of interest (*i*) in formula 2, above. A knowledge cluster specialization is assigned to a county based on the one cluster that accounts for the most extra jobs relative to the other eleven clusters.

GEOGRAPHIC AGGREGATIONS

To examine the differences in economic diversity across urban and rural counties, we adopted the urban-rural typology method suggested in Isserman (2005). This method required the classification of counties as one of four county characters—Urban, Mixed Urban, Mixed Rural, or Rural—based on the population density of the counties and the relative size of urban and rural areas within the counties. To complete the classification, we used U.S. Census 2010 data on total population, rural population, urbanized area and urban cluster population, and total urban population by county. Census information on land area by county was used to calculate population density. Finally, the Census 2010 Urban Area to County Relationship File Layout was used to determine the population of portions of urban areas located completely within individual counties.[20] This file splits all urban areas based on county boundaries and reports the population associated with each portion.

We classified counties according to the following criteria:

> *Rural county*: (1) The county's population density is less than 500 people per square mile, and (2) 90 percent of the county population is in rural areas or the county has no urban area with a population of 10,000 or more.

> *Urban county*: (1) The county's population density is at least 500 people per square mile, (2) 90 percent of the county population lives in urban areas, and (3) the county's population in urbanized areas is at least 50,000 or 90 percent of the county population.

> *Mixed rural county*: (1) The county meets neither the urban nor the rural county criteria, and (2) its population density is less than 320 people per square mile.

> *Mixed urban county*: (1) The county meets neither the urban nor the rural county criteria, and (2) its population density is at least 320 people per square mile. (Isserman, 2005, p. 475)

DETERMINING COMMUTING LINKAGES

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[20] See http://www.census.gov/geo/maps-data/data/ua_rel_layout.html for a description of the Census 2010 Urban Area to County Relationship File Layout contents.

In most U.S. counties, workers, firms, and consumers depend upon employment, shopping, and service opportunities that lie both within and outside their home county. While there are many potential regions that could be defined to approximate the multiple economic relationships among places (e.g., firm-to-firm; worker-to-employer; consumer-to-store), the analysis of commuting patterns provides one method for defining inter-county economic relationships.

Using 2006-2010 county-to-county commuting flow data prepared by the U.S. Census Bureau, we defined commuting sheds for each U.S. county.[21] A county's commuting shed includes all those counties that account for a significant share of the journey-to-work commuting flow headed toward or away from that county. Journey-to-work data from the U.S. Census Bureau's 2006-2010 American Community Survey were used to determine membership in a commuting shed. Specifically, counties are included in a commuting shed if they account for at least five percent of the worker flow toward or away from the county in question. Commuting sheds range in size from one to nine counties in size, including the county of interest. In order to calculate measures of commuting shed diversity, employment by industry data for all counties in a commuting shed were combined.

PRESENTATION OF METRICS

The diversity metrics calculated for this analysis cannot be easily interpreted unless counties are compared relative to one another or the overall distribution of county diversity values. To accomplish these comparisons and allow for interpretation, diversity measures were standardized and classified according to the procedures described in this section.

DATA STANDARDIZATION

For each diversity measure calculated on a county-by-county basis, data standardization required three steps. First, the diversity measure was calculated, resulting in a raw diversity score for each county. Second, the mean, raw diversity value was calculated for each measure by summing the raw diversity values across all counties and dividing by the number of counties. Third, each county's raw diversity value was divided by the mean, raw diversity value, resulting in a standardized value for each county. Standardized values can be interpreted as follows:

- A standard value (X) less than 1.0 is $(1 - X) * 100$ percent less diverse than the mean county diversity value (e.g., a standard value of 0.67 is 33 percent less diverse than the mean diversity value);

- A standard value of 1.0 is equivalent to the mean county diversity value;

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[21] See http://www.fhwa.dot.gov/planning/census_issues/ctpp/ for information on Census Transportation Planning Products

- A standard value (X) greater than 1.0 is (X - 1) * 100 percent more diverse than the mean county diversity value (e.g., a standard value of 1.25 is 25 percent more diverse than the mean diversity value).

Z-SCORES CLASSIFICATION

While standardized diversity scores serve as a simple indicator of the relationship of a county's diversity to the average diversity, z-scores provide information on the relationship of a value to the mean and the value's placement relative to the distribution of diversity (or another measure, such as average establishment size) across all counties. Z-scores for each value and diversity measure were calculated as follows:

- Calculate the mean ($\bar{x}$) and standard deviation (s) for a particular diversity measure;

- For each diversity value (x_i), calculate the difference (d_i) between the value and the mean value ($d_i = x_i - \bar{x}$);

- Calculate the z-score for each county's diversity value (z_i) to equal the quotient of the difference between the county's value and the mean value and the standard deviation ($z_i = d_i/s$)

While the distributions of the diversity values vary by measure, and none of the measures have a perfect normal distribution, z-scores can be used to provide a shorthand classification of individual values into groups with high, low, or about average values. Z-scores were classified into groups as follows:

- Very high ($z_i >= 2$)

- High ($1 <= z_i < 2$)

- Above average ($0 < z_i < 1$)

- Below average ($0 > z_i > -1$)

- Low ($-1 >= z_i > -2$)

- Very low ($z_i <= -2$)

To control for county character, z-scores were also calculated according to the distribution of diversity scores across each of the four county character categories. Each county was then classified on the very low-very high scale according to its z-score based on the distribution of values in the same county character grouping. Where county character-based z-scores were used to classify counties, tables or maps are identified by language indicating the displayed values control for county character.

Economic Diversity in Appalachia

Case Studies in Economic Diversification

February 2014

Prepared for the Appalachian Regional Commission

R|E|A|L

CREC — CENTER FOR REGIONAL ECONOMIC COMPETITIVENESS

CONTENTS

ABOUT THIS REPORT

This report is one of four documents prepared as part of an extensive analysis of economic diversity for the Appalachian Regional Commission by the University of Illinois at Urbana-Champaign's Regional Economics Applications Laboratory and the Center for Regional Economic Competitiveness, with assistance from the RUPRI Center for Rural Entrepreneurship and EntreWorks Consulting. Project leaders were Edward Feser, Ken Poole, Mark White, and Geoffrey Hewings, with Troy Mix serving as Project Manager.

Authors of this report were Mark White, Deb Markley, Erik Pages and Ken Poole.

In addition to this report, the documents include a summary report (*Economic Diversity in Appalachia: Statistics, Strategies, and Guides for Action*), a guide to the web tool (*A Practitioner's Guide for Planning and Analysis with the Appalachian Economic Diversity Web Tool*), and a technical report detailing methods, data, and additional findings (*A Statistical Portrait of Economic Diversity in Appalachia*). All reports associated with the project can be found here:
http://economicdiversityinappalachia.creconline.org/Report/.

INTRODUCTION: WHY STUDYING ECONOMIC DIVERSITY IS IMPORTANT TO APPALACHIA

Mines and mills have dominated the economies of many Appalachian communities for many years. The dependence on the employers in these industries mean that some areas are highly vulnerable to economic shocks resulting from boom and bust cycles. When those industries decline, communities relying on one or two companies are typically poorly positioned to chart a new economic future. Recognizing this challenge, Appalachian leaders frequently cite greater economic diversity as a fundamental development goal. These leaders hope to better position their communities to mitigate economic risks or seize emerging new growth opportunities. Much like individual investors seeking a diverse financial portfolio, a community must also seek to develop a broad base of employment and wealth generators to comprise its economic portfolio. Diversity-driven strategies are therefore one way that local leaders tend to build a more stable economy in anticipation of economic cycles as well as a strategy for responding to crises when they occur.

Demonstrating a clear connection between anticipated outcomes from economic diversification and specific strategies to promote economic diversity can prove particularly difficult. Some communities begin with a greater mix of industries than others. At the same time, some localities serve as regional trading centers while others do not. Some areas attract more in-migrants because they are near growing urbanizing areas.

Furthermore, economic luck (both good and bad) can also influence the economic mix and diversity of a local economy. For instance, the loss of a major employer often leaves a region's economy more diverse because the loss often eliminates an important company that represented an "economic specialty." This is especially true in a rural or small metro area where only a few companies drive the overall economy. In such cases, diversification can bring on wrenching changes and may not necessarily lead to more jobs. At the same time, diversification may result from intentional efforts designed to attract or develop alternative employment options for local residents or to help emerging industries grow. But for larger economies, these efforts alone may be inadequate to the task if they cannot leverage natural economic growth patterns that complement the diversification efforts.

In order to understand this issue in a more applied manner, we sought to identify the key features of strategies in diverse communities, or communities that have experienced increases in diversity and economic growth. In order to better understand these issues, the University of Illinois/CREC team analyzed ten case studies in ten Appalachian counties located in different parts of the region. This report summarizes the findings from this research by laying out the motivations for economic diversification and several ways in which communities might pursue diversification. That analysis includes the ensuing discussion, which provides a brief review of the process for selecting the case studies followed by a synopsis of the findings in each of the ten locations. Each case study offers a brief background about the county and its

economy, but the cases primarily lay out the elements of each county's economic diversification efforts. The report concludes with a review of common themes and trends discovered or validated from the case study research.

KEYS TO ESTABLISHING A MORE DIVERSE ECONOMY

The case study research revealed that no single strategy represents a "silver bullet" leading to a more diverse economy. Each of the case study communities face very different situations that offer unique opportunities. Not surprisingly, communities use a variety of approaches, often simultaneously, to transform their economies and create more opportunities. The five broad diversification strategies identified by the research team are summarized below.

Create collaborative regional planning and implementation systems focused on economic diversification

Structured regional planning processes can motivate and guide the development and implementation of economic diversification strategies. Relationships are important for advancing any kind of economic development goal, and building these relationships throughout the region is a process that requires the time and energy of local leaders. An environment that promotes regional collaboration and planning not only allows for intentional action and accountability, but can better position regions to take advantage of opportunities as they arise. Having these regional relationships established and in place allow places to react to federal or state funding opportunities as they arise.

Build local/regional economic ecosystems that support diversification

These strategies seek to create an ecosystem that is supportive of a wide array of different activities, as well as increasing the region's capacity to support business formation and growth. Common strategies include creating an ecosystem more supportive for entrepreneurs. These strategies involve promoting entrepreneurial opportunities, providing technical assistance for entrepreneurs, and creating infrastructure or space, such as business incubators (or specialized incubators like kitchen incubators for food companies). Investing in entrepreneurship increases the likelihood that new companies will emerge in the region to replace those that inevitably die as a natural part of the economic cycle. Similarly, many regions may seek to invest in infrastructure, whether it involves building interstate-quality roads, constructing modern facilities in which businesses can expand their output, or improving regional broadband capacity to meet the needs of small and medium-sized businesses.

Connect regional assets to external demand/markets

Successful economic development strategies seek to maximize available assets. Many places may not have significant assets from which to build, but they can leverage assets located in neighboring counties (e.g., colleges and universities, large employment centers, significant tourist attractions) to support local growth. A more regional approach to inventorying assets can allow communities to better access additional

resources, expertise, and market demand. Similarly, many places pursue strategies that seek to grow existing specializations and to attract new ones through cluster development strategies. This may occur by connecting local firms to larger supply chains or helping local firms seek out export markets. These efforts might also involve promoting tourist attractions in nearby metro areas as part of their local efforts to attract visitor, or connecting local food growers to large institutional buyers in the form of nearby hospitals or universities. The key to this approach is to recognize that assets located in other places may create economic value locally.

Enhance the skills and capacity of the area workforce

A wide array of workforce skills is necessary to support a diverse economy. As a result, regions need to broaden and upgrade the regional skill base or make efforts to attract workers with necessary skills to the area. Strategies for diversifying the regional skill base often involve making investments in education and training, creating greater communication between educational institutions and employers, and promoting area employment opportunities to talent that may not already live in the area.

Encourage reinvestment of wealth within the region

Capturing greater local wealth is an important element to a stable and sustainable economy. There are multiple strategies for encouraging reinvestment. At the most basic level, local business retention and expansion (BRE) activities undertaken by most economic development organizations are intended to help local firms grow and thrive where they are already located. Sound BRE principles often overlap with many of the strategies mentioned above (e.g., workforce training, infrastructure improvements), but the key element is the open communication between business and area stakeholders and service providers. Additionally, communities might work with local philanthropists and foundations to enlist funding support for local projects. Reinvestment strategies may also focus on connecting local demand for goods and services with local suppliers to increase the amount of money recycled within the community.

These approaches are not mutually exclusive and as the case studies demonstrate, many communities seek to increase their economic diversity by taking multiple approaches simultaneously. Many of these strategic approaches will feature prominently in the case studies profiled later.

IDENTIFYING CASE STUDY CANDIDATES

Determining which counties would represent useful cases for study involved a process that included several steps. The research team first assembled data about the economies of all U.S. counties to assess their relative economic diversity and growth patterns. The team then identified a preliminary group of candidate counties for study by analyzing three key data inputs:

- Measurements of county-level economic diversity allowed the research team to identify candidate counties that either had above-average diversity characteristics, or counties that exhibited an increase in economic diversity.

These counties reflected an initial list of locations where economic diversity may be leading to some kind of economic change. To measure county-level economic diversity, the research team used employment by four-digit NAICS industry group provided by Economic Modeling Specialists International (EMSI).[1] These data enabled the calculation of "entropy of employment" for the time period following the recession (2009 and 2012). One such indicator takes the shares of each type of activity in the local economy, multiplies them by the logarithms of their inverses, and sums up the values.[2] The mathematical details are less important than the result: the measure yields a higher value for places with a broader and more even mix of economic activities, and it registers as zero in the hypothetical case of a location with only a single type of economic activity. The value will be quite low for a community with just a few industries that account for most economic activity. Conversely, the value will be high for a community with more balanced employment across many industries. Measuring this diversity indicator for every county, the team calculated an index and then categorized the counties into percentile groups.

- Data from the Bureau of Economic Analysis' *Regional Economic Accounts* were used to calculate and rank counties according to their change in employment and per capita income over the periods 2002-2009 and 2010-2011.[3] Using these data, the research team conducted a shift-share analysis that estimated employment changes that could be attributed to broad national economic trends, unique industry trends, and regional economic competitiveness factors.[4] The research team considered locations that experienced significant employment changes that could be attributed to regional conditions as potentially good candidates for understanding what local leaders could do to foster economic growth. These represented potentially good examples of how successful local economic development policy interventions might influence actual outcomes that resulted in greater economic diversity. These data were aligned with ARC's index-based county economic classification system that uses three economic indicators—three-year average unemployment rate, per capita market income, and poverty rate. ARC uses these indicators to categorize all ARC counties as either "distressed," "at-risk," "transitional," "competitive," or "attainment." That classification is updated annually. For the purposes of this study, ARC's Fiscal Year 2013 designations are used to describe the studied counties.[5]

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[1] "EMSI Data," Economic Modeling Specialists International, http://www.economicmodeling.com/data/.

[2] This is called an entropy measure of diversity. A more detailed description of the methods and findings summarized in this section is provided in the companion technical report *Statistical Portrait of Economic Diversity in Appalachia*.

[3] "Regional Economic Accounts," Bureau of Economic Analysis, U.S. Department of Commerce, http://www.bea.gov/regional/

[4] Blakely, E. J., & Leigh, N. G. (2009). *Planning local economic development: Theory and practice*. Sage Publications, Incorporated.

[5] Appalachian Regional Commission, Distressed Designation and County Economic Status Classification System, FY 2007 – FY 2014, website, accessed August 2013. http://www.arc.gov/research/SourceandMethodologyCountyEconomicStatusFY2007FY2014.asp

- The research team also considered data on industry dependence, location, and urban and rural characteristics in order to identify locations relevant to conditions in Appalachia's rural, distressed counties. The researchers used a methodology developed by Andrew Isserman that classified counties as either: "Rural," "Mixed Rural," "Mixed Urban," or "Urban," based primarily on their population density characteristics according to U.S. Census 2010. [6] In addition, reporting the USDA Economic Research Service's county typology codes for 2004 provided insight into counties functional specializations and dependence on a particular type of economic activity (e.g., manufacturing, government). [7] To reflect the unique strategies that may arise from the presence of higher education, the team also considered the distance from each county to the nearest research university. [8] Finally, counties were also classified according to their location in the ARC region and particular in ARC sub-regions.

These data on diversity and economic change were assembled for all U.S. counties, but smaller lists of growing and diverse or diversifying rural counties were also generated to assist case selection. Combined, these data elements served as inputs in the research team's process of compiling a list of preliminary candidate case study counties. Using these data and metrics, the project team identified 32 candidate counties that displayed evidence of measured diversification, and/or growth. These candidate counties were initially drawn from both the ARC region and beyond.

CRITERIA FOR SELECTING CASE STUDIES

As part of the effort to narrow the candidates, the team undertook initial research on the economic make up and the economic development policies being implemented in these counties. This revealed whether the county or its broader region had identified economic diversity as an issue or whether the county was undertaking or participating in initiatives to strengthen and diversify the county and/or region's economic base. The subsequent selection criteria then took into consideration the following factors:

- Whether the county or its surrounding region had a current economic development strategy
- Whether the county leaders were engaged in some kind of meaningful economic development efforts, or
- Whether the county was participating in current regional initiatives, such as federal funding opportunities provided through the Rural Jobs and Innovation

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[6] Isserman, Andrew M. (2005). In the National Interest: Defining Rural and Urban Correctly in Research and Public Policy. *International Regional Science Review*, 28(4), 465-499.

[7] "County Typology Codes," Economic Research Service, U.S. Department of Agriculture, 2004, http://www.ers.usda.gov/data-products/county-typology-codes.aspx.

[8] "The Carnegie Classification of Institutions of Higher Education," Carnegie Foundation for the Advancement of Teaching, 2012, http://classifications.carnegiefoundation.org/.

Accelerator grants[9] or HUD Sustainability grants (reflecting an assumption that the county is proactively engaged in collaborative activities in order to successfully win one of these Federal grants).[10]

Based on this preliminary research and consultation with ARC staff, the research team selected ten counties for case studies. It is important to note that these case studies are not necessarily examples of best practices; some case studies are of counties with very high levels of economic diversity and others have very low diversity. The ultimate goal was to select a set of case studies that spoke to a wide range of diversity-related issues.

The project team conducted the case study research through a series of site visits and phone interviews in April and May of 2013. During the course of these case studies, the project team spoke with a wide array of stakeholders including local economic development and planning organizations, educational institutions, community groups, county and local government, and representatives from the business community. The stakeholders interviewed were asked about their economic development activities, and the role that economic diversity plays in motivating those activities. The case study findings are described in the next section.

CASE STUDY FINDINGS

The ten cases studies selected for this analysis represent a number of aspects related to the issue of economic diversity. As noted above, these counties include some that have diverse economies, some that have much more specialized economies, and some that have experienced relatively significant changes in diversity over time. The cases also include examples of both urban and rural counties throughout the ARC region. Additionally, the cases include counties with a wide mix of functional specializations, driven by manufacturing, education, or extractive industries as well as a few counties with no discernible dominant industry. The counties profiled include:

- Tioga County, NY
- Lycoming County, PA
- Garrett County, MD
- Upshur County, WV
- Knott County, KY
- Washington County, VA
- Rutherford County, NC
- Pickens County, SC
- Lauderdale County, AL
- Oktibbeha County, MS

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[9] http://www.rurdev.usda.gov/RuralJobsAcceleratorAbout.html

[10] http://portal.hud.gov/hudportal/HUD?src=/program_offices/sustainable_housing_communities/sustainable_communities_regional_planning_grants

For each of these case studies, the analysis begins with a background discussion about the county and its economy. The case studies, however, focus primarily upon how each community thinks about the issue of diversity and the actions taken to achieve greater economic diversification. The cases also highlight any key issues or lessons learned from each county's individual experience.

TIOGA COUNTY, NY

Tioga County is a "rural" county (as defined by the Isserman 2005 typology) located in New York State's southern tier region. Its largest community is Owego, NY, but given that it is situated between Binghamton, Ithaca, and Elmira, it primarily serves as a bedroom community to those relatively larger metro areas. In fact, according to the U.S. Census Bureau, almost 75 percent of workers living in Tioga County work outside of the county, with most commuting to Broome County (Binghamton) to the east. The county has a long history of relying heavily on single, large employers. In the past it was Endicott Johnson, then IBM, and now Lockheed Martin.

Tioga County experienced a large increase in employment diversity between 2009 and 2012. Tioga County moved from having below average economic diversity (30th percentile of counties nationally) to near average diversity (46th percentile). In most instances, large increases in diversity during this particular economic period resulted from major recession-inspired economic shocks—such as the loss of one major employer or significant downsizing in one dominant industry.[11] This has been the case in Tioga County, where Lockheed Martin recently employed as many as 4,000 employees, but lost nearly 1,600 jobs due to the company's loss of the Marine One Presidential Helicopter contract. These job losses highlighted the extent to which the county relies upon this one employer, and in a sense, shows how the county faces a crisis of diversity.

Tioga County's 2010 Economic Development Plan[12] (approved in 2005) listed the erosion of the county's economic base as a critical challenge. The plan also identified greater diversity as an economic goal and sought to target other activities such as tourism, wood products, agriculture, electronics, and metal fabrication for development. Recently, Tioga County received some modest state funding through the 2012 New York State Regional Economic Development Councils awards to renovating buildings in the Town of Nichols and to support two multi-county initiatives aimed at developing tourism and food processing.

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[11] To illustrate this point, consider that the U.S. county with the greatest percentile change in diversity between 2009 and 2012 was Clinton County, OH where DHL closed a major distribution hub that had employed 7,000 people (representing about 30 percent of that county's total employment). Within the Appalachian Region, other large increases in diversity were found in places like Whitfield County, GA—home to Dalton, GA and a declining carpet manufacturing industry.

[12]

http://www.tiogacountyny.com/images/stories/PDFs/departments/edp/tioga2010planF.pdf

ECONOMIC DEVELOPMENT AND DIVERSIFICATION STRATEGIES

Tioga County's diversification and economic development efforts rely on practitioners operating in a collaborative manner. Given its small size, the county lacks the resources to pursue extensive business recruitment and attraction. Moreover, these activities would not necessarily be appropriate given its rural character. Instead, county economic development stakeholders focus on strengthening relationships both locally and regionally. Locally, area stakeholders make continuous efforts to build cohesion amongst local service providers. The goal is to provide a 'no wrong door' approach to providing business assistance to Tioga County companies. Members of this stakeholder network know their respective roles and responsibilities and can refer companies to the office that can best meet their needs. Therefore, if a business has a land-use question, they know to contact the County Department of Economic Development and Planning, and if they have a question about certain types of industrial loan programs they can be directed to the Tioga County Industrial Development Agency. Building these connections has also helped to support entrepreneurial efforts. For instance, potential entrepreneurs can receive mentoring from SCORE (Service Corps of Retired Executives) representatives. Similarly, further technical assistance is available by directing entrepreneurs to the Small Business Development Center at nearby Binghamton University in Broome County. The ultimate goal is to avoid having a fractured system.

Further efforts are being made to build regional relationships as well, especially with Broome County (Binghamton) to the east, and Chemung County (Elmira) to the west. These efforts have largely centered on information sharing. This often plays out when dealing with businesses that are looking to relocate across county lines. By having these open lines of communication, these counties can avoid wasteful beggar-thy-neighbor activities by not providing incentives to companies that are staying in the region, but just changing their address. These relationships have been strengthened in part due to stakeholder participation in the Southern Tier Regional Economic Development Council (one of ten councils tasked with developing long-term regional economic growth strategies).

Tioga County has further applied a regional lens, by looking at opportunities available in neighboring Pennsylvania. New York State currently bans the drilling for natural gas, but Tioga County is home to about a dozen support companies that are involved in Marcellus Shale drilling in Pennsylvania. For instance, one company takes advantage of a rail line that brings sand and gravel needed to make the drilling platforms. The sand and gravel are offloaded in Tioga County and then shipped just across the border to Pennsylvania. Drilling the Marcellus Shale would offer a new source of economic activity for the county, but decisions about drilling will be made in Albany and are therefore out of the county's direct control.

While many of the activities described above are designed to increase the number of firms and the types of industrial activity in the county, Tioga County is also engaged in other efforts to diversify its sources of wealth. For instance, it has embraced its role as a bedroom community and has invested in making itself an appealing place for commuters to live. For instance, investments have been made in developing Owego's

downtown. As a result, the downtown has numerous shops and businesses, many of which have recovered from the flooding damage brought by Hurricane Irene in 2011. Focusing on making Tioga County attractive to commuters has several benefits. For instance, these workers pay taxes and spend a good portion of their money in Tioga County even though they do not work in the county. It also helps to counter balance the 'Brain Drain' affecting Tioga County and many other Upstate New York communities. In some instances, these residents have brought companies with them. For example, one life sciences company in Owego came out of a Cornell University spinoff. The founder of the company previously worked at Cornell University in Ithaca, but lived in Tioga County.

In spite of these efforts to establish new sources of wealth creation, Tioga County still faces many challenges in diversifying its economy. Most notably, those activities most likely to change the trajectory of local growth or to add significant new employment and wealth will result from decisions that are well beyond local control. For instance, the fate of Lockheed Martin's facility lies in Congress and with Lockheed Martin's corporate leadership. Similarly, opportunities to leverage Marcellus Shale opportunities or add a casino to the Tioga Downs racetrack will be decisions that will be made at the state level in Albany.

At the same time, more locally-based diversification efforts tend to be far more incremental in nature. Ten or twenty new entrepreneurs per year, for instance, cannot outweigh the loss of 1,600 good paying manufacturing jobs at Lockheed Martin. This conundrum is a real issue facing many places like Tioga County that rely heavily on one large employer or industry. Those economic pillars cannot be easily replaced.

KEY FINDINGS AND OTHER OBSERVATIONS

- When control and decision-making about key assets lies external to the region, local communities can experience difficulty in shaping their own economic future.
  - E.g., Future of Lockheed Martin in an age of declining Federal budgets, decisions about natural gas drilling in New York State, etc.

- When budgets are limited, communities must pursue activities appropriate to their situation (size, scale, region, etc.).
  - E.g., small communities with few assets and limited budgets should limit risky and expensive industrial recruitment efforts
  - Emphasis should instead be placed on the efficient delivery of existing services

- Regional perspectives create broader opportunities.
  - Greater access to markets and employment opportunities
  - Greater access to specialized services and expertise (available through Cornell or Binghamton University)

- Diversifying the area's industrial base helps, but so too does diversifying its sources of income.
    - Benefits can be derived from being an attractive bedroom community

LYCOMING COUNTY, PA

Lycoming County is home to 117,000 residents, with Williamsport being its largest community. Its economic base has traditionally focused around activities such as lumber production and manufacturing. More recently, Lycoming County and Williamsport, PA have become one of the epicenters of the natural gas industry and Marcellus Shale development, contributing to the county's recent economic growth. Between 2009 and 2012, county employment grew 2.0 percent annually, well above the national rate of 1.0 percent during the same period. Lycoming County is also one of the most diverse economies in the ARC region; in 2012, it was more diverse than 97 percent of U.S. counties.

The direct and indirect jobs and investment that have emerged from the recent Marcellus Shale development have helped to grow Lycoming County's economy, but area stakeholders do not want these activities to overwhelm their economy. As a result, the need to maintain a diversified economic base is a clearly articulated goal within the community. As stated within the Williamsport/Lycoming Chamber of Commerce 2013 Action Plan:

> *"It is no secret that the Natural Gas Industry has played a critical role in the area's economy and, despite a slowdown caused mostly by low prices, it will be a dominant force in our region for decades to come. However, the Chamber understands the critical balance that must be maintained to have a diversified and healthy economy and during 2012 we worked to maintain a strong local business community across all sectors of our economy including our traditional ones as well as the natural gas industry. We will continue to work hard to maintain our area's economic diversity and improve upon it. A sluggish national and world economy continues to be a danger to our prosperity and the more diverse we become, the better the chance we have of surviving a recession or a continuation of a very slow recovery."[13]*

This diversity-driven thinking has helped to inform Lycoming County's economic development activities. As a result, its economic development strategies have generally focused around ensuring that Lycoming County's workforce and infrastructure can effectively support a wide array of economic activities.

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[13] http://www.williamsport.org/pdf/PlanofAction.pdf

ECONOMIC DEVELOPMENT AND DIVERSIFICATION STRATEGIES

The Marcellus Shale development in Lycoming resulted in significant employment gains. Direct jobs in natural gas have grown from 140 in 2009 to over 1,800 in 2012.[14] The benefits of adding a new component to the economic base are evident. Not only has the county added jobs in industries that directly support natural gas such as trucking, but this economic activity has also led to growth in other industries such as retail and accommodations. Moreover, it has led to investments in infrastructure, such as paving gravel roads, which can help drive additional economic development activity. Greater natural gas activity has, to a certain extent, contributed to a more diverse economy.

Lycoming County's diversification has centered on efforts to ensure that wealth creation is reinvested in the community. Before the natural gas boom occurred in 2008-2009, leaders made investments to position the county for new economic activity. As part of an economic development strategy process in the early 2000s, the county identified a lack of competitive industrial sites and buildings as a key challenge for the area's economic development. Given the county's terrain, there are limited numbers of sites that are both flat and outside of flood zones. As a result, investments were made to develop six sites throughout the county. Originally, it was hoped that the county would attract food manufacturers. These operations failed to materialize at the scale hoped, but as efforts to develop the Marcellus Shale natural gas reserves began in earnest, Lycoming County had ready sites available to the natural gas companies and their related support companies. Consequently, these early investments allowed the county to be well positioned to quickly take advantage of emerging opportunities.

As the developments around the Bakken Shale gas fields in North Dakota have shown, natural gas development can transform economies and regions in very powerful (but not always positive) ways. While the changes resulting from natural gas activities in Pennsylvania are not nearly as dramatic as those in North Dakota, area stakeholders wanted to ensure that they were adequately prepared for the natural gas boom. Once it became clear that these activities were going to significantly accelerate the regional economy, this planning began in earnest. As part of this preparation, approximately 10 area stakeholders went to Fort Worth, TX to see how that community had been affected by the rapid development of natural gas. They sought to understand not only how the gas boom would affect economic development, but also the area's schools, public services, health care providers, and infrastructure. In short, they wanted to learn from the Fort Worth experience to minimize the number of unintended consequences that can arise from rapid development.

The natural gas boom helped Lycoming County grow, even during the recession. Yet as noted above, county leaders continue to emphasize the importance of keeping a diversified economy.[15] Local leaders have clearly articulated that they want Williamsport to be much more than just a "gas town." For the Williamsport/Lycoming

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[14] Data provided by Economic Modeling Specialist International (www.economicmodeling.com)

[15] http://www.williamsport.org/pdf/PlanofAction.pdf (Page 3)

Chamber of Commerce, the main strategy for maintaining and improving diversity is through its Business Retention and Expansion (BRE) efforts. As a result, the Chamber invests time into meeting with area companies to ensure that their needs are being met. Even though natural gas has been important, it has the potential to crowd out investment in new industries or distract from the needs of existing industries. These activities help ensure that there are efforts in place to maintain the diversity within the area's economic base. Moreover, county leaders would prefer that gas companies do not take up all of Lycoming County's available industrial space.

Broadening the industrial base is not the only form of diversification motivated by the natural gas boom. The county has also made efforts to diversify the skills within the area's workforce. Pennsylvania College of Technology (Penn College) has gone a long way in preparing the area's workforce for the gas boom, but they have done this with diversity in mind. Since 2009, Penn College has trained approximately 10,000 people for natural gas related activities. This training, delivered primarily through Penn College's Shale Technology and Education Center (ShaleTEC), ranges anywhere from one-day, non-degree programs to 2-year degree programs. When the natural gas boom first hit in 2008-2009, approximately 25 percent of people in these training programs were from outside of Pennsylvania but now most are Pennsylvanians.

When Penn College sought to invest in new degree programs, they intentionally avoided having a degree specifically and narrowly dedicated to natural gas. Instead they sought to develop programs that were relevant to the natural gas industry, but also had broader applicability to the workforce needs of other industries. As a result, they put resources into developing new programs in mechatronics (which also supports area manufacturers) and emergency management (which also supports public services and utilities). Several factors figured into these investments, and diversity was one aspect of these decisions.

Prior to making these investments, Penn College had conducted a workforce analysis to identify the jobs, skills and competencies that were demanded by the natural gas industry, but also tried to identify those skills and competencies that were transferable to other industries. This was designed not only to meet the most demand, but also to guard against any changes in the natural gas industry. The industry itself tends to be relatively mobile, and Penn College did not want to invest in programs that only served that one industry. In addition to not having degree programs for one industry, Penn College also avoided competing directly with Penn State University's existing Petroleum and Natural Gas Engineering program. Instead, the college would seek to leverage these programs which are only a little over an hour away.

The Lycoming County case highlights several important issues. First, it illustrates the importance of planning and research. Through a planning process, the county identified a key challenge (a lack of adequate industrial sites). By addressing that challenge directly, the county eventually was prepared to meet the needs of a quickly emerging industry. Research also played an important role in preparing the county for the rapid growth that accompanied the natural gas industry. By understanding the consequences of this growth, the county was able to manage it in an intentional and planned manner.

Similarly, research allowed Penn College to strategically invest in new programs that not only met the needs of the emerging gas industry, but the needs of other industries as well. Second, the Lycoming County case highlights the importance of focusing economic and workforce development efforts on the entirety of the economic base, rather than just emerging growth opportunities.

KEY FINDINGS AND OTHER OBSERVATIONS

- The planning process that occurred in the early 2000s identified critical challenges to be addressed (e.g., the lack of adequate industrial sites).
  - Investments in infrastructure allowed the county to take advantage of emerging opportunities

- Research can effectively guide strategy efforts.
  - To prepare for natural gas developments, a delegation of 10 Lycoming County stakeholders went to Fort Worth to see the impact of natural gas development
    - Examine the impact on public services, infrastructure, economic development, etc.
  - Penn College took data-driven approach so they knew what programming to offer
    - Workforce assessment of growth jobs and needed skill competencies

- In meeting industry workforce needs, it is important to consider skills utilized by multiple industries so as to avoid instilling the area workforce with too narrow a set of skills.

- Dominant industries have the potential to crowd out other industries or distract from the needs of existing industries.
  - Community consensus helps to maintain the focus of economic development efforts on the whole economic base, not just growth opportunities presented by mobile industry.

GARRETT COUNTY, MD

Garrett County is Maryland's westernmost county and known for being home to Deep Creek Lake, a prominent resort area in the Mid-Atlantic. It is located between Morgantown, WV (home of West Virginia University) to the west and Cumberland, MD to the east. Garrett County represents a strong example of a community successfully responding to a diversity crisis. In 1996, Bausch and Lomb closed its glasses factory in Oakland (the county's largest community) and relocated 600 jobs to San Antonio, TX. This economic shock served as the impetus for an ongoing strategic planning process. As a result of the sustained response to that event and a strong local belief in local opportunities, the county created a stronger, more diverse economy. Ongoing planning (and implementation of that plan) has played a key role in laying the foundation for the current economy.

Garrett County is among the top 25 percent most diverse counties in the ARC region, and experienced above average employment and income growth between 2002 and 2009. Overall, county employment has remained relatively stable over the past three years, and it has had modest employment gains in areas such as manufacturing and recreation. Although, many county residents commute to Cumberland, MD and Alleghany County to the east, Garrett County's economy remains relatively self-contained. According to the U.S. Census Bureau, nearly two-thirds of people that work in the county also live in the county.

Garrett County's current Economic Development Plan (which was completed in 2011 and was being updated in 2013) is a broad-based and detailed plan that has wide community support. The plan was completed with significant input from five key county organizations including the Garrett County Economic Development Department, the Garrett County Development Corporation, the Garrett County Chamber of Commerce, Garrett County Community Action Committee, and Garrett College. One element of the strategy's vision is to make Garrett County a place with "vibrant, growing, profitable and diverse businesses." In order to realize this vision, the strategy calls for several actions including leadership development, entrepreneurial and small business support, local purchasing initiatives, and promoting more sustainable business practices. As a result, Garrett County's approach to economic development is not reactive or done in an ad hoc fashion, but rather involves a reasonable amount of intentionality.

ECONOMIC DEVELOPMENT AND DIVERSIFICATION STRATEGIES

In 1996, Bausch and Lomb's 600 jobs accounted for about half of the county's manufacturing base. The loss of this important facility devastated the community as those economic base jobs supported many other indirect jobs. Not only had the community lost a significant portion of its economic base, but many of the displaced workers lacked transferable skills. There was also a sense at the time that the local higher educational institution, Garrett College, did not possess the capacity to respond effectively to the situation. The crisis atmosphere created by significant job losses nevertheless spurred community action.

In the wake of this crisis, 25 area leaders met for several days in the Wisp Resort hotel to craft a response. This response was an honest assessment of the county's existing strengths, weaknesses, opportunities and threats (SWOT), and that discussion led to a short and concise strategic plan. The general thrust of this plan was to place greater focus on economic development by leveraging existing assets and investing in economic development infrastructure with the intended goals of growing and diversifying the Garrett County economy.

Since then the county has been effective in growing and diversifying its economy. Tourism and second-home demand have been an important component of that growth. These activities began to emerge following the completion of Interstate 68 (I-68) in 1991, but economic growth really took hold during the 2000s. This was in part fuelled by the growth of the Washington, DC metropolitan area, which generated greater demand for second homes and tourism. The area experienced a bit of a property

bubble leading up to the recession, but Garrett County was able to weather the recession due to a broad set of activities ranging from agriculture, wind energy and a more diversified (albeit smaller) manufacturing base.

This ongoing planning process played an important role in Garrett County's continued economic development. In constructing the county's economic development plan, listening sessions were held to gather community input from several different industry sectors including: manufacturing, retail, real estate, tourism, and agriculture and natural resources among others. These listening sessions allowed county stakeholders to discuss these industries strengths, weaknesses, and current and future trends so that they could inform the resulting plan's strategies and vision. By considering the influences on these different industry sectors, the plan therefore seeks to incorporate strategies that are capable of supporting a diverse range of economic activities. In addition to strengthening its capacity to support its existing and emerging economic base, Garrett County also emphasizes business retention and expansion efforts for existing businesses. These efforts involve continuous communication with area companies about their needs.

The diversification efforts that have emerged from this ongoing planning process have addressed many different issues, beyond just supporting multiple economic sectors. For instance, the community has devoted significant efforts toward improving the environment for entrepreneurs, and has done so in part by expanding and improving the broadband infrastructure. Working in partnership with the One Maryland Broadband Network (and with Appalachian Regional Commission financial support), the county is expanding its fiber optic network. These investments in its broadband infrastructure are vital. Many of the county's entrepreneurs begin as second-home buyers who split their time between Garrett County and the DC or Pittsburgh areas. Natural amenities like Deep Creek Lake entice potential entrepreneurs to vacation or buy second homes in the area, but a strong broadband infrastructure allows those kinds of entrepreneurs to work from or even move to Garrett County permanently.

In addition to expanding and strengthening the broadband infrastructure, there are other county assets available to support entrepreneurs. For instance, the Garrett County Information Enterprise Center is a technology-based business incubator located at Garrett College. More regional efforts and assets expand the range of support available to Garrett County entrepreneurs such as improving the availability of investment capital in the area. For instance, Garrett County participates in the Mountain Maryland Angel Investors Group, which is a regional effort that pools angel investment funds in Garrett, Alleghany and Washington counties. Additional entrepreneurial support services are available through the Small Business Development Center based at Frostburg State University in Cumberland, MD in neighboring Alleghany County.

With committed leadership from a number of stakeholders, including the President of Garrett College, the county has embarked on several workforce development initiatives. One of these initiatives has been the Garrett Promise whereby Garrett County high school graduates and GED recipients are eligible for a scholarship that ensures full

tuition payment in the year of their graduation. These scholarships are intended to not only provide additional education and training, but also to entice students to stay in Garrett County. Other workforce development efforts include the establishment of career pathways programs that will train area students and workers for jobs that local businesses are looking to fill. In doing so, the county hopes to establish a pipeline of talent that can support the area's long-term workforce needs. The county also continues to invest in its training infrastructure as well. For instance, Garrett College's new Career Technology Training Center provides the equipment and facilities necessary to support many of the County's workforce preparation and training needs. As a result, many of the courses that will be taught there will lead to industry certifications in areas such as manufacturing, the construction trades, and healthcare. The space will also be utilized by individual companies for customized training.

It is important to note that designing strategies to achieve growth and diversification means little if they are not effectively implemented. Garrett County exemplifies the benefits of an ongoing planning process tied to ongoing implementation. Furthermore, identifying and agreeing on metrics allows local leaders to measure the outcomes from these efforts, providing accountability for implementation partners. Community efforts to monitor outcomes closely ensures that progress is actually being made and to demonstrate that progress. By revisiting the county's strategy every few years, local leaders also ensure that the strategies continue to meet community needs and are responsive to changing economic conditions.

The process itself also creates cohesion among stakeholders, builds consensus and brings in new leaders which help to continually reenergize the process. This cohesion further allows the county to respond quickly to funding opportunities either at the state or federal level. Rather than spending time building coalitions, local partners can instead be prepared with pre-established coalitions and partnerships ready to respond quickly to funding opportunities. This kind of organization and process has allowed Garrett County organizations to effectively implement the county's economic development strategies and will serve the county well as leaders encounter future challenges, including developing the county's wind industry, making future land use and zoning decisions, and determining how best to leverage the potential from future natural gas development.

KEY FINDINGS AND OTHER OBSERVATIONS

- A crisis is a terrible thing to waste.
    - In 1996, the loss of 600 manufacturing jobs from Bausch and Lomb— half the county's manufacturing base—mobilized community action

- Garrett County's ongoing planning process yields many benefits for the community.
    - Builds consensus about regional vision and a framework for action
    - Sets clear goals and provides accountability
    - Incorporates new leaders

- Attracting and retaining talent an important element in building wealth.
    - Effective marketing of amenities
    - Connectivity (Broadband/I-68) allow people in growth centers to stay for more than a vacation
    - Creating opportunity for youth to stay in the community

- Thinking regionally opens up greater possibility for local opportunity
    - Connecting into growth centers (e.g., Washington, DC, Pittsburgh)
    - Creating scale through regional angel investor networks

UPSHUR COUNTY, WV

Upshur County is a small, rural county located in the foothills of the Alleghany Mountains. Its population is just over 24,000 people, with Buckhannon, WV representing its largest community. There are roughly 11,300 jobs in Upshur County, and its employment grew at an annual rate of 1.1 percent between 2009 and 2012—an annual rate faster than either the U.S. (1.0 percent) or West Virginia (0.7 percent). Its economy is also relatively diverse, as its employment diversity ranked within the 63rd percentile in 2012.

Natural resources have been an important economic driver for Upshur County as it possesses a wide array of resources ranging from lumber to coal and natural gas deposits. Like much of West Virginia, coal has long been important to Upshur County, but that has been in decline. The county has also been a site for natural gas development associated with Marcellus Shale, but as the focus of the natural gas industry has shifted to Pennsylvania, that too has slowed. Manufacturing is another economic driver and the county does support a number of specialty manufacturing businesses that sell outside the region and the state. As the county seeks to diversify its economic drivers, its economic development efforts now focus on three other sectors—agriculture, hardwood products, and tourism. These sectors are regional in nature and have the potential to support a more diverse county and regional economy.

Given their history of resource extraction – coal, timber and more recently natural gas-diversification has always been a regional goal. Upshur County's economic development activities are often regional in nature, and this regional mindset forms the foundation for many of its diversification and development efforts. Upshur County is part of the Region VII Planning and Development Council[16] and has a strong history and success with regional collaboration. The county is located along Corridor H, an East-West route in which WV 55 and U.S. 33 are being upgraded into an interstate quality road. Once this major transportation corridor is completed, the region will only be a three-hour drive from the Washington, D.C. metro area. This, in turn, will open up a wide range of development opportunities. The county's economic development focus has been primarily on business retention and growth, rather than recruitment.

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[16] The Region VII Planning and Development Council also includes Barbour, Braxton, Gilmer, Lewis, Randolph and Tucker counties.

However, the county is also looking to establish itself as a place for other activities related to agriculture, tourism and value-added timber production, and in the process provides a number of important lessons learned for other small, natural resource-based communities that are seeking alternatives to the resource-extraction activities of the past.

ECONOMIC DEVELOPMENT AND DIVERSIFICATION STRATEGIES

Agriculture has always been an important sector and there is a strong focus now on local foods. As part of the efforts to support agriculture, the county is currently participating in a regional Rural Jobs Accelerator grant that focuses on promoting and growing local foods. This grant provides support for creating food value chains in the state, and can strengthen existing efforts. For instance, one current local effort—led by a local agripreneur—helps local organic growers produce for homes and restaurants and creates a community kitchen for food processing. It also further supports the farmers' market in Buckhannon (population: 5,639)—the only incorporated community in the county.

The forest products sector is another area of historic significance in the county. For much of its history, Upshur County saw its timber resources harvested and then shipped out of the county in raw form. A more recent effort seeks to capture more of the value-added activities associated with timber production and the county has participated in a recent regional effort—the Hardwood Alliance Zone. This regional collaboration focuses on marketing and investing in the infrastructure needed to attract value-added hardwood companies to the region. The region has abundant natural hardwood resources, as well as the local sawmills and other services needed to grow value-added production in the region. This regional effort grew out of recognition that together the counties would have greater opportunities to build and support this sector than they would if they were working independently of one another.

The county is also taking a regional approach to promoting and growing its tourism sector. The state of West Virginia has placed significant emphasis on tourism development, and the region is trying to tap into the tourism resources made available by the state. Three counties—Randolph, Lewis, and Upshur—recognized that alone they do not provide enough of a destination to attract tourists to the region. As a result, they are building a regional strategy that links individual attractions along U.S. 33. In doing so, they plan to turn the whole region into a tourist destination by promoting "33 Things To Do Along Route 33."

The economic development focus on agriculture, tourism and forest products, and the regional approach being utilized, is unlikely to change in the years ahead. However, the success of these efforts will depend greatly on the completion of the major interstate (Corridor H) between the Washington, D.C. metro area and this region. Corridor H provides a prime example of the power of regional collaboration. No single county in this region has the political clout to advocate for this transportation lifeline, but by working together they demonstrate the benefits of completing the corridor as a way to boost the entire state's economy. While the new transportation corridor has economic

development benefits to the individual counties and their businesses, it provides clear evidence that regional collaboration can achieve meaningful outcomes. This collaboration established a precedent that is now being used to promote the three counties' regional tourism efforts.

This spirit of collaboration is also occurring within Upshur County itself. Significant private sector leadership, particularly in Buckhannon, has helped to advance many of these development efforts. Local leaders participated in CreateWV, a conference designed to encourage local leaders to create a new economic future for their communities. While city leaders did not formally adopt the plan that grew out of this process, the conference nevertheless empowered local business and community leaders to start CreateBuckhannon—a locally driven effort whose goals are to improve the quality of life and upgrade the town's amenities. CreateBuckhannon has no formal organizational structure, but leaders meet at a regular weekly luncheon open to all. Through this venue, the community secured a USDA grant to build the farmers' market, won a grant to create a downtown park, created new raised beds at the senior center, restored a civil war era home, and built bike and walking trails throughout town. Through these successes, CreateBuckhannon instilled a strong spirit of private sector leadership in the community and the county. The work of this informal group has brought energy to community residents and created a positive image for those outside the community.

Upshur County is also home to West Virginia Wesleyan University, which is a small liberal arts institution located in Buckhannon. Although playing only an informal role in CreateBuckhannon activities, the university has been important in providing community leadership in other ways. The university president has embraced her leadership position in the community, serving formally on economic development committees and boards. As a result, the community has been able to more effectively leverage the university in support of its workforce and community development efforts.

KEY FINDINGS AND OTHER OBSERVATIONS

- Regional partnerships are the key to increasing the county's economic development capacity, as none of Upshur County's major economic initiatives—the Hardwood Alliance, completing Corridor H, and the multi-county tourism marketing effort—would have been possible working on its own.

- Local volunteers and civic leaders can be powerful drivers of change
  - Committed community leaders working collaboratively with elected officials can increase the capacity of the community to address both the challenges and opportunities associated with economic development.

- Adding value to natural assets in a sustainable way is an important goal for resource-driven economies seeking greater diversity.

- o Development focused on value-added opportunities, whether in agriculture or forest products, ensures that the impact of development is greater in the county and more sustainable.
- o Combining these value-added efforts with regional tourism strategies that leverage these natural assets can further contribute to greater diversification.

KNOTT COUNTY, KY

Located in the eastern Kentucky coalfields, the Appalachian Regional Commission designated Knott County as distressed in fiscal year 2013. A rural county with a long-trend of out-migration and population decline, it is currently home to 16,124 residents. Knott County has lost almost 9 percent of its population since 2000 when over 17,600 people lived in the county. The county has roughly 4,600 jobs, but its economy is losing jobs. Mining is the county's single largest employing sector and employment in this sector has declined from almost 1,500 jobs to just under 900 jobs between 2009 and 2012. The mining job losses contribute greatly to an unemployment rate that, at 15.9 percent,[17] remains almost twice the state and U.S. rate. This dependence on mining contributes greatly to a lack of diversity within the Knott County economy; in 2012, Knott County only ranked in the 17th percentile for employment diversity.

Lack of economic diversity is recognized as a concern among regional leaders. Knott County is situated within the broader Kentucky River Area Development District (KRADD), an eight county region in eastern Kentucky.[18] The KRADD comprehensive economic development strategy makes explicit mention of the importance of economic diversification:

> *"Diversification of the economy must be a priority of the area. Efforts must be made to provide employment opportunities for the dislocated worker, with proper training made available to give these individuals the new skills they will need in a diversified economy. Education of the workforce, with adult literacy programs and other education or training programs must be a priority.*
>
> *Efforts to diversify in the region include focusing on the areas of telecommunications, the wood industry, development of small businesses from within the Kentucky River ADD, tourism, and the recruitment of industry into the area."[19]*

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[17] U.S. Bureau of Labor Statistics Local Area Unemployment Statistics, June 2013.

[18] In addition to Knott County, KRADD also serves Breathitt, Lee, Leslie, Letcher, Owsley, Perry, and Wolfe counties.

[19] KRADD Comprehensive Economic Development Strategy Update FY 2012-2013, p. 7. Available at: http://kradd.org/CommunityAndED/2012%202013%20KRADD%20CEDS%20REWRITE.pdf (PDF: 23 MB)

Within Knott County, diversification efforts are based around using the county's assets to promote activities like tourism. Although Knott County's people and economy have long been defined by coal mining, diversification efforts are based around using the county's assets to promote activities like tourism. The county seat, Hindman, is home to the Hindman Settlement School which was established in 1902 as the first rural settlement school designed to provide education and social services to "people of the mountains" while also preserving Appalachian cultural heritage. This mix of the coal industry and Appalachian cultural heritage forms the foundation of more recent efforts to diversify the county's economy.

ECONOMIC DEVELOPMENT AND DIVERSIFICATION STRATEGIES

Interest in diversification is driven by the significant loss of coal industry jobs and income over the past decade. In Knott County, this diversification strategy has roots in an earlier effort as part of Kentucky's Community Development Initiative (CDI) in the late 1990s. In 1997, Knott County residents and leaders developed a sustainable economic development plan that was funded by the state as part of the CDI. The state allocated $18 million to help Knott County achieve its vision of a sustainable local economy driven by the county's heritage of arts and Appalachian crafts.

A key piece of this strategy was the creation of the Kentucky School of Craft, located in the renovated Hindman High School building and operated as part of Hazard Community and Technical College (HCTC). The idea behind the school was to offer residential opportunities for people to train to become master craftsmen in Appalachian crafts (e.g., dulcimer making, pottery). The strategy also included the establishment of the Kentucky Appalachian Artisan Center and incubator on Hindman's Main Street as a potential retail outlet for the work of these artisans. With CDI support, the school was launched but for a number of reasons—including staff turnover, lack of housing opportunities for students, and limited demand for long-term residential programs—it was not successful in creating new sources of economic opportunity. Although it did not achieve everything it set out to accomplish, this CDI process did help to attract significant investment in Knott County infrastructure, including a new Opportunity Center in Hindman that houses the library, a Head Start center and facilities for HCTC. The CDI process helped local residents witness the power of collaboration and engagement among local citizens and brought hope to people for whom this was a scarce commodity.

One of the outgrowths of the CDI experience was the focus by local leadership on adventure tourism. Although Knott County's relative isolation does not bode well for the recruitment of outside industry, the county does have entrepreneurial spirit in the "hollows" across the region, and the emphasis on tourism is designed to capitalize on that spirit. While the School of Craft and focus on heritage tourism was aided by the state's CDI, energy for adventure tourism came from county leadership, both public and private. In 2006, county leaders made a priority of creating an adventure tourism park. As a legacy of the county's dependence on natural resource extraction, there are thousands of acres of reclaimed strip mine and forest lands uniquely suited to a range of outdoor recreational activities. In 2007, Mine Made Paradise Park opened – a

partnership between a prominent regional coal company, local residents and the county. The park covers over 43,000 acres and has 100 miles of trails for off-road biking and additional horseback riding trails and stables. Semi-annual horseback trail rides (spring and fall) began in 2007 with 500 visitors and grew to 10,000 visitors in 2010. A motorcycle/ATV training center and campgrounds complete the park.

The tourism-focused efforts in Knott County, Kentucky offer the potential for diversifying the economy and replacing some of the jobs lost in the coal industry. The School of Craft effort has experienced some difficulty gaining momentum in part due to its lack of connection to other tourism activities. Moving forward, new leadership at HCTC has expressed interest in finding a more sustainable model for the school as one piece of a larger tourism strategy that will increase its potential for success.

By contrast, the grassroots adventure tourism effort has gained momentum and achieved some positive results. The steady increase in the number of visitors (a key metric for tourism activities) and the expansion of facilities and trails at the park provides evidence of this impact. But much like the School of Craft effort, the adventure sports park has room to grow. As it currently operates, the park is relatively self-contained. Park visitors come and camp on the grounds and that tends to limit their potential impact on the broader county and regional economies. This is due in part to the lack of motels near the park, limited restaurants, and few additional entrepreneurial ventures in support of tourism.

Knott County's tourism development efforts are in some ways a replacement strategy, as tourism can create jobs for lower-skill workers that have lost their jobs. As the county's tourism efforts gain momentum and grow, they are more likely to create greater diversification, as a growing number of visitors will likely demand greater opportunities in other activities such as lodging, restaurants and retail. A broader regional effort might help the county create an adventure and heritage tourism brand and destination and would further increase the economic impacts on the county and the region.

To advance these projects, Knott County will need strong, patient leadership. Knott County showed strong leadership in competing for the CDI grant from the state. Private and public sector leaders rallied to make the Mine Made Paradise Park a reality. However, economic development and specifically, tourism development, requires long-term investment in both time and resources. There has been significant leadership turnover in the county, making it difficult to maintain the momentum behind these efforts. The loss of a strong, persuasive and visionary leader can derail efforts unless there is a deep leadership bench and broad buy-in to a compelling community vision.

KEY FINDINGS AND OTHER OBSERVATIONS

- A regional approach to tourism that positions the region as a destination offers more promise than a single county or single attraction approach.

- There is strength in focusing on a sector strategy, e.g., tourism, and not on a set of specific projects.
    - Coordination of efforts can lead to greater economic impacts.

- Depth of leadership and commitment is critical to sustaining long-term economic development efforts.
    - The loss of a strong, persuasive and visionary leader can derail efforts unless there is a deep leadership bench and broad buy-in to a common vision.

- Tourism development requires long-term investment in both time and resources.

- Leveraging natural amenities in support of tourism development provides economic opportunities and can lead to greater diversification, but tourism alone is not going to generate the economic impacts necessary to replace past economic drivers (e.g., coal, manufacturing).

WASHINGTON COUNTY AND BRISTOL CITY, VA

Washington County (2012 population—55,190) and the independent city of Bristol (2012 population—17,662) are located along the Interstate 81 (I-81) corridor in southwest Virginia. Bristol is on the Virginia-Tennessee border; the border runs down the city's Main Street. Washington County is a mixed rural county as defined by Isserman (2005) and a transitional county by ARC standards. The county has shown signs of economic improvement over time. Between 2009 and 2012, Washington County grew at a rate of 1.0 percent annually, a rate comparable to both the U.S. and Virginia. However, these gains were partially offset by economic conditions in the independent city of Bristol which lost employment at a rate of 1.2 percent during the same period.

Washington County has not been overly dependent on a single industry, and both Washington County and Bristol City display above average levels of employment diversity, although Washington County (76th percentile) has a somewhat more diverse economy than Bristol City (57th percentile). Washington County very much benefits from its position along the I-81 transportation corridor. Historically a manufacturing dependent area, Washington County and Bristol City have seen commercial expansion along the interstate, and they have also benefitted from several broader regional initiatives to develop tourism in southwest Virginia.

In many ways, the county and city provide an example of opportunity-driven economic development. Diversifying the city and county economies is an explicit goal shared by leaders across these jurisdictions. The Mount Rogers Planning and Development

Commission[20] (the region's local development district) identified diversity as a key plank of its Comprehensive Development Strategy.[21] The vision for the region, as articulated in that strategy is for a region with:

> "…a diverse, stable economy, grounded in traditional economic development, tourism, and entrepreneurship, that provides high quality jobs while maximizing a competitive cost of doing business;"

Washington County's location feeds into a number of its various diversification efforts. The county's commercial and industrial development efforts are tied directly to its two interstate interchanges and the opportunities those interchanges pose for commercial and retail development. At the local and regional level, tourism drives diversification efforts. Local tourism efforts in Bristol City and Abingdon (the Washington County Seat) emphasize main street developments and tapping into a history of tourism development focused on the Bristol Motor Speedway, host to NASCAR and other races. More regionally-oriented tourism initiatives leverage the region's musical heritage and outdoor recreational assets. All of these activities are underway in the region, but the emphasis placed on each varies by scale and jurisdiction.

