

# Appalachia

THEN AND NOW

*Examining Changes to the Appalachian Region Since 1965*

**FEBRUARY 2015**



Prepared by the Center for Regional Economic Competitiveness  
and West Virginia University for the Appalachian Regional Commission

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## EXECUTIVE SUMMARY

FEBRUARY 2015



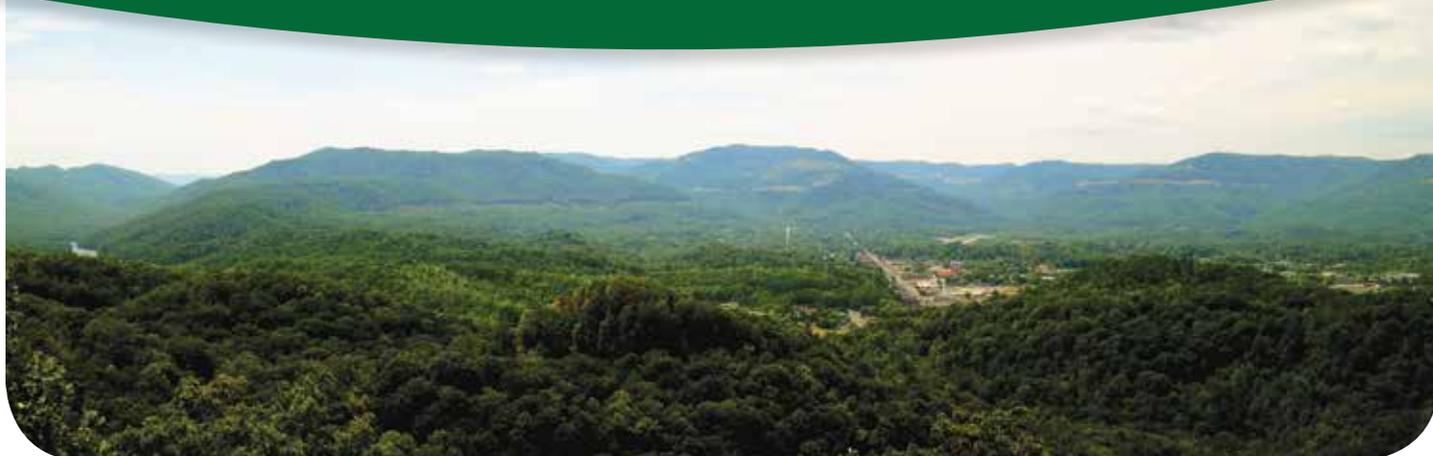
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# Assessing Appalachia's Progress: An Overview



Credit: Ken Murray

## Background

In the late 1950s, intense poverty and economic struggle characterized the existence of many of the 19 million people living in the Appalachian Region. The magnitude and vastness of Appalachia's challenges led the Region's governors in 1960 to form the Conference of Appalachian Governors, in order to develop a regional approach to addressing Appalachia's needs. In 1961, the governors took their case to newly elected President John F. Kennedy, who had been deeply moved by the poverty he saw during campaign trips to West Virginia.

In 1963, President Kennedy formed a federal-state commission, the President's Appalachian Regional Commission (PARC), and directed it to draw up a comprehensive program for the economic development of the Appalachian Region. The commission's report, released in April 1964, called on the federal government to make substantial investments in the Region to provide infrastructure and other programs essential to help the Region grow and provide opportunity for its people. The report also recommended establishing a regional organization,

the Appalachian Regional Commission (ARC), to leverage the use of existing resources and maximize new ones in an ongoing development effort.

The PARC report's recommendations were endorsed by the Conference of Appalachian Governors and cabinet-level officials, and were subsequently used as the basis for the Appalachian Regional Development Act of 1965 (ARDA), ARC's governing legislation. A broad bipartisan coalition in Congress passed the ARDA early in 1965, and President Lyndon B. Johnson signed the legislation into law on March 9, 1965.

It has now been 50 years since the passage of the ARDA. Appalachia has experienced significant progress since then, but still faces persistent challenges. This research report was undertaken to quantify and document changes to Appalachia over the past 50 years, to evaluate ARC's contribution to the Region's economic development during this period, and to assess the extent to which Appalachia remains "a region apart" from the rest of the United States.

The research summarized in this report used an array of evaluation techniques developed to evaluate the impact and legacy of ARC's investments in the Appalachian Region. In particular, this report (1) documents 50 years of socioeconomic and structural changes in the Region; (2) analyzes the economic impacts of ARC's investments, using two techniques: regional input-output analysis and a quasi-experimental method that compares ARC-assisted counties with a control group of counties outside the Region; and (3) examines stakeholder perceptions about past performance and future priorities.

## About the Appalachian Region

The current boundary of the Appalachian Region (see Figure 1) includes all of West Virginia and parts of 12 other states: Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia. It covers 205,000 square miles and 420 counties, and is home to more than 25 million Americans. Forty-two percent of the Region's population is rural, compared with 20 percent of the nation's.

In 1965, the ARDA defined the Appalachian Region as 360 counties in 11 states (Alabama, Georgia, Kentucky, Maryland, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia). The official boundary has expanded several times since then: New York joined the Commission in late 1965, adding 13 counties to the Region, and Mississippi joined in 1967, adding 20. Also in 1967, two Alabama counties, one New York county, and one Tennessee county were added to the Region. In 1990, one Ohio county was added; in 1991 one Mississippi county was added; in 1998 two Alabama counties, two Georgia counties, one Mississippi county, and two Virginia counties were added; in 2002 two Kentucky counties and two Mississippi counties were added, and in 2008, three Kentucky counties, three Ohio counties, two Tennessee counties, and two Virginia counties were added to the Region.

## About the Appalachian Regional Commission

The Appalachian Regional Commission represents a partnership of federal, state, and local governments. Established by the Appalachian Regional Development Act of 1965, ARC's mission is to help the Region achieve socioeconomic parity with the rest of the nation by partnering with the Region and advocating for sustainable community and economic development in Appalachia.

The 1964 report by the President's Appalachian Regional Commission sketched out the major priorities for ARC-funded activities: improving the Region's physical accessibility, developing the Region's economy while reducing dependence on the extraction of natural resources, and enhancing the capability of the Region's people to achieve economic prosperity.

Figure 1: The Appalachian Region



Source: Appalachian Regional Commission

Appalachia is a 205,000-square-mile region that follows the spine of the Appalachian Mountains from southern New York to northern Mississippi. It includes all of West Virginia and portions of 12 other states: Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia. Forty-two percent of the Region's population is rural, compared with 20 percent of the nation's.



Credit: Ken Murray

ARC's structure was designed to ensure an active federal-state-local partnership. There are 14 Commission members: the governors of the 13 Appalachian states and a federal co-chair, who is appointed by the president and confirmed by the Senate. Each year one of the 13 governors is elected by the others to serve as states' co-chair of the Commission. Each governor appoints an alternate, who oversees the state's ARC program and serves as the state-level contact for those seeking ARC assistance. The states' interests at ARC/Washington are handled by the states' Washington representative, who is hired by the states.

Commission members appoint an executive director to serve as the chief executive, administrative, and fiscal officer. Commission staff serve both the federal and the state members in carrying out ARC programs and activities. The Commission's administrative costs are shared equally by the federal and state governments.

All program strategies, allocations, and other policy matters must be approved by both a majority of the governors and the federal co-chair. This consensus model ensures close collaboration between the federal and state partners



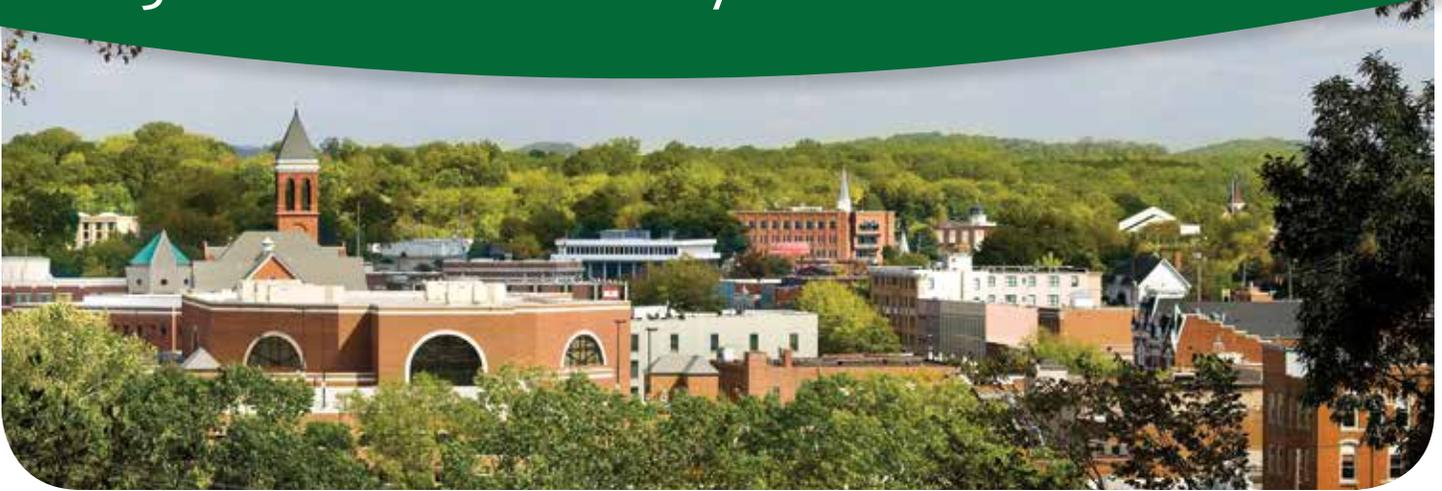
Credit: Ken Murray

in carrying out ARC's mission. Local participation is provided through multi-county local development districts, with boards made up of elected officials, businesspeople, and other local leaders.

Unlike economic development agencies that are primarily grant makers, the Commission also performs advocacy, regional planning, and research activities in combination with its

grant programs. These planning and technical assistance activities multiply the influence and shape of ARC's grant programs. No other entity has this regional mandate for Appalachia.

# A Region Apart: Measuring Appalachia's Progress toward Parity



Credit: Ken Murray

## Key Measures

The 1964 PARC report called Appalachia “a region apart—geographically and statistically,” adding that the Region had many natural advantages that had benefitted too few of its people. At that time, incomes in the Region were much lower than the U.S. average, unemployment was much higher, and the Region suffered from many other disadvantages that reflected what the PARC report called “the realities of deprivation.” These and other measures helped make the case for creating a focused regional development program.

This research uses the same ten key measures that led to the creation of the Appalachian Regional Commission to determine whether there has been measurable improvement across the Region over the last 50 years. While these ten indicators in some ways reflect the concerns of earlier decades, most are just as relevant today.

1. Large income disparity between Appalachia and the rest of the nation.

2. Relatively high unemployment.
3. Decline in employment.
4. Outmigration of people (and workers) from the Region.
5. Over-concentration of employment in extractive industries.
6. Relatively low educational attainment.
7. Relatively poor quality of available housing.
8. Health of the Region's population.
9. Relative isolation due to lack of transportation access.
10. Relative isolation due to limited communications.

## INCOME DISPARITY

### Improving, but still Problematic in some Parts of the Region

Appalachia's poverty rate has been cut in half over the past five and a half decades, from nearly 31 percent in 1960 to about 16.6 percent today. In 1960, per capita income in Appalachia was measured at about 74 percent of U.S. per capita income. A big challenge at

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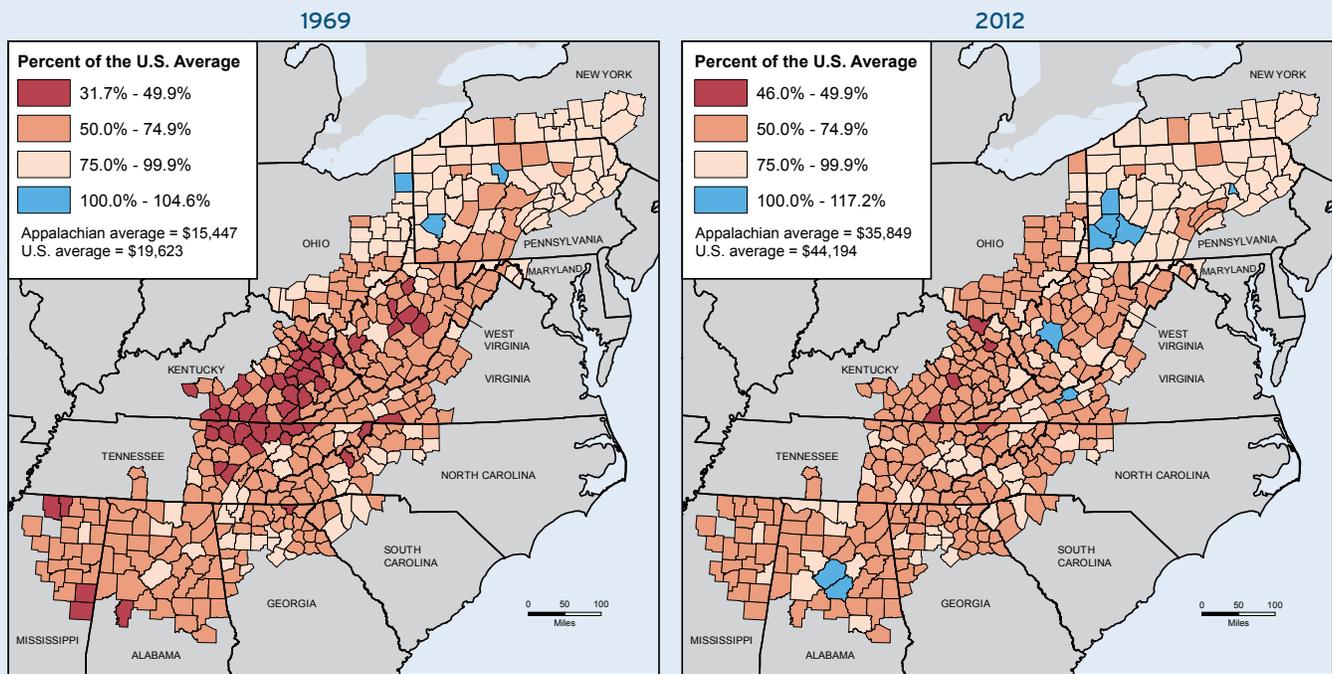
**Appalachia's poverty rate has been cut in half over the past five and a half decades, from nearly 31 percent in 1960 to about 16.6 percent today.**

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that time was the rural character of the Region and the lack of a formal economy in much of it.

Family incomes in the Region were 84 percent of the U.S. level in 1960. This number reflects the facts that the Region's families were larger and more family members earned income (many in informal ways, including barter and exchange) than was typical for the rest of the nation.

Figure 2: Per Capita Income in Appalachia, Relative to the U.S. (Percent of the U.S. Average)



Source: U.S. Bureau of Economic Analysis

Notes: Per capita income is total personal income divided by total population. The percent of U.S. average is computed by dividing the county personal income by the U.S. average and multiplying by 100. Income data are adjusted for inflation, expressed in 2012 dollars.

**By 2012, many counties were approaching socioeconomic parity with the rest of the nation, although some were still struggling, with per capita income levels below 75 percent of the U.S. average.**

Currently, government transfer payments account for nearly 24 percent of personal income in the Appalachian Region. By comparison, those payments account for 17.5 percent of personal income nationally.

Figure 2 shows that per capita income in many counties across Appalachia in 1969 was less than half the national average, and that significant progress had been made by 2012, with only five counties still having such a low income. By

2012, many counties were approaching socioeconomic parity with the rest of the nation, although a number of counties were still struggling, with per capita income levels below 75 percent of the U.S. average.

**UNEMPLOYMENT**  
**Much Improved Compared with the Nation as a Whole**

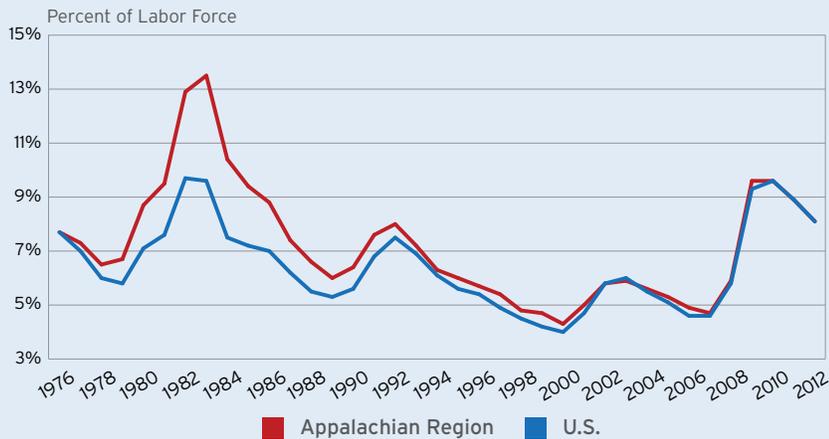
In 1960, the Appalachian Region's unemployment rate stood at 7.1 percent, more than 2 points higher than the

national rate of 5.0 percent. The lack of job opportunities in the Region was due to declines in key sectors, including mining and agriculture. As the Region's economic structure evolved, its unemployment rate converged with that of the nation as a whole, as illustrated in Figure 3.

The Region's unemployment rate tracked slightly higher than the rest of the nation's in the late 1970s, 1980s, and 1990s, but never quite matched the U.S. rate until the recession of the early 2000s. However, since the 2008-09 recession, the Region's unemployment rate has tracked the U.S. rate closely, with a few persistent pockets of joblessness.

Despite the improvement in the unemployment rate, labor force participation rates in Appalachia have remained well below the national average throughout the past 30 years.

Figure 3: Unemployment, Appalachia and the U.S.

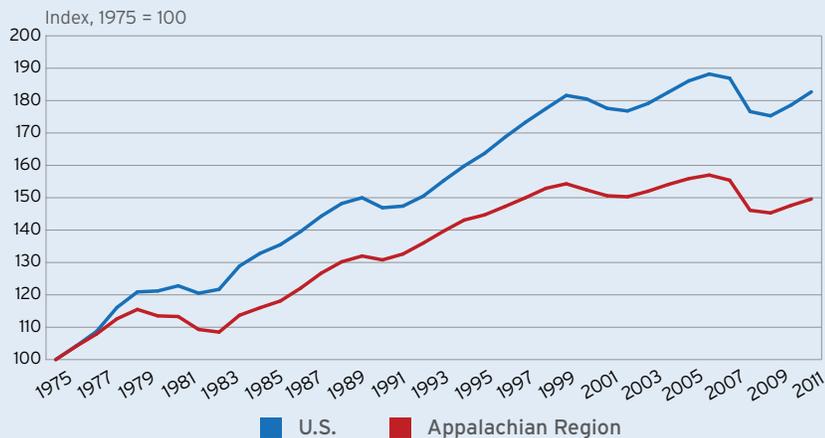


Source: U.S. Bureau of Labor Statistics' 1990 to 2012 published rates and 1976 to 1989 unofficial rates. Data prior to 1976 were not available.

**In the 1950s, Appalachian businesses were shedding jobs, while the U.S. economy grew: the nation increased its total employment by 17 percent during the decade, while the Appalachian Region lost 1.5 percent of its total employment.**

was growing, but more slowly than employment in the nation as a whole.

Figure 4: Total Private Employment, Appalachia and the U.S.



Source: U.S. Bureau of Labor Statistics

National recessions have been particularly harsh to the Appalachian economy. The recession in the early 1980s began a period of much slower employment growth in the Region—slower than the growth in the rest of the nation (see Figure 4). The 1981-82 recession caused rapid employment decline in Appalachia, while employment in the rest of the nation simply stagnated. The Region's reliance on steel and coal employment drove much of that decline. The recessions of 1990-91 and 2001 also adversely affected the Region.

As the U.S. economy transformed over the past 30 years, regional economic growth kept pace with it, but the Region started from a much smaller base. While the rest of the nation experienced economic expansion, driven in part by the real estate bubble, Appalachia missed out on that growth period. But Appalachia was not affected as seriously as the rest of the nation was by the real estate market crash in 2008. In 2012, employment in Appalachia stood at nearly 50 percent above its 1975 level, while the national figure was nearly 83 percent above its 1975 level.

The most recently available data found national labor force participation at 64.2 percent of working-age adults (age 16 and above), compared with 59.5 percent of Appalachian working-age adults. Part of the difference can be explained by greater participation in the informal barter economy in the Region, and a larger proportion of the population receiving government transfer payments, as well as the limited job opportunities in the Region's rural communities.

## EMPLOYMENT CHANGE

### Lagging, with a Widening Gap

In the 1950s, Appalachian businesses were shedding jobs, while the U.S. economy grew. While the nation increased its total employment by 17 percent during the 1950s, the Appalachian Region lost 1.5 percent of its total employment. Among the goals of ARC was to help stabilize this job loss. By the 1970s, Appalachian employment

## POPULATION CHANGE

### Much Slower Growth, Older Population

During the past generation, the U.S. population has grown at a pace nearly twice that of the Appalachian Region's (see Figure 5). This is due in part to the fact that the vast majority of Appalachian counties have a smaller share of young people (those below age 20) and a much greater (and more rapidly growing) share of seniors (those aged 65 and older) than does the nation.

Today, the area remains much more rural than the rest of the nation. Forty-two percent of the people in Appalachia still live in rural areas, compared with 20 percent nationally; and Appalachians who live in cities are much more likely to live in smaller urban centers than are residents of other parts of the country.

Throughout the country, young adults have flocked to major cities for access to jobs and other opportunities. Since there are few major cities in the Appalachian Region, it is not surprising that the Region continues to witness a steady outmigration of adults between the ages of 18 and 35. This trend contributes to the more rapidly aging population in the Appalachian Region.

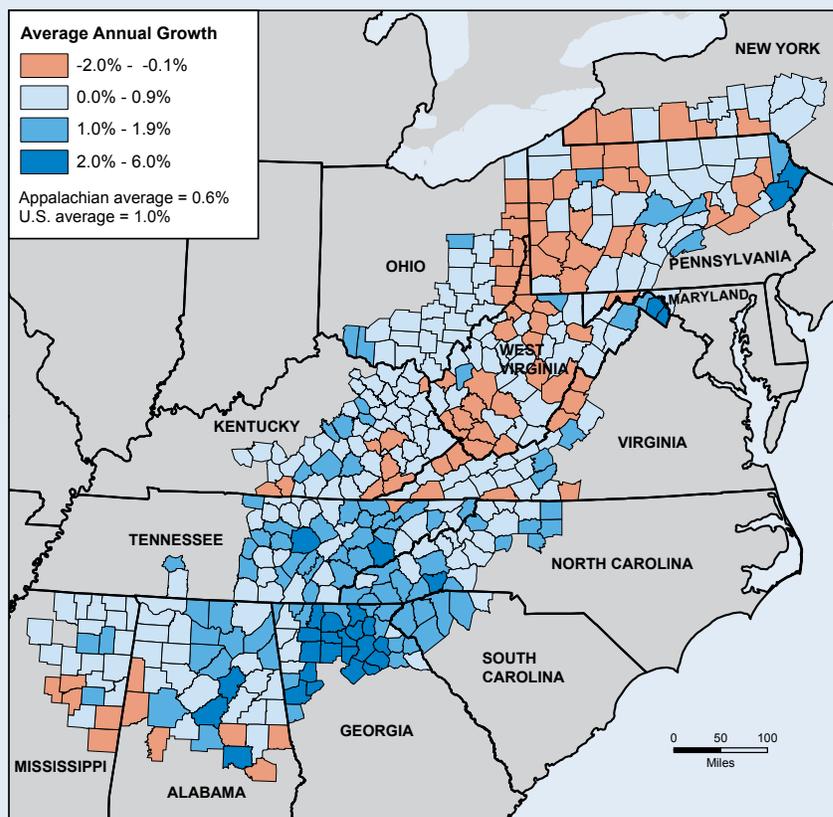
Recessionary periods exacerbate outmigration. During the economic stagnation of the 1980s, population growth in Appalachia languished. Even when the Region's population began to grow again in the early 1990s, its growth rate significantly trailed the U.S. rate.

## ECONOMIC AND INDUSTRY MIX

### Converging toward the U.S. Norm

The Appalachia of 1964 was heavily dependent on large-scale logging and coal mining, but employment in both sectors was rapidly declining. The job losses in these industries were particularly hard on the Region, because they were often in the highest-wage

Figure 5: Average Annual Population Growth in Appalachia, 1969-2012



Source: U.S. Bureau of Economic Analysis

sectors and served as a primary source of family-sustaining wages. The declines limited economic opportunities for area residents and contributed to stagnated regional economic growth.

At the same time, the 1950s and 1960s were a period in which U.S. manufacturing reigned supreme. Building on a very small base, growth in the Region's manufacturing sector was much lower than in the nation as a whole. The raw materials extracted from the hills of Appalachia were used modestly in the Region's growing manufacturing sector; most were shipped to cities in the industrial heartland to supply factories there. When there was a shock to the business cycle, it was Appalachia that felt

the impacts first, as manufacturers cut back on their orders in response to drops in demand.

Over time, manufacturing employment adjusted to consumer demand, shifts in energy sources, advances in product materials, and access to global supply chains, as well as to improvements in productivity and relative loss of U.S. manufacturing competitiveness. As a result, the Region's extractive industries required less labor, and employment in those sectors has continued to decline. Manufacturing employment has also declined—not only in Appalachia, but nationally as well. The Region is becoming less dependent on employment from resource-extractive

**The Region is becoming less dependent on employment from resource-extractive and goods-producing sectors, and more dependent on the service sector for employment.**

and goods-producing sectors, and more dependent on the service sector for employment.

As Figure 6 demonstrates, the Region's economy trails the U.S. economy as a whole in its transition to becoming more service-oriented. The service-producing sector now accounts for more than 75 percent of the Region's employment. According to data from the U.S. Bureau of Labor Statistics, service-sector employment increased nationally from 3 million jobs in 1979 to nearly 6

million jobs in 2012 (even after declines attributed to the recession of 2008-09). Still, one-quarter of the economy relies on highly cyclical manufacturing and extractive industries or the government sector. Manufacturing employment in Appalachia declined from its peak of 2.2 million jobs in 1979 to 1.2 million jobs in 2012, while mining and natural resources-related employment peaked at 241,000 workers in 1979 and stabilized at about 131,000 workers in 2012.

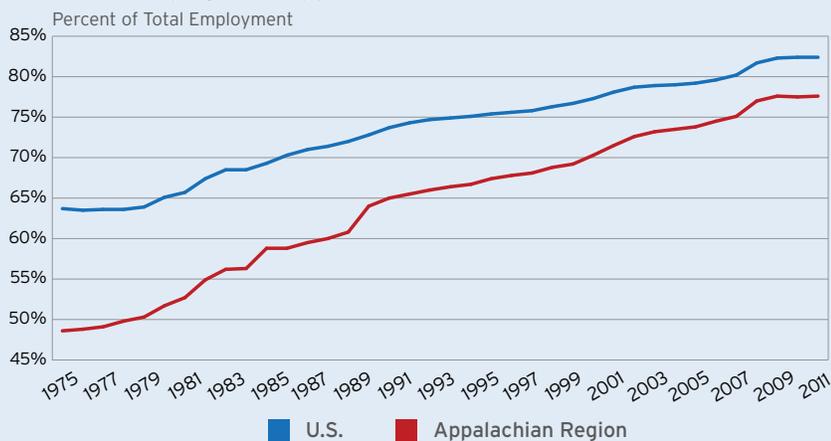
**EDUCATIONAL ATTAINMENT**  
**The Gap is Wide, and Widening**

In 1960, the Appalachian Region struggled with a poorly educated populace. Ninety-two percent of the U.S. population over the age of 25 had completed the 5<sup>th</sup> grade, compared with 89 percent of the Appalachian population. Thirty-two percent of the Appalachian population had completed high school (10<sup>th</sup> grade or higher), compared with 42 percent of the U.S. population. Only 5 percent of Appalachian residents had earned a college degree; compared with nearly 8 percent of all Americans.

As it is today, education 50 years ago was seen as a pathway to prosperity. Concern over the Region's educational attainment rates at the time was acute, because primary and secondary school systems were funded locally, by tax bases often limited by low income levels in the community. Breaking this cycle required investments from outside the Region.

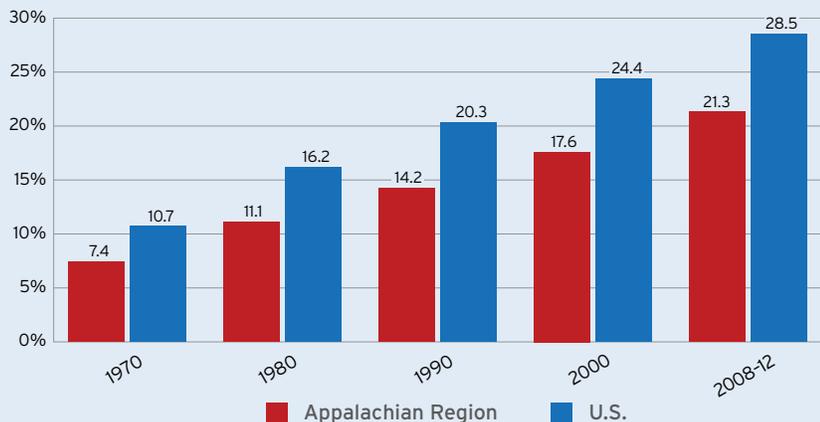
Today the Appalachian Region has achieved near-parity with the nation in high school graduation rates, an important accomplishment since the 1960s; but the Region remains behind in post-secondary educational attainment. In today's economy, the best-paying jobs in the service sector (the sector that dominates the economy now) are highly knowledge-intensive. A high school education is seen as a

**Figure 6: Private Service Sector Employment as a Share of Total Private Employment, Appalachia and the U.S.**



Source: U.S. Bureau of Labor Statistics

**Figure 7: Share of Population 25 Years+ with a Bachelor's Degree or Higher, Appalachia and the U.S.**



Source: U.S. Census Bureau, 1970, 1980, 1990, and 2000 Censuses, and 2008-2012 American Community Survey

prerequisite, but not sufficient, for economic success.

Increasingly, businesses demand post-secondary education from workers receiving middle-class wages. Using “college graduates” as a proxy measure for the phenomenon reveals steady improvements in the Region, but the improvement is not as rapid as it is in the rest of the nation.

Figure 7 shows that the share of the Region’s population over age 25 with at least a bachelor’s degree has tripled since 1970 (to 21.3 percent). However, at 28.5 percent, the share of the nation’s population over 25 with at least a bachelor’s degree has nearly tripled, and the gap between the share of Appalachian adults and the share of the nation’s adults with a college degree has widened steadily over the past two generations.

## HOUSING QUALITY

### Significantly Improved, but Continues to Lag

Not long ago, many homes in the Region lacked adequate plumbing and relied on water from local streams. Many houses were dilapidated, with 7.5 percent in such poor shape that they were deemed a danger to the health and safety of the families living in them. The PARC report found that the median value of homes in the Region was 27 percent below the median value of homes in the rest of the nation, and one in four homes in the Region was valued at less than \$5,000 in 1960, nearly double the national rate.

ARC investments were targeted to help address these concerns, and the Region has made great strides in moving toward parity with the nation on housing quality. Today, 3.2 percent of Appalachian houses lack complete plumbing, compared with 2 percent nationally, as illustrated in Figure 8; a stark improvement from the 13.6 percent of houses in Appalachia that lacked complete plumbing in 1970.

## The share of the Region’s population over age 25 with at least a bachelor’s degree has tripled since 1970.

## HEALTH

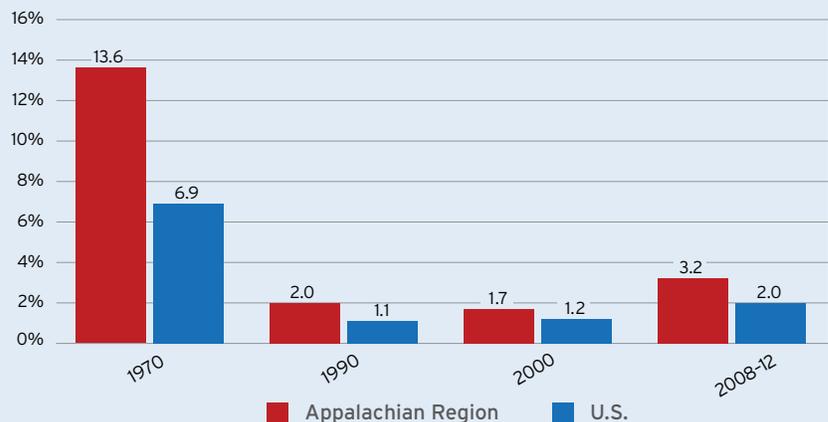
### Losing Ground

Combined with other factors, individual health is a prime indicator of quality of life and impacts economic vitality. In the early 1960s, living standards in Appalachia, as measured by the health and well-being of the population, were well below those of the rest of the nation, and they remain so today.

One of the most basic measures of a region’s health is the mortality rate of its population. The Region’s mortality rate declined rapidly during the 1960s and 1970s, as did the nation’s, due to improved medical care and preventative care. Infant mortality rates, in particular, dropped by more than two-thirds in Appalachia, moving much closer toward parity with the rest of the nation. Today, however, overall

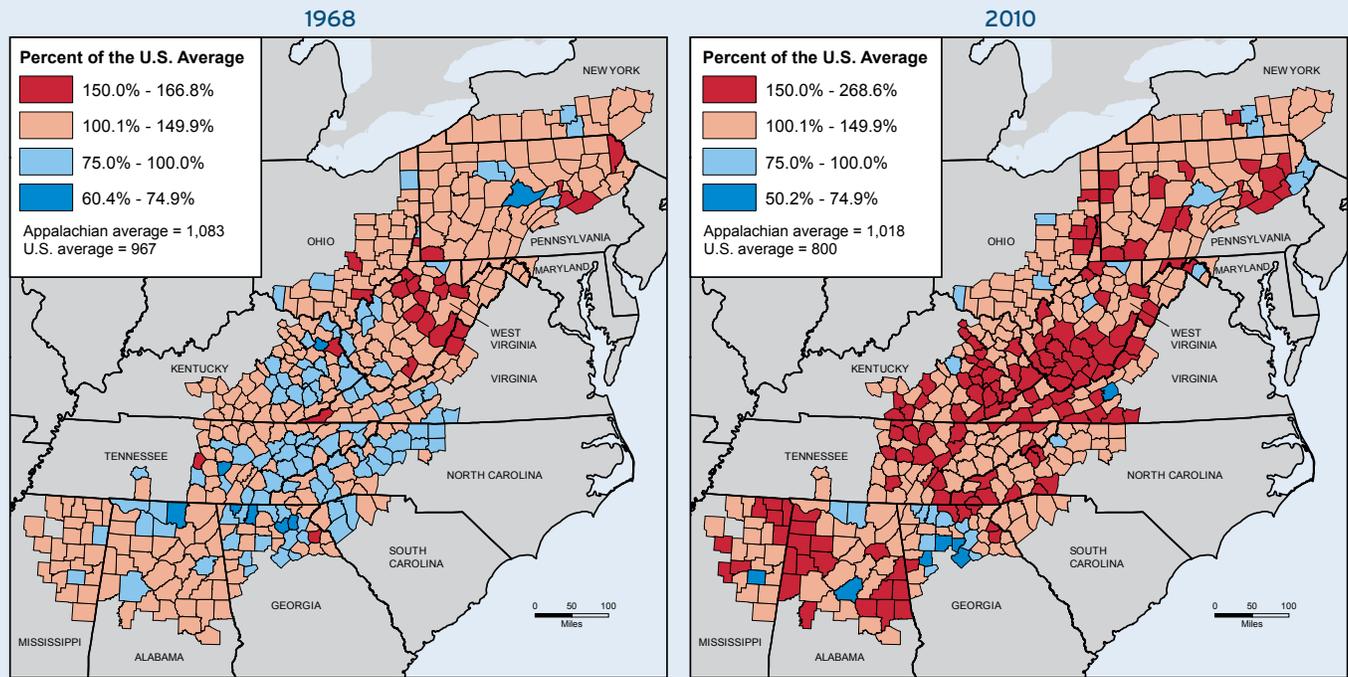
mortality rates are up in the Region, even as they continue to fall in the rest of the country. One reason for Appalachia’s increased mortality rates could be rising rates of obesity; other possible explanations include lack of access to care and the Region’s aging population. As shown in Figure 9, the problem has become particularly acute in areas of Central and Southern Appalachia. These same regions have also seen a rapid rise in the prevalence of diabetes, suggesting that health issues may be increasingly contributing to a lower quality of life there. This is a particularly important problem for government; in 2012 more than one third of the Region’s population was covered under government health insurance. The Region’s rate of population covered by government health insurance has been consistently higher than the rest of the nation’s for the past

Figure 8: Percent of Homes Lacking Complete Plumbing Facilities, Appalachia and the U.S.



Source: U.S. Census Bureau, 1970, 1990, and 2000 Censuses, and 2008-2012 American Community Survey

**Figure 9: Mortality Rates in Appalachia (Deaths per 100,000 People), Relative to the U.S. (Percent of the U.S. Average)**



Source: U.S. Centers for Disease Control and Prevention

Notes: A mortality rate is computed by dividing the number of deaths by total population and multiplying it by 100,000. These rates are not adjusted to differences in mortality rates by age. The percent of U.S. average is computed by dividing the county share by the U.S. average and multiplying by 100.

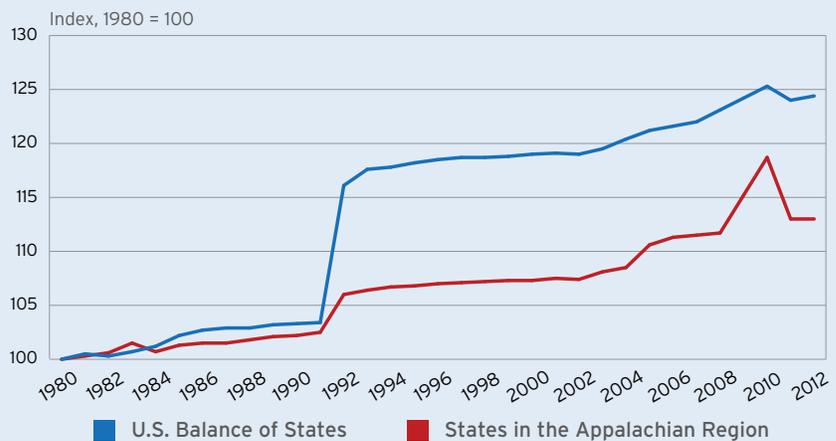
25 years. (These data are from years prior to the implementation of the Patient Protection and Affordable Care Act.)

## ISOLATION: TRANSPORTATION ACCESS

### Lagging, Fallen Behind

One of the most critical challenges facing the Appalachian Region in 1964 was the isolation caused by its limited transportation network. The Interstate Highway System, in the midst of a tremendous building boom in the 1950s, largely bypassed Appalachia, going through or around the Region's rugged terrain as cost-effectively as possible. This resulted in limited access to the rest of the nation for large swaths of Appalachia, and constituted barriers to trade with the rest of the nation and with global markets. Construction of the Appalachian Development Highway System (ADHS), authorized by the ARDA, was given priority as a key to economic development. The system was designed

**Figure 10: Federal-Aid Highway Miles (Indexed to 1980 Mileage Levels)**



Source: Federal Highway Administration, Highway Statistics

to generate development in previously isolated areas; to connect Appalachia federal-aid to, and to supplement, the interstate system; and to provide access to areas within the Region as well as to markets in the rest of the nation.

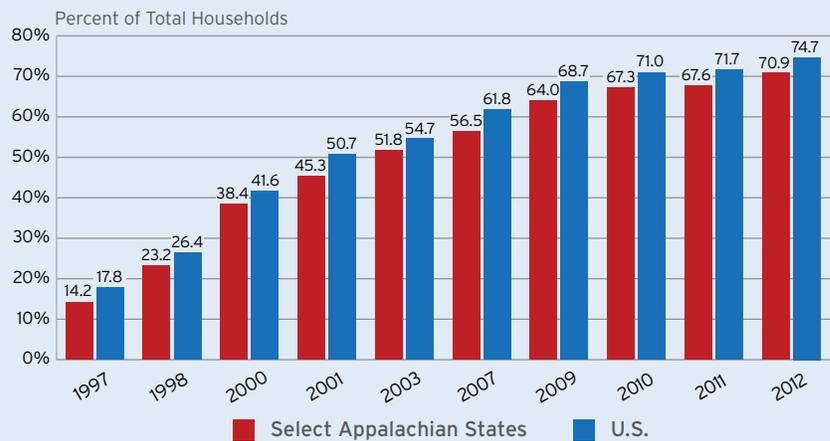
For many years, Appalachian states built federal-aid highway miles at a rate comparable to that of the rest of nation (see Figure 10). A major increase in the rate of miles built in both the Region and the rest of the nation occurred

in 1992; another increase occurred in 2005 as part of a steady increase in funds available with the passage of Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Resources made available through the 2009 American Recovery and Reinvestment Act also helped to increase the number of highway miles built, both regionally and nationally. However, recent data suggest that declines in federal funding have impacted the Appalachian Region more than the rest of country, partly because the relative per-mile cost of building major highways through mountainous terrain and the sparse population in these areas make it difficult for Appalachian states to compete for limited federal funds.

**ISOLATION:  
TELECOMMUNICATIONS CAPACITY**  
**Improving, but Lagging in the Form of Broadband**

Another key aspect of the Region’s isolation in the 1960s was its relative inability to communicate with the outside world. This limited not only the inflow of new ideas and technologies, but also the ability of area residents and leaders to imagine a different future. In the 1960s, a key public policy goal was universal access to telephone service. Many areas of Appalachia lacked access to phone service, and, often, where it was available, multiple families shared party lines. As late as 1970, 16.2 percent of area homes did not have access to phone service, compared with 13 percent of households nationally. By 2012, the proportion of households without phone service in the Appalachian Region was about 2.8 percent, very nearly the same as the national average of 2.5 percent.