ECONOMIC DEVELOPMENT AND DIVERSIFICATION STRATEGIES

The area's economic development strategies have three relatively distinct focus levels—county, city, and region. At the county level, the primary focus has been on commercial and industrial development along the I-81 corridor. This development activity has been driven primarily by the county commission and the county economic developer. They are seeking to attract not only projects related to manufacturing and distribution, but they are also looking for 'destination' retail as exemplified by the location of a Bass Pro Shop or Cabela's facility. To date, these efforts have been largely successful. Development at one of two major interchanges along I-81 is almost complete and there is significant new development planned for the second.

The cities of Bristol and Abingdon employ quite distinctive economic development strategies from Washington County. Instead, the cities focus their attention on downtown revitalization, supporting small business owners and tourism. There is a growing recognition, particularly in Bristol, that entrepreneurial and small business support services are needed to help local businesses actually succeed in their main street locations. Partnerships with other support providers may be the most effective way to increase the capacity in these communities to effectively support entrepreneurs. The community is also looking for effective models elsewhere that can be adapted and implemented locally.

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[20] In addition to Washington County and Bristol City, the Mount Rogers Planning and Development Commission also serves the counties of Bland, Carroll, Grayson, Smyth, and Wythe and the independent city of Galax.

[21] Available at: http://www.mrpdc.org/docs/CEDS.pdf

Bristol has an active Main Street program—Believe in Bristol—and this program is driven primarily by private sector leadership. Private sector leaders play a catalyzing role in advancing Bristol's tourism development and main street projects. This has been most evident through the construction of the Birthplace of Country Music museum. Support for the construction of this museum, which is being built in a central downtown location, has come from the private sector and not local government. As part of the museum's development, local organizers have established an affiliate relationship with the Smithsonian Institution. This relationship not only adds to the museum's credibility, but also opens up opportunities to leverage the resources of the Smithsonian in creative ways (e.g., hosting traveling exhibitions and educational programs). The museum is set to open in August 2014, and its future was ensured in part through strong leadership and a recent merger with Bristol Rhythm and Roots Reunion (a multi-day music festival in downtown Bristol).

Local efforts like the development of the Birthplace of Country Music museum have benefited from strong multi-county regional collaboration in support of tourism development and promotion. For instance, Washington County is crossed by the Crooked Road, which is Virginia's music heritage trail that runs through Southwest Virginia. Washington County is also involved with 'Round the Mountain'—Southwest Virginia's artisan network. Communities need to build on their assets and connect those assets to external demand. To further support these efforts, Heartwood was opened in 2010. Heartwood is an artisan center located along the interstate and is designed to serve as the region's gateway to heritage and cultural tourism. Heartwood was funded with both ARC and state tobacco trust fund resources.

While Heartwood was designed to connect the musical and artisan heritage in the region, it has very limited connection to parallel efforts to promote nature-oriented and outdoor recreational tourism. In order to further connect these tourism assets, Washington County collaborated with 18 other Southwest Virginia counties as a partner in a Rural Jobs Accelerator grant (with funding in part from the U.S. Department of Agriculture or USDA, the U.S. Economic Development Administration or EDA, and ARC). This larger project—'Appalachian Spring'—seeks to connect many of the downtown development efforts with the regional tourism efforts in order to establish a consistent theme and more closely connected network of assets that would help the region market itself as a single destination. This project will also connect not only the cultural and heritage assets, but also the region's many outdoor recreational assets (e.g., the Appalachian Trail for hikers, the Virginia Creeper Trail for bikers).

While tourism-related activities provide the focus for many of the broader regional economic development and diversification efforts, they are not the only activities underway locally. Other emerging efforts seek to strengthen regional food systems such as the establishment of a significant farmers' market in Abingdon and the development of private and non-profit resources through Appalachian Sustainable Development and Harvest Table—a local and influential farm-to-table restaurant.

The three elements of the area's economic development— commercial and industrial development, main street development (in both Bristol and Abingdon) and tourism—

have built a solid foundation for a more diverse regional economy. While local economic development actors are cooperating on an ad hoc basis, future success may require greater collaboration in a more systematic way as well as a more clearly articulated, shared vision for the region's most critical priorities. Creating greater alignment of these different strategic efforts will be a key factor going forward, as it will be necessary to ensure that these assets are developed in ways that do not create conflict or work at cross purposes. For example, the commercial and industry development along the interstate could come into conflict with efforts to promote the region as a destination for outdoor recreation and tourism. There is a growing sense among local leaders that they need to work together to tackle these issues, but the lack of a single driving force to guide this regional approach makes collaboration difficult.

KEY FINDINGS AND OTHER OBSERVATIONS

- The Bristol/Washington County region benefits from economic development strategies that are multi-dimensional.
  - Different units of government (county vs. city) and different sectors (public vs. private) play different roles that collectively contribute to a more diverse and resilient county economy.

- Communities need to build on their assets and connect those assets to demand outside the region.
  - Washington County also benefits from a location that enables easy access – for tourists, for shoppers, for commerce and industry – and from regional initiatives that attracted outside support.
  - Most of the local diversification efforts have focused on leveraging existing assets and linking them together in ways that create a tourist destination that could be marketed together.

- Private sector leadership has an important catalyzing role to play in economic development.
  - Economic development is not the sole domain of paid economic developers.
  - The private sector has played a strong and active role, particularly in Bristol's tourism development efforts and the emerging regional food system efforts.

- Effective public-private partnerships are vital for moving projects forward and connecting to resources.
  - The private sector has played a catalyst role, allowing the region to access a wide range of state and federal resources, including ARC, to support their efforts.

- Downtown revitalization efforts need to be tied to entrepreneurship development.
  - Entrepreneurial and small business support services are needed to help local businesses actually succeed in their main street locations.

- o Partnerships with other support providers may be the most effective way to increase the capacity in these communities to effectively support entrepreneurs.

RUTHERFORD COUNTY, NC

Rutherford County is located between Asheville and Charlotte in North Carolina, and Greenville-Spartanburg in South Carolina. ARC categorizes the county as distressed. The unemployment rate of 12.7 percent is well above average compared to both the U.S. and North Carolina.[22] Rutherford has lost employment over the previous decade. Between 2009 and 2012, Rutherford County lost employment at a rate of 1.3 percent annually. By contrast, North Carolina and the U.S. grew at 0.8 percent and 1.0 percent respectively during the same period.

In spite of these difficult economic headwinds, Rutherford County remains a relatively diverse county and is within the top quartile of counties in terms of employment diversity (79th percentile in employment diversity). Rutherford County has traditionally relied upon manufacturing activities, but many of the manufacturing jobs that formed the economic foundation of mill towns like Rutherfordton, Forest City and Spindale are now gone. While manufacturing remains an important part of the county's economy, local development efforts today emphasize other economic activities. For instance, the county has attracted several data centers—most notably Facebook. There is also a growing retiree population, particularly around Lake Lure and Chimney Rock in the western part of the county. The county is also seeking to boost the agricultural sector by increasing linkages with local food producers.

Given the recent history of Rutherford County and the surrounding region as one dominated by mill towns, it is no surprise that diversity-driven thinking informs the region's strategy development. It is listed as one of the goals in the Isothermal Planning and Development Commission's[23] regional Comprehensive Economic Development Strategy:

> *"The Isothermal region was once too dependent on a very limited number of manufacturing industries. In the future, the region will have a more diverse economy that will help insulate the community against future economic downturns. It will develop a strong entrepreneurial culture so that new companies and ideas will continuously emerge and better insulate the region from external economic forces. The region will also grow its economic strength in globally competitive industries – including advanced manufacturing, manufacturing-related producer and distribution services, entrepreneurial enterprises, as well as tourism and retirement-related industries. The region will also make*

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[22] U.S. Bureau of Labor Statistics Local Area Unemployment Statistics, June 2013.

[23] The service area of the Isothermal Planning and Development Commission includes Rutherford County, as well as Cleveland, McDowell and Polk counties.

use of its land to support activities such as high value added agriculture and viticulture, as well as the continued growth of its already strong equine industry. With more growing companies, relocated firms, and entrepreneurial start-ups in these industries, the Isothermal region can develop a diverse economic base that will provide jobs, wealth, and a sound tax base to ensure prosperity for current and future residents."[24]

As noted in the above vision, the region (and Rutherford County) is pursuing a diverse array of strategies to become a more diverse economy. There is a very clear recognition that no single strategy will rejuvenate the county economy, and the path forward will require the efforts of multiple organizations and stakeholders. Therefore the strategies pursued in Rutherford County fall into several groups of diversification strategies.

DIVERSIFICATION EFFORTS

Given its location between three metro areas (Asheville and Charlotte in NC, and Greenville-Spartanburg in SC), it is logical that Rutherford County has been generally active in seeking out regional opportunities. In the broadest sense, thinking regionally allows area businesses to access broader markets and area workers to find a more extensive array of job opportunities. Regional collaboration also benefits economic development practitioners. For instance, the county participated with 22 other counties in the Advantage West Region to successfully win a Rural Jobs and Innovation Accelerator designed to promote local foods (WNC Agri-ventures). Stakeholders have also participated in other regional endeavors including the Future Forward Economic Alliance (a 12-county group covering the NC Foothills) and the area's workforce development board frequently collaborates with neighboring boards. These partnerships often prove beneficial as they allow the county to leverage other resources, programs and expertise. Moreover, these regional configurations shift as needed. Depending on the issue, stakeholders may pursue regional collaboration with groups from Upstate South Carolina, Asheville, Charlotte or all three. However, to fully derive the benefits from these regional collaborations, there must be very active participation. As budgets and staff resources diminish, it is increasingly difficult for organizations to commit time and staff resources to these efforts which typically fall outside of their core set of responsibilities.

Promoting entrepreneurship is one of the key planks of Rutherford County's diversification efforts. For a number of years, the Foothills Connect Business and Technology Center had been a leader in these efforts by supporting entrepreneurial development and broadband expansion. However, the funding for Foothills Connect expired. While many of the programs put in place through Foothills Connect have found homes, the county no longer has the primary point of contact that it once did. There is a sense in the community that efforts to support entrepreneurship could be stronger. For instance, it was noted that many of these efforts would be more effective if they

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[24] http://www.regionc.org/IPDC/Docs/CEDS%202012%20FinalDraft1_2013.pdf Page 41.

focused less on encouraging people to pursue entrepreneurial ventures, and more on helping established entrepreneurs grow their business.

Rutherford County is working to develop several different sources of both employment and wealth. While advanced manufacturing remains an important economic driver for the area, efforts are underway to broaden the economic base. For instance, due to relatively cheap electricity and water the county has been able to attract several data centers—most notably Facebook. These investments, as well as Google and Apple data centers in nearby counties, has led Isothermal Community College to establish the Data Center Institute to provide short-term, specialized training for workers at these centers. Efforts have also been made to promote the local agricultural sector as well. With resources from the Rural Jobs and Innovation Accelerator grant, local leaders are connecting local farmers to buyers in Asheville and Charlotte and connecting local farmers to the expertise available through the North Carolina Agricultural Extension Service.

While diversifying the employment base can prove beneficial, it is also important to diversify sources of wealth. In Rutherford County, this has perhaps been best exemplified by its retirement attraction efforts. The county leverages several natural assets (e.g., the nearby Blue Ridge Mountains, Lake Lure) to attract retirees to the area. These efforts bring new money into the community through the spending of their retirement savings or Social Security income. This spending helps to support activities such as construction, local retail, and recreational facilities like golf courses or equestrian facilities. Further efforts are being made to grow Rutherford County's attractiveness as a retirement destination. For instance, the county is working to partner with an Asheville-based health care provider to expand access to health care in the Lake Lure area. Similarly, efforts are being made to expand the broadband network, which is often limited due to the mountainous terrain that can block satellite signals. In addition, the county is also exploring ways to increase the diversity of that area's available housing options. Currently the area has a number of retirement homes, but fewer options for people looking for condominiums or assisted living facilities.

Workforce development is an area where local stakeholders feel as though they can make progress through local efforts. The Region C Workforce Development Board (WDB) which represents Rutherford, McDowell, Cleveland, and Polk counties is partnering with the neighboring High Country and Western Piedmont WDBs on a regional literacy initiative. Other workforce initiatives currently underway include promoting greater usage of worker certifications (e.g., ACT WorkKeys) for both employers and workers, job shadowing programs, and other efforts to communicate employer needs to students and other potential workers.

Rutherford County also promotes local reinvestment amongst existing businesses through dedicated business retention and expansion efforts. These efforts involve ongoing communication with area businesses so as to understand their needs. Based on these needs, the Rutherford County Economic Development Commission (EDC)then seeks to connect them to services that might best meet their needs be it assistance from the Small Business Technology Development Center, Industrial Extension Service,

Isothermal Community College, or a local utility company representative. In one instance, one Rutherford County manufacturer sought to get into defense contracting, and the Rutherford EDC helped connect them with the North Carolina Military Business Center which has expertise in these areas.

In spite of these efforts, transforming elements of the old economy to prepare for new industries represent a constant challenge. For instance, Rutherford County has a number of older, obsolete industrial buildings with low ceilings, inadequate lighting, or environmental hazards that require remediation. In other cases, existing facilities may not have adequate infrastructure or road access. These buildings are not assets, but instead are liabilities without the resources to invest in adapting or replacing them.

Similar legacy issues exist within the area's workforce. Many of the county's workers are equipped with the skills that were suitable for declining industries, but not adequate for the demands of today's growing employers. While some workers can be retrained to meet emerging needs, many dislocated workers do not see retraining as a realistic option. Local leaders have found that many older workers either will not seek out additional training or education. Other dislocated workers simply cannot afford to invest the time in undertaking retraining programs. At the same time, skilled younger workers are apt to leave the area for places with more opportunities and a wider array of appealing amenities. However, one of the ancillary benefits of Facebook's recent move to the region was that a number of the employees at the Rutherford County facility are from outside the region and therefore provide a small infusion of relatively young talent. New companies locating to the area are seen as a source for jobs, not only for existing workers, but also for a new generation of talent that could help to create a new sense of energy in the county.

Rutherford County stakeholders fully understand that no single strategy or initiative can revive and diversify the local economy. Rather, multiple efforts—over an extended period of time—are needed to ultimately transform the county's economy. Patience, however, is not a virtue that people in the midst of an economic crisis can afford. As a result, many economic development practitioners face increased pressure from local elected officials who want to see immediate progress. A crisis atmosphere can make many local elected officials reluctant to invest in the staffing, services or infrastructure that might yield long-term benefits. Instead, the investments are often short-term in nature, even if the investment is not seen as optimal in the long-term. For instance, communities in crisis may not be as selective in the businesses they seek to attract. As a general rule, communities often prioritize their investments to encourage businesses that require unique skills or pay higher than average wages. But, in a crisis atmosphere, those same places may not be able to adhere to those priorities, settling for more mobile companies that may offer less than desirable wages or that require greater than expected incentives.

KEY FINDINGS AND OTHER OBSERVATIONS

- Multiple approaches are needed to achieve economic diversification (the shotgun approach).

- Many places would like to attract "good" industries that offer the best wages and are committed to the community, but being truly selective can be a challenge in times of need.
    o Mobile firms may address short-term job needs, but they will continuously seek more advantageous locations.

- Investing in new industrial sites and buildings can potentially support diversification efforts.
    o Buildings that supported the old economy may no longer work for the new economy.
    o Connecting sites/buildings to high quality roads and telecom infrastructure is another important consideration.

- Economic crisis (and often the related fiscal crisis) can impart a risk-averse mindset into local elected officials, and discourage them from making the investments necessary to support diversification strategies.

- Different issues require different stakeholders and regional alliances.
    o Stakeholders must actively participate in order to reap the rewards of regional initiatives.

PICKENS COUNTY, SC

Pickens County, located in Upstate South Carolina, is part of the Greenville-Spartanburg MSA and home to 117,000 people. Local economic developers often refer to three different parts of Pickens County: 1) a western section focused on the city of Clemson and Clemson University (South Carolina's land grant university), 2) a central section that remains very rural and focused on agriculture, and 3) an eastern section that serves as a bedroom community to Greenville, SC. The county has had little net employment growth since the end of the recession. Employment between 2009 and 2012 has remained just under 49,000.

The Pickens County economy has traditionally relied on a very narrow base of economic drivers. For much of its history, the county was dominated by cotton, which was both grown and processed in the community. Until quite recently, textiles represented the county's largest manufacturing sector. Pickens County today is more diverse than two-thirds of U.S. counties. This diversity is driven in part by the presence of Clemson University which serves as an important economic driver for the county and region, particularly neighboring Anderson County. More recently, the county has benefited from rapid growth in the nearby Greenville-Spartanburg metropolitan area.

DIVERSIFICATION EFFORTS

In terms of economic development policy, competitiveness issues, more so than diversification, motivates Pickens County's economic development efforts. This is reflected in the efforts to focus business attraction and retention efforts around key

clusters such as automotive, plastics and metal working, and medical devices and pharmaceuticals. To support this cluster development, Pickens County—under the auspices of the county government and Alliance Pickens (the county's public/private economic development arm)—pursues a relatively traditional economic development strategy by focusing its efforts on attracting new firms, primarily manufacturers. Pickens County's primary selling points have been its lower labor and business costs, but it has also sought to leverage its proximity to the markets and automotive manufacturing cluster in and around Greenville/Spartanburg. These business attraction efforts have proven relatively successful, as Pickens County has succeeded in attracting several major employers to the county. For instance, recent site selection and expansion announcements include a new TaylorMade golf facility and an expanded circuit manufacturing facility for Sealevel, a longtime local manufacturer.

The county has also made investments designed to strengthen its business attraction and retention efforts. For instance, many of these firms have opted to set up operations in the Pickens County Commerce Park, which first opened for business in 2005. The park is equipped with modern utilities, a dedicated fiber switch, and access to a 4-lane highway. The park has been extremely successful, and county officials are now considering creation of a second industrial park located on 500 acres near Clemson.

While the primary focus of Pickens County's economic development efforts is on industrial recruitment, it is not the only focus area. Like many other communities in the Southern Appalachians, Pickens County also tries to capitalize on its natural beauty by promoting tourism and retiree communities. Within Pickens County, there are several high-end retirement communities and golf courses located near Lake Keowee and other local lakes. In keeping with Pickens County's focus on business recruitment, these high end communities are often touted as a local asset to visiting corporate executives. While these communities attract many weekend visitors from around the region, they have not had a huge impact in generating other tourism-focused activities.

Clemson University is another local asset that has not been fully maximized as collaboration between Pickens County and Clemson University appears to be relatively limited. Pickens County clearly benefits from the university's economic ripple effects. For instance, not only is Clemson University a major employer in the county, but spending by faculty, staff and students are significant sources of retail and real estate demand. Moreover, nationally-recognized research centers like the Clemson University International Center for Automotive Research (CU-ICAR, which is based in Greenville) help to attract potential investors. However, conscious strategies and programs to link the county to the university appear limited. Given its role as the South Carolina's land grant university, Clemson University prioritizes serving the entirety of the state (through 'Centers of Economic Excellence' like CU-ICAR) more than building closer connections within Pickens County.

Moreover, for as much as Pickens County benefits from its place within the Upstate South Carolina region (e.g., the Greenville job center, the automotive manufacturing cluster around Greenville-Spartanburg, etc.), it has not embraced active partnerships with neighboring communities. For instance, Pickens County recently opted to end its

formal partnership with the Upstate SC Alliance, a 10-county regional partnership that markets the region worldwide. Pickens County is still considered part of the Alliance, but the county no longer provides direct investment in the group.

Pickens County's economy has performed fairly well in recent years, despite the fact that the county economy lags on many key indicators such as workforce education levels. In spite of these shortcomings, the county remains an attractive location to many potential investors due to its low cost structure, location between Charlotte and Atlanta, proximity to the automotive cluster around Greenville-Spartanburg, and the presence of Clemson University. For the foreseeable future, Pickens County officials intend to use the assets in support of their continued focus on business attraction and recruitment. However, pursuing more extensive regional partnerships—particularly with Clemson University—would not only strengthen these core strategies, but would also provide a great boost to other strategies that could lead to a more diversified employment base such as tourism development and retiree attraction.

KEY FINDINGS AND OTHER OBSERVATIONS

- A smart and focused business attraction strategy can improve economic performance when a region has true in-demand competitive assets such as a major research institution, natural amenities and low cost of doing business.

- There are benefits from being located near large metro regions like Greenville, SC or major research universities like Clemson, but active engagement is required to fully maximize these opportunities.

- Mutually reinforcing strategies can increase strategy impact.
  - E.g., promoting the auto industry by linking business attraction efforts to university research centers that undertake automotive research as well as by building executive housing to appeal to automotive company executives and managers.

LAUDERDALE COUNTY, AL

Located in northwest Alabama, Lauderdale County is home to over 92,000 residents. Over 40 percent of these residents live in the city of Florence, which along with Muscle Shoals in Colbert County form the core of the two-county Florence-Muscle Shoals MSA. Lauderdale County is home to the University of North Alabama (UNA), which first opened in 1830, and now has an enrollment of 7,000 students. The region also has a long history as a center for music. Blues originator W.C. Handy and Sam Phillips, the record producer who discovered Elvis, were both born in Florence, and the Shoals region is globally known as a recording center for rock, gospel, and country music. This musical heritage is a core part of the region's tourism promotions efforts today.

The broader Shoals region has also capitalized on its long historical connection with the Tennessee Valley Authority (TVA), as the nearby Wilson Dam was the first dam on the Tennessee River and later became the first dam under TVA's authority. The TVA

connection remains important to the region. Due to the Tennessee River access and TVA-provided power, the region has long been home to major manufacturing facilities and Lauderdale County and the Shoals region has long served as one of Alabama's leading manufacturing centers. Large manufacturers like Ford, Occidental Chemical, and Reynolds Aluminum were long-time anchors for the local economy.

Overall, county employment grew at a modest rate of 0.3 percent annually between 2009 and 2012, well below the national rate of 1.0 percent during the same period. However, the region's manufacturing sector has experienced net positive job growth between 2009 and 2012, and this has partially helped to offset job losses in other areas such as government and construction. As a result, the county's economy remains relatively diversified and is in the top 25 percent of the nation's most diversified counties (79th percentile in 2012). Although economic development strategies within the region are not explicitly driven by concerns about diversity, the Muscle Shoals region has a relatively diverse economy, and Lauderdale County is working on several efforts to enhance diversification. Many of these efforts are framed and implemented within a broader regional context, and this regional approach has contributed to their success.

DIVERSIFICATION EFFORTS

Like many parts of the traditional "Rust Belt," Northwest Alabama manufacturers were hit hard in the 1980s and the local economy suffered major setbacks. In response to these economic shocks, the community undertook a variety of initiatives to strengthen its economic foundation. Given the interconnected nature of the Florence-Muscle Shoals region, it is not surprising that these efforts were primarily regional in nature. For instance, the Shoals Industrial Development Authority (now known as the Shoals Economic Development Authority—SEDA) was established in 1986 to serve the entire region. SEDA serves as the region's primary business recruitment arm and was Alabama's first multi-county industrial recruitment entity. Creating this entity formalized a more regional approach to business recruitment. SEDA continues to invest in extensive industrial recruitment efforts although much of this recent activity has been located in Colbert County. While many of these investments are made outside of Lauderdale County, they still create employment opportunities for county residents.

Many of Lauderdale County's economic development organizations operate on a regional basis and serve all of the communities located in Lauderdale County and neighboring Colbert County. SEDA was the first regional economic development entity for these two counties, but the Shoals Chamber of Commerce also serves the two-county region and its four largest communities (Florence, Sheffield, Muscle Shoals, and Tuscumbia). Since 2007 the region has also operated an independent Shoals Industrial Development Committee. The Committee is composed of public and private sector leaders and oversees a large "deal-closing" fund for prospective economic development projects. The Northwest Alabama Council of Governments (NACOLG)—the area's Local Development District—is another regional development organization. The NACOLG serves a wider region that includes Lauderdale and Colbert counties, along with Franklin, Marion and Winston counties. NACOLG manages a number of federal and

state-backed business loan programs. The collaboration between these regional organizations enables more effective economic development practice throughout the region, as it facilitates scale and coordination of economic development activities.

While manufacturing remains an important part of the regional economy, efforts are underway to leverage many of Lauderdale County's broader regional assets in order to develop other industry sectors. A strong base of manufacturing firms still operates in the region, and the area benefits from growth occurring across the wider region in nearby communities such as Huntsville and Decatur. Growth in these neighboring regions also benefits other sectors of the Florence and Lauderdale County economy. For instance, Florence has emerged as a major retail center for the surrounding region, attracting numerous shoppers from Northern Alabama, Mississippi and Tennessee. Lauderdale County continues to attract major retail investments, with a second Wal-Mart superstore opening for business in the near future. Florence is also a regional medical hub and is home to ECM Hospital system which is one of the region's largest employers with more than 1,200 employees.

Tourism is another area of emphasis. Spurred by organizations like the Lauderdale County Tourism and Downtown Florence United, Lauderdale County leverages many of its broader regional assets to support its tourism industry. For instance, the region's place on the Robert Trent Jones Golf Trail makes the region a golfing destination more so than any single local golf course would. Similarly, there are efforts underway to capitalize on the Muscle Shoals region's musical heritage. While the area hosts many local events and festivals (e.g., the W.C. Handy Music Festival), there are also efforts to develop these assets in a broader regional strategy. The Americana Music Triangle is a proposal to link five states (AL, AR, LA, MS, and TN) along a tourist trail that introduces visitors to key spots in the development of American roots music. Along with Nashville and New Orleans, the Shoals would be a key stop within the Triangle. This concept is modeled on Virginia's Crooked Road, a highly successful project developed with past ARC investments. Once again, promoting these tourism assets in a unified and strategic manner is more likely to draw tourists than promoting multiple attractions individually. Beyond golf and music, Lauderdale County can also draw on other regional tourism assets such as the Tennessee River and a host of heritage tourism assets.

The University of North Alabama is another asset that can be leveraged to further the region's economic diversity. Lauderdale County has benefited from the recent growth of enrollment at UNA. Not only does UNA serve as an important source for talent and skills, but its student and faculty are also important contributors to retail demand. Moreover, the faculty and staff from both UNA and Colbert County-based Northwest Shoals Community College (NSCC) are important contributors to the region's economic development activities. While UNA does not have a dedicated economic development office, key faculty members sit on local boards and contribute to economic development efforts in other ways. For example, UNA staff members were key players in the initial planning for SEDA.

In addition, UNA also plays an important role in promoting and supporting local entrepreneurship. UNA manages the local Small Business Development Center network

whose staff members work closely with key agencies and with the Shoals Entrepreneur Center. The latter helped build an economic ecosystem capable of supporting a diverse array of economic activities. Since its launch in 1992, the Shoals Entrepreneurial Center has incubated over 150 businesses and created more than 1,500 jobs. As a result, it has proven to be one of the country's most effective business incubation programs. The Shoals Entrepreneurial Center draws support from a wide array of regional stakeholders including many of the regional organizations mentioned above (e.g., UNA, NSCC, NACOLG, SEDA, etc.) and several extra-regional organizations such as TVA, ARC and the U.S. Department of Agriculture.

The Lauderdale County case study demonstrates the importance of regional approaches to economic development and how these activities contribute to a more diversified economy. Regionalism underlies efforts to develop a wide array of economic activities ranging from industrial recruitment, retail development and tourism related to golf and music. In each of these instances, practitioners have sought to position Lauderdale County as part of a broader region in order to market and promote local opportunities. At a more local level, Lauderdale County has also effectively leveraged its available assets like UNA in support of its workforce and entrepreneurial development efforts.

KEY FINDINGS AND OTHER OBSERVATIONS

- A multi-pronged diversification strategy makes sense, as communities proactively pursue multiple approaches and seek to build assets around multiple sectors (e.g., manufacturing, retail, and tourism).

- Large scale impacts take time as shown by the fact that many of Lauderdale County's efforts began in the 1980s and took at least a decade to bear fruit.

- Entrepreneurship can be an effective core strategy if properly supported.
    - The local presence of the Shoals Entrepreneur Center has been an important spur to new businesses in the region.

- Promoting individual tourism assets in a unified, regional manner is more likely to draw tourists than promoting multiple attractions individually.

- While tourism jobs do not always yield high paying jobs, developing tourism can lead to many ancillary benefits such as more desirable downtowns, new hotels, and new amenities.
    - These benefits may improve the quality of life for local residents and serve as a magnet for potential new residents.

OKTIBBEHA COUNTY, MS

Located in east central Mississippi, Oktibbeha County is home to the city of Starkville, Mississippi State University (MSU), and about 48,000 residents. Oktibbeha County is part of a larger region known as Mississippi's Golden Triangle, which also encompasses Clay and Lowndes Counties. Several economic development organizations serve these

three counties, with the newest being the Golden Triangle Development LINK (GTDL). The GTDL is the region's primary business attraction and marketing agency. The Golden Triangle Planning and Development District (GTPDD) is the region's local development district, serving seven counties including Oktibbeha, Lowndes, and Clay as well as Choctaw, Noxubee, Webster and Winston counties.

MSU—Mississippi's land grant university—and its 20,000 students are the county's largest economic engine. However in spite of the university presence, ARC designated Oktibbeha County as a distressed economy in 2013. The county has experienced little to no employment growth over the past few years, and at 9.4 percent the unemployment rate remains above the national average.[25] Average earnings in the county also reflect this distress as the county's average earnings of $32,705 are lower than the average earnings for the U.S. ($49,468), the ARC region ($40,821), and the state of Mississippi ($33,073).

The dominance of Mississippi State has also led to Oktibbeha County having an economy that lacks diversity. In 2012, it was only in the 26th percentile of U.S. counties in terms of the diversity of its employment. Efforts to grow and diversify the county's economy have focused around two key elements. One strategy follows a more traditional economic development focus on industrial recruitment and retention, while the other emphasizes leveraging MSU as a resource in generating a wider array of economic activity.

DIVERSIFICATION EFFORTS

Local economic development leaders acknowledge that MSU's rapid growth has been a primary driver of recent positive economic news in Oktibbeha County. Between 2002 and 2010, enrollment grew by roughly 17 percent. By 2012, there were more than 20,000 students enrolled at MSU. This growth has created strains related to infrastructure on campus and housing options in Starkville, but it has also created new opportunities for area businesses. Local initiatives, such as those sponsored by Main Street Starkville, have smartly sought to capitalize on these new opportunities in order to create a stronger and more diversified economy.

The town and gown linkages have not always been close between Starkville and MSU, and the nature of this relationship often depends on the commitment and focus of MSU's President and other university leadership. Under the current MSU administration, MSU and Starkville's community leadership are enjoying a close and fruitful partnership. Community leaders are trying to link the community to many of the MSU-related activities like football games. In branding Starkville as "Mississippi's College Town" they hope to turn Starkville into a destination for football fans or parents of MSU students. Success in these efforts should create more opportunities to grow other activities such as tourism and retail. Continued efforts to attract visitors to Starkville are also a top priority. Starkville and MSU are currently collaborating to develop a hotel and convention center that should help attract more visitors to the

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[25] U.S. Bureau of Labor Statistics Local Area Unemployment Statistics, June 2013.

community. Besides making Starkville a destination, the community's leadership also hopes to better connect the community with the campus. Consequently, the Starkville Main Street program promotes local shops and community districts—like the popular Cotton District—to the campus community (faculty, staff and students) so that they are more likely to see these areas as attractive destinations for shopping and nightlife.

In addition to trying to capture the demand generated by MSU, Oktibbeha County's economic development community also seeks to leverage its innovative capacity. As a result, efforts to access skilled talent and technology from MSU are centered on investments made at the local Thad Cochran Research and Technology Park. The park first opened in 1985, and is growing rapidly, with newly constructed buildings quickly reaching full capacity and further expansion plans underway. At present, the park is home to seven buildings with more than 1,500 employees working at technology-based businesses.

The other major plank of Oktibbeha County's economic development plan focuses on more traditional business attraction and retention efforts. However, these economic development activities are being undertaken in an increasingly regional context. Key economic development partners are now working to attract new industries— particularly manufacturers—to the broader Golden Triangle region as opposed to focusing on their individual counties. These initiatives further link Oktibbeha County to the wider regional economy by connecting the intellectual assets and talent based at MSU to emerging manufacturing centers in both Clay and Lowndes County. These partnerships, formalized through the GTDL, represent a significant change for the region. Like many areas of Appalachia, the region had previously been characterized by business recruitment competition between county economic development agencies. The GTDL will lessen this competition, and it is hoped that this model will be used across the state.

Other regional organizations have further supported these efforts. For instance, the GTPDD's Comprehensive Economic Development Strategy describes several specific action items such as identifying and preparing new industrial sites, assisting localities in attracting new firms, providing capital through revolving loan funds and other tools, and making workforce development services available to firms needing training support. This regional economic development approach has yielded some early successes, such as the recent location of a new Yokohama Tire facility in West Point. Expected to open in 2015, this new facility is slated to employ more than 2,000 people.

Oktibbeha County has also engaged in a number of other regional initiatives, including several high profile federal grant opportunities in Eastern Mississippi. In 2005, regional leaders in both East Mississippi and West Alabama won a Federal WIRED (Workforce Innovation in Regional Economic Development) grant that was used to develop a regional entrepreneurship support strategy, the MyBiz Mississippi Entrepreneur Alliance. The project also supported enhanced technical training programs at local community colleges, which has continued to expand and was included as part of the Wal-Mart Foundation's national America Works initiative. Oktibbeha County and MSU are also lead partners in an ongoing Rural Jobs and Innovation Accelerator grant project

jointly funded by ARC, USDA, and EDA. This effort will support a host of programs targeting key regional industry clusters such as automotive, furniture and agribusiness.

The Oktibbeha County case study demonstrates the importance of connecting communities to anchor institutions like universities. Focusing economic development efforts around the community's largest employer might seem like a strategy that would reduce economic diversity, but in the case of a major research university like MSU, the school's many activities actually help spur greater diversity. New opportunities are created not only in high tech and advanced manufacturing activities, but also in a diverse set of industries such as retail, recreation and tourism, and real estate. Making these connections and linkages can be important for communities that do not possess large institutions, but are nevertheless close to a large regional institution. The importance of regional approaches can also be seen in Oktibbeha County's industrial recruitment efforts which in the past focused on the county level, but have become more effective since the county became part of a wider regional consortium.

KEY FINDINGS AND OTHER OBSERVATIONS

- Concerted and intentional efforts are required to effectively maximize the economic development potential of major research institutions.
  - Committed leadership from both the community and university are also required.

- Business attraction efforts tend to be most effective when undertaken in a regional context rather than individually.
  - Making these efforts work requires trust and an understanding of roles and relationships between the partners.

COMMON THEMES AND TRENDS

The 10 case studies profiled in this report offer both lessons and cautionary tales. This section seeks to identify the common themes and findings that emerged from these case studies. The goal is not only to improve practitioners' understanding of diversity as a motivating factor in economic development, but also to give those same practitioners insights that might help as they develop their own economic diversification strategies.

DIVERSITY IS MORE OFTEN A GOAL THAN AN ARTICULATED STRATEGY

Many communities identify a more diverse economy as a goal or a value, but diversity is less likely to motivate individual economic development strategies. As a consequence, diversity does not tend to drive strategy development in the same way as a concept like competitiveness. Competitiveness-driven strategies are not necessarily mutually exclusive with regional efforts to diversify, but they do lead to different sets of priorities and types of strategies. A focus on competitiveness can often lead places to select specific clusters around which to focus energy and resources. This, in turn, may limit

their activities to only those that support those clusters, foregoing potential opportunities in other non-core activities.

Diversification does not necessarily need to be seen as a goal in itself to be an important concept in framing decisions about economic development strategy. Instead, explicit consideration of diversification within a strategic planning process may help reveal different kinds of strategies and also lead to the implementation of programs or policies that ultimately help diversify the community's economic base. As a result, diversification as a priority might encourage leaders to consider developing a broader array of skills or focusing on finding new sources of wealth rather than just emphasizing job creation. Thinking carefully about diversity can be helpful for many places, even as leaders consider other goals.

Where diversity does drive thinking, it is usually the result of crisis (e.g., the loss of a major employer or major industry) or the recognition that a crisis might be imminent because the community is overly reliant on a single industry or employer. The justification for seeking economic diversity often centers on mitigating risk and/or capturing opportunity. For those places that rely on a single plant, industry or government facility, there is a need to protect themselves against the potential consequences of losing a large employer (Lockheed Martin in Tioga County, NY) or experiencing a downturn in a key industry (e.g., coal mining in Knott County, KY; furniture and textiles in Rutherford County, NC). As a result, leaders in these places seek additional economic activities to both replace lost jobs in declining industries and reduce the extent to which the community depends on those firms or industries viewed as "declining" or "at-risk" of eventual loss due to global economic forces.

While economic crises may lead communities to seek greater diversity, those same events may also tie leaders' hands in terms of how best to achieve diversity goals. A crisis environment may limit the extent to which places can be intentional about how they pursue their economic development objectives. Rather than being strategic about their efforts, the crisis itself may force leaders to adopt a "beggars can't be choosers" mindset and, as a result, pursue any available opportunity instead of focusing their efforts on quality opportunities.

Capturing greater opportunities is another motivating factor behind diversity-driven strategies. Places with dynamic economies that continuously develop new economic activities and are constantly in a state of transformation are more likely to weather economic storms and raise overall regional prosperity. However, in order to do so, places must be able to maximize their assets to capture current and future opportunities. These "opportunistic" strategies might focus on investing in state-of-the-art infrastructure (e.g., Corridor H in Upshur County, WV), building market relationships with nearby growth centers (e.g., Garrett County, MD's links to Pittsburgh and DC), or effectively connecting firms to local sources of innovation like major research universities (e.g., Clemson University, Mississippi State University) and/or national research laboratories (e.g., Oak Ridge National Laboratory in TN, National Energy Technology Laboratory in WV).

CASE STUDIES IN ECONOMIC DIVERSIFICATION

The data show that places that diversify more quickly are those that experience a sudden loss of a major employer or industry. By contrast, the case studies demonstrate that places that achieve more positive economic diversity tend to do so in smaller numbers and over an extended period of time. Therefore, places seeking to implement diversity-driven strategies must show patience and commitment to those efforts. This requires building consensus around diversity as a goal within the area's long-term economic vision.

DIVERSIFICATION THAT CONTRIBUTES POSITIVELY REQUIRES MANY YEARS

In fact, like making a fine wine, economic diversity requires time to develop local roots and support before its fruit can bear prosperity. Diversity that occurs too rapidly often reflects significant economic weaknesses from a community overly reliant on a single company or industry. These are the stories of crisis and distress that so many regions encounter. While greater diversity may result, its rapid occurrence leads to dislocation among workers and interdependent businesses alike.

The most successful places can expect their efforts to bear positive economic fruit after many years of sustained effort. Several of the case profiles included in this analysis developed their initial plans in the 1990s and pursued that plan's implementation (with appropriate modifications along the way) for 15 years before realizing success. In these cases, the community's citizens (not just its leaders) were committed to a long-term investment strategy. For some, that community commitment may have occurred only after a significant event—a major company downsizing or relocation, meaning that the road back to prosperity was probably much longer and more challenging.

However, this long-term commitment often resulted from a common realization that the community's future had to be built on leveraging one or more unique local assets (a university, a major new highway, or a unique natural geography such as a body of water or mountain) as well as a bit of luck. These assets provided the lynchpin, but the singular focus on a common plan provided the course for the community's new economic trajectory. Identifying those lynchpins and then building local consensus around the plan to leverage those assets are the most challenging tasks—and ultimately the key to success.

DIVERSIFICATION CAN BE ACHIEVED THROUGH A VARIETY OF ECONOMIC DEVELOPMENT STRATEGIES

Economic diversity results from a variety of strategy choices. Communities with varying economic experiences and situations will pursue those strategies that the community supports and that local partners have the capacity to implement. When asked about how they are working to diversify their economy, practitioners identified a wide range of activities including traditional business recruitment, retention and expansion, workforce development, entrepreneurial development, promoting tourism, leveraging university capabilities, investing in infrastructure, and many others. As noted earlier, all these strategies are typically designed to achieve one of five goals:

- Create collaborative regional planning and implementation systems,
- Build an ecosystem capable of supporting a diverse array of economic activities,
- Connect local and regional assets to external markets,
- Develop skills and talent needed in a wide range of industries, and
- Encourage local reinvestment of wealth.

However, at the most basic level practitioners often seek an "anything that works" approach to diversification. Clearly, there are multiple ways to achieve diversity, and several practitioners pointed out that just as the community should not rely on one employer or one industry, nor should the community rely on any single economic development strategy. Much like diversity itself, undertaking multiple strategies allows practitioners to protect themselves against failed or ineffective initiatives while at the same time increasing the likelihood that one of those strategies will succeed. Moreover, many strategies create jobs in relatively small numbers; undertaking multiple strategies can also increase the overall impact of the broader community efforts.

Another influence over selecting preferred economic diversification strategies is the extent to which strategy outcomes can be controlled locally. Practitioners most commonly identified workforce development and entrepreneurial support efforts as actions they could impact locally. In both instances, these strategies involve building the capacity of people who are already located and/or tied to the local community. In other instances, local efforts to foster diversity focused on giving people already living in the community a reason to stay, either through local educational or career opportunities. Traditional business retention and expansion activities also seek to capture and retain investment in the region, but for many businesses, their fate is determined externally as part of far-flung corporate headquarters' decisions or by global market forces.

Ultimately, the most significant challenge to overcome is that most diversification strategies result in creating jobs in the fives or tens over a sustained period of time, whereas an economic event can result in the loss of a major employer or industry and hundreds of jobs at a single moment in time. As demonstrated in the case studies, many Appalachian communities are looking toward tourism development strategies to help diversify their economies and replace past economic drivers. These tourism strategies, however, are often more about replacing lost jobs than diversifying the local economy. While the tourism industry provides jobs for relatively low-skilled workers, the new jobs do not pay those same workers as much as industries like coal or manufacturing once did. Consequently, tourism alone will not lead to greater diversity, but instead must be viewed as but one element of broader economic development strategies.

In this context, the appeal of significant business attraction efforts becomes clear. The attraction of a 200-employee manufacturing plant can make a greater impact on the community than helping a small business grow from 5 employees to 10 employees. While business attraction efforts have a place in many comprehensive economic development strategies, these kinds of investments are made sporadically and a focus on these types of projects can be risky. Most notably, there are few relatively large

projects seeking new locations, and it is probably unrealistic for communities lacking significant assets to expect to win these types of large projects. Many growth companies are also looking to locate in fast-growing, diverse metropolitan areas, closer to their customer base. The projects that are looking for more rural locations often tend to need a low-cost and relatively low-skilled workforce. These kinds of projects are intrinsically mobile and their employment levels are not always sustainable over a long period of time. As a result, this is an area where local forces are least likely to exert real influence over outcomes.

EFFECTIVE DIVERSIFICATION REQUIRES MORE THAN JUST DIVERSIFYING THE EMPLOYMENT BASE

The case studies demonstrated that approaching diversity issues requires communities and practitioners to take a broader perspective and approach. This broad thinking is required in two ways—in how community leaders and economic developers define diversity as well as in how they go about pursuing strategies to promote greater economic diversity. Most practitioners conceptualize a diverse economy as one with a wide array of industries, but this is a relatively narrow way to define diversity. Since wages paid by area employers are not the area's only form of wealth generation, diversity should take into account more than just local employment. Therefore, broader definitions of diversity can lead to outcomes beyond just a diverse employment base. For instance, communities might consider thinking about developing a more diverse set of wealth generators. As shown in places like Rutherford County, NC, retiree attraction efforts can diversify an area's wealth generation capacity. These retirees bring money from outside the region in the form of their retirement accounts as sources of wealth. This wealth can then be re-circulated in the region to support activities like construction and retail. Similarly, Medicare payments (which also originate external to the community) can also generate demand for activities such as those related to health care.

Diversity in the ownership of locally-based companies is another consideration, and specifically whether owners are based inside or outside of the community. Locally-based and headquartered companies are more apt to remain and invest in the area than are firms where the locus of decision making is external to the region. As the Tioga County case study demonstrates, when decisions about a local firm's future are made external to the region, there can be great uncertainty about the region's economic future. In order to mitigate this risk, many places pursue entrepreneurship strategies that promote greater local ownership and control. The case study counties provide numerous examples of entrepreneurial strategies including promoting entrepreneurship to students, recruiting entrepreneurs to the region, connecting entrepreneurs to existing support services, and/or investing in key infrastructure like broadband capacity and business incubators. By growing the number of locally-based firms, communities are more able to exert control over their economic trajectory.

Skills diversity is another area of consideration. Workforce development represents another area that local practitioners identified as a real challenge, but also one where they felt as though local action could make a real impact. Many former mill towns

possess a talent pool that has a relatively narrow range of skills that may not translate well to emerging new industries. This relative lack of skills slows these communities' ability to take on new and different activities and thereby diminishes their capacity to diversify their economies. While there may be a desire to focus training efforts around the region's dominant industry, this can prove risky if that industry experiences significant decline. By contrast, a broad and flexible base of skills is required to support a diverse economy and respond to rapidly changing demand for skills. The Lycoming County case study provides an excellent example of a diversity-driven workforce initiative. In this instance, Penn College intentionally sought to invest in training programs that met the needs of the natural gas industry, but also provided workers with skills that are of use to firms in other industries such as construction, utilities and advanced manufacturing. Therefore, diversifying the skill base can allow communities to better take advantage of opportunities as they present themselves.

These distinctions are important as they force consideration of issues such as the diversity of wealth and ownership, as well as the workforce's ability to respond to changing economic conditions. Consideration of these different forms of diversity also influences strategy design and how outcomes are measured. These different definitions of diversity are not contradictory or mutually exclusive. Broadly defining diversity can lead to the need for a diverse portfolio of development strategies, which in turn can allow communities to not only achieve multiple objectives, but also increase the chances of strategies proving successful.

ECONOMIC DIVERSITY INFLUENCED BY REGIONAL CONTEXT

Communities must also approach diversity with broader geographic considerations. The case studies showed that diversity is a scale-dependent issue. Workers often think regionally when looking for employment, and so too should communities when seeking future opportunities for wealth creation. Understanding the broader regional context can help communities better understand the range of available opportunities and potential risks. For instance, a community like Tioga County, NY will never be a major jobs center but by making themselves an attractive place to live they are able to attract people with good paying jobs in nearby job centers like Ithaca or Binghamton. By contrast, downturns in the Washington, DC or Pittsburgh economies might have negative consequences for a place like Garrett County, MD. Understanding the regional context can therefore help to shape the parameters for strategy development as it helps communities more fully understand the threats and opportunities they face.

Specialized counties that contribute to a broader, more diverse region are more likely to diversify over time. Building stronger regional connections can enable communities to leverage a greater number of assets, and thereby open up greater economic opportunities. For instance, proximity to large universities can prove beneficial not only for the immediate area, but also surrounding communities. If leveraged properly, large universities, such as MSU in Oktibbeha County or Clemson in Pickens County, can be a source of innovative research and talented workers for area companies, as well as a source of demand for local food producers or retailers. While this is important for all counties, it is especially important for more rural communities that lack depth of assets.

However, these regional connections do not always occur naturally and both the university and the community must be willing to work together in order to maximize these opportunities.

Regional thinking can also help create assets. For communities seeking to develop tourism, the whole is greater than the sum of the parts, and they are best served by linking these attractions together in the minds of potential tourists and promoting the entire region as a single destination. By thinking regionally, Lauderdale County, for example, has not only made itself a regional retail center but also a destination for golfers through its place in the Robert Trent Jones Golf Trail. These kinds of economic opportunities would not be available had Lauderdale County acted independently to promote its golf courses or its tourist attractions. Similarly, the tourism and infrastructure initiatives underway in Upshur County and its surrounding region would not have succeeded had those counties operated independently of one another. By contrast, Knott County's efforts to establish itself as a center for adventure sports has yet to fully materialize in part because the initial efforts have been independent of one another and not yet connected to a broader regional effort.

BROAD ENGAGEMENT ACROSS SILOS INCREASES POTENTIAL FOR SUCCESSFUL DIVERSIFICATION STRATEGIES

Similarly, broad engagement with a wide array of stakeholders can also help move diversification efforts forward. Effective strategies engage practitioners from economic development, workforce development, higher education, planning, tourism development, as well as the private sector. Practitioners in each of these arenas bring unique, but sometimes overlapping, networks. These networks offer access to knowledge, resources and expertise. For instance, workforce developers may have access to training funds or training programs that would benefit companies in industries that economic developers seek to promote. Similarly economic developers meet regularly with area companies, and can in turn convey information from these conversations to educators who can then use that information to develop curriculum.

As noted above, regional approaches and regional collaboration is often ideal, but local collaboration is the minimum required for implementing effective strategies. Top down initiatives are not always effective as they often end up being neither regional nor collaborative. Instead, some of the more effective collaborative initiatives emerge from grass roots efforts where local organizations come together to form a partnership to address an issue where there is a consensus need. Economic developers often lead these efforts, but the most effective ones are those that see their primary role as one of a connector. By connecting different regional actors and networks, they are able to gather support and resources to advance regional initiatives. This kind of local collaboration often emerges in places where there are open networks, and grassroots initiatives are able to surface from a wide array of actors.

Opportunities are fewer in places where the practitioners remain within the walls of their silos. The case studies suggest that the communities with the most coherent diversification strategies have overall economic development strategies that are not

driven by local economic developers alone. As in the case of Garrett County, MD, these successful strategies involve multiple stakeholders and enjoy broad-based community support. In these instances, area economic developers see that they have a role beyond just industrial recruitment and retention and are willing to embrace their role as a regional connector or facilitator are more apt to be successful in furthering broad based regional initiatives that seek to promote economic diversity.

RESEARCH CAN GUIDE EFFECTIVE STRATEGY DEVELOPMENT AND IMPLEMENTATION

Strategies are more likely to be successful if they are based on a foundation of data-driven research. However, this is an area where many economic development practitioners often lack capacity. These research skills are needed for economic development practitioners to track regional growth and progress, undertake effective market analysis, understand how to harness creativity and entrepreneurship, and keep up with trends about how technology is re-shaping economic advantage. Many places lack this research capacity, but creative and enterprising practitioners can access these capabilities by looking beyond their silos and partnering with other regional organizations that are capable of performing this research.

At the most basic level, communities should have a basic understanding of the economic trends that are shaping their economy. This baseline analysis is an important component in undertaking an honest appraisal of the community's strengths and weaknesses and is often captured in regional Comprehensive Economic Development Strategies. Understanding these economic trends allows communities and regions to better identify and prioritize key issues as well as determine which strategies are realistic, which are not, and which are likely to yield the greatest impact. For instance, local leaders may seek to turn their community into a tourist destination, but if the community has no hotels or restaurants and lacks highway access or appealing tourist attractions, then this effort will likely experience difficulty gaining traction. Undertaking this kind of honest appraisal allows places to remove less optimal options from consideration and instead focus on diversification strategies that are more appropriate for their circumstances.

In addition to considering their internal strengths and weaknesses, successful places also consider external risks and opportunities. This can be done by better understanding how local firms and industries are connected to external markets, and how growth or decline in other places may affect the local economy. If communities are able to identify comparable places then they might be able to learn from their situation. Similarly, community leaders might also seek to learn from other places that have experienced significant shocks or been presented with similar opportunities. For instance, the Lycoming County case study showed how that community was able to learn from another community—Fort Worth, TX—that had been affected by the natural gas boom, and was better able to prepare for the multitude of impacts arising from these developments.

Research and analytical capacity can also play an important role in monitoring and evaluating strategy progress. By tracking outcomes, places can better identify those strategies that are not performing as hoped and either eliminate them or develop new, more effective tactics for the future. Moreover, tracking outcomes and performance allows stakeholders to demonstrate their progress and impact which is important for enlisting additional support or securing funding.

LEADERSHIP MATTERS

As noted above, there is no single economic development strategy that alone can lead to greater economic diversity. Many different kinds of strategic actions must be undertaken to achieve this goal. However, none of this matters if the strategies are not effectively executed. Successful implementation often comes down to the people involved. For a community to effectively diversify its economy, it must first and foremost have people who see economic diversification as a priority. If diversification proves to be a community priority, then it must also have community leaders and stakeholders who are open to working regionally, collaborating across silos, thinking opportunistically about resources, and willing to take risks in order to make the investments necessary to see diversification strategies through to completion. Moreover, communities need different people in different roles to implement these strategies. At the most basic level, there are two roles that need to be filled—a leadership role and a staff role.

Leadership is crucial for any economic development effort. Local leaders are needed to articulate, and build consensus for, a community vision. They are also needed to serve as champions for strategies and enlist support from the community to help implement those strategies. In several of the cases studies, the research team saw that the private sector could play an important catalyzing role for many strategies. This was especially true for Washington County, VA, where private sector leadership drove the completion of the Birthplace of Country Music Museum. In Oktibbeha County, MS, engaged and committed leadership from both the community and the Mississippi State University administration make it possible for the community to increase the economic impact of the campus community on the local economy. However, for many smaller and more rural Appalachian communities, this kind of strong private sector leadership is not always available, and as a result they often lack the capacity to coalesce local business leadership for true public-private efforts in economic development. In these places, government can become a critical actor in rural local economic development in Appalachia (and elsewhere).

But no matter where this local leadership may come from, there is also a need for multiple leaders. Many of the diversification strategies laid out in the case studies will require long-term commitment before they begin to yield significant and sustainable benefits for the community. Many of the initiatives underway in Lauderdale County began in the mid-1980s and they continue to yield benefits because there has been a long-term commitment to see them continued. Sustaining long-term economic development and diversification efforts therefore requires a depth of leadership. The Knott County, KY case study showed that when there has been significant leadership

turnover, it is difficult to maintain the momentum behind these efforts. The loss of a strong, persuasive and visionary leader can derail efforts unless there is a deep leadership bench and broad buy-in to a common vision. As demonstrated by the Garrett County, MD case study, the county's economic development planning process—which has been ongoing for over 15 years—has been an effective means for on-boarding new leaders into the process and ensuring consensus for the economic development vision.

Leadership alone cannot guarantee successful implementation of economic development and diversification strategies. Strong leaders often succeed when they are supported with great staff. For many leaders, particularly private sector leaders, these kinds of initiatives are well outside of their core professional responsibilities. Therefore, economic development practitioners are needed to do much of the work involved with seeing these strategies through to completion. This may involve work such as organizing meetings and doing the research. Practitioners also play a hugely important role in organizing stakeholders and preparing applications needed to secure state and federal funds that help kick start many of these initiatives. This is not to say that economic development practitioners themselves are not key leaders in their communities. In most instances, they are quite active in many of the core leadership responsibilities (e.g., building a consensus vision, recruiting support) in which private sector leaders should also be engaged. However, rarely can a community truly transform its economy without significant support from business leaders and elected officials and without important support from their economic development practitioners.

It should also be noted that working both collaboratively and regionally requires a great deal of trust among stakeholders. Repeated interaction often leads to greater trust and comfort, so continuously seeking regional and collaborative projects is one way to build these loose coalitions (even if the efforts are not always successful in attracting external funding). The importance of having these coalitions in place cannot be understated. For instance, the existence of ongoing partnerships can allow regions to respond quickly and effectively to funding opportunities as they arise. Just like diversity itself, these coalitions allow places to capture more opportunities and mitigate the risk involved in undertaking new initiatives.

CONCLUSION

These case studies demonstrate that many Appalachian communities view economic diversity as a stated goal, but there are few articulated strategies that are specifically intended to achieve greater economic diversification. Instead, diversity is often used as one of several justifications for pursuing broader economic development goals. In many instances, places identify economic diversity as a goal after they have experienced some kind of crisis like the loss of a major employer or job losses in a regionally significant industry. The motivation for a more diverse economy therefore manifests itself in two ways. First, places seek to mitigate the risk inherent with being too dependent on a given employer or industry. Second, places seek to capture greater opportunity by being involved in a wider array of economic activity. However, it is most often the former that allows diversification to become a core community value. If diversification

is not a core value or key goal, it still may receive some rhetorical support albeit with very limited resources supporting action.

When asked about their diversification efforts, economic development practitioners note a wide array of strategy types. For instance, several practitioners cite their business attraction and retention efforts as a key plank of the diversification efforts. Perhaps most commonly, practitioners look to targeted efforts—like those focused on the agriculture or tourism sector. Frequently, these may not even be central to their traditional economic development efforts. While these activities often take advantage of assets—namely existing developable land or even available wilderness—developing these industries are in some instances more of an economic replacement strategy than a diversification strategy. The initiatives are designed to provide jobs for relatively lower-skilled workers who are no longer able to work in mines or mills. As a result, tourism and agriculture may represent a return for communities to their rural roots due to a lack of alternatives rather than an effort to find a new economic rationale for their community. This approach can be valuable, especially in cases where no alternative options exist, but this approach seldom contributes sufficiently to local wealth as to help transform the local economy in response to global market forces.