**Figure 11: Percent of Households Using the Internet**



Note: Select Appalachian States include Alabama, Pennsylvania, and West Virginia  
Source: U.S. Census Bureau, Current Population Surveys

Today, the gap in use of the Internet—the communications engine driving the information and knowledge economy—is more relevant. As Figure 11 illustrates, some Appalachian states are improving as rapidly as the rest of the U.S. in this area, but the Region began the Internet era of the late 1990s lagging other parts of the country in Internet use.

What these data mask, however, is the fact that Internet access alone is not enough: it is important to have access to high-speed Internet services. Anecdotal evidence from interviews with local leaders suggests that Appalachia trails badly in the affordability of Internet service, as well as in access to high-speed broadband, especially at the household or business-unit level. High-speed Internet represents the superhighway for transporting services to customers in today’s global economy. Many local leaders understand that building this infrastructure is as vital as building major highways for helping

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**Building telecommunications infrastructure is as vital as building major highways for helping Appalachian companies compete and win in the high-growth technology industries that offer the best-paying jobs for area citizens.**

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Appalachian companies compete and win in the high-growth technology industries that offer the best-paying jobs for area citizens.

# Impacts from Appalachian Regional Commission Investments



Credit: Ken Murray

## Investments in Appalachia

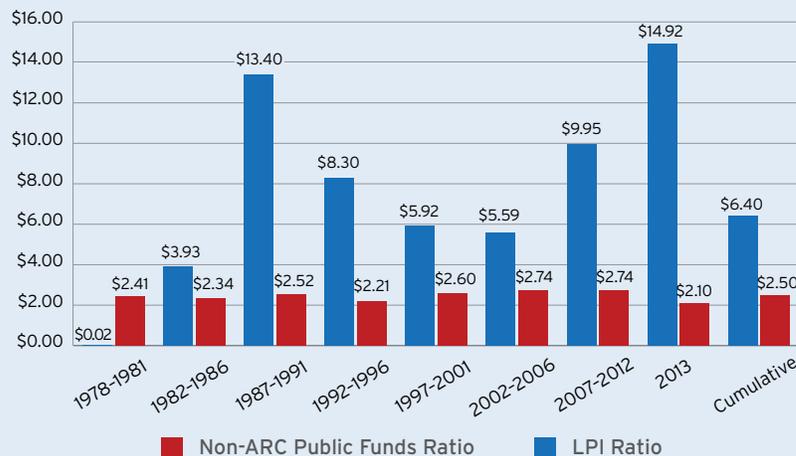
More than \$25 billion in public investments<sup>1</sup> (through FY 2013) have been made in the Appalachian Region by ARC and other federal, state, and local agencies in both highway- and non-highway-related activities. Since 1965, ARC has made investments in nearly 25,000 strategic non-highway activities in the Region. These investments were funded by \$3.8 billion in appropriated ARC funds and \$9 billion in matching funds from other federal, state, and local funding sources. Since 1978, these matching funds have averaged \$2.50 for each \$1.00 in funds invested by ARC. This ratio has been relatively steady; in the most recent five-year period (2007-2012), it was 2.74 to 1.

ARC investments in Appalachia have attracted nearly \$16 billion in leveraged

private investment (LPI), the dollar amount of private-sector financial commitments (non-project funds), that result from an ARC investment. Since 1978, when ARC began tracking this data, for each \$1 in funds invested by ARC in non-highway projects, an average of \$6.40 in private-sector funding has been leveraged (see Figure 12). This figure was nearly 10 to 1 in the most recent five-year period (2007-2012) and nearly 15 to 1 in 2013. See Figure 12 for

**Since 1965, ARC has made investments in nearly 25,000 strategic non-highway activities in the Region.**

**Figure 12: Ratio of ARC Investments to Non-ARC Matching Project Funds and to LPI (Non-Highway Investments)**



<sup>1</sup>This figure includes \$3.8 billion in ARC Area Development Program funds, \$9 billion in other federal, state, or local public match dollars connected to these investments, \$9.1 billion obligated to the Appalachian Development Highway System, including funds from TEA-21, SAFETEA-LU and their extension acts, and \$3.5 billion in state and local funds, assumed to be a 20 percent ADHS match. This total does not include 100 percent state- and local-funded highway projects.



Credit: Ann Hawthorne

## Economic Impacts from ARC Non-Highway Grant Investments

This section quantifies the employment and income impacts attributable to the ARC non-highway grant investments made in the Region over the years. ARC's investments have helped stimulate economic activity that has fueled the hiring of workers and the purchase of material goods and services needed to put new developments in place. Income from all of these activities fueled additional demand, further multiplying the total economic impacts of these investments.

ARC investments have been made over a 50-year time span, presenting a unique challenge in measuring these multiplier impacts. The economic structures of the Appalachian Region and the nation have changed significantly, so impact models must be recalibrated over time to reflect those structural changes. For this study, a customized input-output (I-O) model for the Appalachian Region was constructed, with adjustments to

data on non-ARC matching funds and LPI for ARC non-highway investments.

Through FY 2013, more than \$9 billion has been obligated to the states for the Appalachian Development Highway System (ADHS). An additional \$3.5 billion has been provided in state and local match funds. As of September 30, 2014, a total of 2,762.9 miles, or 89.4 percent of the 3,090 miles authorized for the ADHS, were completed or under construction (see Figure 13). Another 96 miles were in the final design or right-of-way acquisition phase, and 231.2 miles were in the location studies phase.

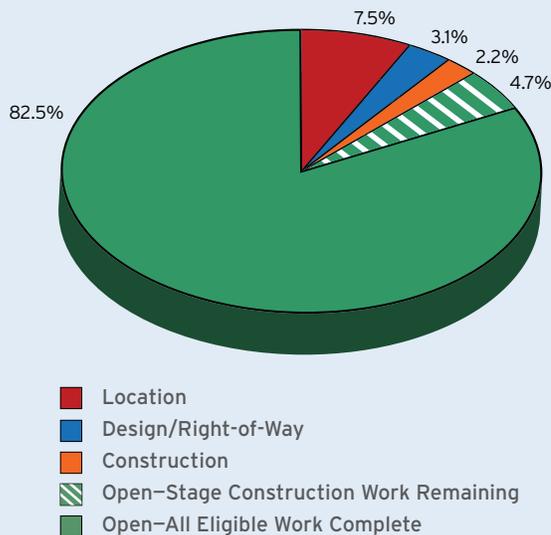
**Many of the new jobs created over the past five decades were in professional and technical services, manufacturing, trade, and construction industries.**

the modeling made after every five-year period to help account for measured economic changes. Detailed investment data were provided by the Appalachian Regional Commission and were assigned to one of 39 final demand categories, and then aggregated to one of 11 industry sectors.<sup>2</sup>

The results from the economic modeling show that the \$3.8 billion in ARC non-highway investments (Area Development Program) were responsible for creating nearly 312,000 jobs and \$10 billion in added earnings in the Region. On average, annually, these ARC funds supported an estimated 6,364 jobs and \$204 million (in constant 2013 dollars) in earnings.

Figure 14 shows the detailed results from the I-O analysis. Many of the new jobs created were in professional and technical services, manufacturing, trade, and construction industries. These figures include the direct, indirect, and induced job growth. Direct effects are the employment directly attributable to the spending of ARC funds within a particular industry. Indirect effects are the spending and employment of suppliers and contractors to produce inputs for the industry. Induced effects

**Figure 13: Appalachian Development Highway System Status of Completion as of 9/30/2014**  
3,090 Eligible Miles



Source: Appalachian Regional Commission

<sup>2</sup> The investment data covered ARC Area Development Program investments made from 1965 to 2013.

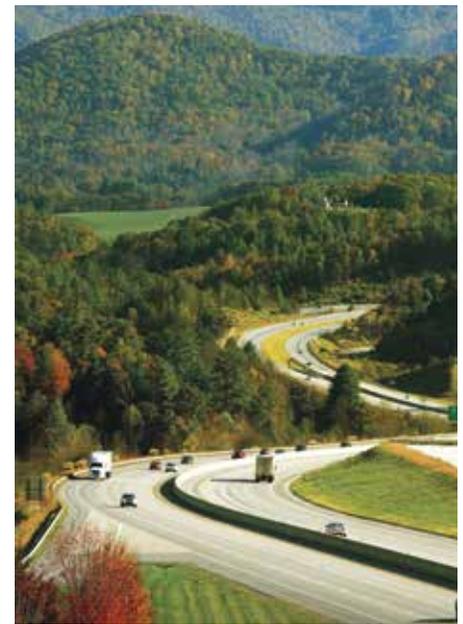
include household spending on goods and services by both industry employees and the employees of contractors and suppliers (both direct and indirect employees). Total economic impact is the sum of direct, indirect, and induced effects.

Only the ARC portion of funds for non-highway investments was included in the economic modeling produced for this study. In every ARC-funded activity there are also public monies from other federal, state, and local sources, as well as the likelihood of leveraged private investment. Therefore, the total employment and income impacts to the Region would be substantially higher if all funding sources were included in the modeling. However, in this report, only the ARC portion of funds was modeled in order to prevent attributing the overall economic effect from a combined total investment to only the ARC portion of that investment. Therefore, the

figures reported here should be read as conservative estimates of the ultimate employment and income effects from various ARC-supported non-highway investments. Given the large amount of non-ARC dollars that were directed to many of these investments, the actual resulting employment and income effects may be many times greater.

### Economic Impacts from ADHS Investments

In 1964, the President’s Appalachian Regional Commission reported to Congress that economic growth in Appalachia would not be possible until the Region’s isolation had been overcome. Because the nation’s Interstate Highway System sought out the most cost-effective routes, it largely bypassed the rugged terrain of the Appalachian Region. Congress responded by creating the Appalachian Development Highway System (ADHS) expressly to provide



Credit: Ken Murray

growth opportunities for the residents of Appalachia—the same benefits afforded the rest of the nation through the construction of the Interstate Highway System. The ADHS, a system of modern highway corridors, would

Figure 14: Employment Impacts—Appalachian Region Totals (Non-Highway Investments)

Period	Farming	Agricultural Services, Forestry, and Fishing	Mining	Construction	Manufacturing	Transportation and Public Utilities	Wholesale and Retail Trade	Finance, Insurance, and Real Estate	Services	Federal Civilian Government	State and Local Government	Total
1965-1971	1,989	2,057	962	3,932	11,852	3,282	10,609	2,885	41,130	1,545	5,308	85,551
1972-1976	2,396	2,533	642	5,132	14,387	3,963	12,645	3,378	47,448	1,810	6,289	100,622
1977-1981	1,149	1,225	639	4,622	7,630	2,041	7,499	2,028	21,571	844	3,527	52,775
1982-1986	424	553	247	1,906	2,664	684	2,884	755	6,369	291	1,224	18,002
1987-1991	255	333	111	1,315	1,546	415	1,862	474	4,282	176	695	11,463
1992-1996	309	498	123	1,914	1,975	598	2,661	537	5,662	231	916	15,426
1997-2001	169	308	61	2,098	1,203	395	1,658	335	3,576	18	134	9,954
2002-2006	134	147	53	1,548	811	259	948	173	4,300	13	106	8,491
2007-2013	122	162	57	1,952	760	241	971	195	4,970	10	113	9,552
All Years	6,946	7,816	2,895	24,420	42,828	11,877	41,736	10,760	139,307	4,937	18,312	311,835

replace a network of worn, winding two-lane roads, with the aim of generating economic development in previously isolated areas, supplementing the interstate system, and providing access to areas within the Region as well as to markets in the rest of the nation and overseas (see Figure 15).

Additionally, as part of the ADHS program and its federal funding authority, Congress authorized use of a portion of the funds for local access roads, at the discretion of ARC member states. This approach provides the flexibility to meet local needs with a financing mechanism to support a variety of economic development opportunities throughout the Region. In addition to using ADHS funds for local access road projects, a state may also use ARC non-highway funds and have its state department of transportation and the Federal Highway Administration administer the project.

The ARDA authorized construction of 2,350 miles of the ADHS; revisions to the ARDA over the years increased the authorized mileage to 3,090.

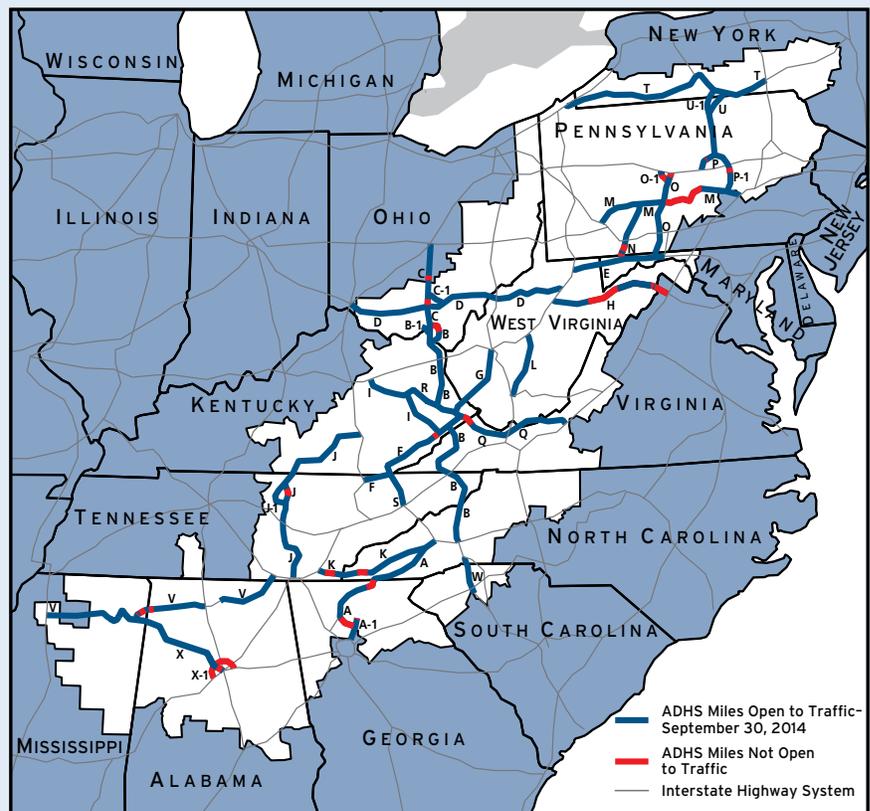
A recent study of the ADHS measured the economic development and safety benefits to the Region from sustained highway-system investments. The June 2008 study, conducted by Cambridge Systematics, Inc., with Economic Development Research Group, Inc., assessed the travel performance, trade, and economic development impacts that would result from completing the ADHS.<sup>3</sup> The study also assessed connectivity, accessibility, and how well the ADHS corridor improvements would connect Appalachian people and businesses to other highway facilities, multimodal transportation, and economic markets after completion of the ADHS.



Credit: Ken Murray

**Recent studies of the ADHS measured the economic development and safety benefits to the Region from sustained highway-system investments and found significant positive results.**

**Figure 15: Appalachian Development Highway System**



Source: Appalachian Regional Commission

<sup>3</sup> Cambridge Systematics, Inc., Economic Development Research Group, and HDR Decision Economics. *Economic Impact Study of Completing the Appalachian Development Highway System*. Appalachian Regional Commission, June, 2008.



Credit: Ken Murray

The study found that total economic impacts on the Region of completing the ADHS would include the direct effects of reduced travel time and costs, along with increased regional competitiveness via market accessibility gains and multiplier effects. These effects would gradually increase over time and by 2035 would result in an estimated 80,500 jobs, \$5.0 billion in increased value-added production, and \$3.2 billion in increased wages for workers in the Region. At the national level, the estimated return on investment would yield \$3.00 for every \$1.00 invested.

### Assessing ARC's Role in Achieving Growth in the Region

Reviewing ARC's role in helping Appalachia develop its economy and the funds it has invested in the Region to do so raises the question as to whether this experiment in regional economic development has paid off for U.S. taxpayers. The research aimed to answer this question by using a quasi-experimental methodology that compares counties in the Appalachian Region to similar counties outside the Region. The results of this research

indicate that employment and per capita income grew at a faster rate in the Appalachian counties than in the non-Appalachian counties, as a result of the ARC investments.

Prior to this report, assessing the impact of Appalachian Regional Commission investments in the Region's counties was the topic of the seminal Isserman and Rephann study (1995) of the Region, in which the authors sought to assess whether actual changes in the Appalachian Region could be attributed to ARC programs.<sup>4</sup> They determined that answering the question of the effectiveness of ARC's investments requires positing an alternative scenario: if the ARC investments had not taken place, would the Region have grown less rapidly? Although this seems like a daunting task, the methodology outlined in Isserman and Rephann (1995) can be used to assess the effectiveness

<sup>4</sup>Isserman, Andrew and Terrance Rephann. "The Economic Effects of the Appalachian Regional Commission: An Empirical Assessment of 26 Years of Regional Development Planning." *Journal of the American Planning Association*, vol. 61, no. 3, summer 1995, pp. 345-364.

of these investments and answer the counterfactual question posed above.

The Quasi-Experimental Method (QEM) is an empirical technique designed to answer such counterfactual claims. Somewhat similar to a traditional scientific experiment, the QEM methodology uses matching techniques to assign each "treated" entity (or counties in this instance) with one (or more) "control" entities (or counties). Then, QEM uses statistical methods to see if the difference in the outcome variable in the two entities is statistically significant. If the matching is done accurately and the differences between treatments and controls are statistically different, it can confidently be stated that the divergence is due to the policy implementation.

Isserman and Rephann (1995) conducted a study in which they constructed a counterfactual by matching counties in Appalachia that received ARC funding (i.e., the "treated" group) to counties outside of Appalachia that did not receive any ARC funding (i.e., the "control" group). The matching of treated counties and control counties is a fundamental step in this process and "closer" matches tend to provide more convincing evidence.

The results presented here use a methodology similar to the one used by Isserman and Rephann (1995), with two differences designed to improve the matching process. First, while the 1995 Isserman and Rephann study used 24 variables to match the treated and control counties, this study used five additional variables (a total of 29 variables) to assist in the matching. The use of these additional variables in the matching algorithm ensured a match as good as, or better than, the match obtained by Isserman and Rephann. Second, this study used a different econometric technique to implement the matching, based on developments that have occurred in the field since the 1995 study.

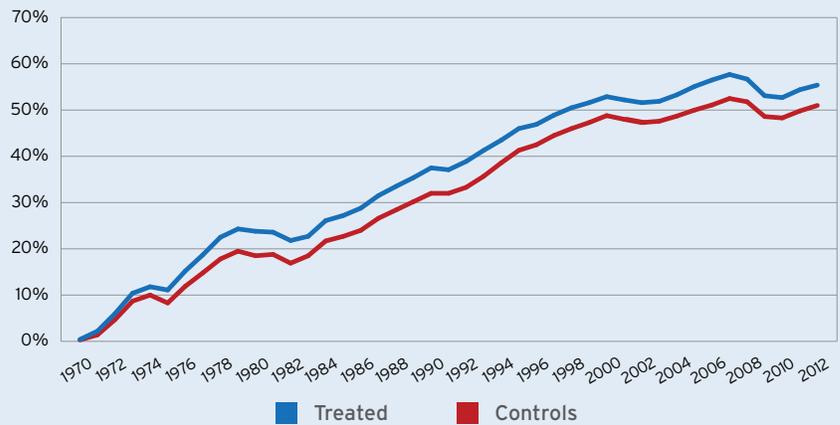
The empirical examples undertaken in this study concentrate on two important metrics: the growth in employment and the growth in per capita income. Job growth is one economic indicator that is important to many stakeholders, as it measures how economically viable a region is in terms of employment. The same may be said for the importance of per capita income. The results of the analysis using these two metrics follow.

The first set of results appears in Figure 16, "Employment Growth Rates between Treated and Control Counties." The results indicate that for virtually every year used in the analysis (i.e., from 1970 to 2012), the counties in the Appalachian Region (treatment counties) had higher employment growth than the matched counties that did not receive ARC funding. The average difference in growth rates between the counties that obtained ARC investments and those that did not receive ARC investments was approximately 4.2 percent. This statistical analysis provides evidence that ARC investments led to higher employment growth over the time period 1970-2012.

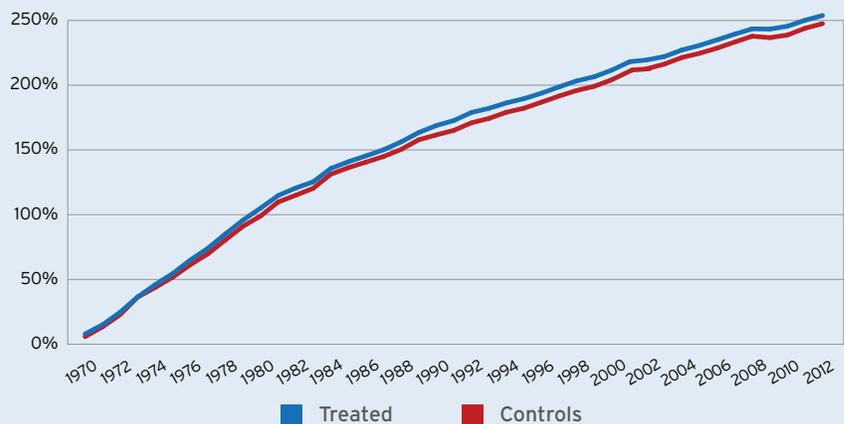
The second set of results, illustrated in Figure 17, "Per Capita Income Growth Rates between Treated and Control Counties," indicates that the per capita income growth rate in counties that received ARC investments grew an average of 5.5 percent more over the time period than the counties that did not receive ARC investments, providing evidence that ARC investments led to higher growth in per capita income over the time period 1970-2012.

In summary, using a well-established QEM technique, the research shows that employment growth and per capita income growth over the period 1970-2012 were higher in Appalachian counties than in counties that did not receive ARC investments. On average, counties that received ARC investments

**Figure 16: Employment Growth Rates between Treated and Control Counties, Base Year 1969**



**Figure 17: Per Capita Income Growth Rates between Treated and Control Counties, Base Year 1969**



experienced 4.2 percent higher employment growth and 5.5 percent higher per capita income growth than the counties that did not receive ARC funding. These results indicate the effectiveness of ARC investments for the Appalachian counties in the study.

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**The research shows that employment growth and per capita income growth over the period 1970-2012 were higher in counties that received ARC investments than in counties that did not.**

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# Input from Stakeholders



Credit: Ken Murray

**A**s part of this research, meetings were held in all 13 Appalachian states to give key stakeholders the opportunity to provide insights about their region's ARC-related activities. More than 220 stakeholders participated in these facilitated sessions, each of which involved roughly 10 to 20 participants. This section provides a brief synopsis of the comments and broad themes that arose during those sessions. They speak to ARC's legacy, the strength of its partnership model, and how ARC investments can be used to generate significant regional impact.

## *The ARC Model*

- Stakeholders were quick to mention ARC's catalyzing role in spurring regional development. Regional stakeholders shared many examples of relatively small ARC investments that planted the seed for significantly more investment and growth. In many of these examples, later investments would not have occurred without the initial ARC investment. This was especially true for many investments in the Region's most distressed communities, which have few accessible funding sources because of the difficulty they have in

raising even a modest amount of local matching funds.

- ARC does more than fund projects—it also provides leadership, advocacy, planning, research, and timely seed-investments to advance these efforts, and has done so with countless federal, state, nonprofit, and private partners. This model has proven effective over the past 50 years and may become even more important for achieving the Region's development goals in the future.
- Stakeholders noted that over the past 50 years, ARC's federal-state-local partnership model has proven effective in helping Appalachian communities advance efforts with great local support and impact.
- ARC allows states and regions to set their own priorities and make their own decisions about how ARC funding is used. This model has allowed states to shift their focus in response to changing economic, political, or fiscal conditions. Diminished funds have led a number of states to refocus their ARC investments from relatively expensive physical infrastructure projects to business enterprise and

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**ARC allows states and regions to set their own priorities and make their own decisions about how ARC funding is used. This allows states to shift their focus in response to changing economic, political, or fiscal conditions.**

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tourism development, workforce training, and health promotion activities. Many stakeholders see this new generation of investments as having greater regional impact with the available funds.

## *Flexibility of ARC Funding*

Local and regional stakeholders universally praise ARC's flexibility. Unlike other funding programs, ARC funding allows regions to think creatively about how best to address pressing regional challenges.



Credit: Ken Murray

Many stakeholders spoke of ARC's role in supporting the expansion of health-care and education facilities and the importance of those investments to the well-being of the Region's population. In many ways, these efforts helped address serious market failures that would have significantly diminished the health and welfare of the Region's residents.

Several focus group participants said that economic transformation in Appalachia is less about diversification, and more about forging entirely new economies. To help facilitate this process, ARC has made investments that support these transformations. This includes investing in the preparation of industrial sites, but also providing support for entrepreneurship, tourism destination development and promotion, export expansion, and business development programs, helping companies access programs that support technology acceleration or advanced manufacturing processes.

### **State and Local Partnerships**

ARC's approach to development prioritizes partnerships with other federal, state, private, and nonprofit partners. Therefore ARC funding aligns

with and complements state development initiatives, such as New York State's Regional Economic Development Councils and Kentucky's Shaping Our Appalachian Region (SOAR) initiative.

Stakeholders from every state noted the importance of ARC's support for the Region's 73 local development districts (LDDs). Several focus group participants cited the critical ability of LDDs to serve as an interagency connection between different service providers and local jurisdictions within the Region; and to connect local residents and businesses with resources at the state, regional, and federal levels, as well as with private resources. ARC funding also allows the LDDs to assist communities with project development, including assistance in grant writing for common funding sources. Without this support, stakeholders maintained, many of the most successful ARC projects would never have started.

### **ARC Investments Complement One Another**

- While the challenges facing Appalachia shift over time, ARC continues to lay the groundwork for future development by making investments that are designed to advance the Commission's strategic goals. Few investments embody this more than those that improve the Region's broadband infrastructure. Efforts to increase broadband access and speed have proven to be a vital foundation in addressing many other issues, including entrepreneurship development, tourism, telemedicine, distance learning, and even in-person education. Stakeholders throughout the Region noted that this was one of the most prominent issues that required ARC attention and investment.
- ARC investments in basic physical infrastructure, such as highways; water and wastewater; and, more recently, broadband, have allowed Appalachian communities to lay

the basic foundation for additional development. Without this assistance, these communities would be at a significant disadvantage in taking advantage of future economic development opportunities.

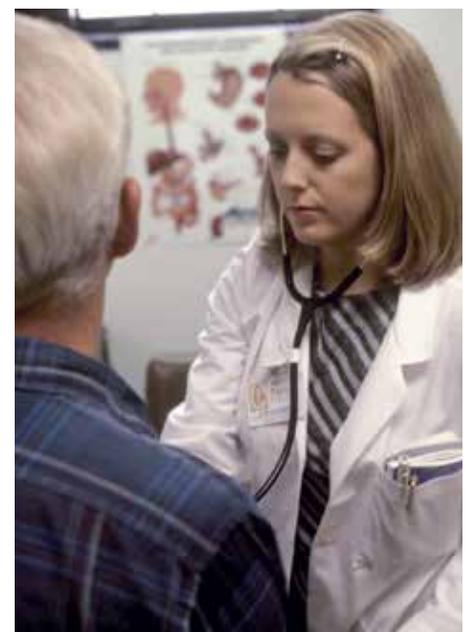
- ARC has made investments to advance education and training programs to prepare the Region's workers for the jobs of tomorrow. These investments

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## **ARC's approach to development prioritizes partnerships with other federal, state, private, and nonprofit partners.**

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are not only for curricula and educational programs, but also for the construction of new facilities and the purchase of training equipment, with an emphasis on assisting the Region's most economically distressed or underserved communities.



Credit: Ken Murray

- Place-making projects are another area where ARC investments not only create new economic activity, but also preserve Appalachian culture and improve the Region's overall quality of life. Focus group participants noted several ARC-supported projects that helped preserve historic buildings or revitalize downtowns. Similarly, efforts to develop local food systems are beneficial in that they can serve as an attraction to visitors while creating new economic opportunities and healthier food options for residents. Focus group participants noted that these kinds of ARC-supported projects contribute to the Region's tourism infrastructure.
- ARC has invested in efforts to link individual projects, such as Virginia's Crooked Road, which connects heritage music venues and events; and the Great Allegheny Passage trail, which provides bike access from Pittsburgh to Cumberland, Maryland. These projects leverage many individual attractions to make the Region a more compelling destination



Credit: Courtesy of Jackson County Commissioners

for visitors since they can take advantage of many attractions rather than just one.

### *Accomplishments and Challenges*

- Many communities said they are continuously trying to do more with less. In order to do this, they must find ways to partner and leverage other public and private funding opportunities. For example, ARC launched multi-year Global Appalachia grants to foster member states' rural trade development efforts, building on the State Trade and Export Promotion Program of the U.S. Small Business Administration. Another example is ARC's participation in the Rural Jobs and Innovation Accelerator Challenge, in partnership with the U.S. Economic Development Administration and the U.S. Department of Agriculture.
- Communities can find projects that fit into other ARC or regional investments. Tourism and cultural projects provide a structure that

allows regions to connect individual attractions into a bigger idea that makes the region itself a more attractive destination for visitors. By leveraging other investments, the sum of the parts becomes greater than the whole and is an effective way of doing more with less.

- Stakeholders recognize the importance of prioritizing ARC funding based on need. This does not mean, however, that the classification of counties by distress levels is free from challenges. For instance, persistent pockets of poverty can remain even in counties that overall are performing well relative to other counties. Additionally, while not a common occurrence, fluctuations in county economic status from year to year can also pose challenges for communities. Given that a change in status results in a change in matching funds requirements, this can introduce some long-term planning difficulties for some counties.
- Finally, stakeholders also suggested that ARC recognize that its impact has been well beyond what might be easily measured. As noted in several states and in similar ways, it is impossible to drink water, flush a toilet, or drive down a highway without seeing firsthand the result of an ARC investment. Given this significant impact on the Region, many stakeholders thought that ARC should more actively promote its accomplishments in ways similar to what other agencies do (e.g., signs that read "This road was paid for in part through ARC funds").



Credit: Kathryn Whiteman

# Key Report Findings



Credit: Ken Murray

## ***Based on the analysis in this report, key findings emerge.***

### **1. ARC represents a highly valued and active player in the Appalachian Region's economic development, supporting state and local partners in their efforts to transform their communities.**

Since 1965, ARC has made nearly 25,000 non-highway strategic investments in the Region. Working with federal, state, and local partners, ARC has invested more than \$3.8 billion in these projects. These investments supported a variety of community and economic development initiatives, including basic infrastructure improvements, job creation initiatives, and leadership development. For every dollar in ARC funds, state and local partners were able to leverage an average of \$2.50 from other federal, state and local funds, as well as \$6.40 in private-sector investments.

In addition, more than \$9 billion has been obligated since 1965 for the

Appalachian Development Highway System, which is now 89 percent complete or under construction. When finished, the 3,090-mile ADHS will connect almost every part of the Region to an interstate-quality highway and to the national Interstate Highway System.

### **2. ARC has had a significant and important impact on the Region's economic vitality.**

Over the past 50 years (with much higher appropriations in the earlier years of the program), ARC's \$3.8 billion in non-highway investments have resulted in nearly 312,000 direct, indirect, and induced jobs for the Region and \$10.5 billion (in constant 2013 dollars) in additional earnings. Between 2007 and 2013, ARC non-highway investments accounted for nearly 10,000 jobs and \$400 million in regional earnings. These impacts do not include the benefits accruing as a result of the investments ARC has leveraged over the years.

Furthermore, our research demonstrates that counties receiving ARC investments grew at a slightly faster pace than similar counties that did not receive ARC investments. Using a rigorous quasi-experimental research method, our analysis suggests that ARC investments helped counties add employment at a 4.2 percent faster pace, and per capita income at a 5.5 percent faster pace, than similar counties that did not receive ARC investments.

Moreover, leaders in the Region expressed consensus about the value of ARC's role as a catalyst in helping to make projects happen that might not otherwise have gone forward. In interviews with over 220 local, state, and federal stakeholders in every Appalachian state, ARC was praised for helping leaders respond to uniquely local problems and for its ability to leverage other resources (by seeding new projects or providing the "last dollars" in) when projects did not fit neatly into other funding program models and might not have otherwise happened.

**3. ARC has made progress toward helping the Appalachian Region reach socioeconomic parity with the nation, but much work remains in moving some key indicators.**

ARC's strategic plan has four major goals: (1) increasing job opportunities and per capita income in the Region; (2) strengthening the capacity of the people of Appalachia to compete in the global economy; (3) developing and improving the Region's infrastructure; and (4) building the ADHS to reduce Appalachia's isolation. On measures related to poverty, income disparity, unemployment, the industrial mix, and housing quality, the Region has improved significantly. For instance, as Figure 18 shows, there has been a dramatic reduction in the number of Appalachian counties where the share of the population living in poverty exceeds 150 percent of the national average. The number of high-poverty counties in the

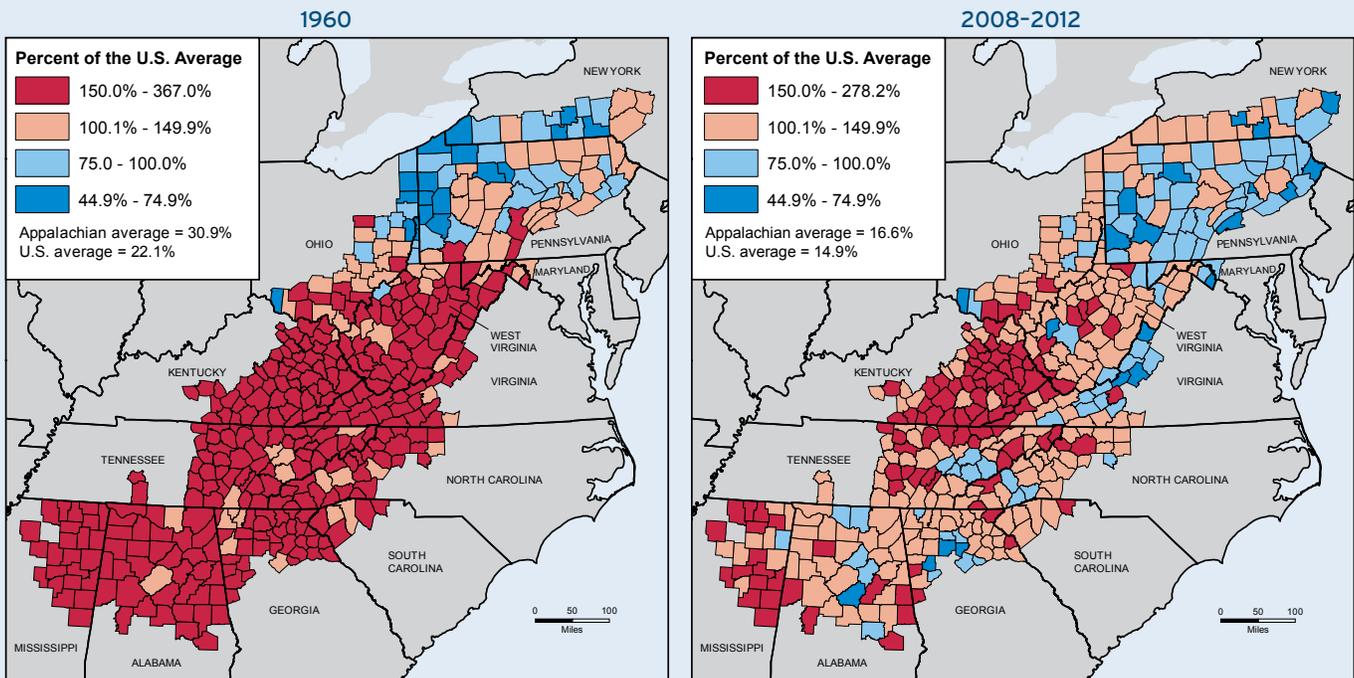
Region (those with poverty rates above 150 percent of the U.S. average) declined from 295 in 1960 to 107 for the period 2008-2012. The overall poverty rate for Appalachia is almost half that of 1960, dropping from over 30 percent to just under 17 percent.

**ARC investments have supported a variety of community and economic development initiatives, including basic infrastructure improvements, job creation initiatives, and leadership development.**



Credit: Ken Murray

**Figure 18: Poverty Rates in Appalachia, Relative to the U.S. (Percent of the U.S. Average)**



Source: U.S. Census Bureau, 1960 Census and 2008-2012 American Community Survey  
 Notes: A poverty rate is the ratio of persons whose income falls below the poverty level, to the total number of persons for whom poverty status is determined. The percent of U.S. average is computed by dividing the county rate by the U.S. average and multiplying by 100.

**4. ARC has not yet fully accomplished its mission of bringing the Region to parity with the rest of the nation on key socioeconomic indicators.**

The Region still lags in many key areas. The Region's population growth is relatively stagnant, reflecting an economy that lags in terms of employment growth and educational attainment, so that there are not enough high quality jobs to support its citizens.

Government transfer payments account for one-quarter of all personal income, a 41 percent higher rate than the rest of the nation. By comparison, the ratio was 17 percent after the 1981-82 recession, about 35 percent higher than the rest of the nation. Some, but certainly not all, of this increase can be explained by the rise in citizens aged 65 and over now eligible for Social Security.

Furthermore, the Region's citizens have relatively poorer health outcomes (in terms of mortality rates as well as the prevalence of obesity and diabetes), reflecting changes in modern-day life that have reduced the quality of life for many residents. In addition, the Region remains relatively more isolated from the rest of the nation because the ADHS is not yet completed and, increasingly, because the Region lags the rest of the nation in access to affordable high-speed broadband service.



Credit: Ken Murray

### **Appalachia Moving Forward**

The data from this research suggest that ARC has been a vital partner in the economic and community development progress achieved in the Appalachian Region. However, there is a continued need for investment to help Appalachia reach socioeconomic parity with the rest of the nation. Many questions remain about how best to address the challenges Appalachia faces today. How can leaders create a climate of entrepreneurship and opportunity so that local citizens can remain and contribute to Appalachia's future success? How can the Region compete and succeed in the global economy when it cannot always reach new markets? Few states or localities have the capacity to address these significant challenges without outside help. Addressing the Region's disparities will require continued local-state-federal partnerships and strategic investments that build opportunity for growth.

# Appalachia

THEN AND NOW

*Examining Changes to the Appalachian Region Since 1965*

**TECHNICAL REPORT**

**FEBRUARY 2015**



Prepared by the Center for Regional Economic Competitiveness  
and West Virginia University for the Appalachian Regional Commission

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## Technical Report Introduction

The Appalachian Regional Commission (ARC) represents a truly unique federal-state-local partnership reflecting a shared commitment toward eradicating regional poverty through grassroots efforts to create long-term sustained investments in public works, economic development, and planning. In its early years, these investments focused on to some success on developing growth centers to serve as the foundation for development, but as the program evolved, ARC placed greater emphasis in more recent years on making investments in distressed and rural areas. This report explores the 50-year history of ARC and assesses the actual impacts that ARC investments have had on the Region.

Evaluating the impact of the ARC has always been uniquely challenging. As ARC's first director Ralph Widner noted, the agency's objectives were not clearly articulated in the statute intentionally. The Region is so complex and the Congressional alliance required at that time to gain support for the agency was so vague and contradictory in their intentions that ARC had to navigate a very fine line between Federal investment and state/local control (Widner 1973). Consequently, the ARC has developed as an amalgamation of programs—managed largely at the state and regional level—to achieve a broad array of goals and objectives based on a variety of models of growth and change. Not surprisingly, measuring impact in this environment is necessarily a complex task.

This Technical Report companion to *Appalachia Then and Now: Examining Changes to the Appalachian Region since 1965: Executive Summary*, provides a more detailed description of the methodology and analysis that helped inform the findings found in the Executive Summary.

The project team contributing to the report represents a collaboration between the Center for Regional Economic Competitiveness (CREC), a nonprofit research organization based in Arlington, Virginia and two West Virginia University research units: the Regional Research Institute (RRI) and the Bureau of Business and Economic Research (BBER). The team brings together nationally recognized expertise in regional quantitative and economic impact analysis, economic development policy design and implementation, economic development program evaluation, and local and regional economic development strategic planning. The team also has extensive experience working in Appalachia as well as in rural and distressed communities elsewhere.

The project team also benefitted from the input, insights, and review of hundreds of others over the course of completing this report. This included fellow academics and regional development practitioners, ARC staff, and residents and stakeholders throughout the Appalachian Region. A complete list of those who contributed to this report is found in *Appalachia Then and Now: Examining Changes to the Appalachian Region since 1965: State Meetings Report*.

Before launching into a more detailed discussion of the present program evaluation approach used for this report and what we found, it is necessary to review the many past program evaluations that have already been conducted and to provide a discussion of the findings from these assessments of ARC's impact in the Region over the past 50 years.

### **Assessing ARC's Impacts—A Review of Past Program Evaluations**

Signed into law on March 9, 1965, the Appalachian Regional Development Act (ARDA), ARC's governing legislation, seeks to advance the Region's economic development and achieve parity with the relative prosperity enjoyed by the rest of the nation (Appalachian Regional Commission, 2014; Bradshaw, 1992). In diagnosing the symptoms of pre-ARC Appalachia, the President's Appalachian Regional Commission (1964) also sketched out the major priorities that would form the thrust of ARC-funded activities—improving the Region's physical accessibility, developing the Region's economy while reducing dependence on natural resources extraction, and enhancing the capability of the Region's human resources to achieve economic prosperity.

What impacts have been made by this experiment in regional development? As the 50<sup>th</sup> anniversary of the Appalachian Regional Commission approaches, this document addresses this question by presenting an assessment of ARC-commissioned and independent, scholarly evaluations of ARC's programs and individual projects. Addressing the priorities laid out by the President's Appalachian Regional Commission, findings of these evaluations are reviewed for three areas—physical accessibility, economic development, and human resource development. Additionally, this document reviews select findings regarding ARC's overall impact as an entity for leveraging funds and catalyzing regional development. This discussion serves as a synthesis of ARC's impacts and the challenges inherent in evaluations of regional public policy. To assess the validity of these reported impacts, a review of the methods used to conduct these evaluations precedes this topically-organized assessment of impacts.

A summary of the evaluations described in this section can be found in Figure 1.