Some places think more broadly about diversification than just seeking to encourage a broad base of industry employment. In those cases, community leaders emphasize efforts aimed at diversifying the local talent base and the skills available from the local workforce while others may focus on growing the number of locally-owned firms through entrepreneurial support efforts. In other instances, efforts are placed on diversifying sources of wealth generation by pursuing activities like retiree attraction. Overall though, successful diversification efforts involve identifying and successfully implementing multiple strategies simultaneously.

The case studies also show that diversity is a scale dependent concept. If places are able to look beyond the borders of their own town or county, they may be able to better capitalize on more regional assets. This is demonstrated in a number of ways. For instance, places might seek to better integrate their community with larger job centers in neighboring counties. They might also attempt to leverage the expertise or demand generated by nearby institutions to support their own locally based efforts. Another common strategy is to work with individual local industries in a context in which those companies are connected to similar industries across a broader area—recognizing the importance that industry clusters can have in creating a regional identity. This is a common technique in developing the tourism industry, organizing individual tourist attractions from across a region in such a way as to create a more appealing tourist destination. The same principles can be used in organizing the agricultural sector, selected manufacturing industries, or other targeted sectors. The better able the community is in connecting these industries to key economic assets, the more equipped the community will be to mitigate risk and capture opportunity for those industries (and the community's citizens).

Communities that successfully implement diversification strategies often share several common traits. First, they develop their strategies on a solid foundation of analysis and

research. Second, they think long-term, recognizing that sound development approaches can take time to mature.   Third, they think and operate regionally so as to maximize the resources and assets available to them. Fourth, practitioners work across silos to create broader networks and coalitions and to leverage networks and expertise. Fifth, successful places put the right leaders and staff in place to gain common understanding about the challenges ahead and the most appropriate risks to take in addressing those challenges. Finally, successful places have a process in place not only for developing and implementing their strategies, but also for incorporating new leaders. Economic diversity is a legitimate economic aspiration and goal, but like all economic development goals, it will only be accomplished if area leaders and stakeholders thoughtfully and effectively implement their economic development strategies.

Economic Diversity in Appalachia

A Practitioner's Guide for Planning and Analysis with the Appalachian Economic Diversity Web Tool

February 2014

Prepared for the Appalachian Regional Commission

CENTER FOR
REGIONAL ECONOMIC
COMPETITIVENESS

CONTENTS

ABOUT THIS GUIDE

This guide is one of four documents prepared as part of an extensive analysis of economic diversity for the Appalachian Regional Commission by the University of Illinois at Urbana-Champaign's Regional Economics Applications Laboratory and the Center for Regional Economic Competitiveness, with assistance from the RUPRI Center for Rural Entrepreneurship and EntreWorks Consulting. Project leaders were Edward Feser, Ken Poole, Mark White, and Geoffrey Hewings, with Troy Mix serving as Project Manager.

Authors of this guide were Mark White and Ken Poole. Erol Yildirim and William Cook were primarily responsible for building the web tool.

In addition to this guide, the documents include a summary report (*Economic Diversity in Appalachia: Statistics, Strategies, and Guides for Action*), a detailed synopsis of case studies (*Case Studies in Economic Diversification in Appalachia*), and a technical report detailing methods, data, and additional findings (*A Statistical Portrait of Economic Diversity in Appalachia*). All reports associated with the project can be found here: http://economicdiversityinappalachia.creconline.org/Report/.

INTRODUCTION

Appalachian communities have long relied on one or two major industries to support their economies. To paraphrase an old saying: when those industries sneezed, Appalachian communities caught pneumonia. Not surprisingly, economic development practitioners working in Appalachia recognize the importance of promoting greater economic diversity. However, they may not be fully aware of just how dependent their local communities are on a single industry or handful of industries.

As part of a comprehensive analysis of economic diversity conducted for the Appalachian Regional Commission (ARC), the University of Illinois at Urbana-Champaign and Center for Regional Economic Competitiveness research team created a unique website designed to help practitioners better understand the structure of their local economies, both singly and in comparison to other counties and regions of similar scale and type within Appalachia and across the United States. The website taps a compilation of data elements to facilitate user-customized quantitative portraits of Appalachia's counties and regions. The data, indicators, and visualization facilities together constitute a *web tool* rather than a simple website.[1]

The web tool includes data points designed to help practitioners and policy makers understand and explore several key concepts related to economic diversity. Through tables, charts, graphics, and maps, users are able to undertake selected analyses of their economies' diversity quickly and easily.

While the web tool is not intended to be a single source of information and analytics to support all economic development planning, the tool is best suited to help address four commonly asked applied research questions:

1. How is my economy doing?
2. How diverse is my economy and what risks and opportunities does that diversity present?
3. What kind of asset is my local workforce?
4. How is my county doing relative to similar counties elsewhere?

This guide is organized around plausible scenarios that economic development practitioners frequently encounter, often as part of a local or regional planning process. After providing a brief orientation to the website, the guide directs users through the mechanics of investigating each question using the data and tools the site offers. The guide also points users to additional resources that supplement the information on the website.

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[1] http://economicdiversityinappalachia.creconline.org/

ABOUT THE APPALACHIAN ECONOMIC DIVERSITY WEB TOOL

There are several core elements to the Appalachian Economic Diversity Web Tool; many of the features can be accessed through the tabs at the top of the Home page (see Figure 1). Practitioners who are new to the tool can familiarize themselves with the site via a basic tour accessible by a link in the green box. Users can also find definitions for key terms by rolling the mouse over the information icon (*i*) found next to key terms. After clicking on the icon, users will see a pop-up window that includes a definition of the term. More detailed definitions are also available on the **'About'** link.

Figure 1: Key Pages of the Appalachian Diversity Web Tool
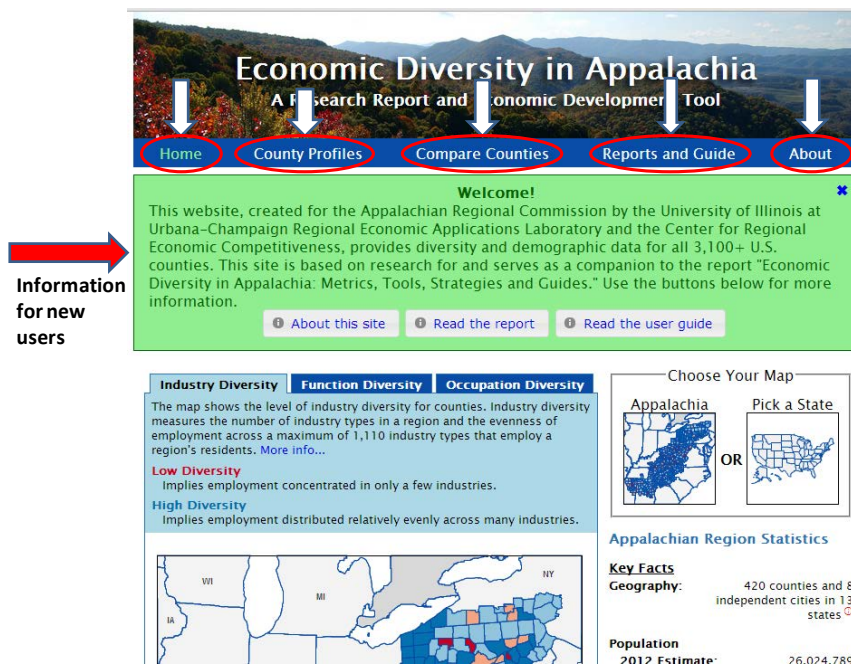
We will provide more detail about the information and data contained on each of the pages as we address each of the key questions throughout this guide. The following is an inventory of items located on each page.

- **Home page:** The home page provides data tied to three different measures of economic diversity—industrial, functional, and occupational. Those concepts are explained in depth in a companion report.[2] In general, the measures describe how well-endowed each of the region's 420 counties are in terms of the number of industries and their employment levels, the prevalence of broad

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[2] See *Economic Diversity in Appalachia,* a report prepared for the Appalachian Regional Commission by the UIUC Regional Economics Applications Laboratory, the Center for Regional Economic Competitiveness, and the RUPRI Center on Entrepreneurship (Washington, DC, 2014).

types of economic functions or roles regions often play (e.g., a government center, a retail trade center, a manufacturing hub, etc.), and the number and size of occupations represented in the workforce. The level of diversity in each county is captured via a statistical index and mapped. Using the maps, practitioners can explore county-by-county patterns of economic diversity within each of the states or across the entire ARC region.

The economic diversity maps can be filtered in multiple ways so that users can focus on a few important variables if they wish. For instance, users can opt to look at just those counties with high or low levels of industrial diversity, to focus on a county's economic status or functional specialization, or to access basic employment and population data.

- **County Profile page:** The County Profile page provides much of the web tool's key data and information. In the left- hand column, users will find data about individual counties. Those data pertain to the selected county's economic performance, the names of five comparison counties, and employment data by economic function and occupational knowledge cluster. In the right-hand column users will find a number of diversity-related metrics, including metrics for other geographies, such as the county's commuter shed and development district.

- **Compare Counties page:** The Compare Counties page allows users to make side-by-side comparisons for up to three counties quickly and easily. Using the available filters, other Appalachian counties may be selected for comparison based on ARC sub-region or economic status designations.

- **Report page:** The report page contains links to PDF versions of the *Economic Diversity in Appalachia* reports that contain more detailed information about the diversity metrics and data.

- **About:** This page contains information about the Economic Diversity in Appalachia website and a glossary of key terms and concepts. It also includes a description of the methodology used to develop the metrics presented in the web tool.

QUESTION 1: HOW IS MY ECONOMY DOING?

The first and simplest use of the Appalachian Economic Diversity Web Tool is to explore basic trends for a given county and its neighboring counties. A number of key indicators may be explored, such as population, employment, and income growth. Such explorations are valuable for monitoring of the overall health of a county's economy.

Data from the site are pulled from a variety of public and private sources. Included are detailed population estimates from the U.S. Bureau of the Census and employment estimates from Economic Modeling Specialists International (EMSI). EMSI uses Bureau of Labor Statistics (BLS) employment data and applies an algorithm designed to estimate data that BLS suppresses for small area geographies. This estimation technique is important because, at the 5-digit NAICS level of industry detail, more than half of the employment data in a given county may be suppressed to meet federal confidentiality requirements. To calculate a complete set of diversity measures, the research team required estimates of employment for all suppressed data cells.

When tracking economic indicators, practitioners must also understand the context of individual data points. County employment or population may be growing at a given rate, but how does that rate compare to the state or nation? The tool provides such information readily. Even if growth is occurring at a relatively fast pace, it is critical to understand the sources of growth to assess whether it is manageable and sustainable.

Figure 2 shows the location on the Home page where users can find diversity characteristics and growth trends within the ARC region or in any state. By clicking on counties in the map, users can explore basic population and employment growth data for different places. The growth trends are presented in a way that allows the comparison of one county to another county, the state, or the nation.

Population and employment growth rates for each county are provided as compound annual growth rates (CAGR) for the period 2009 to 2012, which covers the last year of the recession through the most recent full year of data available. Percentile rankings aid interpretation of a county's relative performance.

USING THE WEB TOOL TO CREATE A PROFILE: A SCENARIO

As an example, consider the data for Lycoming County, Pennsylvania. Users can access individual county data in two ways. By selecting the county of their choice—in this example, Lycoming County, PA—on the Home page they will be able to see basic population, employment, and earnings data. Clicking on the 'View Detailed County Profile' link on the bottom of the right column opens more individual county data. Alternatively, users can access this same detailed county profile by selecting the 'County Profiles' link at the top of the Home page. Once on the 'County Profiles' page, use the State and County drop down menus to select the county of interest—in this case, Pennsylvania and Lycoming County. The Lycoming County profile page is illustrated in Figure 3.

Figure 2: Accessing basic trends through the home page
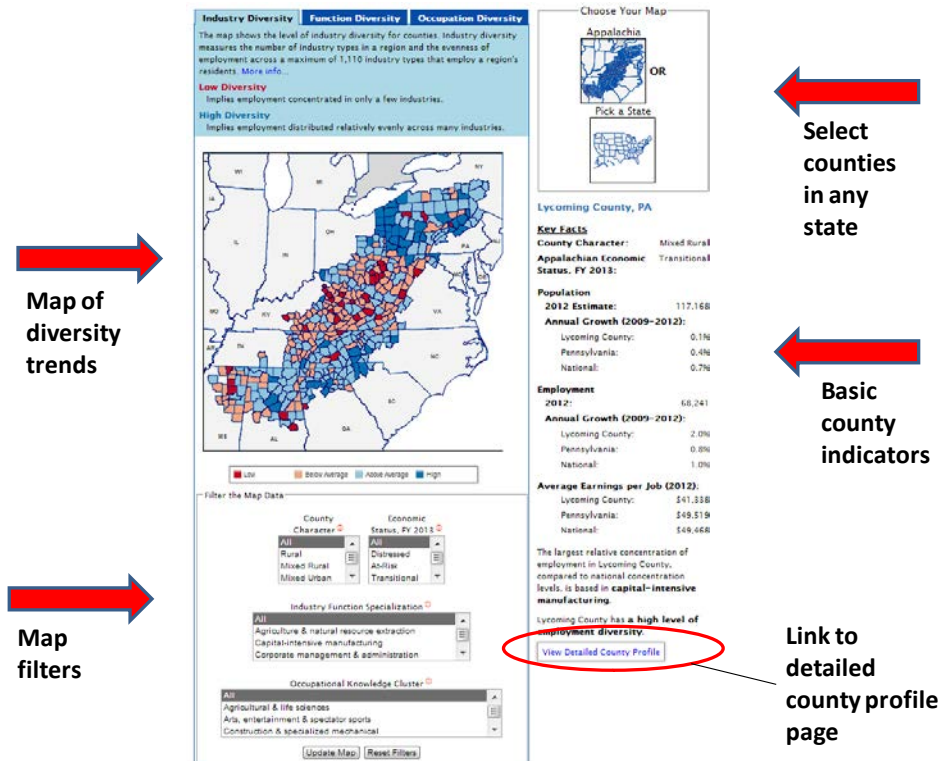
Lycoming County is at the center of the Marcellus Shale natural gas boom in Pennsylvania, and trends reveal how its growing employment has far exceeded population growth. Between 2009 and 2012, Lycoming County's population grew at a rate of only 0.1 percent annually. When compared with the Pennsylvania and national growth rates, Lycoming County's population has grown relatively slowly within a state that has also seen relatively slow population growth. The percentile rankings for population growth offer further context and show that nearly 67 percent of U.S. counties and 60 percent of ARC counties added population at a faster rate than Lycoming County.

Figure 3: Basic Indicators on the detailed County Profile page
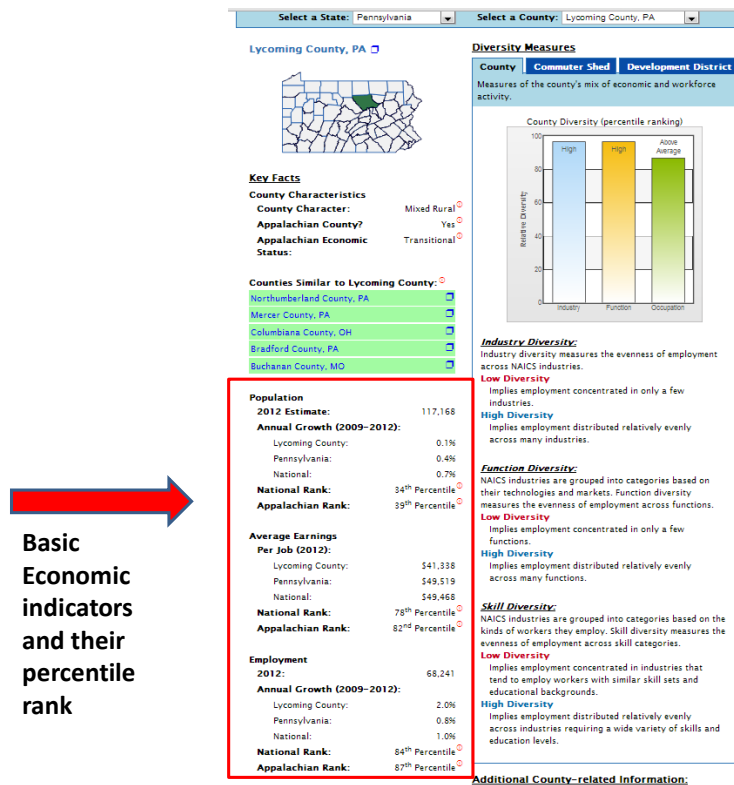
Lycoming is a portrait of contradictions. Even as its population remained stable, the county's employment grew at an annual rate that was twice the national rate and 2.5 times faster than the Pennsylvania rate between 2009 and 2012. Lycoming is a fast growing county in terms of employment in a relatively slow growing state. In spite of this rapid job growth, the percentile rankings show that there were still 16 percent of U.S. counties, and 13 percent of ARC counties, that added jobs at a faster pace.

The web tool will align counties side-by-side to facilitate comparisons. For our example, we have chosen to compare Lycoming County with another county—Williams County, North Dakota—that has also been greatly affected by natural gas activity. To produce these side-by-side comparisons, select the 'Compare Counties' link at the top of the webpage. Then select the comparison counties by first using the 'Filter by State' drop down menu, and then the 'Select a County' drop down menu. Comparison counties must be selected individually, up to three counties in total. For users only interested in ARC counties, additional filters have been included to facilitate comparisons by Appalachian Sub-region or by ARC Economic Status.

Returning to the Lycoming County, PA and Williams County, ND example, Figure 4 displays the side-by-side comparison. Williams County lies at the heart of the Bakken Shale natural gas development in the Upper Great Plains and has encountered many of the same development pressures as Lycoming County. Economic trends have been very

Figure 4: Side-by-side county comparisons

Side by side comparisons of counties available in the compare counties page
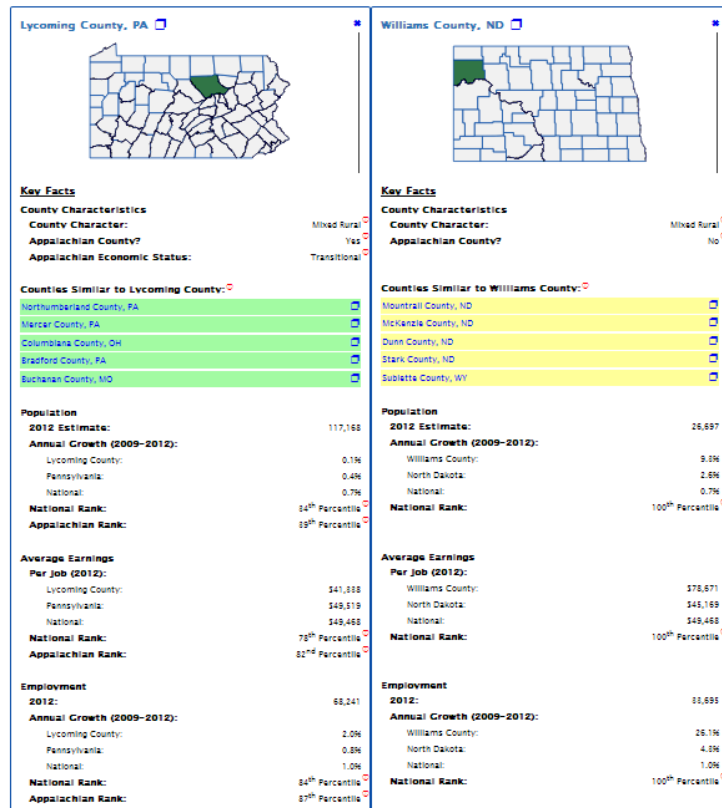
different, however. Williams County's population and employment annualized growth rates between 2009 and 2012 were in the 100th percentile of U.S. counties, meaning that it had grown faster than almost every other county in the nation. Moreover, average earnings in Williams County were also in the 100th percentile and well above the state and national average earnings. By contrast, Lycoming County's average earnings were in the 78th percentile of counties and remain below the average earnings of both the U.S. and Pennsylvania.

These simple data points help us interpret the relative magnitudes of basic economic and demographic trends and to ask whether our given study county is unique or following patterns evident in other similar places. More data and research are required to fully understand the similarities and differences underlying the economic and demographic changes occurring in these two locations. While the web tool is designed to highlight differences and similarities, it is not designed to answer every comparative question.

To help users continue their exploration and to conduct more in-depth research, the tool's County Profile page also includes links to relevant data in the Census Bureau's Quick Facts page and the BEARFACTS page of the Bureau of Economic Analysis. Those resources, along with data from the U.S. Bureau of Labor Statistics, can provide

additional information for users who wish to analyze the drivers behind the trends they are observing.

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QUESTION 2: HOW DIVERSE IS MY ECONOMY AND WHAT RISKS AND OPPORTUNITIES DOES THAT DIVERSITY PRESENT?

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Promoting economic diversity is largely focused on identifying economic risks and capturing opportunities. Practitioners can look at economic diversity to understand those risks better and explore prospects for emerging growth. A diverse economy is not synonymous with a growing economy, but conventional wisdom suggests that diverse economies are much less likely to suffer debilitating losses when an industry falters or a company shuts down. Because alternative employment opportunities exist for workers, the painful impacts of loss are usually more quickly mitigated in places with greater economic diversity.

The Appalachian Economic Diversity Web Tool includes three basic ways of understanding economic diversity.[3]

- **Industrial diversity** measures the level and evenness of employment across a maximum of 1,110 industry types that might employ a region's residents.[4] *Industry diversity is important to practitioners because the more industries represented in a local economy, the greater the alternatives for area residents in seeking jobs. Furthermore, places that have higher industrial diversity are less likely to be severely impacted by negative trends associated with a particular industry or dominant company.*

- **Functional diversity** measures the evenness of employment across eleven broad industry groups that capture major economic roles that regions often play, such as education centers (e.g., if a university is present), government centers (capital city or prevalence of government agencies or installations), a manufacturing hub, a retail trade center, and so on. *Functional diversity is important to practitioners because regions diverse enough to serve multiple "economic functions" might be expected to experience greater moderation in growth or decline that result from cyclical changes.*

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[3] More detailed definitions of the terms and measures used in the tool can be found by selecting the 'About' tab on the webtool (http://economicdiversityinappalachia.creconline.org/About/#definitions). For an in-depth description of how these measures were calculated, consult A Statistical Portrait of Economic Diversity in Appalachia

[4] These industries types are based on 6-digit NAICS (North American Industry Classification System) definitions. More information about NAICs can be found at: http://www.census.gov/eos/www/naics/

- **Occupational diversity** measures the evenness of employment across 96 occupational groups (as defined by the Bureau of Labor Statistics).[5] Occupations are grouped based on "work performed, skills, education, training, and credentials" and examples of groupings include agricultural workers, life scientists, secretaries and administrative assistants, and top executives. Unlike industries, which are defined by what companies make, occupations reflect what workers actually do. *Counties may realize benefits when they have specializations in multiple occupations that collectively require a wide variety of local workforce skills. Occupational diversity can translate to greater adaptability for the workforce as economic activities change and job opportunities shift.*

Practitioners using the tool can view maps showing different levels of industrial and functional diversity for every county in the ARC region and for all counties in each of the 50 states. Users can apply the available filters to focus on those counties with different diversity levels.

The Home page also allows users to explore other county features such as "county character," "economic status," "industry function specialization," and "occupational knowledge cluster."

- *County character* categorizes how urban or rural a county may be, and is based upon its population density and the proportion of its population that lives either in Census-defined urban or rural locations.

- *Economic status* represents the state of the county's economy in relation to the national economy, as defined by ARC. ARC combines three variables— the three-year average unemployment rate, per capita market income, and the poverty rate— to specify economic status. Since this is a formal ARC definition, the tool does not assign economic status characteristics to counties outside of the Appalachian region.[6]

- *Industry Function Specialization* identifies a county's largest employment concentration relative to the U.S. in one of eleven broad categories. This information serves as a quick way to identify a county's predominant type of economic activity and the role (or function) it plays in the national economy.

- *Occupational Knowledge Cluster Specialization* represents its largest specialization relative to the share of U.S. employment accounted for by each of 12 occupation-based clusters. These clusters were determined by identifying groups of occupations that had similarities in the knowledge required to work

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[5] For more information, see: http://bls.gov/oes/current/oes_stru.htm

[6] www.arc.gov/appalachian_region/CountyEconomicStatusandDistressedAreasinAppalachia.asp

in these professions. This information allows users to quickly identify the predominant skills of the county's workforce.[7]

The measures allow users to quickly compare their various characteristics with other counties in the arc region or in their state. Practitioners can also use the measures to identify other counties that may be experiencing similar economic conditions.

INDUSTRIAL AND FUNCTIONAL DIVERSITY: A SCENARIO

Consider the case of McDowell County, West Virginia. McDowell is a rural place with a distressed economy according to ARC's definition. The county's main economic drivers are mining and prisons. Much like the examples discussed in the previous section, users can access more detailed data about McDowell County, WV by either selecting the county on the Home page map, or by using the state and county drop-down menus found on the 'County Profiles' page. Once users have accessed the McDowell County Profile page they will see that the county's employment base has grown at a relatively quick rate since the recession and it also has relatively high average wages. Yet in spite of that employment growth, McDowell lost residents between 2009 and 2012.

The county's economy relies on a few economic drivers and very little diversity. As illustrated in Figure 5, diversity metrics for the county are found in the right-hand column of the County Profile page. The economic diversity metrics shown on McDowell

Figure 5: County diversity scores by percentile ranking

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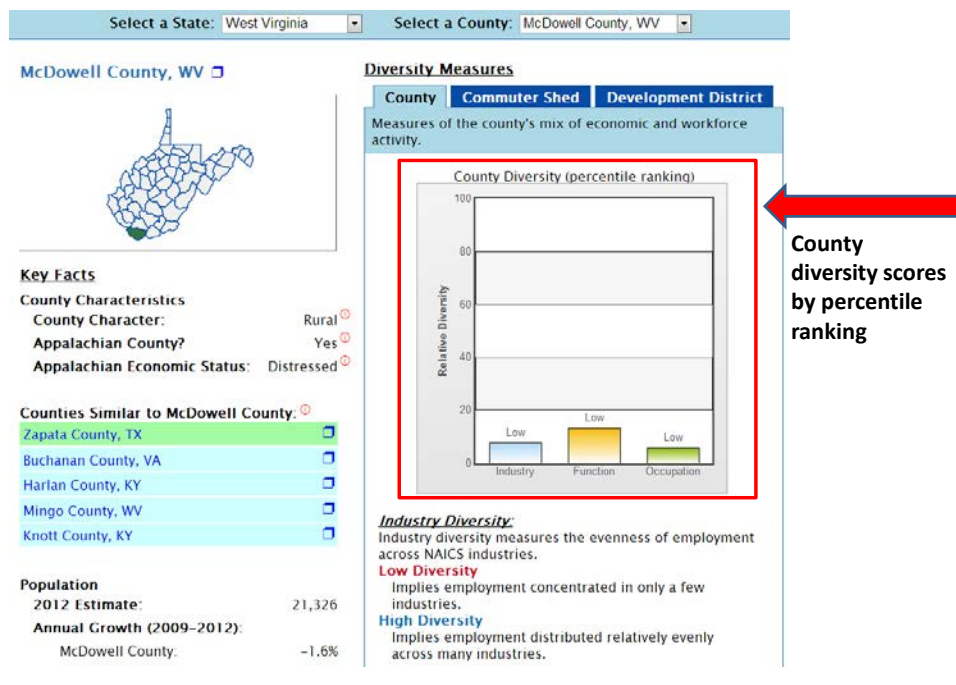
[7] It should also be noted that nearly 75 percent of counties have a specialization of "skilled, semi-skilled labor & machine operation" or "semi-skilled service", reflecting the prevalence of basic skill jobs across the U.S. economy, regardless of location.

industrial diversity and the 13th percentile for functional diversity. Those statistics suggest how dependent McDowell is upon a limited number of local economic engines.

To help better understand the scale of the county's key industry functions, users can consult the 'Industry Function Employment' table toward the bottom of the left hand column on the 'County Profile' page. In the McDowell County, WV example, there are almost 1,900 jobs in agriculture and natural resources extraction, which is far more than any other functions. To put this into better context, users can click on the 'View Radar Chart' link at the bottom of the Industry Function Employment Table. Figure 7 shows the functional employment radar chart for McDowell County. It illustrates that natural resources extraction (predominantly coal mining) accounts for 26 percent of the county's total employment. Such an over-reliance on mining poses potential risk to the county's economy in the event this activity declines.

Of course, it is important to understand the nature of this activity. Resource extraction tied to coal mining has lost significant jobs in the region as coal faces increased regulatory restrictions and becomes more costly compared to other sources of energy. At the same time, new technologies have made hydraulic fracturing ("fracking") of natural gas a more competitive source of energy, spurring economic growth elsewhere in Appalachia. So, it is not enough to know the nature of the functional specialization; it is also important to understand the competitive conditions that specialization faces, in terms of the business cycle, the industry growth cycle, and the technology cycle. The data in the web tool provide only a starting point for exploring those conditions.

Examining the economy of a county in isolation can be misleading. It is critical to view a county's profile in the context of its neighbors. A specialized county in a more diverse regional economy is in a very different situation than an undiversified county in a region of little diversity. While McDowell is highly concentrated in natural resource extraction activities, it is located in a broader, more diverse region that offers more alternative work opportunities for its residents.

One can examine the broader geographic region by selecting the tabs showing the diversity metrics for the combined counties in McDowell County's commuter shed and/or development district (see Figure 6). Doing so, one can see that the functional diversity of the region's local development district (the Region 1 Planning and Development Council) is in the 78th percentile, much higher than the county's own level. Selecting the 'Commuting Shed' or 'Development District' tabs at the top of the Diversity Measures chart shows how a county compares to the other counties in its commuting shed or development district. Clicking on the name of those other counties directs the user to the 'County Profile' page for those counties. Clicking on the box on the right-hand side of the county name brings up the 'Compare Counties' page. Using these tools, one can quickly compare a county to its neighboring counties.

Figure 6: Development district diversity scores by percentile ranking
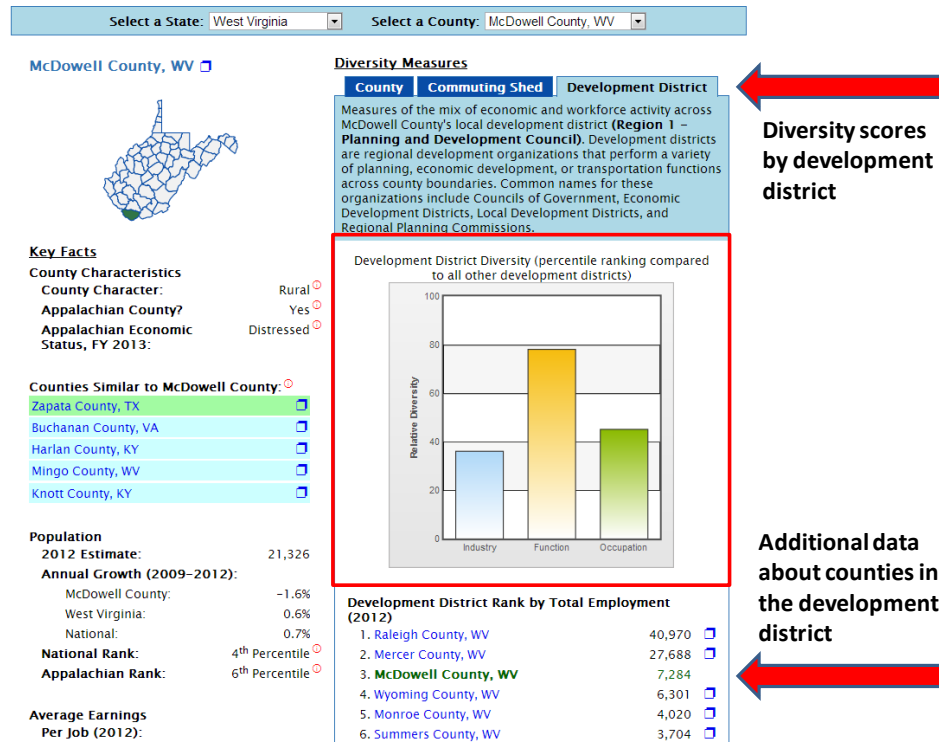
Returning to the McDowell County example, the Commuter Shed and Development District metrics suggest that it is heavily reliant on one functional specialization, yet the risks associated with such concentration may be mitigated by the diversity of the broader region. The radar charts (see Figure 7), which illustrate the proportion of total employment concentrated in each functional category, reveal the range of economic activities underway in each county and make it easy to compare with other jurisdictions.

Looking at the radar charts for neighboring counties begins to identify the opportunities that the broader region may offer to McDowell's workers. Figure 7 displays radar charts for McDowell County and neighboring Mercer County.[8] Mercer County has a much more balanced economy with significant employment in distributive services, healthcare, and finance, insurance and real estate. This distribution produced more employment growth and higher wages for Mercer than the less balanced employment mix did for McDowell. Furthermore, Mercer's balance of activities offered job opportunities to commuters from throughout the surrounding region.

This type of information can shape economic development planning and practices. It reveals the critical role that thinking regionally can play in understanding the local economy. It also illustrates that economic development practitioners must not only understand their locality's existing specializations, but also think about supporting the

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[8] It should be noted that the Tool only allows for one radar chart to be displayed at a time. Figure 7 was an image created to illustrate the differences between two counties.

Figure 7: Radar Charts displaying proportion of employment by functional specialization
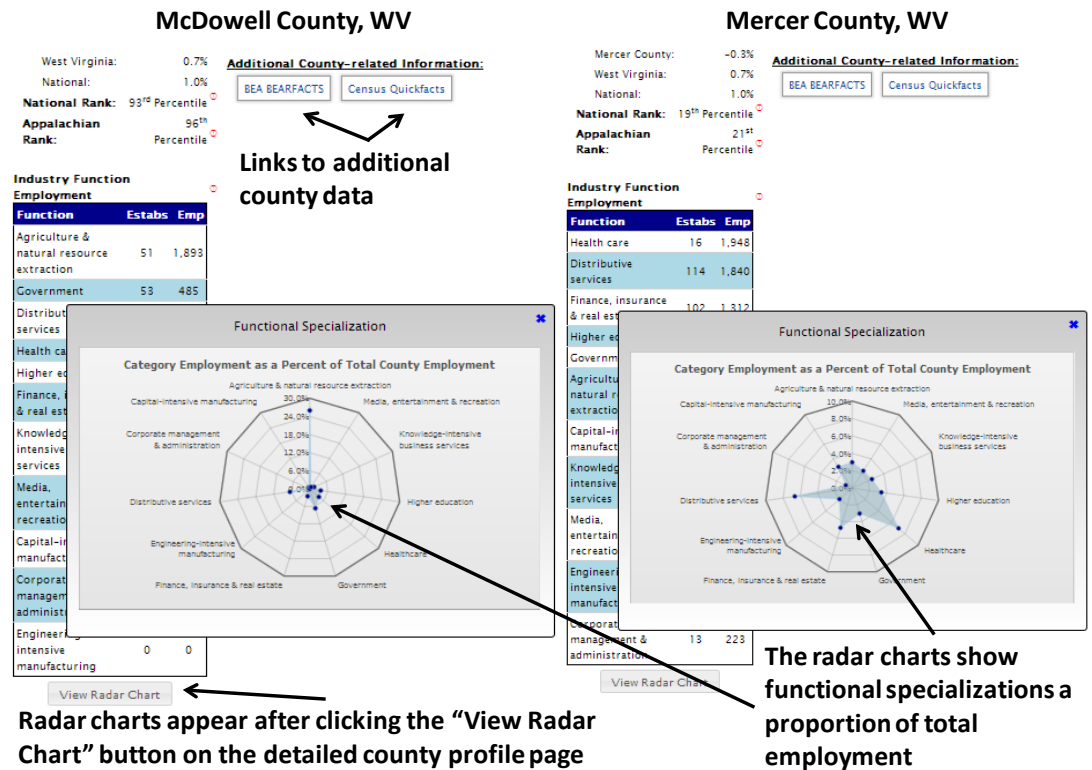
development of new specializations. This insight should be coupled with additional data about detailed industry trends and projections to truly understand current and future economic prospects. In addition, practitioners can use qualitative case study analysis to better anticipate local, national and global trends that are critical to existing and prospective specialties.

Since diversity is scale-dependent, these data can help guide strategy development. For low diversity counties located in low diversity regions, practitioners may seek to focus economic development efforts on creating new specializations. Practitioners developing strategies for low diversity counties located in high diversity regions might seek to increase linkages with their neighbors to provide increased employment and business development opportunities. To do so requires not only identifying the economic drivers found throughout a region, but also determining how those economic drivers sit within their broader global supply and demand chains.

QUESTION 3: WHAT KIND OF ASSET IS MY LOCAL WORKFORCE?

Discussions of economic diversity often focus on the mix of industries and companies in a place. Yet practitioners increasingly understand that one of their most important economic assets is the local workforce. Corporations considering a new facility focus on the availability and quality of labor. Quality is defined on more dimensions than just educational attainment; businesses are also concerned about the adaptability of local labor. So, it follows that one key aspect of economic diversity is how prepared the local workforce is to shift into sectors, master new technologies, and learn new skills.

The occupational diversity metrics provide a way for practitioners to better understand the nature of their workforce and the skills they have to offer. Occupational diversity measures how specialized or even the employment distribution is across 96 occupational groups, such as agricultural workers, life scientists, secretaries and administrative assistants, and executives. The web tool provides several features that capture occupational diversity. The map on the Home page covers the entire ARC region and links are provided for state and county maps.

County Profile pages provide users with more information about a county's occupational diversity and structure. As demonstrated above, the bar chart on the County Profile page shows the county's diversity scores in terms of its percentile rankings. The third bar in the diversity bar chart reflects the county's occupational diversity.

EXPLORING OCCUPATIONAL DIVERSITY: A SCENARIO

To explore the concept of occupational diversity, consider Tioga County, New York. Looking at Tioga County's occupational mix reveals just how unique the county is when compared with the rest of the Appalachian region. Access this information by selecting the 'Occupation Diversity' tab at the top of the map on the Home page. The occupational diversity map shows that Tioga County has a relatively high level of occupational diversity.

We can further narrow our focus by using the occupational knowledge cluster filter on the Home page (Figure 8). Occupational knowledge clusters are 12 categories of occupations, where those occupations were grouped based on similarities in the types of work done (and the knowledge required for that work) in multiple detailed occupations. Using the Occupational Knowledge Cluster filter found at the bottom of the map, and then clicking the 'Update Map' button, identifies the primary knowledge cluster of each county.

Tioga County is one of only a few counties where the largest knowledge cluster is engineering, architecture, and natural resource sciences. The reason is the presence of a large Lockheed Martin facility. Other counties within the Appalachian region have similarly unique assets, such as Montgomery County, Virginia (home to Virginia Tech), Roane County, Tennessee (the location of Oak Ridge National Laboratory), and Madison County, Alabama (the site for the U.S. Space and Rocket Center).

Figure 8: The knowledge cluster filter can be used to find counties with similar occupational strengths

Home page filter to show counties within similar primary occupational knowledge clusters
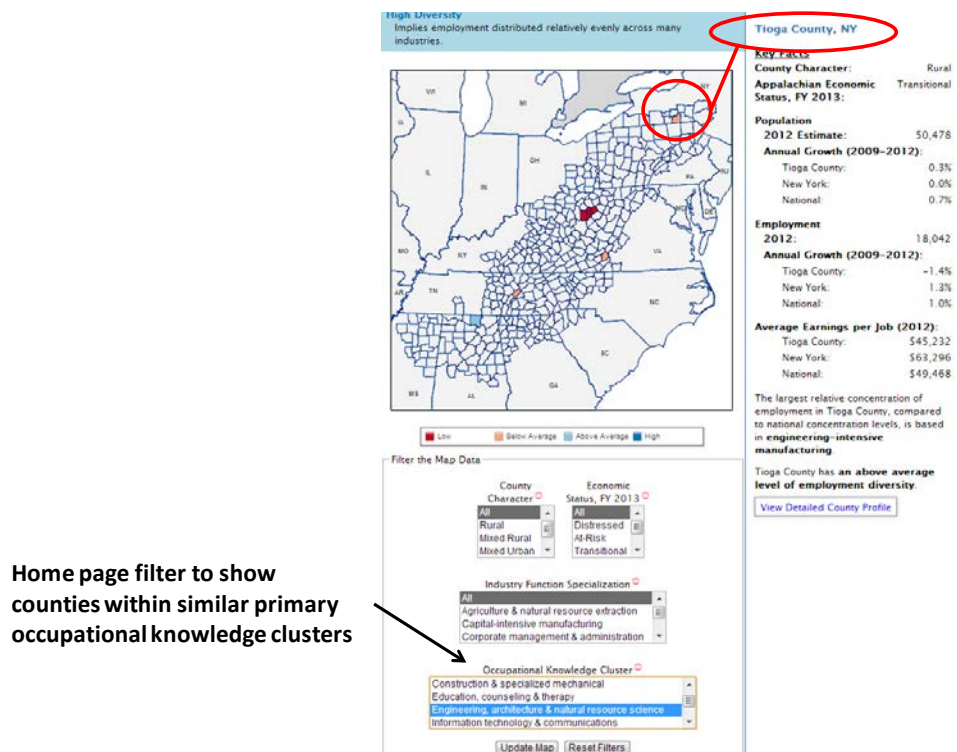
Users are better able to dig deeper into Tioga County's occupational profile by looking at its County Profile page. Figure 9 shows that the county's industrial diversity (the left bar in the bar chart) is in the 46th percentile of counties nationwide, but in terms of its occupational diversity, it is in the 98th percentile. We can infer that Tioga's workforce has a relatively broad base of skills even if its employment is concentrated within an industrial base that lacks diversity.

One can begin to better understand this imbalance by looking at the distribution of the county's employment by industry functions and occupational knowledge clusters. The data show (see Figure 10) that a large proportion of Tioga County's employment falls within one functional category—engineering-intensive manufacturing. This one category accounted for over 3,000 jobs within the county, or as shown in the industry function employment radar chart, 17.1 percent of total employment. Moreover, this employment exists within less than 10 establishments. Job losses in any of those establishments (which includes the county's largest—Lockheed Martin) could significantly disrupt the county's economy.

Figure 9: Occupational diversity by percentile ranking on the detailed County Profile page
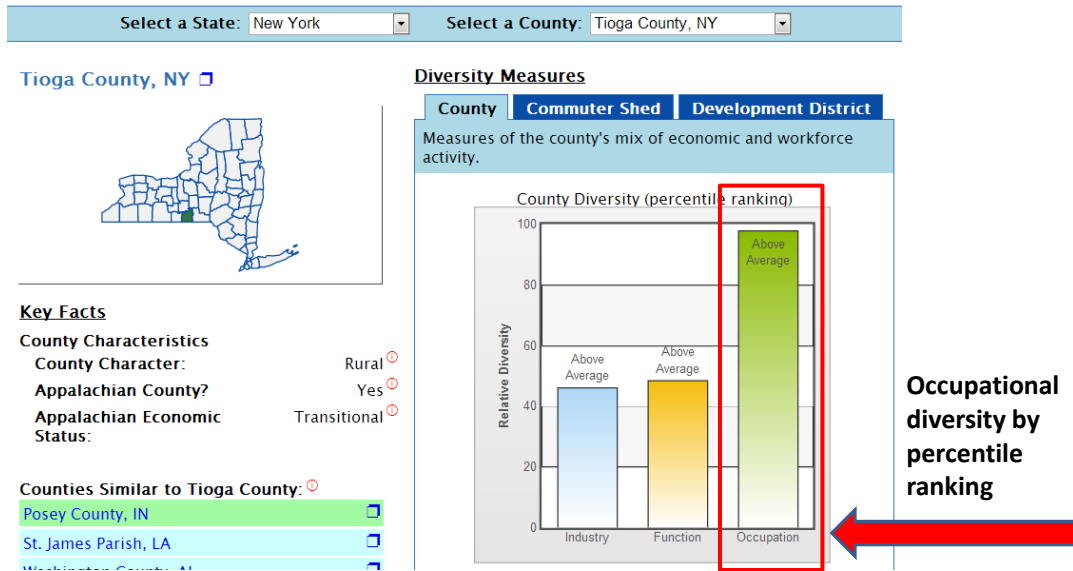
However, these data do not necessarily reflect what Tioga County workers actually do. To better understand that dynamic, users might consider the 'Occupational Knowledge Cluster Employment' data found at the bottom of the left-hand column on the 'County Profile' page. This table shows county employment in each knowledge cluster. By clicking on the 'View Radar Chart' button at the bottom of the table, users can see a visual representation of the distribution of knowledge cluster employment within the county.

Figure 10 shows the knowledge cluster data and radar chart for Tioga County, NY. It demonstrates that the occupational diversity shown in Tioga County's workforce may represent its secret weapon in offsetting the risks associated with so much employment concentrated in a single specialty. The data show that the county has over 1,000 workers in five different knowledge clusters—semi-skilled service; skilled and semi-skilled labor and machine operation; legal, clerical and administrative; management and finance; and construction and specialized mechanics. This balance indicates that the county's workforce may possess the capacity to move into a broader array of activities.

Figure 10: Knowledge cluster data and radar charts

Knowledge cluster
radar chart

Knowledge
cluster data
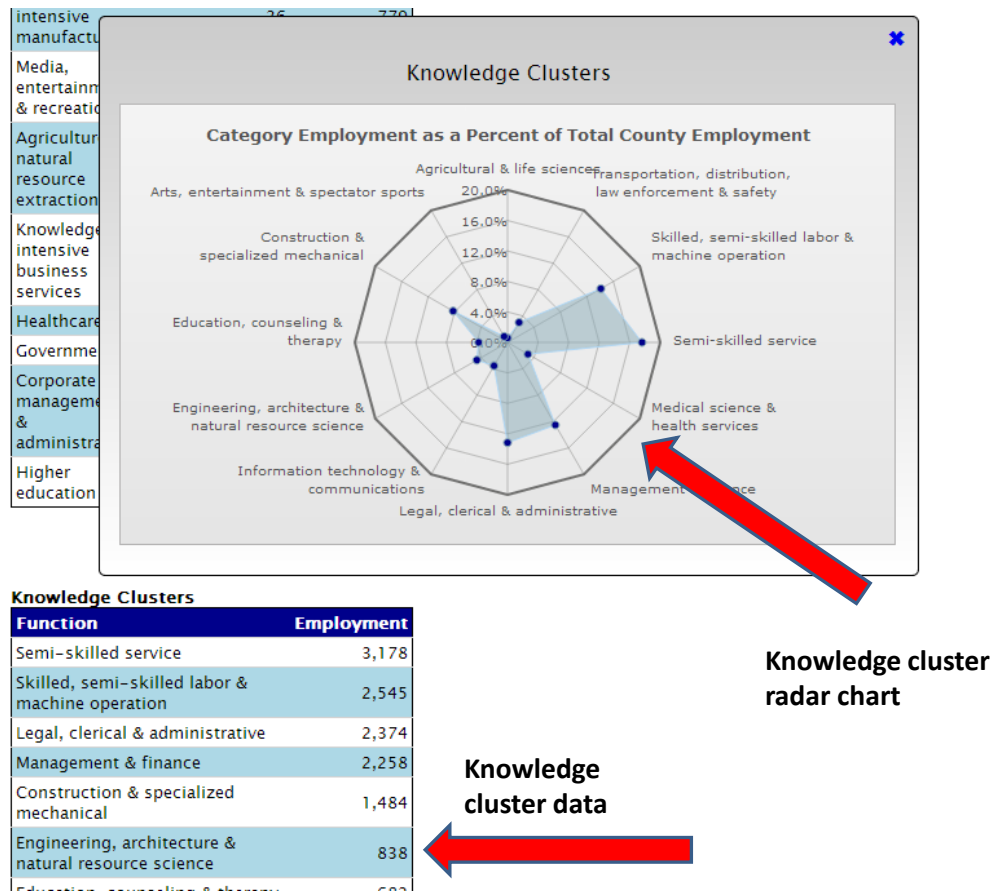
Data on occupational specialization can inform future workforce development policy making and directly influence economic development planning. If regional economic developers are better aware of the basic components of their workforce, they are in a better position to strategize about how to use those assets to leverage other potential industry specializations. Such information can also help practitioners target economic development efforts to other industries that tap similar skill sets. Understanding knowledge clusters for places with a diverse range of skills can help define future possibilities while for regions with a narrow range of skills, training and education to broaden the talent pool may be the best strategy.

QUESTION 4: HOW IS MY COUNTY DOING RELATIVE TO SIMILAR COUNTIES ELSEWHERE?

Practitioners may use data in a variety of ways, but they seldom have meaning unless they are compared with something else. Earlier in this guide, we noted that analysts can use the web tool to compare with the nation, the state, and neighboring counties. During the planning process, and in efforts to design programs or monitor programs, practitioners may find value in comparing their place to others as a way of giving some perspective on how well their county is doing.

However, which counties are most appropriate for comparisons? How do we find places that have similar economic structures or face similar challenges that would serve as more appropriate comparators?

One of the most useful features of the Appalachian Economic Diversity Web Tool is that it provides means of identifying useful and appropriate comparison counties. The tool provides two primary methods for identifying potential comparator counties. First, the filters available on the Home page map allow users to identify other counties within the ARC region or within their state that have similar economic conditions, functional specializations, or knowledge clusters. Users can build a list of comparator counties that have similar characteristics and thus potentially similar economic development priorities or challenges.

Second, the County Profile page of the web tool reports other counties in the U.S. that are most similar to a given study county in terms of key economic, social, demographic, and locational characteristics. Similarity was measured through a statistical analysis of 16 different variables measuring population, geographic size, income and earnings, industrial structure, educational attainment, and poverty:

- Per capita Income (source: U.S. Bureau of Economic Analysis, Local Area Personal Income and Employment, 2011)
- Sources of income (source: U.S. Bureau of Economic Analysis, Local Area Personal Income and Employment)
    - Percent farm income
    - Percent income from dividends, interest and rents
    - Percent proprietors income
- Population characteristics (source: U.S. Census Bureau)
    - Total population
    - Percent of the population (age 25+) with at least a high school diploma
    - Percent of the population in poverty
- Geographic considerations (source: U.S. Census Bureau)
    - Land area in square miles
    - Distance from a large (one million plus) urban area
- Percent of earnings by industry (source: Economic Modeling Specialists International)
    - Share of mining earnings
    - Share of capital-intensive manufacturing earnings

- o Share of engineering-intensive manufacturing earnings
- o Share of finance, insurance and real estate earnings
- o Share of corporate management earnings
- o Share of government earnings
- o Share of knowledge-intensive business services earnings

Not every U.S. county can be strongly paired with one or more other U.S. counties; some counties are simply too unique. Moreover, in some cases, data were not sufficient to draw valid comparisons. For the vast majority of U.S. counties, however, it is possible to produce a measure of similarity that not only matches each county with comparators, but also assesses the strength of the match.

The web tool highlights the strength of each match with a color coding system. Strongly similar county pairs are coded as "green" while weak ones are coded in red. This strength of pairing is very important because there are a few counties so unique (such as New York County, or Manhattan) that they have few truly meaningful comparators. In these instances, the team identified comparators, but they are likely to be weaker and much more likely to compare well on only a few of the economic, demographic, and location characteristics like per capita income or population size.

IDENTIFYING BENCHMARK COUNTIES: A SCENARIO

Consider Oktibbeha County in Mississippi. Oktibbeha is the home of Mississippi State University (MSU) and, not surprisingly, has a functional specialization in higher education. The importance of MSU to the county's economy makes Oktibbeha somewhat unique. As a result, it might make more sense to benchmark Oktibbeha to counties with dominant college towns rather than against neighboring counties or other Mississippi counties. However, finding the right university-driven economies will require additional research. At first blush, one might imagine Oxford, Mississippi (home of the University of Mississippi) or Tuscaloosa, Alabama (location of the University of Alabama), but how similar are those places to Oktibbeha? What if we want to explore how the county compares with other Appalachian counties or other university towns?

 Much like the earlier example that used the Home page map filters to identify counties with similar knowledge clusters, practitioners can use a different filter on the Home page map to focus first on filtering counties by their functional specialization (see Figure 11). Among those that the web tool reveals include Pickens County, SC (Clemson University), Watauga County, NC (Appalachian State University), Knox County, TN (University of Tennessee), and Montgomery County, VA (Virginia Tech). These counties are all dominated by a public university, a characteristic each shares with Oktibbeha County. They could serve as a good first cut of potential comparator counties, but how can we find counties that may be a closer fit than these?

Figure 11: The functional specialization filter can help identify similar counties

The functional specialization filter on the home page can help identify counties with similar specializations
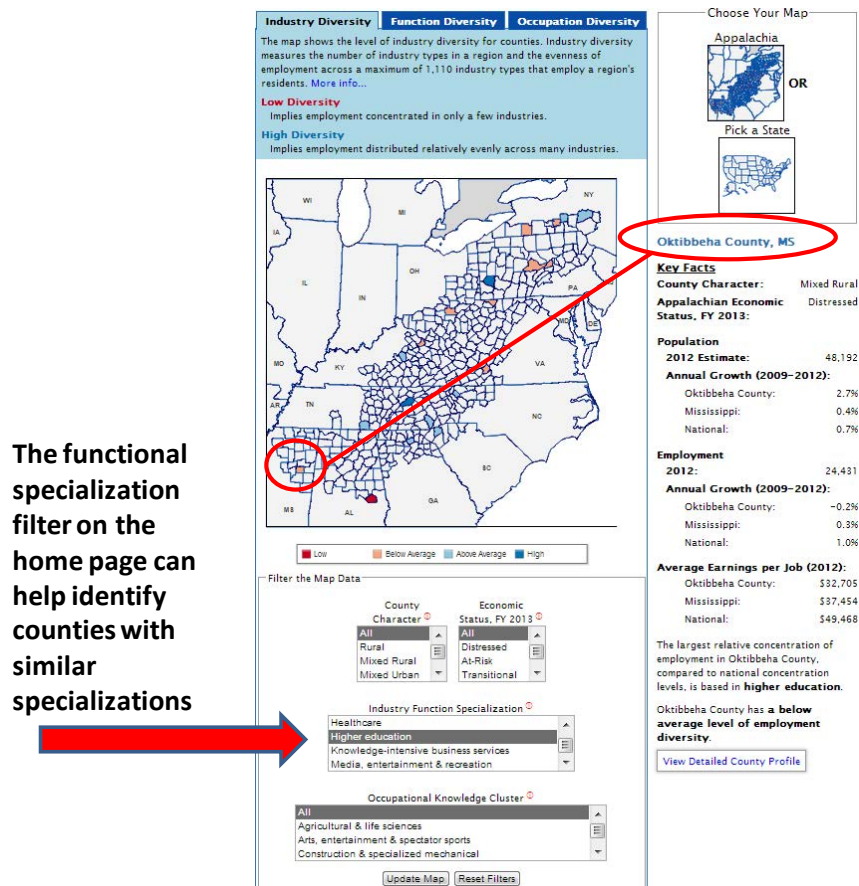
What if we are interested in seeking comparison counties with the strongest similarity ratings? These may be located anywhere in the U.S. and additional inputs will be needed. Beginning with the individual county profiles, we have additional information readily at hand to help identify five other counties with the most similar economic and social characteristics. Figure 12 illustrates how those data might be used. Our comparison found that Athens County, OH, another Appalachian county (home to Ohio University), as a potential comparator. Under this scenario, the tool also generates Watauga County, NC (Appalachian State University) again. The tool identified three other moderately similar counties, all home to medium-sized universities, including Isabella County, MI (Central Michigan University), Lincoln Parish Louisiana (Grambling University and Louisiana Tech), and Jackson County, IL (Southern Illinois University).

These five counties represent the most similar in the U.S. to Oktibbeha County in its overall demographic, economic, and location characteristics and therefore represent a first point of exploration in identifying benchmark counties. Of course, to a knowledgeable practitioner, it may be politically unwise to exclude Lafayette County, MS (University of Mississippi) or Tuscaloosa County, AL (University of Alabama), but

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Figure 12: Comparing Counties with Similar Characteristics

Similar counties can be found on the detailed county profile page

The color indicates the strength of the similarity

these data will help explain why those comparisons may be more aspirational than the comparisons with more empirically similar counties.

The web tool's findings should not be the only inputs used in selecting comparison counties. Policy makers, practitioners, and researchers selecting similar places to compare should also explore whether the counties being considered are pursuing similar economic development strategies or targeting similar industries. Sometimes, this may be more important than whether the existing economies of other areas are similar. Taking such factors into account will likely require a combination of quantitative and qualitative research.

DIVERSITY AND ECONOMIC DEVELOPMENT PLANNING

Diversity and economic diversification have several major implications for local economic development planning and policy making:

- Growth occurs through specialization;
- Diversification strategies help assess risks and capture opportunities;
- Economic diversity reflects the *what*, *how*, and *why* of local economic development;
- Diversity is also influenced by *where* economic activity is located;
- Fundamental strategic planning embraces diversification.

GROWTH OCCURS THROUGH SPECIALIZATION

A diverse set of economic activities is often tied to more economic stability. However, growth typically results when a region is leveraging a strength that gives it a means of out-competing other regions. Thus, practitioners should employ the web tool to assess whether the county or its region (1) has a strong mix of multiple competitive specializations or (2) relies too much on one or two major specializations. Furthermore, the web tool may also help to assess whether a diverse economy is the result of multiple specialized strengths or simply the absence of specialty. Lack of all specialization typically implies little activity that offers a distinctive competitive advantage. It is an important reason why some of the most diverse economies are also those in slow decline.