### **Approaches to Evaluation**

In an assessment of impact studies conducted for federal economic development agencies, the U.S. General Accounting Office [GAO] (1996) identified three characteristics of studies that would make a persuasive case for program impact:

First, it would have to document that there had been some improvement in the targeted area. Second, it would have to link specific elements in the program to the economic changes. Finally, it would have to measure the growth stemming from other influences on the region's economy in order to isolate the impact that could be attributed to the economic development program (p 4).

Evaluations that satisfy even more than one of these elements are rare, and the accomplishment of all three in a public policy context is exceedingly difficult (U.S. General Accounting Office,

1996). Most evaluations document project success and suggest progress in the achievement of program goals, but studies that identify specific pathways leading from program elements to regional improvements, while also controlling for other potential influences, are much rarer. Recognized as one evaluation that goes further than most in controlling for factors other than the ARC program, Isserman and Rephann (1995) concurred with the GAO study that existing ARC program evaluations—with their reliance on “interviews, on-site observation, and comparative statistics”—have fallen short of actually measuring economic impacts (p. 351). Essentially, documentation of program investments, development activity, and changes in economic and demographic conditions have been forthcoming, but few evaluations link program investments with impacts in a rigorous cause-and-effect manner.

For the purposes of this assessment, evaluation methods were grouped into five categories—surveys, before-and-after comparison, case studies, economic modeling, and quasi-experimental designs.<sup>1</sup> The remainder of this section defines each grouping, identifies frequency of use for evaluating ARC, and discusses the typical characteristics and advantages and disadvantages of these techniques as applied in ARC evaluations.<sup>2</sup>

## Surveys

Employed most frequently, this general category relies upon standardized data collection methods, such as surveys, questionnaires, interviews of program participants, and reviews of project databases, to report the outputs and outcomes of program activities. In most instances, these methods allow for an audit of program investments that ensures project conformance with planned activities and results. They tend to be carried out within the timeframe of a few years after project completion. Most commonly, this method of evaluation involves a sample of ARC funding recipients reporting outputs such as jobs created or households or clients served. Respondents may be asked more general evaluation questions such as their satisfaction with ARC assistance or the degree to which ARC funds allowed projects to move forward at all.

While this method documents whether projects were implemented as planned, it does not often provide evidence that can establish a clear cause-and-effect relationship between projects and desired program outcomes. Additionally, at least four factors can affect the reliability and usefulness of data collected. First, self-reported data from those implementing projects may bias results in favor of more successful project outcomes. Second, respondents may lack the resources necessary to document all but the most direct, short-run impacts of projects, and even accurately reporting the common metric, “jobs created,” can prove difficult or misleading. For example,

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<sup>1</sup> As part of their evaluation of ARC’s infrastructure and public works projects, HDR Decision Economics, Cambridge Systematics, Economic Development Research Group, and Mt. Auburn Associates (2013) identified and assessed the merits of twelve methods used in program evaluations (pp. 16-30).

<sup>2</sup> Figure 1 lists the evaluations reviewed for this study, identifies the use of the five methods, and provides brief, illustrative summaries of the evaluation findings relative to the noted four focus areas.

training programs aimed at enhancing entrepreneurship may not create many direct jobs, particularly in the short run. Third, addressing the likelihood for a project to move forward in the absence of ARC funds may be difficult, and responses may only roughly proxy for ARC's ability to spur otherwise dormant activity. Fourth, survey data only reflect overall program results to the degree that respondents represent a random sample of all projects. Deviations from a random sample, such as the tendency to target only closed—at least nominally successful—projects presents a distorted picture of results.

### **Before-and-after comparison**

Used for six of the reviewed evaluations, these methods identify a policy treatment of interest (e.g., the entire ARC program or select elements of it) and compare quantitative or qualitative conditions before-and-after this treatment to identify potential impacts. For example, the Appalachian Regional Commission (2010) and Wood and Bischak (2000) tracked changes in measures such as income levels and poverty rates since the initiation of the ARC program. Consistent with a logical approach to establishing causation, this method requires a treatment to precede the outcomes that it may cause. Further, statistical tests may be used to assess the significance of any changes uncovered in a before-and-after comparison. However, these methods do not systematically control for other potential causes of outcomes.

### **Case studies**

The second most frequently used method provides evidence of program implementation and impact that cannot be captured through quantitative metrics such as jobs created. Typically, case studies offer a narrative description of projects and programs based on details gathered from project records, interviews with participants, and on-site observations. This context may provide insight on particular characteristics that make for successful or unsuccessful projects. In concert with before-and-after comparisons, case studies may be useful for specifying causal pathways linking programs and outcomes. By design, case studies focus on only one or a few projects at a time. If case studies focus on only successful projects or only projects in certain settings, then they may offer limited insights for understanding impacts in many contexts.

### **Economic modeling**

This group includes tests for statistical relationships between independent (i.e., causes) and dependent variables (i.e., effects); statistical assessments of observed differences in metrics; or simulations of project impacts based on economic assumptions. Regression-based models that test relationships among variables may be used to evaluate ARC's programmatic focus. For example, evidence that increased educational attainment is associated with reduced economic distress may result in the prioritization of education programming. Statistical tests of the differences between two data samples (e.g., a comparison of county-based per-capita incomes in 1965 and 2000) can identify the significance of changes in before-and-after circumstances.

Input-output models were the simulation methods applied most frequently. A typical application inputs job creation data from project files into a commercially-produced input-output model

(e.g., IMPLAN) that estimates the trade relationships between industries. Based on these estimated relationships, the number of jobs directly created in one industry sector can be used to estimate the indirect employment generated in other trade-linked sectors. Further, the wages earned from new jobs results in new household spending that induces additional demand for employment to satisfy consumer wants. Transportation simulations were also used to estimate the impacts highway improvements make on travel-times and economic accessibility in the Region. As with all models, these simulations simplify reality and, short of painstaking data collection efforts for each study, are likely to miss important differences, such as those between firms within the same industry or those across regions within Appalachia.

### **Quasi-experimental methods**

Isserman and Rephann (1995) implemented the only full scale (entire Region) ARC-focused quasi-experimental evaluation conducted to date. Quasi-experimental methods match the sample of interest (i.e., ARC counties) with control group twins based on similarity in factors that might produce changes of interest (e.g., income growth). Control group counties have not been subjected to the policy treatment of interest, in this case participation in ARC programs. After matching, statistical tests allow for the assessment of differences resulting from the policy treatment.

### **Evaluating ARC's Impacts by Priority Area**

Major findings and methods of analysis from existing evaluations are summarized in the figure below. The following narrative summarizes results, limitations, and caveats by ARC priority area.

#### **Improving Physical Accessibility**

ARC infrastructure investments include the Appalachian Development Highway System (ADHS), local access road improvements, extended water and wastewater service, and enhanced telecommunications. In many cases these projects serve sites or facilities that have been identified for future development. Consequently, estimating the number of direct jobs impacted under these circumstances can be relatively less complicated than for projects that may not be targeted to support a specific project. ADHS improvements aimed to more broadly improve the Region's accessibility by increasing and speeding traffic flows within Appalachia and from Appalachia to regional centers. The ARDA authorized construction of 2,350 miles of the ADHS; revisions to the ARDA over the years increased the authorized mileage to 3,090. Job creation was also attributed to these improvements, though there is some evidence that these improvements led to improved accessibility conditions for counties at the periphery of ARC, but not necessarily to increased traffic flows to the more isolated, distressed counties of Central Appalachia (Hale & Walters, 1974; Moore, 1994; Widner, 1990). Many of the evaluated telecommunications projects resulted in few direct jobs or short-term outcomes, as they tended to focus on providing new training or educational opportunities to the Region's residents (Westat, 2003).

More recent studies of the ADHS have measured the economic development and safety benefits to the Region from sustained highway-system investments. Those studies have found significant positive results in the 13-state Region. A June 2008 economic impact study on the ADHS conducted by Cambridge Systematics, Inc., with Economic Development Research Group, Inc., assessed the travel performance, trade, and economic development impacts that would result from completing the ADHS.<sup>3</sup> The study also assessed connectivity, accessibility, and how well the ADHS corridor improvements would connect Appalachian people and businesses to other highway facilities, multimodal transportation, and economic markets after completion of the ADHS.

The study found that total economic impacts of completion of the ADHS for the Appalachian Region would include the direct effects of reduced travel time and costs, along with increased regional competitiveness via market accessibility gains and multiplier effects. These effects would gradually increase over time and by 2035 would result in an estimated 80,500 jobs, \$5.0 billion in increased value added production, and \$3.2 billion in increased wages for workers in the Region. At the national level, the estimated return on investment would yield \$3.00 for every dollar invested.

### **Developing Appalachian Economies**

ARC's projects in this category seek to diversify regional economies and build capacity for new development opportunities by investing in activities such as strategic planning, entrepreneurship programming, and tourism infrastructure. Easily measured, short-term outcomes are not available for many of these projects. For example, general, longer run, and hard-to-quantify outcomes such as greater awareness of and commitment to addressing regional issues are cited frequently as outcomes of community capacity building projects (Westat, 2004). Existing studies find that entrepreneurship programs helped to foster new startup activity and encourage business to adopt new business methods (Regional Technology Strategies Inc., 2001; Rural Policy Research Institute: Center for Rural Entrepreneurship, 2008). Tourism-related investments are more site-specific in nature, and the creation of direct jobs is reported, but evaluations completed soon after project close may not capture important long-term impacts (Regional Technology Strategies Inc., Mt. Auburn Associates, & Appalachian State University, 2010).

### **Developing Human Resource Capabilities**

Educational attainment rates in Appalachia continue to lag behind national averages (Appalachian Regional Commission, 2010). That said, ARC investments in education and workforce training programs have enabled a considerable number of Appalachians to receive training and career counseling and earn credentials (Westat, 2001, 2002, 2012). As with the

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<sup>3</sup> Cambridge Systematics, Inc., Economic Development Research Group, and HDR Decision Economics, "Economic Impact Study of Completing the Appalachian Development Highway System" *Appalachian Regional Commission*, June, 2008.

capacity building projects noted previously, direct impacts can be difficult to evaluate in the short-term. Further complicating the evaluation of these programs from a regional perspective is that the benefits of these programs accrue mainly to mobile individuals that may choose to take their improved capabilities elsewhere within the Region or entirely outside Appalachia.

### **Catalyzing Regional Development**

Existing before-and-after evaluations of ARC investments find mixed results for the Region as a whole, and significant variation within the Region, in improving education, income, or poverty conditions (Appalachian Regional Commission, 2010; Widner, 1990). In a more systematic evaluation of impacts, Isserman and Rephann (1995) found that growth of income, population, and per capita income in Appalachian counties significantly outpaced growth in control-group counties between 1969 and 1991.

Another way to assess performance might also be in analyzing the ability for ARC to leverage other funding. By design, ARC grant investments leverage funds by requiring that significant funds be contributed by other sources (U.S. General Accounting Office, 1996). Consistent with this requirement, program evaluations typically report significant amounts of leveraged private investment acquired to implement ARC projects (Brandow Company & Economic Development Research Group, 2000; Regional Technology Strategies Inc., 2001; Regional Technology Strategies Inc. et al., 2010). Perhaps the more important question is whether ARC designation affords Appalachian counties greater capacity to conduct development activity than they would otherwise have. That question remains largely unanswered, though Hall (2008) provides evidence that Kentucky's ARC counties were able to access more and larger total amounts of federal grants than their non-ARC counterparts, potentially pointing to capacity advantages granted by ARC programming.

Program evaluation surveys conducted tend to reveal that ARC-funded grant investments would not have been implemented without the benefits of ARC funds (Brandow Company & Economic Development Research Group, 2007; Westat, 2001, 2003). Many of these evaluations report on projects that resulted in significant job creation. There is also some evidence of job creation resulting in more diversified economies, and that more economically diverse counties were more likely to be lifted out of economic distress (Brandow Company & Economic Development Research Group, 2007; Wood & Bischak, 2000). Moving away from a strict focus on job creation, Partridge, Lobao, Jeanty, Beaulieu, and Goetz (2008) indicate that forward-looking measures such as evidence of entrepreneurship and educational attainment are better predictors of future economic well-being than are current incomes and poverty rates. To the degree that ARC programs create opportunities for regions to advance on those fronts above and beyond what would have been otherwise possible, ARC may play a significant role in moving regions out of distress.

Figure 1: Major Findings and Methods of Analysis from Existing Evaluations

Evaluation	Methods		Evaluation results by priority area					
	Survey	Before-and-after Case studies	Economic modeling	Quasi-experimental	Improving physical accessibility	Developing Appalachian economies	Developing human resource capabilities	Catalyzing regional development
HDR Decision Economics, Cambridge Systematics Economic Development Research Group, & Mt. Auburn Associates. (2013). Program Evaluation of the Appalachian Regional Commission's Infrastructure & Public Works Projects.	S	C			34 completed infrastructure projects resulted in creation or maintenance of >8,000 jobs; Reported impacts exceeded recipient projections			ARC funded 20% of total project cost, with 35% of recipients indicating project would not have advanced without ARC funding
Westat. (2012). Evaluation of the Appalachian Regional Commission's Education and Workforce Development Projects: 2000–2008.	S	C					Education projects served more students than projected; Improved school readiness and credential attainment rates among cited impacts	
Regional Technology Strategies Inc., Mt. Auburn Associates, & Appalachian State University. (2010). Program Evaluation of ARC's Tourism, Cultural Heritage and Natural Asset-Related Projects.	S	C				Recipients reported creating fewer direct jobs than projected, though time horizon, project type, and data availability may limit accuracy		\$0.40 ARC investment leveraged \$100 private investment, on average
Appalachian Regional Commission. (2010). Economic Assessment of Appalachia: An Appalachian Regional Development Initiative Report.		B & A						Region fares worse than national average on variety of development measures such as employment/earning levels, poverty rates, and education
Rural Policy Research Institute: Center for Rural Entrepreneurship. (2008). Creating an Entrepreneurial Appalachian Region: Findings and Lessons from an Evaluation of the Appalachian Regional Commission's Entrepreneurship Initiative 1997–2005.	S	B & A	C	S		Increased entrepreneurial activity, with incomes lagging; Job creation metrics may not measure progress on long-term strategy		Program raised profile of entrepreneurship in region, setting stage for innovative approaches; Leveraged \$120 for every ARC dollar invested
Partridge, M., Lobao, L., Jeanty, P. W., Beaulieu, L. J., & Goetz, S. (2008). An Assessment of Alternative Measures for Determining Economically Distressed Counties and Areas in the Appalachian Region.				E				Concludes that poverty dominates current distress indicator and recommends measures better-aligned with future development prospects
Hall, J. L. (2008). The Forgotten Regional Organizations: Creating Capacity for Economic Development. Public Administration Review, 68(1), 110-125.	S			E				ARC counties in Kentucky receive more federal grants and higher average grant amounts than do their non-ARC counterparts
Cambridge Systematics, Economic Development Research Group, & HDR Decision Economics. (2008). Economic Impact Study of Completing the Appalachian Development Highway System.				E	Completing ADHS projected to significantly reduce travel times; increase development opportunities due to accessibility improvements			Significant indirect and induced growth expected from new, accessibility-enabled economic development

Evaluation	Methods			Evaluation results by priority area			
	Survey	Before-and-after Case studies	Economic modeling Quasi-experimental	Improving physical accessibility	Developing Appalachian economies	Developing human resource capabilities	Catalyzing regional development
Bradow Company, & Economic Development Research Group. (2007). Program Evaluation of the Appalachian Regional Commission's Infrastructure and Public Works Projects.	S	C S	E M	Sample of 104 projects (including 33 industrial parks and 51 water and sewer projects) created >17k direct new jobs and retained >9k jobs	Evidence that new jobs created resulted in more diverse economies		Economic development projects leveraged \$75 in private funds for every \$1 of ARC funds; 73% said ARC funds were critical for project
Westat. (2004). Evaluation of the Appalachian Regional Commission's Community Capacity Building Projects.	S	C S			Among 100 projects surveyed, 35% conducted strategic planning; 26% obtained technical assistance; few measurable outcomes	51% of projects surveyed conducted a workshop or course; 28% held forums	Commonly cited outcomes include greater awareness of regional issues and stronger buy-in for addressing community issues
Westat. (2003). Evaluation of the Appalachian Regional Commission's Telecommunications Projects: 1994-2000.	S	C S		84% of 70 projects surveyed provided onsite education; 92% indicated project success met or exceeded expectations; Limited measurable outcomes			Survey indicated 63% of projects would not have been implemented without ARC funds; >75% of projects operating after grant period
Westat. (2002). Evaluation of the Appalachian Regional Commission's Vocational Education and Workforce Training Projects.	S	C S			Median outputs from 67 projects included 195 persons receiving academic/vocational training; 51 counseled on career; 50 earning credentials		Most projects continued to operate after grant period
Westat. (2001). Evaluation of The Appalachian Regional Commission's Educational Projects: Final Report.	S	C S			Among 84 projects surveyed, almost 75% indicated meeting or exceeding education or training goals; documentation supported many claims		67% of respondents indicated projects would not have advanced without ARC funds
Regional Technology Strategies Inc. (2001). Evaluation of the Early Stages of the Appalachian Regional Commission's Entrepreneurship Initiative.	S	C S			Among 23 sampled projects, 75% indicated development of new products; 55% said firms upgraded technologies; 50% identified business startups		ARC funds accounted for half of total sampled project budgets; 70% of program clients were highly satisfied with services received
Wood, L. E., & Bischak, G. A. (2000). Progress and Challenges in Reducing Economic Distress in Appalachia: An Analysis of National and Regional Trends Since 1960.		B & A			Counties moving out of distress had more diversified economies, larger shares of manufacturing employment, and more resident retirees	Higher rates of educational attainment associated with counties that moved out of distress	Number of distressed counties decreased by more than half since 1960, though approximately 25% of those distressed in 1960 remained so
Bradow Company, & Economic Development Research Group. (2000). Evaluation of the Appalachian Regional Commission's Infrastructure and Public Works Program Projects.	S	C S	E M	Sample of 99 projects directly resulted in >23,000 new jobs and an estimated total of >44,000 indirect jobs; Created >\$575 million in new wages			ARC funds used to leverage significantly larger sums of other public and private funds

Evaluation	Methods					Evaluation results by priority area			
	Survey	Before-and-after	Case studies	Economic modeling	Quasi-experimental	Improving physical accessibility	Developing Appalachian economies	Developing human resource capabilities	Catalyzing regional development
U.S. General Accounting Office. (1996). Limited Information Exists on the Impact of Assistance Provided by Three Agencies. Washington, D.C.		S							3-to-1 ratio in total funds vs. ARC funds devoted to projects; Few studies assess cause-effect relationships between ARC and outcomes
Isserman, A., & Rephann, T. (1995). The economic effects of the Appalachian Regional Commission: An empirical assessment of 26 years of regional development planning. Journal of the American Planning Association, 61(3), 345-364.				E	Q				Control-group analysis, indicates ARC counties grew faster than their control-group twins in terms of population and per capita income
Moore, T. G. (1994). Core-periphery models, regional planning theory, and Appalachian development. Professional Geographer, 46(3), 316.		B & A		E	M	County highway improvements correlated with increased incomes; weakest/least significant relationships in Central Appalachia			
Widner, R. R. (1990). Appalachian development after 25 years: An assessment. Economic development quarterly, 4(4), 291-312.		B & A	C	S		Evidence of improved access to centers at periphery of region, with little evidence of diverted traffic increasing demand to locate in region	Significant education gaps remain, with promising results achieved from investments in vocational education		Gaps between ARC and nation narrowed on several fronts; Federal-local partnership can effect innovation, with significant regional variation
Hale, C. W., & Walters, J. (1974). Appalachian regional development and the distribution of highway benefits. Growth and Change, 5(1), 3-11.		B & A		E	M	Areas located within and just outside ARC's periphery benefited most from highway improvements, based on changes in driving times			
Widner, R. R. (1973). Evaluating the Administration of the Appalachian Regional Development Program. Growth and Change, 4(1), 25-29.			C	S					Federal coordination has been challenging; State and district roles show promise of effecting innovative solutions through experimentation

## Assessing ARC's Impacts—Present Program Evaluation Approach

As with most public policy evaluations, ARC's impact assessments fall short of the experimental ideal that would unequivocally assign credit to specific program investments. The default approach is to document project implementation and capture short-term outcomes. While valuable, this short-term focus should be supplemented by multi-dimensional evaluation approaches that use diverse sources to tie investments to immediate outputs and the prospects for long-term outcomes. This is particularly critical in the case of longer-term initiatives, with the recent assessment of entrepreneurial programs exemplifying how a comprehensive evaluation approach can measure progress on a concept not easily summed up by simple job creation metrics (Rural Policy Research Institute: Center for Rural Entrepreneurship, 2008).

Given the inherent limitations in reaching an experimental ideal in most all public policy evaluations, and also given the long time span of 50 years to assess the progress being made in the Appalachian Region, the project team chose to utilize a multidimensional, mixed-methods approach to this present program evaluation. In this way, we could build on an array of evaluation techniques to better understand the impact and legacy of the ARC. In particular, this report: (1) documents the Appalachian Region's 50 years of socioeconomic and structural changes; 2) analyzes the economic impacts of ARC investments through regional input-output analysis and 3) uses a quasi-experimental method designed to compare ARC-assisted counties with a control group. An additional technique employed assesses stakeholder perceptions about past performance and future priorities, and is discussed in *Appalachia Then and Now: Examining Changes to the Appalachian Region since 1965: State Meetings Report*.

The following chapters detail these methods and analysis; the findings are discussed in *Appalachia Then and Now: Examining Changes to the Appalachian Region since 1965: Executive Summary*.

Chapter I details major socioeconomic trends that have occurred in the Appalachian Region over roughly the past half-century using available data sets which span all or at least most of the period.

Chapter II lays out the conceptual and methodological basis for the customized input-output (IO) modeling approach used to assess the economic impacts of non-highway investments made in the Region by the Appalachian Regional Commission.

Chapter III discusses our use of an empirical technique designed to answer the counterfactual, namely, what would have happened in Appalachia without the ARC? This Quasi-Experimental Methods (QEM) approach uses matching techniques to assign to each "treated" entity one (or more) "control". Statistical methodology is then employed to see if the difference in the outcome variable of interest is statistically significant. In the case of Appalachia, we concentrate on two important metrics: the growth in employment and the growth in per-capita income.

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## Chapter I: Fifty Years of Socioeconomic and Structural Change in the Appalachian Region

### Section Summary

This chapter details major socioeconomic trends that have occurred in the Appalachian Region over roughly the past half-century. While Appalachia has enjoyed significant economic progress over this period along many dimensions, the Region still lags the nation significantly in several aspects. Highlights of this research are as follows:

- Private-sector employment in Appalachia has grown by nearly 50 percent since 1975, but this growth rate falls well short of the national employment growth rate over the same period.
- The Appalachian unemployment rate has been roughly on par with the national figure for around 14 years, after having surpassed the national rate for much of the period of analysis.
- Labor force participation in Appalachia has lagged the national figure for the entire period of analysis.
- Per capita personal income in Appalachia was 81.1 percent of the national average in 2012, an improvement from 78.7 percent in 1969.
- Earnings per capita in Appalachia have fallen relative to the national figure over the period of analysis. This drop in earnings has been more than offset by a more-than-proportional increase in federal transfers per capita to Appalachia relative to the national average.
- Poverty rates in Appalachia have consistently surpassed national figures over the period of analysis, although the degree to which Appalachia lags the nation has lessened considerably.
- Overall population in Appalachia has grown by over 30 percent over the period of analysis, but this falls short of national population growth.
- The degree to which the population has aged in Appalachia has exceeded the national level.
- The share of the Region's population under age 19 declined substantially, especially since the mid-1980s.
- Although educational attainment has increased substantially in Appalachia over the period of analysis, the Region has consistently lagged the nation.
- The overall mortality rate in Appalachia has only slightly improved over the period of analysis and has consistently lagged the nation.
- The share of homes in Appalachia that lack telephones or complete plumbing facilities has fallen dramatically over the period of analysis and the current figures are roughly on par with the nation.

In this chapter we examine the myriad ways in which the Appalachian Region has evolved socioeconomically since the creation of the Appalachian Regional Commission (ARC) in 1965. Our analysis is organized based on the four general goals outlined in ARC’s current strategic plan, which are as follows:

*Goal 1: Increase job opportunities and per capita income in Appalachia to reach parity with the nation.*

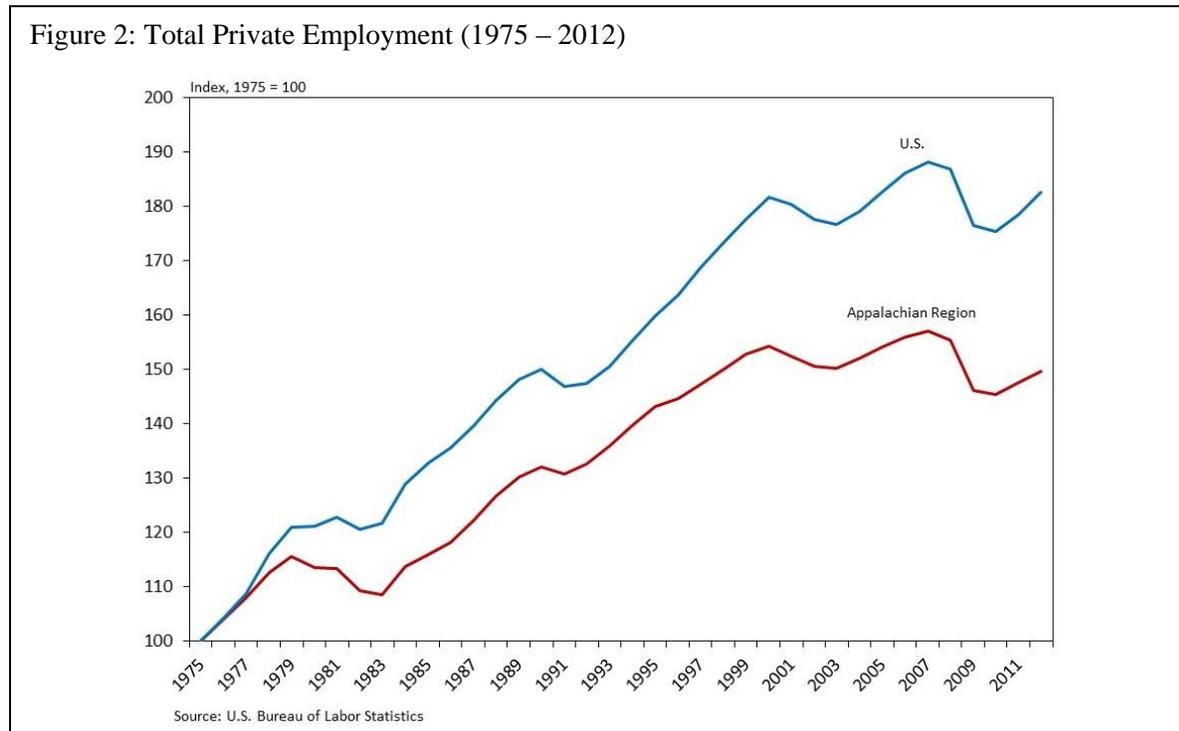
*Goal 2: Strengthen the capacity of the people in Appalachia to compete in the global economy.*

*Goal 3: Develop and improve Appalachia’s infrastructure to make the Region economically competitive.*

*Goal 4: Build the Appalachian Development Highway System to reduce Appalachia’s isolation.*

### **Employment, Unemployment, and Labor Force Participation in Appalachia**

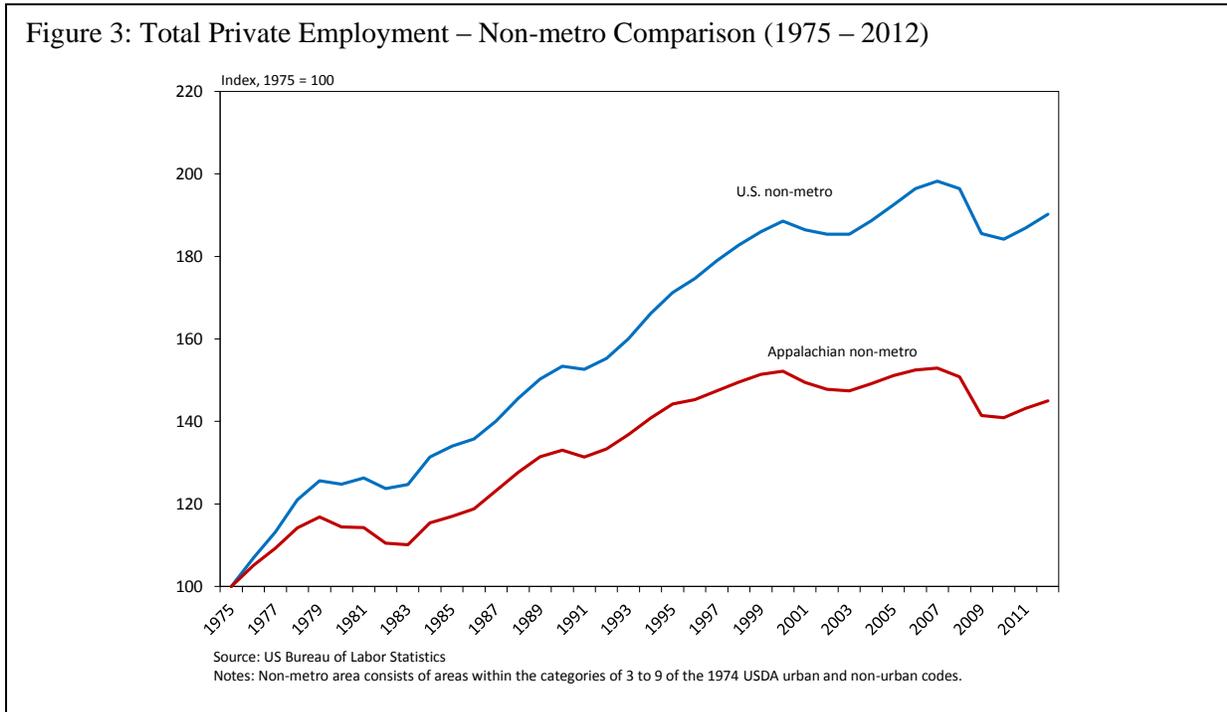
We begin with an analysis of employment outcomes in Appalachia.<sup>4</sup> Figure 2 illustrates total private sector employment growth in the Appalachian Region and in the U.S. overall since 1975.<sup>5</sup> Both series are indexed to their 1975 level. As the figure shows, employment growth in



<sup>4</sup> Throughout this chapter of the report we define the Appalachian Region to consist of the 420 counties that are defined as such by the Appalachian Regional Commission currently. See [www.arc.gov](http://www.arc.gov) for a complete list of these counties.

<sup>5</sup> Ideally we would examine trends to 1965, the year of the founding of the Appalachian Regional Commission. However, in many cases county-level data do not exist for the early years of this time frame. In any such instance, we begin our analysis of each data series with the earliest year available.

Appalachia has lagged national employment growth overall during the period. By 2012, employment in Appalachia stood at nearly 50 percent above its 1975 level, whereas the figure was nearly 83 percent nationally. Employment growth was significantly faster for the nation compared to Appalachia during the years 1978 – 2000; however, overall employment has been mostly flat for both the Region and the nation since around the year 2000.

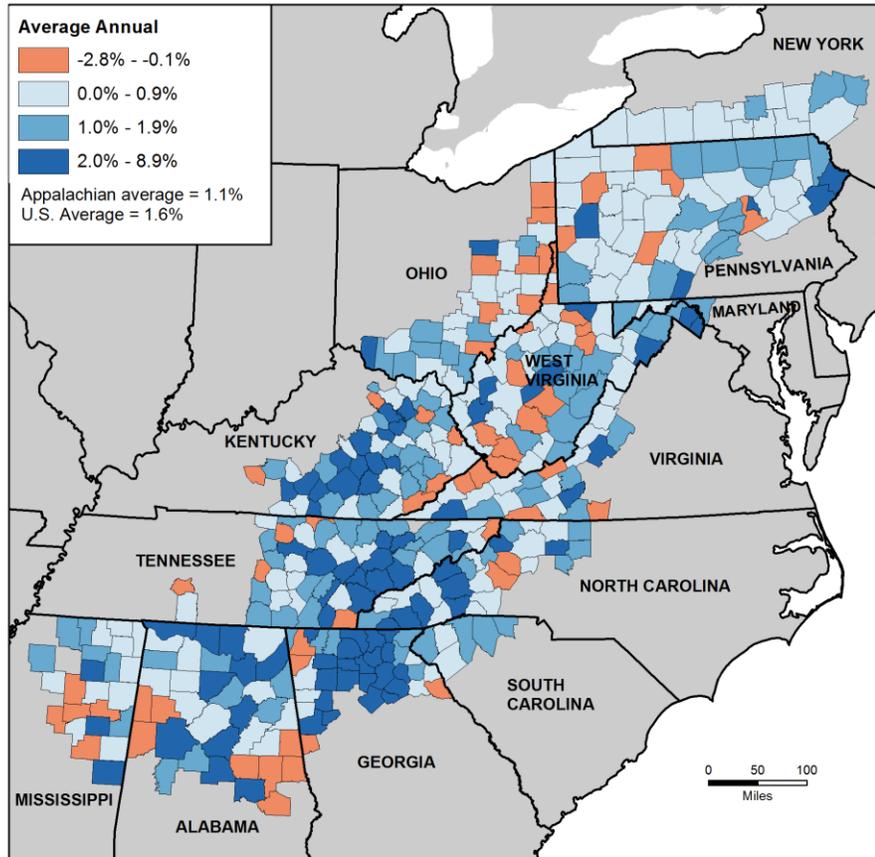


Since the Appalachian Region tends to be less urban than the nation as a whole, in Figure 3 we illustrate the growth in employment for only the non-metropolitan counties in Appalachia versus those in the nation as a whole.<sup>6</sup> The general pattern does not vary significantly from what was presented in the previous figure. By this measure, employment in the non-metropolitan Appalachian Region has grown by 45 percent over the period of analysis, whereas growth has been just over 90 percent for the non-metropolitan areas of the U.S.

<sup>6</sup> For this division we use the definitions of rural-urban continuum codes constructed by the United States Department of Agriculture (USDA). The USDA provides 9 classifications to describe US counties, which are as follows: 1-Counties in metro areas of 1 million population or more; 2-Counties in metro areas of 250,000 to 1 million population; 3 – Counties in metro areas of fewer than 250,000 population; 4-Urban population of 20,000 or more, adjacent to a metro area; 5-Urban population of 20,000 or more, not-adjacent to a metro area; 6-Urban population of 2,500-19,999, adjacent to a metro area; 7-Urban population of 2,500-19,999, not adjacent to a metro area; 8-Completely rural or less than 2,500 urban population, adjacent to a metro area; 9- Completely rural or less than 2,500 urban population, not adjacent to a metro area. We consider all counties that are classified as 3 through 9 on this scale as non-metro.

Figure 4 illustrates the rate of employment growth among counties within Appalachia from 1975 through 2012. While a great deal of variation exists among the 400-plus counties in the Region, many of the faster growing counties tend to be concentrated in the southern part of the Region, such as in Alabama, Georgia, Kentucky, North Carolina, and Tennessee. The relatively small number of counties that have lost jobs over the period are scattered throughout every state in the Region except New York.

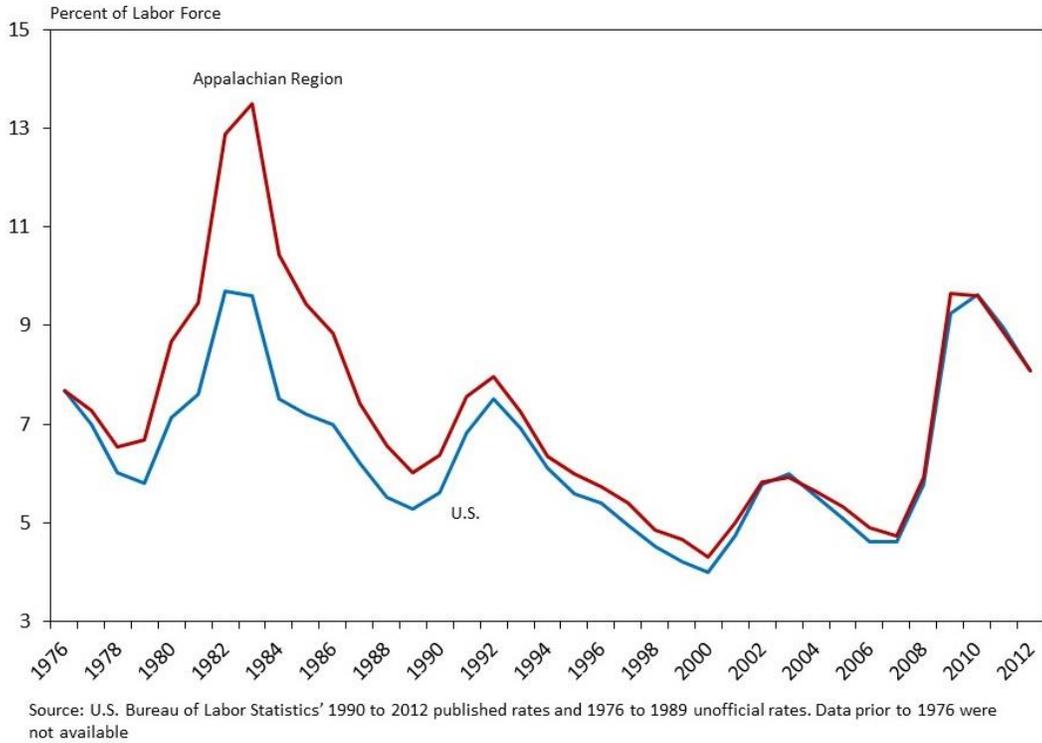
Figure 4: Average Annual Growth Total Private Employment (1975 – 2012)



Source: U.S. Bureau of Labor Statistics

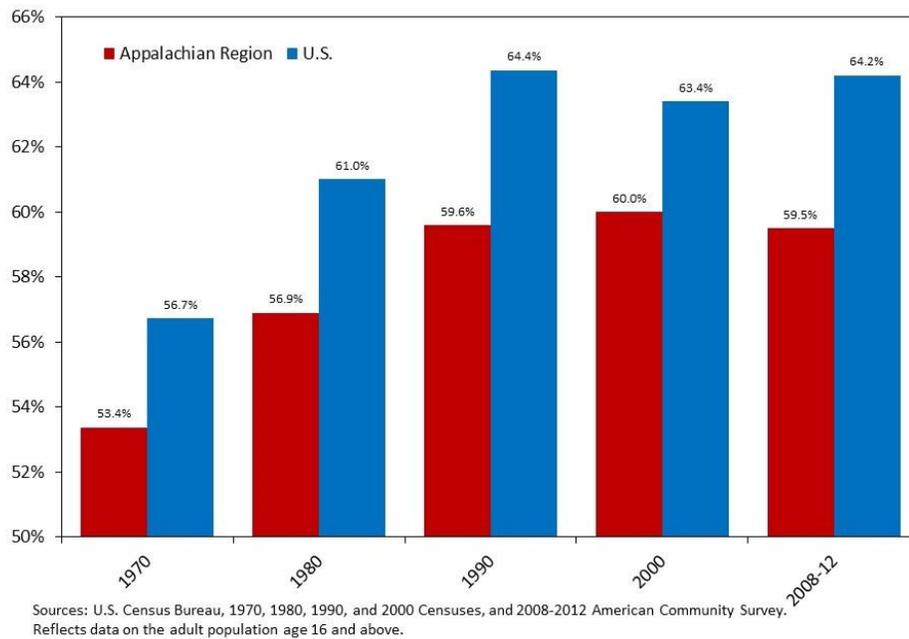
Unemployment in Appalachia and the nation are illustrated in Figure 5. Appalachian unemployment tracked slightly higher than the rest of the nation in the late 1970s, 1980s, and 1990s, but never quite matched the U.S. rate until the recession of the early 2000s. However, since the 2008-09 recession, the Region's unemployment rate has tracked the U.S. rate closely, with a few persistent pockets of joblessness.

Figure 5: Unemployment Rate (1976 – 2012)



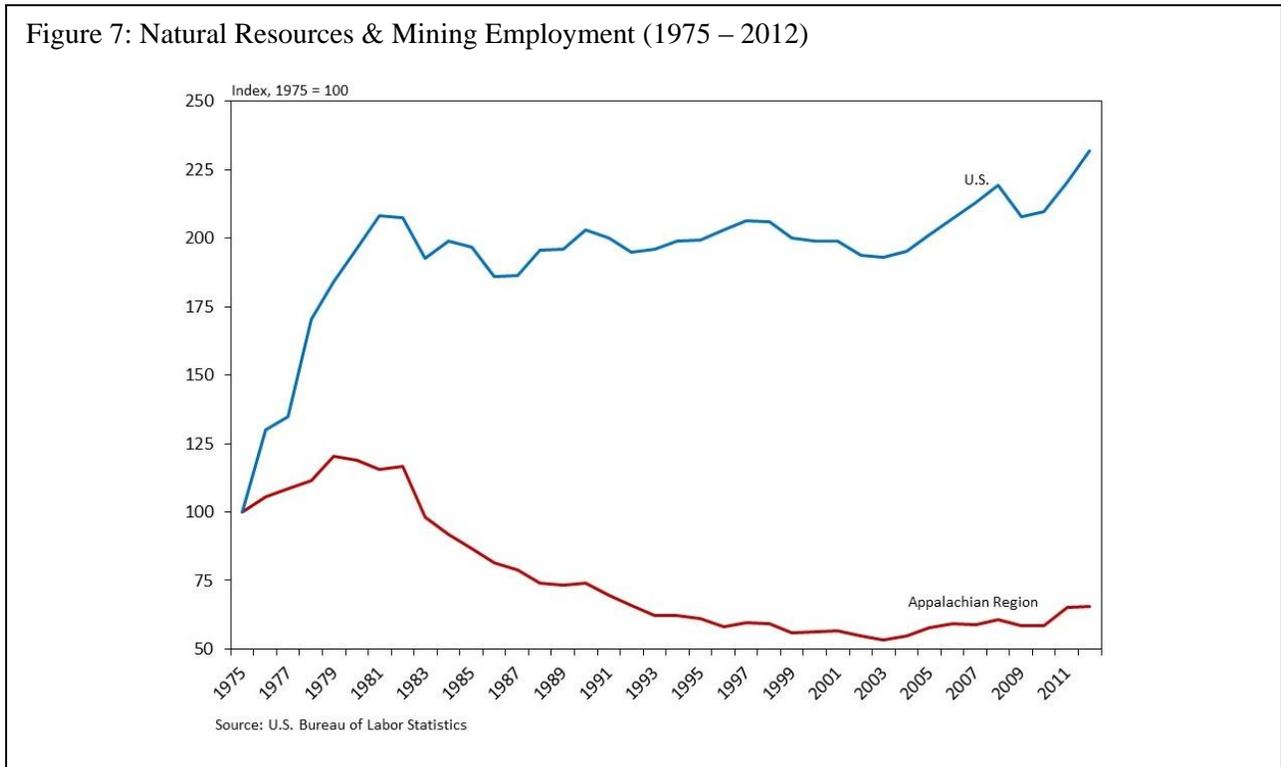
Related to the unemployment rate is the labor force participation rate, which illustrates the share of the adult population (age 16 and above) that is available to work, whether they are employed or not. As illustrated in Figure 6, the labor force participation rate nationally and in Appalachia grew significantly between 1970 and 1990 - primarily as more women entered the workforce - but the figure has remained mostly steady since 1990.

Figure 6: Labor Force Participation Rate (1970 – 2012)



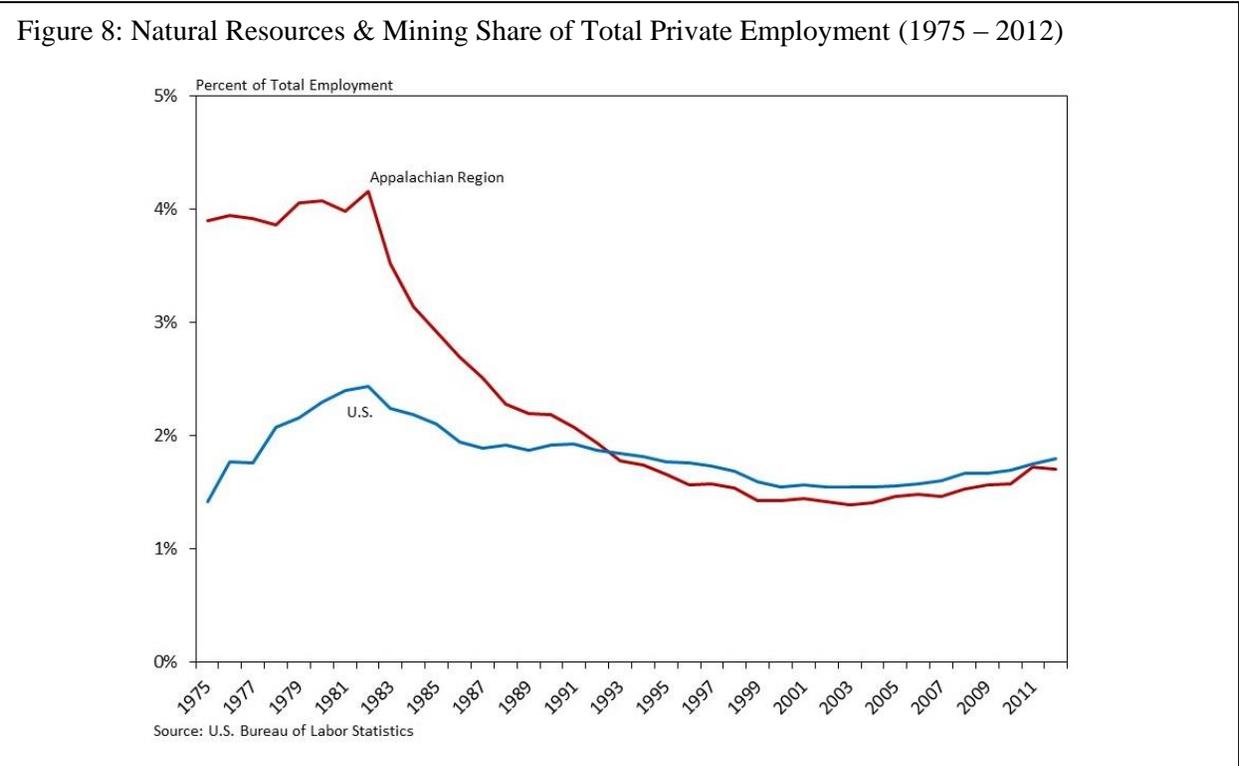
However, labor force participation rates in Appalachia have remained well below the national average throughout the past 30 years. The most recently available data found national labor force participation at 64.2 percent of working age adults (age 16 and above), compared with 59.5 percent of Appalachian adults. Part of the difference can be explained by greater participation in the informal barter economy in the Region, and a larger proportion of the population receiving government transfer payments, as well as the limited job opportunities in the Region's rural communities.

Now we examine employment for a few key industrial sectors for counties in the Appalachian Region. Figure 7 illustrates the evolution of natural resources and mining employment growth for the nation and for Appalachia since 1975, again indexed to 1975 values. As illustrated, employment in this sector underwent a steady decline from the early-1980s through the late 1990s, falling by approximately one-half since its peak.



However, the figure has grown by a noticeable margin in Appalachia since 2003. Nationally, natural resource and mining employment expanded rapidly from around 1976 through 1981 due primarily to rapid growth in agriculture in the Midwestern U.S., remained steady from the early-1980s through the early 2000s, and has then grown since around 2003. Overall employment in this sector nationally stands at more than double its 1975 level.

Figure 8 illustrates the total share of private employment in natural resource and mining (representing agriculture, mining, and related extractive activities). As illustrated, the figure fell rapidly for Appalachia from the early-1980s through the early 2000s, to rebound slightly over the past decade or so. The figure has roughly remained steady for the nation at approximately two percent of private employment since the mid-1980s.



Overall, while natural resources and mining employment as a share of total employment was nearly three times higher for Appalachia compared to the nation in 1975, the figure has been roughly the same for the Region and for the nation since the early 1990s.

Turning to manufacturing, total employment in the sector has fallen substantially in both the nation and in Appalachia overall since 1975, with the decline being noticeably larger in Appalachia. As reported in Figure 9, manufacturing employment in the U.S. stands at approximately 70 percent of its 1975 level, while the figure for Appalachia is approximately 59 percent. Since the 2008-2009 recession, manufacturing employment has rebounded slightly in Appalachia as well as the U.S. as a whole.

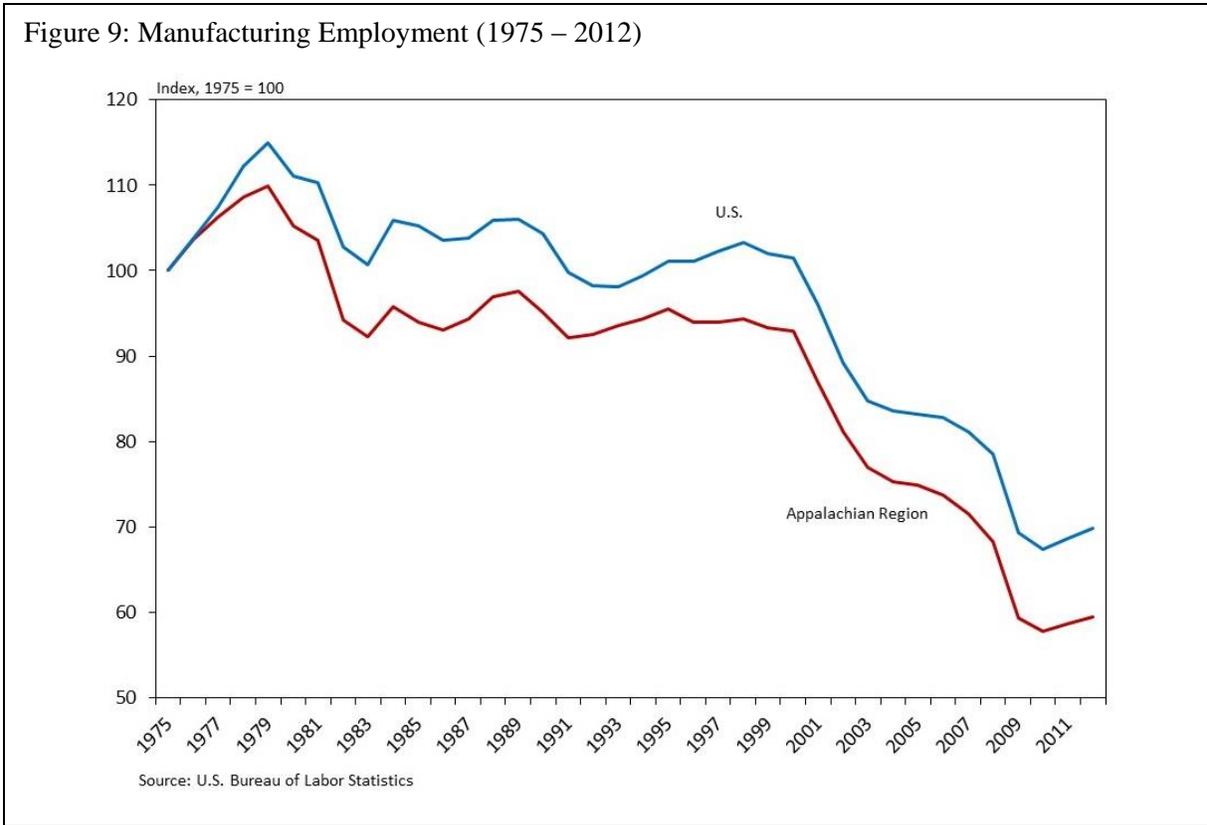
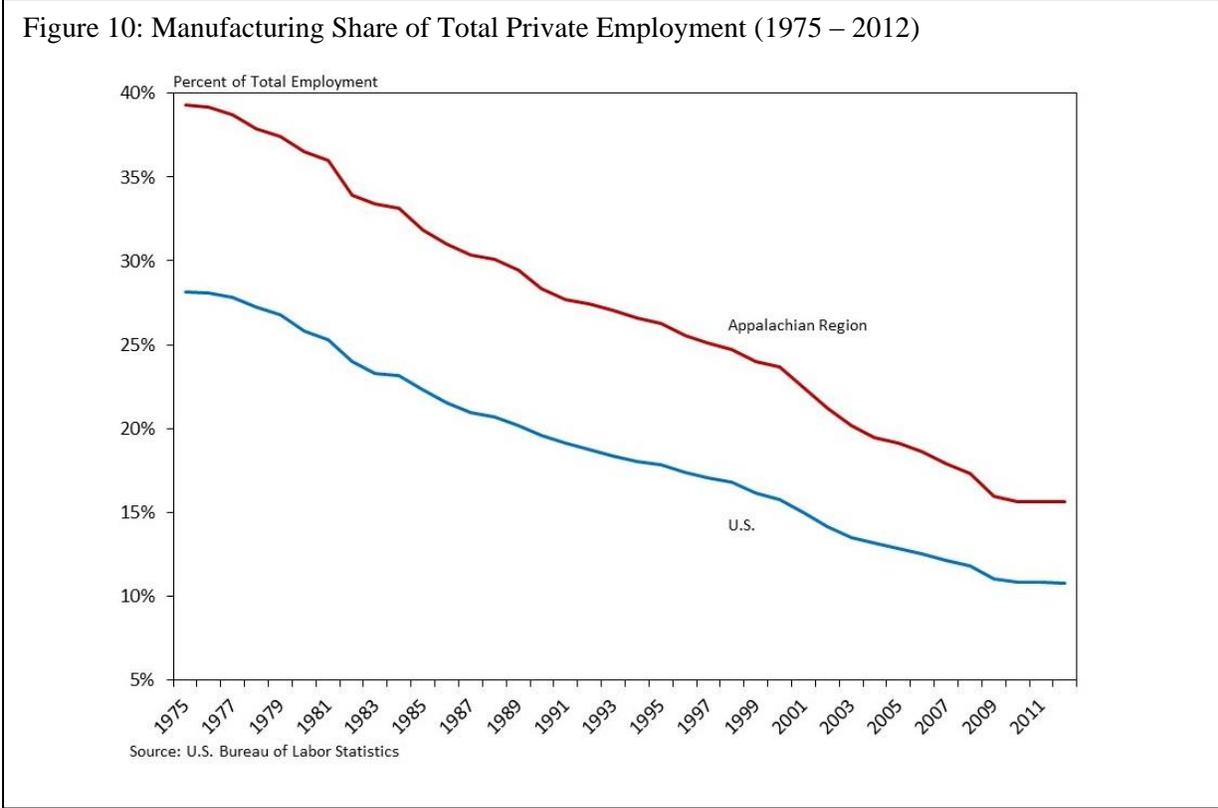


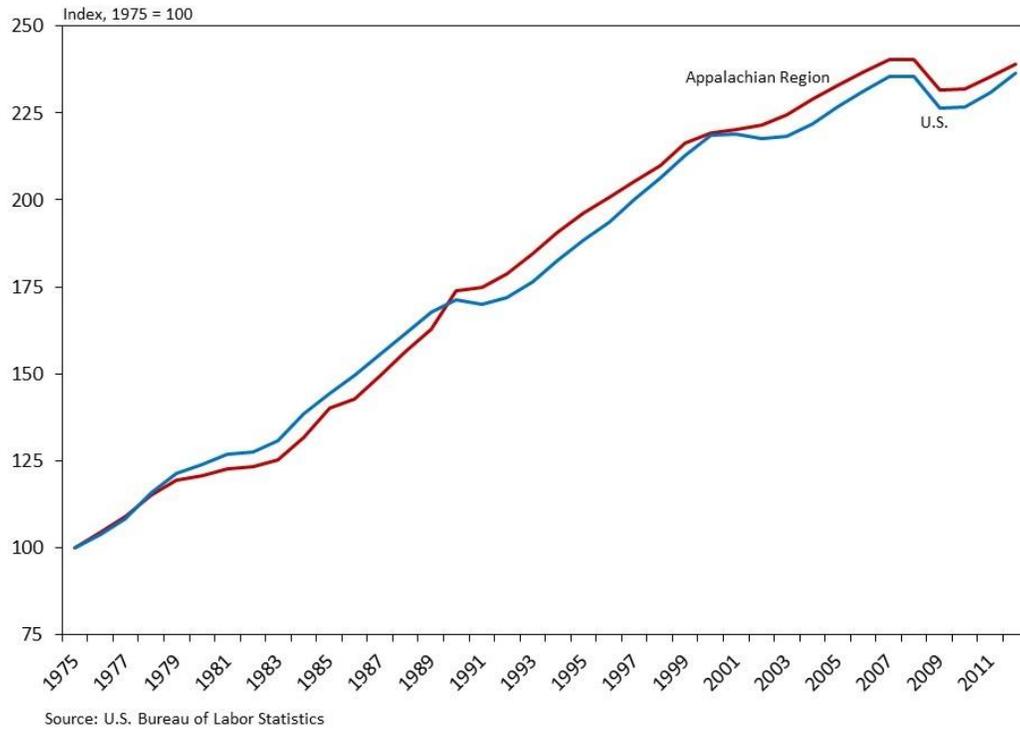
Figure 10 reports the manufacturing share of total private employment for the Region and the nation. As illustrated, manufacturing’s employment share has fallen to approximately 16 percent of total employment in Appalachia from nearly 40 percent in 1975. However, despite this decline, manufacturing accounts for a significantly larger share of the workforce in the Region compared to the nation, where a similar decline occurred.



It should be noted that, while manufacturing employment has fallen, manufacturing output has increased for both the nation and the Region over the period of analysis, reflecting technological improvements and increasing capital intensity in manufacturing.

Service-providing employment has been the driving force behind the overall employment growth regionally and nationally as suggested by the strong employment growth illustrated in Figure 11.<sup>7</sup> As illustrated, service-sector employment for the Region and the nation has grown virtually in lockstep over the period of analysis, resulting in total service sector employment growth of approximately 136 percent.

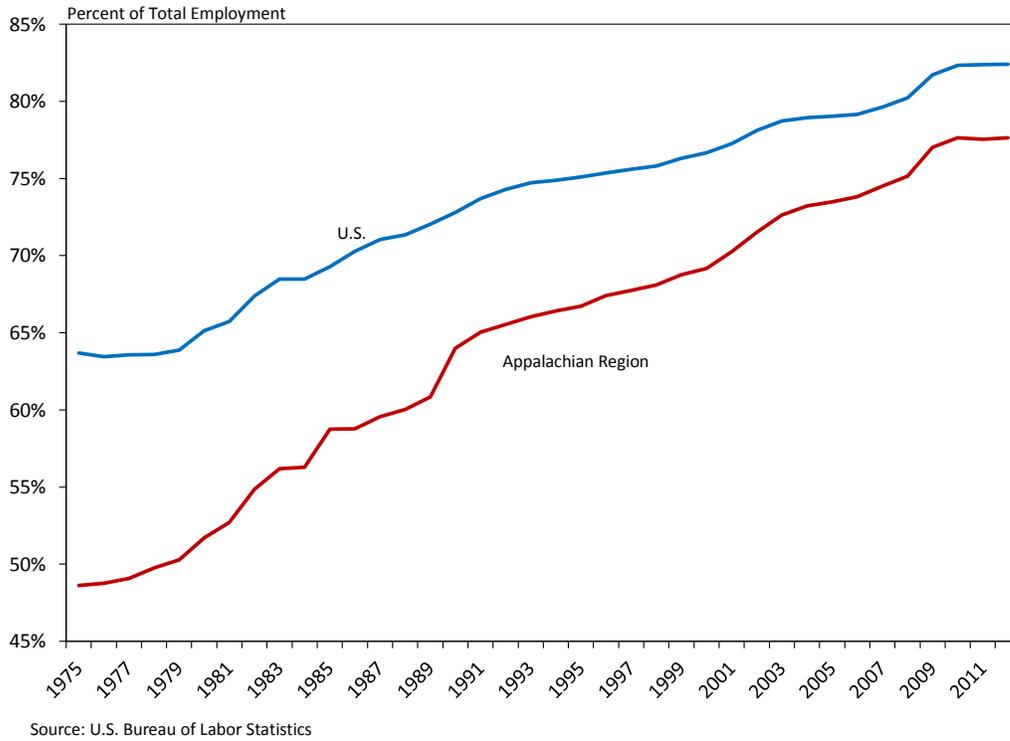
Figure 11: Private Service-Providing Employment (1975 – 2012)



<sup>7</sup> Service-providing industries include the following: Trade, Transportation, and Utilities; Information; Financial Activities; Profession-Business Services; Education-Health Services; Other Services.

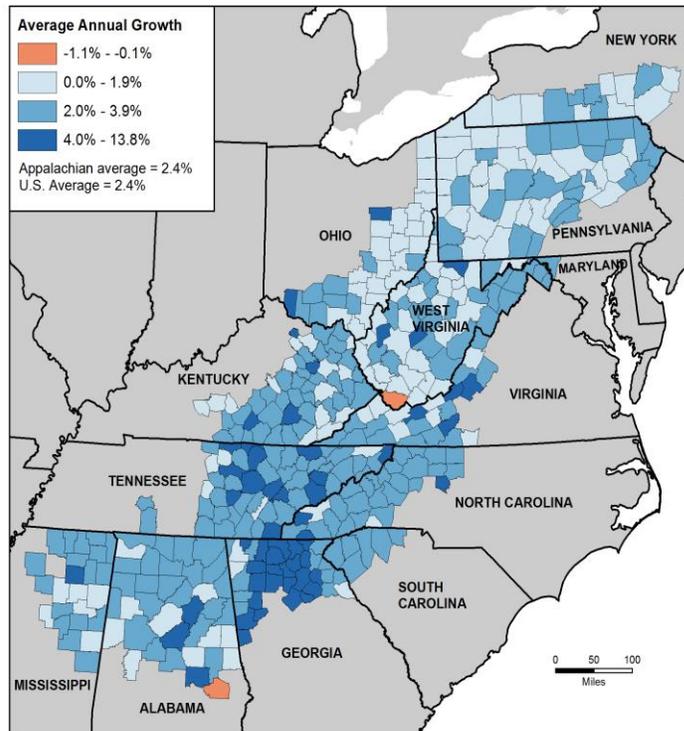
In a similar fashion, service sector employment as a share of total employment has grown substantially over the period of analysis, as shown in Figure 12. As illustrated, by the end of the period of analysis, service sector employment stood at approximately 78 and 82 percent of total employment for the Region and the nation, respectively.

Figure 12: Private Service-Providing Share of Total Private Employment (1975 – 2012)



As illustrated in Figure 13, growth in service-providing employment exhibits a great deal of variation among Appalachian counties. However, this figure does correlate to a large extent with overall employment growth with many of the high growth counties concentrated in the southern part of the Region. Only two counties in the Region have lost service-providing jobs overall throughout the period of analysis.

Figure 13: Average Annual Growth Service-Providing Employment (1975-2012)

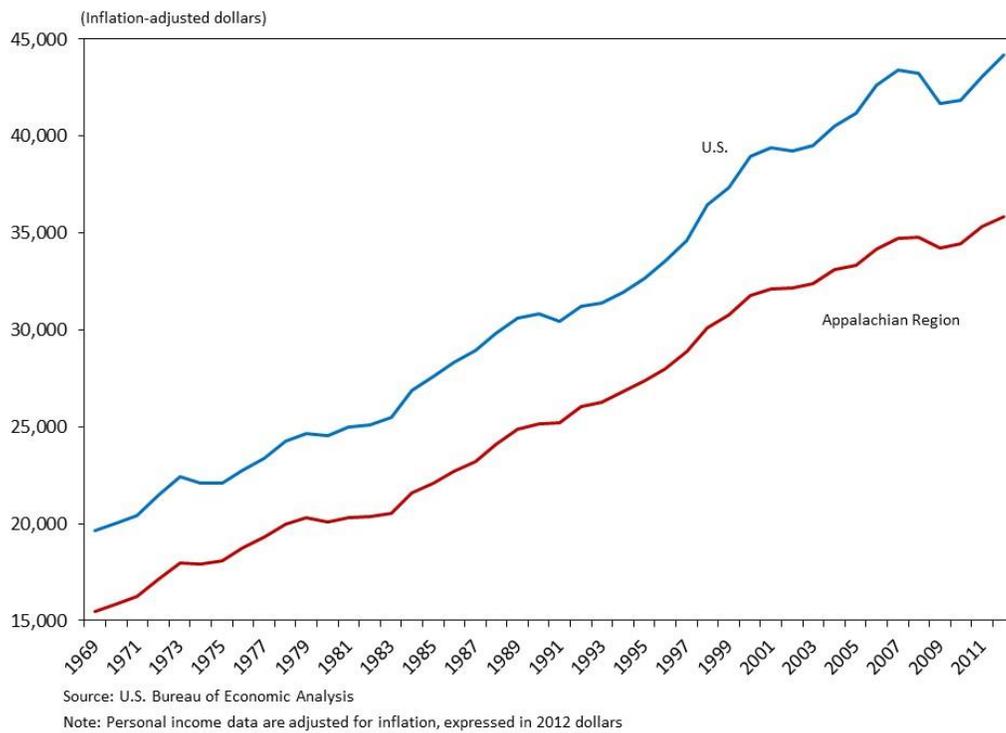


Source: U.S. Bureau of Labor Statistics

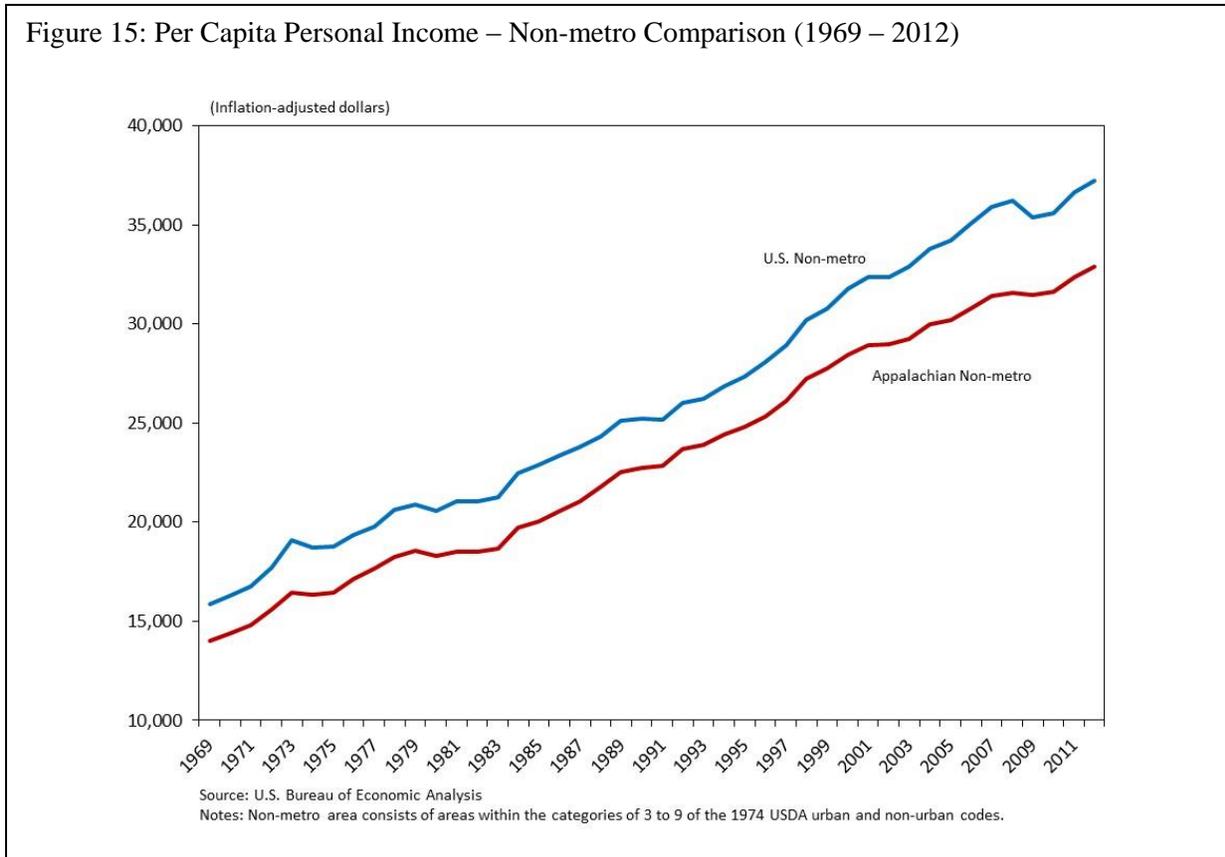
## Income in Appalachia

Turning to income, as reported in Figure 14, per capita personal income has grown substantially in Appalachia over the past half-century, rising by around 136 percent over the entire period in inflation-adjusted terms. Growth has mostly been steady, with a few relatively brief periods of decline over the long-run. Per capita income in Appalachia has remained below the national average for the entire period of analysis. However, the gap is decreasing in relative terms: per capita personal income in Appalachia was 81.1 percent of the national average in 2012, an improvement from 78.7 percent in 1969. Despite this relative improvement, the absolute size of the per capita personal income gap has widened, expanding to \$8,344 in 2012 from \$4,175 in 1969, again in inflation-adjusted terms.

Figure 14: Per Capita Personal Income (1969 – 2012)



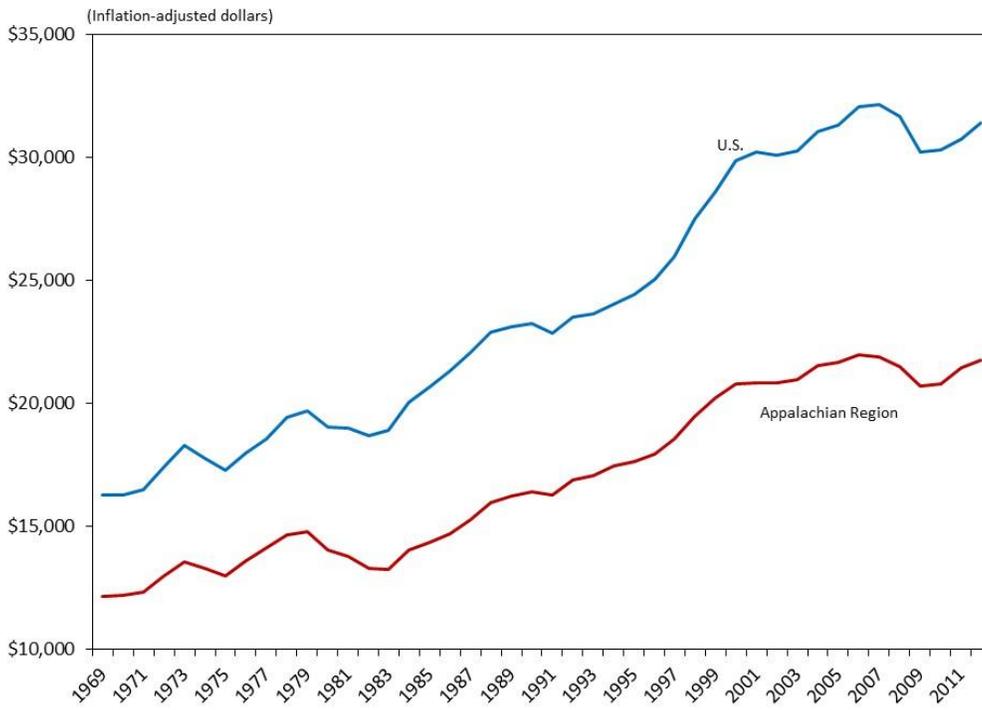
It is also valuable to compare income growth in the non-metro portion of the Region with growth in the non-metro U.S. As reported in Figure 15, the pattern of how per capita personal income in non-metro Appalachia tracks income in the non-metro U.S. looks the same as that in the whole region illustrated in the previous figure. Looking at more detail shows that per capita income in both non-metro Appalachian and the non-metro U.S. is lower than that in the whole region.



In addition, in relative terms, income in non-metro Appalachian is closer to that of the non-metro U.S. and the gap remains the same. In this context, per capita personal income in non-metro Appalachia stands at 88.2 percent of the national average in 1969 and at 88.4 percent by 2012.

To investigate income growth more fully, we turn to earnings per capita in Figure 16. Earnings per capita differs from per capita personal income in that the former excludes transfer payments from government, such as social security payments or unemployment insurance compensation and it takes taxes paid to the federal government into consideration. Here the relative gap between earnings per capita in the Region has widened substantially since 1969 rather than narrowed. In particular, earnings per capita in Appalachia fell from 74.6 percent of the national average in 1969 to 69.3 percent by 2012.

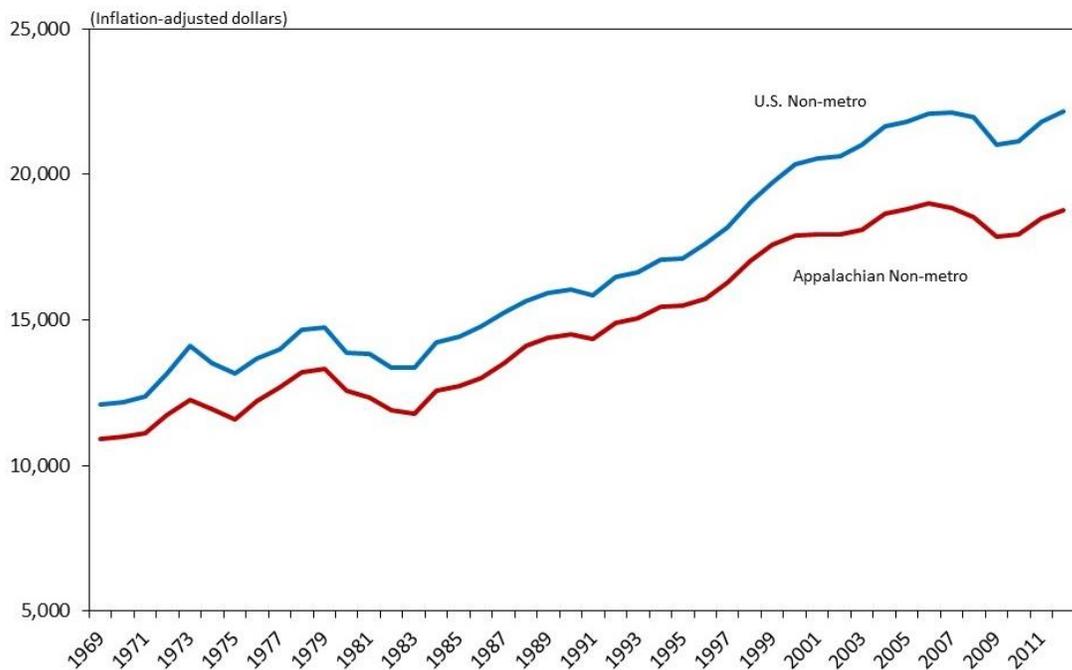
Figure 16: Earnings Per Capita (1969 – 2012)



Source: U.S. Bureau of Economic Analysis  
 Note: Earnings data are adjusted for inflation, expressed in 2012 dollars

We also report earnings per capita for the non-metro parts of Appalachia and the U.S. in Figure 17. Consistent with the pattern seen with per capita personal income, earnings per capita are much closer between Appalachia and the U.S. when considering only non-metro counties. However, the pattern remains in this context; Appalachia has fallen in comparison to the nation in terms of earnings per capita over the period of analysis. As reported in the figure, earnings per capita in non-metro Appalachia fell from 90.2 percent of the national average in 1969 to 84.8 percent by 2012. Also note the general lack of significant growth in the figure in both Appalachia and the U.S. over the period of analysis.

Figure 17: Earnings Per Capita – Non-metro Comparison (1969 – 2012)

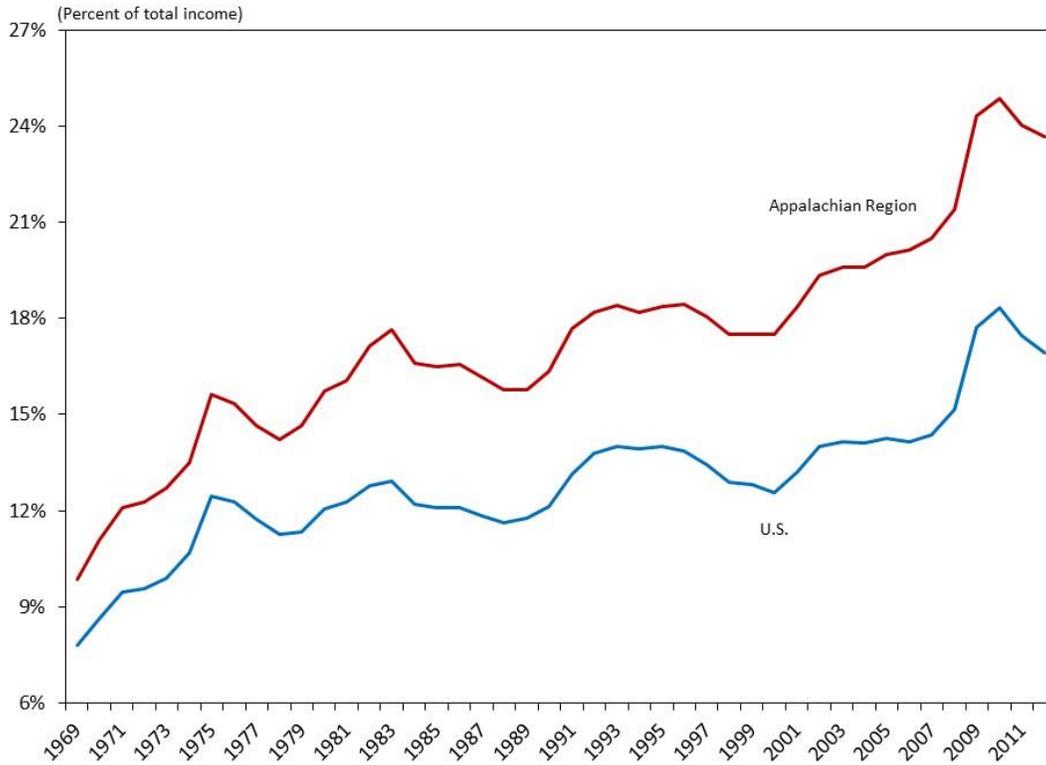


Source: U.S. Bureau of Economic Analysis

Notes: Non-metro area consists of areas within the categories of 3 to 9 of the 1974 USDA urban and non-urban codes.

The divergence between per capita personal income versus earnings per capita can be explained by federal transfers. As reported in Figure 18, federal transfers as a share of personal income have increased substantially in Appalachia over the period and by 2012 accounted for around 24 percent of personal income, significantly higher than the national figure of 17 percent. In 1969, federal transfers as a share of personal income was around 10 percent in the Region, compared to around 8 percent nationally.

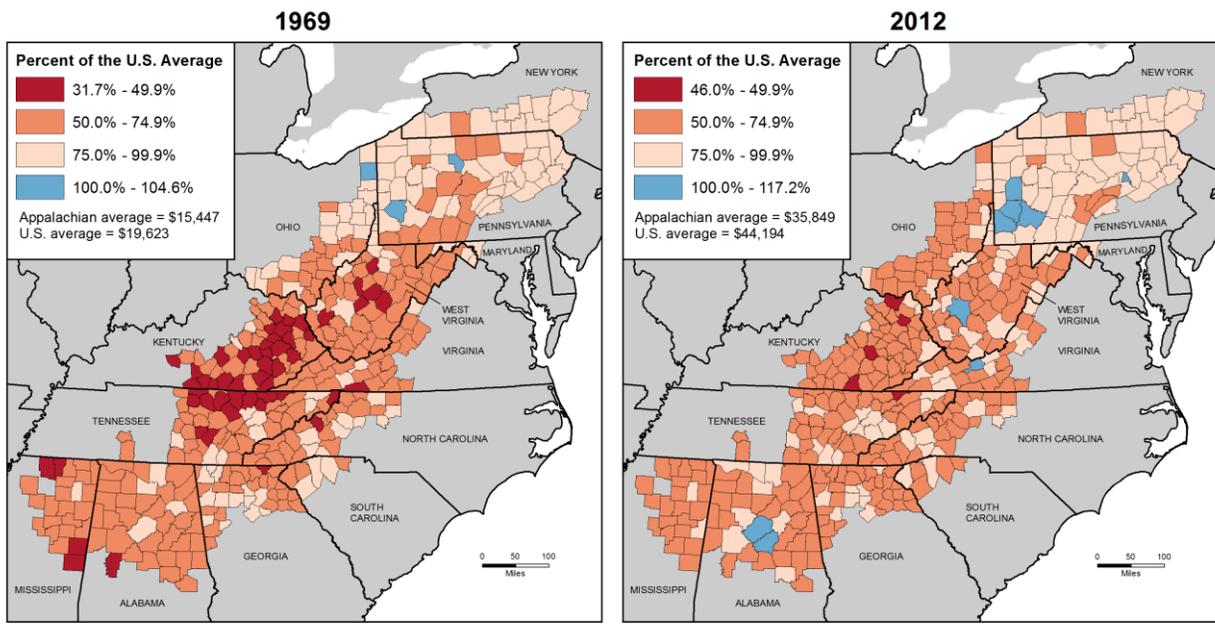
Figure 18: Government Transfer Payments as a Share of Personal Income (1969 – 2012)



Source: U.S. Bureau of Economic Analysis

Figure 19 illustrates cross sectional variation in per capita personal income within Appalachia for 1969 (left panel) and for 2012 (right panel). The figure shows that per capita income in many counties across Appalachia in 1969 was less than half the national average. The map demonstrates significant progress by 2012, with only five counties still having such a low relative income. By 2012, development in many counties was approaching parity with the rest of the nation, although a number of counties were still struggling, with per capita income levels below 75 percent of the U.S. average.

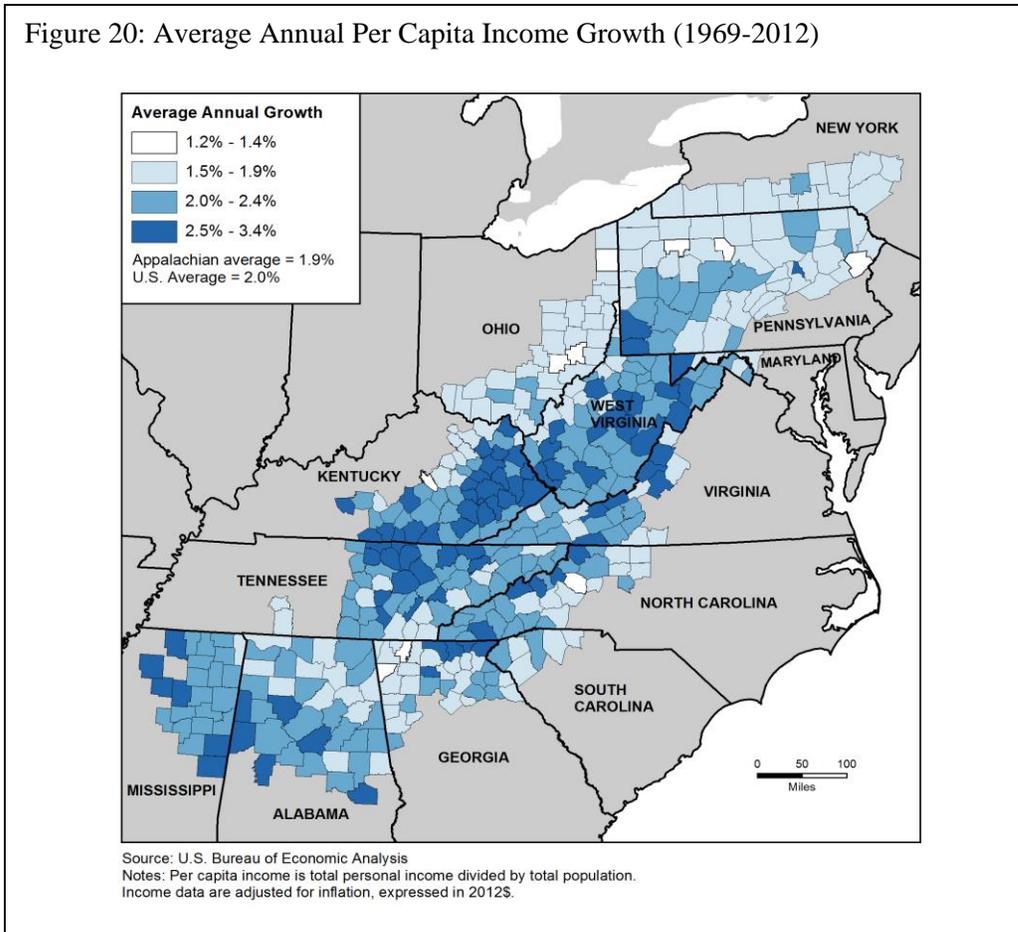
Figure 19: Per Capita Income Relative to the U.S. (Percent of the U.S. Average)



Source: U.S. Bureau of Economic Analysis  
Notes: Per capita income is total personal income divided by total population. The percent of U.S. average is computed by dividing the county personal income by the U.S. average and multiplying by 100. Income data are adjusted for inflation, expressed in 2012\$.