DIVERSIFICATION STRATEGIES HELP ASSESS RISKS AND CAPTURE OPPORTUNITIES

A highly specialized economy may grow rapidly if core driver industries can expect robust demand for their goods and services, but the economy may face known or even unknown threats that could significantly disrupt key industries. In this environment, economic development practitioners have a key role in assessing and understanding potential "risks" associated with the current economic structure, as well as identifying competitive strengths that could offer prospects for future growth. The web tool provides a basis for scanning for both opportunities and risks. The tool may also help to identify ways to focus economic development efforts around attracting new companies, expanding existing firms, forming new enterprises, or investing in related institutions or infrastructure. The web tool also may help in crystalizing local leaders' understanding of the risks tied to being overly specialized and reveal ways to manage the region's portfolio better, not necessarily by divesting in driver industries (a political impossibility at best), but by ensuring that investments in retaining those industries do not crowd out the resource needs of emerging sectors.

ECONOMIC DIVERSITY REFLECTS THE *WHAT*, *HOW*, AND *WHY* OF LOCAL ECONOMIC DEVELOPMENT

The research team's analysis revealed that practitioners should consider economic diversity beyond the traditional terms of the variety of industries or the absence of a

single dominant enterprise. In this respect, economic diversity reflects what the place "makes" (its private sector firms and other employers); what its residents "do" (the skills and capabilities of its workforce); and the county's role as an element of the broader national or global economy (its economic "function"). The web tool uses a variety of new metrics to describe economic diversity in each of those terms through the concepts of industrial diversity, functional diversity, and occupational diversity. Those distinctions are important because they reflect different ways a county or its surrounding region can develop a competitive advantage or develop a more risk-tolerant economy.

DIVERSITY IS ALSO INFLUENCED BY *WHERE* ECONOMIC ACTIVITY IS LOCATED

This guide has stressed the context of a county's situation in assessing its economic diversity. A key aspect of that context is the county's place in a larger global economy. For most local industries, distant industries, consumers, and markets determine current and future competitive needs. Local industries that serve multiple stable markets are less prone to volatility and risk. Furthermore, a local county that is quite specialized may also be tightly linked to a more diverse regional economy that helps to provide greater stability and alternative options even if there is volatility in the county's core industry. The web tool can provide only limited understanding of the global consumer markets, but it can be very useful in assessing the linkages between the local county and its surrounding region. For those non-diverse counties in diverse regions, practitioners should heed the call for greater regional thinking in local planning efforts.

FUNDAMENTAL STRATEGIC PLANNING EMBRACES DIVERSIFICATION

Diversification strategies follow the same principles as a well-designed and well-balanced economic development strategy. Such strategies emphasize the use of research and analysis to maximize the use of local and regional resources or assets. Economic diversification also focuses on a broad array of strategic techniques. The web tool can be valuable in identifying counties with highly diverse economies as a first step in identifying those regions that have been intentional in promoting diversity as a core strategic goal. With an understanding of which counties are the best comparators, practitioners may employ the tool to find those counties that are most likely to have replicable experiences.

VALUE TO THE PLANNING PROCESS

Planning involves **three** major steps focused on developing, translating, and implementing a plan. Within each of those steps, there are a number of planning activities that the web tool may be used to inform. Figure 13 illustrates that planning process, including nine "elements" or sets of activities tied to each of the major steps in the process.[9]

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[9] More information about the planning process outlined in Figure 13 can be found in *Creating Regional Coopetition: A Data-Driven Approach to Strategic Economic Planning:*

Figure 13: The Strategic Economic Development Planning Framework
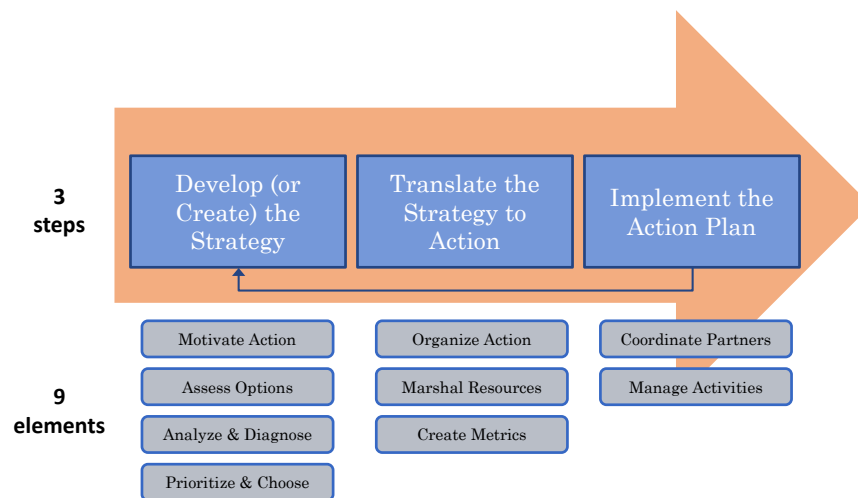
Source: (Council for Community and Economic Research, 2011)

The first phase of an economic development planning process involves ***developing the strategy***. During this phase, economic development practitioners must identify the challenges and opportunities that face the county or its surrounding region, explore potential competitive advantages, and seek out ways to leverage advantages or ameliorate weaknesses. The web tool, with its basic profile information organized to reveal industrial, functional, and occupational specializations and to draw appropriate comparisons, is a convenient source for creating a basic understanding of a county (and its surrounding region).

The basic economic data in the web tool can be used to understand if the given county and region faces over-specialization in specific industries, functional economic categories, occupations, or knowledge areas. The data—and the insights drawn from them—may be used to target opportunities based on the revealed relative strengths. Furthermore, the tool can help identify other places with similar characteristics to aid benchmarking and comparisons of economic development practices and strategies.

The second phase of the planning process involves ***translating the strategy into action***. In this phase, economic development practitioners must identify a specific series of tactics that can help to move the strategy forward. A critical element of this phase is pinpointing metrics that might ultimately be used in assessing progress. The web tool can be particularly helpful in providing insights about which economic or workforce data may be most useful for assessing the county's economic performance as well as its development.

The third phase in an economic development planning exercise entails ***implementing the action plan***. Implementation also involves developing new iterations of the plan based on real-life experience during the plan's execution. This stage involves monitoring county economic performance as well as strategy implementation outcomes. Comparing the county's performance with that of other counties can be particularly

The third phase in an economic development planning exercise entails ***implementing the action plan***. Implementation also involves developing new iterations of the plan based on real-life experience during the plan's execution. This stage involves monitoring county economic performance as well as strategy implementation outcomes. Comparing the county's performance with that of other counties can be particularly useful in ascribing credit for strategies that may be implemented in one place but not in another.

In summary, the web tool provides a valuable instrument for policymakers and practitioners seeking to understand the importance of diversity and specialization in defining their county's economic risks and opportunities. The tool provides an approach to examining diversity using data rather than anecdotes and it also provides a quantitative method for identifying benchmark counties and regions. Appropriate benchmarks ultimately help leaders better assess more precisely how well their local economic development efforts are doing.

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Statistical Portrait of Economic Diversity in Appalachia

February 2014

Prepared for the Appalachian Regional Commission

CONTENTS

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ABOUT THIS REPORT

This report is one of four documents prepared as part of an extensive analysis of economic diversity for the Appalachian Regional Commission by the University of Illinois at Urbana-Champaign's Regional Economics Applications Laboratory and the Center for Regional Economic Competitiveness, with assistance from the RUPRI Center for Rural Entrepreneurship and EntreWorks Consulting. Project leaders were Edward Feser, Ken Poole, Mark White, and Geoffrey Hewings, with Troy Mix serving as Project Manager.

Authors of this report were Troy Mix and Edward Feser.

In addition to this report, the documents include a summary report (*Economic Diversity in Appalachia: Statistics, Strategies, and Guides for Action*), a guide to the web tool (*A Practitioner's Guide for Planning and Analysis with the Appalachian Economic Diversity Web Tool*), and a detailed synopsis of case studies (*Case Studies in Economic Diversification in Appalachia* All reports associated with the project can be found here: http://economicdiversityinappalachia.creconline.org/Report/.

1. INTRODUCTION

Economic diversity merits attention for regional development practitioners working in Appalachia. Many of Appalachia's rural, distressed regions have been historically dependent on a few dominant industries, such as manufacturing, mining, and forestry, and considerable research points toward a connection between this dependence and negative economic outcomes (Bradshaw, 1992; Freudenburg & Wilson, 2002; Stedman, Patriquin, & Parkins, 2011). Urban locales in Appalachia have also been associated with a lack of economic diversity. For example, the economies in regions surrounding Youngstown, Ohio and Pittsburgh, Pennsylvania were long propelled by large, vertically-integrated steel producers.

Prompted in part by Appalachia's legacy of low economic diversity and the lack of practical guidance for pursuing diversification strategies, the Appalachian Regional Commission (ARC) sponsored research aimed at better understanding economic diversity in Appalachia and supporting the development of strategies aimed at diversifying regional economies. Begun in November 2012, this effort consisted of three major components—1) developing a quantitative understanding of economic diversity in Appalachia; 2) studying contemporary regional development strategies and activities to identify best practices for economic development related to economic diversity; and 3) offering guidance for practitioners to use the data and best practice findings to implement successful and appropriate development initiatives in their own communities.

This technical report presents detailed findings from the project component aimed at building a comprehensive, quantitative understanding of economic diversity across Appalachia. The remainder of this introductory chapter provides an overview of the goals particular to this component of the research, summarizes generalized findings from this effort and outlines the approach used to present these findings in this report, and reviews previous research on economic diversity.

1-1. RESEARCH GOALS

By presenting a multi-dimensional, quantitative picture of economic diversity across Appalachia and the United States, this project component aims to accomplish the following:

1. Frame questions useful for understanding the challenges to and opportunities for development in Appalachia;

2. Offer evidence of how concepts such as economic diversity and diversification manifest themselves in Appalachian counties and regions;

3. Provide regional development practitioners and scholars with tools for assessing and tracking indicators of economic diversity and using these data to inform strategic development initiatives.

To accomplish these goals, this technical report provides empirical evidence related to the spatial distribution of economic diversity; the associations among economic diversity and other indicators of regional economic conditions such as urban or rural character, industry mix, regional linkages, and economic outcomes; and the mechanics of how economic diversification and specialization occur at the county level.

1-2. SUMMARY OF FINDINGS AND REPORT ORGANIZATION

Understood as a formal metric of regional economies, economic diversity refers to the number of categories of economic activity in a region and the evenness of the distribution of activity across those categories (Malizia & Ke, 1993). While commonsense notions of diversity suggest simple connections between economic diversity and stability or growth, the overall finding of this report is that the simple understanding of economic diversity fails to provide a comprehensive accounting for the distribution of economic diversity across the U.S. and the relationships among diversity, economic outcomes, and other measures of regional economic activity.

The following generalized findings expand on this overall finding and provide the basis for organizing the empirical investigation of economic diversity found in chapters 3-7:

1. Urban places enjoy a natural advantage in economic diversity;

2. Spatial differences in industrial legacy influence the distribution of economic diversity;

3. County-level economies tend to experience *diversification* via employment declines and *specialization* via employment gains;

4. Comprehensive examinations of economic diversity can reveal regional economic strengths and weaknesses; and

5. Functional and regional context can shed light on economic opportunities and threats.

1-3. BACKGROUND ON ECONOMIC DIVERSITY

Well-known admonitions such as "don't put all your eggs in one basket" and "make sure you have a lot of legs to stand on" lend support to the commonsense notion that diversity provides practical benefits in daily life. Applications of this general proposition include the working professional that seeks to balance career advancement with personal fulfillment; the business that launches a new product line to access additional revenue sources; and the portfolio manager that advises a mixed investment strategy aimed at striking an appropriate balance between risks and gains.

The appeal of economic diversity for regional development draws on similar ideas about the stability and growth benefits that often accompany diversification. Regional development practitioners have long advanced economic diversification as a desirable goal for the purported benefits it can provide in reducing regional exposure to economic downturns and opening up potential avenues for economic growth. Considerable

scholarship has accompanied this practical focus, with research aimed primarily at devising and evaluating methods for measuring regional economic diversity and testing the relationships among economic diversity and regional growth and stability (Attaran, 1986; Conroy, 1975; Dissart, 2003; Frenken, Van Oort, & Verburg, 2007; Jackson, 1984; Mack, Grubesic, & Kessler, 2007; McLaughlin, 1930).

This section reviews the literature on economic diversity, with a focus on assessing the evidence for major claims associated with this concept and evaluating methods used to measure economic diversity.

1-3A. EVIDENCE OF ECONOMIC DIVERSITY'S VALUE FOR STABILITY

Scholars and practitioners advance the notion that economic diversity can reduce the impact of economic shocks on a region's employment. Dissart (2003) refers to economic diversity as an "averaging process: the greater the variety of industries in a region, and the more dispersed the regional employment among these industries, the less likely a region is to suffer severe…economic decline" (p. 424). Put differently, diverse regions are expected to be more stable since "their fortunes are not tied to the fortunes of a few industries" (Chinitz, 1961, p. 281).

There is considerable, though not unequivocal, empirical support for a positive relationship between regional economic diversity and stability. In a review of economic diversity literature since 1930, Dissart (2003) reported that the majority of approximately 40 studies have found a positive relationship between the diversity and stability of regional economies, and that larger economies tend to be both more diverse and more stable than smaller economies. Using an entropy measure of economic diversity, Malizia and Ke (1993) found a relationship between increased U.S. metropolitan area diversity and both less unemployment and more employment stability. Using the portfolio variance approach to measuring diversity, Conroy (1975) also reported a significant, positive relationship between metropolitan area diversity and economic stability. In a recent study of employment in regions of the Netherlands, Frenken et al. (2007) found a negative relationship between the diversity of regional employment across major industry sectors (i.e., unrelated variety) and the growth of unemployment in those regions.

In one example of a contrary study, Attaran (1986) found no relationship between economic diversity and employment stability across U.S. states. While Hammond and Thompson (2004) reported a negative relationship between economic diversity and employment volatility, they presented other findings that questioned the wisdom of pursuing stability policies. In particular, they found that increased local spending on education and increased educational attainment had a significant, positive impact on employment volatility—likely due in part to the increased mobility that tends to accompany a more educated workforce (Hammond & Thompson, 2004, pp. 537-539). This finding highlights a potential tradeoff between policies that seek economic stability and policies that seek to improve long-term growth rates but may exacerbate regional employment volatility, such as investments to improve education.

Hammond and Thompson (2004) also stressed the differences in employment volatility between metropolitan and nonmetropolitan regions, with employment in metropolitan regions about 40 percent more stable than it is in nonmetropolitan regions. The separate examination of metropolitan and nonmetropolitan regions also revealed differences in the diversity characteristics that served as significant explanations for stability. For example, Hammond and Thompson (2004) found that for nonmetropolitan regions industrial specialization was not a significant predictor of stability, though employment in mining and manufacturing did have a significant, positive relationship to volatility. For metropolitan regions, industrial specialization had a significant, positive relationship to volatility, while mining and manufacturing employment was insignificant.

1-3B. EVIDENCE OF ECONOMIC DIVERSITY'S VALUE FOR GROWTH

At least three logics connect the concept of economic diversity to growth. First, the presence of more industries in a region creates opportunity for growth in support services (e.g., accounting and law firms) that increase the incentive for firms to locate and expand in a region. Second, the diversification of regional activities within a given sector can directly and indirectly affect the regional growth of employment. For example, a community dominated by the production of an agricultural commodity may enjoy immediate employment growth as the economy diversifies through the addition of industries aimed at processing these commodities. Later, the increased household incomes associated with the addition of this processing activity might result in increased employment in local-serving industries such as retail trade and personal services (Watkins, 1963). Third, the diversity of industries in a region may increase growth through innovation by improving "opportunities to interact, copy, modify, and recombine ideas, practices and technologies across industries" (Frenken et al., 2007, p. 687).

The empirical evidence supporting economic diversity's relationship to growth is decidedly more mixed than it is for diversity's relationship to stability. In the words of Dissart (2003), "the evidence regarding the relationship between economic diversity and employment growth is less conclusive [and]…research on the relationship between economic diversity and income levels and growth yields contradictory results" (p. 434). For example, Wagner and Deller (1998) found a positive relationship between economic diversity and growth in per capita incomes, while Attaran (1986) found a negative relationship between these variables. Refining the notion of the type of diversity that is important for economic growth, Frenken et al. (2007) reported a significant positive relationship between the diversity of employment by industry within major economic sectors (i.e., related variety) and employment growth.

1-3C. EVIDENCE OF THE DANGERS OF WRONG SPECIALIZATION

While economic diversity is often measured in an industry-blind manner, many of the studies cited in this section present findings that stress the differential impacts of certain specializations. Notably, Malizia and Ke (1993) and Hammond and Thompson (2004) found that employment in mining had about as much impact on decreasing economic stability as did industrial specialization more generally. Employment in

durable goods manufacturing—an industry thought to suffer from similar cyclical downturns—has also been studied for its relationship to economic stability.

Considerable attention has been paid to the negative economic impacts of specialization in some extraction-based industries. Freudenburg and Wilson (2002) reviewed approximately 300 studies on this topic, finding that about half the studies reported negative economic impacts from mining employment, with mixed or neutral findings reported from the other studies. Where positive impacts were found, they tended to relate mining employment to income growth, not regional employment growth. In related work, Auty (2000) reported that, since the 1960s, developing, resource-abundant countries have experienced slower growth than relatively resource-poor countries have. Papyrakis and Gerlagh (2007) tested this relationship in a developed country context and found that resource-abundant states in the United States experienced slower growth than less endowed states did.

Literature on the development of staple-based economies has sought to explain the stunted growth that often accompanies resource-based industries (Watkins, 1977). This literature advances the "staple trap" model for explaining the vicious economic cycle that keeps resource-dependent regions from diversifying. One iteration of this model specifies that, in regions with significant natural resources, industrialization is delayed since significant profits can be enjoyed through resource extraction; less urbanization occurs; a less skilled workforce results; and government intervention is called upon to create jobs and protect industries—reducing the competitiveness of extractive industries in the process (Auty, 2000, 2001).

1-3D. APPROACHES TO MEASURING ECONOMIC DIVERSITY

Common economic diversity measures include the national averages, ogive, entropy, and Herfindahl indexes; the durable goods index; and portfolio variance (Dissart, 2003; Jackson, 1984; Mack et al., 2007). The national averages, ogive, entropy, and Herfindahl indices compare regional industrial structure to identified referents to measure diversity. The national averages index compares the share of a region's employment in each sector to the same measure at the national level and sums the differences, with greater sums equating to greater than average specialization. Ogive and entropy indices are generally calculated by summing the differences between the shares of regional employment in each sector and the share of employment in each sector if employment were equally distributed among sectors.

The remaining two measures make more explicit connections between diversity and stability. The durable goods index uses the percentage of regional employment or income in durable goods sectors as a measure of diversity, with high income elasticities of demand for these goods presumably capturing the vulnerability of a region to demand shocks. The portfolio variance method equates a region's economic activity with a financial portfolio. Portfolio risk (e.g., employment instability) is determined by weighting each sector according to its share of total employment and summing the employment variances for each industry and employment covariances between each industry pair over a selected time period.

For this study, the entropy measure serves as the basic metric of economic diversity. This measure has the advantage of assuming no particular relationship between diversity and stability or growth. Compared to other measures that make no particular assumptions about diversity's value, the entropy measure results in more observable variation across counties and allows for the decomposability of regional diversity as described in Chapter 2.

2. DATA AND METHODS

This chapter reviews the data and procedures used to complete the economic diversity analysis. In particular, the following sections focus on the measurement of economic diversity based on industries, economic functions, occupations, and workforce knowledge; the geographies used to calculate and aggregate measures of diversity; and the linkages among counties based on commuting and functional economic ties.

2-1. BASE DATA AND METHODS FOR CALCULATING ECONOMIC DIVERSITY

2-1A. ESTIMATES OF COUNTY EMPLOYMENT AND EARNINGS BY INDUSTRY

Most of the diversity calculations conducted for this report use county employment estimates acquired from Economic Modeling Specialists International (EMSI). The particular datasets used were "complete" employment estimates for 2009 and the third quarter of 2012, along with "covered" employment estimates for 2009 and 2012.[1] Each dataset provides an individual row of data for each six-digit North American Industrial Classification System (NAICS) industry within a county, with the rows detailing the estimated employment and earnings in the industry and county in question. Based on the Bureau of Labor Statistics' *Quarterly Census of Employment and Wages*, the covered employment dataset contains estimates for jobs covered by federal or state unemployment insurance systems. In addition to earnings and employment estimates by industry, the covered employment dataset provides estimates of the number of establishments by industry and county, although these establishment estimates are for 2011. For this report, the covered employment dataset was only used to conduct analyses that relied upon establishment estimates.

The complete employment dataset includes all employment in the covered dataset along with wage-and-salary employment exempt from unemployment insurance coverage—such as military and railroad employment and employment as a real estate or insurance agent—and self-employment that accounts for all or a portion of an individual's income. For both datasets, EMSI uses proprietary algorithms and a variety of data sources from the Bureau of Economic Analysis, U.S. Census Bureau, and Bureau of Labor Statistics to produce estimates of employment that do not suppress employment and earnings numbers for any county or industry. With a considerable number of employment statistics suppressed to prevent the release of confidential firm

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[1] See http://www.economicmodeling.com/data/ for more information on these datasets.

information, these datasets allow for a more complete analysis of county employment than allowed for by standard federal data releases (Isserman & Westervelt, 2006).

2-1B. ENTROPY MEASURE OF ECONOMIC DIVERSITY

The entropy measure of diversity was used to calculate industry-, function-, occupation-, and knowledge-based measures of economic diversity across U.S. counties and a variety of other geographies (Malizia & Ke, 1993). These metrics were calculated according to formula 1:

$$ENTR = \sum_{i=1}^{k} (p_i) \ln \left(\frac{1}{p_i} \right)$$

(1)

where there are i=1 to k industries and p_i is the share of economic activity (e.g., employment or earnings) in the ith industry. The products of industry shares of economic activity and the natural log of the inverse industry shares of economic activity are summed to arrive at the final entropy index measurement. The index has a minimum value of 0 when all economic activity is within one industry, and the value increases as the number of industries increases and the distribution of economic activity across these industries becomes more equal.

Where entropy measures were calculated for non-county geographies (e.g., the United States as a whole or individual states), the employment data were summed by industry and the geography in question before the entropy calculation was performed. Unless otherwise noted, economic diversity statistics cited in this report were calculated based on the entropy values of individual counties located within a geography or aggregation of interest; they do not represent the calculation of entropy based on all aggregated economic activity within a given geography. For example, the average entropy by ARC sub-region represents the mean value of all county entropy values within each sub-region, not the calculation of entropy across all economic activity in the sub-regions.

2-1C. CALCULATING DIVERSITY-RELATED METRICS

Several measures are reported or cited in this document that are not diversity metrics, but provide context to these measures; in particular, correlations, average establishment sizes, and average earnings per job. The details of these calculations are briefly described in this sub-section.

Correlations

All correlation coefficients (r) presented in this report are Pearson coefficients. The coefficients are all significant at the $p < 0.001$ level.

Average establishment size

Average establishment size calculations rely upon the establishment estimates provided in EMSI's covered employment datasets. For average establishment sizes by industry, the sum of total employment across that industry is divided by the sum of the number of establishments in the industry. For average establishment sizes by county, the sum of total employment across the county is divided by the sum of the number of establishments in the county.

Earnings per job

All earnings per job values draw from EMSI's complete employment datasets. For average earnings per job by industry, the sum of total earnings across that industry is divided by the sum of employment in the industry. For average earnings per job by county, the sum of total earnings across the county is divided by the sum of total employment in the county.

2-2. MEASURING INDUSTRIAL DIVERSITY

2-2A. BASE DIVERSITY OF EARNINGS AND EMPLOYMENT

The entropy measure serves as the base metric of *industry-based economic diversity*, which this report commonly refers to as **industrial diversity**. Measures were calculated for both earnings and employment, with earnings and employment by six-digit NAICS industry, respectively, serving as the share of total economic activity (p_i) specified in formula 1.

2-2B. DIVERSITY AT TWO SCALES OF INDUSTRIAL AGGREGATION

The entropy measure can be decomposed based on the hierarchical classification systems used to categorize the data being analyzed for diversity (Attaran, 1986; Frenken et al., 2007). In the case of this analysis, the hierarchical NAICS, which nests more specific industry classifications (e.g., four- or six-digit classifications) within larger aggregations of related industries (e.g., two- or three-digit classifications), provides a vehicle for decomposing the entropy measure of economic diversity.

Practically, unrelated variety measures the diversity of economic activity across major industry sectors that are relatively "unrelated" from one another compared to the similarity of six-digit industries within the same three-digit sector. Related variety measures the diversity of employment within a county's three-digit sector specializations. Together, these measures can be used to examine the distribution of a diversity factor thought to be related to economic stability—unrelated variety or diversity across broad industry sectors—and another factor thought to be related to prospects for economic growth—related variety or the diversity of a county's sectoral specializations (Frenken et al., 2007).

To decompose industrial diversity for this analysis, unrelated and related variety were calculated according to formulas 2 through 5:

$$P_g = \sum_{i \in S_g} p_i$$

(2)

where a subset of six-digit industries i fall into a three-digit sector G and the three-digit share of total employment, P_g, is equivalent to the sum of the subset, six-digit industry shares, P_i.

$$UV = \sum_{g=1}^{G} P_g \ln\left(\frac{1}{P_g}\right)$$

(3)

Unrelated variety (UV) is equivalent to the sum of the products of the three-digit industry shares and the natural logarithm of the inverse three-digit industry shares. In this analysis, unrelated variety equals the entropy measure of economic diversity calculated at a three-digit level of industrial aggregation.

$$RV = \sum_{g=1}^{G} P_g H_g$$

(4)

Related variety (RV) equals the sum of the entropy of six-digit industries within each three-digit sector (H_g) multiplied by the three-digit share of total employment (P_g), where

$$H_g = \sum_{i \in S_g} \frac{P_i}{P_g} \ln\left(\frac{1}{p_i / P_g}\right)$$

(5)

the entropy of six-digit industries within three-digit sectors (H_g) is equivalent to the sum of the products of the share of a six-digit industry as a portion of three-digit sector employment and the natural logarithm of the inverse share of a six-digit industry as a portion of three-digit sector employment.

Calculated at the six-digit level of industrial aggregation, the entropy measure of industrial diversity is equal to the sum of unrelated variety—entropy measured at the three-digit NAICS level—and related variety—the weighted sum of six-digit industries within three-digit sectors.

2-2C. ANALYZING CHANGES IN DIVERSITY

This analysis relies upon 2009 and 2012 complete employment estimates from EMSI and 1999 suppression-adjusted employment data prepared by Isserman and Westervelt (2006) to calculate changes in economic diversity. Diversity changes were examined for the periods 2009-2012 and 1999-2009. For the 1999-2009 analysis, the industries included with the 1999 dataset were used as the baseline for comparison when accounting for differences between the Isserman and Westervelt (2006) and EMSI datasets. Raw changes and percent changes in entropy measures were calculated for the noted time periods.

2-3. MEASURING FUNCTIONAL DIVERSITY

A region's economic function or functions represent the collection of broad economic activities that the region's workforce and firms engage in. Practically, functions can be identified by grouping industries together into categories that are broadly similar on factors such as inputs, outputs, and/or the technological or skill requirements necessary to perform the work customary to these industries. Grouping industries according to function, rather than simply accepting the NAICS industry categories, can help to broadly characterize the economic roles a county plays in its region; provide insight into the economic relationships and similarities counties have with other regions; identify factors that make regions comparatively better fits for certain economic activities; and speak to the broader economic and demographic forces that are likely to impact a county's economic prospects.

2-3A. CREATING FUNCTIONAL INDUSTRY CLASSIFICATIONS

One purpose of a functional industry classification is to broadly define the types of work that are prevalent in a region. For example, Thompson and Thompson (1987) suggest grouping industries and occupations into functional classes to identify regional specializations in "routine work, precision operations, central management, research and development, and entrepreneurship" (p. 558). In an examination of the rise of services as a proportion of employment, Noyelle (1983) advanced a functional classification system for services "based on the type of outputs (intermediate or final outputs) and the institutional setting under which services are provided (private, public, or nonprofit sectors)" (p. 282). Lawrence (1984) classified manufacturing industries on the basis of the primary end use of the product (e.g., intermediate goods; consumer durables; producer durables; consumer nondurables) and the necessary inputs to the industry (e.g., research and development expenditures; scientists and engineers; capital-, labor-, and resource-intensive).

This analysis draws primarily from the work of Lawrence (1984) and Noyelle (1983) to categorize industries according to functional types. In an effort to focus on the economic base of counties, industries that often serve local populations, such as retail trade, personal services, doctor's offices, local government, and construction, were excluded from the analysis of functions. Eleven functional categories were delineated and Table 2-1 lists the category titles and selected examples of industries within each class. The complete list of six-digit industries included within each classification appears as Table 9-1.

Table 2-1: Functional Categories with Selected Industry Examples

Functional industry category		
NAICS code and title		
Agriculture & resource extraction		
11 Agriculture, Forestry, Fishing and Hunting	21 Mining Quarrying, and Oil and Gas Extraction	
Capital-intensive manufacturing		
311 Food manufacturing	312 Beverage and tobacco product manufacturing	313 Textile mills
314 Textile product mills	315 Apparel manufacturing	316 Leather and allied product manufacturing
321 Wood Product Manufacturing	322 Paper Manufacturing	323 Printing and Related Support Activities
327 Nonmetallic Mineral Product Manufacturing	331111 Iron and steel mills	332116 Metal stamping
333414 Heating equipment (except warm air furnaces) manufacturing	335212 Household vacuum cleaner manufacturing	336111 Automobile manufacturing
Corporate management & administration		
551111 Offices of Bank Holding Companies	551114 Corporate, Subsidiary, and Regional Managing Offices	561110 Office Administrative Services
Distributive services		
22 Utilities	42 Wholesale trade	48-49 Transportation and warehousing
517110 Wired telecommunication carriers	517410 Satellite telecommunications	518 Data processing, hosting, and related srevices
Engineering-intensive manufacturing		
324110 Petroleum refineries	325110 Petrochemical manufacturing	331311 Alumina refining
332994 Small arms manufacturing	333291 Paper industry machinery manufacturing	333314 Optical instrument and lens manufacturing
334 Computer and Electronic Product Manufacturing	335121 Residential electric lighting fixture manufacturing	336411 Aircraft manufacturing
Finance, insurance & real estate		
52 Finance and insurance	53 Real estate and rental and leasing	
Government		
901149 U.S. postal service	901199 Federal civilian, except U.S. postal service	902999 State government, excluding education and hospitals
92 Public administration		
Healthcare		
621511 Medical laboratories	622110 General medical and surgical hospitals	622210 Psychiatric and substance abuse hospitals
623110 Nursing care facilities	902622 Hospitals, state government	903622 Hospitals, local government
Higher education		
611310 Colleges, universities, and professional schools	902612 Colleges and universities, state government	903612 Colleges and universities, local government
Knowledge-intensive business services		
541110 Offices of Lawyers	541330 Engineering services	541810 Advertising agencies
Media, entertainment & recreation		
511 Publishing Industries (except Internet)	512 Motion Picture and Sound Recording Industries	515 Broadcasting (except Internet)
519 Other Information Services	71 Arts, Entertainment, and Recreation	721120 Casino hotels

Data sources: North American Industry Classification System; Economic Modeling Specialists International (EMSI)

2-3B. CATEGORIZING COUNTIES BASED ON FUNCTIONAL INDUSTRY SPECIALIZATION

The concept of extra jobs quantifies specializations in terms of the absolute number of jobs employed in a particular category above or below the national average. To assign a single functional industry specialization to all counties, an extra jobs value was calculated for the groups of industries comprising each functional category in each county. The functional category with the largest number of extra jobs was assigned as the functional industry specialization for the county in question.

For each county, extra jobs were calculated for each functional category as shown in formula 6:

$$Extra_i = \left(\frac{E_{ic}}{E_c} - \frac{E_{in}}{E_n} \right) E_c$$

(6)

where E_{ic} is employment in the functional category of interest (i) for a county (c), E_c is total employment in the county of interest, E_{in} is the nation's employment in the functional category of interest, and E_n is total national employment.

2-3C. CALCULATING FUNCTION-BASED ECONOMIC DIVERSITY

The entropy measure was used to calculate *function-based economic diversity*, which this report commonly refers to as **functional diversity**. The metric was calculated for each county with employment by functional category serving as the share of total economic activity (p_i) specified in formula 1.

2-4. MEASURING OCCUPATIONAL DIVERSITY

Understanding what a region "does"—in addition to what a region "makes"—can help an analyst to better gauge the adaptability and suitability of a region to shocks and opportunities (Feser, 2003; Thompson & Thompson, 1987). In part, knowing what a region "does" requires data on the occupations of workers employed in the region's industries and the skills required to perform those occupations. This section reviews the methods used to estimate county-level employment by occupations. These occupational employment estimates are then used as the basis for the calculation of an occupation-based measure of economic diversity.

Occupational diversity uses the 96 minor occupational groups defined in the Bureau of Labor Statistics' 2000 Standard Occupational Classification as the units of analysis in the calculation of entropy.[2] According to the Bureau of Labor Statistics, occupations are grouped based on similarity of "work performed, skills, education, training, and credentials." Example occupational groups include agricultural workers, life scientists, secretaries and administrative assistants, and top executives. To estimate employment by minor occupational grouping, data from the Bureau of Labor Statistics' national

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[2] See http://www.bls.gov/soc/2000/socguide.htm

Staffing Pattern Matrix were used to translate county employment by industry data to county-level employment by occupation.

2-4A. CALCULATING OCCUPATION-BASED ECONOMIC DIVERSITY

The entropy measure was used to calculate *occupation-based economic diversity*, which this report commonly refers to as **occupational diversity**. The metric was calculated for each county with employment by minor occupational group serving as the share of total economic activity (p_i) specified in formula 1.

2-5. MEASURING KNOWLEDGE DIVERSITY

To estimate the diversity of workforce knowledge at the county level, occupation-based knowledge clusters were derived and employment across these clusters provided the basis for an additional entropy calculation. Knowledge clusters are 12 groups of occupations categorized based on similarities in the type and level of knowledge required to work in these professions. Feser (2003) details the procedures used to identify these clusters. Again, the Bureau of Labor Statistics' national Staffing Pattern Matrix was used to translate county employment by industry data to county-level employment by knowledge cluster. Employment in government industries, including military employment, is not accounted for by these knowledge clusters. Table 2-2 lists the 12 knowledge clusters and provides examples of common occupations and average education or training levels associated with them. Similar to the functional specializations detailed in sub-section 2-3b, knowledge cluster specializations were identified for each county based on the knowledge cluster with the most extra jobs in a particular county.

2-5A. CALCULATING KNOWLEDGE-BASED ECONOMIC DIVERSITY

The entropy measure was used to calculate *knowledge-based economic diversity*, which this report commonly refers to as **knowledge diversity**. The metric was calculated for each county with employment by knowledge cluster serving as the share of total economic activity (p_i) specified in formula 1.

Table 2-2: Illustrative Description of Knowledge Clusters

Agricultural & life sciences
Common professions in this cluster include veterinarians, veterinary assistants and technicians, medical and clinical laboratory technicians, and supervisors of farming, fishing, and forestry workers. On average, these jobs require just over 3 years of post-secondary education—the 3rd highest average among the 12 knowledge clusters.

Arts, entertainment & spectator sports
Common professions in this cluster include photographers, musicians, actors, writers, fine artists, and reporters. On average, these jobs require just less than 2 years of post-secondary education—ranking 7th highest among the 12 knowledge clusters.

Construction & specialized mechanical
Common professions in this cluster include carpenters, maintenance workers, construction laborers, and automotive service technicians and mechanics. On average, these jobs require less than 1 year of post-secondary education—ranking 10th among the 12 knowledge clusters. The average length of on-the-job training required for these professions is the 2nd highest among the clusters.

Education, counseling & therapy
Common professions in this cluster include teachers, fitness trainers, clergy, physical therapists, and social workers. On average, these jobs require nearly 3.5 years of post-secondary education—the highest average among the 12 knowledge clusters.

Engineering, architecture & natural resource science
Common professions in this cluster include civil, mechanical, and industrial engineers, electricians, architectural drafters, architects, and chemists. On average, these jobs require approximately 3.25 years of post-secondary education—the 2nd highest average among the 12 knowledge clusters. The average length of on-the-job training required for these professions is the highest among the clusters.

Information technology & communications
Common professions in this cluster include computer support specialists, software engineers, systems analysts, and database and network administrators. On average, these jobs requires just less than 3 years of post-secondary education—the 4th highest average among the 12 knowledge clusters.

Legal, clerical & administrative
Common professions in this cluster include office clerks, cashiers, bookkeepers, secretaries, lawyers, and financial advisors. On average, these jobs require just over 1 year of post-secondary education—ranking 8th among the 12 knowledge clusters.

Management & finance
Common professions in this cluster include general managers, accountants, first-line supervisors, real estate agents, and securities sales agents. On average, these jobs require nearly 2.5 years of post-secondary education—the 6th highest average among the 12 knowledge clusters. The average length of on-the-job training required for these professions is the 3rd highest among the clusters.

Medical science & health services
Common professions in this cluster include nurses, nursing aides, physicians, dental assistants, and pharmacists. On average, these jobs require just over 2.5 years of post-secondary education—the 5th highest average among the 12 knowledge clusters.

Semi-skilled service
Common professions in this cluster include retail salespersons, customer service representatives, waiters and waitresses, stock clerks, child care workers, and food preparation workers. On average, these jobs require less than 1 year of post-secondary education—ranking 9th among the 12 knowledge clusters.

Skilled, semi-skilled labor & machine operation
Common professions in this cluster include janitors, laborers, landscapers and groundskeepers, farmworkers, and welders. On average, these jobs require less than 1 year of post-secondary education—ranking 11th among the 12 knowledge clusters.

Transportation, distribution, law enforcement & safety
Common professions in this cluster include truck drivers, security guards, and pilots. On average these jobs require less than 1 year of post-secondary education—the lowest average among the 12 knowledge clusters.

Data source: Occupational Information Network (O*NET) used to characterize 12 knowledge clusters derived using the methods detailed in Feser (2003)

2-6. GEOGRAPHIC SCALES AND AGGREGATIONS

2-6A. BASE GEOGRAPHIES

Metrics for this analysis are reported for or summarized by geographies including all U.S. counties; counties in Appalachian states and the formal ARC region; ARC sub-regions; and U.S. Census Regions and Divisions. 3,142 county equivalents were used for

the U.S. counties geography. For metrics reported for and summarized by Appalachian geographies, independent cities in Virginia were combined with the nearest county to create a combined county dataset with 420 counties in the formal ARC region, 1,070 counties in the 13 Appalachian states, and 3,113 counties across the United States. Table 2-3 lists the states included within the U.S. Census Regions and Divisions used for summary purposes in this report. Figure 2-1 depicts the 13 Appalachian states, the boundary of the formal ARC region, and the five ARC sub-regions as revised in November 2009. This analysis also summarized diversity metrics by ARC's county economic status classification system, which classifies counties in one of five categories based on unemployment rates, per capita income, and poverty rate (see Figure 2-2).[3]

Table 2-3: States by U.S. Census Regions and Divisions

U.S. Census Region		
States		
Northeast region		
New England Division		
Connecticut	Maine	Massachusetts
New Hampshire	Rhode Island	Vermont
Middle Atlantic Division		
New Jersey	New York	Pennsylvania
Midwest region		
East North Central Division		
Illinois	Indiana	Michigan
Ohio	Wisconsin	
West North Central Division		
Iowa	Kansas	Minnesota
Missouri	Nebraska	North Dakota
South Dakota		
South region		
South Atlantic Division		
Delaware	District of Columbia	Florida
Georgia	Maryland	North Carolina
South Carolina	Virginia	West Virginia
East South Central Division		
Alabama	Kentucky	Mississippi
Tennessee		
West South Central Division		
Arkansas	Louisiana	Oklahoma
Texas		
West region		
Mountain Division		
Arizona	Colorado	Idaho
Montana	Nevada	New Mexico
Utah	Wyoming	
Pacific Division		
Alaska	California	Hawaii
Oregon	Washington	

Data source: U.S. Census Bureau, 2010

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[3] See http://www.arc.gov/research/SourceandMethodologyCountyEconomicStatusFY2007FY2014.asp for details on the source and methodology for the ARC economic status designations

Figure 2-1: Appalachian Sub-regions

The Appalachian subregions are contiguous regions of relatively homogeneous characteristics (topography, demographics, and economics) within Appalachia. This classification was developed in the early history of the ARC and provides a basis for subregional analysis. ARC revised the classification in November 2009 by dividing the Region into smaller parts for greater analytical detail and by using current economic and transportation data. This classification is used only for research purposes and not to allocate ARC funds.

Subregions
- Northern
- North Central
- Central
- South Central
- Southern

Map Created: November 2009.

Figure 2-2: ARC's County Economic Status Designations, Fiscal Year 2013
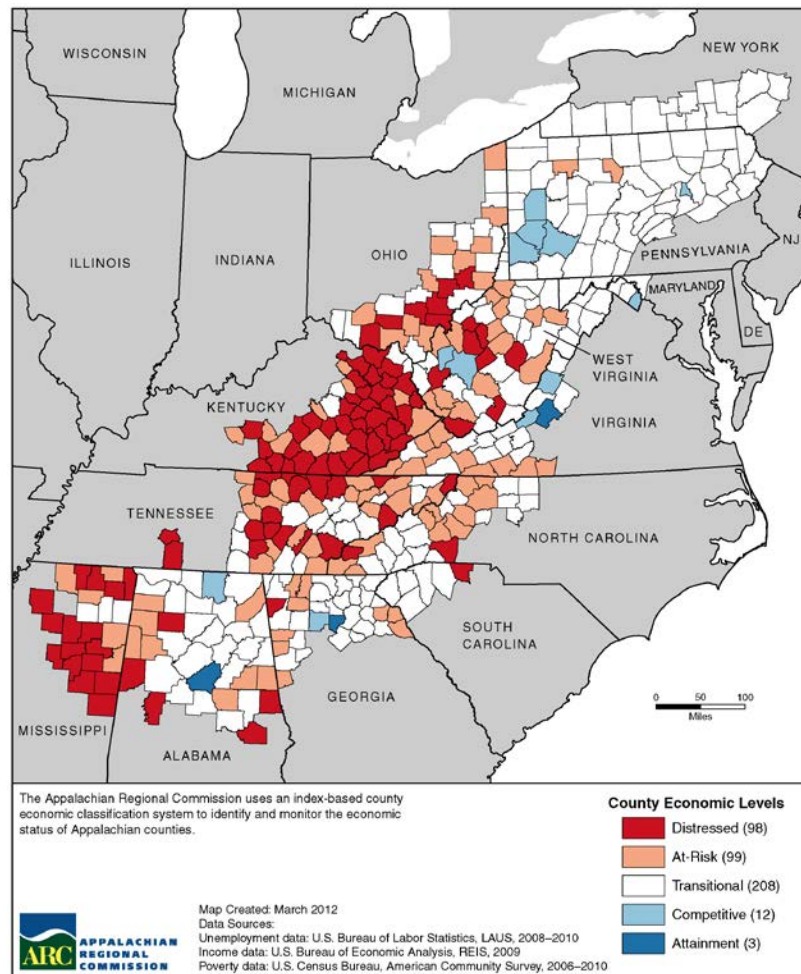
2-6B. DETERMINING URBAN AND RURAL CHARACTERISTICS

To examine the differences in economic diversity across urban and rural counties, we adopted the urban-rural typology method suggested in Isserman (2005). This method required the classification of counties as one of four county characters—Urban, Mixed Urban, Mixed Rural, or Rural—based on the population density of the counties and the relative size of urban and rural areas within the counties. To complete the classification, we used U.S. Census 2010 data on total population, rural population, urbanized area and urban cluster population, and total urban population by county. Census information on land area by county was used to calculate population density. Finally, the Census 2010 Urban Area to County Relationship File Layout was used to determine the population of portions of urban areas located completely within individual counties.[4] This file splits all urban areas based on county boundaries and reports the population associated with each portion.

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[4] See http://www.census.gov/geo/maps-data/data/ua_rel_layout.html for a description of the Census 2010 Urban Area to County Relationship File Layout contents.

The Isserman (2005, p. 475) typology classifies counties according to the following criteria:

> *Rural county*: (1) The county's population density is less than 500 people per square mile, and (2) 90 percent of the county population is in rural areas or the county has no urban area with a population of 10,000 or more.
>
> *Urban county*: (1) The county's population density is at least 500 people per square mile, (2) 90 percent of the county population lives in urban areas, and (3) the county's population in urbanized areas is at least 50,000 or 90 percent of the county population.
>
> *Mixed rural county*: (1) The county meets neither the urban nor the rural county criteria, and (2) its population density is less than 320 people per square mile.
>
> *Mixed urban county*: (1) The county meets neither the urban nor the rural county criteria, and (2) its population density is at least 320 people per square mile.

2-6C. DETERMINING COMMUTING LINKAGES

In most U.S. counties, workers, firms, and consumers depend upon employment, shopping, and service opportunities that lie both within and outside their home county. While there are many potential regions that could be defined to approximate the multiple economic relationships among places (e.g., firm-to-firm; worker-to-employer; consumer-to-store), the analysis of commuting patterns provides one method for defining inter-county economic relationships.

Using 2006-2010 county-to-county commuting flow data prepared by the U.S. Census Bureau, we defined commuting sheds for each U.S. county.[5] A county's commuting shed includes all those counties that account for a significant share of the journey-to-work commuting flow headed toward or away from that county. Journey-to-work data from the U.S. Census Bureau's 2006-2010 American Community Survey were used to determine membership in a commuting shed. Specifically, counties are included in a commuting shed if they account for at least five percent of the worker flow toward or away from the county in question. Commuting sheds range in size from one to nine counties in size, including the county of interest. In order to calculate measures of commuting shed diversity, employment by industry data for all counties in a commuting shed were combined.

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[5] See http://www.fhwa.dot.gov/planning/census_issues/ctpp/ for information on Census Transportation Planning Products

2-7. ANALYZING FUNCTIONAL COUNTY ROLES IN THE REGIONAL ECONOMY

To understand the functional economic roles of counties in their regions, we conducted a principal components factor analysis to identify several latent variables that can be used to characterize functional economic types. The 25 variables for this analysis were total employment for counties and their commuting sheds; extra employment in each of the defined functional categories for counties and their commuting sheds (see Table 2-1); and counties' net commuting flows expressed as a percentage of the number of workers residing in those counties. Collectively, these variables express counties' economic roles in their regions as a function of their economic specializations, the economic specializations present in their commuting regions, and the commuting relationships between counties and their commuting sheds.

Using the PROC FACTOR procedure available in the *SAS* statistical software package, these variables were subjected to a principal components analysis, with a varimax rotation used to aide interpretation of the resulting factors. Eigenvalues, scree plots, and the proportion of variance explained by each factor also helped with interpretation, and the ultimate selection of factors.[6] After several test runs of the analysis, the decision was made to conduct separate factor analyses for mixed rural or rural counties and mixed urban or urban counties, with counties with total employment greater than 400,000 included in the mixed urban or urban analysis.[7]

After examining the derived factors, we selected a final set of nine factors that explain approximately two-thirds of the variance of the 25 input variables across the 2,759 U.S. counties in the mixed rural or rural grouping. A final set of seven factors explain nearly 80 percent of this same variance across the 354 U.S. counties in the mixed urban or urban groupings. These factors were then used to score individual counties based on their values on the input variables, resulting in each county having loading values for each of the factors derived for their county character type. Higher loading values indicate similarity between the distribution of an individual county's variables and a derived factor. While each county has loadings for each factor derived for its county character type, counties were assigned to groups based on their highest loading value. For example, Los Angeles County, California has the highest loading value among U.S. counties for both the *media and entertainment centers* and *transportation and distributive services centers* factors. However, Los Angeles was classified as a *media and entertainment center* since its loading value for this factor was higher than that for *transportation and distributive services centers*. These groupings can be interpreted as functional types of county roles in regional economies, and they are used in this report to examine the distribution of diversity characteristics and economic outcomes across

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[6] See http://www.ats.ucla.edu/stat/sas/library/factor_ut.htm for an overview of the use of *SAS* for factor analysis.

[7] This decision allowed for the analysis of counties such as Clark County, Nevada (the home of Las Vegas) alongside urban counties, even though the low density of development in these counties resulted in it being classified as Mixed Rural for other purposes.

county types. The final list of derived factors appears in Table 2-4, with each of these factors discussed in more detail within section 7-3.

Table 2-4: Summary Results of Principal Components Analysis of Functional County Roles

Counties analyzed Factor #	Factor interpretation	Eigenvalue	% of total variance explained	% of cumulative variance explained
Rural or Mixed Rural counties				
1	Bedroom communities to midsize centers	4.13	16.5	16.5
2	Agriculture & resource extraction centers	2.65	10.6	27.1
3	Rural destinations & advanced services districts	2.40	9.6	36.7
4	Bedroom communities to corporate and distributive services centers	1.85	7.4	44.1
5	Corporate and distribution outposts	1.47	5.9	50.0
6	Rural manufacturing centers	1.28	5.1	55.1
7	Rural government districts	1.25	5.0	60.1
8	Town and gown communities	1.13	4.5	64.6
9	Rural medical centers	1.03	4.1	68.7
Urban or Mixed Urban counties				
1	Satellite cities and suburbs	6.81	27.2	27.2
2	Corporate and financial centers	3.53	14.1	41.4
3	Government centers and suburbs	3.17	12.7	54.1
4	Media and entertainment centers	1.91	7.6	61.7
5	Higher education and medical complexes	1.50	6.0	67.7
6	Advanced manufacturing districts	1.21	4.8	72.5
7	Transportation and distributive services centers	1.13	4.5	77.0

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Derived as detailed in *Statistical Portrait of Economic Diversity in Appalachia* section 2-7

2-8. PRESENTATION OF METRICS

The diversity metrics calculated for this analysis cannot be easily interpreted unless counties are compared relative to one another or the overall distribution of county diversity values. To accomplish these comparisons and allow for interpretation, diversity measures were standardized and classified according to the procedures described in this section.

2-8A. DATA STANDARDIZATION

For each diversity measure calculated on a county-by-county basis, data standardization required three steps. First, the diversity measure was calculated, resulting in a raw diversity score for each county. Second, the mean, raw diversity value was calculated for each measure by summing the raw diversity values across all counties and dividing by the number of counties. Third, each county's raw diversity value was divided by the mean, raw diversity value, resulting in a standardized value for each county. Standardized values can be interpreted as follows:

- A standard value (X) less than 1.0 is (1 − X) * 100 percent less diverse than the mean county diversity value (e.g., a standard value of 0.67 is 33 percent less diverse than the mean diversity).

- A standard value of 1.0 is equivalent to the mean county diversity value

- A standard value (X) greater than 1.0 is (X - 1) * 100 percent more diverse than the mean county diversity value (e.g., a standard value of 1.25 is 25 percent more diverse than the mean diversity).

2-8B. Z-SCORES CLASSIFICATION

While standardized diversity scores serve as a simple indicator of the relationship of a county's diversity to the average diversity, z-scores provide information on the relationship of a value to the mean and the value's placement relative to the distribution of diversity (or another measure, such as average establishment size) across all counties. Z-scores for each value and diversity measure were calculated as follows:

- Calculate the mean ($\bar{x}$) and standard deviation (s) for a particular diversity measure

- For each diversity value (x_i), calculate the difference (d_i) between the value and the mean value ($d_i = x_i - \bar{x}$)

- Calculate the z-score for each county's diversity value (z_i) to equal the quotient of the difference between the county's value and the mean value and the standard deviation ($z_i = d_i/s$)

While the distributions of the diversity values vary by measure, and none of the measures have a perfect normal distribution, z-scores can be used to provide a shorthand classification of individual values into groups with high, low, or about average values. Z-scores were classified into groups as follows:

- *Very high* ($z_i >= 2$)

- *High* ($1 <= z_i < 2$)

- *Above average* ($0 < z_i < 1$)

- *Below average* ($0 > z_i > -1$)

- *Low* ($-1 >= z_i > -2$)

- *Very low* ($z_i <= -2$)

In addition to the six groupings noted above, *above average* and *below average* values were grouped and reported together as *about average* values in several instances. To control for county character, z-scores were also calculated according to the distribution of diversity scores across each of the four county character categories. Each county was then classified on the very low-very high scale according to its z-score based on the distribution of values in the same county character grouping. Where county character-based z-scores were used to classify counties, tables or maps are identified by text indicating the displayed values control for county character.

2-8C. RANKING APPALACHIAN COUNTIES BASED ON ECONOMIC DIVERSITY

Table 9-2 lists the standardized industrial, functional, occupational, and knowledge diversity values for each county in Appalachia. These counties are arranged in alphabetic order, and each standardized value is accompanied by a rank value based on the particular county's standing relative to other Appalachian counties for that particular diversity metric. Counties ranked as #1 are the most diverse for a particular measure, while those ranked #420 are the least diverse.

3. URBAN PLACES ENJOY A NATURAL ADVANTAGE IN ECONOMIC DIVERSITY

The nature of economic diversity measures and the typical characteristics of urban regions result in the tendency for urban regions to achieve higher economic diversity measures than their rural and less urban counterparts do. This chapter provides evidence for this tendency by reporting the distribution of economic diversity across urban and rural counties and decomposing diversity metrics to reveal the factors contributing to variation in diversity across urban and rural places.

3-1. ECONOMIC DIVERSITY ACROSS URBAN AND RURAL COUNTIES

Industry-, function-, occupation-, and knowledge-based economic diversity measures vary significantly across counties according to their urban and rural characteristics. In this section, the composite measures of county character discussed in sub-section 2-6b. are used to examine the distribution of economic diversity across classifications of counties with similar urban or rural characteristics.

3-1A. DISTRIBUTION OF ECONOMIC DIVERSITY ACROSS URBAN AND RURAL COUNTIES

While the distribution of industrial diversity is not normal, classifying counties according to their distance in standard deviations from the mean diversity provides a useful grouping of counties based on their relative diversity values. This classification, as depicted in Figure 3-1, makes one pattern abundantly clear—low and very low diversity counties are more likely to be located in the rural interior of the country than they are in the more densely populated coastal regions. For example, the states in the West North Central Census Division—Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota—contain 141 counties with a diversity score more than one standard deviation below the mean, while the states in the New England Census Division—Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont—don't contain any counties with low or very low diversity scores.

Figure 3-1: Industry-based Employment Diversity in U.S. Counties, 2012
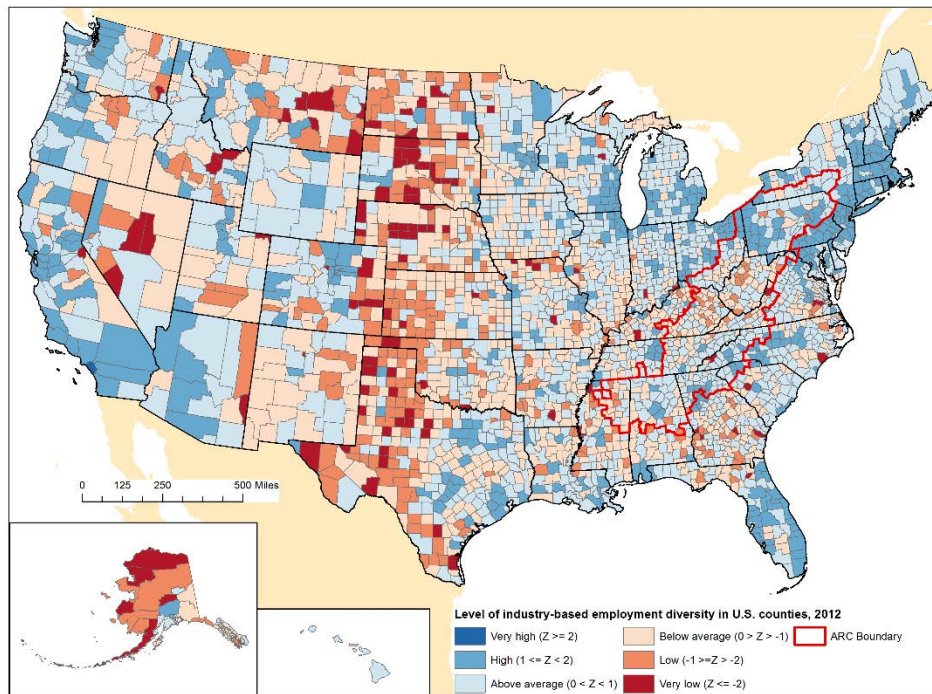
Industry-based Employment Diversity in U.S. Counties, 2012.
Data Source: Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012.
Notes: 1. 6-digit NAICS aggregtion used for Entropy measure 2. Entropy measures categorized based on distance from mean value as measured by standard deviations (Z)

Classifying counties according to their urban or rural character presents an alternative perspective for understanding economic diversity. As listed in Table 3-1, the average industrial diversity increases as counties become more urban. While rural counties are not uniformly less diverse than their urban counterparts, their maximum diversity approximates the mean diversity for urban counties. This difference is even more pronounced in Appalachia, where the maximum diversity for rural counties is roughly equivalent to the mean of mixed urban counties. From an industry-based perspective, the average Appalachian county is more diverse than the average U.S. county—a relationship that also applies to Appalachian counties when they are compared to their peers in each of the four county character designations.