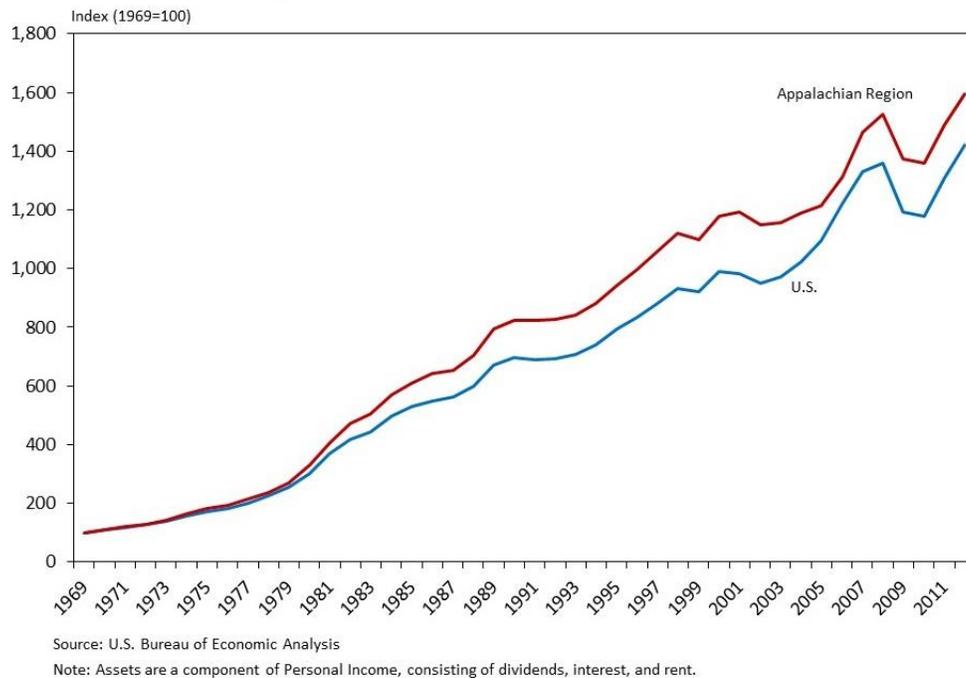
Source: U.S. Bureau of Economic Analysis  
Notes: Per capita income is total personal income divided by total population. The percent of U.S. average is computed by dividing the county personal income by the U.S. average and multiplying by 100. Income data are adjusted for inflation, expressed in 2012\$.

Figure 20 illustrates average annual growth in per capita income by county over the period 1969-2012. While a significant amount of variation exists, to some extent a “catch-up” effect is illustrated in that counties that were initially lower income grew at a faster rate over the period compared to counties that were initially higher income. For instance, numerous counties that were initially lower income in Kentucky, Mississippi, and West Virginia exhibited the highest relative growth rates. These counties compare to several counties in Ohio, Pennsylvania, and New York that were initially higher income but exhibited slower growth rates over the period.



In Figure 21 we provide some insight into wealth in Appalachia versus the nation. Since we do not have direct data on wealth, we use per capita personal income derived from assets (e.g., dividend, interest, and rent income) as a proxy measure. As illustrated, since around 1980 Appalachia has grown faster than the nation in terms of asset income, suggesting that the wealth gap between the Region and the nation has lessened somewhat. This income results from rent, dividends, and interest. It is unclear why this gap has lessened.

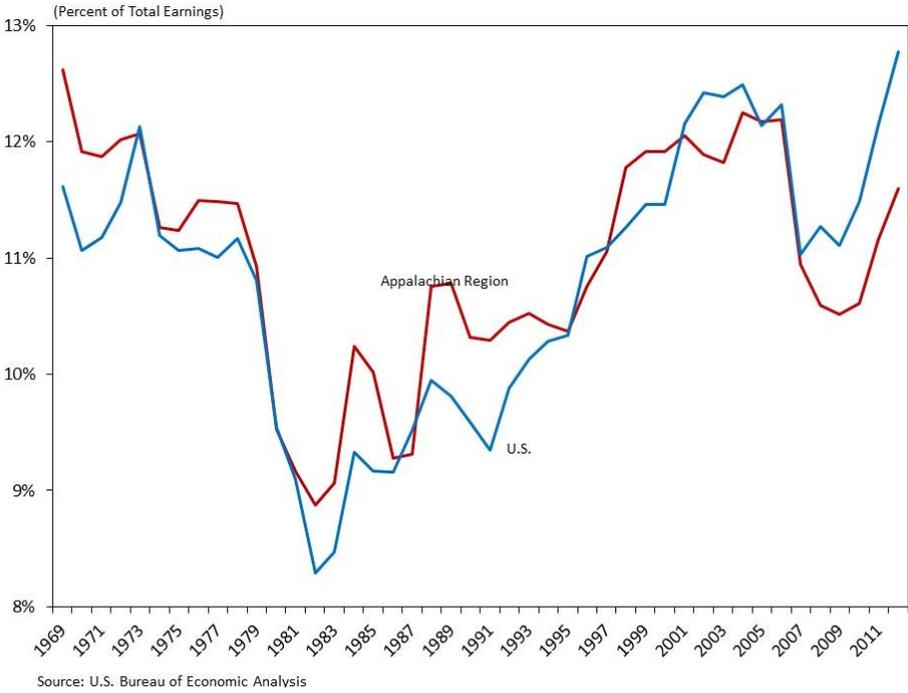
Figure 21: Per Capita Personal Income from Assets (1969 – 2012)



The proportion of the Region’s assets found in the 10 wealthiest counties (in terms of assets) might be used as a proxy for the Region’s money centers. In 1969 and 2006, these counties accounted for 30 percent of all regional assets, but for most other years, their share of Appalachia’s total assets has been between 26 and 30 percent. Thus, one might conclude that the overall increased value in regional assets is tied as much to the increased value of rural lands (with their natural gas and other mineral rights) as it does to any other possible explanation.

In Figure 22 we examine a measure of entrepreneurship in Appalachia and in the nation. While it is difficult to measure entrepreneurship, typical metrics are often related to self-employment activity and/or small business activity. Here we consider sole-proprietors' income as a share of total earnings, the idea being that a larger metric might be indicative of a more entrepreneurial economy. As illustrated, sole-proprietors' income in Appalachia has been very similar to that in the nation as a whole throughout most of the period of analysis, although there is a slight gap between Appalachia and the rest of the nation during the past few years.

Figure 22: Proprietors' Income as a Share of Total Earnings (1969 – 2012)



## Poverty in Appalachia

Turning to poverty, Figure 23 illustrates poverty status over the period of analysis. The Appalachian Region has consistently reported a higher poverty rate compared to the U.S. overall. However, the degree to which poverty in Appalachia exceeds the national figure fell considerably during the 1970s and has remained fairly constant since. Appalachia's poverty rate has been cut in half over the past five and a half decades, from nearly 31 percent in 1960 to about 16.6 percent today.

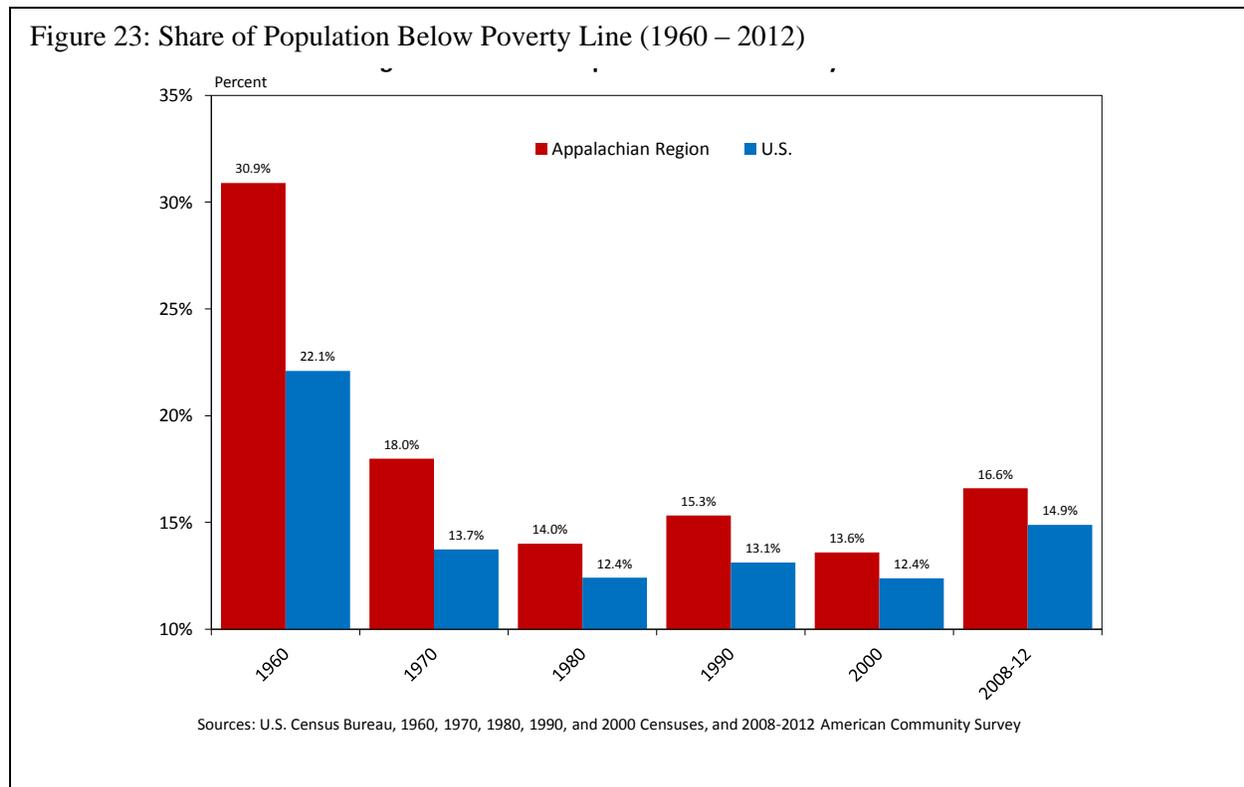


Figure 24 reports poverty rates for the non-metro counties of the Appalachian Region and the U.S. While poverty rates are higher for non-metro regions, a similar pattern emerges.

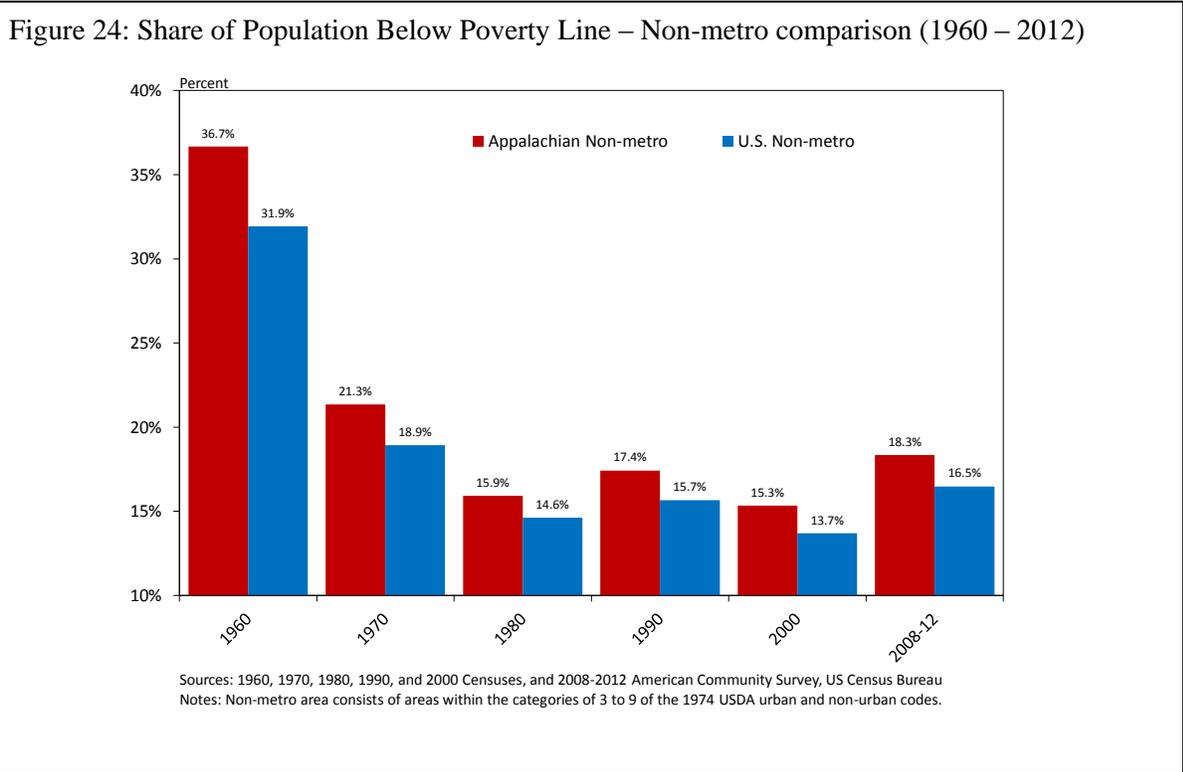
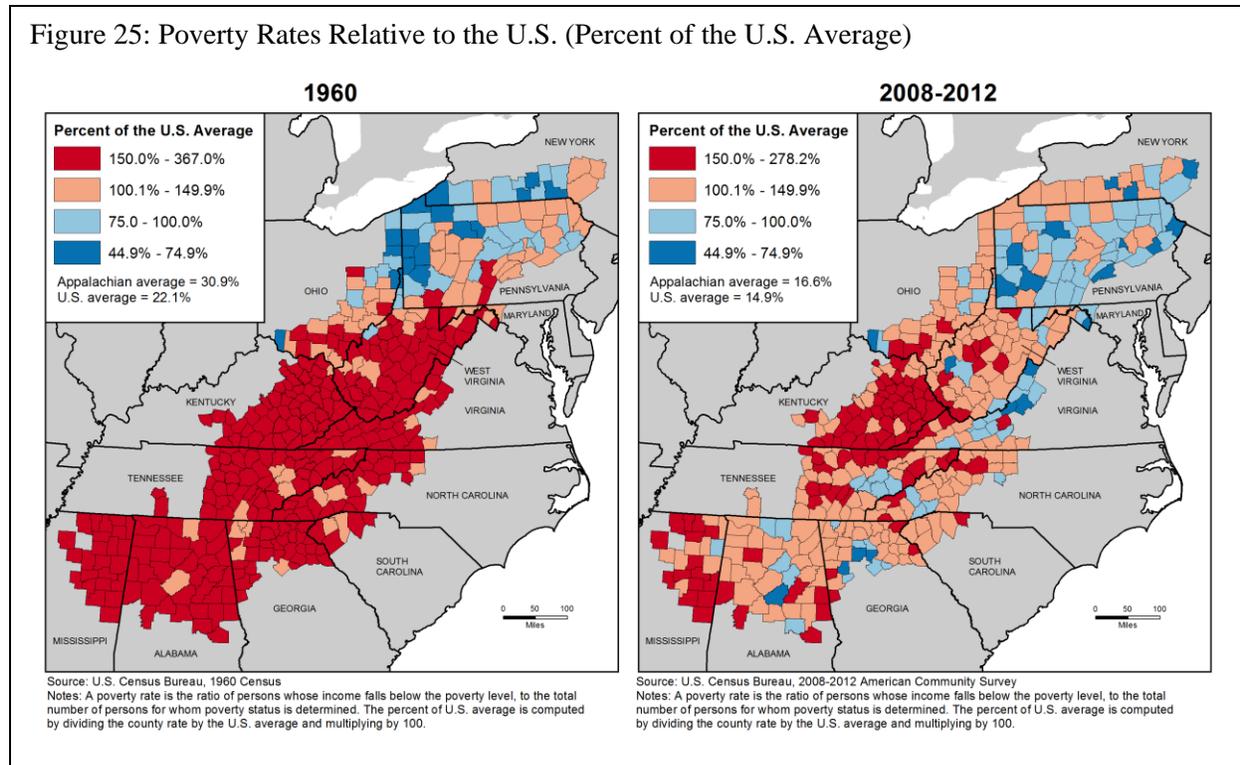


Figure 25 depicts poverty rates within the Appalachian Region for 1960 (left panel) as well as the average over 2008-2012 (right panel). As the figure below shows, there has been a dramatic reduction in the number of Appalachian counties where the share of the population living in poverty exceeds 150 percent of the national average. The number of high-poverty counties in the Region (those with poverty rates above 150 percent of the U.S. average) declined from 295 in 1960 to 107 for the period 2008–2012.



In Figure 26 we turn to poverty among the elderly population in Appalachia versus the U.S. As was the case with overall poverty, as discussed above, there is a large reduction in elderly poverty rates from 1970 to 1980, as well as a reduction in the degree to which Appalachian poverty rates exceed those of the nation. By the most recent year illustrated, elderly poverty in Appalachia was only 0.8 percentage points higher than the national figure.

Figure 26: Share of Population 65 or Older Below Poverty Line (1970 – 2012)

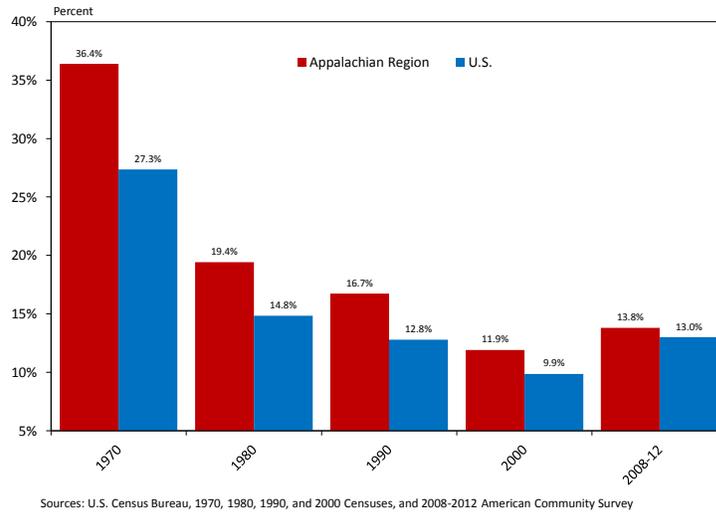
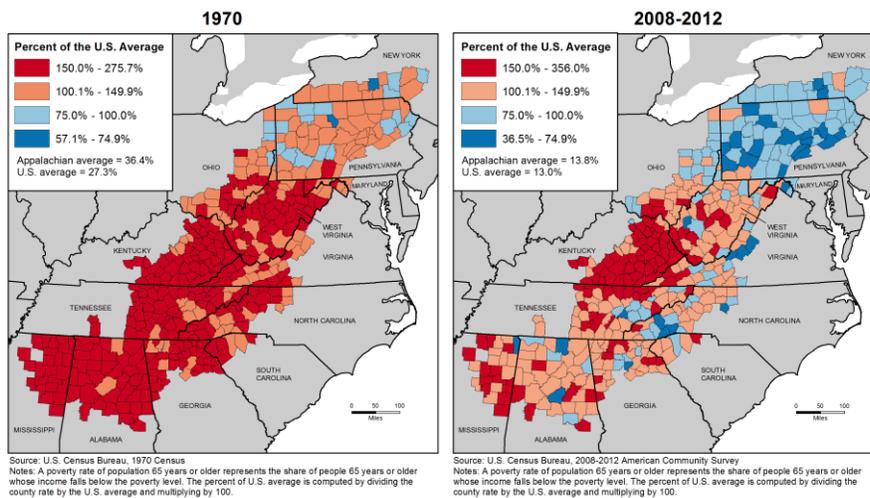


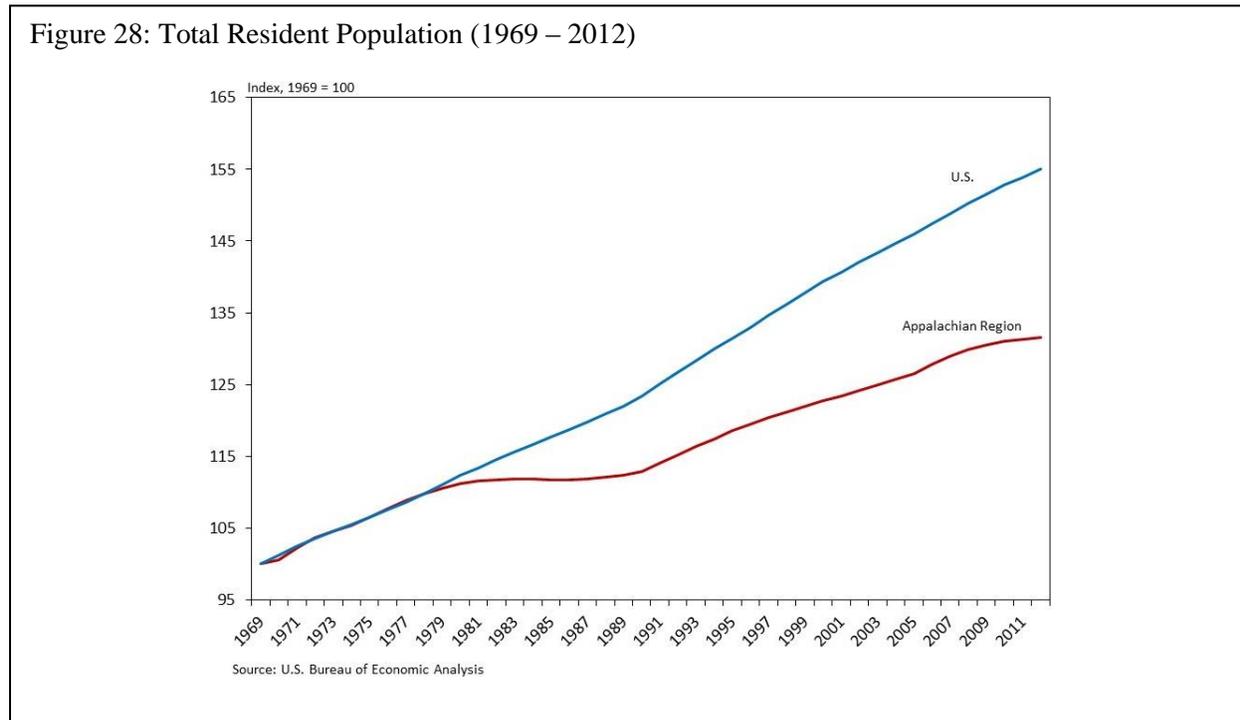
Figure 27 shows the pattern for poverty rates for the elderly population among Appalachian counties for 1970 (left panel) and over the years 2008-2012 (right panel) is similar to the one for overall poverty rates in the Region.

Figure 27: Poverty Rates of Population 65 or Older relative to the U.S. (Percent of the U.S. Average)



## Population in Appalachia

Figure 28 reports population growth in Appalachia and the nation since 1969, indexed to initial values. As illustrated, U.S. population grew more rapidly and more consistently. Altogether Appalachian population stands at nearly 132 percent of its 1969 level whereas the U.S. stands at 155 percent of its 1969 level.



During the past generation, the U.S. population has grown at a pace more than twice that of the Appalachian Region. This is due in part to the fact that the vast majority of Appalachian counties have a lower share of young people (those below age 20) and a much higher (and more rapidly growing) share of seniors (those aged 65 and older) than the nation.

Today, the area remains much more rural than the rest of the nation. Forty-two percent of the people in Appalachia still live in rural areas, compared with 20 percent nationally; and Appalachians who live in cities are much more likely to live in smaller urban centers than are residents of other parts of the country.

Recessionary periods also exacerbate outmigration. During the economic stagnation of the 1980s, population growth in Appalachia languished. Even when the Region's population began to grow again in the early 1990s, the growth rate significantly trailed the U.S. rate.

As depicted in Figure 29, population in the Appalachian Region has fallen from 9.5 percent of the U.S. population in 1969 to 8.1 percent by 2012.

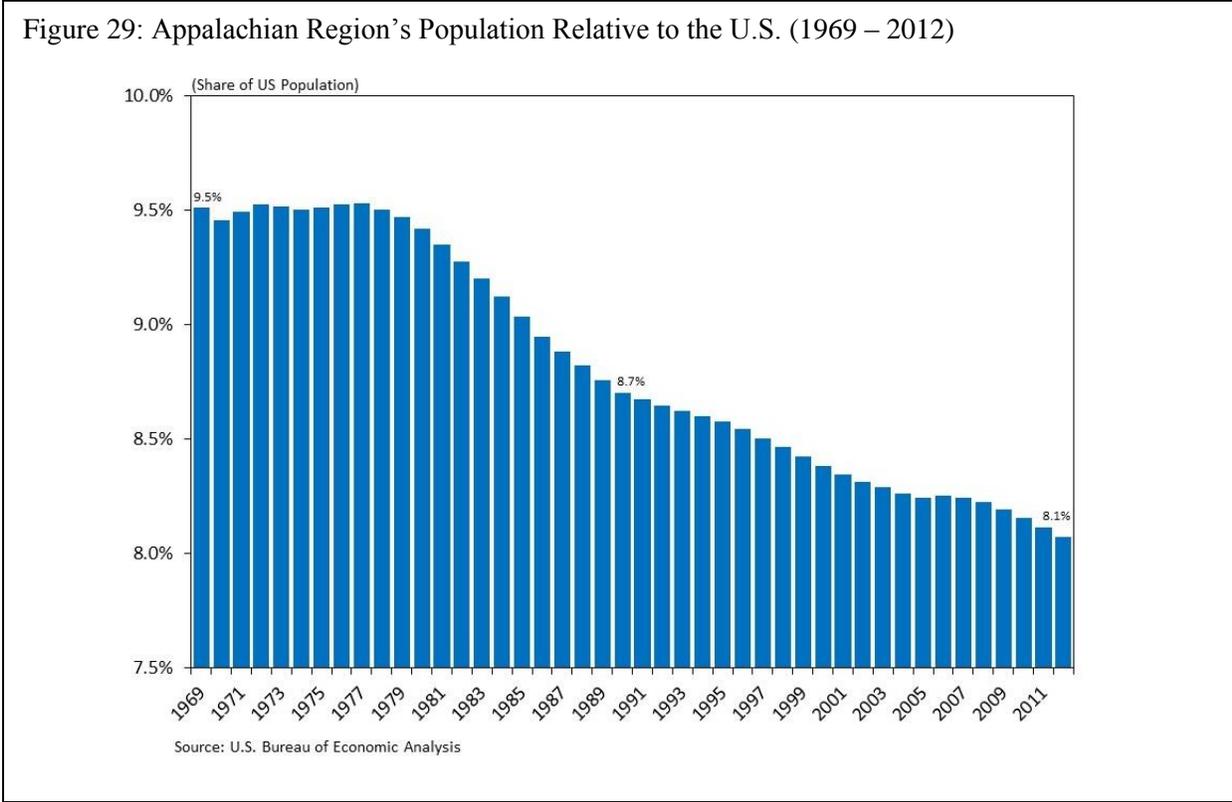
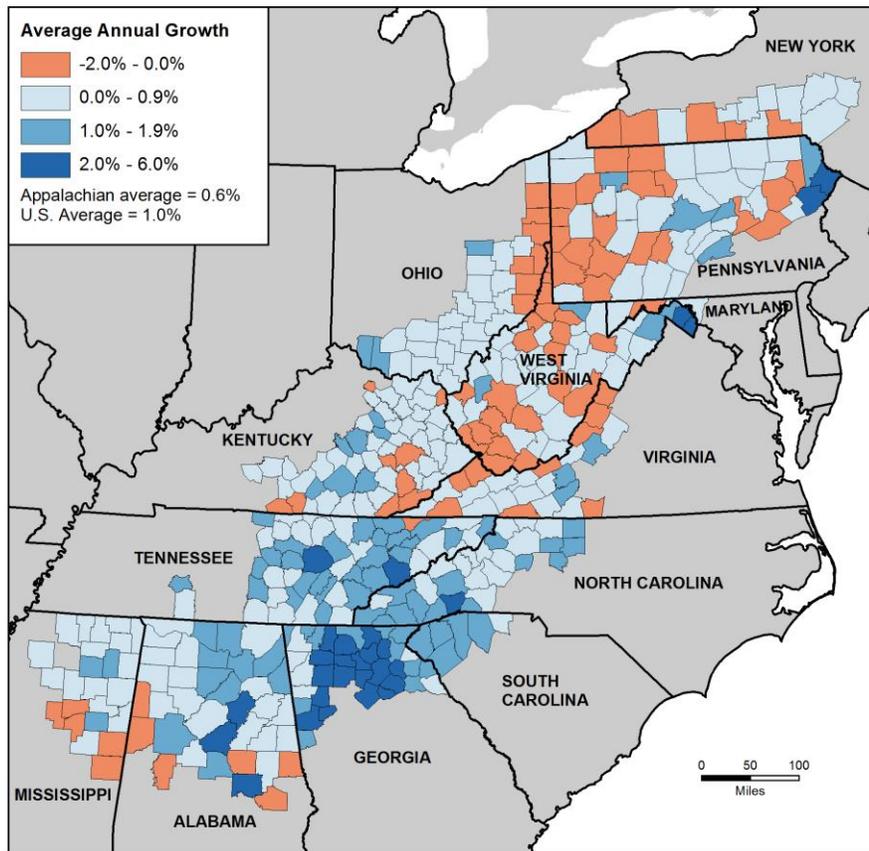


Figure 30 illustrates variation in population growth rates over the period 1969 through 2012 among Appalachian counties. As illustrated, the fastest growing counties tend to be in the southern part of the Region, whereas the counties that have lost population tend to be located in the northern and central parts of the Region.

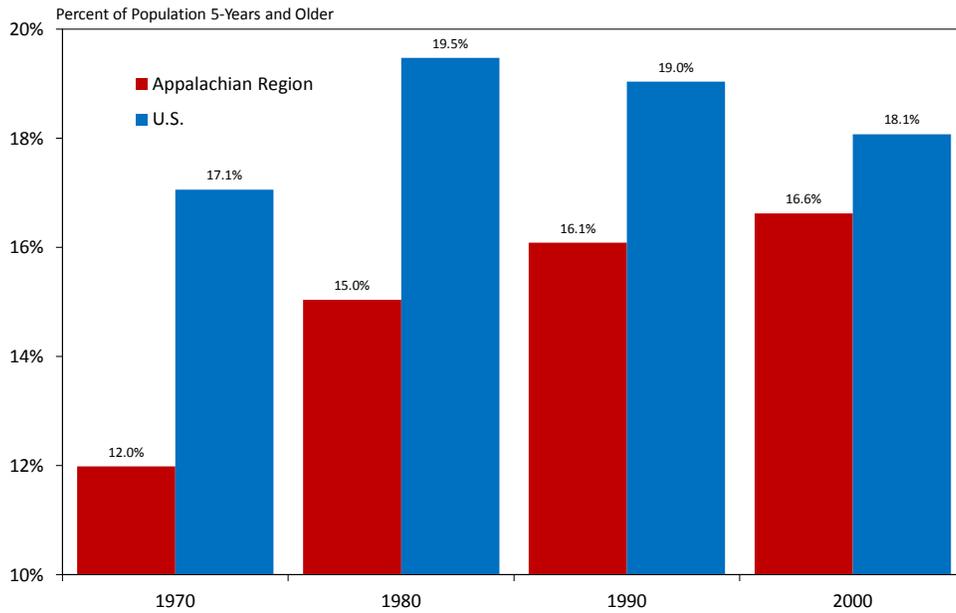
Figure 30: Average Annual Population Growth, 1969-2012



Source: U.S. Bureau of Economic Analysis

Next we turn to population mobility. Figure 31 depicts the share of the population that has moved from another county within a given state in the last five years. In terms of movement between counties (and within a given state), Appalachia has lagged the nation over the entire period of analysis, but that gap has declined considerably over the period.

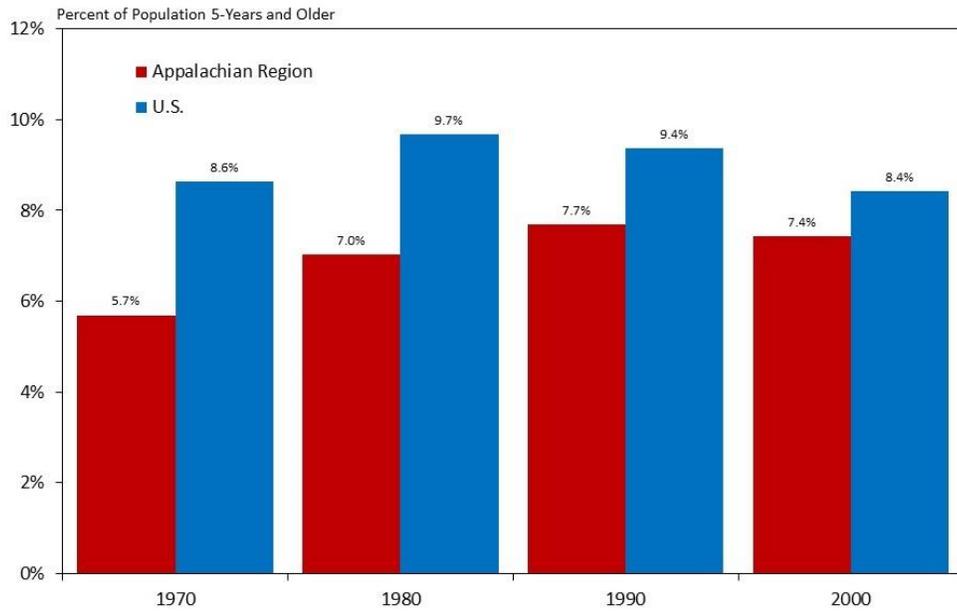
Figure 31: Share of Population Who Moved in from Different County in Last Five Years (1970 – 2000)



Sources: U.S. Census Bureau, 1970, 1980, 1990, and 2000 Censuses

The same general trend is apparent in terms of movement from another state. Figure 32 depicts the share of the population that has moved from another state in the past five years. In this case the degree to which Appalachia lags the nation became very small by the end of the period of analysis.

Figure 32: Share of Population Who Moved in from Different State in Last Five Years (1970 – 2000)

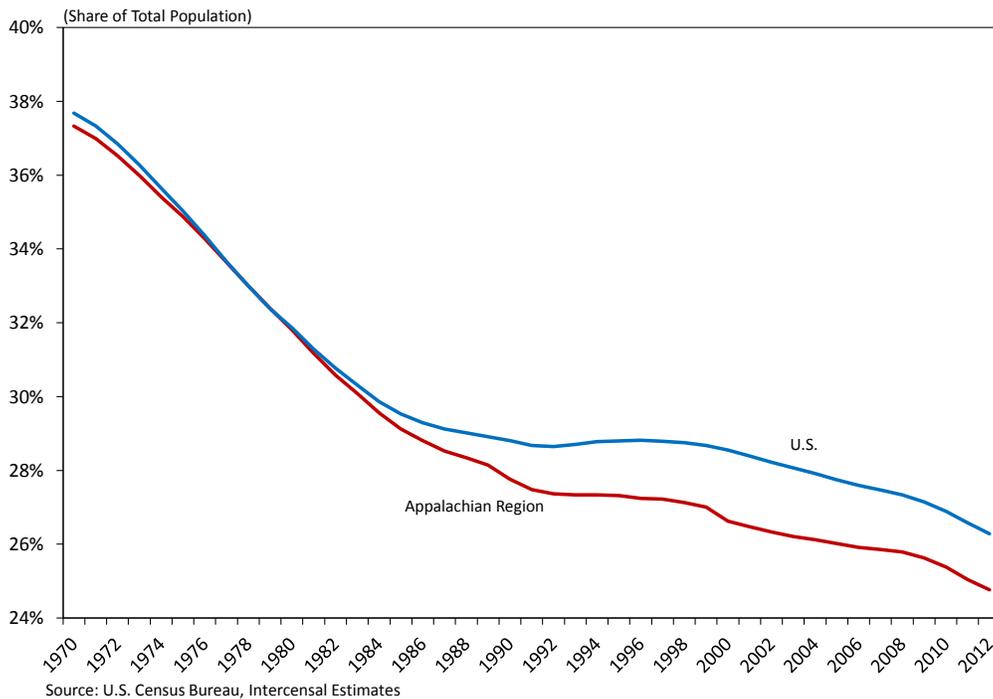


Sources: U.S. Census Bureau, 1970, 1980, 1990, and 2000 Censuses

## Aging in Appalachia

Next we consider the aging of Appalachia's population that has occurred over the past several decades. As illustrated in Figure 33, the share of Appalachia's population that is under 20 years old has fallen substantially since 1970 – falling from just under 38 percent in 1970 to around 25 percent by 2012. This decline occurred in tandem with the U.S. from 1970 through the early 1980s, but since then has been more pronounced in Appalachia.

Figure 33: Share of Population 0 to 19 Years (1970 – 2012)



In a parallel fashion, Figure 34 depicts the rise of the over age 65 share of the population in Appalachia, which rose from just over 10 percent of the population in 1970 to around 16 percent in 2012. This aging pattern also occurred at the national level, although to a lesser extent.

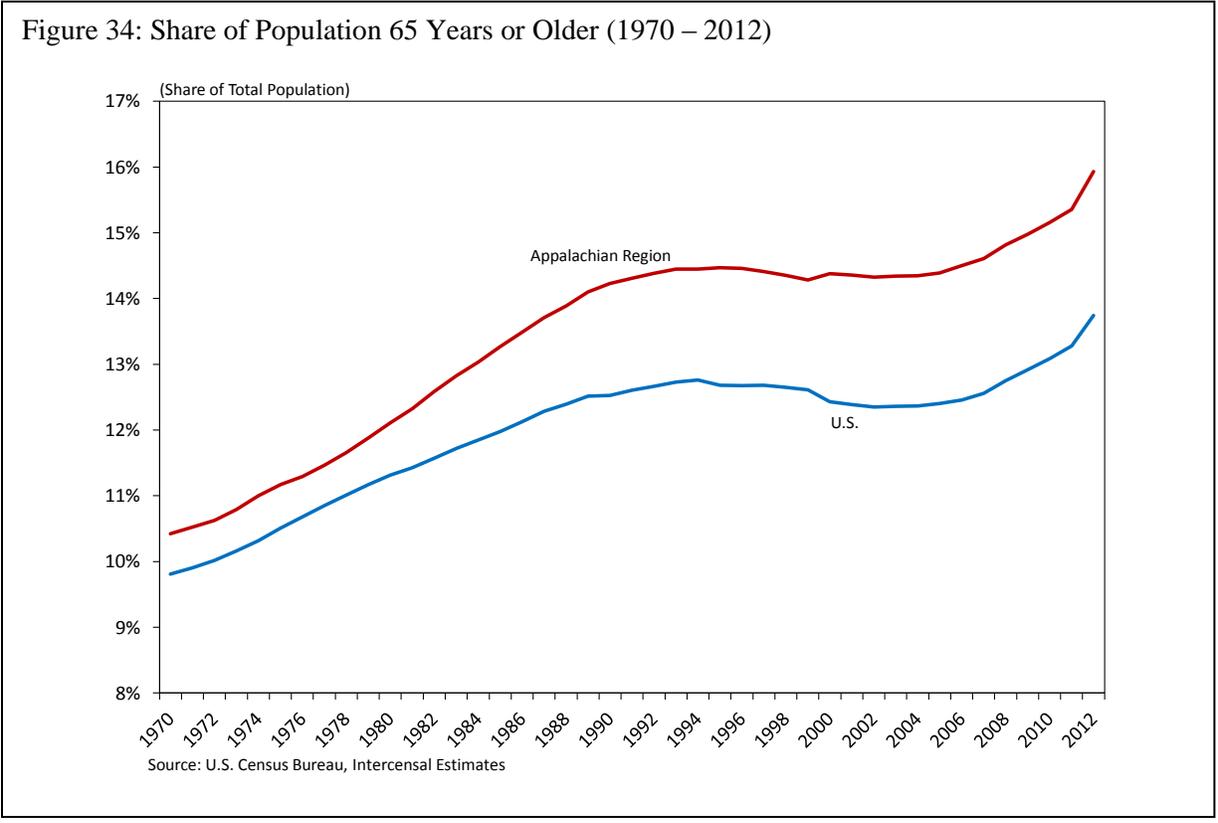
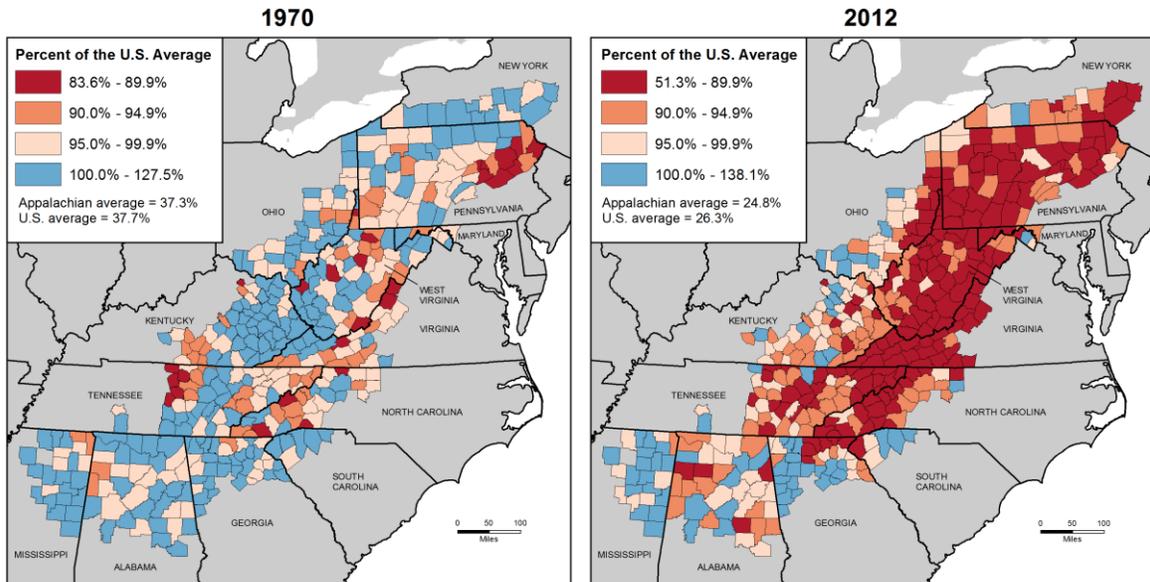


Figure 35 depicts variation in the under-20 population share across Appalachian counties for 1970 (left panel) and 2012 (right panel). While a strong pattern is hard to discern in 1970, the counties stretching from Northeast Tennessee, through Virginia, West Virginia, and into Pennsylvania tend to exhibit low population shares in the under age 20 category.