Table 3-1: Industrial Diversity Statistics for Counties by County Character, 2012

| Region | Number of county equivalents | Standardized industrial diversity statistics, 2012 | | | | | |
		Minimum	25th percentile	Mean	Median	75th percentile	Maximum
United States	3,142	0.23	0.93	1.00	1.01	1.08	1.24
County character, 2010							
Urban	195	0.80	1.10	1.14	1.17	1.19	1.24
Mixed Urban	182	0.84	1.09	1.12	1.14	1.17	1.23
Mixed Rural	1,017	0.59	1.03	1.06	1.07	1.11	1.21
Rural	1,748	0.23	0.89	0.94	0.95	1.01	1.14
Appalachian counties	420	0.74	0.95	1.02	1.02	1.09	1.20
County character, 2010							
Urban	5	1.14	1.15	1.17	1.17	1.18	1.20
Mixed Urban	29	0.95	1.11	1.13	1.14	1.17	1.20
Mixed Rural	146	0.89	1.03	1.07	1.08	1.11	1.20
Rural	240	0.74	0.92	0.97	0.98	1.02	1.13

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012

Notes: 1. Entropy calculated at 6-digit NAICS aggregations 2. Standardized values represent ratio to U.S. mean 3. County character designated using U.S. Census 2010 data and Isserman (2005) typology

Table 3-2 lists statistics for standardized functional diversity across urban and rural counties in the U.S. and Appalachia. No clear pattern in functional diversity is evident from these data, though the least diverse counties continue to be those with a rural character. The average county in Appalachia has a higher functional diversity level than the average county in the United States, although the average urban county in Appalachia is less diverse than the U.S. average.

Table 3-2: Functional Diversity Statistics for Counties by County Character, 2012

Region	Number of county equivalents	Standardized functional diversity statistics, 2012					
		Minimum	25th percentile	Mean	Median	75th percentile	Maximum
United States	3,142	0.16	0.94	1.00	1.03	1.09	1.20
County character, 2010							
Urban	195	0.72	1.06	1.08	1.09	1.13	1.20
Mixed Urban	182	0.76	1.05	1.08	1.10	1.13	1.20
Mixed Rural	1,017	0.41	1.03	1.07	1.09	1.13	1.20
Rural	1,748	0.16	0.88	0.94	0.97	1.04	1.20
Appalachian counties	420	0.62	0.98	1.03	1.05	1.10	1.18
County character, 2010							
Urban	5	0.90	0.96	0.99	1.00	1.02	1.06
Mixed Urban	29	0.89	1.04	1.06	1.06	1.10	1.15
Mixed Rural	146	0.81	1.04	1.08	1.09	1.13	1.17
Rural	240	0.62	0.96	1.01	1.02	1.08	1.18

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Entropy calculated across eleven functional categories defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3 2. Standardized values represent ratio to U.S. mean 3. County character designated using U.S. Census 2010 data and Isserman (2005) typology

The relationship between increasing urbanity and increasing occupational diversity is not as strong as it is in the case of industrial diversity, though occupational diversity does tend to increase as counties become more urban. As shown in Table 3-3, the minimum floor for Urban and Mixed Urban occupational diversity exceeds that of all the other groupings across the U.S. and Appalachia. Occupational diversity is considerably less variable across counties than is industrial diversity, with most counties registering occupational diversity measures that fall very close to average. As discussed in sub-section 3-2a., diversity metrics increase as the number of categories containing employment increases. With occupational diversity measuring employment across 96 categories of occupations, it is not surprising that the variance of occupational diversity is less than the variance of industrial diversity which measures employment across 1,110 six-digit NAICS industries.

Table 3-3: Occupational Diversity Statistics for Counties by County Character, 2012

Region	Number of county equivalents	Standardized occupational diversity statistics, 2012					
		Minimum	25th percentile	Mean	Median	75th percentile	Maximum
United States	3,142	0.68	0.99	1.00	1.01	1.02	1.04
County character, 2010							
Urban	195	0.93	1.02	1.02	1.03	1.03	1.04
Mixed Urban	182	0.95	1.01	1.02	1.02	1.03	1.04
Mixed Rural	1,017	0.76	1.01	1.02	1.02	1.02	1.04
Rural	1,748	0.68	0.97	0.99	1.00	1.01	1.04
Appalachian counties	420	0.89	1.00	1.01	1.01	1.02	1.04
County character, 2010							
Urban	5	1.02	1.04	1.04	1.04	1.04	1.04
Mixed Urban	29	0.98	1.02	1.03	1.03	1.04	1.05
Mixed Rural	146	0.96	1.02	1.03	1.03	1.04	1.05
Rural	240	0.86	0.99	1.00	1.00	1.02	1.05

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Entropy calculated across 96 minor occupational groups in 2000 Standard Occupational Classification, Bureau of Labor Statistics 2. Bureau of Labor Statistics' national Staffing Pattern Matrix used to estimate employment by minor occupational groups 3. Standardized values represent ratio to U.S. mean 4. County character designated using U.S. Census 2010 data and Isserman (2005) typology

Comparing Appalachia to the U.S., the average county in Appalachia is slightly more diverse than the average U.S. county from an occupation-based perspective. There is also considerably less variance in occupational diversity across Appalachian counties than there is for U.S. counties as a whole. Compared to occupational diversity, the statistics for knowledge diversity demonstrate considerably less variance across all counties (see Table 3-4). Once again, the average Appalachian county is more diverse from a knowledge-based perspective than is the average U.S. county. This pattern holds across each of the four county character types, and the minimum floor for knowledge diversity is considerably higher than the minimum values found for this measure within which of the four types.

Table 3-4: Knowledge Diversity Statistics for Counties by County Character, 2012

Region	Number of county equivalents	Standardized knowledge diversity statistics, 2012					
		Minimum	25th percentile	Mean	Median	75th percentile	Maximum
United States	3,142	0.77	0.99	1.00	1.00	1.02	1.10
County character, 2010							
Urban	195	0.87	1.00	1.01	1.02	1.03	1.09
Mixed Urban	182	0.94	0.99	1.01	1.01	1.02	1.05
Mixed Rural	1,017	0.84	0.99	1.01	1.01	1.02	1.10
Rural	1,748	0.77	0.98	0.99	1.00	1.01	1.10
Appalachian counties	420	0.90	0.99	1.01	1.01	1.02	1.09
County character, 2010							
Urban	5	1.00	1.02	1.02	1.02	1.02	1.03
Mixed Urban	29	0.98	0.99	1.01	1.00	1.02	1.04
Mixed Rural	146	0.90	0.99	1.01	1.01	1.02	1.09
Rural	240	0.94	0.99	1.01	1.01	1.02	1.08

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Entropy calculated across 12 knowledge clusters; see Feser (2003) for details on knowledge cluster derivation 2. Bureau of Labor Statistics' national Staffing Pattern Matrix used to estimate employment by knowledge cluster 3. Standardized values represent ratio to U.S. mean 4. County character designated using U.S. Census 2010 data and Isserman (2005) typology

While economic diversity is not always higher in more urban locations, the relationship between diversity level and urban character is strong enough to suggest the need to consider urban and rural counties separately when examining the relative diversity standings of counties. Figures 3-2 to 3-9 present two maps each for industry-, function-, occupation-, and knowledge-based economic diversity. The first of each pair of maps presents the diversity level of counties with all counties considered in the same distribution and counties qualitatively ranked based on their distance in standard deviations from the mean diversity level across U.S. counties. The second map in each pair presents qualitative rankings of county diversity based on considering each county in one of four distributions based on the county character type of the county in question. Counties are then qualitatively ranked according to their standing within the

distribution of counties of the same character type (e.g., comparing rural counties to rural counties and urban counties to urban counties).

While the differences between these pairs of maps are not widespread, there are many occasions when the diversity level for a county considered relative to all counties is upgraded or downgraded when that county is considered only in relation to its peers with the same county character type. While comparing counties to all other counties is not necessarily inappropriate, the nature of diversity metrics, and its susceptibility to influence from characteristics associated with urban counties, suggests that comparing counties to their county character type peers presents a more realistic assessment of diversity conditions in a county.

Figure 3-2: Industrial Diversity in Appalachian Counties, 2012
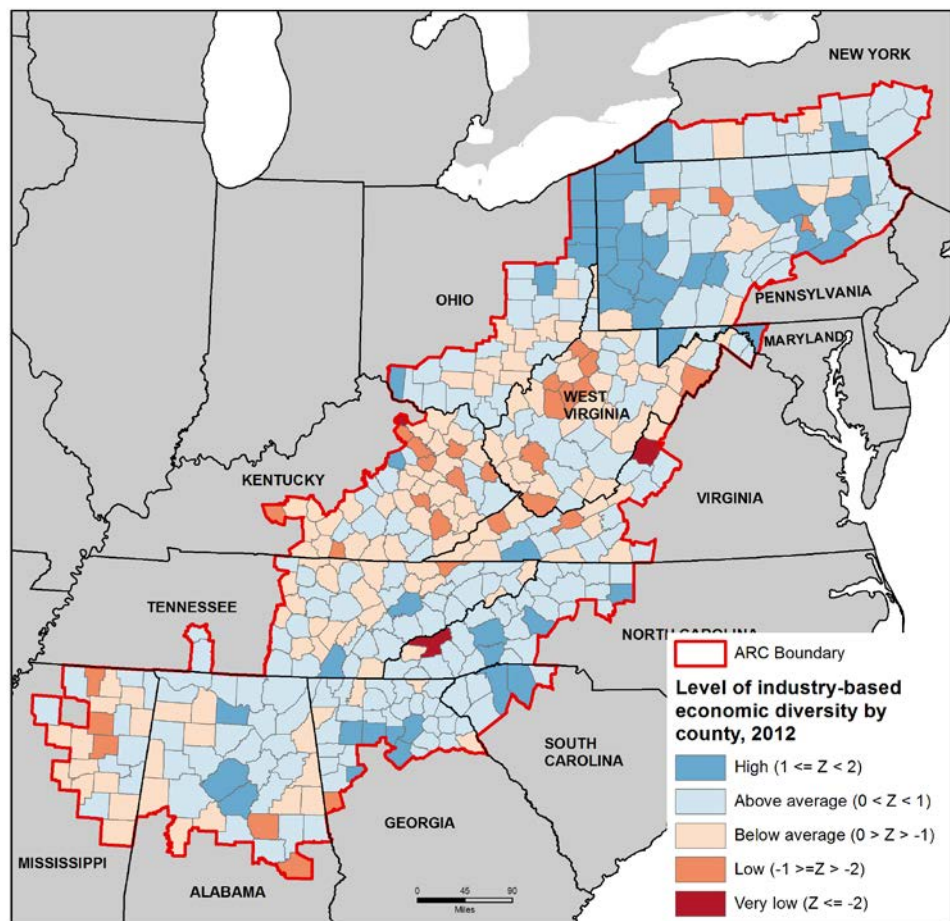
Industry-based Economic Diversity in Appalachian Counties, 2012.
Data Source: Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012.
Notes: 1. Entropy calculated at 6-digit NAICS aggregation 2. Classifications based on standard deviations (Z) from mean

Figure 3-3: Industrial Diversity in Appalachian Counties, Controlled for County Character, 2012
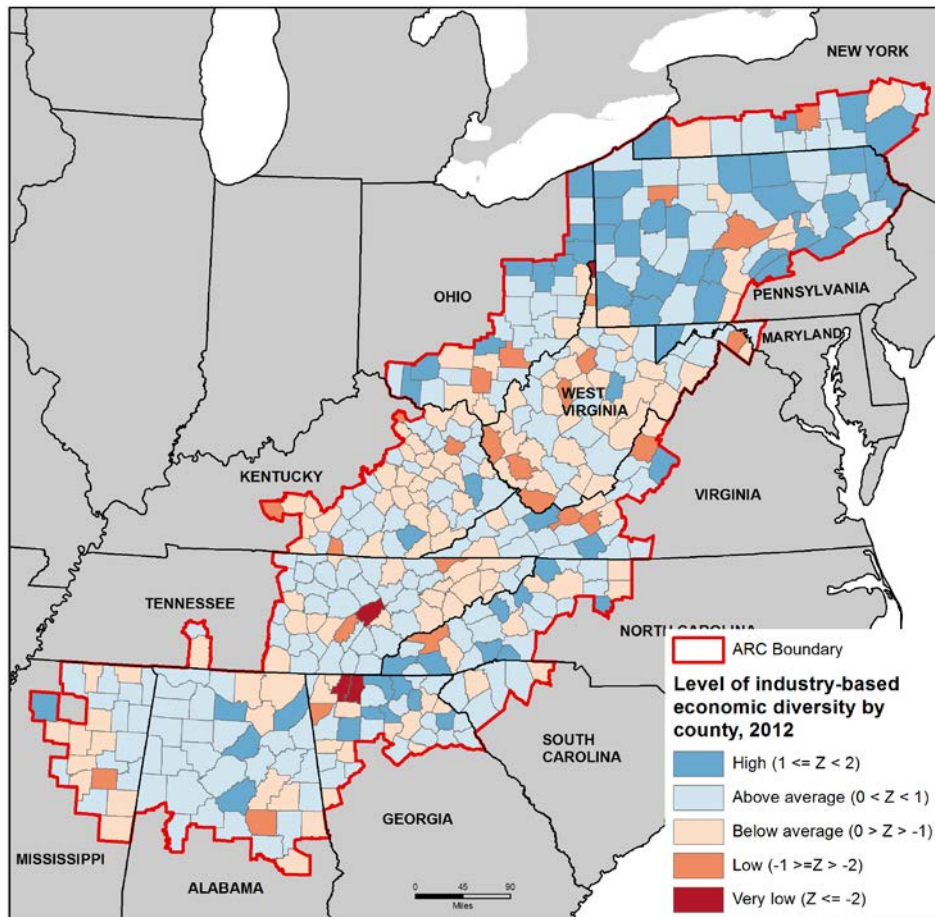
Industry-based Economic Diversity in Appalachian Counties, Controlled for County Character, 2012.
Data Source: Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012.
Notes: 1. Entropy calculated at 6-digit NAICS aggregation 2. Classifications based on standard deviations (Z) from mean

Figure 3-4: Functional Diversity in Appalachian Counties, 2012
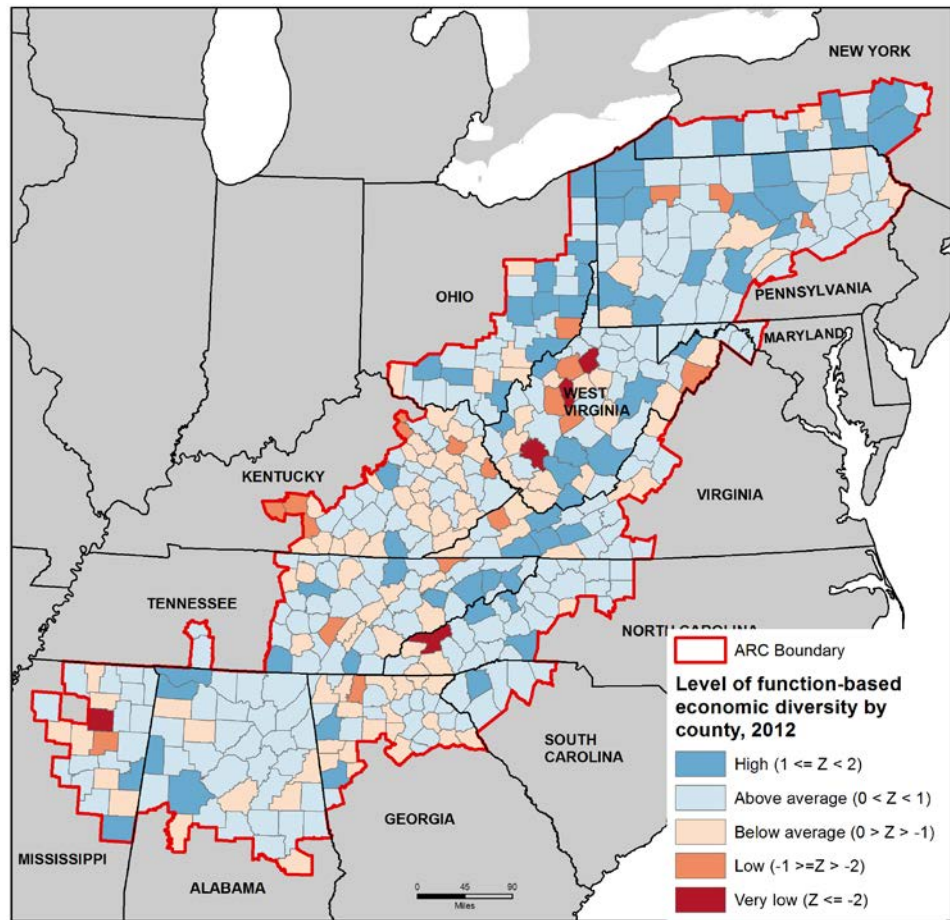
Function-based Economic Diversity in Appalachian Counties, 2012.
Data Sources: 1. Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Functional categories assembled as noted in Appendix 2. Classifications based on standard deviations (Z) from mean

Figure 3-5: Functional Diversity in Appalachian Counties, Controlled for County Character, 2012
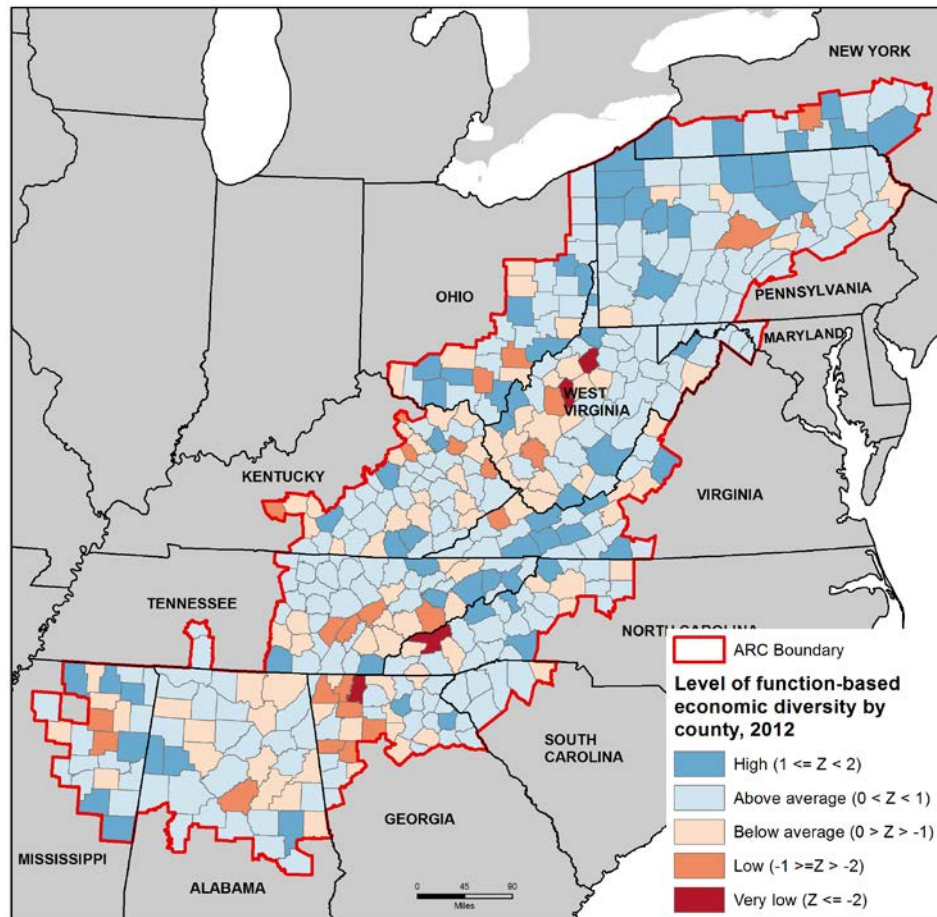
Function-based Economic Diversity in Appalachian Counties, Controlled for County Character, 2012.
Data Sources: 1. Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Functional categories assembled as noted in Section 2 2. Classifications based on standard deviations (Z) from mean

Figure 3-6: Occupational Diversity in Appalachian Counties, 2012
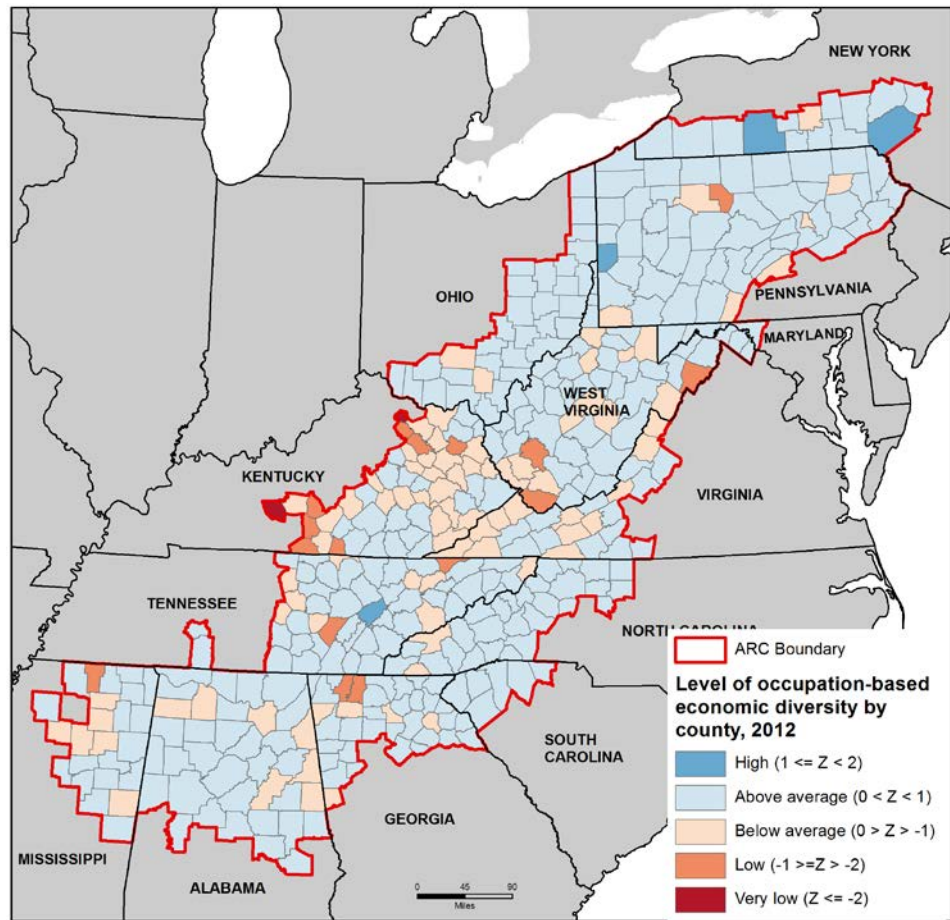
Occupation-based Economic Diversity in Appalachian Counties, 2012. Data Sources: 1. Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012 2. Occupational staffing patterns by industry, ONET
Notes: 1. Entropy calculated at SOC minor occupational grouping level 2. Classifications based on standard deviations (Z) from mean

Figure 3-7: Occupational Diversity in Appalachian Counties, Controlled for County Character, 2012
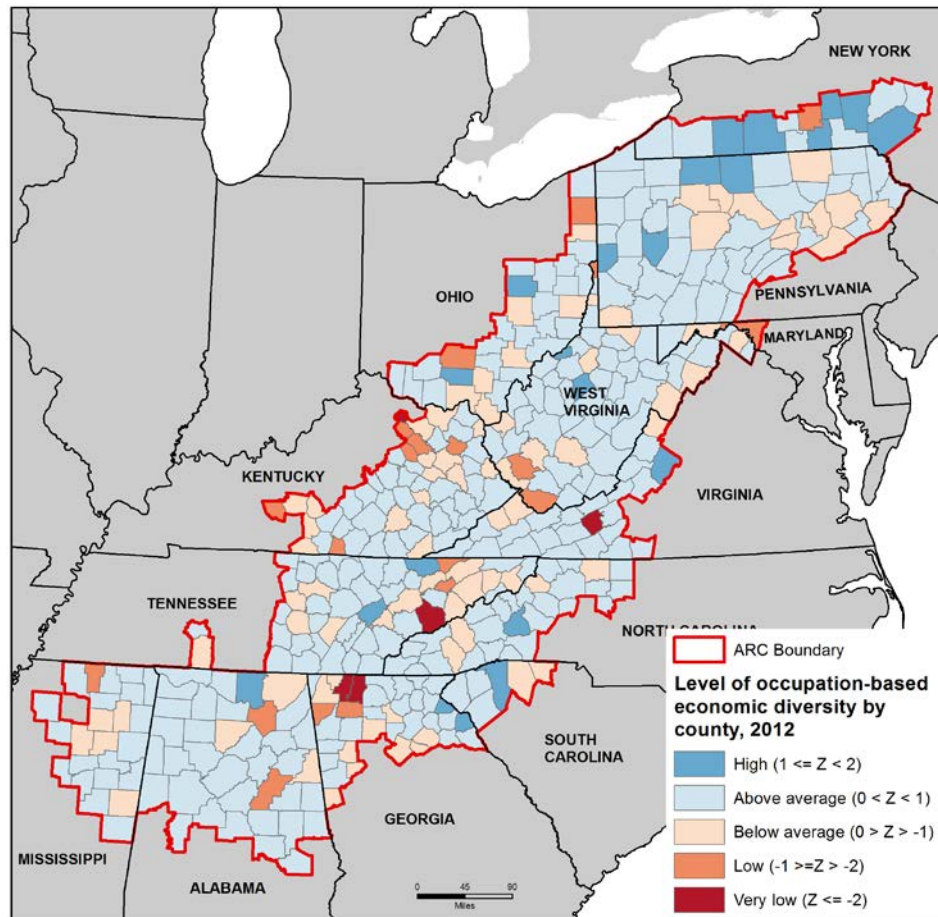
Occupation-based Economic Diversity in Appalachian Counties, Controlled for County Character, 2012. Data Sources: 1. Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012 2. Occupational staffing patterns by industry, ONET Notes: 1. Entropy calculated across 96 minor occupations 2. Classifications based on standard deviations (Z) from mean

Figure 3-8: Knowledge Diversity in Appalachian Counties, 2012
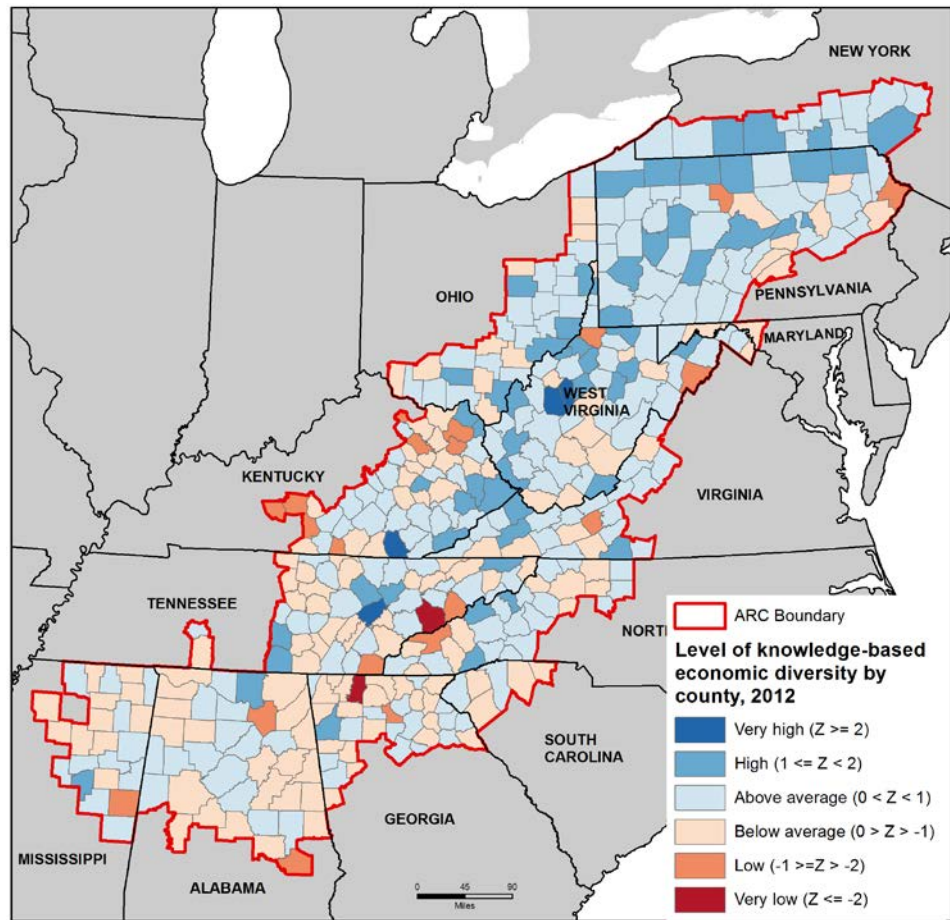
Knowledge-based Economic Diversity in Appalachian Counties, 2012. Data Sources: 1. Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012 2. Occupational staffing patterns by industry, ONET
Notes: 1. Knowledge clusters derived as detailed in Appendix 2. Classifications based on standard deviations (Z) from mean

Figure 3-9: Knowledge Diversity in Appalachian Counties, Controlled for County Character, 2012
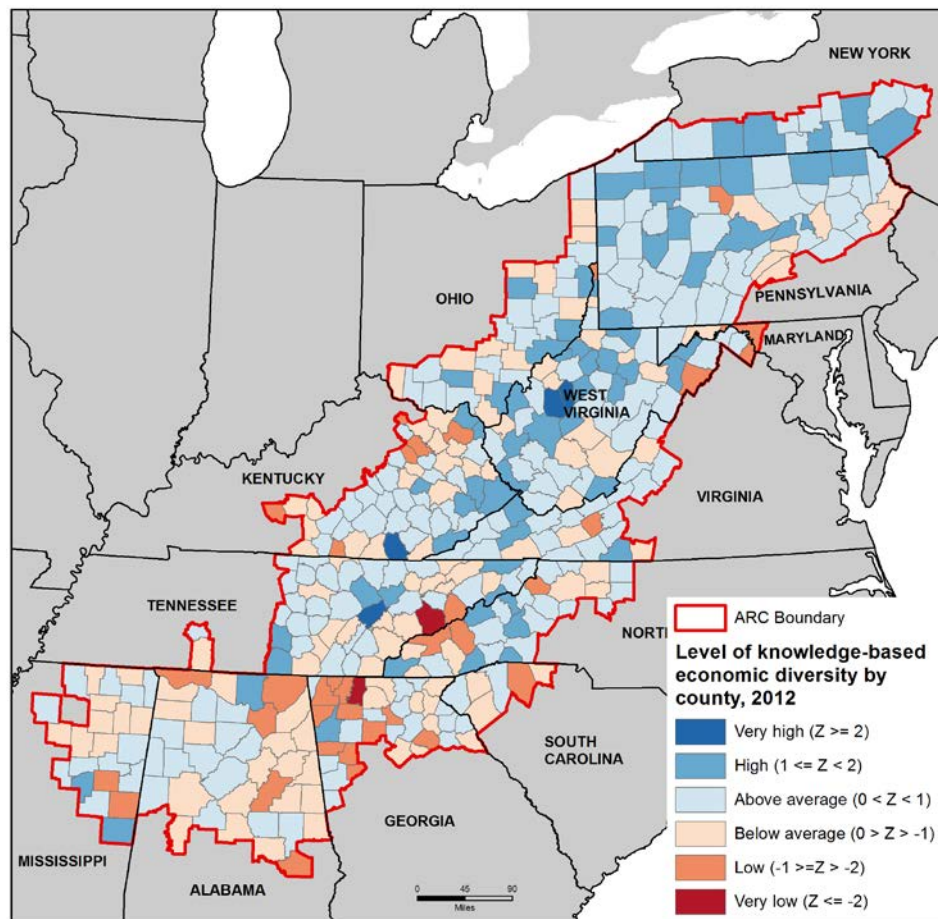
Knowledge-based Economic Diversity in Appalachian Counties, Controlled for County Character, 2012. Data Sources: 1. Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012 2. Occupational staffing patterns by industry, ONET Notes: 1. Knowledge clusters derived as detailed in Appendix 2. Classifications based on standard deviations (Z) from mean

3-2. DIVERSITY METRICS AND THE MECHANICS OF URBAN AND RURAL DIVERSITY DISPARITIES

Diversity metrics seek to measure the actual diversity of economic activity in a region, but they must rely upon classifications of employment by type of economic activity that may over- or underemphasize the actual differences between categories. This section evaluates the degree to which the classification schemes that form the basis of economic diversity measures influence the resulting differences in diversity across urban and rural counties. In particular, the average number of industry sectors by county character is determined and the role of related variety in determining the variance of industrial diversity is examined.

3-2A. INDUSTRY SECTORS BY URBAN AND RURAL COUNTIES

Industrial diversity measurements are influenced in part by the number of six-digit industries that a county has employment in. In 2012, the average county had employment in 587 six-digit industries, with this value ranging from 35 industries in

Loving County, Texas (diversity = 2.27) to 1,090 industries in Los Angeles County, California (diversity = 5.52). The number of industries varies significantly across the categories of county character, with Urban counties averaging employment in 974 industries, Mixed Urban averaging 931 industries, Mixed Rural counties averaging 850 industries, and Rural counties averaging employment in only 630 industries.

3-2B. RELATED VARIETY AS A PRIMARY SOURCE OF VARIANCE IN INDUSTRIAL DIVERSITY

Industrial diversity can be decomposed into two components—unrelated variety that measures the diversity of employment across 3-digit NAICS industries and related variety that measures the sum of the diversity of employment of six-digit NAICS industries within each 3-digit industry weighted by the share each 3-digit industry comprises of total employment. With considerably more six-digit industries than 3-digit industries in most counties, 2012 related variety values range from standardized values of approximately 0.3 to 2.9, while unrelated variety values range from approximately 0.7 to 2.8.

As shown in Tables 3-5 and 3-6, both unrelated and related variety values tend to increase as the level of county urbanity increases. However, the average standardized difference between the related variety values of urban and rural counties (0.64) is significantly greater than the average difference between the unrelated variety values of these county types (0.08). These statistics also demonstrate that the urban advantage in diversity is more fully expressed in the case of related variety, as each successive rung of urbanity has higher values at the 25th percentile, median, mean, 75th percentile, and maximum than the lower levels of urbanity do. The rankings for unrelated variety statistics do not follow this same pattern, though the mean at each higher level of urbanity exceeds or meets the value found at the preceding level.

Table 3-5: Industry-based Unrelated Variety Statistics for Counties in Appalachia by County Character, 2012

Region	Number of county equivalents	Standardized industry-based unrelated variety statistics, 2012					
		Minimum	25th percentile	Mean	Median	75th percentile	Maximum
Appalachian counties	420	0.78	0.99	1.02	1.03	1.07	1.13
County character, 2010							
Urban	5	1.03	1.07	1.07	1.07	1.09	1.09
Mixed Urban	29	0.99	1.06	1.07	1.07	1.09	1.12
Mixed Rural	146	0.90	1.04	1.06	1.06	1.09	1.13
Rural	240	0.78	0.96	0.99	1.01	1.03	1.11

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Unrelated variety uses 3-digit NAICS aggregations 2. Standardized values represent ratio to U.S. mean
3. County character designated using U.S. Census 2010 data and Isserman (2005) typology

Table 3-6: Industry-based Related Variety Statistics for Counties in Appalachia by County Character, 2012

Region	Number of county equivalents	Standardized industry-based related variety statistics, 2012					
		Minimum	25th percentile	Mean	Median	75th percentile	Maximum
Appalachian counties	420	0.43	0.83	1.00	0.99	1.15	1.65
County character, 2010							
Urban	5	1.36	1.48	1.51	1.51	1.53	1.65
Mixed Urban	29	0.72	1.25	1.33	1.41	1.46	1.54
Mixed Rural	146	0.73	1.02	1.12	1.12	1.22	1.44
Rural	240	0.43	0.75	0.87	0.87	0.98	1.29

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Unrelated variety uses 6-digit NAICS aggregations 2. Standardized values represent ratio to U.S. mean
3. County character designated using U.S. Census 2010 data and Isserman (2005) typology

Figure 3-10 further illustrates the higher variability of industry-based related variety when compared to unrelated variety. This cross tabulation of unrelated and related variety levels reveals that 346 of the 420 Appalachian counties have an unrelated variety value that is about average. In the case of related variety, 312 counties have a related variety value that is about average.

Figure 3-10: Level of Industry-based Unrelated and Related Variety in Appalachian Counties, Controlled for County Character, 2012
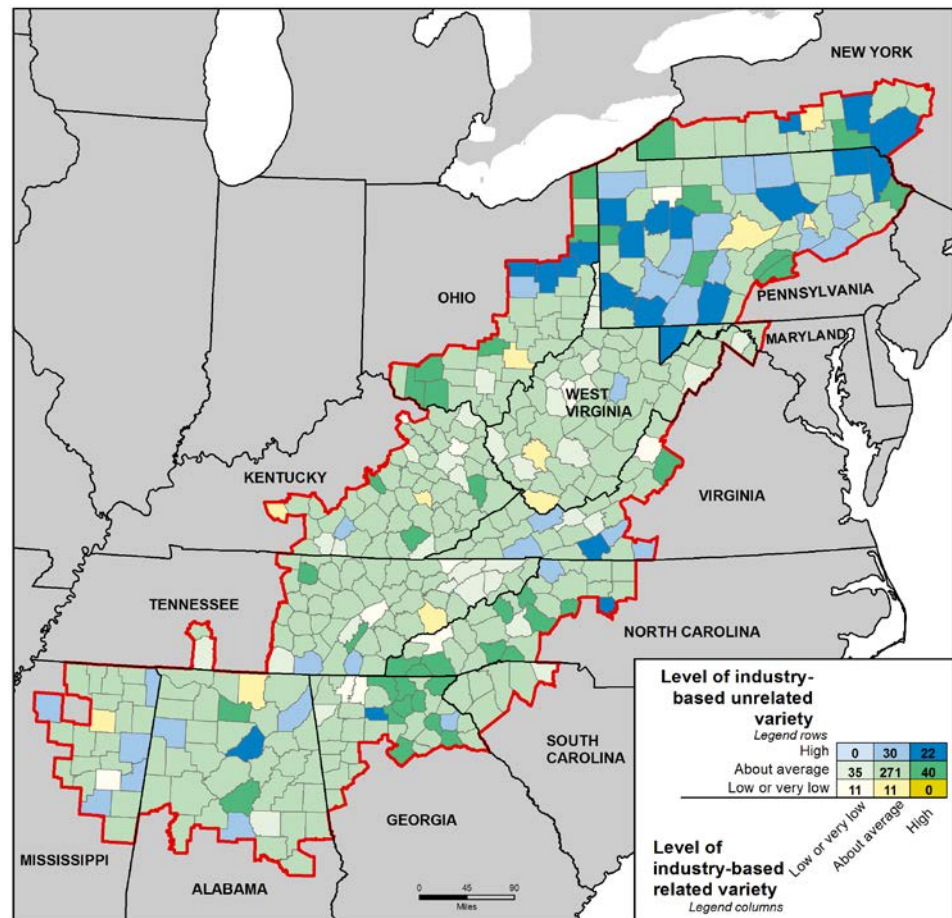
Level of Industry-based Unrelated and Related Variety in Appalachian Counties, Controlled for County Character, 2012. Data Sources: 1. Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012 Notes: 1. See section 2 for details on Unrelated/Related Variety calculation 2. Classifications based on standard deviations from mean (about average <1 Z from mean)

3-3. LESSONS FOR PRACTICE

3-3A. BE AWARE OF THE IMPACT OF CLASSIFICATION ON THE CALCULATION OF DIVERSITY

The default approach to measuring industrial diversity treats every separation of industries into different categories as equally important. In reality, there may be few significant differences between industries such as "Mens and Boys' Cut and Sew Apparel Contractors (NAICS 315211) and "Womens, Girls', and Infants' Cut and Sew Apparel Contractors" (NAICS 315212) where factors such as industry inputs and workforce skill requirements are concerned. A diversity metric that accounts for slight industry

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differences, such as those in this example, may be artificially inflating economic diversity in particular regions.

Blind measurement of economic diversity without consideration of the relevant degree of differences among industries can result in an obscured picture of diversity, and might offer little practical value for benchmarking economic progress and informing strategy. Practitioners might pursue two potential approaches for reducing the adverse influence of classification schemes on diversity metrics. First, practitioners could revise existing industry classification systems to be useful for the purposes of exposing key differences between industries and thus accurately measuring diversity. At a minimum, such an approach might involve a practitioner deciding to use a more aggregated level of industry classification (e.g., 3-digit NAICS rather than six-digit NAICS) for the calculation of diversity.

A second approach might involve practitioners measuring the admittedly problematic and often ill-defined concept of diversity in multiple ways. This triangulation approach to understanding economic diversity is essentially the approach used for this analysis. By measuring diversity on industry, function, occupation, and knowledge bases, this approach aims to provide particularized understandings of economic diversity that eschew a single county diversity score in favor of multiple measurements that can be more readily applied to understanding the variety of economic development opportunities and threats facing localities.

3-3B. CONSIDER THE FRONTIERS OF DIVERSITY WHEN BENCHMARKING COUNTIES AGAINST EACH OTHER

If the aim is to have a high diversity score, then diversity metrics are certainly biased in favor of larger, more urban communities. The chief technical underpinning of this tendency is the positive relationship that exists between the number of industry sectors in a region and that region's diversity level. In smaller places, the maximum diversity is limited by the natural tendency for there to be fewer industry sectors present. Practitioners should consider the natural bias of diversity for larger places and benchmark regional diversity to regions similar in size and urban population characteristics. This approach will allow for the identification of real differences in economic diversity that are not primarily due to size disparities. Benchmarking against similar size and character counties will allow practitioners to identify realistic goals for economic progress, though it may still be beneficial for comparisons to be made with larger places in order to track progress on more ambitious, transformative economic development goals.

4. SPATIAL AND INDUSTRIAL LEGACIES OF ECONOMIC DIVERSITY

Significant regional differences in economic diversity levels exist across the U.S. and Appalachia. In part these differences reflect the previously noted relationship between urbanization and diversity—with more urbanized counties of the north and northeast exhibiting higher diversity levels than their less densely populated counterparts in the southern and western portions of the United States. However, even when differences in urban and rural character are controlled for, spatial patterns in the distribution of economic diversity persist. This chapter provides evidence of these spatial patterns—and offers potential explanations for their existence—by reporting the spatial distribution of economic diversity, examining the spatial distribution of functional specializations, and investigating the characteristics of these specializations that contribute to differences in overall diversity levels.

4-1. SPATIAL DISTRIBUTION OF ECONOMIC DIVERSITY

Based on the distribution of counties by county character across U.S. regions and Appalachia sub-regions, it should be little surprise that diversity differences based on urbanity carry over to diversity differences based on location. As listed in Table 4-1, Urban counties represent just over five percent of the 2,925 counties in the Midwest, South, and West Census Regions, while they comprise approximately 20 percent of the 217 counties in the Northeast region. Rural counties, on the other hand, account for nearly 60 percent of the counties in the Midwest, South, and West regions, while representing about a quarter of the counties in the Northeast. In Appalachia, the proportion of Rural counties by sub-region ranges from a third of counties in the Northern sub-region to approximately 85 percent of counties in the Central sub-region.

Table 4-1: U.S. Counties by Region and County Character, 2010

Regional designation	Number of county equivalents	Number of counties by county character			
		Rural	Mixed Rural	Mixed Urban	Urban
U.S. Census region					
Northeast	217	56	83	34	44
Midwest	1,055	666	305	46	38
South	1,423	792	456	83	92
West	447	234	173	19	21
Appalachian sub-region					
Northern	86	28	47	10	1
North Central	63	43	17	3	0
Central	82	70	12	0	0
South Central	85	43	35	6	1
Southern	104	56	35	10	3

Data sources: U.S. Census Bureau, 2010; Appalachian Regional Commission, 2009
Notes: 1. County character designated using U.S. Census 2010 data and Isserman (2005) typology

Even when controlling for county character when considering the distribution of diversity, the regions with more rural counties tend to exhibit lower diversity levels (see tables 4-2 and 4-3). No very low diversity counties are located in the Northeast Census Region, while this category ranges from approximately four to six percent of the counties in the other regions. In Appalachia, the Central and North Central sub-regions are the most rural settings, based on the county character indicator. Low diversity counties account for a larger percentage of the counties in these sub-regions (9.8 and 7.9 percent, respectively) than they do in the other sub-regions, although no very low diversity counties are situated in these sub-regions.

Table 4-2: Level of Industrial Diversity in U.S. Counties by U.S. Census Region, Controlled for County Character, 2012

Level of industrial diversity by county	U.S. Census Region				
	Northeast	Midwest	South	West	Total
Number of county equivalents	217	1,055	1,394	447	3,113
% Very high diversity	0.0	0.0	0.0	0.2	0.0
% High diversity	35.0	11.9	7.0	18.6	12.3
% Above average diversity	44.7	46.7	46.1	33.3	44.4
% Below average diversity	12.9	29.4	33.5	28.9	30.0
% Low diversity	7.4	8.2	9.5	13.4	9.5
% Very low diversity	0.0	3.8	3.9	5.6	3.8

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Entropy calculated at 6-digit NAICS aggregations 2. Levels based on standard deviations from mean

Table 4-3: Level of Industrial Diversity in Appalachian Counties by Sub-region, Controlled for County Character, 2012

Level of industrial diversity by county	Appalachian sub-region					
	Northern	North Central	Central	South Central	Southern	Total
Number of county equivalents	86	63	82	85	104	420
% High diversity	39.5	6.4	3.7	11.8	11.5	15.0
% Above average diversity	40.7	44.4	43.9	51.8	54.8	47.6
% Below average diversity	14.0	41.3	42.7	29.4	28.9	30.5
% Low diversity	4.7	7.9	9.8	5.9	2.9	6.0
% Very low diversity	1.2	0.0	0.0	1.2	1.9	1.0

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Entropy calculated at 6-digit NAICS aggregations 2. Levels based on standard deviations from mean

4-2. SPATIAL DISTRIBUTION OF FUNCTIONAL SPECIALIZATIONS

The fact that significant differences in diversity persist even when county urban and rural characteristics are accounted for suggests that other significant factors contribute to the regional distribution of diversity. One potential explanation for these differences is that comparative economic advantages enjoyed by regions make certain locations more suitable for extensive activities related to particular economic functions. For

example, significant mineral resources and forest stands can make some regions more likely than others to house counties dominated by natural resources-based industries. While significant employment in natural resources industries is not synonymous with a lack of economic diversity, related factors such as the topography associated with mineral resource deposits and the large land areas consumed by activities such as agriculture and forestry may contribute to challenges associated with attracting and sustaining a diversity of other industries in many of these regions.

Apart from situations of industries dependent on the natural resources present in a region, particular industries may benefit more than others from economies of scale that makes a regional focusing of individual firm activities beneficial. Likewise, firms in certain industries may seek out the benefits of agglomeration economies when making site selection decisions. For example, a computer software company may choose to locate in Silicon Valley to benefit from networking opportunities and shared labor pools made possible by a large, existing contingent of other high-technology firms. Whether regional specialization develops through particular industries targeting their location due to the limited availability of required natural resources or individual firms choosing to focus activities to reap positive externalities, such activities may contribute to regional differences in diversity that arise from unequal distribution of natural, human, and institutional resources.

If regional functional specializations are not evenly distributed across U.S. and Appalachian counties, then this would lend some support to an explanation for differences in diversity based on differing regional resources and industry and firm requirements and business practices. Figure 4-1 depicts the uneven distribution of functional specialization across U.S. counties. For example, functional specializations in agriculture and resource extraction are found disproportionately in midwestern and western states, while specializations in capital-intensive manufacturing appear disproportionately in the eastern U.S. (see Figure 7-1 for Appalachian counties in more detail).

Figure 4-1: Functional Specializations with the Most Extra Jobs in U.S. Counties, 2012
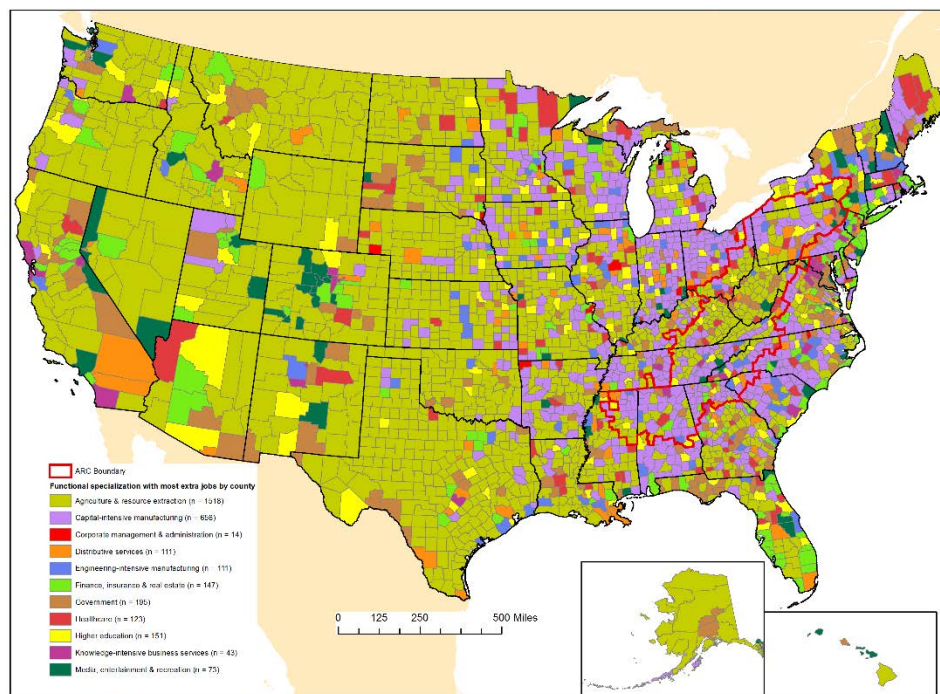
Functional Specializations in U.S. Counties, 2012.
Data Sources: Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012.
Notes: 1. Extra jobs equivalent to number of jobs in functional category for a county minus expected jobs based on the share of total U.S. employment accounted for by this category

Table 4-4 can be used to observe several notable regional groupings of functional specializations in Appalachia. Mining communities in the North Central and Central sub-regions contribute to considerably higher than average percentages of counties in these sub-regions with functional specializations in agriculture & resource extraction. The North Central sub-region also contains a higher than average percentage of counties with functional specializations in government. A higher than average percentage of counties in the Northern, South Central, and Southern sub-regions have functional specializations in capital-intensive manufacturing.

Table 4-4: Percent of Appalachian Counties with Select Functional Specializations, by Sub-region, 2012

| Functional specialization | Appalachian sub-region | | | | | |
	Northern	North Central	Central	South Central	Southern	Total
Number of county equivalents	86	63	82	85	104	420
Agriculture & resource extraction	27.9	61.9	72.0	31.8	19.2	40.2
Capital-intensive manufacturing	34.9	4.8	14.6	42.4	54.8	32.9
Corporate management & administration	1.2	0.0	0.0	0.0	0.0	0.2
Distributive services	4.7	3.2	0.0	1.2	7.7	3.6
Engineering-intensive manufacturing	4.7	4.8	1.2	5.9	3.9	4.1
Finance, insurance & real estate	1.2	1.6	0.0	0.0	5.8	1.9
Government	4.7	11.1	3.7	0.0	1.9	3.8
Healthcare	9.3	6.4	6.1	5.9	1.9	5.7
Higher education	8.1	3.2	2.4	7.1	3.9	5.0
Knowledge-intensive business services	0.0	0.0	0.0	2.4	1.0	0.7
Media, entertainment & recreation	3.5	3.2	0.0	3.5	0.0	1.9

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Functional specializations defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3

4-3. FUNCTIONAL SPECIALIZATIONS AND THEIR DIFFERENTIAL IMPACTS ON DIVERSITY

For functional specializations to contribute to measurable differences in diversity, the specializations must vary from one another on at least one of several potential factors that would result in differential diversity impacts. This section reviews the evidence for two factors that might lead functional specializations to systematically impact regional diversity levels—1) differences in the average share of employment accounted for by functional specializations and 2) differences in the number of industry sectors contained within a functional specialization. This section concludes by examining the distribution of economic diversity levels across county functional specializations.

4-3A. AVERAGE SHARE OF EMPLOYMENT IN FUNCTIONAL SPECIALIZATIONS

In addition to being influenced by the number of categories of economic activity in a region, economic diversity levels increase as the evenness of economic activity across

industry categories increases. If particular functional specializations tend to account for a disproportionately high or low percentage of regional employment then their presence might reasonably be expected to influence regional diversity levels. Table 4-5 provides statistics on the average characteristics of functional specializations across all U.S. counties. Agriculture and resource extraction accounts for an average of 18 percent of a county's total employment when it is a county's functional specialization. Capital-intensive manufacturing, knowledge-intensive business services, and distributive services rank second, third, and fourth, respectively, behind agriculture and resource extraction for the largest percentage of employment accounted for when this function is a county's specialization.

Table 4-5: Employment and Establishment Size Statistics by U.S. County Functional Specializations, 2012

Functional specialization	Number of county equivalents	Functional specialization averages			
		Percent of county employment	Percent of total establishments	Establishment size (employees)	Ratio of establishment size to overall county average
Agriculture & resource extraction	1,518	18.0	7.8	448	23.8
Capital-intensive manufacturing	656	15.1	5.2	484	22.3
Corporate management & administration	14	7.8	1.6	1,808	73.4
Distributive services	111	14.2	11.8	201	9.2
Engineering-intensive manufacturing	111	10.8	1.5	1,721	78.3
Finance, insurance & real estate	147	14.0	8.9	225	11.7
Government	195	12.0	5.5	739	31.9
Healthcare	123	9.0	0.8	3,212	155.9
Higher education	151	11.7	0.3	17,201	734.5
Knowledge-intensive business services	43	14.6	15.2	195	7.7
Media, entertainment & recreation	73	11.6	4.9	460	25.5

Data source: Estimated employment and establishments by industry, Economic Modeling Specialists International (EMSI), 2012

Notes: 1. Functional specializations defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3

While the data on establishments in Table 4-5 are not diversity metrics, they do offer insight into the dependence on individual firms that tends to accompany particular functional specializations. For example, where engineering-intensive manufacturing, healthcare, or higher education serve as a county's functional specialization they account for an average of fewer than two percent of the establishments in their counties. At the same time, these few establishments are significantly larger than the average establishment size across all industries in these counties. Whether these large

establishments leave a region particular vulnerable may depend on an assessment of the volatility of these industries. In this case, though there has been recent clamoring about a "higher education bubble," healthcare and higher education have historically been seen as more stable industries (Cronin & Horton, 2009). Indeed, Silicon Valley was not built on a culture of stability, but many regional development practitioners would surely risk instability for the potential growth and prosperity associated with this successful IT district. Any specialization can be considered through a similar lens, with dependence bringing the potential for regions to "win big" while also exposing them to the risk of industry-focused economic downturns.

4-3B. INDUSTRIES BY FUNCTIONAL SPECIALIZATION

Much as urban counties tend to house employment in more industry sectors than their rural counterparts do, some functional specializations include more industries than others. In both cases, the presence of more industry groupings creates a built in advantage for achieving high diversity when certain functional specializations are present. Table 4-6 lists the number of six-digit NAICS industries that comprise each of the functional groupings of industries used for determining county functional specialization. With the number of industries by functional grouping ranging from 3 to 328, some functional specializations seem to be considerably more likely than others to contribute to high diversity scores. For example, the 328 industries associated with capital-intensive manufacturing create an increased possibility for high diversity relative to the three industries associated with the government functional grouping.

Table 4-6: NAICS Industry Sectors by Functional Economic Groupings

Functional economic grouping	Number of 6-digit NAICS industries in functional grouping
Agriculture & resource extraction	46
Capital-intensive manufacturing	328
Corporate management & administration	4
Distributive services	143
Engineering-intensive manufacturing	144
Finance, insurance & real estate	55
Government	3
Healthcare	8
Higher education	3
Knowledge-intensive business services	41
Media, entertainment & recreation	54

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Functional groupings defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3

4-3C. AVERAGE ECONOMIC DIVERSITY BY FUNCTIONAL SPECIALIZATION

Differences among functional specializations on factors such as the average percentage of total employment accounted for by the specialization and the number of industries within the functional grouping appear to translate to differences in economic diversity across counties with different functional specializations. Table 4-7 displays the distribution of industrial diversity across counties with a specialization in one of the five most prevalent functional specializations. When controlling for county character, counties specialized in capital-intensive manufacturing—a functional grouping with a large number of industry sectors—have the greatest tendency to have an above average industrial diversity value. Counties specialized in higher education and healthcare are the most likely to have low industrial diversity values. In the case of these specializations, the small number of industries contained in each grouping may partially account for these low industrial diversity values.