Figure 35: Share of Population 0 to 19 Years Old Relative to the U.S. (Percent of the U.S. Average)



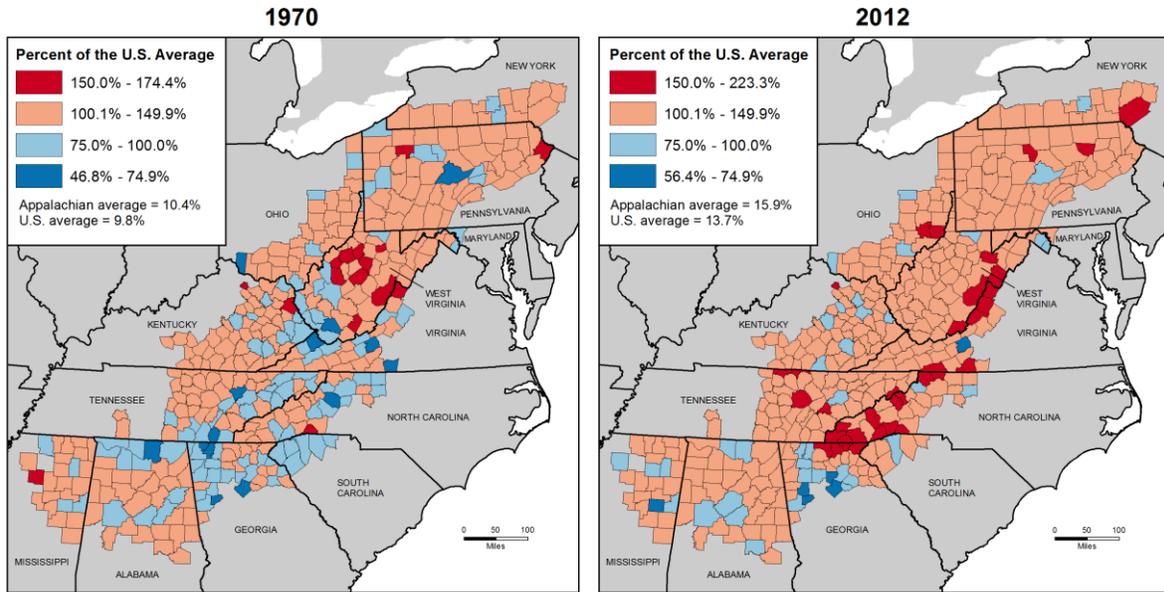
Source: U.S. Census Bureau Intercensal Population Estimates  
Notes: A share of population 0 to 19 years old represents the ratio of population aged 0 to 19 years old to total population. The percent of U.S. average is computed by dividing the county share by the U.S. average and multiplying by 100.

Source: U.S. Census Bureau Intercensal Population Estimates  
Notes: A share of population 0 to 19 years old represents the ratio of population aged 0 to 19 years old to total population. The percent of U.S. average is computed by dividing the county share by the U.S. average and multiplying by 100.

By 2012, a significant reduction in the population share under age 20 is apparent, especially in the counties of Tennessee, North Carolina, Virginia, West Virginia, and Pennsylvania. The counties with higher under age 20 population shares tend to be located in the southernmost portion of the Region.

Figure 36 depicts variation in the share of the 65-and-over population among Appalachian counties for 1970 (left panel) and for 2012 (right panel). Little consistency is apparent in the cross-county variation in the over age 65 population share, although the overall aging of the population can be observed.

Figure 36: Share of Population 65 Years or Older Relative to the U.S. (Percent of the U.S. Average)



Source: U.S. Census Bureau Intercensal Population Estimates  
 Notes: A share of population 65 years or older represents the ratio of population aged 65 years or older to total population. The percent of U.S. average is computed by dividing the county share by the U.S. average and multiplying by 100.

Source: U.S. Census Bureau Intercensal Population Estimates  
 Notes: A share of population 65 years or older represents the ratio of population aged 65 years or older to total population. The percent of U.S. average is computed by dividing the county share by the U.S. average and multiplying by 100.

## Educational Attainment in Appalachia

Now we turn to educational attainment in Appalachia. In 1960, the Appalachian Region struggled with a poorly educated populace. Ninety-two percent of the U.S. population over the age of 25 had completed the 5<sup>th</sup> grade, compared with 89 percent of the Appalachian population. Thirty-two percent of the Appalachian population had completed high school (10<sup>th</sup> grade or higher), compared with 42 percent of the U.S. population. Only 5 percent of Appalachian residents had earned a college degree; compared with nearly 8 percent of all Americans.

Today, the Appalachian Region has achieved near parity with the nation in high school graduation rates, an important accomplishment since the 1960s; but the Region remains behind in post-secondary educational attainment.

Figure 37: Share of Population 25 Years and Older with a Bachelor's Degree or Higher (1970 – 2012)

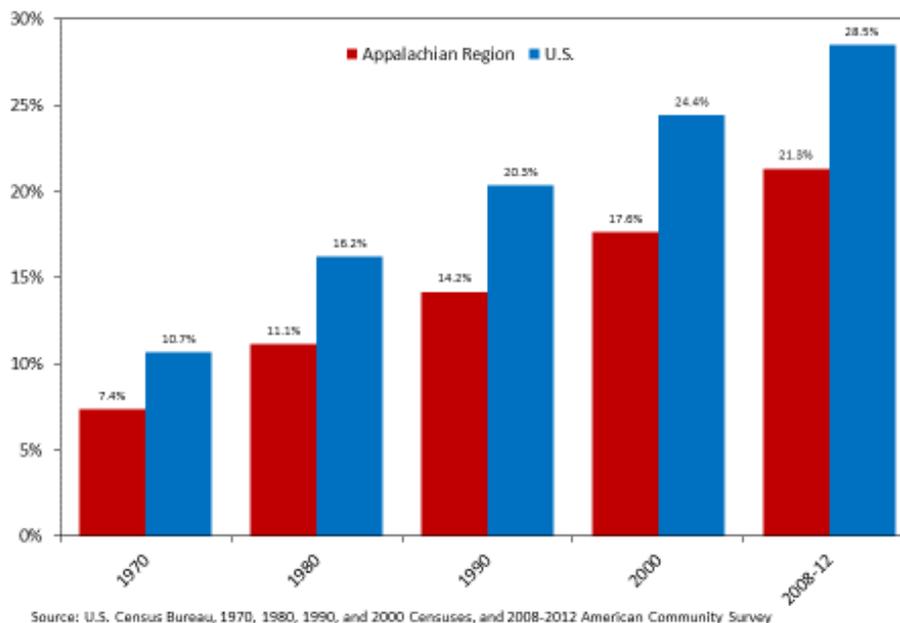
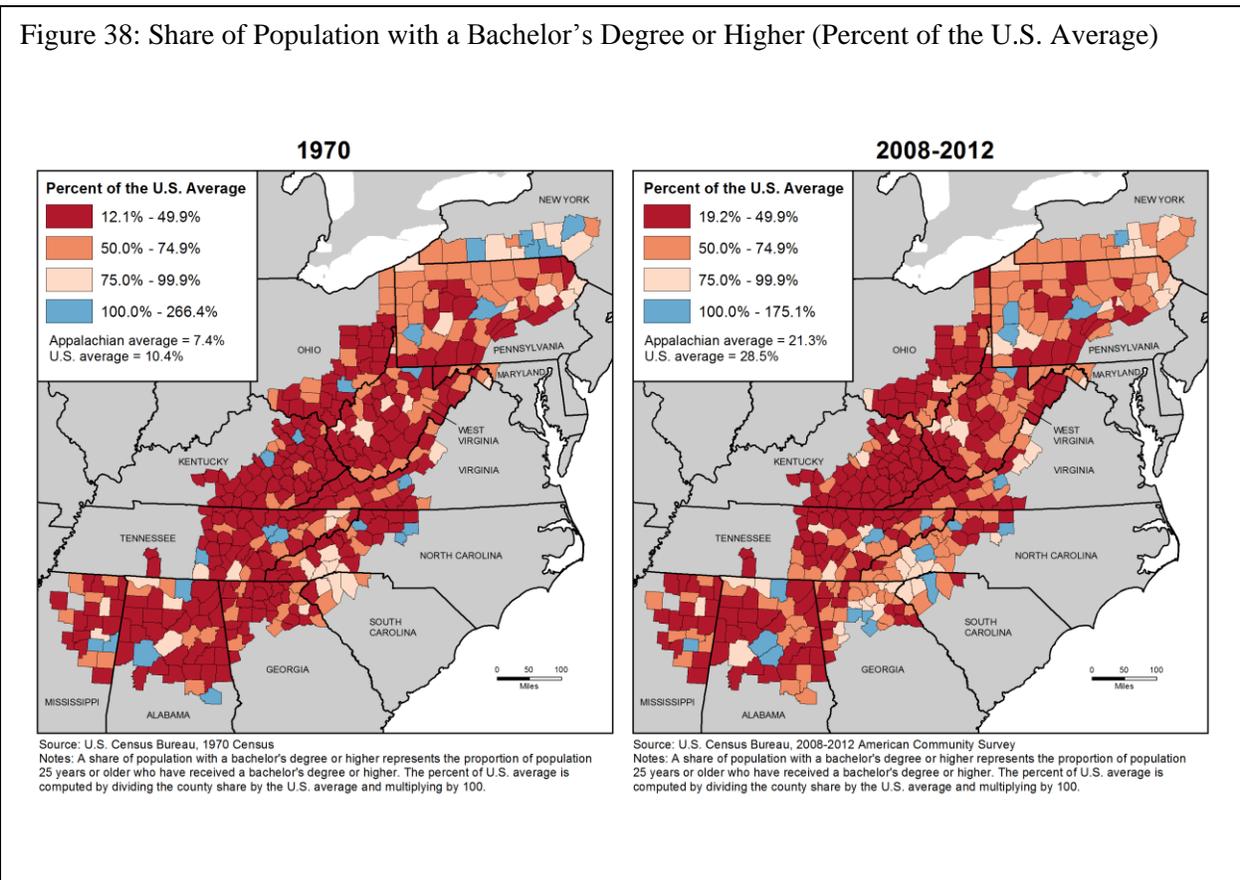


Figure 37 shows that the share of the Region's population over age 25 with at least a bachelor's degree has tripled since 1970 (to 21.3 percent). However, the share of the nation's population over 25 with at least a bachelor's degree has nearly tripled (to 28.5 percent), and the gap between the share of Appalachian adults and the share of the nation's adults with a college degree has widened steadily over the past two generations.

In Figure 38 we depict the variation in educational attainment across Appalachian counties for 1970 (left panel) and for the average over the years 2008-2012 (right panel). The figures illustrate a great deal of randomness in terms of where the higher- and lower-educational attainment counties are located. Perhaps the only weak pattern across the counties that is discernable is that more of the higher educational attainment counties tend to be located in the northern part of the Region in Pennsylvania and New York.

Figure 38: Share of Population with a Bachelor’s Degree or Higher (Percent of the U.S. Average)

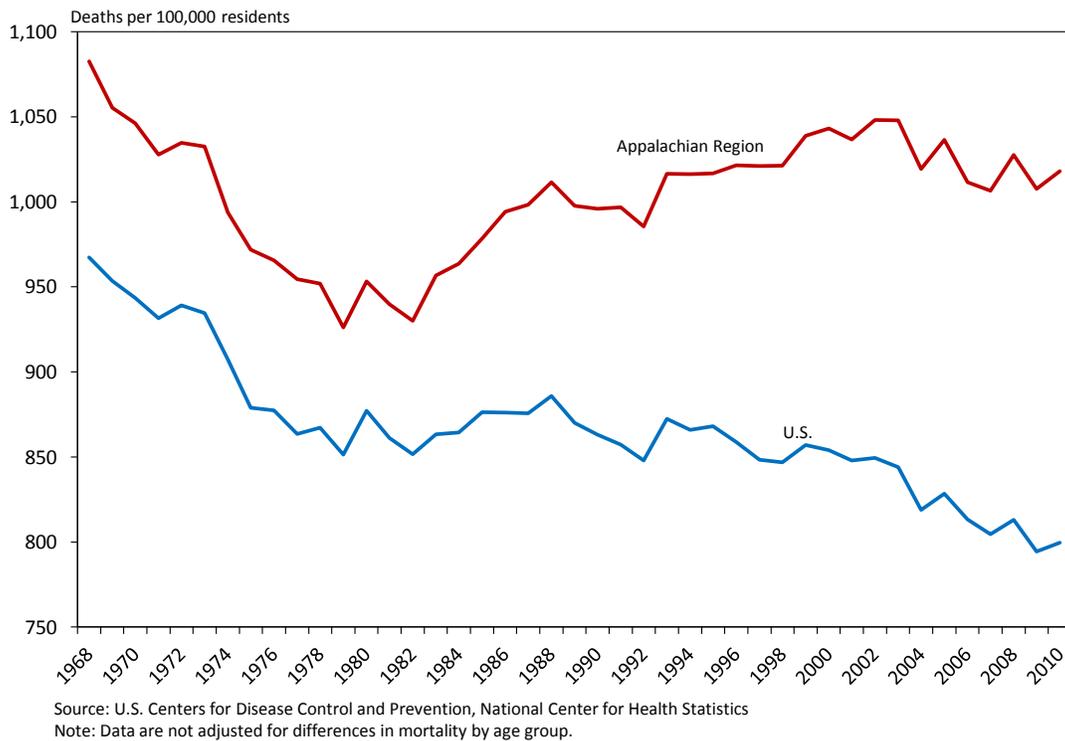


In today’s increasingly knowledge-driven and global economy, having educational attainment beyond a high school degree is considered an important prerequisite for individual success in the job market. It is also viewed as an important measure for the economic growth potential of an area. Therefore, the share of population with a Bachelor’s Degree or higher may be seen as a proxy measure for having a highly skilled workforce. However, it is also the case that there are many good job opportunities for individuals, and equally important to an area’s economic development prospects, for those with or who are seeking 2 year/vocational/and certificate education. The share of the Region’s population over age 25 with some post-secondary education or higher has more than tripled since 1970 (14 percent to 48.0 percent). This rate of growth is faster than that of the nation (21 percent to 57 percent), but the overall gap has widened.

## Health in Appalachia

Next we turn to health outcomes in Appalachia. Combined with other factors, individual health is a prime indicator of quality of life and impacts economic vitality. In the early 1960s, living standards in Appalachia, as measured by the health and well-being of the population, were well below those of the rest of the nation, and they remain so today.

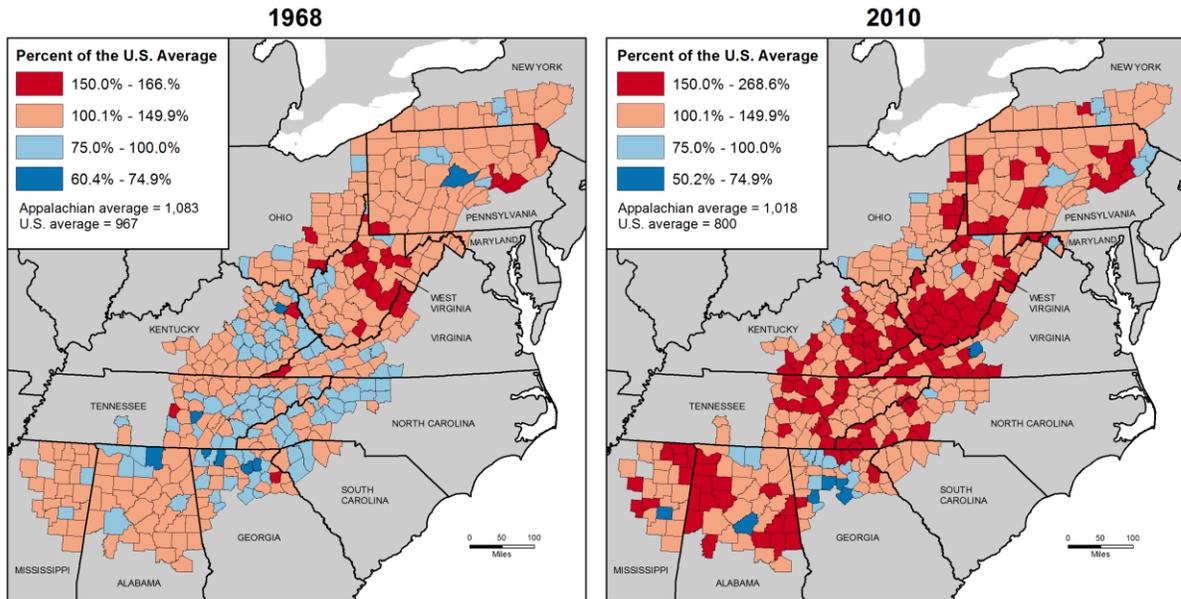
Figure 39: Mortality Rates (Deaths per 100,000 People), (1968 – 2010)



We begin with the overall mortality rate shown in Figure 39. As illustrated, mortality in the Appalachian Region fell from the late-1960s through the early-1980s, but then rose through 2004. Since 2004, the overall number of deaths per 100,000 residents has fallen slightly. Throughout the entire period, mortality in Appalachia has been higher than that at the national level.

In Figure 40 we depict mortality across counties within Appalachia for 1968 (left panel) and for 2010 (right panel). In 1968, there tended to be concentrations of higher mortality rates in Central Appalachia, in states such as West Virginia, while lower mortality rates tended to be concentrated in the southern part of the Region. By 2010, the higher mortality rate counties tended to be located in the central part of the Region, particularly in various parts of Kentucky and West Virginia, along with a few other heavy pockets, such as in Alabama.

Figure 40: Mortality Rates (Deaths per 100,000 people) (Percent of the U.S. Average)

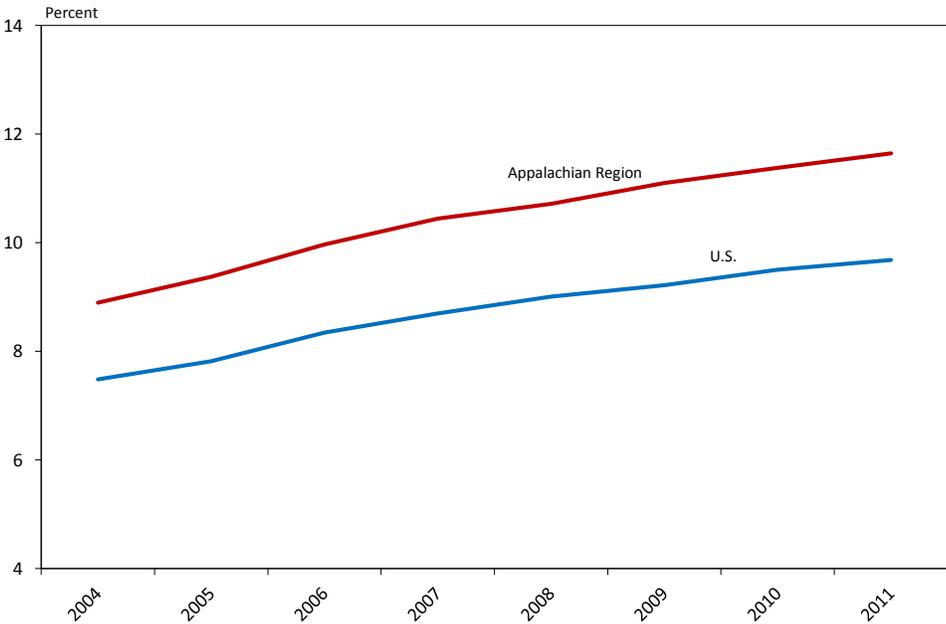


Source: U.S. Center for Disease Control and Prevention, National Center for Health Statistics  
Notes: A mortality rate is computed by dividing the number of deaths by total population and multiplying it by 100,000. These rates are not adjusted to differences in mortality rates by age. The percent of U.S. average is computed by dividing the county share by the U.S. average and multiplying by 100.

Source: U.S. Center for Disease Control and Prevention, National Center for Health Statistics  
Notes: A mortality rate is computed by dividing the number of deaths by total population and multiplying it by 100,000. These rates are not adjusted to differences in mortality rates by age. The percent of U.S. average is computed by dividing the county share by the U.S. average and multiplying by 100.

In Figure 41 we illustrate the prevalence of diabetes in Appalachia and in the U.S. Data are only available since 2004. As illustrated, diabetes has increased for both Appalachia and the nation, and Appalachia has consistently exhibited higher diabetes rates compared to the nation as a whole over the period.

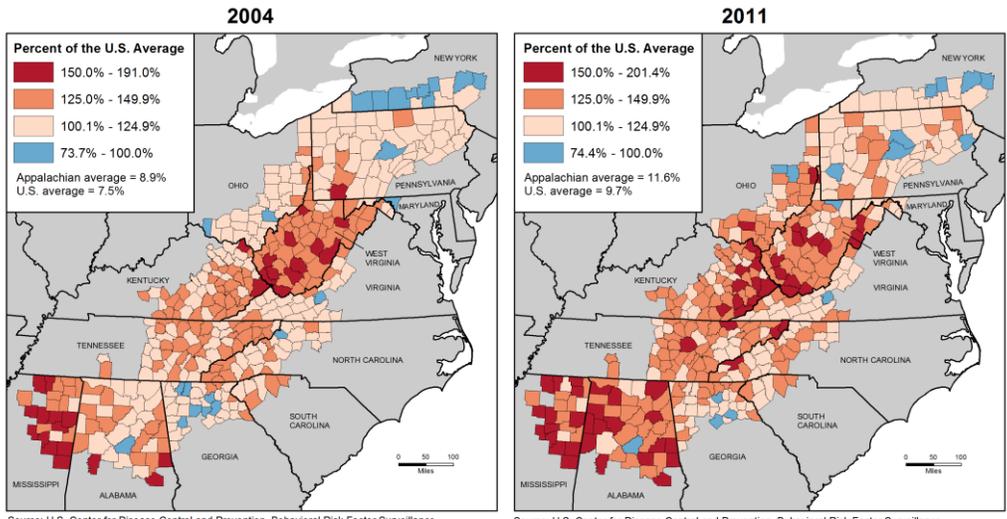
Figure 41: Diabetes Prevalence (2004 – 2011)



Source: U.S. Centers for Disease Control and Prevention, Behavioral Risk Factor Surveillance System (BRFSS)  
Note: Diabetes Prevalence Rate represents the proportion of adult people 20 years and over suffering from diabetes.

In Figure 42 we illustrate how diabetes varies across counties in the Region for 2004 (left panel) and 2011 (right panel). Counties with higher rates of diabetes tend to be located in Kentucky and West Virginia in Central Appalachia, as well as in Mississippi and Alabama in Southern Appalachia.

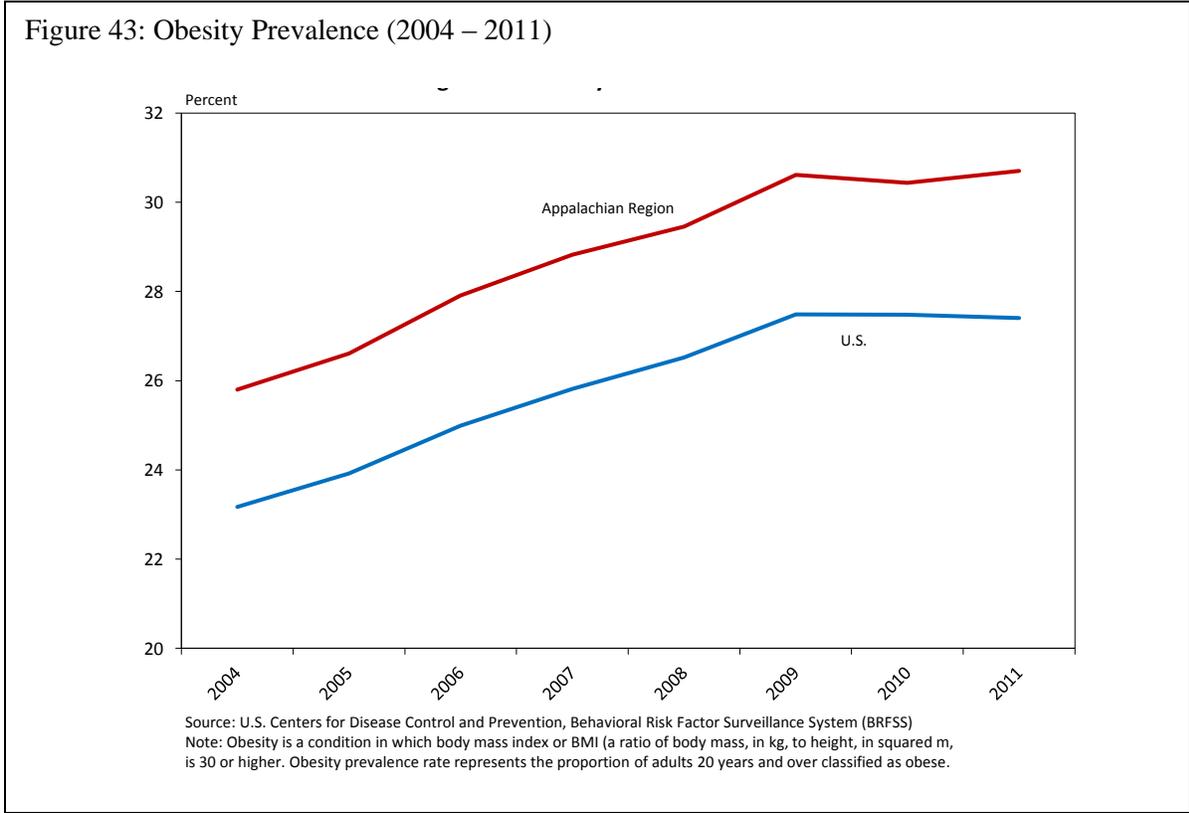
Figure 42: Diabetes Prevalence Rates Relative to the U.S. (Percent of the U.S. Average)



Source: U.S. Center for Disease Control and Prevention, Behavioral Risk Factor Surveillance System (BRFSS). Notes: The rates reported are for adult population 20 years and over. The rates represent the ratio of adults suffering from diabetes to total adult population. The percent of U.S. average is computed by dividing the county rate by the U.S. average and multiplying by 100.

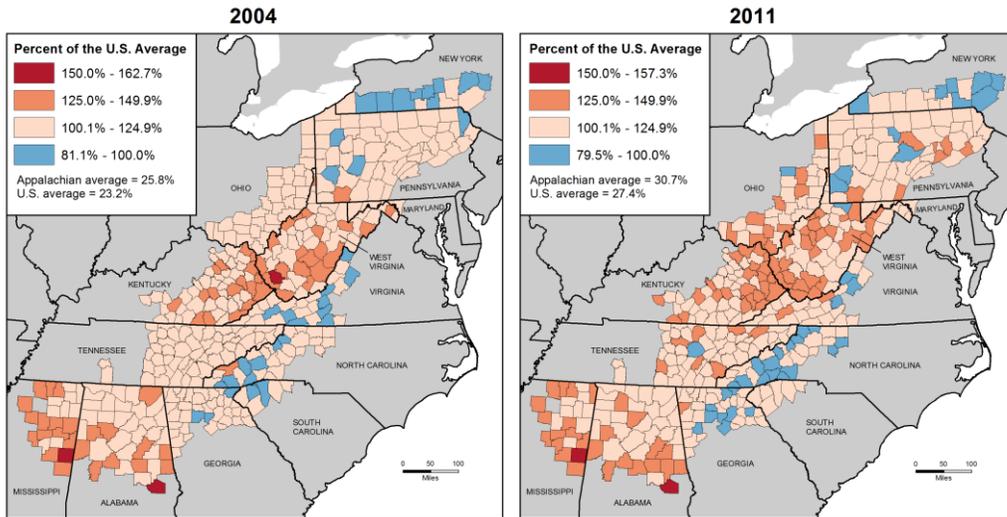
Source: U.S. Center for Disease Control and Prevention, Behavioral Risk Factor Surveillance System (BRFSS). Notes: The rates reported are for adult population 20 years and over. The rates represent the ratio of adults suffering from diabetes to total adult population. The percent of U.S. average is computed by dividing the county rate by the U.S. average and multiplying by 100.

In Figure 43 we illustrate the prevalence of obesity in Appalachia and in the U.S. for 2004 through 2011. The pattern is very similar to that of diabetes, as discussed above: Obesity has increased for both Appalachia and the nation, and Appalachia has consistently exhibited higher obesity rates compared to the nation as a whole over the period.



In Figure 44 we illustrate how obesity varies across counties in the Region for 2004 (left panel) and 2011 (right panel). A similar pattern to that of diabetes emerges in this context as well.

Figure 44: Obesity Prevalence Rates Relative to the U.S. (Percent of the U.S. Average)

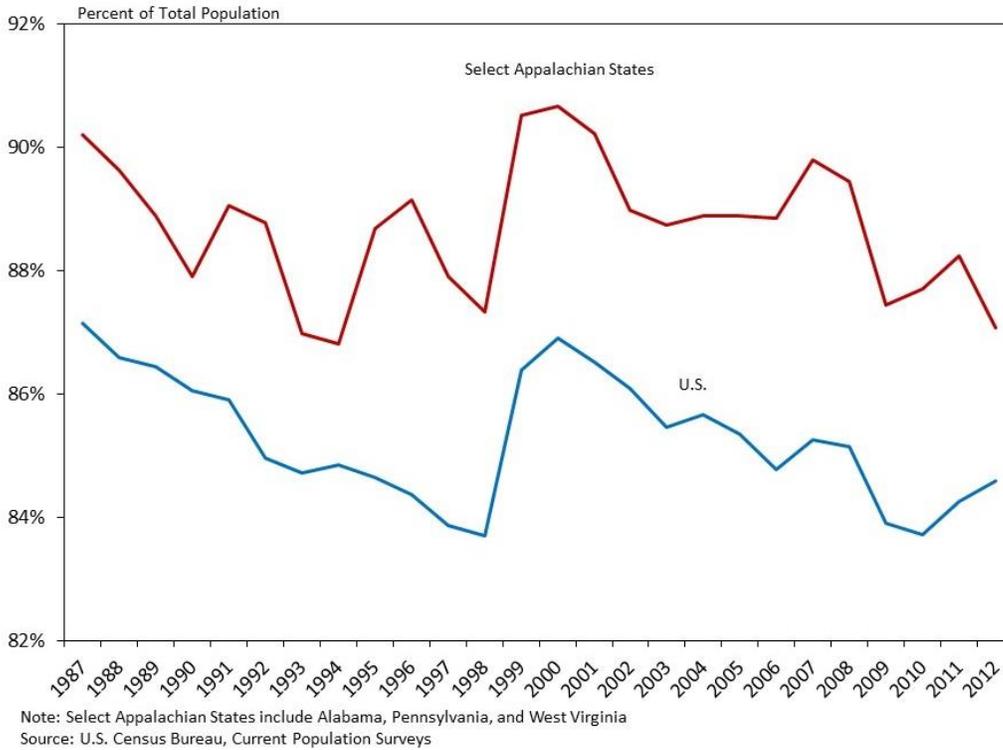


Source: U.S. Center for Disease Control and Prevention, Behavioral Risk Factor Surveillance System (BRFSS). Notes: Obesity is a condition in which the person's body mass index (in kg per squared meter) is 30 or higher. The rate represents the ratio of obese adults to total adult population. The percent of U.S. average is computed by dividing the county rate by the U.S. average and multiplying by 100.

Source: U.S. Center for Disease Control and Prevention, Behavioral Risk Factor Surveillance System (BRFSS). Notes: Obesity is a condition in which the person's body mass index (in kg per squared meter) is 30 or higher. The rate represents the ratio of obese adults to total adult population. The percent of U.S. average is computed by dividing the county rate by the U.S. average and multiplying by 100.

Next we consider health insurance coverage since it can be an important driver of overall health outcomes. Here, we select three states that are predominately part of Appalachia to use as representative of the Region as a whole. In particular, we use Alabama, Pennsylvania, and West Virginia.<sup>8</sup>

Figure 45: Percent of People Covered by Health Insurance (1987 – 2012)

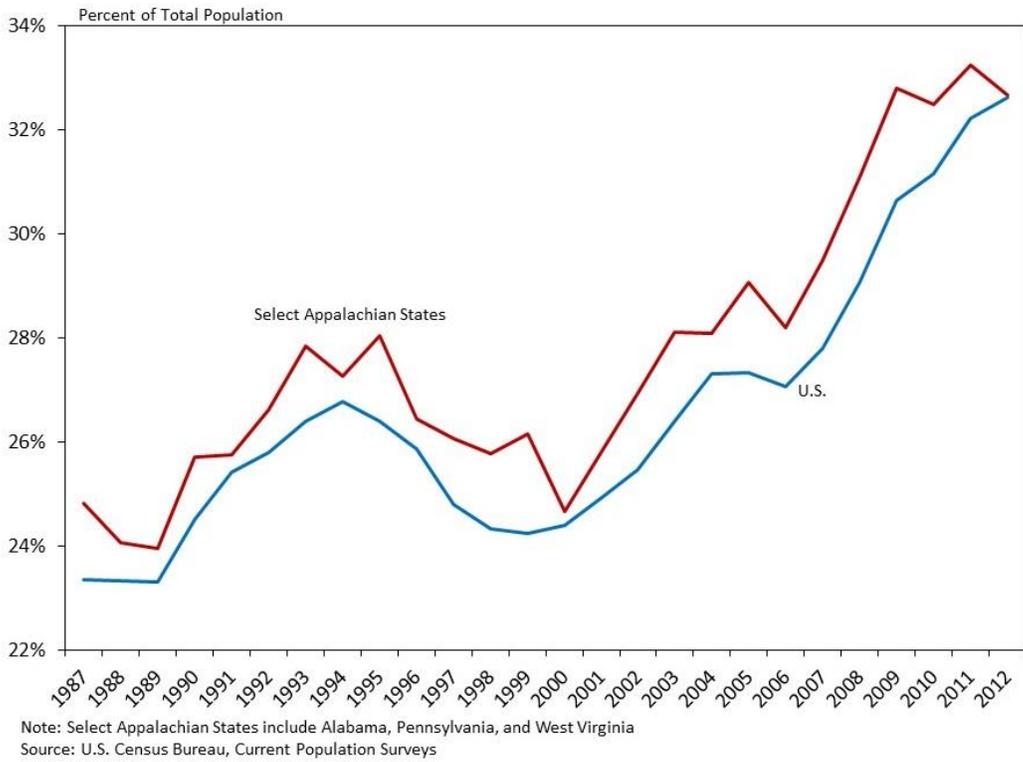


As illustrated in Figure 45, a larger portion of residents in the Appalachian Region (as represented by these three states) have health insurance compared to the nation as a whole. This trend has been the case since 1987. By 2012, nearly 87 percent of the population in Appalachia was covered by health insurance, compared to nearly 85 percent nationally.

<sup>8</sup> These states were determined as representative of the Appalachian Region because the population share and the share of their counties that fall within the Region was the largest among the 13 states that form the Region. The U.S. Census Bureau also produces estimates of health insurance coverage through its Small Area Health Insurance Estimates (SAHIE) program. The SAHIE program produces single-year estimates of health insurance coverage which are model-based and consistent with the American Community Survey (ACS).

In Figure 46 we investigate health insurance coverage further by examining the population share that has access to government health insurance. As illustrated, here the Appalachian Region also has a slightly higher rate of public health insurance coverage, and that has been the case for most of the time since 1987. By 2012, however, around 33 percent of the population in both the Appalachian Region and the U.S. was covered by government health insurance.

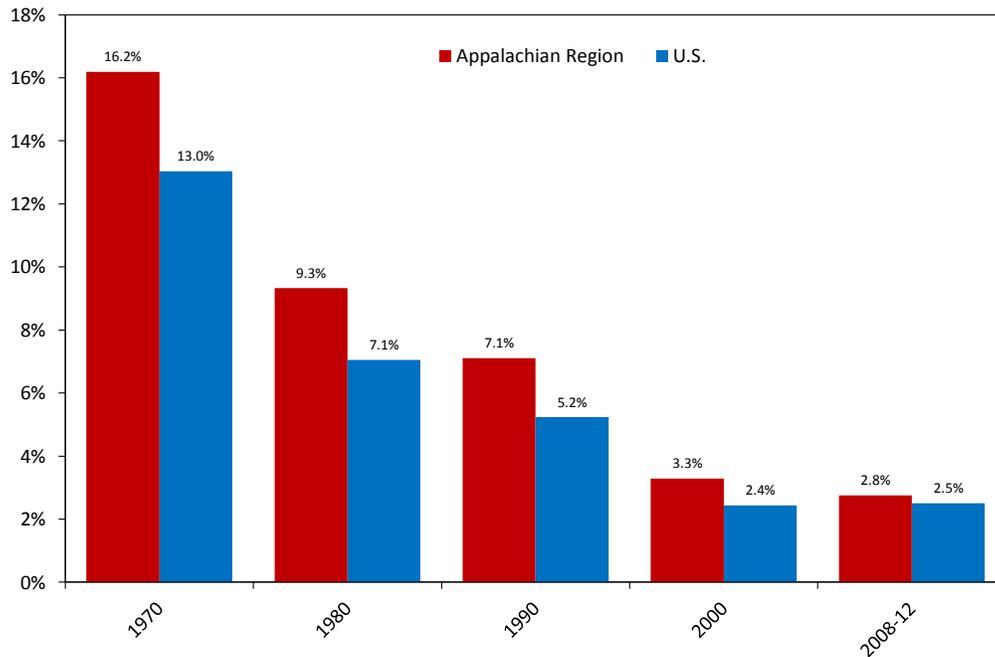
Figure 46: Percent of People Covered by Government Health Insurance (1987 – 2012)



## Infrastructure in Appalachia

Now we turn to infrastructure in Appalachia. Another key aspect of the Region's isolation in the 1960s was its relative inability to communicate with the outside world. This limited not only the in-flow of new ideas and technologies and the ability of area residents to learn, but also the ability of area residents and leaders to imagine a different future.

Figure 47: Percent of Homes without Phone Services (1970 – 2012)

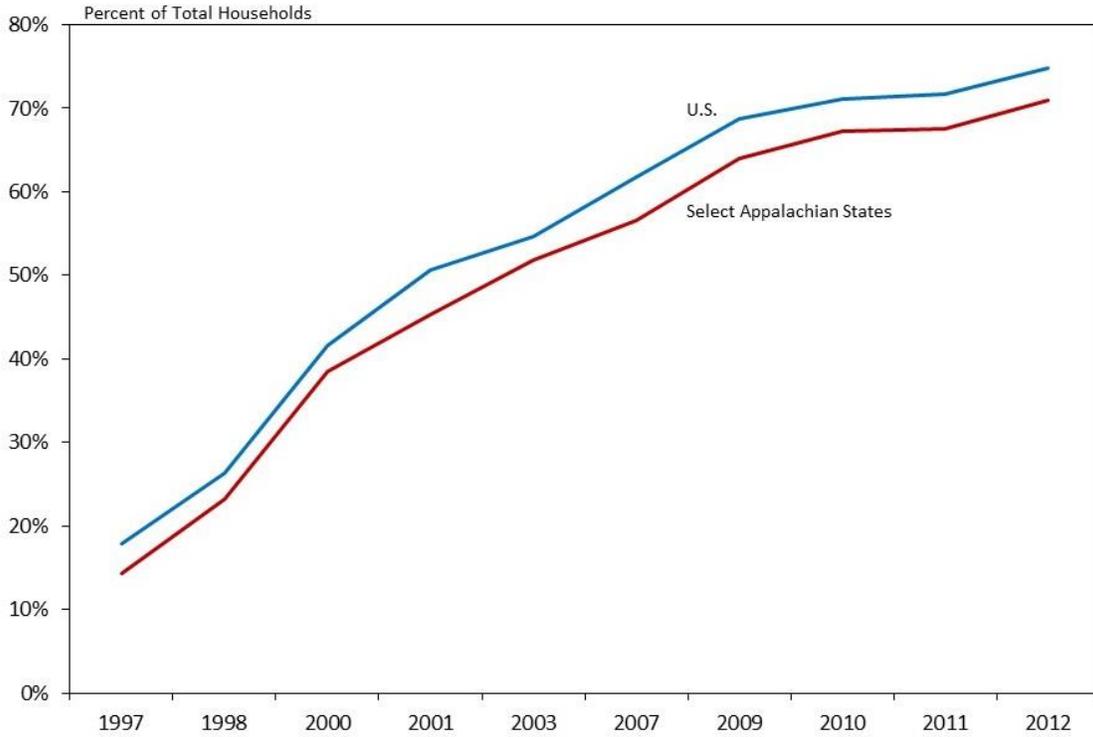


Source: U.S. Census Bureau, 1970, 1980, 1990, and 2000 Censuses, and 2008-2012 American Community Survey

In the 1960s, a key public policy goal was universal access to telephone service. Many areas of Appalachia lacked access to phone service, and, where it was available, multiple families shared party lines. As Figure 47 shows as late as 1970, 16.2 percent of area homes did not have access to phone service, compared with 13 percent of households nationally. By 2012, the proportion of households without phone service in the Appalachian Region was about 2.8 percent, very nearly the same as the national average of 2.5 percent.