Table 4-7: Level of Industrial Diversity in Appalachian Counties with Select Functional Specializations, Controlled for County Character, 2012

Level of industrial diversity by county	Selected county functional specializations					
	Agriculture & resource extraction	Capital-intensive manufacturing	Healthcare	Higher education	Engineering-intensive manufacturing	Total
Number of county equivalents	169	138	24	21	17	420
% High	13.6	18.1	12.5	4.8	5.9	15.0
% Above average	47.3	52.9	50.0	28.6	52.9	47.6
% Below average	33.7	23.2	29.2	47.6	41.2	30.5
% Low	5.3	4.4	8.3	19.1	0.0	6.0
% Very low	0.0	1.5	0.0	0.0	0.0	1.0

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012

Notes: 1. Entropy calculated at 6-digit NAICS aggregations 2. Levels based on standard deviations from mean
3. Functional specializations defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3

Counties specialized in healthcare and higher education have the highest proportion of their membership with high functional diversity values (see Table 4-8). Each of these functions accounts for an average of approximately ten percent of total county employment in the counties where it is the most significant specialization, allowing sufficient room for other functional groupings to account for significant employment as well. At the same time, the large establishments that often accompany higher education specializations may contribute to the significant proportion of higher education specialized counties with a low level of functional diversity.

Table 4-8: Level of Functional Diversity in Counties with Select Functional Specializations, Controlled for County Character, 2012

	Selected county functional specializations					
Level of functional diversity by county	Agriculture & resource extraction	Capital-intensive manufacturing	Healthcare	Higher education	Engineering-intensive manufacturing	Total
Number of county equivalents	169	138	24	21	17	420
% High	11.8	13.8	41.7	33.3	29.4	15.5
% Above average	63.3	52.2	54.2	33.3	64.7	55.2
% Below average	18.9	26.8	4.2	19.1	5.9	22.1
% Low	4.7	6.5	0.0	14.3	0.0	6.2
% Very low	1.2	0.7	0.0	0.0	0.0	1.0

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Entropy calculated across eleven functional categories 2. Levels based on standard deviations from mean 3. Functional specializations defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3

4-4. LESSONS FOR PRACTICE

4-4A. NATURAL, HUMAN, AND INSTITUTIONAL RESOURCES INFLUENCE REGIONAL SPECIALIZATIONS AND CAN AFFECT DIVERSITY LEVELS

Some places are a better fit for certain economic activities than other places. This notion of comparative advantage has long been part of the economist's toolbox for explaining regional differences and the essential lessons of this idea can contribute to understanding regional diversity. The advantage of a place for particular industries might come from the presence of certain natural resources, the existence of a workforce with the requisite skills, or the presence of a finance and business support services network that has long catered to the needs of a particular industry sector. In addition to these resources benefitting incumbent firms, existing industry specializations may grow as these advantages attract new, related firms to the region.

While regional resources impact economic specializations, they also indirectly influence economic diversity in a place since functional specializations tend to vary on fronts such as percent of total regional employment, the diversity of skillsets required by their workforces, and the number of industries that form a cohesive, functional economic group—all factors that can significantly influence industry-, occupation-, function-, and

knowledge-based economic diversity. For the practitioner interested in understanding regional diversity, wise places to start are to investigate the resources that make a region attractive or unattractive to particular industries and examine the diversity-related characteristics of a county's functional specializations.

4-4B. BENCHMARKING TO COUNTIES WITH SHARED FUNCTIONAL SPECIALIZATIONS CAN MAKE FOR HONEST AND USEFUL COMPARISONS

Just as it makes sense to benchmark a county's diversity to counties with similar urban or rural characteristics, benchmarking to the right places in terms of similar functional specialization can help to make realistic comparisons that at least partially account for differences in diversity due to the structure of counties' economic specializations. Comparing several counties with similar specializations but very different characteristics related to factors such as economic performance and the tenure of the economic specialization can also help to assess the trajectory of a region's development and might provide opportunities for gaining policy insights from the experiences of peer counties.

4-4C. INDUSTRY MIX MIGHT INFLUENCE THE ABILITY FOR REGIONS TO REACT TO SHOCKS AND OPPORTUNITIES

Dependence naturally creates some difficulty in adjustment. To the degree that counties are dependent on particular industries or groupings of industries, the economic diversity characteristics of these industries may make regional adjustment to economic shocks or opportunities more difficult. This difficulty might manifest itself in a few forms. Most generally, the larger the portion of a region's economy that is connected to a particular industry (e.g., through employment or earnings), the more likely that a shock to this industry will negatively affect the region. More specifically, low occupational diversity might make it difficult to seize opportunities since the workforce may lack the necessary skills or experiences to pursue employment in a wide variety of fields.

Industrial specializations might also stamp counties with institutional legacies that make adaptation more or less likely. For example, Thompson and Thompson (1987) cite the example of Midwestern automobile cities and their "struggle…with the legacy of high wages for low skills, wrung from...oligopoly and union power" (p. 548). By contrast, Chinitz (1961) speculated that the independent and entrepreneurial nature of New York City's apparel sector made risk-taking activity more common—and, by extension, allowed for greater adaptive capacity—in that location than it did in Pittsburgh, where the steel industry was dominated by large corporations.

Examining a county's overall diversity levels, the diversity characteristics associated with its specializations, and the impact of prevalent specializations on the supply of financial and human capital in a region might help practitioners to better understand and work toward enhancing a region's capacity for economic adaptation.

5. DIVERSIFICATION THROUGH JOB LOSS AND SPECIALIZATION THROUGH JOB GAIN

Diversification is generally assumed to be a positive economic process that brings significant value, particularly as long-run benefits of stability are achieved. However, there is little empirical evidence of how economic diversification occurs. This chapter uses employment estimates from 1999, 2009, and 2012 to examine diversification trends across the U.S. as a whole, U.S. counties, and Appalachian counties. These trends are further analyzed to reveal the factors associated with economic diversification or specialization. Finally, these findings on diversification are translated to lessons for economic development practitioners.

5-1. TRENDS AND COMPONENTS OF DIVERSIFICATION

According to the entropy index of industrial diversity, the United States became slightly less diverse from an employment perspective between 2009 and 2012 (see Table 5-1). In the United States, total employment over this time period increased by approximately five million jobs. At the same time, earnings increased at a rate more than double the rate of change in employment. This increase in earnings was accompanied by a very slight increase in the entropy metric of industry-based earnings diversity across the United States. Industry-based employment and earnings diversity increased very slightly in Appalachia between 2009 and 2012, while approximately 400,000 jobs and $35 billion in earnings were added to the Appalachian economy over this timeframe.

Table 5-1: U.S. and Appalachian Region Economic Activity and Diversity Trends, 2009-2012

Economic activity measure	2009	2012	Percent change
United States			
Employment			
Total employment	174 million	179 million	3.21%
Entropy index	5.643	5.637	-0.10%
Earnings			
Total earnings	$8.3 trillion	$9.0 trillion	7.34%
Entropy index	5.602	5.604	0.03%
Appalachian Region			
Employment			
Total employment	12.4 million	12.8 million	2.67%
Entropy index	5.595	5.596	0.02%
Earnings			
Total earnings	$488 billion	$521 billion	6.77%
Entropy index	5.575	5.582	0.12%

Data source: Estimated county employment and earnings by industry, Economic Modeling Specialists International (EMSI), 2009 & 2012
Notes: 1. Entropy calculated at 6-digit NAICS aggregations

Figure 5-1 displays the spatial distribution of significant changes in industrial diversity (i.e., those changes in diversity greater than one standard deviation from the mean change) and changes in employment between 2009 and 2012 in Appalachian counties. The sea of green counties throughout Appalachia in this map reveals that the dominant trend over this time was one of only very slight changes to economic diversity. Where significant changes did occur, counties were most likely to experience either jobs gains associated with a significant decrease in industrial diversity or job losses associated with a significant increase in industrial diversity.

Figure 5-1: Change in Industrial Diversity and Employment in the Appalachian Region, 2009-2012
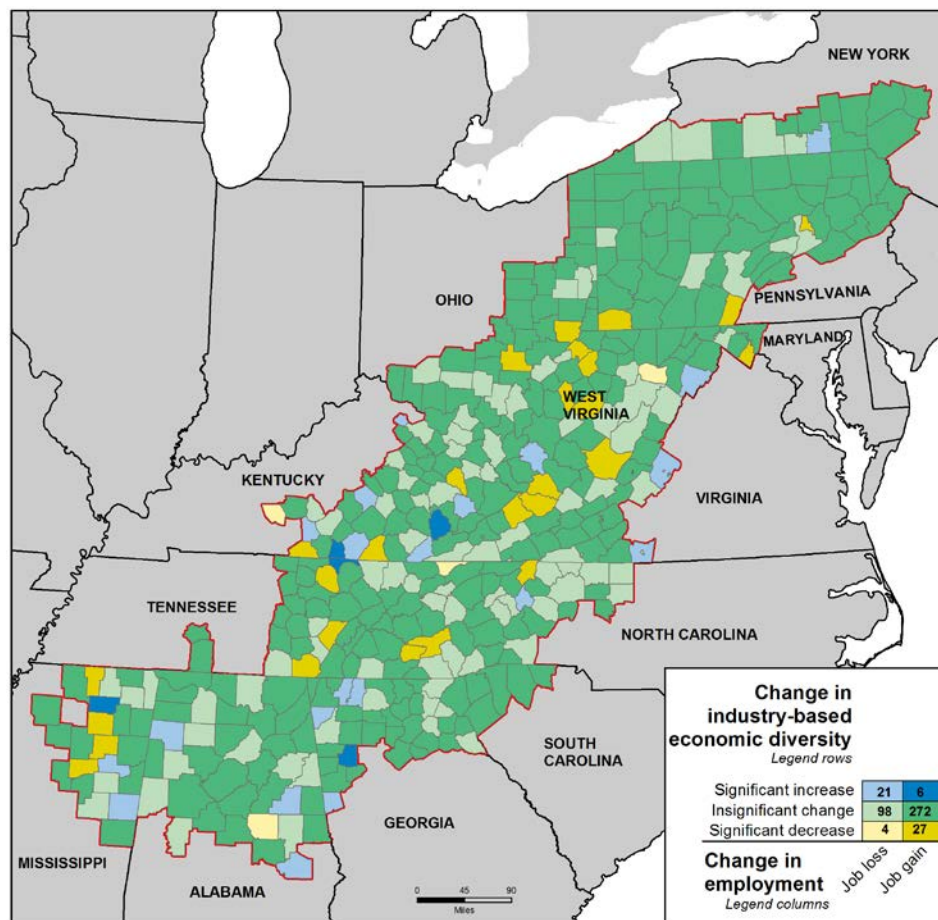
Change in Industry-Based Economic Diversity and Employment in the Appalachian Region, 2009-2012. Data Sources: 1. Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2009 and 2012 Notes: 1. Entropy calculated at 6-digit NAICS aggregation 2. Significant change indicates distance of >1 standard deviation from mean change in diversity

Where significant changes to diversity did occur, decreases in diversity (i.e., specialization) tended to be associated with significant increases in employment levels, while increases in diversity tended to be associated with either decreases in employment levels or relatively smaller employment increases. For example, the 31 counties in Appalachia that experienced a significant decrease in industrial diversity between 2009 and 2012 had an average increase in employment levels of 5.7 percent (see Table 5-2). Over the same time period, the 27 Appalachian counties that experienced a significant increase in industrial diversity had an average decrease in

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employment levels of 3 percent. In the case of changes between 1999 and 2009, counties that experienced increases in diversity averaged significantly smaller rates of employment increase than did counties that experienced decreases in diversity. One of the more notable recent examples of diversification and decline occurred in Clinton County, Ohio where DHL closed a major distribution hub that had employed 7,000 people. This employment loss contributed to one of the largest increases in county-level diversity recorded between 2009 and 2012. Similarly, within Appalachia a large increase in diversity occurred in Whitfield County, Georgia—home to a declining carpet manufacturing industry.

Table 5-2: Trends and Components of County Diversification in the U.S. and Appalachia by Significance of Change in Industrial Diversity, 1999-2009 and 2009-2012

Change in industrial diversity Region	1999 - 2009			2009 - 2012		
	Number of county equivalents	Percent change in employment	Percent change in diversity	Number of county equivalents	Percent change in employment	Percent change in diversity
Significant increase (diversification)						
U.S. counties	162	43.0	108.0	219	-0.8	3.0
ARC counties	21	16.4	96.3	27	-3.0	2.7
Modest increase (diversification)						
U.S. counties	1,460	33.7	13.7	944	1.5	0.5
ARC counties	174	19.4	12.5	131	1.6	0.5
Modest decrease (specialization)						
U.S. counties	1,432	46.0	-10.8	1,725	2.8	-0.7
ARC counties	225	25.4	-9.8	239	2.3	-0.8
Significant decrease (specialization)						
U.S. counties	80	315.5	-43.7	254	8.7	-3.5
ARC counties	8	88.2	-36.7	31	5.7	-3.2

Data sources: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2009 & 2012; Suppression-adjusted employment by industry, 1999, Isserman & Westervelt (2006)
Notes: 1. County equivalents count independent cities separately, resulting in 428 ARC county equivalents 2. Entropy calculated at 6-digit NAICS aggregations 3. Significant changes identified based on diversity change values located either at least one standard deviation above or below the average change in diversity

5-2. LESSONS FOR PRACTICE

5-2A. GROWTH TENDS TO COMPLEMENT EXISTING INDUSTRIES, AMENITIES, OR RESOURCES

True industrial recruitment coups are rare. Most growth in employment, whether by existing businesses or new establishments, tends to complement the existing economic base in a region while drawing upon regional assets. The 1992 location of a BMW assembly plant in Greenville-Spartanburg provides an illustrative example of growth building on existing assets. While $130 million in state and local government incentives served as the popular explanation for BMW's decision, this focus belied the importance

of other factors. Since the late 1950s, the region had consciously sought to compensate for its declining, domestic textiles industry by attracting foreign investment—focusing first on manufacturers of equipment for the textiles industry and later on a broad assortment of industries ranging from chemicals to automotive supplies. By the time of BMW's site selection decision, the Greenville-Spartanburg region had become one of the nation's per-capita leaders in attracting foreign investment, with German companies including Michelin, Bosch, and Bertelesmann AG calling the region home (New York Times, 1992; Saporito & Solo, 1992). In addition to creating a friendly business environment for foreign investment, state and regional leaders had made significant investments in infrastructure, particularly a regional airport, and technical education and workforce training programs that proved attractive to BMW (Eichel, 1992; Kanter, 2003). The well-known and much heralded Research Triangle Park in North Carolina serves as an additional example of an economic development success that resulted from at least fifty years of public policy effort—much to the consternation of economic developers seeking to easily replicate the success enjoyed in that region (Feldman & Desrochers, 2003).

County employment growth proceeds less from filling in gaps in a region's economic portfolio than it does from building on existing strengths (Frenken et al., 2007; Wagner & Deller, 1998). From the perspective of firms making location and expansion decisions, a region's existing portfolio of industries can signal strengths or weaknesses on site selection criteria such as infrastructure capacity, workforce skills, and quality of life. For economic developers, these and other site selection criteria can be thought of as regional competencies. These competencies can be exploited by encouraging the expansion of existing and related industries through attraction and retention activities. Activities might also be aimed at enhancing existing strengths or addressing weaknesses in the current set of regional competencies. Fundamental, intentional changes to a region's economy tend to result from an incremental process. Attracting truly new industries to a region can be a hard sell since regional conditions may be less than ideal for success in many industries. Further, a region's competencies cannot be changed substantially in short order. For example, specialized training programs might be used to quickly ready workers for opportunities in particular industries, but changes that result in the opportunity for attracting wholly new industry sectors may only result from orchestrating a long, coordinated effort amongst entities such as governments, the business community, school districts, universities, and community colleges.

5-2B. SHORT-RUN BENCHMARKING OF ECONOMIC DIVERSITY MAY CONFUSE EASILY MEASURABLE PROGRESS WITH DESIRABLE ECONOMIC OUTCOMES

Distressed counties in Appalachia tend to be less diverse than the more prosperous counties in the Region. However, the statistics presented in this chapter indicate that, in many instances, diversification may not be an appropriate short-run goal. Empirically, short-run diversification is more likely to be associated with slow growth or employment declines than is economic specialization. This undesirable diversification is likely unintentional, with higher diversity measures resulting from often significant

employment losses in particular industries effecting a more even distribution of employment across all industries. Building on the previous lesson in this chapter, a logical explanation for a specialization's association with higher growth rates is that conditions already exist to support related activities in a particular region so more of these industries may be brought into the region in a relatively quick fashion. If the location of truly new activities in a region is rare, then the rapid, large-scale location of truly new activities in a region is even rarer. Lacking significant evidence of the success that can be won in a particular region, individual firms are likely to practice wait-and-see approaches as industries gain a foothold in new territories.

If economic diversity is to be used as a measure for tracking and benchmarking a region's economy, then it should be considered in combination with other indicators such as total employment levels, unemployment and poverty rates, and the growth or decline of particular industries. This multidimensional approach can tell a developer much more about the outcomes and desirability of changes to a region's economy than a single diversity measure can.

6. COMPREHENSIVE EXAMINATION OF ECONOMIC DIVERSITY CAN REVEAL ECONOMIC STRENGTHS AND WEAKNESSES

The call to avoid putting all your eggs in one basket presents only limited value for economic development practice. This maxim captures the idea that diversity can yield value in the form of economic stability and increased, long-term growth rates, but it shines little attention on the actual industries and firms that comprise a region's economic base—the proverbial eggs that most directly impact outcomes related to wages in a region and the prospects for current and future growth rates.

Mark Twain (1894, p. 197) offered an alternative perspective on this familiar quote— "put all your eggs in one basket and—WATCH THAT BASKET." As opposed to the more commonly cited quote, this version does not imply that there is anything inherently dangerous about specialization. For economic development, this version suggests an approach that does not simply aim for an even distribution of economic activity across industries—the implications being that the exact industries in question matter for economic outcomes and detailed knowledge of a region's economy can provide insights about existing strengths and weaknesses.

This chapter presents what can be learned through a detailed examination of regional diversity measures—an exercise in carefully watching the regional basket of economic activities. In particular, several measures of diversity are examined to determine their relationships to one another and economic outcomes in a region.

6-1. INDUSTRIAL DIVERSITY OF EMPLOYMENT AND EARNINGS

In the preceding chapters, industrial diversity has referred to the distribution of regional employment across NAICS-defined industrial groupings. This approach treats each industry classification as equivalent for the purposes of calculating diversity measures, with regions "rewarded" with a higher score when employment is distributed equally

across all these classifications. An alternative way to consider industrial diversity is by examining the distribution of earnings across these same industry classifications. This approach weights employment in each industry according to the income earned by employees in these industries.

This section presents information on industrial diversity of employment and earnings across the U.S. and Appalachia, with particular attention paid to the relationships between these two measures and these measures and regional economic outcomes. In order to illustrate how this diversity manifests itself in concrete settings, the section concludes with a discussion of examples of industrial diversity in Appalachian counties.

6-1A. INDUSTRIAL DIVERSITY OF EMPLOYMENT

In 2012, industrial diversity of employment in the U.S. ranged from a low entropy measure of 1.02 in Chattahoochee County, GA to a high measure of 5.58 in Orange County, CA in 2012. Between these extremes, and as depicted in Figure 6-1, most counties (71 percent) have diversity measures which are less than one standard deviation from the mean diversity value of 4.51. More diversity observations are located above the mean value than below it, but no counties have a diversity measure greater than two standard deviations above the mean and 108 counties have a diversity measure greater than two standard deviations below the mean—reflecting the presence of very low diversity outliers without very high diversity counterparts.

Figure 6-1: Distribution of Industry-based Employment Diversity for U.S. Counties, 2012
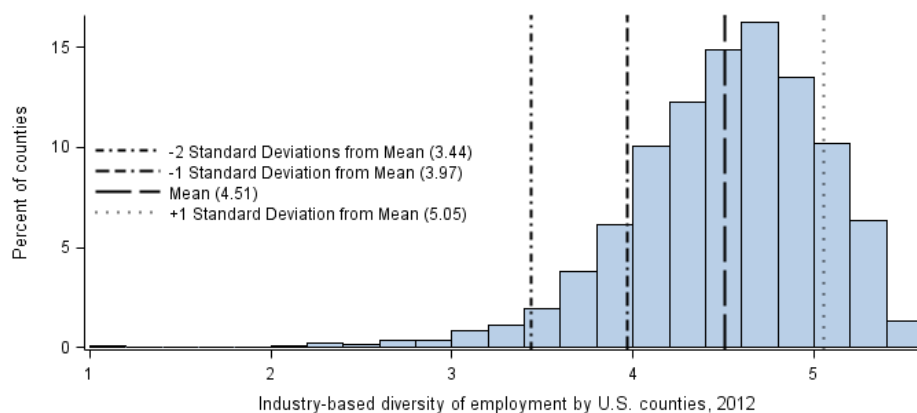
Data source: Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012
Note: Entropy calculated at 6-digit NAICS aggregation

In addition to the relationships among employment diversity, urban characteristics, and industry mix discussed in chapters 3 and 4, economic outcomes in Appalachia appear to have some relationship to diversity. Table 6-1 cross-tabulates the level of diversity in Appalachian counties versus economic status in those counties, while controlling for the different distributions of diversity in each county character type. Across the five classifications of economic status, distressed counties are most likely to have a low diversity measure and least likely to have a high diversity measure. Approximately 56 percent of distressed counties in Appalachia have an employment diversity level of below average or low, with this combination accounting for no more than 40 percent of counties in the other economic status groups. As county economic status proceeds to the attainment level, counties generally become more likely to have a high diversity level and less likely to have a low diversity level.

Table 6-1: Level of Industrial Diversity in Appalachia by County and Economic Status, Controlled for County Character, 2012

Level of industrial diversity by county	Economic Status					
	Distressed	At-Risk	Transitional	Competitive	Attainment	Total
Number of county equivalents	98	99	208	12	3	420
% High diversity	3.1	9.1	22.6	25.0	33.3	15.0
% Above average diversity	40.8	51.5	49.5	41.7	33.3	47.6
% Below average diversity	46.9	29.3	23.6	25.0	33.3	30.5
% Low diversity	9.2	8.1	3.4	8.3	0.0	6.0
% Very low diversity	0.0	2.0	1.0	0.0	0.0	1.0

Data sources: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Entropy calculated at 6-digit NAICS aggregations 2. Levels based on standard deviations from mean

The general trend of increasing diversity along with improved economic status does not hold universally. For example, the few very low diversity counties in Appalachia are classified as either at-risk or transitional—not distressed. Additionally, the competitive classification has a larger percentage of low diversity counties than is present in the transitional classification. The few examples of high diversity counties in the distressed and at-risk classifications also run counter to the general pattern of higher diversity being associated with improved economic status.

6-1B. INDUSTRIAL DIVERSITY OF EARNINGS

Industrial diversity of earnings has a high positive correlation with industrial diversity of employment across U.S. counties.[8] As a result, the distribution of earnings diversity levels across economic status categories is largely equivalent to the distribution of employment diversity levels across the same groupings. There are differences between the two measures, however. For example, earnings tend to be more concentrated across industries than employment is, resulting in average earnings diversity being lower than average employment diversity.

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[8] $r = 0.95$ at $p<0.001$

As shown in Figure 6-2, employment diversity exceeds earnings diversity in all but a small percentage of U.S. counties. In the hypothetical situation of equal employment across all industries in a high employment diversity county, a lower diversity of earnings would result from total earnings differences across these industries—reflecting wage differentials.

Figure 6-2: Distribution of the Ratio of Industry-based Earnings Diversity to Employment Diversity for U.S. Counties, 2012
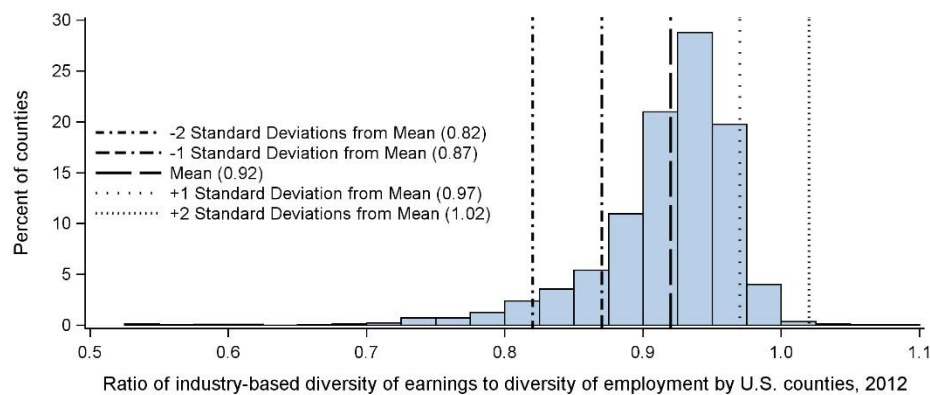
Data source: Estimated complete county employment and earnings by industry, Economic Modeling Specialists International (ESMI), 2012
Notes: 1. Entropy calculated at 6-digit NAICS aggregation

For economic developers, job quality is often equated with salaries or wages paid. Examining the ratio of earnings diversity to employment diversity in a particular region might provide insight on the concentration of earnings relative to the concentration of employment across industries—potentially offering the first clues to an over- or under-dependence on high or low paying jobs. Table 6-2 cross-tabulates the level of the ratio of earnings to employment diversity in Appalachian counties versus the economic status of these counties. Similar to the case with employment diversity and economic status, distressed counties are the least likely to have an above average or high ratio between earnings and employment diversity, and they are the most likely to have a low or very low ratio between these measures. While the likelihood for high ratios between these measures tends to increase as economic status improves, there are many fewer counties with high ratios than there are counties with high employment diversity measures. Excepting the three attainment counties, counties in the other classifications are more likely to have a low or very low ratio between these measures than they were to have a low employment diversity measure.

Table 6-2: Level of Ratio of Industry-based Earnings Diversity to Employment Diversity in Appalachia by County and Economic Status, 2012

Level of ratio of industry-based earnings to employment diversity by county	Economic Status					Total
	Distressed	At-Risk	Transitional	Competitive	Attainment	
Number of county equivalents	98	99	208	12	3	420
% High ratio	3.1	5.1	8.7	16.7	0.0	6.7
% Above average ratio	43.9	60.6	56.3	50.0	100.0	54.5
% Below average ratio	30.6	20.2	25.5	16.7	0.0	25.0
% Low ratio	18.4	9.1	7.7	8.3	0.0	10.5
% Very low ratio	4.1	5.1	1.9	8.3	0.0	3.3

Data sources: Estimated county employment and earnings by industry, Economic Modeling Specialists International (EMSI), 2012

Notes: 1. Entropy calculated at 6-digit NAICS aggregations 2. Levels based on standard deviations from mean

6-1C. ILLUSTRATIVE EXAMPLES OF INDUSTRY-BASED EARNINGS AND EMPLOYMENT DIVERSITY IN APPALACHIA

Without further investigation of conditions in an individual county, the explanations for particularly high or low ratios between earnings and employment diversity—and economic conditions accompanying these differences—can remain unclear. Table 6-3 lists the names and basic characteristics of several counties in Appalachia that had either high, low, or very low ratios between earnings and employment diversity in 2012. While the general trend depicted in Table 6-2 holds, multiple economic statuses are represented in each of the groupings of ratio levels. Functionally, these counties pursue a variety of specializations from agriculture & resource extraction to engineering-intensive manufacturing.

Table 6-3: Illustrative Examples of the Ratio between Industry-based Employment and Earnings Diversity in Appalachia, 2012

Ratio of earnings diversity to employment diversity County	County characteristics					
	Standardized industry-based earnings diversity	Standardized industry-based employment diversity	Employment estimate (2012)	Functional specialization	Economic status	County character
High						
Calhoun, WV	0.81	0.77	3,736	Agriculture & resource extraction	Distressed	Rural
Holmes, OH	1.18	1.12	27,052	Capital-intensive manufacturing	Transitional	Rural
Bath, VA	0.80	0.75	2,686	Healthcare	Competitive	Rural
Low						
Mineral, WV	0.87	0.96	10,886	Engineering-intensive manufacturing	Transitional	Rural
Tompkins, NY	0.88	0.94	62,688	Higher education	Transitional	Mixed Rural
Martin, KY	0.76	0.86	3,761	Agriculture & resource extraction	Distressed	Rural
Very low						
Montour, PA	0.70	0.84	22,915	Corporate management & administration	Competitive	Rural
Boone, WV	0.67	0.85	10,169	Agriculture & resource extraction	Transitional	Rural
McDowell, WV	0.73	0.83	7,284	Agriculture & resource extraction	Distressed	Rural

Data sources: Estimated county employment and earnings by industry, Economic Modeling Specialists International (EMSI), 2012

Notes: 1. Entropy calculated at 6-digit NAICS aggregations 2. Functional specializations defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3 3. Levels based on standard deviations from mean 4. County character designated using U.S. Census 2010 data and Isserman (2005) typology

All the high ratio counties have a higher standardized earnings diversity value than their standardized value for employment diversity. In Calhoun County, West Virginia, there is significant employment and earnings in the "Crude Petroleum and Natural Gas

Extraction" industry.[9] However, since average earnings in this industry are significantly lower than they are in many of other industries in the county, "Crude Petroleum and Natural Gas Extraction" accounts for approximately a third of total employment but only 18 percent of total earnings in the county. While Bath County, Virginia is classified as competitive and Calhoun is distressed, they share similar earnings and employment diversity characteristics. For Bath, the high ratio between these measures results from substantial employment in the hospitality industry[10] that pays significantly less on average than employment in the county's second largest industry by employment— "General Medical and Surgical Hospitals"[11]—does. Finally, Holmes County, Ohio contains employment across a wide diversity of manufacturing industries, with the mixture of mid- and high-paying jobs across these industries making earnings diversity even higher than employment diversity in this case.

Standardized employment diversity exceeds standardized earnings diversity in all the low and very low ratio example counties listed in Table 6-3. Mineral County, West Virginia is home to many high-paying jobs associated with the Allegany Ballistics Laboratory[12]—resulting in a concentration of earnings by industry relative to employment by industry and a low ratio between the two diversity measures. High levels of employment associated with Cornell University and Ithaca College in Tompkins County, New York[13]—and the relatively high earnings associated with these jobs—result in a similarly low ratio between these diversity measures. Finally, employment associated with coal mining[14] and a federal penitentiary[15] in Martin County, Kentucky accounts for approximately one quarter of total employment in the county. The high pay in these industries relative to other employment in the county results in these industries accounting for just over half of total earnings in the county and a low ratio between earnings and employment diversity.

Montour County, Pennsylvania is a competitive county with low employment diversity and very low earnings diversity. These diversity conditions result most directly from the large proportion of county employment comprised by jobs related to the corporate headquarters of a regional medical center, and the even larger proportion of earnings that can be attributed to this center. Boone and McDowell counties in West Virginia represent two additional examples of regions with a very low ratio between earnings and employment diversity. In both these counties, relatively high-paying jobs in the

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[9] NAICS 2007, 211111

[10] NAICS 2007, 721110

[11] NAICS 2007, 622110

[12] e.g., Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing (NAICS 2007, 336415)

[13] Colleges, Universities, and Professional Schools (NAICS 2007, 611310)

[14] Bituminous Coal and Lignite Surface Mining (NAICS 2007, 212111); Bituminous Coal Underground Mining (212112); Support Activities for Coal Mining (213113)

[15] Federal government, civilian, excluding Postal Service (EMSI NAICS code 901199; see http://www.economicmodeling.com/2012/05/03/emsi-data-2012-1-final/)

mining industry account for a significant percentage of employment and earnings. From an economic outcomes perspective, Boone ranks as a transitional county while McDowell—which has a slightly lower employment diversity—ranks as a distressed county.

6-2. ESTABLISHMENTS SIZE AND DIVERSITY

The size of establishments in a region can affect conditions such as the vulnerability of a regional economy to periodic downturns and the supply of entrepreneurs, as well as being a factor that can affect the economic diversity of a place. Rationales for the impact of establishment size are similar to those of economic diversity's impact. For example, the loss of any one large establishment in a region could have a significant, negative impact just as overdependence on one industry sector can leave a region exposed to economic downturns. When employment is spread more evenly across establishments, or industries, any one downturn may be offset by the continued vitality of other activities. In relation to entrepreneurship, large establishments may stifle the supply of entrepreneurs by limiting opportunity for individuals to access the managerial skills, capital, and experience necessary to successfully start and expand a business (Chinitz, 1961; Watkins, 1963).

This section presents information on the average size of establishments across Appalachia and the relationships among establishment size, industrial diversity, and economic performance. The section concludes with a discussion of example Appalachian counties that illustrate various establishment size and diversity conditions.

6-2A. ESTABLISHMENT SIZE, GEOGRAPHY AND ECONOMIC OUTCOMES

The average establishment size by county in 2011 varied significantly across geography and county character. As listed in Table 6-4, in 2011, counties in Appalachia were about 15 percent more likely than counties across the U.S. to have a larger than average establishment size. In Appalachia, rural counties were less than half as likely as other counties to have an above average establishment size. Eighty percent or more of Mixed Rural, Mixed Urban, and Urban counties in Appalachia had an above average establishment size.

Table 6-4: Level of Estimated Average Establishment Size by County and County Character, 2011

Level of estimated average establishment size by county	U.S. counties	Appalachian counties	Appalachian counties by county character			
			Rural	Mixed Rural	Mixed Urban	Urban
Number of county equivalents	3,113	420	240	146	29	5
% Very small	0.2	0.0	0.0	0.0	0.0	0.0
% Small	14.2	2.9	5.0	0.0	0.0	0.0
% Below average	39.2	37.6	56.3	13.7	6.9	20.0
% Above average	33.2	45.2	34.2	64.4	44.8	20.0
% Large	10.9	12.6	3.8	19.2	44.8	60.0
% Very large	2.4	1.7	0.8	2.7	3.5	0.0

Data source: Estimated employment and establishments by industry, Economic Modeling Specialists International (EMSI), 2012

Notes: 1. County character designated using U.S. Census 2010 data and Isserman (2005) typology 2. Levels based on standard deviations from mean

To correct for differences in establishment size associated with the different size distributions across county character types, the remaining data presented on establishment size and diversity controls for county character. As evidenced in Table 6-5, Appalachia's distressed and at-risk counties were more likely than counties in any other economic status grouping to have an above average establishment size when controlling for county character. With many of Appalachia's distressed counties located in rural areas, this suggests that Appalachia's rural counties tend to have larger than average establishment sizes compared to their counterpart counties across the United States. By contrast, Appalachia's transitional, competitive, and attainment counties were more likely to have below average establishment sizes.

Table 6-5: Level of Estimated Average Establishment Size in Appalachia by County and Economic Status, Controlled for County Character, 2011

Level of estimated average establishment size by county	Economic Status					Total
	Distressed	At-Risk	Transitional	Competitive	Attainment	
Number of county equivalents	98	99	208	12	3	420
% Small	0.0	1.0	3.4	8.3	33.3	2.4
% Below average	33.7	33.3	37.0	33.3	33.3	35.2
% Above average	48.0	48.5	45.7	50.0	33.3	46.9
% Large	18.4	15.2	11.5	0.0	0.0	13.6
% Very large	0.0	2.0	2.4	8.3	0.0	1.9

Data source: Estimated employment and establishments by industry, Economic Modeling Specialists International (EMSI), 2012

Notes: 1. Levels based on standard deviations from mean

6-2B. ILLUSTRATIVE EXAMPLES OF ESTABLISHMENT SIZE AND DIVERSITY IN APPALACHIA

Across U.S. counties in 2011, there was a slight negative correlation between establishment size and industrial diversity, suggesting that as establishment size increases industrial diversity tends to decrease.[16]

Figure 6-3: Level of Average Establishment Size and Industrial Diversity in Appalachia, Controlled for County Character, 2011/2012
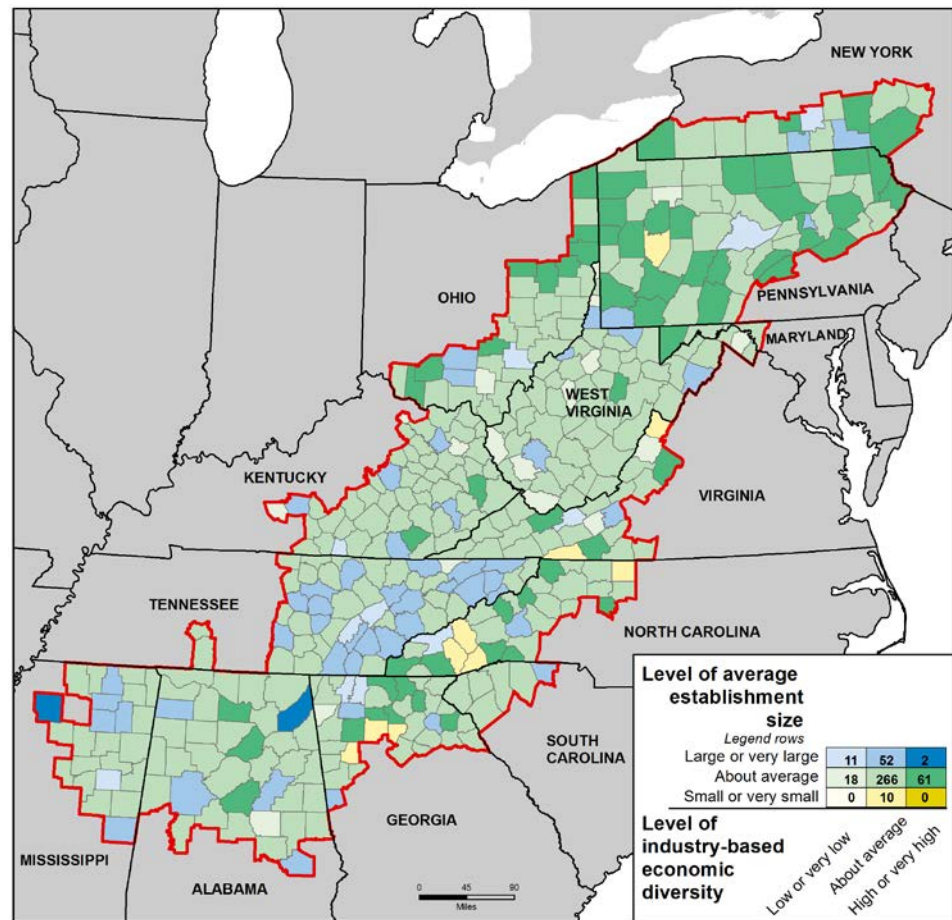
Level of Average Establishment Size and Industry-based Economic Diversity in Appalachia, Controlled for County Character, 2011/2012.
Data Sources: 1. Estimated complete and covered county employment by industry, Economic Modeling Specialists International (EMSI), 2011 "covered" data for establishment size calculation; 2012 "complete" data for diversity calculation

Figure 6-3 displays the distribution of average establishment size and industrial diversity across Appalachian counties. While the majority of Appalachian counties (266 of 420) exhibit about average levels of both establishment size and industrial diversity, there are numerous instances that speak to the negative correlation between establishment size and diversity. Eleven counties had a large or very large establishment size and a low or very low level of diversity. There were also 141 instances of counties having an about average level on one characteristic and a more extreme level on the other characteristic.

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[16] r = -0.06 at p < 0.001

Brief explanations of the examples listed in Table 6-6 can shed further light on the conditions existing in Appalachia's counties across a variety of average establishment sizes. Centre County, Pennsylvania and Roane County, Tennessee serve as examples of counties with very large average establishment sizes. Both counties have low or very low levels of employment diversity, are classified in the transitional economic status grouping, and have more than a quarter of their employment in a single, relatively high-paying establishment. Centre County is home to the main campus of Penn State University, while Roane County hosts research and development employment related to Oak Ridge National Laboratory.

Table 6-6: Illustrative Examples of Average Establishment Size in Appalachia, 2012

Level of estimated average establishment size, 2011 County	County characteristics				
	Level of industry-based employment diversity	Employment estimate (2012)	Functional specialization	Economic status	County character
Very large					
Centre, PA	Low	96,347	Higher education	Transitional	Mixed Rural
Roane, TN	Very low	23,000	Knowledge-intensive business services	Transitional	Mixed Rural
Large					
Macon, AL	Below average	7,780	Higher education	Distressed	Rural
Perry, KY	Above average	15,688	Agriculture & resource extraction	Distressed	Rural
Small					
Cherokee, GA	Above average	75,293	Finance, insurance & real estate	Competitive	Mixed Urban
Grayson, VA	Above average	4,353	Agriculture & resource extraction	At-Risk	Rural

Data sources: Estimated employment and establishments by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Entropy calculated at 6-digit NAICS aggregations 2. Functional specializations defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3 3. Levels based on standard deviations from mean 4. County character designated using U.S. Census 2010 data and Isserman (2005) typology 5. Levels controlled for county character

Both the listed examples of large average establishment size counties are classified as rural and distressed. In Macon County, Alabama, employment connected to the Tuskegee National Forest and Tuskegee University accounts for approximately 25 percent of jobs in the county and nearly 50 percent of total earnings. Outside of employment in Macon County's top two industries (i.e., higher education and government), the average earnings per job does not reach $30,000. Perry County, Kentucky has an above average level of diversity, but several large mining establishments account for approximately 15 percent of employment and 30 percent of earnings in the county.

Cherokee County, Georgia and Grayson County, Virginia have small average establishment sizes and above average levels of employment diversity. Cherokee is a

competitive county located in metropolitan Atlanta. Reflecting a common pattern in many rural and exurban counties, the local school system represents the county's largest employer with many small establishments in retail trade and finance, insurance & real estate sectors. Cherokee depends heavily on the surrounding region for economic opportunities, with more than 40,000 resident workers commuting outside the county for work. Grayson is an at-risk county in the Blue Ridge Mountains of rural southwestern Virginia. Many residents commute elsewhere for work and employers include the local school system, a few manufacturers, service and retail establishments serving the local population, and small-scale tourism-related establishments.

6-3. OCCUPATIONAL DIVERSITY

The predominant workforce skillsets in a region can limit or expand opportunities for economic development. This section presents information on occupational diversity across Appalachia and its relationships with economic outcomes and industrial diversity. The section concludes with a discussion of example Appalachian counties that illustrate various occupational and industrial diversity characteristics.

6-3A. OCCUPATIONAL DIVERSITY AND ECONOMIC OUTCOMES

The distribution of occupational diversity across the economic status groupings of Appalachian counties is similar to that of industrial diversity. As listed in Table 6-7, distressed counties are the most likely to have a below average or lower level of occupational diversity, followed closely by transitional and at-risk counties. More than 80 percent of counties in the competitive and attainment classifications have above average or higher levels of occupational diversity.

Table 6-7: Level of Occupational Diversity in Appalachia by County and Economic Status, Controlled for County Character, 2012

Level of occupational diversity by county	Appalachian counties by economic status					
	Distressed	At-Risk	Transitional	Competitive	Attainment	Total
Number of county equivalents	98	99	208	12	3	420
% High	1.0	5.1	7.2	8.3	0.0	5.2
% Above average	69.4	70.7	65.9	75.0	100.0	68.3
% Below average	21.4	17.2	22.1	16.7	0.0	20.5
% Low	7.1	5.1	3.9	0.0	0.0	4.8
% Very low	1.0	2.0	1.0	0.0	0.0	1.2

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Entropy calculated across 96 minor occupational groups in 2000 Standard Occupational Classification, Bureau of Labor Statistics 2. Bureau of Labor Statistics' national Staffing Pattern Matrix used to estimate employment by minor occupational groups 3. Levels based on standard deviations from mean

While there is a significant positive correlation between industrial- and occupational diversity, there are instances where the two values vary considerably from one another.[17] As shown in Figure 6-4, most Appalachian counties have about average levels of industrial and occupational diversity. However, there are almost 80 counties that have an about average level in one diversity measure and a more extreme level in the other measure.

Figure 6-4: Levels of Industrial and Occupational Diversity in Appalachia, 2012
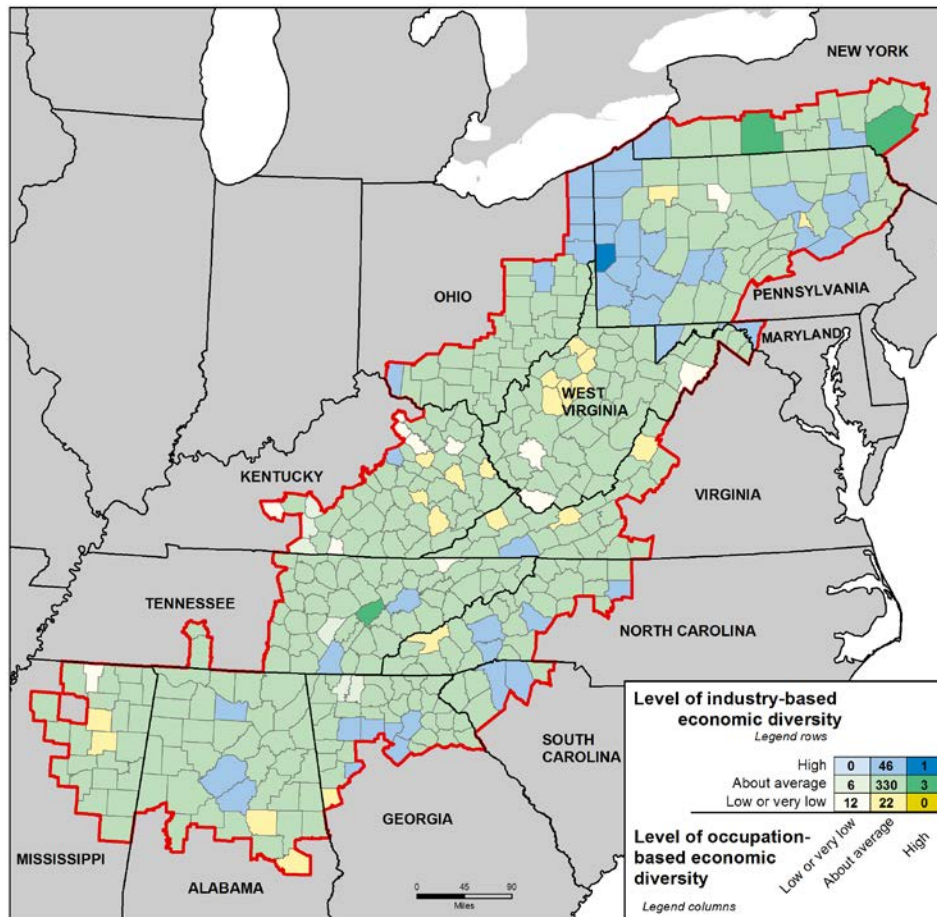
Level of Industry- and Occupation-Based Economic Diversity in Appalachia, 2012. Data Sources: 1. Estimated county employment by industry, Economic Modeling Specialists International (EMSI), 2012 2. Occupational staffing patterns by industry, ONET Notes: 1. Entropy calculated across 6-digit NAICS/96 occupations 2. Classifications based on standard deviations from mean (about average <1 Z from mean)

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[17] r = 0.76 at p < 0.001

6-3B. ILLUSTRATIVE EXAMPLES OF OCCUPATIONAL DIVERSITY IN APPALACHIA

As before, descriptions of examples—listed in Table 6-8—can provide further insight on the conditions associated with various levels of occupational diversity in Appalachian counties. Beaver County, Pennsylvania has high levels of occupational and industrial diversity. Beaver County is a transitional, mixed urban county that is part of the Pittsburgh metropolitan area. The county houses a diverse array of employment across industries and occupations—with none of the industries accounting for more than five percent of total employment in the county.

Table 6-8: Illustrative Examples of Occupational Diversity in Appalachia, 2012

Level of occupational diversity County	County characteristics				
	Level of industrial diversity	Employment estimate (2012)	Functional specialization	Economic status	County character
High					
Beaver, PA	High	72,341	Capital-intensive manufacturing	Transitional	Mixed Urban
Below average					
Montour, PA	Below average	22,915	Healthcare	Competitive	Rural
Low					
Hancock, TN	Low	1,680	Agriculture & resource extraction	Distressed	Rural

Data sources: Estimated employment and establishments by industry, Economic Modeling Specialists International (EMSI), 2012

Notes: 1. Entropy calculated across 96 minor occupational groups in 2000 Standard Occupational Classification, Bureau of Labor Statistics 2. Bureau of Labor Statistics' national Staffing Pattern Matrix used to estimate employment by minor occupational groups 3. Levels based on standard deviations from mean 4. County character designated using U.S. Census 2010 data and Isserman (2005) typology 5. Functional specializations defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3 6. Levels controlled for county character

Montour County, Pennsylvania has below average levels of occupational and industrial diversity. A competitive county, Montour County has a pronounced workforce specialization in occupations related to medical science & health services. Hancock County, is a distressed, rural counties with low levels of occupational and industrial diversity. Hancock contains a very small economy with employment concentrated in occupations related to skilled and semi-skilled labor and machine operation.

6-4. LESSONS FOR PRACTICE

6-4A. DIVERSITY CAN SIGNAL ECONOMIC STRENGTH OR WEAKNESS

While economic diversity tends to be greater in those counties that are more prosperous, the examples discussed in this chapter demonstrate that this is not a universal truth. Examining diversity from employment, earnings, and occupational perspectives can provide more insight into the strengths and weaknesses of a county's economy than examining a single diversity metric can. In many urban areas,

employment diversity exists in the form of business services that allow the development of numerous industrial specializations. While this can also be the case in more rural areas, diversity in these settings can also signal the lack of a significant, competitive industrial specialization within the region. In one setting diversity can provide a strength in the form of multiple potential avenues for growth and hedges against shocks. In another setting diversity can signal a small amount of employment in many industries— none of which have been able to gain the traction necessary to achieve significant growth.

Considered with employment diversity, earnings diversity can offer insight into the prosperity that a region's mix of industries provides. A ratio of earnings diversity to employment diversity that is higher than average can signal specializations in relatively low paying jobs, since this situation makes earnings across sectors more equal than employment across sectors. A ratio of earnings diversity to employment diversity that is lower than average can signal specializations in high paying jobs—effectively making earnings more concentrated than employment. Occupational diversity can provide similar signals, with a diverse county potentially indicating that there are just about as many low-skill jobs as high-skill (and often high-wage) jobs. Low occupational diversity might indicate a specialized workforce to support a competitive, high-wage industry, though it may also indicate a dearth of high-skill jobs.

For practitioners, a comprehensive consideration of diversity metrics can help to understand whether economic diversity is a strength or weakness for a particular region. In almost all cases, proper interpretation of the clues that diversity metrics offer requires an examination of a region's industry mix. This further investigation can help economic developers to uncover whether high diversity scores signify a competitive economy that can support a wide range of economic activities, or a struggling economy that lacks the critical mass of skills or support services to encourage growth on many fronts. Likewise, low diversity scores might signal an overdependence on a volatile, low-paying industry, or an economy that enjoys the benefits of depth in related workforce skillsets and industries that make the region's firms highly competitive.

6-4B. CHARACTERISTICS OF ECONOMIC DEPENDENCE MATTER FOR STABILITY AND GROWTH

Higher than average establishment sizes and low diversity metrics related to earnings and employment can signal economic dependence on a few sectors or firms. Addressing whether this dependence is good or bad for a region's economic development requires a closer look at the firms and industries that make up the economy. The concepts of stability and growth can be useful for guiding the type of additional analysis that might help practitioners understand the nature of economic dependency in their regions. From a stability perspective, large firms are, on average, less likely to dissolve than small firms are. They may also have the resources and diverse product lines necessary to weather downturns while avoiding layoffs. On the other hand, large firms with remote ownership may be more likely to relocate than are small, locally-owned firms that may be more invested in the community in a variety of ways. The danger of relocation also

depends on the degree to which firms depend upon relatively scarce geographic features or human, institutional, or natural resources.

The dominant industries in a region can also affect stability. For example, farming and mining industries heavily affected by commodity prices are generally more likely to exhibit greater volatility in employment and earnings than are traditionally more stable sectors such as higher education or government. Industries that depend primarily on local demand, such as secondary education, healthcare, and many personal services and retail sectors, may be more likely to maintain at least a minimum level of local employment than are those industries dependent on external demand sources.

From a growth perspective, small firms are, on average, more likely than large firms to experience rapid expansion or contraction of employment and earnings. Industries also possess very different growth potentials. Industries such as healthcare, education, and government may be guided primarily by demographic imperatives, while industries dependent on continued research and development can experience explosive growth as new products create new demand. For regional development practitioners, the prospects of capturing growth locally may be just as important a consideration as the prospects of firm growth more generally. From this perspective, some large firms may have more local growth potential than small firms, particularly if the firms pursue a diverse array of activities. Development efforts to grow the regional economy might focus on encouraging firms to diversify their local presence—potentially spurred on by cost savings that accompany their consolidation. Similarly, practitioners might seek to attract industries related to existing firms in an effort to both increase regional employment and enhance the competitiveness of local firms.

To characterize economic dependency and stability in their region, practitioners might investigate factors such as:

- the location of firm ownership

- the competitive prospects of individual firms and industries

- financial and business support services available to small and large firms in the region

- the prospects for diversification within existing firms and existing industries

- the sourcing policies of existing and potential firms in the region

- the workforce skills, infrastructure, and capital required for diversification of existing firms and industries

7. FUNCTIONAL AND REGIONAL CONTEXT CAN SHED LIGHT ON ECONOMIC OPPORTUNITIES AND THREATS

Regional economies do not respect the artificial lines drawn to better understand them. The availability and format of regional data tends to bias analysis of regional economies to NAICS-defined industries and county-level geography. While this focus can yield considerable insights, it tends to undercut alternative methods for understanding regional economies. In particular, analyses that consider the functional and regional context of county-level economic activities can introduce concepts related to function- and geography-based economic connections into understandings of local economies.

Adopting a functional perspective to understanding regional economies involves grouping industries into several large classifications—e.g., agriculture and resource extraction, capital-intensive manufacturing, and higher education—based on factors such as shared inputs, similar outputs, and/or similar technological or skill requirements necessary to perform the work customary to these industries. These functional groupings allow for the consideration of a county's economic connections to broad economic forces that may not be apparent when examining only the specific industries resident to a county. Similarly, grouping occupations into knowledge clusters that require similar types and levels of knowledge may reveal regional competencies or weaknesses that a more specific examination of occupations can gloss over.

A regional perspective acknowledges that few counties rely only upon the economic activity that takes place within their formal boundaries. Workers commute elsewhere to work, households shop and purchase services outside their counties, and firms in counties draw from neighboring counties, and beyond, to populate their workforces. The regional context can provide insights into the surrounding economic strengths individual counties can draw from, as well as acknowledging the weaknesses that prevail in the regional economy.

This chapter seeks to understand what can be learned through considering the functional and regional context of counties. Functional and knowledge cluster specializations and function-, industry-, and knowledge-based economic diversity are examined for counties and their commuting sheds, with a particular emphasis on the association between these measures and economic outcomes (see Chapter 2 for details on these designations and geographies). The chapter concludes with an examination and discussion of functional county roles that jointly consider the industrial compositions of counties and their regions and the commuting connections among counties and their regions.

7-1. FUNCTIONAL AND KNOWLEDGE SPECIALIZATIONS IN COUNTIES AND COMMUTING SHEDS

7-1A. FUNCTIONAL SPECIALIZATIONS

As noted in section 4-2, functional specializations are not distributed evenly across Appalachia and the United States. Figure 7-1 depicts the functional specializations of counties across Appalachia. Central Appalachia consists of many counties with an agriculture & resource extraction functional specialization, with relatively few counties with a specialization in one of the manufacturing functions. Counties with manufacturing specializations tend to cluster in Pennsylvania and Ohio and south of West Virginia. The remaining specializations are spread throughout the region, with few easily identifiable functional clusters.

Figure 7-1: Functional Specializations by Counties in Appalachia, 2012
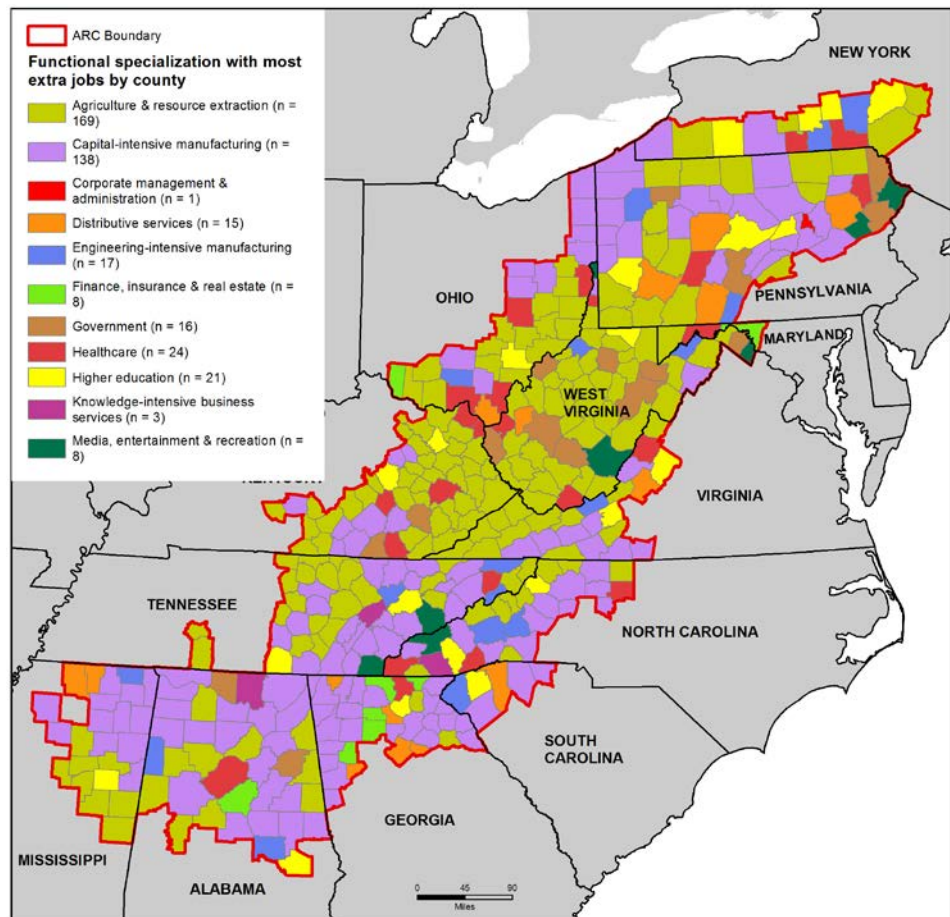
Functional Specialization by Counties in Appalachia, 2012. Data Sources: 1. Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012 Notes: 1. Functions assembled as noted in Section 2 2. Extra jobs equivalent to number of jobs in functional category for a county minus expected jobs based on the share of total US employment accounted for by this category

A county's functional specialization appears to have a relationship to economic outcomes. As shown in Table 7-1, just over 65 percent of distressed counties and 45 percent of at-risk counties had a functional specialization in agriculture & resource extraction. By contrast, no distressed or at-risk counties had functional specializations in finance, insurance & real estate, corporate management & administration, or knowledge-intensive business services.

Table 7-1: Functional Specializations with Most Extra jobs in Appalachia by County and Economic Status, 2012

Functional specialization	Appalachian counties by economic status					
	Distressed	At-Risk	Transitional	Competitive	Attainment	Total
Number of county equivalents	98	99	208	12	3	420
Agriculture & resource extraction	65.3	45.5	27.9	16.7	0.0	40.2
Capital-intensive manufacturing	23.5	40.4	35.1	8.3	33.3	32.9
Corporate management & administration	0.0	0.0	0.0	8.3	0.0	0.2
Distributive services	1.0	1.0	4.8	16.7	33.3	3.6
Engineering-intensive manufacturing	1.0	5.1	5.3	0.0	0.0	4.1
Finance, insurance & real estate	0.0	0.0	2.9	8.3	33.3	1.9
Government	2.0	3.0	4.8	8.3	0.0	3.8
Healthcare	3.1	3.0	8.2	8.3	0.0	5.7
Higher education	4.1	0.0	7.7	8.3	0.0	5.0
Knowledge-intensive business services	0.0	0.0	1.0	8.3	0.0	0.7
Media, entertainment & recreation	0.0	2.0	2.4	8.3	0.0	1.9

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012

Notes: 1. Functional specializations defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3

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By mapping the functional specializations of county commuting sheds across counties in Appalachian states, Figure 7-2 depicts a more regionalized picture of functional economic activity. While an individual county's functional specialization only accounts for employment within that county, the functional specialization of a county's commuting shed accounts for employment in all those counties identified as that county's major commuting partners. Neighboring counties are much more likely to share the same commuting shed functional specialization than they are to share the same functional specialization for employment within their own boundaries. For example, Penn State University and other colleges and universities in central Pennsylvania create an identifiable hub of higher education activity based on commuting sheds, while the apparent regional impacts of this activity were minimized when examining functional specializations on a county-by-county basis. Similarly, the prevalence of finance, insurance & real estate and knowledge-intensive business services specializations demonstrate the often far-flung impacts of cities, such as Atlanta, Birmingham, New York City, and Philadelphia on their surrounding regions.

Figure 7-2: Functional Specializations in Appalachia's Commuting Sheds, 2012
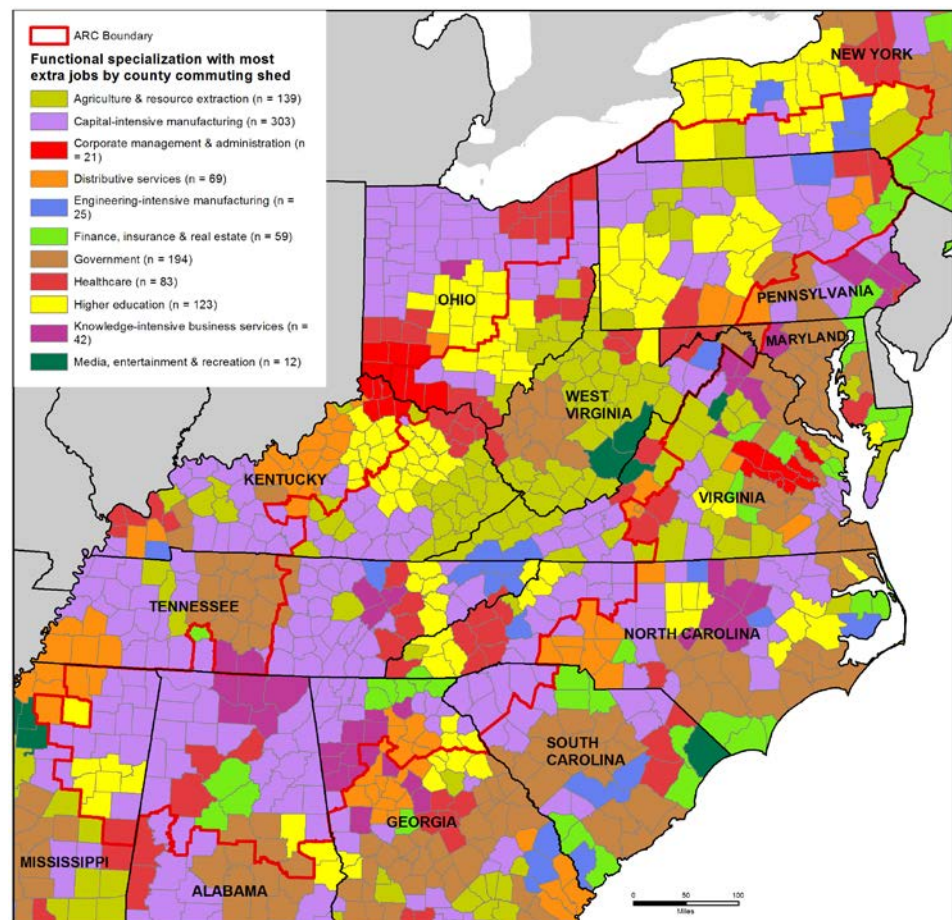
Functional Specializations in Appalachia's Commuting Sheds, 2012. Data Sources: 1. Estimated complete county employment by industry, EMSI, 2012 2. U.S. Census American Community Survey, 2006-2010 Note: Extra jobs equivalent to number of jobs in functional category for a commuting shed minus expected jobs based on the share of total US employment accounted for by this category

Further, the significant number of corporate management & administration specializations in southwestern Ohio and northern Kentucky also demonstrate the

impact of Cincinnati's industry mix on the region. The lack of manufacturing specializations in central Appalachia continues to be apparent when considering functional specializations from a commuting shed perspective. The regional importance of government and recreation-related employment does become more apparent when viewed from a commuting shed perspective, however. The commuting shed perspective on functional specializations also suggests that many counties in Appalachia rely on economic activities that occur outside the ARC regional boundaries. For example, New York City is part of the commuting shed for Monroe County in northeast Pennsylvania. The knowledge-intensive business services specializations emerging from Atlanta in northwestern Georgia seem to demonstrate a similar phenomenon of significant activity crossing the ARC boundary.

Table 7-2 presents a cross-tabulation of county commuting shed functional specializations by economic status. Distressed counties are most likely to be situated in a commuting shed with a functional specialization of capital-intensive manufacturing. An above average percentage of distressed counties have a commuting shed functional specialization in either agriculture & resource extraction or higher education. The knowledge-intensive business services and healthcare functions comprise an above average percentage of commuting shed specializations for competitive counties in Appalachia.

Table 7-2: Functional Specializations with Most Extra Jobs in Appalachia by County Commuting Shed and Economic Status, 2012

Commuting shed functional specialization	Appalachian counties by economic status					
	Distressed	At-Risk	Transitional	Competitive	Attainment	Total
Number of county equivalents	98	99	208	12	3	420
Agriculture & resource extraction	22.5	26.3	13.5	0.0	0.0	18.1
Capital-intensive manufacturing	40.8	38.4	35.1	8.3	0.0	36.2
Corporate management & administration	1.0	0.0	1.0	0.0	0.0	0.7
Distributive services	3.1	1.0	4.3	0.0	66.7	3.6
Engineering-intensive manufacturing	1.0	4.0	3.4	0.0	0.0	2.9
Finance, insurance & real estate	1.0	1.0	4.3	0.0	33.3	2.9
Government	5.1	6.1	5.3	16.7	0.0	5.7
Healthcare	6.1	6.1	12.0	16.7	0.0	9.3
Higher education	19.4	13.1	14.4	33.3	0.0	15.7
Knowledge-intensive business services	0.0	3.0	5.8	25.0	0.0	4.3
Media, entertainment & recreation	0.0	1.0	1.0	0.0	0.0	0.7

Data source: U.S. Census journey-to-work data, American Community Survey, 2006-2010; Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Functional specializations defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3
2. Commuting sheds defined per section 2-6

7-1B. KNOWLEDGE DIVERSITY AND KNOWLEDGE CLUSTER SPECIALIZATIONS

Thompson & Thompson (1987) argue that the quality and skills of a region's workforce can help to ensure the "adaptability and mobility of human resources, and thereby [provide] perhaps the only sure road to security and opportunity"—much as other scholars posit that economic diversity can bring about stability and growth for a region's economy (p. 560). The distribution of knowledge diversity across the economic status groupings of Appalachian counties reflects an increased tendency for Distressed and At-Risk counties to have either very high or very low levels of diversity (see Table 7-3). While these extremes of diversity are limited to a select few Appalachian counties, the tendency for relatively moderate values of knowledge diversity in counties with the highest economic status levels (i.e., in Competitive and Attainment counties) seems to indicate that positive economic performance depends on both not having employment overly concentrated in a few clusters of knowledge types and education levels and not having an overly balanced distribution across these knowledge clusters.

Table 7-3: Level of Knowledge Diversity in Appalachia by County and Economic Status, Controlled for County Character, 2012

Level of knowledge diversity by county	Economic Status					
	Distressed	At-Risk	Transitional	Competitive	Attainment	Total
Number of county equivalents	98	99	208	12	3	420
% Very high diversity	3.1	0.0	0.5	0.0	0.0	1.0
% High diversity	9.2	19.2	18.3	25.0	0.0	16.4
% Above average diversity	46.9	48.5	45.7	50.0	66.7	46.9
% Below average diversity	31.6	24.2	26.9	8.3	33.3	26.9
% Low diversity	9.2	7.1	8.2	16.7	0.0	8.3
% Very low diversity	0.0	1.0	0.5	0.0	0.0	0.5

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Entropy calculated across 12 knowledge clusters; see Feser (2003) for details on knowledge cluster derivation 2. Bureau of Labor Statistics' national Staffing Pattern Matrix used to estimate employment by knowledge cluster 3. Levels based on standard deviations from mean

Examining workforce specializations at the county level can shed further light on the relationship between knowledge diversity and economic performance. Based on a comparison with the share of employment made up by these occupations nationally, a full 70 percent of ARC counties have their largest knowledge cluster specialization in the *Skilled, semi-skilled labor & machine operation* cluster of occupations (see Table 7-4).[18] Distressed and At-Risk counties are about ten percent more likely to have this cluster as their largest specialization, with the general trend reflecting a tendency for counties with higher economic status to have larger portions of their employment in service occupations. In part this tendency serves as evidence of the presence of higher skill and higher wage jobs (e.g., *Medical science & health services*) in counties of strong economic performance.[19] Above average levels of service employment in these counties also reflect the demand for retail and personal services (e.g., *Semi-skilled service*) created by higher personal incomes.[20]

Table 7-4: Largest Knowledge Cluster Specializations by County and Economic Status, Controlled for County Character, 2012

Knowledge cluster specialization	Economic Status					
	Distressed	At-Risk	Transitional	Competitive	Attainment	Total
Number of county equivalents	98	99	208	12	3	420
Skilled, semi-skilled labor & machine operation	82.7	81.8	62.5	16.7	66.7	70.5
Medical science & health services	8.2	4.0	11.5	16.7	0.0	9.1
Construction & specialized mechanical	2.0	7.1	7.2	25.0	0.0	6.4
Semi-skilled service	0.0	2.0	9.6	25.0	33.3	6.2
Education, counseling & therapy	0.0	3.0	5.8	0.0	0.0	3.6

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. See Feser (2003) for details on knowledge cluster derivation 2. Bureau of Labor Statistics' national Staffing Pattern Matrix used to estimate employment by knowledge cluster with specializations defined as detailed in *Statistical Portrait of Economic Diversity in Appalachia* section 2-5

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[18] Common professions in this cluster include janitors, laborers, landscapers and groundskeepers, farmworkers, and welders. On average, these jobs require less than 1 year of post-secondary education—ranking 11th among the 12 knowledge clusters.

[19] Common professions in this cluster include nurses, nursing aides, physicians, dental assistants, and pharmacists. On average, these jobs require just over 2.5 years of post-secondary education—the 5th highest average among the 12 knowledge clusters.

[20] Common professions in this cluster include retail salespersons, customer service representatives, waiters and waitresses, stock clerks, child care workers, and food preparation workers. On average, these jobs require less than 1 year of post-secondary education—ranking 9th among the 12 knowledge clusters.

7-2. ECONOMIC DIVERSITY IN COUNTIES AND COMMUTING SHEDS

For economic development purposes, practitioners may need to exploit opportunities or address threats related to industry sectors, workforce knowledge, or functional economic roles that span formal, jurisdictional boundaries. From the perspective of individual firms, understanding the region's competencies in terms of industries, knowledge, and functional relationships can assist the effort to make informed location and expansion decisions. This section individually reviews the connections among county-level industry- and functional diversity, the commuting shed counterparts of these diversity measures, and the association between these measures and economic outcomes.

7-2A. INDUSTRIAL DIVERSITY

Across U.S. counties, there is a moderate, positive correlation between industrial diversity for counties and the same measure for county commuting sheds.[21] Figure 7-3 displays the distribution of county and commuting shed industrial diversity across Appalachia. The majority of counties have about average industrial diversity levels for both the county and commuting shed. Table 7-5 lists the commuting characteristics for each of the seven cross-tabulated categories of county and commuting shed diversity. On average, counties that have high industrial diversity and about average values for their commuting shed have the largest net commuting flows. Counties with about average industrial diversity values and high values for their commuting shed have the smallest net commuting flows, followed closely by counties that have a high diversity value along with their commuting shed. These findings suggest that more diverse economies attract workers from surrounding counties, while individuals in less diverse counties rely upon accessing jobs and exploiting business opportunities available in more diverse counties.

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[21] r = 0.54 at p < 0.001

Figure 7-3: Level of Industrial Diversity for Counties and their Commuting Sheds in the Appalachian Region, 2010
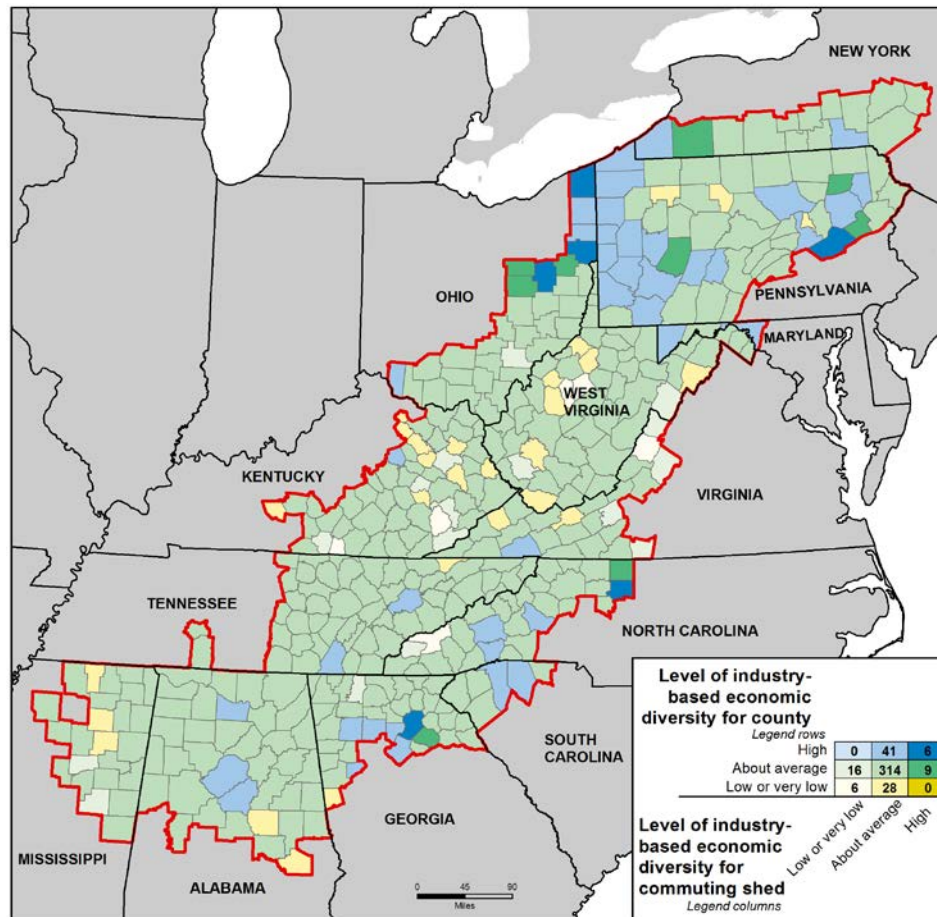
Level of Industry-based Economic Diversity for Counties and their Commuting Sheds in the Appalachian Region, 2012.
Data Sources: 1. Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012 Notes: 1. Entropy calculated at 6-digit NAICS aggregation 2. Classifications based on standard deviations from mean (about average <1 Z from mean)

Table 7-5: County Commuting Flow Statistics by Level of County and Commuting Shed Diversity, 2006-2010

Level of industrial diversity for county and commuting shed	Number of county equivalents	Net commuting flow statistics		
		Minimum	Average	Maximum
Both high	6	-13,163	-2,043	24,819
High / About average	41	-42,031	547	96,208
About average / High	9	-11,992	-4,412	1,547
Both about average	314	-38,183	-1,762	34,053
About average / Low or Very Low	16	-4,679	154	5,509
Low or Very Low / About Average	28	-2,736	-613	5,081
Both Low or Very Low	6	-928	45	1,291

Data source: U.S. Census journey-to-work data, American Community Survey, 2006-2010; Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Entropy calculated at 6-digit NAICS aggregations 2. Commuting sheds defined in *Statistical Portrait of Economic Diversity in Appalachia* section 2-6 3. Levels based on standard deviations from mean

Table 7-6 cross-tabulates the levels of county and commuting shed diversity across the five economic status levels in Appalachia. Distressed and at-risk counties are more likely than average to have a low level of industrial diversity for the county and about average level of diversity for the commuting shed. By contrast, competitive and attainment counties are more likely than average to have a high level of county diversity and about average level of commuting shed diversity. In combination with the commuting characteristics shown in Table 7-5, these findings suggest that high diversity counties tend to serve as centers that attract commuters from less economically diverse surrounding areas. On average, these economic centers tend to enjoy higher levels of economic status than do the less diverse surrounding counties.

Table 7-6: Level of Industrial Diversity in Appalachia by County and Commuting Shed and Economic Status, 2012

Level of industrial diversity by county and commuting shed	Appalachian counties by economic status					
	Distressed	At-Risk	Transitional	Competitive	Attainment	Total
Number of county equivalents	98	99	208	12	3	420
% Both high	0.0	2.0	1.9	0.0	0.0	1.4
% High / About average	0.0	1.0	15.9	41.7	66.7	9.8
% About average / High	0.0	1.0	3.9	0.0	0.0	2.1
% Both about average	73.5	81.8	74.5	41.7	33.3	74.8
% About average / Low or very low	9.2	3.0	1.9	0.0	0.0	3.8
% Low or very low / About average	14.3	9.1	1.9	8.3	0.0	6.7
% Both low or very low	3.1	2.0	0.0	8.3	0.0	1.4

Data source: U.S. Census journey-to-work data, American Community Survey, 2006-2010; Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012

Notes: 1. Entropy calculated at 6-digit NAICS aggregations 2. Commuting sheds defined in *Statistical Portrait of Economic Diversity in Appalachia* section 2-6 3. Levels based on standard deviations from mean

7-2B. FUNCTIONAL DIVERSITY

Distressed and at-risk counties in Appalachia have higher than average percentage of counties with below average, low, or very low functional diversity values. As listed in Table 7-7, those counties with a transitional status are most likely to have a high or above average functional diversity value. While most of the twelve competitive counties have an above average or high functional diversity value, there are four competitive counties that have a below average or low diversity value. Two of the attainment counties have a below average value for functional diversity, with the third county having an above average value. The lack of a clear, consistent pattern in these data further suggests functional diversity can have multiple impacts. For example, high functional diversity may indicate the presence of several competitive specializations, though it may also indicate about equal employment across several functions with none of these functions able to attain competitive stature. Further, low functional diversity may indicate the presence of a large, competitive specialization or dependence on a large, potentially volatile specialization.

Table 7-7: Level of Functional Diversity in Appalachia by County and Economic Status, 2012

Level of functional diversity by county and commuting shed	Appalachian counties by economic status					
	Distressed	At-Risk	Transitional	Competitive	Attainment	Total
Number of county equivalents	98	99	208	12	3	420
% Both high	0.0	1.0	1.4	0.0	0.0	1.0
% High / About average	5.1	13.1	20.2	8.3	0.0	14.5
% About average / High	0.0	2.0	1.9	0.0	0.0	1.4
% Both about average	78.6	68.7	72.6	83.3	100.0	73.6
% About average / Low or very low	5.1	6.1	1.9	0.0	0.0	3.6
% Low or very low / High	0.0	1.0	0.0	0.0	0.0	0.2
% Low or very low / About average	10.2	6.1	1.9	8.3	0.0	5.0
% Both low or very low	1.0	2.0	0.0	0.0	0.0	0.7

Data source: U.S. Census journey-to-work data, American Community Survey, 2006-2010; Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012

Notes: Entropy calculated across eleven functional categories defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3 3. Commuting sheds defined in *Statistical Portrait of Economic Diversity in Appalachia* section 2-6 4. Levels based on standard deviations from mean

Figure 7-4 depicts the combinations of functional diversity for counties and commuting sheds across Appalachia. 309 of the 420 Appalachian counties have county and commuting shed values for functional diversity that are about average, though there are instances of significant variation between county and commuting shed values. For instance, there are 103 counties that have one about average value and a more extreme (i.e., high or low) value for functional diversity at either the county or commuting shed scale.

Figure 7-4: Level of Functional Diversity for Counties and their Commuting Sheds in Appalachia, 2012
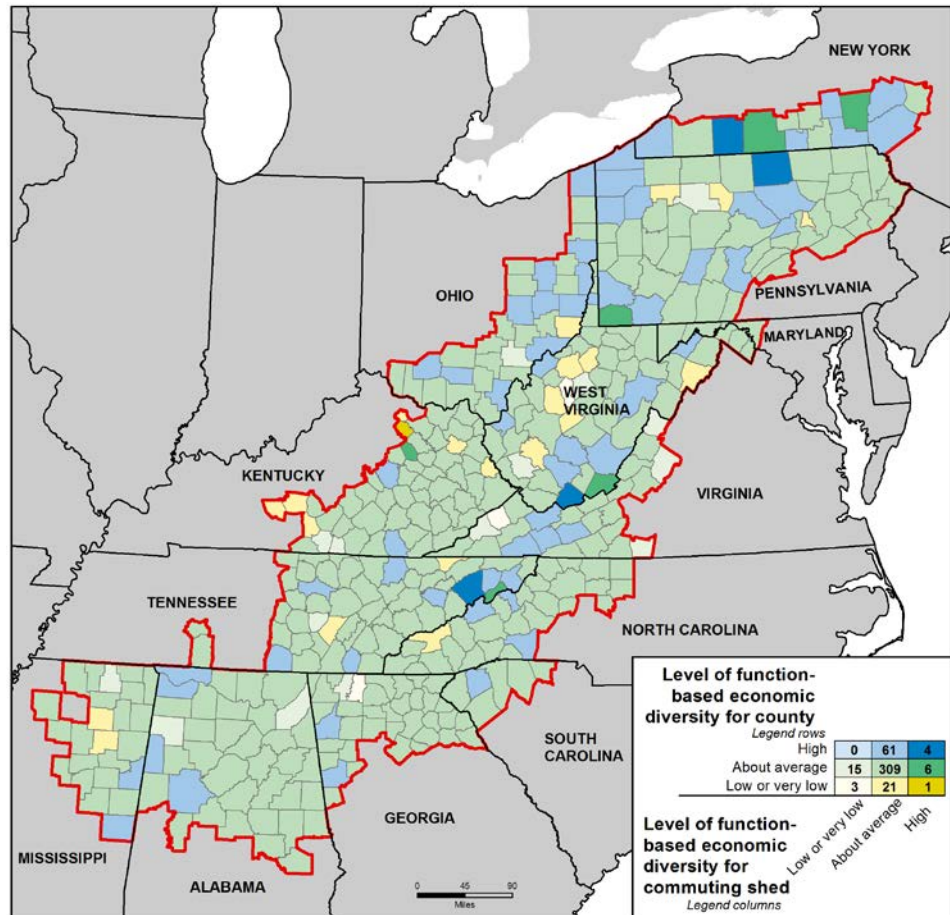
Level of Function-based Economic Diversity for Counties and their Commuting Sheds in Appalachia, 2012.
Data Sources: 1. Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012 Notes: 1. Entropy calculated across 11 economic functions 2. Classifications based on standard deviations from mean (about average <1 Z from mean)

7-3. REGIONAL LINKAGES AND FUNCTIONAL ECONOMIC ROLES

Commuting characteristics and the functional specializations of a county and its commuting shed can be used to define a county's economic role in its region. This section reports the results of an analysis of county and regional specializations and commuting patterns conducted according to the methods detailed in section 2-7. These results can be used to understand counties' roles within their regional and national economy in ways that an examination of individual county or commuting shed

characteristics cannot—providing an additional lens for considering the economic opportunities and threats that face a county.

7-3A. DEFINING COUNTY ROLES IN THE REGIONAL ECONOMIC HIERARCHY

Table 7-8 lists the derived functional types of counties along with the number of counties, the average largest functional specializations of counties and commuting sheds, average commuting characteristics, and the county with the largest factor loading in each category.

Table 7-8: Summary of Functional Specialization and Commuting Characteristics by County Functional Economic Types

County types analyzed Functional types	# of U.S. counties	County functional specialization with highest # of average extra jobs	Commuting shed functional specialization with highest # of average extra jobs	Average net commuting flow as % of resident workers	County most representative of functional type
Rural or Mixed Rural counties					
Agriculture & resource extraction centers	568	Agriculture & resource extraction	Agriculture & resource extraction	3.5	Loving, TX
Bedroom communities to corporate & distributive services centers	108	Agriculture & resource extraction	Distributive services	-29.3	Chambers, TX
Bedroom communities to midsize centers	368	Capital-intensive manufacturing	Capital-intensive manufacturing	-28.5	Monroe, MI
Corporate & distribution outposts	381	Agriculture & resource extraction	Distributive services	-13.8	Benton, AR
Rural destinations & advanced services districts	375	Finance, insurance and real estate	Finance, insurance and real estate	-19.0	Washoe, NV
Rural government districts	283	Government	Government	-22.4	Sangamon, IL
Rural manufacturing centers	289	Capital-intensive manufacturing	Capital-intensive manufacturing	-5.7	Tazewell, IL
Rural medical centers	228	Healthcare	Media, entertainment & recreation	4.0	Hinds, MS
Town and gown communities	159	Higher education	Higher education	-4.1	Centre, PA
Urban or Mixed Urban counties					
Advanced manufacturing districts	48	Engineering-intensive manufacturing	Knowledge-intensive business services	-9.7	Santa Clara, CA
Corporate and financial centers	39	Finance, insurance and real estate	Finance, insurance and real estate	27.1	New York, NY
Government centers and suburbs	68	Government	Government	4.9	Washington, D.C.
Higher education and medical complexes	70	Higher education	Healthcare	5.7	Suffolk, MA
Media and entertainment centers	45	Media, entertainment & recreation	Media, entertainment & recreation	-17.7	Los Angeles, CA
Satellite cities and suburbs	38	Finance, insurance and real estate	Finance, insurance and real estate	-20.1	Putnam, NY
Transportation and distributive services centers	46	Distributive services	Distributive services	3.6	Cook, IL

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012; U.S. Census journey-to-work data, American Community Survey, 2006-2010
Notes: 1. Derived as detailed in *Statistical Portrait of Economic Diversity in Appalachia* section 2-7

The average net commuting flow characteristics indicate that the vast majority of counties do not function as the economic center of their regions—in other words, most counties lose more workers via out-commuting than they gain through in-commuting. Rural or mixed rural counties in the bedroom community categories tend to be the most dependent on economic opportunities outside their borders, with urban or mixed urban satellite cities and suburbs similarly dependent on activity outside their borders. The nature of dependency varies considerably across these types. For example, bedroom communities to corporate & distributive services centers tend to be dependent on large and sometimes distant urban centers, while bedroom communities to midsize centers tend to be dependent on smaller, relatively proximate centers with specializations in activities such as healthcare, higher education, and manufacturing. Satellite cities are usually large, urban or suburban communities in their own right with tight economic linkages to some of the largest urban centers in the United States.

The most common functional types among rural or mixed rural counties include rural destinations and advanced services districts, agriculture & resource extraction centers, rural manufacturing centers, and rural government districts. While agricultural and resource extraction tends to be common in rural areas, there are also many rural destinations and advanced services districts. As a group, this category includes many counties that rely on their historical role as an outdoor recreation or general entertainment destination. Members of this grouping contain casino destinations such as Reno, Nevada and Tunica, Mississippi, Lake Tahoe, numerous ski and golf resorts, communities surrounding Branson, Missouri and Nashville, Tennessee, and a wide variety of state and national parks and outdoor activities. Agriculture and resource extraction centers encompass a wide variety of counties focused on activities related to farming, forestry, and mining. Rural manufacturing centers and rural medical centers are among the most likely types of rural and mixed rural counties to be the central players in their regions from a commuting standpoint. Corporate & distribution outposts recognize the instances when firms locate significant headquarters or trade-related activities in rural areas—with Bentonville, Arkansas, the headquarters city of WalMart, representing the extreme example of this case. Finally, town and gown communities house major universities including Penn State, the University of Illinois, and Clemson University and tend to be the centers of significant economic activity in their regions.

Media and entertainment centers include many of the nation's largest centers of entertainment, such as Los Angeles and Las Vegas. Corporate and financial centers include New York City and San Francisco. Many of the urban and suburban counties surrounding these major centers are grouped together as satellite cities and suburbs. While many of the government centers and suburbs are situated around Washington, D.C., communities around state capitals and military installations also find membership in this group. Higher education and medical complexes include U.S. cities with major healthcare or higher education sectors, such as Boston, Philadelphia, Baltimore, Ann Arbor, St. Louis, Pittsburgh, and Cincinnati. Distributive services centers include urban areas with significant employment related to transportation, trade, and utilities, such as Houston, Chicago, Atlanta, and Tulsa. Finally, advanced manufacturing districts include some of the nation's most recognizable high-tech manufacturing regions, such as

Greater Seattle's aviation industry, Silicon Valley's computer hardware and software industries, and suburban Boston's biotech industries.

7-3B. FUNCTIONAL ECONOMIC ROLES AND ECONOMIC OUTCOMES IN APPALACHIA

The distribution of the functional roles of Appalachian counties reflects many of the patterns visible from examining the distribution of functional specializations in Appalachia (see Figure 7-1). For example, there are relatively fewer counties with manufacturing-related roles in central Appalachia than there are in the northern and southern parts of the region. Compared to depictions of county functional specializations, the functional county roles shown in Figures 7-5 and 7-6 more neatly reveal the relationships among counties than a look at individual county functional specializations can. The bedroom community categories present the clearest case of counties that are particularly dependent on nearby centers for their economic livelihoods. Functional roles can also suggest economic peers for communities to benchmark their economic development activities against. For example, Allegheny County, PA (which includes the city of Pittsburgh) might track its progress and gain insights from examining the activities in other counties included in the higher education and medical complex grouping.

Figure 7-5: Functional Roles in Appalachia's Rural & Mixed Rural Counties, 2012

Functional Economic Roles in Rural and Mixed Rural Counties in Appalachia, 2012.

Data source: Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012 Note: Derived as detailed in section 2-7. *Statistical Portrait of Economic Diversity in Appalachia*

☐ ARC Boundary

Functional economic roles in Rural and Mixed Rural counties

- Agriculture & resource extraction centers (n = 46)
- Bedroom communities to corporate & distributive services centers (n = 5)
- Bedroom communities to midsize centers (n = 94)
- Corporate & distribution outposts (n = 42)
- Rural destinations & advanced services districts (n = 34)
- Rural government districts (n = 38)
- Rural manufacturing centers (n = 64)
- Rural medical centers (n = 30)
- Town and gown communities (n = 33)

Figure 7-6: Functional Roles in Appalachia's Urban & Mixed Urban Counties, 2012

Functional Economic Roles in Urban and Mixed Urban Counties in Appalachian States, 2012.

Data source: Estimated complete county employment by industry, Economic Modeling Specialists International (EMSI), 2012 Note: Derived as detailed in section 2-7, *Statistical Portrait of Economic Diversity in Appalachia*

☐ ARC Boundary

Functional economic roles in Urban and Mixed Urban counties

- Advanced manufacturing districts (n = 13)
- Corporate and financial centers (n = 14)
- Government centers and suburbs (n = 41)
- Higher education and medical complexes (n = 32)
- Media and entertainment centers (n = 17)
- Satellite cities and suburbs (n = 14)
- Transportation and distributive services centers (n = 24)

Table 7-9 cross-tabulates functional county types in Appalachia against the five economic status groupings. The numerous economic outcomes resulting from each functional type suggests that this classification system does not capture important variables for economic performance. For example, the simple assignment of counties to one functional type belies the fact that counties can play multiple functional roles to different degrees. Both the multiplicity of roles and the degree to which counties play these roles may be important variables for understanding potential economic performance and identifying peer counties and regions.

Table 7-9: Functional Economic Roles in Appalachian Counties by Economic Status, 2012

| County functional economic role, 2012 | Appalachian counties by economic status | | | | | |
	Distressed	At-Risk	Transitional	Competitive	Attainment	Total
Number of county equivalents	98	99	208	12	3	420
Rural or Mixed Rural counties						
Agriculture & resource extraction centers	11.2	18.2	8.2	0.0	0.0	11.0
Bedroom communities to corporate & distributive services centers	27.6	25.3	20.2	0.0	0.0	22.4
Bedroom communities to midsize centers	3.1	2.0	0.0	0.0	0.0	1.2
Corporate & distribution outposts	24.5	6.1	3.9	25.0	33.3	10.0
Rural destinations & advanced services districts	9.2	7.1	7.2	16.7	33.3	8.1
Rural government districts	7.1	11.1	9.1	8.3	0.0	9.1
Rural manufacturing centers	10.2	19.2	16.8	0.0	0.0	15.2
Rural medical centers	2.0	8.1	9.6	0.0	0.0	7.1
Town and gown communities	5.1	2.0	11.5	16.7	0.0	7.9
Urban or Mixed Urban counties						
Advanced manufacturing districts	0.0	0.0	1.4	0.0	0.0	0.7
Corporate and financial centers	0.0	0.0	0.5	0.0	0.0	0.2
Government centers and suburbs	0.0	0.0	1.9	8.3	0.0	1.2
Higher education and medical complexes	0.0	0.0	3.9	16.7	0.0	2.4
Media and entertainment centers	0.0	0.0	1.9	0.0	0.0	1.0
Satellite cities and suburbs	0.0	0.0	1.0	8.3	0.0	0.7
Transportation and distributive services centers	0.0	1.0	2.9	0.0	33.3	1.9

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012
Notes: 1. Derived as detailed in *Statistical Portrait of Economic Diversity in Appalachia* section 2-7

7-4. LESSONS FOR PRACTICE

7-4A. CONSIDERING FUNCTIONAL ROLES AND THE SCOPE OF ECONOMIC DEVELOPMENT ACTION

The range of possible economic development actions is large enough that taking options off the table can be a valuable first step for practitioners. Considering functional roles can help to focus efforts by clarifying the feasibility of short- and long-term economic development goals and suggesting peer regions that may offer lessons for the region in question. As a check on the feasibility of goals, a region's functional roles can be considered more permanent than its industry composition. For example, short-term efforts are unlikely to reverse the flow of commuters within a region or make a county a significant tourist destination overnight, but these might make for appropriate—if aspirational—long-term goals that suggest a strategic collection of actions in the short- and long-term. Identifying peer regions with similar functional roles can help to benchmark development efforts and suggest beneficial economic development actions. Practitioners might also identify the aspirational function of their region and examine the development history of regions with similar functions to assess potential strategies for progressing toward the region's aspirations.

7-4B. PURSUING REGIONAL PARTNERSHIPS

For most communities, there is at least some value to be found in the pursuit of regional partnerships for economic development. The examination of functional county roles can help to clarify the necessity and potential content of these arrangements. In order to compensate for local gaps in factors such as workforce skills or infrastructure, individual communities might seek to highlight their ties to other communities in their region that play different functional roles. In the same vein, business recruitment or cluster strategies may be more successful if they highlight the region's resources, not just those of individual communities. For example, a bedroom community with close economic ties to a regional work center may find it in their interest to cooperate with the work center and other surrounding counties in funding transit improvements. As part of regional branding efforts, individual communities and the region as a whole may benefit by highlighting the functional distinctions among the component jurisdictions of the region. For example, a campaign that highlights the vibrant urban centers, peaceful bedroom communities, and outdoor recreation opportunities in a region might be attractive to a diverse workforce and, thus, attractive to employers seeking to provide employees with a high quality of life.

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9. DETAILED DOCUMENTATION

Table 9-1: NAICS 6-digit Industries by Functional Industry Categories

Functional industry category

NAICS code and title

Agriculture and resource extraction

111000 Crop production	212221 Gold Ore Mining
112000 Animal production	212222 Silver Ore Mining
113110 Timber Tract Operations	212231 Lead Ore and Zinc Ore Mining
113210 Forest Nurseries and Gathering of Forest Products	212234 Copper Ore and Nickel Ore Mining
113310 Logging	212291 Uranium-Radium-Vanadium Ore Mining
114111 Finfish Fishing	212299 All Other Metal Ore Mining
114112 Shellfish Fishing	212311 Dimension Stone Mining and Quarrying
114119 Other Marine Fishing	212312 Crushed and Broken Limestone Mining and Quarrying
114210 Hunting and Trapping	212313 Crushed and Broken Granite Mining and Quarrying
115111 Cotton Ginning	212319 Other Crushed and Broken Stone Mining and Quarrying
115112 Soil Preparation, Planting, and Cultivating	212321 Construction Sand and Gravel Mining
115113 Crop Harvesting, Primarily by Machine	212322 Industrial Sand Mining
115114 Postharvest Crop Activities (except Cotton Ginning)	212324 Kaolin and Ball Clay Mining
115115 Farm Labor Contractors and Crew Leaders	212325 Clay and Ceramic and Refractory Minerals Mining
115116 Farm Management Services	212391 Potash, Soda, and Borate Mineral Mining
115210 Support Activities for Animal Production	212392 Phosphate Rock Mining
115310 Support Activities for Forestry	212393 Other Chemical and Fertilizer Mineral Mining
211111 Crude Petroleum and Natural Gas Extraction	212399 All Other Nonmetallic Mineral Mining
211112 Natural Gas Liquid Extraction	213111 Drilling Oil and Gas Wells
212111 Bituminous Coal and Lignite Surface Mining	213112 Support Activities for Oil and Gas Operations
212112 Bituminous Coal Underground Mining	213113 Support Activities for Coal Mining
212113 Anthracite Mining	213114 Support Activities for Metal Mining
212210 Iron Ore Mining	213115 Support Activities for Nonmetallic Minerals (except Fuels) Mining

Capital-intensive manufacturing

311111 Dog and Cat Food Manufacturing	326113 Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing
311119 Other Animal Food Manufacturing	326121 Unlaminated Plastics Profile Shape Manufacturing
311211 Flour Milling	326122 Plastics Pipe and Pipe Fitting Manufacturing
311212 Rice Milling	326130 Laminated Plastics Plate, Sheet (except Packaging), and Shape Manufacturing
311213 Malt Manufacturing	326140 Polystyrene Foam Product Manufacturing
311221 Wet Corn Milling	326150 Urethane and Other Foam Product (except Polystyrene) Manufacturing
311222 Soybean Processing	326160 Plastics Bottle Manufacturing
311223 Other Oilseed Processing	326191 Plastics Plumbing Fixture Manufacturing
311225 Fats and Oils Refining and Blending	326192 Resilient Floor Covering Manufacturing
311230 Breakfast Cereal Manufacturing	326199 All Other Plastics Product Manufacturing
311311 Sugarcane Mills	326211 Tire Manufacturing (except Retreading)
311312 Cane Sugar Refining	326212 Tire Retreading
311313 Beet Sugar Manufacturing	326220 Rubber and Plastics Hoses and Belting Manufacturing
311320 Chocolate and Confectionery Manufacturing from Cacao Beans	326291 Rubber Product Manufacturing for Mechanical Use
311330 Confectionery Manufacturing from Purchased Chocolate	326299 All Other Rubber Product Manufacturing
311340 Nonchocolate Confectionery Manufacturing	327111 Vitreous China Plumbing Fixture and China and Earthenware Bathroom Accessories Manufacturing

Functional industry category

NAICS code and title

311411 Frozen Fruit, Juice, and Vegetable Manufacturing	327112 Vitreous China, Fine Earthenware, and Other Pottery Product Manufacturing
311412 Frozen Specialty Food Manufacturing	327113 Porcelain Electrical Supply Manufacturing
311421 Fruit and Vegetable Canning	327121 Brick and Structural Clay Tile Manufacturing
311422 Specialty Canning	327122 Ceramic Wall and Floor Tile Manufacturing
311423 Dried and Dehydrated Food Manufacturing	327123 Other Structural Clay Product Manufacturing
311511 Fluid Milk Manufacturing	327124 Clay Refractory Manufacturing
311512 Creamery Butter Manufacturing	327125 Nonclay Refractory Manufacturing
311513 Cheese Manufacturing	327211 Flat Glass Manufacturing
311514 Dry, Condensed, and Evaporated Dairy Product Manufacturing	327212 Other Pressed and Blown Glass and Glassware Manufacturing
311520 Ice Cream and Frozen Dessert Manufacturing	327213 Glass Container Manufacturing
311611 Animal (except Poultry) Slaughtering	327215 Glass Product Manufacturing Made of Purchased Glass
311612 Meat Processed from Carcasses	327310 Cement Manufacturing
311613 Rendering and Meat Byproduct Processing	327320 Ready-Mix Concrete Manufacturing
311615 Poultry Processing	327331 Concrete Block and Brick Manufacturing
311711 Seafood Canning	327332 Concrete Pipe Manufacturing
311712 Fresh and Frozen Seafood Processing	327390 Other Concrete Product Manufacturing
311811 Retail Bakeries	327410 Lime Manufacturing
311812 Commercial Bakeries	327420 Gypsum Product Manufacturing
311813 Frozen Cakes, Pies, and Other Pastries Manufacturing	327910 Abrasive Product Manufacturing
311821 Cookie and Cracker Manufacturing	327991 Cut Stone and Stone Product Manufacturing
311822 Flour Mixes and Dough Manufacturing from Purchased Flour	327992 Ground or Treated Mineral and Earth Manufacturing
311823 Dry Pasta Manufacturing	327993 Mineral Wool Manufacturing
311830 Tortilla Manufacturing	327999 All Other Miscellaneous Nonmetallic Mineral Product Manufacturing
311911 Roasted Nuts and Peanut Butter Manufacturing	331111 Iron and Steel Mills
311919 Other Snack Food Manufacturing	331112 Electrometallurgical Ferroalloy Product Manufacturing
311920 Coffee and Tea Manufacturing	331210 Iron and Steel Pipe and Tube Manufacturing from Purchased Steel
311930 Flavoring Syrup and Concentrate Manufacturing	331221 Rolled Steel Shape Manufacturing
311941 Mayonnaise, Dressing, and Other Prepared Sauce Manufacturing	331222 Steel Wire Drawing
311942 Spice and Extract Manufacturing	331312 Primary Aluminum Production
311991 Perishable Prepared Food Manufacturing	331314 Secondary Smelting and Alloying of Aluminum
311999 All Other Miscellaneous Food Manufacturing	331315 Aluminum Sheet, Plate, and Foil Manufacturing
312111 Soft Drink Manufacturing	331316 Aluminum Extruded Product Manufacturing
312112 Bottled Water Manufacturing	331319 Other Aluminum Rolling and Drawing
312113 Ice Manufacturing	331411 Primary Smelting and Refining of Copper
312120 Breweries	331419 Primary Smelting and Refining of Nonferrous Metal (except Copper and Aluminum)
312130 Wineries	331421 Copper Rolling, Drawing, and Extruding
312140 Distilleries	331422 Copper Wire (except Mechanical) Drawing
312210 Tobacco Stemming and Redrying	331423 Secondary Smelting, Refining, and Alloying of Copper
312221 Cigarette Manufacturing	331491 Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding
312229 Other Tobacco Product Manufacturing	331492 Secondary Smelting, Refining, and Alloying of Nonferrous Metal (except Copper and Aluminum)
313111 Yarn Spinning Mills	331511 Iron Foundries
313112 Yarn Texturizing, Throwing, and Twisting Mills	331512 Steel Investment Foundries
313113 Thread Mills	331513 Steel Foundries (except Investment)
313210 Broadwoven Fabric Mills	331521 Aluminum Die-Casting Foundries

Functional industry category

NAICS code and title

313221 Narrow Fabric Mills	331522 Nonferrous (except Aluminum) Die-Casting Foundries
313222 Schiffli Machine Embroidery	331524 Aluminum Foundries (except Die-Casting)
313230 Nonwoven Fabric Mills	331525 Copper Foundries (except Die-Casting)
313241 Weft Knit Fabric Mills	331528 Other Nonferrous Foundries (except Die-Casting)
313249 Other Knit Fabric and Lace Mills	332111 Iron and Steel Forging
313311 Broadwoven Fabric Finishing Mills	332112 Nonferrous Forging
313312 Textile and Fabric Finishing (except Broadwoven Fabric) Mills	332114 Custom Roll Forming
313320 Fabric Coating Mills	332115 Crown and Closure Manufacturing
314110 Carpet and Rug Mills	332116 Metal Stamping
314121 Curtain and Drapery Mills	332117 Powder Metallurgy Part Manufacturing
314129 Other Household Textile Product Mills	332211 Cutlery and Flatware (except Precious) Manufacturing
314911 Textile Bag Mills	332213 Saw Blade and Handsaw Manufacturing
314912 Canvas and Related Product Mills	332214 Kitchen Utensil, Pot, and Pan Manufacturing
314991 Rope, Cordage, and Twine Mills	332311 Prefabricated Metal Building and Component Manufacturing
314992 Tire Cord and Tire Fabric Mills	332312 Fabricated Structural Metal Manufacturing
314999 All Other Miscellaneous Textile Product Mills	332313 Plate Work Manufacturing
315111 Sheer Hosiery Mills	332321 Metal Window and Door Manufacturing
315119 Other Hosiery and Sock Mills	332322 Sheet Metal Work Manufacturing
315191 Outerwear Knitting Mills	332323 Ornamental and Architectural Metal Work Manufacturing
315192 Underwear and Nightwear Knitting Mills	332410 Power Boiler and Heat Exchanger Manufacturing
315211 Men's and Boys' Cut and Sew Apparel Contractors	332420 Metal Tank (Heavy Gauge) Manufacturing
315212 Women's, Girls', and Infants' Cut and Sew Apparel Contractors	332431 Metal Can Manufacturing
315221 Men's and Boys' Cut and Sew Underwear and Nightwear Manufacturing	332439 Other Metal Container Manufacturing
315222 Men's and Boys' Cut and Sew Suit, Coat, and Overcoat Manufacturing	332510 Hardware Manufacturing
315223 Men's and Boys' Cut and Sew Shirt (except Work Shirt) Manufacturing	332611 Spring (Heavy Gauge) Manufacturing
315224 Men's and Boys' Cut and Sew Trouser, Slack, and Jean Manufacturing	332612 Spring (Light Gauge) Manufacturing
315225 Men's and Boys' Cut and Sew Work Clothing Manufacturing	332618 Other Fabricated Wire Product Manufacturing
315228 Men's and Boys' Cut and Sew Other Outerwear Manufacturing	332710 Machine Shops
315231 Women's and Girls' Cut and Sew Lingerie, Loungewear, and Nightwear Manufacturing	332721 Precision Turned Product Manufacturing
315232 Women's and Girls' Cut and Sew Blouse and Shirt Manufacturing	332722 Bolt, Nut, Screw, Rivet, and Washer Manufacturing
315233 Women's and Girls' Cut and Sew Dress Manufacturing	332811 Metal Heat Treating
315234 Women's and Girls' Cut and Sew Suit, Coat, Tailored Jacket, and Skirt Manufacturing	332812 Metal Coating, Engraving (except Jewelry and Silverware), and Allied Services to Manufacturers
315239 Women's and Girls' Cut and Sew Other Outerwear Manufacturing	332813 Electroplating, Plating, Polishing, Anodizing, and Coloring
315291 Infants' Cut and Sew Apparel Manufacturing	332911 Industrial Valve Manufacturing
315292 Fur and Leather Apparel Manufacturing	332912 Fluid Power Valve and Hose Fitting Manufacturing
315299 All Other Cut and Sew Apparel Manufacturing	332913 Plumbing Fixture Fitting and Trim Manufacturing
315991 Hat, Cap, and Millinery Manufacturing	332919 Other Metal Valve and Pipe Fitting Manufacturing
315992 Glove and Mitten Manufacturing	332996 Fabricated Pipe and Pipe Fitting Manufacturing

Functional industry category

NAICS code and title

315993 Men's and Boys' Neckwear Manufacturing	332998 Enameled Iron and Metal Sanitary Ware Manufacturing
315999 Other Apparel Accessories and Other Apparel Manufacturing	332999 All Other Miscellaneous Fabricated Metal Product Manufacturing
316110 Leather and Hide Tanning and Finishing	333298 All Other Industrial Machinery Manufacturing
316211 Rubber and Plastics Footwear Manufacturing	333414 Heating Equipment (except Warm Air Furnaces) Manufacturing
316212 House Slipper Manufacturing	333415 Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment Manufacturing
316213 Men's Footwear (except Athletic) Manufacturing	335211 Electric Housewares and Household Fan Manufacturing
316214 Women's Footwear (except Athletic) Manufacturing	335212 Household Vacuum Cleaner Manufacturing
316219 Other Footwear Manufacturing	335221 Household Cooking Appliance Manufacturing
316991 Luggage Manufacturing	335222 Household Refrigerator and Home Freezer Manufacturing
316992 Women's Handbag and Purse Manufacturing	335224 Household Laundry Equipment Manufacturing
316993 Personal Leather Good (except Women's Handbag and Purse) Manufacturing	335228 Other Major Household Appliance Manufacturing
316999 All Other Leather Good and Allied Product Manufacturing	335921 Fiber Optic Cable Manufacturing
321113 Sawmills	335929 Other Communication and Energy Wire Manufacturing
321114 Wood Preservation	336111 Automobile Manufacturing
321211 Hardwood Veneer and Plywood Manufacturing	336112 Light Truck and Utility Vehicle Manufacturing
321212 Softwood Veneer and Plywood Manufacturing	336120 Heavy Duty Truck Manufacturing
321213 Engineered Wood Member (except Truss) Manufacturing	336211 Motor Vehicle Body Manufacturing
321214 Truss Manufacturing	336212 Truck Trailer Manufacturing
321219 Reconstituted Wood Product Manufacturing	336213 Motor Home Manufacturing
321911 Wood Window and Door Manufacturing	336214 Travel Trailer and Camper Manufacturing
321912 Cut Stock, Resawing Lumber, and Planing	336312 Gasoline Engine and Engine Parts Manufacturing
321918 Other Millwork (including Flooring)	336322 Other Motor Vehicle Electrical and Electronic Equipment Manufacturing
321920 Wood Container and Pallet Manufacturing	336330 Motor Vehicle Steering and Suspension Components (except Spring) Manufacturing
321991 Manufactured Home (Mobile Home) Manufacturing	336340 Motor Vehicle Brake System Manufacturing
321992 Prefabricated Wood Building Manufacturing	336350 Motor Vehicle Transmission and Power Train Parts Manufacturing
321999 All Other Miscellaneous Wood Product Manufacturing	336360 Motor Vehicle Seating and Interior Trim Manufacturing
322110 Pulp Mills	336370 Motor Vehicle Metal Stamping
322121 Paper (except Newsprint) Mills	336391 Motor Vehicle Air-Conditioning Manufacturing
322122 Newsprint Mills	336399 All Other Motor Vehicle Parts Manufacturing
322130 Paperboard Mills	336510 Railroad Rolling Stock Manufacturing
322211 Corrugated and Solid Fiber Box Manufacturing	336611 Ship Building and Repairing
322212 Folding Paperboard Box Manufacturing	336612 Boat Building
322213 Setup Paperboard Box Manufacturing	336991 Motorcycle, Bicycle, and Parts Manufacturing
322214 Fiber Can, Tube, Drum, and Similar Products Manufacturing	336992 Military Armored Vehicle, Tank, and Tank Component Manufacturing
322215 Nonfolding Sanitary Food Container Manufacturing	336999 All Other Transportation Equipment Manufacturing
322221 Coated and Laminated Packaging Paper Manufacturing	337110 Wood Kitchen Cabinet and Countertop Manufacturing

Functional industry category

NAICS code and title

322222 Coated and Laminated Paper Manufacturing	337121 Upholstered Household Furniture Manufacturing
322223 Coated Paper Bag and Pouch Manufacturing	337122 Nonupholstered Wood Household Furniture Manufacturing
322224 Uncoated Paper and Multiwall Bag Manufacturing	337124 Metal Household Furniture Manufacturing
322225 Laminated Aluminum Foil Manufacturing for Flexible Packaging Uses	337125 Household Furniture (except Wood and Metal) Manufacturing
322226 Surface-Coated Paperboard Manufacturing	337127 Institutional Furniture Manufacturing
322231 Die-Cut Paper and Paperboard Office Supplies Manufacturing	337129 Wood Television, Radio, and Sewing Machine Cabinet Manufacturing
322232 Envelope Manufacturing	337211 Wood Office Furniture Manufacturing
322233 Stationery, Tablet, and Related Product Manufacturing	337212 Custom Architectural Woodwork and Millwork Manufacturing
322291 Sanitary Paper Product Manufacturing	337214 Office Furniture (except Wood) Manufacturing
322299 All Other Converted Paper Product Manufacturing	337215 Showcase, Partition, Shelving, and Locker Manufacturing
323110 Commercial Lithographic Printing	337910 Mattress Manufacturing
323111 Commercial Gravure Printing	337920 Blind and Shade Manufacturing
323112 Commercial Flexographic Printing	339911 Jewelry (except Costume) Manufacturing
323113 Commercial Screen Printing	339912 Silverware and Hollowware Manufacturing
323114 Quick Printing	339913 Jewelers' Material and Lapidary Work Manufacturing
323115 Digital Printing	339914 Costume Jewelry and Novelty Manufacturing
323116 Manifold Business Forms Printing	339920 Sporting and Athletic Goods Manufacturing
323117 Books Printing	339931 Doll and Stuffed Toy Manufacturing
323118 Blankbook, Looseleaf Binders, and Devices Manufacturing	339932 Game, Toy, and Children's Vehicle Manufacturing
323119 Other Commercial Printing	339941 Pen and Mechanical Pencil Manufacturing
323121 Tradebinding and Related Work	339942 Lead Pencil and Art Good Manufacturing
323122 Prepress Services	339943 Marking Device Manufacturing
324121 Asphalt Paving Mixture and Block Manufacturing	339944 Carbon Paper and Inked Ribbon Manufacturing
324122 Asphalt Shingle and Coating Materials Manufacturing	339950 Sign Manufacturing
324191 Petroleum Lubricating Oil and Grease Manufacturing	339991 Gasket, Packing, and Sealing Device Manufacturing
324199 All Other Petroleum and Coal Products Manufacturing	339992 Musical Instrument Manufacturing
325991 Custom Compounding of Purchased Resins	339993 Fastener, Button, Needle, and Pin Manufacturing
325998 All Other Miscellaneous Chemical Product and Preparation Manufacturing	339994 Broom, Brush, and Mop Manufacturing
326111 Plastics Bag and Pouch Manufacturing	339995 Burial Casket Manufacturing
326112 Plastics Packaging Film and Sheet (including Laminated) Manufacturing	339999 All Other Miscellaneous Manufacturing

Corporate management and administration

551111 Offices of Bank Holding Companies	551114 Corporate, Subsidiary, and Regional Managing Offices
551112 Offices of Other Holding Companies	561110 Office Administrative Services

Distributive services

221111 Hydroelectric Power Generation	424820 Wine and Distilled Alcoholic Beverage Merchant Wholesalers
221112 Fossil Fuel Electric Power Generation	424910 Farm Supplies Merchant Wholesalers
221113 Nuclear Electric Power Generation	424920 Book, Periodical, and Newspaper Merchant Wholesalers
221119 Other Electric Power Generation	424930 Flower, Nursery Stock, and Florists' Supplies Merchant Wholesalers
221121 Electric Bulk Power Transmission and Control	424940 Tobacco and Tobacco Product Merchant Wholesalers
221122 Electric Power Distribution	424950 Paint, Varnish, and Supplies Merchant Wholesalers