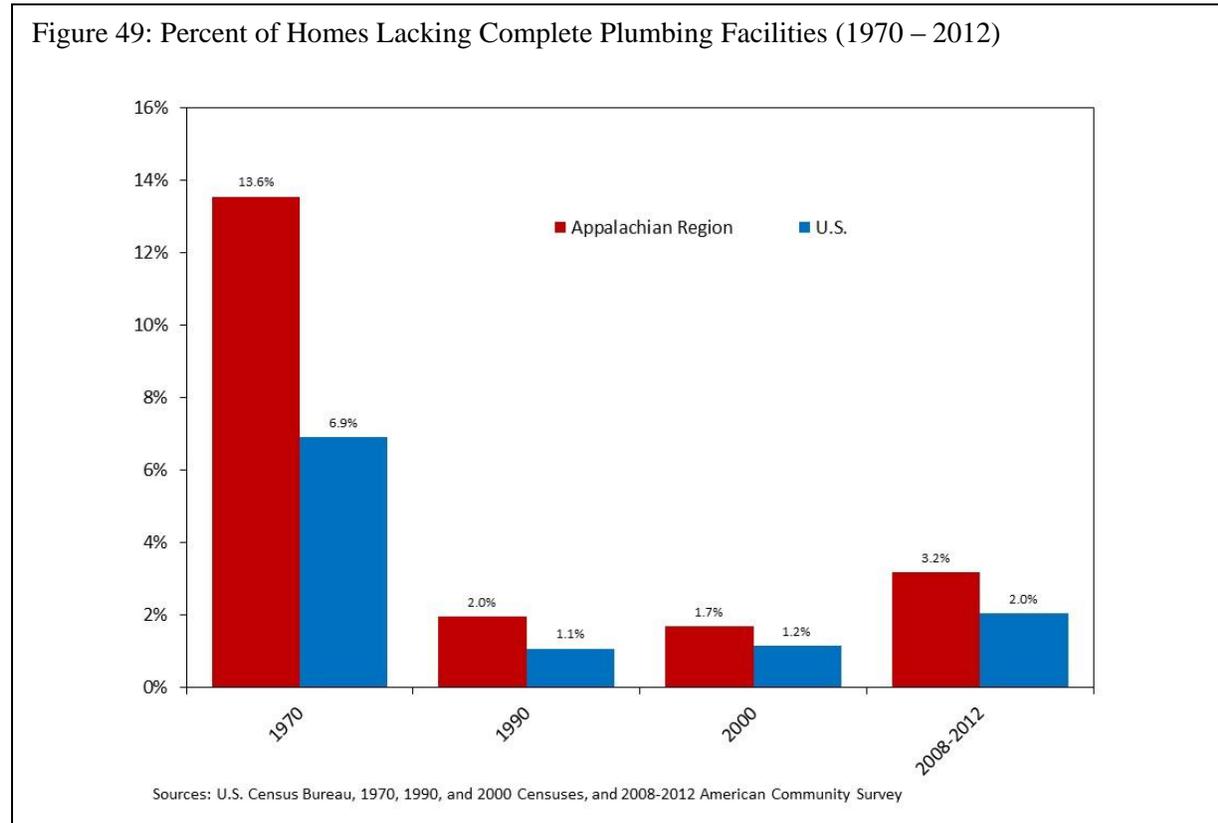
In a similar fashion we explore Internet access in Figure 48. As depicted, the three states that we have chosen to represent Appalachia exhibit an internet usage rate that has grown tremendously since 1997, but has lagged the U.S. by a small margin.

Figure 48: Percent of Households Using the Internet (1997 – 2012)



Note: Select Appalachian States include Alabama, Pennsylvania, and West Virginia  
Source: U.S. Census Bureau, Current Population Surveys

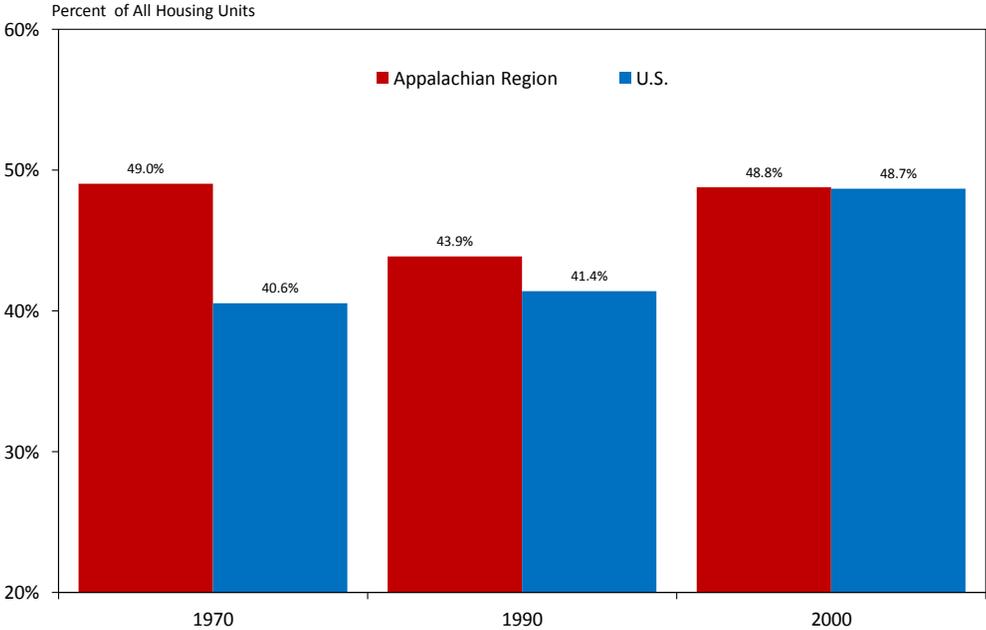
In Figure 49 we depict the share of homes that lack complete plumbing facilities in Appalachia and in the nation. Not very long ago, many homes in the Appalachian Region lacked adequate plumbing and relied on water from local streams. Many houses were dilapidated, with 7.5 percent in such poor shape that they were deemed a danger to the health and safety of the families living in them.



Today, 3.2 percent of Appalachian houses lack complete plumbing, compared with 2 percent nationally. That is a stark improvement from the 13.6 percent of houses in Appalachia that lacked complete plumbing in 1970.

In Figure 50 we examine the age of the housing stock in Appalachia versus in the nation. Here we depict the share of the housing stock that was built more than 30 years earlier. As illustrated, by this measure the housing stock in Appalachia was considerably older compared to the nation in 1970, but that gap had virtually disappeared by 2000.

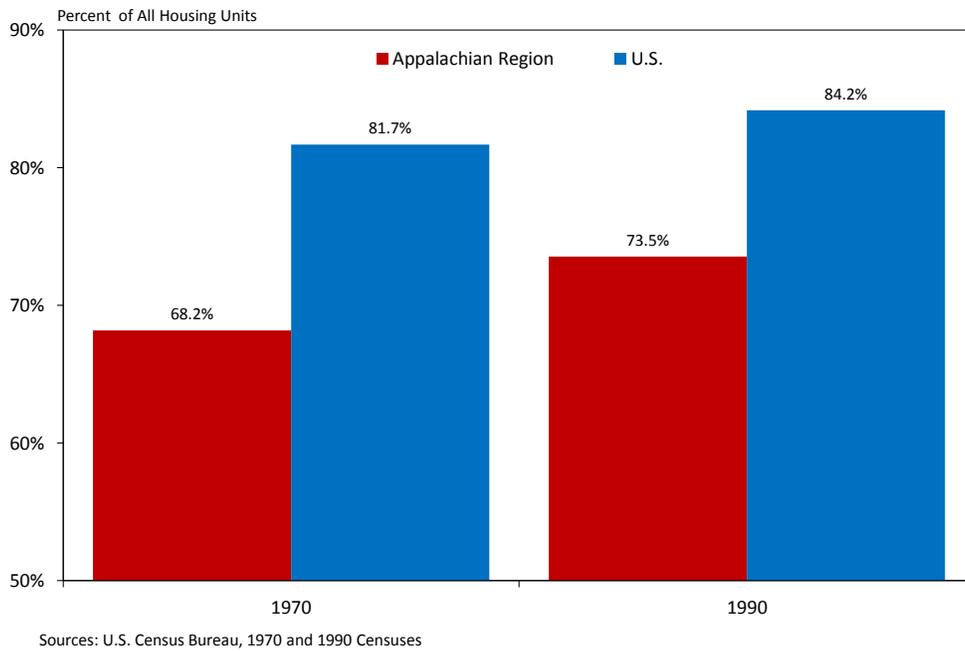
Figure 50: Share of Housing Units Built 30 Years Ago or Before (1970 – 2000)



Sources: U.S. Census Bureau, 1970, 1990, and 2000 Censuses

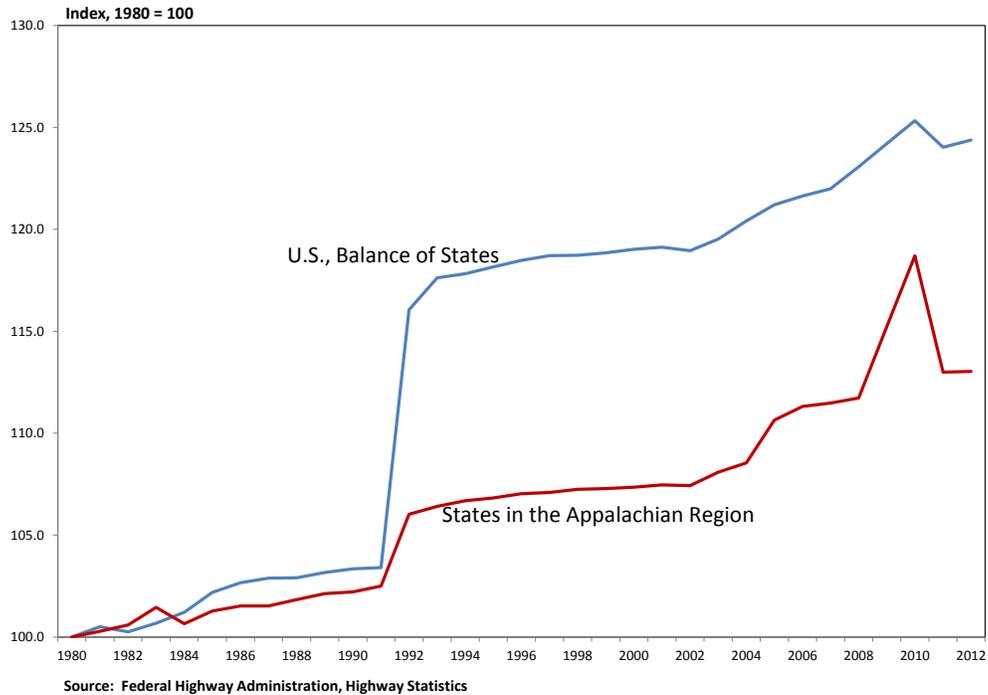
In Figure 51 we consider household access to a public water system, a data point that is no longer collected as part of the U.S. Census but one that was considered very important in the early days of ARC. Here we examine the share of housing in Appalachia and in the nation that have access to water from a public system or from a private company (i.e., households that do not have to rely on a private well). By this metric, both the Region and the nation have improved over the period of analysis. Further, the degree to which Appalachia has lagged the nation has diminished over the period, although Appalachia continues to lag the nation in this metric.

Figure 51: Share of Housing Units Whose Source of Water comes from Public System or Private Company (1970 – 1990)



One of the most critical challenges facing the Appalachian Region in 1964 was its isolation due to a limited transportation network. The Interstate Highway System, in the midst of a tremendous building boom in the 1950s, largely by-passed Appalachia, going through or around the Region's rugged terrain as cost-effectively as possible. This resulted in limited access to the rest of the nation for large swaths of Appalachia, and constituted barriers to trade with the rest of the nation and to global markets.

Figure 52: Federal-Aid Highway Miles Indexed to 1980 Mileage Levels (1980 – 2012)

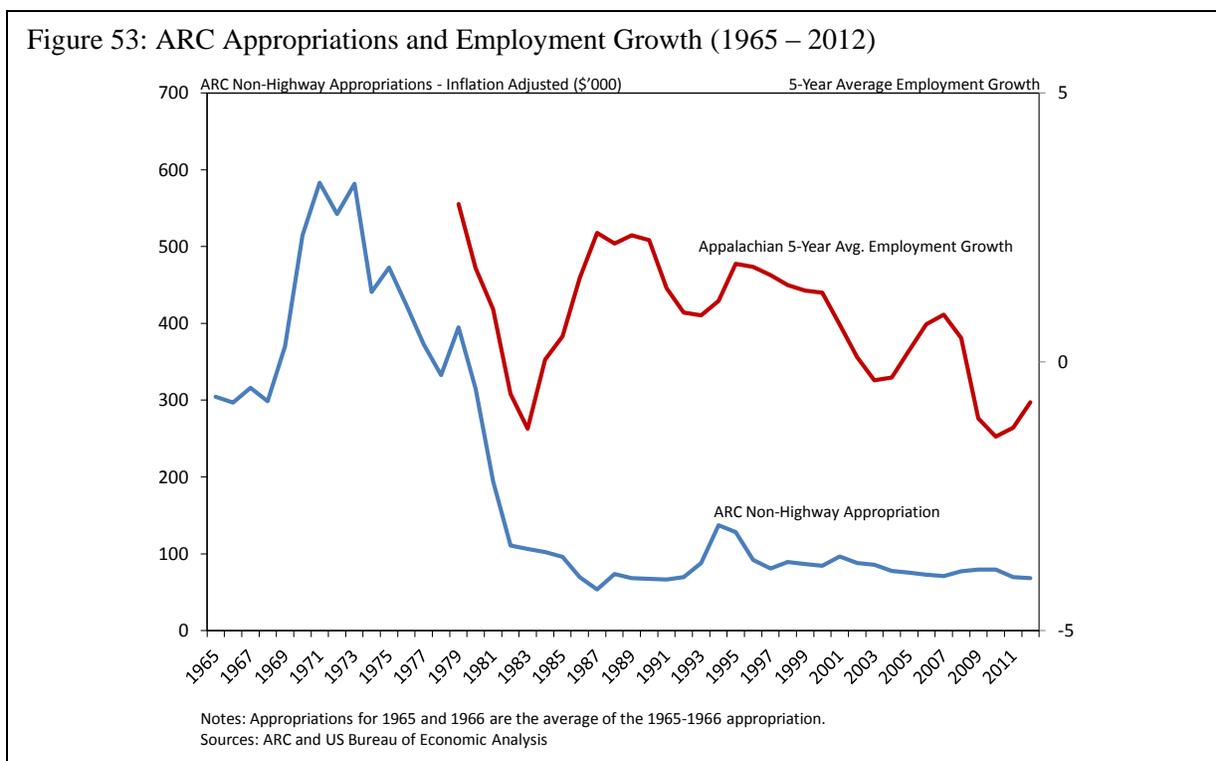


For many years, ARC states built highway miles at a rate comparable to that of the rest of nation (see Figure 52). A major increase in the rate of miles built in both the Region and the nation as a whole in 1992, and again in 2005 as part of a steady increase in funds available with the passage of Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Additional resources made available through the 2009 American Recovery and Reinvestment Act also helped to increase the number of highway miles built, both regionally and nationally. However, recent data suggest that declines in federal funding have impacted the Appalachian Region more than the rest of country, partly because the relative per-mile cost of building major highways through mountainous terrain and the sparse population in these areas make it difficult for Appalachian states to compete for limited federal funds.

## Appalachian Regional Commission Investment and Economic Outcomes

In this section we provide a brief examination of investment by ARC in the Region since 1965 and loosely relate it to employment, income, and poverty outcomes. Here any findings are only suggestive of a relationship between ARC investment and the various outcomes of interest; we do not provide an in-depth statistical analysis nor do we provide evidence of a causal relationship between ARC appropriations and the outcomes we examine.

In Figure 53 we depict total ARC non-highway appropriations, by year, since the inception of the ARC in 1965. We exclude appropriations made for the Appalachian Development Highway System in our analysis. As illustrated, after adjusting for inflation, ARC spending stood at around \$300 million during the early years of the ARC. This figure rose rapidly to nearly \$600 million by 1971. After four years of spending in excess of \$500 million, spending began to fall after 1975, reaching the \$300 million-range by the late-1970s, and then more significantly to less than \$100 million by the early-1980s. Appropriations have remained fairly constant since the early-1980s.

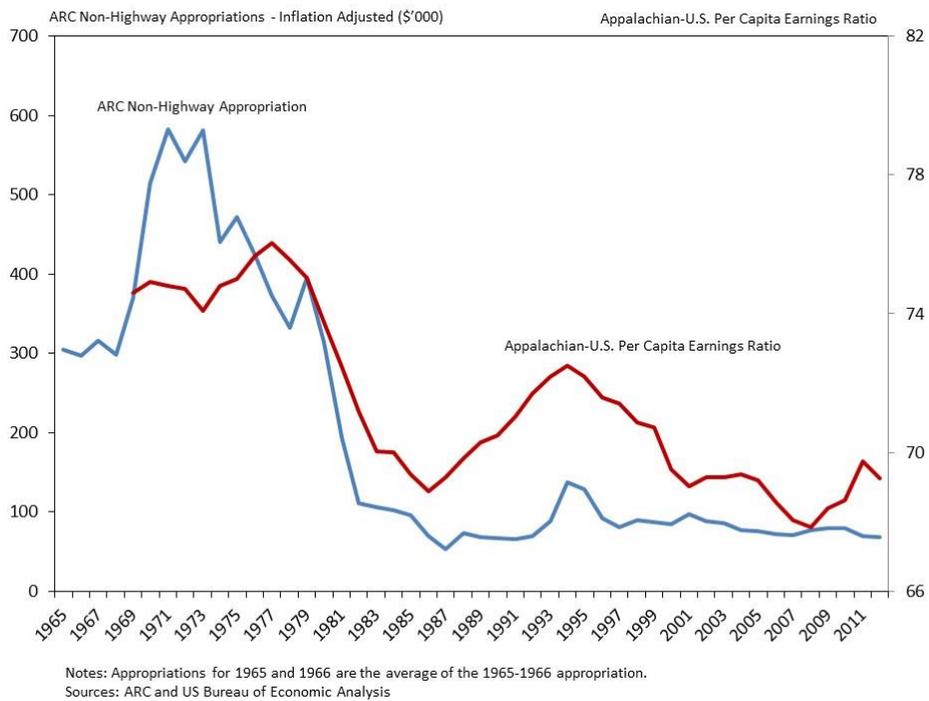


Also in Figure Figure53, we overlay the five-year rate of employment growth in the Appalachian Region. Unfortunately the necessary employment data do not begin until 1975, preventing a full analysis. While it is difficult to discern a strong relationship between the two variables, it is interesting to note that the highest recorded rate of job growth (over the 1975-1979 period;

marked 1979 in the figure) began just after ARC investment stood at its peak. It is perhaps interesting that the sharp decline that occurred in employment growth from the late-1970s through the early-1980s does seem to correspond to the decline in ARC investment. However, the national economy was in recession over much of this period of the early-1980s as well, blurring the comparison.

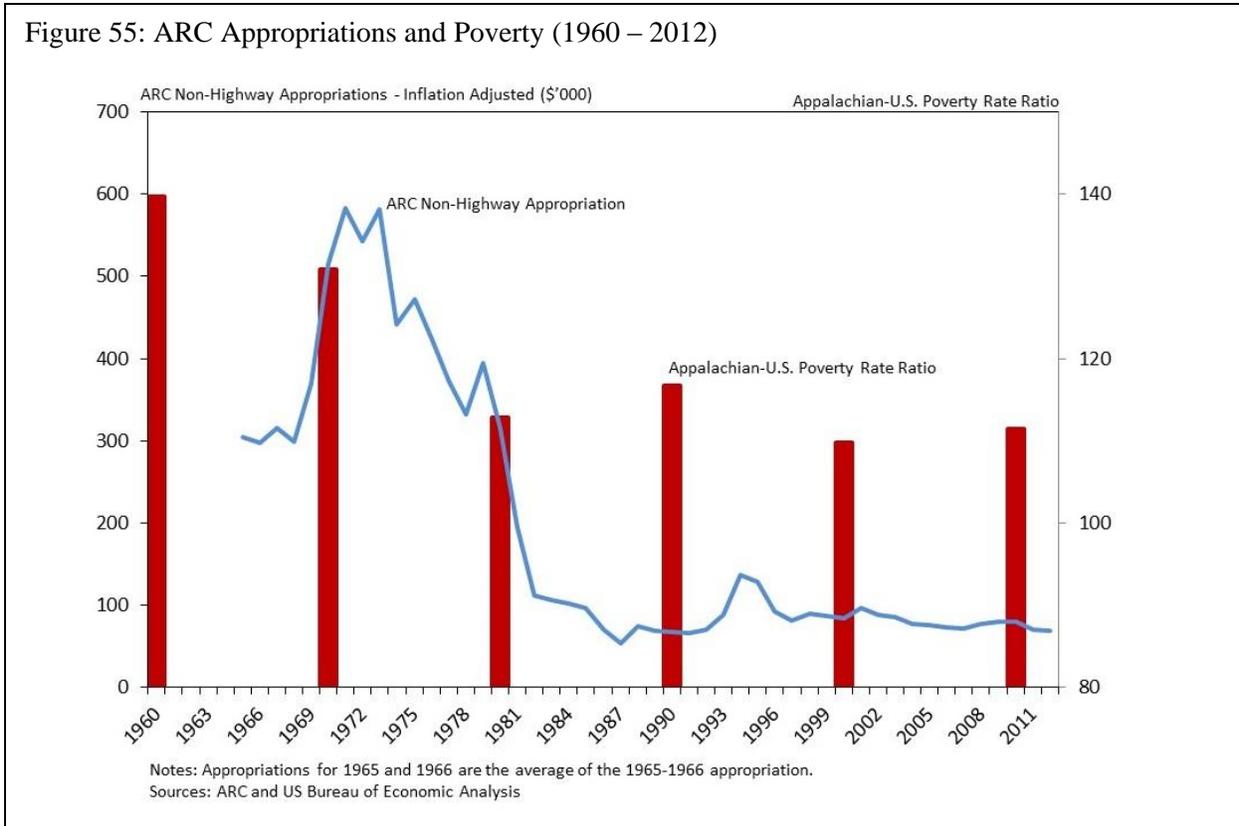
In Figure 54 we compare ARC appropriations to wage and salary earnings. In particular, we report earnings per capita in Appalachia relative to the national figure. Here it is interesting to note that earnings per capita in Appalachia did rise relative to the national figure during the 1970s, when ARC investment was relatively high. Then the figure fell significantly from the late-1970s through the mid-1980s, occurring simultaneously with the drop in ARC investment. Earnings in Appalachia did bounce back to some degree relative to the national figure from the mid-1980s through the mid-1990s, which does not seem relate to a change in ARC appropriations.

Figure 54: ARC Appropriations and Per Capita Earnings (1965 – 2012)



In Figure 55 we depict ARC appropriations as it compares to poverty. In this context we depict the poverty rate in the Appalachian Region relative to that of the nation. As illustrated, poverty rates in Appalachia did improve relative to national rates to a significant degree between 1960 and 1970, and then further from 1970 to 1980, improving from around 140 percent of the national average in 1960 to 113 percent of the national average in 1980. This drop largely occurred during the years when ARC investment was at its highest level.

Figure 55: ARC Appropriations and Poverty (1960 – 2012)



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## Chapter II: Assessing Economic Impacts of Non-Highway Investments

### Section Summary

This chapter quantifies the employment and income impacts attributable to the ARC non-highway grant investments made in the Region over the years. ARC's investments have helped stimulate economic activity that has fueled the hiring of workers and the purchase of material goods and services needed to put new developments in place. Income from all of these activities fueled additional demand, further multiplying the total economic impacts of these investments.

ARC investments have been made over a 50-year time span, presenting a unique challenge in measuring these multiplier impacts. The economic structures of the Appalachian Region and the nation have changed significantly, so impact models must be recalibrated over time to reflect those structural changes. For this study, a customized input-output (IO) model for the Appalachian Region was constructed, with adjustments to the modeling made after every five year period to help account for measured economic changes. Detailed investment data were provided by the Appalachian Regional Commission and were assigned to one of 39 final demand categories, and then aggregated to one of eleven industry sectors.<sup>9</sup>

The results from the economic modeling show that the \$3.8 billion in ARC non-highway investments (Area Development Program) were responsible for creating nearly 312,000 jobs and \$10 billion in added earnings in the Region. On average, annually, these ARC funds supported an estimated 6,364 jobs and \$204 million (in constant 2013 dollars) in earnings.

### Appalachian Regional Commission Investments

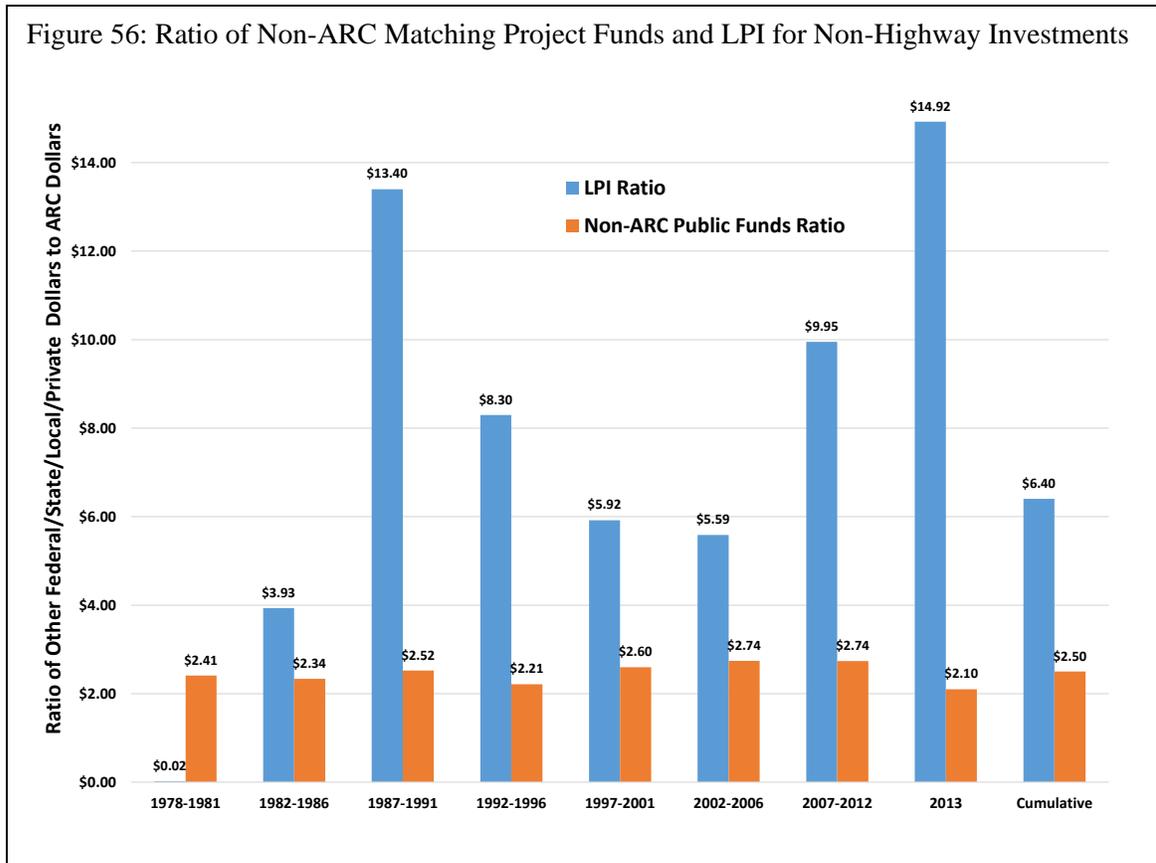
More than \$25 billion in public investments<sup>10</sup> (through FY 2013) have been made in the Appalachian Region by ARC and other federal, state and local agencies in both highway- and non-highway-related activities. Since 1965, ARC has made investments in nearly 25,000 strategic non-highway activities in the Region, which were funded by \$3.8 billion in appropriated ARC funds and \$9 billion in matching funds from other federal, state and local funding sources. Since 1978, these matching funds have averaged \$2.50 for each \$1 in funds invested by the ARC (see Figure 56). This ratio has been relatively steady; in the most recent five year period (2007-2012), it was 2.74 to 1.

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<sup>9</sup> The investment data covered ARC Area Development Program investments made from 1965 to 2013.

<sup>10</sup> This figure includes \$3.8 billion in ARC Area Development Program funds, \$9 billion in other federal, state or local public match dollars connected to the ADP investments, \$9.1 billion obligated to the Appalachian Development Highway System, including funds from TEA-21, SAFETEA-LU and their extension acts, and \$3.5 in state and local funds assumed to be a 20 percent ADHS match. This total does not include 100 percent state and local funded highway projects.

Figure 56: Ratio of Non-ARC Matching Project Funds and LPI for Non-Highway Investments

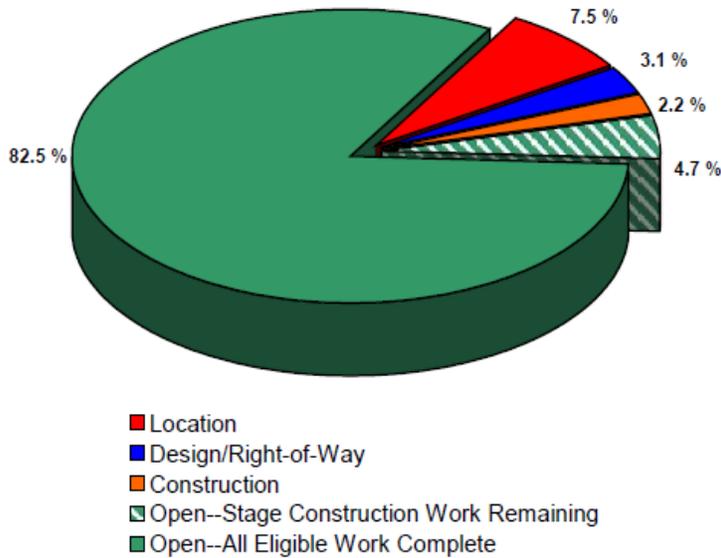


ARC investments in Appalachia have also attracted nearly \$16 billion in leveraged private investment (LPI), the dollar amount of private-sector financial commitments (non-project funds), that result from an ARC investment. Since 1978, when ARC began tracking this data, for each \$1 in funds invested by ARC in non-highway projects, an average of \$6.40 in private-sector funding has been leveraged. This figure was nearly 10 to 1 in the most recent five-year period (2007-2012) and nearly 15 to 1 in 2013.

Through FY 2013, more than \$9 billion has been obligated to the states for the Appalachian Development Highway System (ADHS). An additional \$3.5 billion has been provided in state and local match funds. As of September 30, 2014, a total of 2,762.9 miles, or 89.4 percent of the 3,090 miles authorized for the ADHS, were completed or under construction (see Figure 57). Another 96 miles were in the final design or right-of-way acquisition phase, and 231.2 miles were in the location studies phase.

Figure 57: Appalachian Development Highway System

**Status of Completion as of 9/30/2014  
3090.1 Eligible Miles**



Source: Appalachian Regional Commission

Considering the totality of the ARC investments over the past 50 years directed toward improving the Region's physical accessibility, economic development, human resource capabilities, and catalyzing regional development, a review of the investment data shows that a great majority of the funds went toward the development of basic infrastructure. This is not surprising, since having basic road, housing, and water and sewer services are essential precursors to being able to more fully develop an area's economy.

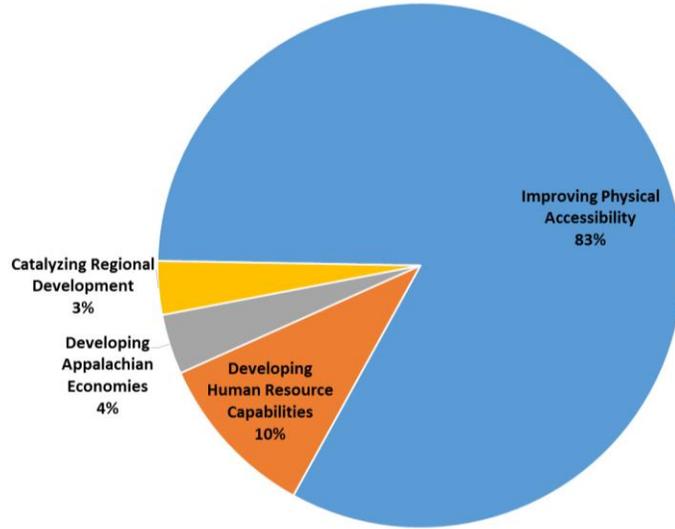
Figure 58 shows that 83 percent of ARC funds went to this particular category of investment.<sup>11</sup> The next largest category for cumulative ARC investments since 1965 were directed to developing human resource capabilities in Appalachia at 10 percent.<sup>12</sup> This category includes funding for child development, education, workforce training, and health investments. Developing Appalachian economies received 4 percent of the funding, while catalyzing regional development activities had 3 percent.<sup>13</sup>

<sup>11</sup> The category of improving physical accessibility includes the ARC investment classifications: Appalachian Development Highway System, community development, and housing.

<sup>12</sup> The category of developing human resource capabilities includes the ARC investment classifications: child development, education, education & workforce development, education & job training, and health.

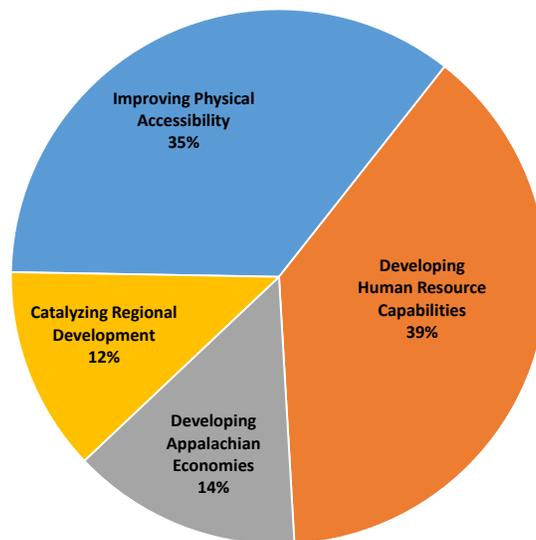
<sup>13</sup> The category of developing Appalachian economies includes the ARC investment classifications: asset-based development, business development, and leadership & civic capacity. The category of catalyzing regional development includes the ARC investment classifications: civic entrepreneurship, local development district planning & administration, research & evaluation, research & technical assistance, and state & LDD administration.

Figure 58: ARC Funds Expended by Investment Classification (Cumulative Total)



In this chapter of the report, however, we are only considering the economic impact related to ARC’s non-highway investments stemming from its Area Development Program. Given this focus, and thereby removing highway funds from the calculation, the ARC investment totals since 1965 for non-highway funds have been much more balanced. In fact, as Figure 59 shows the largest share of ARC non-highway funds have gone to developing human resource capabilities.

Figure 59: ARC Funds Expended for Area Development Program by Investment Classification (Cumulative Total)



## IO Concept and Method

There are many economic models from which to choose when estimating the regional employment and income impacts of public sector investments. Such choices are conditioned and often constrained by data availability, time, effort, and budget, and of course each method is subject to assumptions about the ways in which the impacts of economic shocks of various sorts – including public investments – work their ways through regional economies. There are sometimes also very unique challenges that accompany specific problem contexts.

The unique challenge in the present context is presented by the fact that the ARC investments have been made over a 50-year time span. As a consequence, impacts models, which rely on representations of regional economic structure, would ideally be recalibrated over time to reflect economic structural changes. This applies whether the model is a simple economic base type model, where the multiplier relies on the ratio of basic economic activity to total; an econometric model where multipliers are calibrated to time series that lead up to the dates of investment, an input-output (IO) model whose multipliers are derived from relationships among regional industries, or even complex computable general equilibrium (CGE) models whose parameters are calibrated to input-output structures.

The economic time series data that would be necessary for calibrating econometric models for multiple time periods – particularly at the regional level extending back to the beginnings of ARC and its investment activities – are not available. Calibrating regional CGE models can be a data-intensive process even for a single region in a recent period, so even were the necessary data available, such analyses would be well beyond the scope and available resources of this project. There are data that could support an economic base analysis, but because those same data also can support the more sophisticated IO modeling framework, an IO approach was chosen.

This section lays out the conceptual and methodological foundations of the impacts assessments.

### Concept

The impacts of investments in a region are a function of its economic structure. Industries buy and sell from one another, and workers spend portions of their incomes on goods and services, some of which are produced and provided locally. Impacts of investments in more self-sufficient regions, in terms of producing and providing industries with their production requirements and consumers with their goods and services, tend to be larger than impacts of those same investments in regions that depend on other regions to satisfy their needs. Good impact assessment models account for these levels of self-sufficiency and dependence on other regions.

Regions that are more dependent on other regions are described as being more *open* than their self-sufficient counterparts. More open regions will generally experience smaller beneficial impacts of goods production and service provision activity that accompanies regional investments than more closed regions. Good impact models capture this kind of variation, and

IO models are particularly well suited to modeling intra-regional and inter-regional sales and purchases relationships – indeed often referred to as the input-output structure of a region. Good models also can reflect temporal changes in economic structure.

It would be impractical to generate regional impacts models for multiple regions for every year of the ARC’s 50-year existence, so it is fortunate that IO structures change gradually rather than rapidly. Nevertheless, IO structures do change as regions grow and develop, so the approach taken here is to analyze ARC’s regional investments for multi-year periods. The benchmark year for each multi-year period was selected subject to constraints of national counterpart IO data, which are used as the foundation for calibrating the region-specific IO models.

Specifically, the benchmark years used here for regional IO models are for years ending in 2 and 7 (1972, 1977, 1982, etc.) from 1972 through 2007. As described in Figure 60, the 1972 U.S. IO structure, the first that used the commodity-by-industry accounting framework – was used as a benchmark for the 1965 and 1972 regional models. Industry-specific investments during the 1965-1971 period were deflated to benchmark year dollars and summed and used to generate their regional impacts. For subsequent periods, investments between benchmark

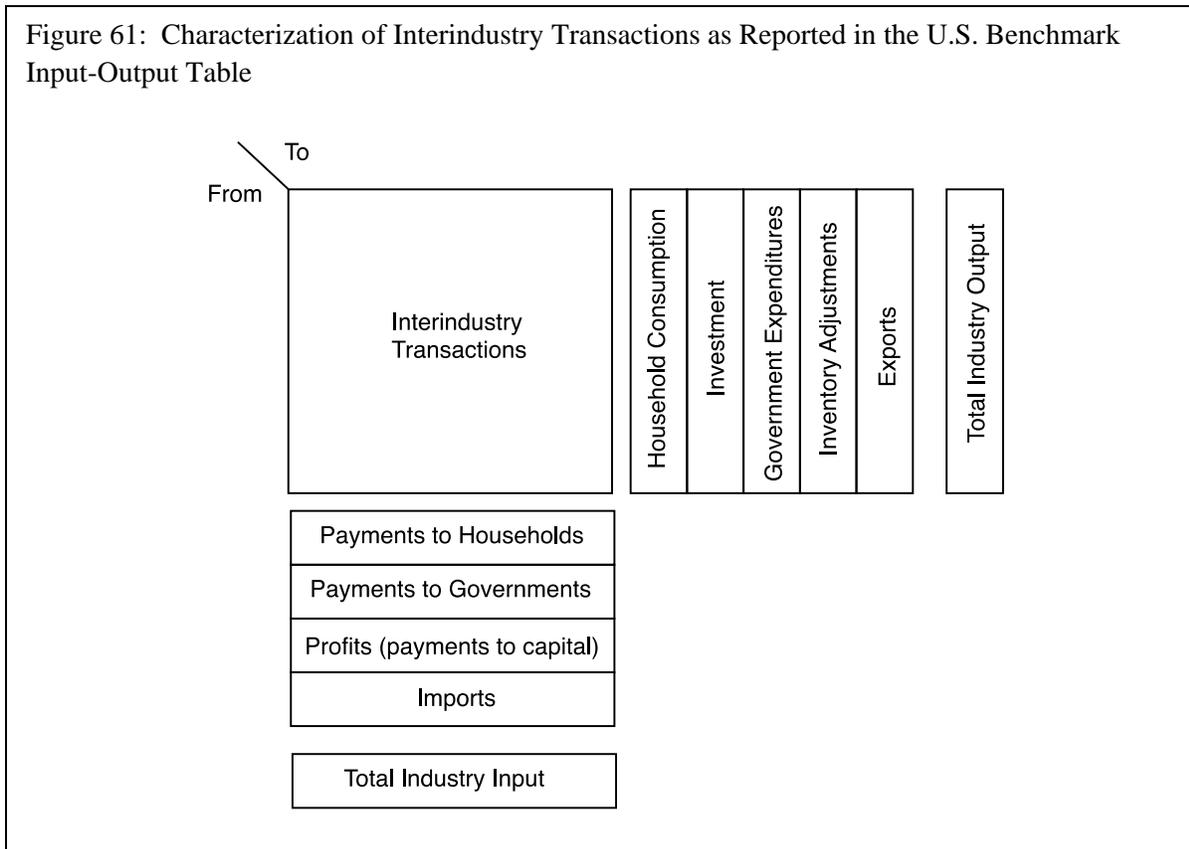
years (i.e., between 1972 and 1976) were deflated to the benchmark year and summed to generate their impacts. Impacts for investments from 2007 through the present were used to generate their impacts. Impacts in benchmark year dollars were then inflated to 2013 dollars to generate the cumulative impacts of ARC investments.