Functional industry category

NAICS code and title

221210 Natural Gas Distribution	424990 Other Miscellaneous Nondurable Goods Merchant Wholesalers
221310 Water Supply and Irrigation Systems	425110 Business to Business Electronic Markets
221320 Sewage Treatment Facilities	425120 Wholesale Trade Agents and Brokers
221330 Steam and Air-Conditioning Supply	481111 Scheduled Passenger Air Transportation
423110 Automobile and Other Motor Vehicle Merchant Wholesalers	481112 Scheduled Freight Air Transportation
423120 Motor Vehicle Supplies and New Parts Merchant Wholesalers	481211 Nonscheduled Chartered Passenger Air Transportation
423130 Tire and Tube Merchant Wholesalers	481212 Nonscheduled Chartered Freight Air Transportation
423140 Motor Vehicle Parts (Used) Merchant Wholesalers	481219 Other Nonscheduled Air Transportation
423210 Furniture Merchant Wholesalers	482110 Rail transportation
423220 Home Furnishing Merchant Wholesalers	483111 Deep Sea Freight Transportation
423310 Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers	483112 Deep Sea Passenger Transportation
423320 Brick, Stone, and Related Construction Material Merchant Wholesalers	483113 Coastal and Great Lakes Freight Transportation
423330 Roofing, Siding, and Insulation Material Merchant Wholesalers	483114 Coastal and Great Lakes Passenger Transportation
423390 Other Construction Material Merchant Wholesalers	483211 Inland Water Freight Transportation
423410 Photographic Equipment and Supplies Merchant Wholesalers	483212 Inland Water Passenger Transportation
423420 Office Equipment Merchant Wholesalers	484110 General Freight Trucking, Local
423430 Computer and Computer Peripheral Equipment and Software Merchant Wholesalers	484121 General Freight Trucking, Long-Distance, Truckload
423440 Other Commercial Equipment Merchant Wholesalers	484122 General Freight Trucking, Long-Distance, Less Than Truckload
423450 Medical, Dental, and Hospital Equipment and Supplies Merchant Wholesalers	484210 Used Household and Office Goods Moving
423460 Ophthalmic Goods Merchant Wholesalers	484220 Specialized Freight (except Used Goods) Trucking, Local
423490 Other Professional Equipment and Supplies Merchant Wholesalers	484230 Specialized Freight (except Used Goods) Trucking, Long-Distance
423510 Metal Service Centers and Other Metal Merchant Wholesalers	485111 Mixed Mode Transit Systems
423520 Coal and Other Mineral and Ore Merchant Wholesalers	485112 Commuter Rail Systems
423610 Electrical Apparatus and Equipment, Wiring Supplies, and Related Equipment Merchant Wholesalers	485113 Bus and Other Motor Vehicle Transit Systems
423620 Electrical and Electronic Appliance, Television, and Radio Set Merchant Wholesalers	485119 Other Urban Transit Systems
423690 Other Electronic Parts and Equipment Merchant Wholesalers	485210 Interurban and Rural Bus Transportation
423710 Hardware Merchant Wholesalers	485310 Taxi Service
423720 Plumbing and Heating Equipment and Supplies (Hydronics) Merchant Wholesalers	485320 Limousine Service
423730 Warm Air Heating and Air-Conditioning Equipment and Supplies Merchant Wholesalers	485410 School and Employee Bus Transportation
423740 Refrigeration Equipment and Supplies Merchant Wholesalers	485510 Charter Bus Industry
423810 Construction and Mining (except Oil Well) Machinery and Equipment Merchant Wholesalers	485991 Special Needs Transportation
423820 Farm and Garden Machinery and Equipment Merchant Wholesalers	485999 All Other Transit and Ground Passenger Transportation
423830 Industrial Machinery and Equipment Merchant Wholesalers	486110 Pipeline Transportation of Crude Oil
423840 Industrial Supplies Merchant Wholesalers	486210 Pipeline Transportation of Natural Gas
423850 Service Establishment Equipment and Supplies Merchant Wholesalers	486910 Pipeline Transportation of Refined Petroleum Products

Functional industry category

NAICS code and title

423860 Transportation Equipment and Supplies (except Motor Vehicle) Merchant Wholesalers	486990 All Other Pipeline Transportation
423910 Sporting and Recreational Goods and Supplies Merchant Wholesalers	487110 Scenic and Sightseeing Transportation, Land
423920 Toy and Hobby Goods and Supplies Merchant Wholesalers	487210 Scenic and Sightseeing Transportation, Water
423930 Recyclable Material Merchant Wholesalers	487990 Scenic and Sightseeing Transportation, Other
423940 Jewelry, Watch, Precious Stone, and Precious Metal Merchant Wholesalers	488111 Air Traffic Control
423990 Other Miscellaneous Durable Goods Merchant Wholesalers	488119 Other Airport Operations
424110 Printing and Writing Paper Merchant Wholesalers	488190 Other Support Activities for Air Transportation
424120 Stationery and Office Supplies Merchant Wholesalers	488210 Support Activities for Rail Transportation
424130 Industrial and Personal Service Paper Merchant Wholesalers	488310 Port and Harbor Operations
424210 Drugs and Druggists' Sundries Merchant Wholesalers	488320 Marine Cargo Handling
424310 Piece Goods, Notions, and Other Dry Goods Merchant Wholesalers	488330 Navigational Services to Shipping
424320 Men's and Boys' Clothing and Furnishings Merchant Wholesalers	488390 Other Support Activities for Water Transportation
424330 Women's, Children's, and Infants' Clothing and Accessories Merchant Wholesalers	488410 Motor Vehicle Towing
424340 Footwear Merchant Wholesalers	488490 Other Support Activities for Road Transportation
424410 General Line Grocery Merchant Wholesalers	488510 Freight Transportation Arrangement
424420 Packaged Frozen Food Merchant Wholesalers	488991 Packing and Crating
424430 Dairy Product (except Dried or Canned) Merchant Wholesalers	488999 All Other Support Activities for Transportation
424440 Poultry and Poultry Product Merchant Wholesalers	491110 Postal Service
424450 Confectionery Merchant Wholesalers	492110 Couriers and Express Delivery Services
424460 Fish and Seafood Merchant Wholesalers	492210 Local Messengers and Local Delivery
424470 Meat and Meat Product Merchant Wholesalers	493110 General Warehousing and Storage
424480 Fresh Fruit and Vegetable Merchant Wholesalers	493120 Refrigerated Warehousing and Storage
424490 Other Grocery and Related Products Merchant Wholesalers	493130 Farm Product Warehousing and Storage
424510 Grain and Field Bean Merchant Wholesalers	493190 Other Warehousing and Storage
424520 Livestock Merchant Wholesalers	517110 Wired Telecommunications Carriers
424590 Other Farm Product Raw Material Merchant Wholesalers	517210 Wireless Telecommunications Carriers (except Satellite)
424610 Plastics Materials and Basic Forms and Shapes Merchant Wholesalers	517410 Satellite Telecommunications
424690 Other Chemical and Allied Products Merchant Wholesalers	517911 Telecommunications Resellers
424710 Petroleum Bulk Stations and Terminals	517919 All Other Telecommunications
424720 Petroleum and Petroleum Products Merchant Wholesalers (except Bulk Stations and Terminals)	518210 Data Processing, Hosting, and Related Services
424810 Beer and Ale Merchant Wholesalers	
Engineering-intensive manufacturing	
324110 Petroleum Refineries	333911 Pump and Pumping Equipment Manufacturing
325110 Petrochemical Manufacturing	333912 Air and Gas Compressor Manufacturing
325120 Industrial Gas Manufacturing	333913 Measuring and Dispensing Pump Manufacturing
325131 Inorganic Dye and Pigment Manufacturing	333921 Elevator and Moving Stairway Manufacturing
325132 Synthetic Organic Dye and Pigment Manufacturing	333922 Conveyor and Conveying Equipment Manufacturing

Functional industry category

NAICS code and title

325181 Alkalies and Chlorine Manufacturing	333923 Overhead Traveling Crane, Hoist, and Monorail System Manufacturing
325182 Carbon Black Manufacturing	333924 Industrial Truck, Tractor, Trailer, and Stacker Machinery Manufacturing
325188 All Other Basic Inorganic Chemical Manufacturing	333991 Power-Driven Handtool Manufacturing
325191 Gum and Wood Chemical Manufacturing	333992 Welding and Soldering Equipment Manufacturing
325192 Cyclic Crude and Intermediate Manufacturing	333993 Packaging Machinery Manufacturing
325193 Ethyl Alcohol Manufacturing	333994 Industrial Process Furnace and Oven Manufacturing
325199 All Other Basic Organic Chemical Manufacturing	333995 Fluid Power Cylinder and Actuator Manufacturing
325211 Plastics Material and Resin Manufacturing	333996 Fluid Power Pump and Motor Manufacturing
325212 Synthetic Rubber Manufacturing	333997 Scale and Balance Manufacturing
325221 Cellulosic Organic Fiber Manufacturing	333999 All Other Miscellaneous General Purpose Machinery Manufacturing
325222 Noncellulosic Organic Fiber Manufacturing	334111 Electronic Computer Manufacturing
325311 Nitrogenous Fertilizer Manufacturing	334112 Computer Storage Device Manufacturing
325312 Phosphatic Fertilizer Manufacturing	334113 Computer Terminal Manufacturing
325314 Fertilizer (Mixing Only) Manufacturing	334119 Other Computer Peripheral Equipment Manufacturing
325320 Pesticide and Other Agricultural Chemical Manufacturing	334210 Telephone Apparatus Manufacturing
325411 Medicinal and Botanical Manufacturing	334220 Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
325412 Pharmaceutical Preparation Manufacturing	334290 Other Communications Equipment Manufacturing
325413 In-Vitro Diagnostic Substance Manufacturing	334310 Audio and Video Equipment Manufacturing
325414 Biological Product (except Diagnostic) Manufacturing	334411 Electron Tube Manufacturing
325510 Paint and Coating Manufacturing	334412 Bare Printed Circuit Board Manufacturing
325520 Adhesive Manufacturing	334413 Semiconductor and Related Device Manufacturing
325611 Soap and Other Detergent Manufacturing	334414 Electronic Capacitor Manufacturing
325612 Polish and Other Sanitation Good Manufacturing	334415 Electronic Resistor Manufacturing
325613 Surface Active Agent Manufacturing	334416 Electronic Coil, Transformer, and Other Inductor Manufacturing
325620 Toilet Preparation Manufacturing	334417 Electronic Connector Manufacturing
325910 Printing Ink Manufacturing	334418 Printed Circuit Assembly (Electronic Assembly) Manufacturing
325920 Explosives Manufacturing	334419 Other Electronic Component Manufacturing
325992 Photographic Film, Paper, Plate, and Chemical Manufacturing	334510 Electromedical and Electrotherapeutic Apparatus Manufacturing
331311 Alumina Refining	334511 Search, Detection, Navigation, Guidance, Aeronautical, and Nautical System and Instrument Manufacturing
332212 Hand and Edge Tool Manufacturing	334512 Automatic Environmental Control Manufacturing for Residential, Commercial, and Appliance Use
332991 Ball and Roller Bearing Manufacturing	334513 Instruments and Related Products Manufacturing for Measuring, Displaying, and Controlling Industrial Process Variables
332992 Small Arms Ammunition Manufacturing	334514 Totalizing Fluid Meter and Counting Device Manufacturing
332993 Ammunition (except Small Arms) Manufacturing	334515 Instrument Manufacturing for Measuring and Testing Electricity and Electrical Signals
332994 Small Arms Manufacturing	334516 Analytical Laboratory Instrument Manufacturing
332995 Other Ordnance and Accessories Manufacturing	334517 Irradiation Apparatus Manufacturing
332997 Industrial Pattern Manufacturing	334518 Watch, Clock, and Part Manufacturing

Functional industry category

NAICS code and title

333111 Farm Machinery and Equipment Manufacturing	334519 Other Measuring and Controlling Device Manufacturing
333112 Lawn and Garden Tractor and Home Lawn and Garden Equipment Manufacturing	334611 Software Reproducing
333120 Construction Machinery Manufacturing	334612 Prerecorded Compact Disc (except Software), Tape, and Record Reproducing
333131 Mining Machinery and Equipment Manufacturing	334613 Magnetic and Optical Recording Media Manufacturing
333132 Oil and Gas Field Machinery and Equipment Manufacturing	335110 Electric Lamp Bulb and Part Manufacturing
333210 Sawmill and Woodworking Machinery Manufacturing	335121 Residential Electric Lighting Fixture Manufacturing
333220 Plastics and Rubber Industry Machinery Manufacturing	335122 Commercial, Industrial, and Institutional Electric Lighting Fixture Manufacturing
333291 Paper Industry Machinery Manufacturing	335129 Other Lighting Equipment Manufacturing
333292 Textile Machinery Manufacturing	335311 Power, Distribution, and Specialty Transformer Manufacturing
333293 Printing Machinery and Equipment Manufacturing	335312 Motor and Generator Manufacturing
333294 Food Product Machinery Manufacturing	335313 Switchgear and Switchboard Apparatus Manufacturing
333295 Semiconductor Machinery Manufacturing	335314 Relay and Industrial Control Manufacturing
333311 Automatic Vending Machine Manufacturing	335911 Storage Battery Manufacturing
333312 Commercial Laundry, Drycleaning, and Pressing Machine Manufacturing	335912 Primary Battery Manufacturing
333313 Office Machinery Manufacturing	335931 Current-Carrying Wiring Device Manufacturing
333314 Optical Instrument and Lens Manufacturing	335932 Noncurrent-Carrying Wiring Device Manufacturing
333315 Photographic and Photocopying Equipment Manufacturing	335991 Carbon and Graphite Product Manufacturing
333319 Other Commercial and Service Industry Machinery Manufacturing	335999 All Other Miscellaneous Electrical Equipment and Component Manufacturing
333411 Air Purification Equipment Manufacturing	336311 Carburetor, Piston, Piston Ring, and Valve Manufacturing
333412 Industrial and Commercial Fan and Blower Manufacturing	336321 Vehicular Lighting Equipment Manufacturing
333511 Industrial Mold Manufacturing	336411 Aircraft Manufacturing
333512 Machine Tool (Metal Cutting Types) Manufacturing	336412 Aircraft Engine and Engine Parts Manufacturing
333513 Machine Tool (Metal Forming Types) Manufacturing	336413 Other Aircraft Parts and Auxiliary Equipment Manufacturing
333514 Special Die and Tool, Die Set, Jig, and Fixture Manufacturing	336414 Guided Missile and Space Vehicle Manufacturing
333515 Cutting Tool and Machine Tool Accessory Manufacturing	336415 Guided Missile and Space Vehicle Propulsion Unit and Propulsion Unit Parts Manufacturing
333516 Rolling Mill Machinery and Equipment Manufacturing	336419 Other Guided Missile and Space Vehicle Parts and Auxiliary Equipment Manufacturing
333518 Other Metalworking Machinery Manufacturing	339112 Surgical and Medical Instrument Manufacturing
333611 Turbine and Turbine Generator Set Units Manufacturing	339113 Surgical Appliance and Supplies Manufacturing
333612 Speed Changer, Industrial High-Speed Drive, and Gear Manufacturing	339114 Dental Equipment and Supplies Manufacturing
333613 Mechanical Power Transmission Equipment Manufacturing	339115 Ophthalmic Goods Manufacturing
333618 Other Engine Equipment Manufacturing	339116 Dental Laboratories
Finance, insurance, and real estate	
521110 Monetary Authorities-Central Bank	524127 Direct Title Insurance Carriers
522110 Commercial Banking	524128 Other Direct Insurance (except Life, Health, and Medical) Carriers
522120 Savings Institutions	524130 Reinsurance Carriers
522130 Credit Unions	524210 Insurance Agencies and Brokerages

Functional industry category

NAICS code and title

522190 Other Depository Credit Intermediation	524291 Claims Adjusting
522210 Credit Card Issuing	524292 Third Party Administration of Insurance and Pension Funds
522220 Sales Financing	524298 All Other Insurance Related Activities
522291 Consumer Lending	525110 Pension Funds
522292 Real Estate Credit	525120 Health and Welfare Funds
522293 International Trade Financing	525190 Other Insurance Funds
522294 Secondary Market Financing	525910 Open-End Investment Funds
522298 All Other Nondepository Credit Intermediation	525920 Trusts, Estates, and Agency Accounts
522310 Mortgage and Nonmortgage Loan Brokers	525990 Other Financial Vehicles
522320 Financial Transactions Processing, Reserve, and Clearinghouse Activities	531110 Lessors of Residential Buildings and Dwellings
522390 Other Activities Related to Credit Intermediation	531120 Lessors of Nonresidential Buildings (except Miniwarehouses)
523110 Investment Banking and Securities Dealing	531130 Lessors of Miniwarehouses and Self-Storage Units
523120 Securities Brokerage	531190 Lessors of Other Real Estate Property
523130 Commodity Contracts Dealing	531210 Offices of Real Estate Agents and Brokers
523140 Commodity Contracts Brokerage	531312 Nonresidential Property Managers
523210 Securities and Commodity Exchanges	531320 Offices of Real Estate Appraisers
523910 Miscellaneous Intermediation	531390 Other Activities Related to Real Estate
523920 Portfolio Management	532120 Truck, Utility Trailer, and RV (Recreational Vehicle) Rental and Leasing
523930 Investment Advice	532411 Commercial Air, Rail, and Water Transportation Equipment Rental and Leasing
523991 Trust, Fiduciary, and Custody Activities	532412 Construction, Mining, and Forestry Machinery and Equipment Rental and Leasing
523999 Miscellaneous Financial Investment Activities	532420 Office Machinery and Equipment Rental and Leasing
524113 Direct Life Insurance Carriers	532490 Other Commercial and Industrial Machinery and Equipment Rental and Leasing
524114 Direct Health and Medical Insurance Carriers	533110 Lessors of Nonfinancial Intangible Assets (except Copyrighted Works)
524126 Direct Property and Casualty Insurance Carriers	

Government

901149 US Postal Service	902999 State Government, Excluding Education and Hospitals
901199 Federal Civilian, Except US Postal Service	

Healthcare

621511 Medical Laboratories	622310 Specialty (except Psychiatric and Substance Abuse) Hospitals
621512 Diagnostic Imaging Centers	623110 Nursing Care Facilities
622110 General Medical and Surgical Hospitals	902622 Hospitals, State Government
622210 Psychiatric and Substance Abuse Hospitals	903622 Hospitals, Local Government

Higher education

611310 Colleges, Universities, and Professional Schools	903612 Colleges and Universities, Local Government
902612 Colleges and Universities, State Government	

Knowledge-intensive business services

541110 Offices of Lawyers	541513 Computer Facilities Management Services
541191 Title Abstract and Settlement Offices	541519 Other Computer Related Services
541199 All Other Legal Services	541611 Administrative Management and General Management Consulting Services
541211 Offices of Certified Public Accountants	541612 Human Resources Consulting Services
541213 Tax Preparation Services	541613 Marketing Consulting Services
541214 Payroll Services	541614 Process, Physical Distribution, and Logistics Consulting Services
541219 Other Accounting Services	541618 Other Management Consulting Services
541310 Architectural Services	541620 Environmental Consulting Services
541320 Landscape Architectural Services	541690 Other Scientific and Technical Consulting Services

Functional industry category

NAICS code and title

541330 Engineering Services	541711 Research and Development in Biotechnology
541340 Drafting Services	541712 Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)
541350 Building Inspection Services	541720 Research and Development in the Social Sciences and Humanities
541360 Geophysical Surveying and Mapping Services	541810 Advertising Agencies
541370 Surveying and Mapping (except Geophysical) Services	541820 Public Relations Agencies
541380 Testing Laboratories	541830 Media Buying Agencies
541410 Interior Design Services	541840 Media Representatives
541420 Industrial Design Services	541850 Display Advertising
541430 Graphic Design Services	541860 Direct Mail Advertising
541490 Other Specialized Design Services	541870 Advertising Material Distribution Services
541511 Custom Computer Programming Services	541890 Other Services Related to Advertising
541512 Computer Systems Design Services	

Media, entertainment, and recreation

511110 Newspaper Publishers	711120 Dance Companies
511120 Periodical Publishers	711130 Musical Groups and Artists
511130 Book Publishers	711190 Other Performing Arts Companies
511140 Directory and Mailing List Publishers	711211 Sports Teams and Clubs
511191 Greeting Card Publishers	711212 Racetracks
511199 All Other Publishers	711219 Other Spectator Sports
511210 Software Publishers	711310 Promoters of Performing Arts, Sports, and Similar Events with Facilities
512110 Motion Picture and Video Production	711320 Promoters of Performing Arts, Sports, and Similar Events without Facilities
512120 Motion Picture and Video Distribution	711410 Agents and Managers for Artists, Athletes, Entertainers, and Other Public Figures
512131 Motion Picture Theaters (except Drive-Ins)	711510 Independent Artists, Writers, and Performers
512132 Drive-In Motion Picture Theaters	712110 Museums
512191 Teleproduction and Other Postproduction Services	712120 Historical Sites
512199 Other Motion Picture and Video Industries	712130 Zoos and Botanical Gardens
512210 Record Production	712190 Nature Parks and Other Similar Institutions
512220 Integrated Record Production/Distribution	713110 Amusement and Theme Parks
512230 Music Publishers	713120 Amusement Arcades
512240 Sound Recording Studios	713210 Casinos (except Casino Hotels)
512290 Other Sound Recording Industries	713290 Other Gambling Industries
515111 Radio Networks	713910 Golf Courses and Country Clubs
515112 Radio Stations	713920 Skiing Facilities
515120 Television Broadcasting	713930 Marinas
515210 Cable and Other Subscription Programming	713940 Fitness and Recreational Sports Centers
519110 News Syndicates	713950 Bowling Centers
519120 Libraries and Archives	713990 All Other Amusement and Recreation Industries
519130 Internet Publishing and Broadcasting and Web Search Portals	721120 Casino Hotels
519190 All Other Information Services	721211 RV (Recreational Vehicle) Parks and Campgrounds
711110 Theater Companies and Dinner Theaters	721214 Recreational and Vacation Camps (except Campgrounds)

Sources: North American Industry Classification System; Economic Modeling Specialists International (2012)

Note: Eleven functional categories defined per *Statistical Portrait of Economic Diversity in Appalachia* section 2-3

Table 9-2: Standardized Scores and Ranks of Industrial, Functional, Occupational, and Knowledge Diversity for Appalachian Region Counties

County, State	Industrial Std. Score	Rank	Functional Std. Score	Rank	Occupational Std. Score	Rank	Knowledge Std. Score	Rank
Bibb County, AL	0.99	264	1.04	237	1.01	265	0.99	297
Blount County, AL	1.09	103	1.05	220	1.02	104	1.01	189
Calhoun County, AL	1.09	95	1.07	175	1.02	135	1.00	291
Chambers County, AL	1.02	208	1.03	244	1.02	74	0.99	304
Cherokee County, AL	0.99	267	1.01	285	0.99	338	0.98	381
Chilton County, AL	1.03	185	1.02	259	1.01	210	0.99	317
Clay County, AL	0.92	359	0.96	350	1.01	233	0.99	349
Cleburne County, AL	0.97	304	0.94	359	0.99	378	0.97	390
Colbert County, AL	1.11	60	1.13	53	1.02	120	1.00	290
Coosa County, AL	0.82	412	1.08	154	1.00	313	1.02	113
Cullman County, AL	1.11	56	1.11	81	1.01	218	1.01	193
DeKalb County, AL	1.09	105	1.07	168	1.01	206	0.99	322
Elmore County, AL	1.08	115	1.11	87	1.02	70	0.99	299
Etowah County, AL	1.09	98	1.10	117	1.02	168	1.00	235
Fayette County, AL	1.02	220	1.11	73	1.02	116	1.01	202
Franklin County, AL	0.97	305	0.94	361	0.99	355	0.97	393
Hale County, AL	0.94	325	1.00	299	1.01	259	0.98	385
Jackson County, AL	1.05	156	1.02	262	1.01	276	0.98	371
Jefferson County, AL	1.18	7	1.02	261	1.03	33	1.02	132
Lamar County, AL	0.98	281	1.13	42	1.00	286	1.01	198
Lauderdale County, AL	1.10	90	1.12	55	1.02	128	0.98	363
Lawrence County, AL	0.98	285	1.02	275	1.00	335	1.00	237
Limestone County, AL	1.11	74	1.10	119	1.02	181	1.00	255
Macon County, AL	0.85	396	0.98	322	1.00	299	0.95	414
Madison County, AL	1.09	99	1.00	290	1.03	14	1.04	15
Marion County, AL	1.03	192	1.07	179	1.01	186	1.00	293
Marshall County, AL	1.04	183	1.00	292	1.00	331	0.97	407
Morgan County, AL	1.14	36	1.06	190	1.03	57	1.01	200
Pickens County, AL	0.96	308	1.05	218	1.01	187	1.03	79
Randolph County, AL	0.98	287	1.06	192	0.99	356	0.99	345
Shelby County, AL	1.16	20	0.93	375	1.02	72	1.00	238
St. Clair County, AL	1.11	66	1.04	229	1.02	131	0.99	351
Talladega County, AL	1.04	178	1.01	284	1.00	336	0.98	374
Tallapoosa County, AL	1.02	218	1.10	109	1.02	171	1.00	243
Tuscaloosa County, AL	1.11	70	1.13	43	1.02	109	0.99	343
Walker County, AL	1.12	51	1.05	202	1.02	68	1.02	139
Winston County, AL	0.97	303	0.93	366	1.00	315	0.99	354
Banks County, GA	1.01	239	0.98	329	1.00	329	0.97	396
Barrow County, GA	1.11	71	1.04	232	1.02	152	1.00	252
Bartow County, GA	1.14	40	1.02	266	1.02	125	1.01	224
Carroll County, GA	1.09	101	1.13	38	1.03	50	1.02	135
Catoosa County, GA	1.11	75	1.01	286	1.01	223	0.99	332
Chattooga County, GA	0.97	301	1.02	279	1.00	325	0.98	386
Cherokee County, GA	1.14	35	0.93	367	1.02	129	0.99	341
Dade County, GA	1.03	204	1.05	214	1.03	65	1.00	229
Dawson County, GA	1.07	133	0.93	368	0.98	394	0.94	418
Douglas County, GA	1.14	34	1.00	301	1.01	207	0.99	352
Elbert County, GA	0.95	317	0.98	325	1.00	296	0.99	331
Fannin County, GA	1.06	138	0.91	378	1.00	293	0.99	302
Floyd County, GA	1.08	118	1.13	46	1.03	29	1.03	48
Forsyth County, GA	1.14	33	0.96	340	1.03	19	1.02	100
Franklin County, GA	1.06	147	1.10	106	1.02	145	1.01	196
Gilmer County, GA	1.02	227	1.02	278	1.00	305	0.97	394
Gordon County, GA	1.02	225	0.92	376	0.98	384	0.98	379
Gwinnett County, GA	1.20	2	0.90	389	1.02	160	1.00	251
Habersham County, GA	1.05	169	1.11	76	1.03	42	0.99	326
Hall County, GA	1.12	47	1.07	163	1.02	84	1.02	120
Haralson County, GA	1.02	226	0.98	328	1.02	137	1.00	261
Hart County, GA	1.01	232	1.08	157	1.03	41	1.01	205

County, State	Industrial		Functional		Occupational		Knowledge	
	Std. Score	Rank	Std. Score	Rank	Std. Score	Rank	Std. Score	Rank
Heard County, GA	0.86	394	1.04	243	0.98	393	1.00	289
Jackson County, GA	1.07	128	1.05	208	1.01	270	0.98	362
Lumpkin County, GA	1.03	184	1.11	93	1.03	63	1.00	260
Madison County, GA	1.03	202	0.99	309	1.01	236	1.01	157
Murray County, GA	0.89	382	0.81	410	0.94	414	0.94	419
Paulding County, GA	1.11	57	0.89	393	1.01	217	0.99	325
Pickens County, GA	1.08	116	1.01	289	1.02	76	1.01	191
Polk County, GA	1.04	181	0.95	355	1.02	167	0.97	391
Rabun County, GA	1.03	203	0.97	337	1.00	291	0.98	382
Stephens County, GA	1.06	148	1.10	107	1.03	9	1.01	171
Towns County, GA	0.98	279	0.91	380	1.00	298	1.01	199
Union County, GA	1.05	164	0.97	331	1.01	280	1.00	278
Walker County, GA	1.03	205	0.96	343	1.01	219	0.98	378
White County, GA	1.10	77	1.06	191	1.02	178	0.99	321
Whitfield County, GA	1.00	252	0.90	390	0.95	406	0.98	380
Adair County, KY	0.93	346	1.09	124	0.99	370	1.03	78
Bath County, KY	0.86	393	0.91	379	0.94	412	0.95	415
Bell County, KY	1.00	253	1.07	169	1.01	274	1.00	233
Boyd County, KY	1.07	136	1.11	78	1.01	209	1.03	55
Breathitt County, KY	0.94	329	1.07	166	0.99	359	0.99	320
Carter County, KY	1.00	262	0.97	333	1.00	302	0.96	409
Casey County, KY	0.98	288	1.06	193	1.00	323	1.00	241
Clark County, KY	1.13	43	1.01	283	1.03	67	1.01	158
Clay County, KY	0.93	350	0.94	360	1.00	311	1.02	150
Clinton County, KY	0.81	413	0.90	387	0.95	411	0.95	413
Cumberland County, KY	0.94	332	0.98	321	0.99	342	1.02	147
Edmonson County, KY	0.83	410	0.84	406	0.93	419	0.96	410
Elliott County, KY	0.77	416	0.77	413	0.93	418	0.97	402
Estill County, KY	0.93	339	1.05	219	1.00	310	0.99	303
Fleming County, KY	0.96	311	1.02	273	0.97	400	0.99	338
Floyd County, KY	1.05	152	1.05	215	1.01	208	1.04	37
Garrard County, KY	1.03	189	0.98	318	0.99	345	1.00	242
Green County, KY	0.92	354	0.89	391	0.96	405	0.98	368
Greenup County, KY	1.01	240	1.05	203	1.02	146	1.03	54
Harlan County, KY	0.92	357	0.99	313	0.99	349	1.04	36
Hart County, KY	0.93	345	0.88	398	0.98	396	0.97	405
Jackson County, KY	0.90	372	1.00	298	0.99	337	1.00	280
Johnson County, KY	1.01	242	1.00	293	0.99	352	0.99	347
Knott County, KY	0.90	378	0.90	388	1.01	267	1.05	5
Knox County, KY	1.05	163	1.11	75	1.02	69	1.02	88
Laurel County, KY	1.08	122	1.02	267	1.01	237	1.01	220
Lawrence County, KY	0.96	312	0.93	371	1.00	333	1.02	118
Lee County, KY	0.92	360	0.98	326	1.01	196	1.04	16
Leslie County, KY	0.87	390	0.98	323	0.99	346	1.02	126
Letcher County, KY	0.95	322	0.94	363	0.99	368	1.02	105
Lewis County, KY	0.93	342	0.96	347	0.98	381	0.99	315
Lincoln County, KY	1.00	255	1.07	180	1.02	155	1.02	123
Madison County, KY	1.03	191	1.15	16	1.02	162	1.01	212
Magoffin County, KY	0.85	399	0.94	364	0.99	377	1.00	230
Martin County, KY	0.86	395	0.81	409	0.97	398	0.98	376
McCreary County, KY	0.90	377	0.96	348	1.01	242	0.98	384
Menifee County, KY	0.88	387	0.98	330	0.97	399	1.00	287
Metcalfe County, KY	0.91	370	0.87	402	0.96	404	0.97	399
Monroe County, KY	0.90	376	1.00	295	0.97	403	0.98	358
Montgomery County, KY	1.01	238	0.95	353	1.00	334	0.98	365
Morgan County, KY	0.89	379	0.99	307	0.98	382	0.99	330
Nicholas County, KY	0.84	405	0.87	403	0.94	416	1.00	248
Owsley County, KY	0.83	407	0.90	384	0.97	401	1.00	276
Perry County, KY	0.98	282	1.04	225	0.99	371	1.02	87
Pike County, KY	1.02	217	1.03	246	1.01	262	1.04	29
Powell County, KY	0.98	283	1.05	200	1.00	326	0.97	395
Pulaski County, KY	1.09	102	1.12	67	1.02	154	1.02	114
Robertson County, KY	0.74	420	0.79	411	0.89	420	0.95	417

County, State	Industrial		Functional		Occupational		Knowledge	
	Std. Score	Rank	Std. Score	Rank	Std. Score	Rank	Std. Score	Rank
Rockcastle County, KY	0.93	341	1.04	240	0.99	351	1.02	134
Rowan County, KY	0.94	330	1.11	92	0.99	357	0.99	323
Russell County, KY	1.02	215	1.07	171	1.01	266	1.00	250
Wayne County, KY	0.97	299	0.98	320	1.01	225	0.99	337
Whitley County, KY	0.97	302	1.13	50	1.02	85	1.06	3
Wolfe County, KY	0.90	375	1.00	294	0.98	389	1.00	254
Allegany County, MD	1.08	114	1.12	66	1.01	197	1.00	271
Garrett County, MD	1.13	44	1.07	172	1.02	144	1.01	226
Washington County, MD	1.15	28	1.07	161	1.00	308	0.99	335
Alcorn County, MS	1.04	177	1.11	88	1.02	101	0.99	344
Benton County, MS	0.85	398	0.95	354	0.94	413	0.99	342
Calhoun County, MS	0.93	349	0.97	335	0.98	395	0.98	364
Chickasaw County, MS	0.85	401	0.82	408	0.98	385	0.97	388
Choctaw County, MS	0.93	351	1.03	249	1.02	81	1.05	6
Clay County, MS	1.02	214	1.06	185	1.02	127	1.01	188
Itawamba County, MS	0.99	266	1.06	197	1.01	230	0.99	316
Kemper County, MS	0.92	362	1.15	15	1.00	284	1.03	70
Lee County, MS	1.11	58	1.06	195	1.01	232	1.00	249
Lowndes County, MS	1.11	55	1.14	33	1.03	66	1.01	192
Marshall County, MS	1.01	244	1.10	112	1.02	124	1.02	115
Monroe County, MS	1.03	193	1.10	103	1.02	107	1.01	177
Montgomery County, MS	0.96	313	1.00	291	1.00	285	1.01	195
Noxubee County, MS	0.93	340	0.98	316	0.98	383	0.95	411
Oktibbeha County, MS	0.93	335	1.00	300	1.03	44	0.98	373
Panola County, MS	1.05	165	1.02	274	1.02	108	1.00	273
Pontotoc County, MS	0.84	403	0.71	417	0.98	386	0.98	360
Prentiss County, MS	0.98	277	1.10	99	1.01	203	1.00	282
Tippah County, MS	0.99	273	1.10	102	1.02	71	1.01	169
Tishomingo County, MS	1.03	201	1.05	217	1.02	111	1.00	232
Union County, MS	0.96	310	0.94	358	0.99	369	0.99	355
Webster County, MS	0.91	366	1.04	239	1.01	264	1.01	197
Winston County, MS	1.01	236	1.11	86	1.02	80	1.02	141
Yalobusha County, MS	0.92	353	0.95	356	0.99	350	0.98	366
Alexander County, NC	1.03	187	0.93	372	1.02	106	1.00	295
Alleghany County, NC	1.01	247	1.09	138	1.01	275	1.01	172
Ashe County, NC	1.05	151	1.11	83	1.01	251	1.01	161
Avery County, NC	1.06	150	1.05	205	1.01	248	1.01	201
Buncombe County, NC	1.18	11	1.11	82	1.03	27	1.02	94
Burke County, NC	1.13	42	1.09	128	1.03	30	1.02	121
Caldwell County, NC	1.11	64	1.07	167	1.02	89	1.01	227
Cherokee County, NC	1.07	132	1.08	156	1.02	130	1.03	74
Clay County, NC	1.02	210	0.95	357	1.00	327	0.98	375
Davie County, NC	1.08	111	1.05	213	1.02	140	1.00	253
Forsyth County, NC	1.15	30	1.06	183	1.03	38	1.02	84
Graham County, NC	0.94	331	0.91	381	1.01	279	0.98	367
Haywood County, NC	1.08	120	1.08	150	1.01	222	0.98	361
Henderson County, NC	1.15	27	1.10	104	1.03	45	1.01	156
Jackson County, NC	1.02	219	1.04	222	1.00	290	0.99	313
Macon County, NC	1.08	117	1.00	302	1.01	254	1.01	216
Madison County, NC	1.00	256	1.14	28	1.02	75	1.04	12
McDowell County, NC	1.02	224	1.11	79	1.03	12	1.03	64
Mitchell County, NC	1.01	235	1.12	59	1.02	147	1.04	20
Polk County, NC	1.04	175	1.03	247	1.02	105	1.03	66
Rutherford County, NC	1.10	92	1.15	18	1.03	32	1.01	168
Stokes County, NC	1.05	159	1.04	234	1.02	156	1.01	218
Surry County, NC	1.10	79	1.11	71	1.01	235	1.00	279
Swain County, NC	0.75	419	0.62	420	1.00	332	0.96	408
Transylvania County, NC	1.08	109	1.07	164	1.02	96	1.03	62
Watauga County, NC	1.03	190	1.04	228	1.00	306	0.98	383
Wilkes County, NC	1.06	145	1.05	216	1.02	172	0.99	300
Yadkin County, NC	1.02	212	1.04	227	1.00	301	0.99	356
Yancey County, NC	1.04	173	1.09	133	1.02	110	1.01	215
Allegany County, NY	0.99	269	1.12	58	1.03	40	1.04	31

County, State	Industrial Std. Score	Rank	Functional Std. Score	Rank	Occupational Std. Score	Rank	Knowledge Std. Score	Rank
Broome County, NY	1.13	41	1.15	23	1.03	53	1.03	80
Cattaraugus County, NY	1.04	180	1.12	68	1.03	24	1.01	170
Chautauqua County, NY	1.14	32	1.16	9	1.03	39	1.01	181
Chemung County, NY	1.11	59	1.16	12	1.02	83	1.02	108
Chenango County, NY	1.08	119	1.09	127	1.03	20	1.03	72
Cortland County, NY	1.08	108	1.17	4	1.03	8	1.01	176
Delaware County, NY	1.07	134	1.18	1	1.04	1	1.04	13
Otsego County, NY	1.02	209	1.13	49	1.02	112	1.02	95
Schoharie County, NY	1.02	222	1.09	132	1.02	132	1.02	127
Schuyler County, NY	1.06	142	1.05	212	1.02	97	1.02	137
Steuben County, NY	1.08	123	1.11	90	1.04	2	1.04	11
Tioga County, NY	1.00	251	1.07	176	1.03	6	1.05	9
Tompkins County, NY	0.94	327	0.94	362	0.99	376	1.01	173
Adams County, OH	1.03	195	1.11	77	1.01	228	1.01	204
Ashtabula County, OH	1.16	21	1.13	51	1.02	91	1.02	110
Athens County, OH	0.95	320	0.96	341	1.01	244	1.00	277
Belmont County, OH	1.11	67	1.12	56	1.01	283	1.00	257
Brown County, OH	1.06	146	1.07	177	1.01	221	1.02	117
Carroll County, OH	1.10	84	1.10	100	1.01	192	1.01	225
Clermont County, OH	1.17	14	0.99	312	1.02	93	0.99	298
Columbiana County, OH	1.16	25	1.13	44	1.02	100	1.02	93
Coshocton County, OH	1.11	65	1.05	207	1.03	5	1.04	39
Gallia County, OH	1.00	250	1.12	65	1.01	227	1.04	25
Guernsey County, OH	1.10	83	1.13	45	1.02	134	1.02	111
Harrison County, OH	0.95	319	1.03	253	1.02	177	1.01	182
Highland County, OH	1.04	174	1.15	20	1.01	268	1.00	292
Hocking County, OH	1.06	140	1.09	135	1.02	163	0.99	339
Holmes County, OH	1.12	50	0.90	385	1.00	294	0.98	357
Jackson County, OH	0.97	295	0.96	342	1.00	322	1.00	265
Jefferson County, OH	1.05	154	1.14	26	1.02	136	1.04	18
Lawrence County, OH	1.04	179	1.08	142	1.01	189	0.99	309
Mahoning County, OH	1.19	5	1.09	122	1.02	133	1.00	263
Meigs County, OH	0.97	300	0.96	345	1.01	229	1.01	185
Monroe County, OH	0.89	384	0.88	396	1.01	240	1.04	17
Morgan County, OH	0.98	291	1.07	170	1.01	183	1.02	125
Muskingum County, OH	1.10	89	1.14	25	1.01	201	1.02	145
Noble County, OH	0.95	315	1.07	178	1.00	300	1.02	124
Perry County, OH	0.99	270	1.01	288	1.02	90	1.02	92
Pike County, OH	1.00	261	1.14	30	1.03	34	1.03	46
Ross County, OH	1.02	211	1.02	270	1.00	330	1.00	231
Scioto County, OH	1.03	198	1.08	147	1.01	278	1.01	163
Trumbull County, OH	1.15	29	1.05	211	1.01	239	1.00	268
Tuscarawas County, OH	1.17	16	1.14	36	1.02	126	1.00	236
Vinton County, OH	0.90	371	1.08	149	1.01	255	1.01	160
Washington County, OH	1.11	68	1.16	8	1.03	25	1.04	21
Allegheny County, PA	1.17	12	1.00	304	1.03	21	1.03	44
Armstrong County, PA	1.13	45	1.08	152	1.03	15	1.04	24
Beaver County, PA	1.17	18	1.08	144	1.04	4	1.02	85
Bedford County, PA	1.10	82	1.08	145	1.01	261	1.00	259
Blair County, PA	1.16	22	1.10	94	1.02	166	1.01	186
Bradford County, PA	1.09	93	1.08	146	1.01	184	1.03	43
Butler County, PA	1.19	4	1.09	121	1.03	48	1.02	106
Cambria County, PA	1.16	26	1.12	61	1.03	18	1.04	26
Cameron County, PA	0.85	397	0.85	405	0.95	408	0.95	412
Carbon County, PA	1.09	96	1.05	204	1.03	49	1.02	149
Centre County, PA	0.99	271	0.97	339	1.03	52	1.03	59
Clarion County, PA	1.08	126	1.11	72	1.03	58	1.03	77
Clearfield County, PA	1.12	49	1.11	89	1.01	194	1.01	167
Clinton County, PA	1.08	127	1.13	54	1.01	190	0.99	340
Columbia County, PA	1.12	48	1.09	139	1.01	215	0.99	311
Crawford County, PA	1.14	38	1.17	2	1.03	36	1.03	61
Elk County, PA	1.04	182	1.02	264	0.99	375	1.01	164
Erie County, PA	1.17	13	1.14	32	1.03	46	1.02	96

County, State	Industrial		Functional		Occupational		Knowledge	
	Std. Score	Rank	Std. Score	Rank	Std. Score	Rank	Std. Score	Rank
Fayette County, PA	1.16	23	1.12	62	1.02	86	1.01	219
Forest County, PA	0.79	414	0.87	401	1.02	122	1.03	65
Fulton County, PA	0.91	365	1.02	265	0.99	366	1.02	146
Greene County, PA	0.93	338	0.88	395	0.99	373	1.03	42
Huntingdon County, PA	1.06	143	1.13	52	1.03	26	1.03	75
Indiana County, PA	1.11	62	1.10	105	1.02	77	1.02	90
Jefferson County, PA	1.10	76	1.10	95	1.02	79	1.03	58
Juniata County, PA	1.04	176	0.97	334	1.01	250	0.99	319
Lackawanna County, PA	1.18	9	1.10	120	1.03	60	1.02	97
Lawrence County, PA	1.15	31	1.10	97	1.03	31	1.03	71
Luzerne County, PA	1.19	6	1.07	165	1.02	148	1.01	183
Lycoming County, PA	1.18	10	1.16	10	1.03	54	1.02	131
McKean County, PA	1.08	125	1.12	69	1.03	10	1.04	32
Mercer County, PA	1.16	24	1.15	17	1.02	139	1.03	76
Mifflin County, PA	1.10	85	1.08	160	1.02	180	1.02	116
Monroe County, PA	1.11	69	1.10	118	1.01	185	0.99	328
Montour County, PA	0.84	406	0.78	412	0.98	380	1.05	7
Northumberland County, PA	1.14	39	1.10	115	1.02	82	1.02	129
Perry County, PA	1.05	168	1.02	260	1.00	328	0.99	310
Pike County, PA	1.07	129	0.91	382	1.01	271	0.97	401
Potter County, PA	1.05	155	1.11	91	1.03	23	1.04	22
Schuylkill County, PA	1.14	37	1.08	151	1.01	191	1.01	153
Snyder County, PA	1.05	158	1.04	231	1.01	273	0.99	348
Somerset County, PA	1.11	72	1.11	84	1.03	43	1.02	86
Sullivan County, PA	0.99	272	1.07	162	1.01	205	1.01	184
Susquehanna County, PA	1.08	113	0.97	336	1.01	193	1.03	60
Tioga County, PA	1.08	121	1.16	7	1.01	216	1.00	234
Union County, PA	1.01	248	1.12	63	1.01	238	1.03	53
Venango County, PA	1.10	87	1.17	3	1.02	176	1.01	166
Warren County, PA	1.07	130	1.09	140	1.03	51	1.04	34
Washington County, PA	1.20	3	1.13	39	1.03	22	1.02	103
Wayne County, PA	1.10	91	1.06	188	1.01	234	1.01	211
Westmoreland County, PA	1.20	1	1.11	74	1.03	62	1.02	140
Wyoming County, PA	0.99	263	0.98	314	0.99	361	1.00	274
Anderson County, SC	1.12	53	1.09	129	1.02	157	0.99	336
Cherokee County, SC	1.05	170	1.05	210	1.01	282	0.99	334
Greenville County, SC	1.16	19	1.06	182	1.03	11	1.02	109
Oconee County, SC	1.07	135	1.08	148	1.02	98	1.01	214
Pickens County, SC	1.06	144	1.14	29	1.02	113	0.99	353
Spartanburg County, SC	1.17	17	1.06	184	1.02	141	0.99	327
Anderson County, TN	1.07	131	0.99	311	1.02	117	1.04	28
Bledsoe County, TN	0.89	380	0.82	407	0.95	409	0.99	350
Blount County, TN	1.11	54	1.02	280	1.02	119	1.00	256
Bradley County, TN	1.12	52	1.14	27	1.03	17	1.02	128
Campbell County, TN	1.05	171	1.14	31	1.02	179	1.01	213
Cannon County, TN	0.99	275	1.03	251	0.99	367	1.02	102
Carter County, TN	1.08	124	1.15	21	1.01	214	1.01	206
Claiborne County, TN	0.99	265	1.10	114	1.03	47	1.02	89
Clay County, TN	1.00	260	1.06	194	1.00	312	1.01	194
Cocke County, TN	1.03	199	1.02	271	1.01	247	0.97	400
Coffee County, TN	1.06	139	1.04	230	1.03	37	1.04	27
Cumberland County, TN	1.10	88	1.09	134	1.02	158	1.01	223
DeKalb County, TN	0.93	343	1.02	268	0.98	387	1.00	294
Fentress County, TN	1.01	243	0.99	306	1.01	246	1.00	285
Franklin County, TN	1.03	207	1.15	13	1.02	87	1.03	45
Grainger County, TN	0.95	323	0.98	324	0.98	391	0.98	377
Greene County, TN	1.05	166	1.15	22	1.01	272	1.01	175
Grundy County, TN	0.97	306	0.96	346	1.01	241	1.00	264
Hamblen County, TN	1.11	73	1.10	110	1.01	277	1.00	240
Hamilton County, TN	1.18	8	1.05	201	1.03	55	1.02	107
Hancock County, TN	0.77	415	0.87	400	0.93	417	0.98	369
Hawkins County, TN	1.03	196	1.02	269	1.01	257	0.99	346
Jackson County, TN	1.03	188	0.99	308	1.00	309	1.00	267

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County, State	Industrial		Functional		Occupational		Knowledge	
	Std. Score	Rank	Std. Score	Rank	Std. Score	Rank	Std. Score	Rank
Jefferson County, TN	1.06	149	1.15	24	1.03	64	1.02	143
Johnson County, TN	0.94	334	1.09	126	0.99	362	1.00	262
Knox County, TN	1.17	15	1.04	233	1.02	114	1.02	151
Lawrence County, TN	1.05	153	1.07	181	1.00	292	1.00	269
Lewis County, TN	1.01	246	1.06	189	1.01	224	1.00	228
Loudon County, TN	1.05	157	1.04	238	1.01	256	1.00	266
Macon County, TN	1.01	228	1.03	252	1.00	314	1.00	286
Marion County, TN	1.02	213	1.08	155	1.01	253	0.99	329
McMinn County, TN	1.09	100	1.03	250	1.02	138	1.01	162
Meigs County, TN	1.03	186	0.98	315	1.01	252	1.00	272
Monroe County, TN	1.02	221	0.94	365	1.00	304	0.99	312
Morgan County, TN	0.98	286	1.03	258	1.03	59	1.04	35
Overton County, TN	0.95	314	1.04	236	1.00	307	1.01	155
Pickett County, TN	0.89	383	1.04	224	0.99	365	0.99	333
Polk County, TN	0.94	328	1.10	116	1.01	263	0.97	403
Putnam County, TN	1.08	110	1.12	57	1.01	198	0.98	359
Rhea County, TN	0.97	298	0.95	352	1.02	88	0.99	307
Roane County, TN	0.91	368	0.97	338	1.04	3	1.09	1
Scott County, TN	0.98	278	1.06	196	1.02	164	1.02	119
Sequatchie County, TN	1.00	257	1.01	287	1.01	195	0.97	397
Sevier County, TN	1.02	223	0.93	373	0.97	402	0.90	420
Smith County, TN	0.96	307	0.98	317	0.99	344	1.00	275
Sullivan County, TN	1.10	86	1.11	85	1.03	61	1.03	57
Unicoi County, TN	0.92	355	1.08	158	1.02	102	1.03	68
Union County, TN	0.97	297	1.03	254	0.99	353	0.97	389
Van Buren County, TN	0.90	373	1.04	241	0.99	348	1.02	138
Warren County, TN	1.05	161	1.03	248	1.01	281	1.01	222
Washington County, TN	1.09	97	1.14	35	1.01	202	0.99	308
White County, TN	1.02	216	1.09	131	1.01	260	0.99	301
Alleghany (+ Covington city) County, VA	1.01	233	1.04	221	1.02	170	1.02	104
Bath County, VA	0.75	418	1.09	136	0.99	341	0.98	370
Bland County, VA	0.82	411	1.04	223	0.99	360	1.02	81
Botetourt County, VA	1.09	106	1.00	305	1.02	99	1.02	144
Buchanan County, VA	0.95	318	0.91	383	0.99	374	1.04	30
Carroll (+ Galax city) County, VA	1.07	137	1.07	174	1.01	226	1.00	281
Craig County, VA	0.95	316	0.93	369	1.00	318	1.01	154
Dickenson County, VA	0.87	391	0.77	414	0.98	379	1.02	99
Floyd County, VA	1.03	200	1.04	226	1.01	199	1.01	174
Giles County, VA	0.93	336	1.10	111	1.02	95	1.02	83
Grayson County, VA	0.94	326	0.98	319	0.99	347	1.01	152
Henry (+ Martinsville city) County, VA	1.10	81	1.08	143	1.02	118	1.00	258
Highland County, VA	0.92	356	0.90	386	0.98	390	1.01	178
Lee County, VA	0.98	292	0.98	327	1.00	317	1.02	148
Montgomery (+ Radford city) County, VA	1.00	254	1.04	235	1.02	94	1.01	179
Patrick County, VA	0.99	274	1.11	80	1.02	174	1.04	38
Pulaski County, VA	0.97	296	1.10	98	0.98	397	0.97	406
Rockbridge (+ Buena Vista city + Lexington city) County, VA	1.05	160	1.11	70	1.03	7	1.02	112
Russell County, VA	1.01	241	1.00	296	1.01	220	1.03	56
Scott County, VA	0.92	358	1.09	141	0.99	340	0.99	296
Smyth County, VA	1.01	231	1.12	64	1.01	211	1.01	221
Tazewell County, VA	1.05	172	1.16	11	1.02	151	1.02	122
Washington (+ Bristol city) County, VA	1.12	46	1.17	5	1.02	103	1.00	283
Wise (+ Norton city) County, VA	0.98	289	1.07	173	1.00	320	1.02	91
Wythe County, VA	1.01	237	1.13	48	1.00	324	0.98	372
Barbour County, WV	0.97	293	1.03	256	1.02	121	1.05	10
Berkeley County, WV	1.06	141	1.05	199	1.02	149	1.01	187
Boone County, WV	0.85	402	0.74	416	0.95	410	1.00	244
Braxton County, WV	0.95	324	1.02	281	0.99	363	1.00	270
Brooke County, WV	0.99	268	1.06	187	1.02	150	1.03	52

County, State	Industrial		Functional		Occupational		Knowledge	
	Std. Score	Rank	Std. Score	Rank	Std. Score	Rank	Std. Score	Rank
Cabell County, WV	1.11	63	1.15	19	1.01	200	1.01	210
Calhoun County, WV	0.77	417	0.67	419	1.00	289	1.08	2
Clay County, WV	0.88	386	0.87	399	0.99	339	1.03	63
Doddridge County, WV	0.83	409	0.69	418	0.99	372	1.03	51
Fayette County, WV	1.01	230	1.13	41	1.01	231	1.00	288
Gilmer County, WV	0.87	392	0.93	370	1.03	28	1.05	8
Grant County, WV	0.98	284	1.03	255	1.01	243	1.03	73
Greenbrier County, WV	1.03	197	1.14	34	1.01	249	0.99	324
Hampshire County, WV	1.01	245	0.99	310	1.00	297	1.01	209
Hancock County, WV	0.95	321	1.05	198	1.01	269	0.98	387
Hardy County, WV	0.85	400	0.85	404	0.95	407	0.95	416
Harrison County, WV	1.09	107	1.09	125	1.03	16	1.03	67
Jackson County, WV	0.98	290	1.05	209	1.00	287	1.00	245
Jefferson County, WV	1.01	229	1.10	101	1.02	159	0.97	392
Kanawha County, WV	1.10	78	1.05	206	1.02	78	1.03	69
Lewis County, WV	0.93	337	0.96	351	1.01	258	1.02	130
Lincoln County, WV	0.93	344	0.93	374	1.01	213	1.03	49
Logan County, WV	0.98	276	1.09	123	0.99	343	1.01	217
Marion County, WV	1.09	94	1.10	113	1.02	115	1.01	208
Marshall County, WV	1.03	206	1.06	186	1.02	92	1.02	101
Mason County, WV	0.93	348	1.10	108	1.01	188	1.04	14
McDowell County, WV	0.83	408	0.89	392	0.94	415	1.00	284
Mercer County, WV	1.08	112	1.17	6	1.02	123	0.99	306
Mineral County, WV	0.96	309	1.15	14	1.02	73	1.04	23
Mingo County, WV	0.89	381	0.96	349	0.98	392	1.03	50
Monongalia County, WV	1.00	258	1.09	137	1.01	245	1.03	47
Monroe County, WV	0.93	352	1.02	282	1.00	316	1.03	41
Morgan County, WV	1.00	259	1.08	159	1.03	56	1.01	190
Nicholas County, WV	1.00	249	1.04	242	1.00	288	0.99	318
Ohio County, WV	1.05	162	1.12	60	1.02	161	1.00	247
Pendleton County, WV	0.92	363	1.00	297	0.98	388	1.01	180
Pleasants County, WV	0.94	333	1.09	130	1.03	13	1.04	19
Pocahontas County, WV	0.92	361	1.02	277	1.02	182	1.00	239
Preston County, WV	1.01	234	1.03	257	0.99	364	1.01	207
Putnam County, WV	1.11	61	1.00	303	1.02	153	1.02	142
Raleigh County, WV	1.09	104	1.13	47	1.02	165	1.02	98
Randolph County, WV	1.03	194	1.13	40	1.02	143	1.02	82
Ritchie County, WV	0.90	374	0.88	397	1.02	142	1.02	133
Roane County, WV	0.87	389	0.77	415	1.02	169	1.06	4
Summers County, WV	0.91	364	0.96	344	1.00	295	1.01	203
Taylor County, WV	0.93	347	1.02	276	1.00	319	0.99	314
Tucker County, WV	0.91	369	1.02	272	1.01	212	0.97	398
Tyler County, WV	0.88	388	1.03	245	1.01	204	1.03	40
Upshur County, WV	1.05	167	1.08	153	1.02	175	1.04	33
Wayne County, WV	0.97	294	1.02	263	1.03	35	1.01	159
Webster County, WV	0.88	385	0.97	332	0.99	358	1.02	136
Wetzel County, WV	0.98	280	1.10	96	0.99	354	0.97	404
Wirt County, WV	0.84	404	0.89	394	1.00	303	0.99	305
Wood County, WV	1.10	80	1.14	37	1.02	173	1.00	246
Wyoming County, WV	0.91	367	0.92	377	1.00	321	1.01	165

Data source: Estimated employment by industry, Economic Modeling Specialists International (EMSI), 2012

Note: Industrial, functional, occupational, and knowledge diversity calculated per *Statistical Portrait of Economic Diversity in Appalachia* Chapter 2