Figure 60: Year of U.S. Input-Out Benchmark Table Applied to Each ARC Investment Period

	Investment Period	Benchmark U.S. Table Year
1	1965-1971	1972
2	1972-1976	1972
3	1977-1981	1977
4	1982-1986	1982
5	1987-1991	1987
6	1992-1996	1992
7	1997-2001	1997
8	2002-2006	2002
9	2007-2013	2007

## Method

Mathematically, IO models are relatively straightforward. Most presentations of IO begin by acknowledging that the data foundation on which they are built is essentially a double-entry accounting system, as shown in the simplified diagram below. In Figure 61, the box labeled Interindustry Transactions characterizes interindustry sales and purchases structure, and contains a row and a column for every industry in the national (or regional) economy. Tracing along a row will identify all of the sales of the row industry to other industries, to households, and other



*final demand* sectors, including investment, government purchasers, and the world outside the region. The sum of these values is the value of total output of the row industry, which will be the same as the sum of the entries in that industry’s corresponding column – hence the double-entry nature of the accounting framework.

In its annotation version,  $X$  corresponds to industry output (or input), and  $Y$  represents final demand. For those interested in the math underlying the model, we designate interindustry transactions by variable  $z$ , and posit a relationship  $a$  between industry inputs and industry output, or  $z_{ij} = a_{ij}X_j$ . We can then write out a set of equations that describes the disposition of outputs of each industry, as shown below. The subscripts indicate industry of origin and or destination.

$$\begin{aligned}
X_1 &= a_{11}X_1 + a_{12}X_2 + \cdots + a_{1j}X_j + \cdots + a_{1n}X_n + Y_1 \\
X_2 &= a_{21}X_1 + a_{22}X_2 + \cdots + a_{2j}X_j + \cdots + a_{2n}X_n + Y_2 \\
&\vdots \\
X_j &= a_{j1}X_1 + a_{j2}X_2 + \cdots + a_{jj}X_j + \cdots + a_{jn}X_n + Y_j \\
&\vdots \\
X_n &= a_{n1}X_1 + a_{n2}X_2 + \cdots + a_{nj}X_j + \cdots + a_{nn}X_n + Y_n
\end{aligned}$$

We then call on matrix notation to simplify the mathematical expressions, and which gives the following:

$$A = \begin{pmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{n1} & \cdots & a_{nn} \end{pmatrix}, X = \begin{pmatrix} X_1 \\ \vdots \\ X_n \end{pmatrix}, Y = \begin{pmatrix} Y_1 \\ \vdots \\ Y_n \end{pmatrix}$$

$$X = AX + Y$$

$$X - AX = Y$$

$$(I - A)X = Y$$

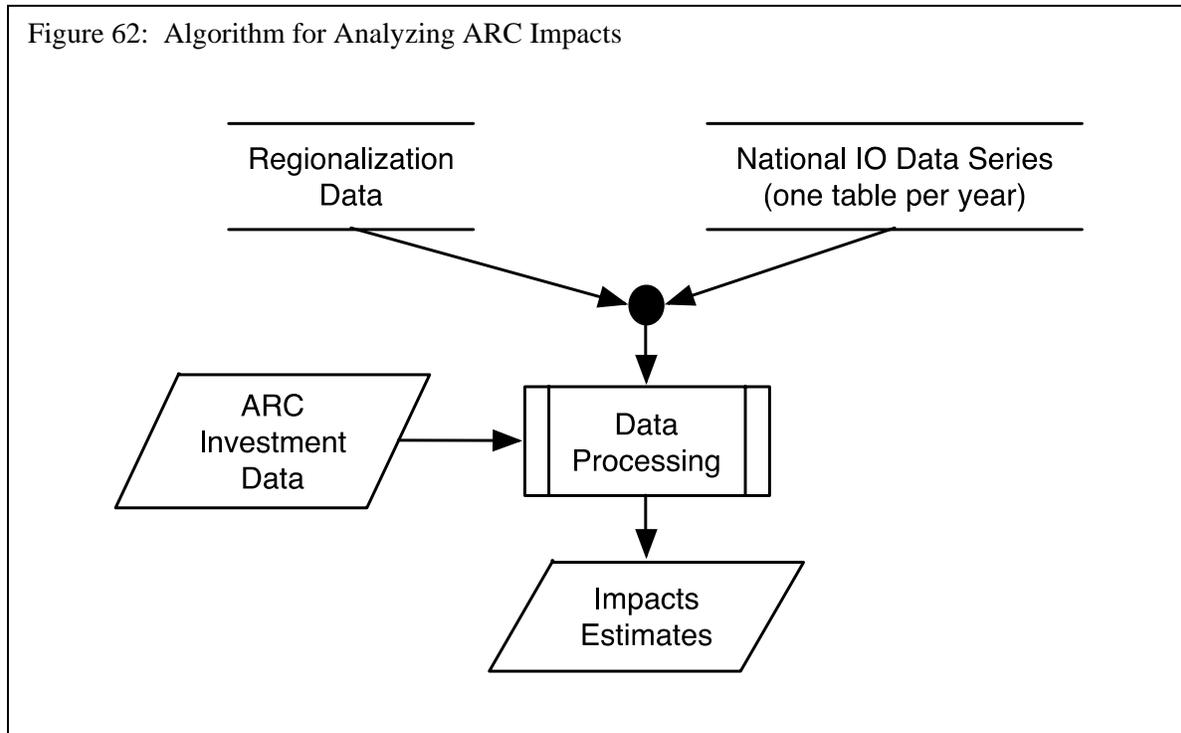
Subject to certain mathematical conditions (that essentially prevent us from dividing by zero) the model allows us to solve for the change ( $\Delta$ ) in output given a change in final demand (e.g., Investment).

$$(I - A)^{-1} Y = X$$

$$\text{and } (I - A)^{-1} \Delta Y = \Delta X$$

$\Delta X$  is an array of values that correspond to impacts of the final demand changes on each industry in the region. If we also know the relationship between employment and output, and earnings and output, we can easily compute the corresponding impacts on these variables. Therefore, the intermediate step toward setting up a solution equation for each region is developing their double-entry accounting frameworks – building the accounts.

Building the regional accounts is accomplished by using available region-specific data to adapt the U.S. national accounts data to a close approximation of the region in a process known as IO regionalization. The specific regionalization procedure we follow is described in detail in a paper by Jackson (1998), and used regional earnings by industry as the primary driving variable in the regionalization process. The U.S. Benchmark IO accounts and the employment and earnings data are described more fully in the data section. In general, the regionalization process follows that in the schematic diagram in Figure 62.



To this point there has been little mention of the way in which the geographical differentiation within ARC enters into the analytical process. Impact assessments are generally more accurate when the entire study region has the potential to respond to the specific investment whose impacts are of interest. One would typically not assume that the economic structure of Pennsylvania, for example, would be particularly relevant to the determination of impacts of investments made in Alabama. Without going to the extreme of attempting to match every investment to a model of the county or multi-county region in which it was targeted, we have moved in this direction by generating, in addition to an overall Appalachian Region model comprising all counties, additional state models comprising all of the counties in each of the 13 ARC states in each benchmark year, for a total of 14 regional models for each of nine analysis periods. The investments were similarly partitioned by region by period to generate the impact estimates.

When conducting analyses of this type, it is most common and intuitive to observe that the impacts on the larger Appalachian Region will be greater than or equal to the sum of the impacts on the sub-regions, and indeed this is the case in the vast majority of results. The reason that this is usually the case is that imports to one sub-region from another sub-region contribute to the openness of the sub-region, but they are internal to and therefore contribute to the self-sufficiency of the larger region.

However, precisely because these model results are partly a function of regional openness, it is not uncommon to observe a very small number of instances where the sum of the sub-regional impacts is greater than the impact on the entire region. This counterintuitive result can happen when an industry-specific investment is targeted to a sub-region that is substantially more self-sufficient in a subset of activities than is the larger region. A sub-region, for example, could produce enough steel for its own use, but a larger region of which it is a part might actually need to import steel for production. This phenomenon explains why the sum of impacts from an investment on specific states within the ARC Region, for instance, might not add precisely to overall impacts within the entire Appalachian Region.

## Data

### IO Data

Earnings data come from the Bureau of Economic Analysis (BEA) in their CA05 and CA05N data series. The CA05 files use SIC classifications and include a breakdown of income by county for multiple sectors from 1969 to 2000 (CA05, 2013). The CA05N files use NAICS classifications and include a breakdown of income by county for multiple sectors from 2001 on (CA05N, 2013). The data were aggregated to 11 industry sectors (see Figure 63), which was the highest level of detail at which reliable employment and earnings estimates could be compiled for all counties in the ARC Region. The eleven industry sectors are shown below.

Employment data also come from the BEA in their CA25 and CA25N data series. The CA25 files use SIC classifications and include a breakdown of employment by county for multiple sectors from 1969 to 2000 (CA25, 2013). The CA25N files use NAICS classifications include a breakdown of employment by county for multiple sectors from 2001 on (CA25N). The CA25N tables were aggregated to the 11-sector level.

Figure 63: North American Industrial Classification System Industry Sectors

1	Farm
2	Agr svcs forestry, and fishing
3	Mining
4	Construction
5	Manufacturing
6	Transportation and public utilities
7	Wholesale and Retail Trade
8	Finance, insurance, and real estate
9	Services
10	Federal, civilian
11	State and local

Both the income and employment data files have unreported values in the tables. These missing values are given placeholder (D) and (L) when they are unreported for confidentiality reasons, or (NA) when the information was not available for that reporting year. The (L) placeholder indicates that the value is less than \$50,000 in the income files and less than 10 jobs in the employment files. Income files typically contain more unreported values than the employment files. Years 2001 to 2011 have higher proportions of reporting issues for both income and employment files than years prior. Missing values were imputed using an algorithm that begins with feasible initial estimates of the missing values and alternating between a procedure that applies a moving average algorithm within sectors across years and a procedure that reconciles with known totals (summing up constraints). The result of applying this alternating procedure a large number of times is a set of estimates that minimizes inter-year variation while ensuring that the results are consistent with all published values.

Employment and earnings data are available for each base year (1965, 1972, 1977, 1982, 1987, 1992, 1997, 2002, and 2007). Although coefficient change does occur gradually, IO structure was assumed to be stable throughout each 5-year period of analysis. The BEA's income and employment files span years 1969-2011. For this reason, and because the commodity-by-industry accounts were initiated in 1972, the 1972 structure was used for the periods beginning and ending in that year. Any county included in the ARC during any year within the 5-year period is included for the entire 5-year period for purposes of defining the respective multi-county regions. ARC investment data were deflated and summed to correspond to each of the 5-year periods, for each of the 13 ARC sub-regions and in total for the larger ARC Region.

Personal consumption expenditure (PCE) data come from the BEA at the state level from 1997-2012. The personal consumption expenditure data use the NAICS classification (PCE, 2014). The PCE data were compiled to conform to the model sectoring scheme using a bridge that is also provided by the BEA (PCE, 2014). Where necessary, aggregate totals for PCE sectors were disaggregated using corresponding national PCE distributions. In the absence of state-specific PCE data for earlier years, the PCE distribution for 1997 was applied to corresponding consumption totals to generate PCE expenditures for the regionalization process for earlier years.

State and Local Expenditure data come from the U.S. Census Bureau in their Annual Surveys of State and Local Government Finances. Data are available for years from 1992 to 2011 at the state level (U.S. Census Bureau, 2014). These data were processed using an approach that parallels that described above for PCE data. These tables are based on information from public records and contain no missing values or confidential data (U.S. Census Bureau, 2014). In the absence of state-specific state and local expenditures data for earlier years, the PCE distribution for 1997 was applied to corresponding consumption totals to generate PCE expenditures for the regionalization process for earlier years.

Input-output data come from BEA, which publishes benchmark commodity-by-industry accounts every five years for years ending in 2 and 7, beginning in 1972 and ending in 2007. The tables

for years 1972-1992 use SIC classifications and 1997-2012 tables use NAICS classifications (Benchmark Input-Output, 2014). National Federal Expenditures, State and Local Expenditures, Investments, Exports, and Personal Consumption Expenditures are included in the Final Demand Sections of the BEA Use tables (Benchmark Input-Output, 2014). There are no missing values in the BEA’s Make and Use tables.

### ARC Non-Highway Investment Data

The investment data were provided by the Appalachian Regional Commission and processed by assigning each of the nearly 25,000 project records initially to one of 39 final demand categories, which were subsequently used to aggregate further to one of the eleven industry sectors identified above. Each investment was further assigned to its appropriate analysis period and region for the impacts assessment. The following Figure 64 reports these data in millions of dollars.

Figure 64: ARC Appropriated Non-Highway Investment by Period and State (millions of dollars)

	Alabama	Georgia	Kentucky	Maryland	Mississippi	New York	North Carolina
<b>1965-1971</b>	\$43.5	\$30.5	\$47.6	\$14.9	\$12.8	\$20.0	\$32.2
<b>1972-1976</b>	\$62.4	\$47.9	\$59.5	\$28.0	\$38.3	\$38.5	\$52.7
<b>1977-1981</b>	\$52.0	\$36.2	\$53.5	\$24.8	\$37.1	\$42.7	\$40.7
<b>1982-1986</b>	\$20.4	\$18.6	\$29.6	\$7.8	\$17.0	\$15.1	\$17.3
<b>1987-1991</b>	\$19.0	\$11.1	\$28.5	\$6.6	\$12.8	\$11.7	\$13.7
<b>1992-1996</b>	\$26.3	\$18.2	\$38.1	\$12.1	\$15.7	\$14.3	\$18.8
<b>1997-2001</b>	\$23.2	\$20.0	\$48.4	\$11.0	\$22.8	\$16.9	\$19.3
<b>2002-2006</b>	\$26.6	\$15.9	\$46.6	\$11.2	\$25.9	\$13.6	\$18.7
<b>2007-Present</b>	\$35.6	\$26.7	\$76.2	\$14.9	\$43.6	\$19.6	\$26.5
<b>Summary</b>	\$309.0	\$225.1	\$427.9	\$131.3	\$226.0	\$192.4	\$239.8

	Ohio	Pennsylvania	South Carolina	Tennessee	Virginia	West Virginia	ARC
<b>1965-1971</b>	\$35.0	\$81.7	\$32.2	\$34.3	\$27.8	\$44.1	\$6.6
<b>1972-1976</b>	\$49.6	\$108.2	\$47.4	\$59.5	\$39.1	\$75.2	\$9.2
<b>1977-1981</b>	\$38.2	\$77.9	\$40.1	\$59.8	\$34.2	\$53.3	\$23.8
<b>1982-1986</b>	\$15.5	\$31.5	\$14.2	\$26.1	\$11.7	\$26.9	\$33.6
<b>1987-1991</b>	\$13.9	\$27.2	\$11.6	\$22.3	\$12.3	\$20.4	\$16.4
<b>1992-1996</b>	\$23.1	\$35.1	\$16.6	\$26.7	\$18.2	\$37.7	\$53.6
<b>1997-2001</b>	\$26.1	\$35.2	\$16.4	\$29.4	\$18.5	\$44.9	\$24.1
<b>2002-2006</b>	\$24.3	\$28.6	\$12.8	\$23.3	\$18.3	\$36.9	\$36.7
<b>2007-Present</b>	\$33.2	\$40.2	\$20.2	\$45.1	\$22.3	\$48.3	\$31.1
<b>Summary</b>	\$258.9	\$465.4	\$211.6	\$326.5	\$202.5	\$387.6	\$235.0

Note that these data are reported in current dollars. For analytical purposes, each investment was deflated to correspond to the appropriate analytical benchmark year. Also, some of the projects were “Commission” investments, labeled as ARC in the figure above. These broader regional investments were not allocated to any specific states, but were a part of the direct impacts for the overall regional impacts assessments.

## Results

The results from the economic modeling show that the \$3.8 billion in ARC non-highway investments (Area Development Program) were responsible for leveraging nearly 312,000 jobs and \$10 billion in added earnings in the Region. On average annually, these ARC funds supported an estimated 6,364 jobs and \$204 million (in constant 2013 dollars) in earnings. (See Appendix A for details on Appalachian Region state specific estimated impacts).

Figure 65 shows the detailed results from the IO analysis. Many of the new jobs created were in professional and technical services, manufacturing, trade, and construction industries. These figures include the direct, indirect and induced job growth. Direct effects are the employment directly attributable to the spending of ARC funds within a particular industry. Indirect effects are the spending and employment of suppliers and contractors to produce inputs for the industry. Induced effects include household spending on goods and services by both industry employees and the employees of contractors and suppliers (both direct and indirect employees). Total economic impact is the sum of direct, indirect, and induced effects.

Figure 65: Employment Impacts - Appalachian Region Totals (Non-Highway Investments)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	1,989	2,057	962	3,932	11,852	3,282	10,609	2,885	41,130	1,545	5,308	85,551
1972-1976	2,396	2,533	642	5,132	14,387	3,963	12,645	3,378	47,448	1,810	6,289	100,622
1977-1981	1,149	1,225	639	4,622	7,630	2,041	7,499	2,028	21,571	844	3,527	52,775
1982-1986	424	553	247	1,906	2,664	684	2,884	755	6,369	291	1,224	18,002
1987-1991	255	333	111	1,315	1,546	415	1,862	474	4,282	176	695	11,463
1992-1996	309	498	123	1,914	1,975	598	2,661	537	5,662	231	916	15,426
1997-2001	169	308	61	2,098	1,203	395	1,658	335	3,576	18	134	9,954
2002-2006	134	147	53	1,548	811	259	948	173	4,300	13	106	8,491
2007-2013	122	162	57	1,952	760	241	971	195	4,970	10	113	9,552
<b>All Years</b>	<b>6,946</b>	<b>7,816</b>	<b>2,895</b>	<b>24,420</b>	<b>42,828</b>	<b>11,877</b>	<b>41,736</b>	<b>10,760</b>	<b>139,307</b>	<b>4,937</b>	<b>18,312</b>	<b>311,835</b>

Figure 66: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	85,551	\$ 2,570,534	\$ 30.0	\$ 2,646.8	\$ 463.2
1972-1976	100,622	\$ 3,026,601	\$ 30.1	\$ 3,057.2	\$ 715.4
1977-1981	52,775	\$ 1,730,431	\$ 32.8	\$ 1,866.7	\$ 614.2
1982-1986	18,002	\$ 588,186	\$ 32.7	\$ 590.9	\$ 285.4
1987-1991	11,463	\$ 394,647	\$ 34.4	\$ 405.7	\$ 227.6
1992-1996	15,426	\$ 567,140	\$ 36.8	\$ 536.3	\$ 354.5
1997-2001	9,954	\$ 377,341	\$ 37.9	\$ 487.0	\$ 356.0
2002-2006	8,491	\$ 351,580	\$ 41.4	\$ 425.6	\$ 339.2
2007-2013	9,552	\$ 395,247	\$ 41.4	\$ 530.2	\$ 483.5
<b>Summary</b>	311,835	\$ 10,001,707	\$ 32.1	\$ 10,546.4	\$ 3,839.0

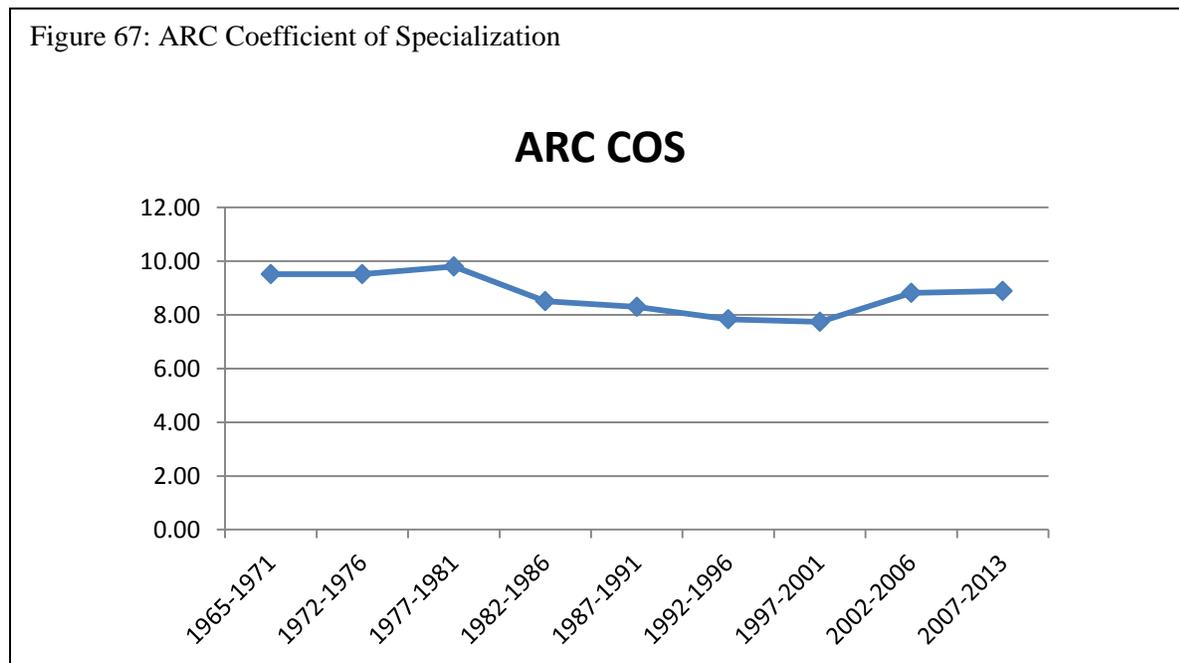
Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$27.3	\$56.6	\$52.4	\$164.9	\$468.7	\$162.0	\$289.9	\$67.5	\$1,031.6	\$84.3	\$165.4	\$2,570.5
1972-1976	\$32.9	\$69.7	\$35.0	\$215.3	\$569.0	\$195.5	\$345.5	\$79.0	\$1,190.1	\$98.7	\$195.9	\$3,026.6
1977-1981	\$13.2	\$26.6	\$48.2	\$197.4	\$339.2	\$110.3	\$203.5	\$45.6	\$577.7	\$53.1	\$115.7	\$1,730.4
1982-1986	\$3.9	\$11.7	\$17.8	\$74.1	\$121.9	\$35.6	\$71.6	\$16.5	\$175.0	\$18.9	\$41.0	\$588.2
1987-1991	\$2.1	\$6.3	\$5.9	\$53.1	\$74.9	\$22.0	\$48.3	\$12.3	\$130.7	\$12.0	\$27.1	\$394.6
1992-1996	\$4.6	\$10.6	\$9.0	\$76.7	\$99.9	\$32.4	\$71.2	\$16.8	\$189.1	\$18.1	\$38.5	\$567.1
1997-2001	\$1.9	\$5.9	\$4.2	\$87.7	\$62.9	\$21.2	\$47.5	\$12.3	\$126.3	\$1.5	\$6.0	\$377.3
2002-2006	\$1.3	\$4.3	\$3.0	\$72.0	\$47.5	\$15.3	\$33.0	\$7.9	\$161.1	\$1.2	\$5.0	\$351.6
2007-2013	\$1.9	\$4.7	\$3.7	\$85.6	\$46.7	\$14.3	\$34.3	\$7.6	\$189.7	\$1.0	\$5.7	\$395.2
<b>All Years</b>	\$89.0	\$196.4	\$179.3	\$1,026.8	\$1,830.7	\$608.6	\$1,144.9	\$265.6	\$3,771.2	\$288.8	\$600.4	\$10,001.7

*Only the ARC portion of funds for non-highway investments was included in the economic modeling produced for this study.* In every ARC-funded activity there are also public monies from other federal, state and local sources, as well as the likelihood of leveraged private investment. This was noted in the previous discussion of leverage. Therefore, the total employment and income impacts to the Region would be substantially higher if all funding sources were included in the modeling. However, in this report, only the ARC portion of funds were modeled in order to prevent attributing the overall economic effect from a combined total investment to only the ARC portion of that investment. Therefore, the figures reported in Figure 66 should be read as conservative estimates of the ultimate employment and income effects from various ARC-supported non-highway investments. Given the large amount of non-ARC dollars that are directed to many of these investments, the actual resulting employment and income effects may be many times greater.

## Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of 0 to a maximum of 100. Figure 67 shows that the ARC's COS values ranged from 9.51 in the first period to 8.89 in the latest period. This indicates the Region is becoming more diversified.



## Summary

This chapter quantified the employment and income impacts attributable to the sizable amount of ARC grant investments made in the Region over the years. While the primary objectives of ARC investments are to improve the quality of life and socioeconomic status of the Region, ARC's investments help to achieve economic gains that fuel the hiring of workers and purchase of material goods and services needed to put new developments in place. Incomes from all of these activities also fuel additional demand, further multiplying the total economic impacts of these investments.

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## Chapter III: “But For” the Appalachian Regional Commission Investments: Answering the Counterfactual with Quasi-Experimental Methods (QEM)

### Section Summary

Reviewing ARC’s role in helping Appalachia develop its economy and the funds it has invested in the Region to do so raises the question as to whether this experiment in regional economic development has paid off for U.S. taxpayers. The research aimed to answer this question by using a quasi-experimental methodology that compares counties in the Appalachian Region to similar counties outside the Region. The results of this research indicate that employment and per-capita income grew at a faster rate in the Appalachian counties than in the non-Appalachian counties, as a result of the ARC investments.

Assessing the impact of ARC investments in the counties of Appalachia can be a challenge because in order to determine the effectiveness of, we have to posit an alternative scenario as if the investments did not take place. Although this seems like a daunting task, the methodology outlined in Isserman and Rephann (1995) can be used to assess the effectiveness of these investments and answer the counterfactual question posed above.

These kinds of counterfactual claims can be evaluated through the use of Quasi-Experimental methods (hereafter QEMs). QEMs attempt to replicate the case-control group framework most commonly associated with clinical trials and other forms of scientific experiments (Rosenbaum, 2010; Guo and Fraser, 2010). They use matching techniques to assign to each “treated” entity one or more “controls” and then use statistical tests to see if outcomes significantly differ between the cases and the controls. If the matching is done accurately and the differences between treatments and controls are significant, we can be confident that the divergence is due to the experimental intervention.

Among the pioneering studies using QEM methods to evaluate regional development programs is Isserman and Rephann’s 1995 study of the economic impacts of the ARC. In this study, the researchers constructed a counterfactual by matching counties in Appalachia that received ARC funding (i.e. the “treated” group) to counties outside of Appalachia that did not receive any ARC funding (i.e. the “control” group) but were otherwise similar to funded counties in terms of demographic, socioeconomic, and other characteristics. The matching of treated counties and control counties is a fundamental step in this process and “closer” matches tend to provide more convincing evidence than those based on pure correlation methods.

We use a generally similar methodology as Isserman and Rephann to evaluate the employment and income impacts of the ARC over its first fifty years. There are, however, several differences. First, while the original Isserman and Rephann (1995) study used 24 variables to match the treated and control counties, this study uses 29. The added variables include important starting

conditions such as poverty rates, racial composition, and farming employment, whose omission was questioned by critics of Isserman and Rephann's findings (Feser, 2013). These additional variables in the matching algorithm helps to ensure that we are obtaining a match that is as good as or better than that of Isserman and Rephann. Second, building on recent advances in the field (Caliendo and Kopeinig, 2005), we use a more sophisticated econometric technique to implement the matching. Third, we study a longer period of analysis for which we have developed smaller sub-periods to observe the empirical effects of ARC policy in these sub-periods.

The remainder of this technical report will outline several details and results from the QEM methodology.

### **Control Group Selection**

QEM analyses generally combine two steps in selecting control groups: eligibility criteria and matching. In both cases, the objective is to select a control group with close similarity to the treatment group (before the treatment has occurred). In the eligibility criteria, the counties selected for the control group have similar characteristics (e.g. income and education) as the treated counties. For example, consider a government program to improve development in counties, such as funding for highways. In order to compare the success of this policy, we need to compare to a group of similar counties that are not part of the program. However to make this comparison reasonable, we need to be sure that the only difference between the counties is the fact that certain counties received the funds and others did not receive funds. The counties should be similar in every respect possible with the exception being who received the highway funding. Regression discontinuity methods (Bhutta, 2009) use a similar methodology, where regions are assigned to control and treatment group based on a threshold value (i.e. a cutoff point) of the selected assignment variable (Lee and Lemieux, 2009). Cases and controls closer to the threshold are assumed to be more similar, allowing the estimation of local treatment effects.

Matching is the second step involved in selecting the control groups. There are many varieties of methods that can be used in selecting control groups that match the treatment group. These include difference of means tests (Isserman and Merrifield 1982), Mahalanobis distance (Aleseyed, Rephann, and Isserman, 1998; Stenberg et.al 2009), and propensity score methods (Artz, Orazem, and Otto, 2007), as well as combinations of the above (i.e. Mahalanobis distance with propensity score). Propensity score matching is the most common methodology employed (Rosenbaum 2010a). A propensity score is the conditional probability of being selected for treatment based on observable characteristics (Artz, et al., 2007, Wenz, 2007, and Johnson, 2009).

Smith and Todd (2005) argue that, while the propensity score is a valuable econometric tool, it should not be taken as a general solution to policy evaluation problems. They show that the results are very sensitive to the choice of the variables included in the estimation of the scores as well as to the sample used in the estimation.

Even though all three methods provide similar results for the treated region in the periods before the policy, there is no consensus as to what and how many variables should be used to select the control group, even in studies that assess the same public policy. In evaluating the impact of highways on economic development, Broder et al (1992) used only five county socioeconomic characteristics (i.e. population, per capita income, manufacturing employment, service employment, relationship to interstate highways, and proximity to metropolitan statistical areas) compared to Rephann and Isserman (1994) who use 31 socioeconomic characteristics to match the treatment and control groups.

We now turn our attention to the matching algorithms utilized in the empirical analysis.

### Matching Algorithms

We begin our description of matching techniques by assigning the counties into two groups: the “treated group” that received ARC investments and the rest of the counties that did not receive ARC investments. In order to test the effect of the policy, we need to compare the effect of the investment in the treated group with a comparable group of counties that did not receive the investment which will be called the “control group.” This control group should be similar to the treated group before the treatment (pre-test) and this similarity is measured by how closely counties match in terms of selected variables. We define  $D=1$  for the counties that received treatment and  $D=0$  for control counties, where the treated counties are defined as the counties where investment by the ARC occurred in the period of 1965 to 1970; the counties that received these ARC investments include a group similar to the one used by Isserman and Rephann (1995) who included counties that are members of the ARC. For the sub-periods the treated group is defined as the group of counties that received investments from ARC projects in the beginning of the analyzed sub-period. For example, for the sub-period from 1966 to 1974 we included in the treated group the counties that received investments from 1966 to 1968. The effects of the policy (post-test) are measured by evaluating the behavior of target variables. Note that creating sub-periods for all the different years when ARC investments occurred would be intractable because ARC investments occurred every year.

There are several matching methods available: propensity score matching using kernel matching, nearest neighbor matching, radius matching, stratification, and the Mahalanobis distance metric (Caliendo and Kopeinig, 2005; Isserman and Repphan, 1995; Rosenbaum, 1989). In this study we examined matches based on three criteria: propensity score matching using nearest neighbors, kernel matching and Mahalanobis distance. Both nearest neighbor matching and kernel matching are considered propensity score methods, because both use fitted values of the probit model to determine similar cases and controls. Propensity score matching and Mahalanobis

distance methodologies have been used to more accurately measure the impact of policies in regional science (Isserman and Rephann, 1995; Pender and Reeder, 2010). These methods perform better than standard regression techniques when the policy adoption is endogenous (Reed and Rogers, 2003); this is appropriate in this analysis since the counties that are selected for ARC investments have to be within the Appalachian Region and not randomly chosen.

Even when using the same matching criteria variables, different matching methods can produce different control groups. No method is universally accepted as superior to any other method. In this study we test three different matching algorithms: propensity score using nearest neighbor matching, propensity score using kernel matching, and Mahalanobis distance.

The propensity score matching algorithm is based on matching the result of a probit model with  $D$  as the dependent variable and  $x$  as a matrix of explanatory variables:

$$p(x) = \text{prob}(D = 1|x) = E(D|x)$$

The probit model provides the probability that a county is a control county and this probability will be used as the propensity score to match treated counties with untreated or control counties. There are various methods to match counties based on their propensity scores, which comes from the fitted value of the probit model.

The nearest neighbor approach matches each treated observation  $i$  with one of the control observations  $j$  that has the closest propensity score using the formula  $\min \|p_i - p_j\|$ . The procedure can be employed either with or without replacement. For our estimation purposes we use without replacement since we have a large number of candidate counties to be selected for the control group, and to avoid the situation where a single county was selected to match a large group of treated counties.

The kernel matching estimator does not find a county to be the closest match to each treated observation but rather calculates a combination of control counties that provide a closer comparison group, while the nearest neighbor procedure finds the control county with the closest value of the propensity score. The controls are weighted by their degree of similarity to the treated observation. The weights used in the matching algorithm are defined as follows:

$$w(i, j) = \frac{K\left(\frac{p_j - p_i}{h}\right)}{\sum_{j=1}^{n_0} K\left(\frac{p_j - p_i}{h}\right)}$$

Where  $p$  measures the propensity score of each  $i$  (treated) and  $j$  (not treated) counties,  $K$  is the kernel function,  $h$  is the bandwidth in the kernel density function, and the kernel function used in the matching is the Epanechnikov kernel. The function creates weights for each of the  $j$  counties.

The Mahalanobis Distance metric is not a propensity score method per se, although it follows the same general principles. This model measures the distance between the treated county and other counties and the inverse of the variance-covariance matrix of the variables and can be mathematically represented as follows:

$$d^2(X_T, X_C) = (X_T - X_C)' \Sigma^{-1} (X_T - X_C)$$

Where  $T$  is the treated county,  $C$  is a possible control county,  $d$  is the distance between the two vectors, and  $\Sigma^{-1}$  is the variance-covariance matrix.

To determine the most appropriate matching method, we consider the standardized bias for each variable, which measures the differences in the  $X$  variables between the treated and control groups (Rosenbaum and Rubin, 1985). Such result compares the overall match between cases and controls variables “as the difference of sample means in the treated and matched control subsamples as a percentage of the square root of the average of sample variances in both groups” (Caliendo and Kopeinig, 2005 pp. 15). The best matching algorithm (between Mahalanobis distance, nearest neighbors, and Kernel) is the one with the lowest pseudo  $R^2$  and likelihood ratio test statistic values (estimated after treated and control groups were selected), the least number of variables with significant biases, and lowest bias values (Caliendo and Kopeinig, 2005). First we identify variables used in the model that are significantly different between treated and matched controls, and focus on the percentage difference between treated and control (bias), and how many variables in the matched counties have large and significant differences. We then look for low values among pseudo  $R^2$  and the likelihood ratio test statistics, because low values on these tests indicate that the explanatory variables will predict a lower difference in the propensity score between treated and untreated matched counties.

The decision of which matching algorithm to choose is not clear, because the pseudo  $R^2$  and likelihood ratio test statistics can point towards one model and the average bias, max bias and number of significant variables point to another model as the best fitting algorithm. Therefore, choosing the best matching algorithm involves looking at all of the above criteria, not just a single one.

The next step in the analysis is to use a difference-in-difference model (DID). DID is applied when panel data on outcomes are available before ( $b$ ) and after ( $a$ ) the experiment the experiment occurs. It measures the difference-in-differences average treatment effect on the treated (ATET) and is specified as:

$$\begin{aligned}
ATET &= E(\Delta_a - \Delta_b | D = 1) = E((y_{1a} - y_{0a}) - (y_{1b} - y_{0b}) | x, D = 1) \\
&= E(y_{1a} - y_{1b} | x, D = 1) - E(y_{0a} - y_{0b} | x, D = 1)
\end{aligned}$$

where the first term in the equation refers to the differences in outcomes before and after the treatment for the treated group. The before and after differences alone may be biased if there are time trends. The second term in the equation measures the before and after change in the control groups. Together they are used to eliminate this bias under the assumption that both groups experience the same time trend.

## Data

Figure 68 shows by year and state how many counties began their first investments from the Appalachian Region. We measure the timing of the "treatment" according to the ARC investments in each county.

Figure 68: Number of Counties by State that Received their First Investment from the ARC

State	1965- 1969	1970- 1979	1980- 1989	1990- 1999	2000-present
Alabama	22	13		2	
Georgia	25	10		2	
Kentucky	34	15			5
Maryland	3				
Mississippi	15	5		2	2
New York	12	2			
North Carolina	27	2			
Ohio	18	10		1	3
Pennsylvania	39	12	1		
South Carolina	6				
Tennessee	45	5			2
Virginia	16	3		4	2
West Virginia	39	16			
<b>NEW ARC Counties</b>	<b>301</b>	<b>93</b>	<b>1</b>	<b>11</b>	<b>14</b>

There are a few considerations worth making before describing the investment data. The original data were separated by investment type. However, we decided not to have the analysis by type of investment but rather having a set of outcomes variables (described below) to evaluate the investments. The rationale behind this is that it would have been very difficult to isolate the effect of each type of investment (even with a small number of categories) since different types of investments were done during the same year. On the other hand, aggregating different types of investments generated a situation in which once a county received an investment, the ARC generally kept investing for at least a few years.<sup>14</sup> Also to avoid the issues from including counties with small investments we consider only investments above a yearly average or median.

Finally, we also evaluated measuring the timing of the treatment according to the year of the first investment in each county. By 1980 almost 400 counties had already received funding for different projects. At the same time we wanted to be able to say more about recent years' investments and therefore we decided not to pursue this route.

Ideally, one would like to estimate the effect of only one program in one particular year (i.e. only one investment in each county in a specific year). This is to avoid any sorts of spillover effects, either spatial as well as coming from some sort of combination of different investments.

The ARC investments were made over a large period of time, therefore we decided to break up the overall period into sub-periods. Of course, this implied finding controls at the beginning of each time interval.

The variables used for the analysis include the economic structure of the county, the level of economic development, other socioeconomic factors and demographic characteristics. These variables are collected for periods before the investment in the ARC counties took place, allowing us to perform a pre-treatment matching of counties. The variables included for each classification are listed in Figure 69. The original variables used by Isserman and Rephann (1995) totaled 24 and in the analysis presented here, five additional variables were used to bring the number of variables used in the matching exercise to 29. We excluded counties located within 60 miles of the ARC counties to avoid issues related to spatial spillovers. The 60 miles distance is important because as Plane and Rogerson (1994) explain, this distance accounts for a local labor market that could obtain benefits from the jobs created in the ARC counties (Isserman and Rephann, 1995).

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<sup>14</sup> We have created a dataset containing a single variable that is equal to 1 if the county received any form of investment from the ARC in a particular year and 0 otherwise. Note that in many instances, the ARC investment is part of a larger investment made by the state or even private party institutions. However, with QEMs the only matters is whether the investment happened or not in a specific county.

Figure 69: Variables Used in the QEM Matching Algorithm

<b>Isserman and Rephann (1995) Original Variables</b>	
freeway	Binary (or dummy) variable for presence of highway
lpop	log of population 1959
spc	state and local per capita earnings
rtot	rate of growth of total income 1950-1959
rpop	population growth rate for period 1950-1959
dens	population density per square mile for 1959
city25	distance of county to the closest city with 25,000 population
city100	distance of county to closest city with 100,000
city250	distance of county to closest city with 250,000
city500	distance of county to closest city with 500,000
city1000	distance of county to closest city with 1,000,000 population
psvc	share of services earnings in 1959
prtl	share of retail trade earnings
ptpu	share of transportation and public utilities earnings
pmfg	share of manufacturing earnings
pcon	share of construction earnings
pfar	share of farming and agriculture earnings
ptrf	share of transfer income earnings
pdir	share of earnings from dividends, interest, and rents
pres	residential adjustment share
pmil	share of military earnings
pfed	share of federal earnings
pstl	share of state and local earnings
pwhl	share of wholesale trade earnings
<b>New Variables Added</b>	
pov	percent of population in poverty 1959
pc17	percent of population under 17 years of age
pc65	percent of population over 65 years of age
black	percent of black population 1959
nfarms	percent of population living on farms 1959

The variables included in Figure 69 are designed to capture various aspects of the counties under study. For example, the economic characteristics of counties such as the variables measuring earnings and income measure the overall economic strength of the counties. The variables that measure the various industry shares are designed to measure the industrial mix of the various counties, while the demographic variables measure the population characteristics. Although categorizing these into distinct groups is somewhat arbitrary, these variable groupings are the ones that are most important in this study.

For the various sub-period analyses we use the same variable selection methods for the county matching procedure, but for each sub-period we will define a matching pre-test sample of counties, a specific dummy treatment variable, and a specific objective variable. The periods of study are: (1) from 1965 to 1974; (2) from 1975 to 1984; (3) from 1985 to 1994; (4) from 1995 to 2002; and (5) from 2003 to 2012. The sub-period analysis is included to determine if the effects of ARC investments differs over time. (See Appendix B for details on the sub-period analysis).

In the empirical examples undertaken in this study, we concentrate on two important metrics: the growth in per-capita income and the growth in employment. Income growth is one economic indicator that is important to many stake holders as it measures the overall well-being of people living in ARC counties over the past fifty years; the same may be said for the importance of employment growth. (See Appendix C for regression model results related to these variables).

## Results

The matching was performed using data from 1959 and 1960 for all counties, excluding counties located within 60 miles of the Appalachian Region to avoid spatial spillovers issues. The matching from the three procedures generated control counties that are very similar to the treated ones as can be seen in Figure 70, where we compare the variables used in the matching procedures and estimates from differences in their averages. Also highlighted are the statistically significant differences between treated and control, which are the variables that show a significant difference that can explain the difference between treated and control on average. As noted earlier the better model is the one that finds a control group that is more homogeneous. Therefore from the results in Figure 70 the models that fit better would be those using the Mahalanobis distance metric and those using nearest neighbors matching.

Figure 70: Comparison of averages for variables used for estimating the matching procedure between treated and control and significance levels for full period matching. \* = 10% \*\* = 5% and \*\*\* = 1%

Variable	Mean Treated	Mahalanobis Distance			Nearest Neighbors without replacement			Kernel Matching		
		Mean Control	Bias	t-test	Mean Control	Bias	t-test	Mean Control	Bias	t-test
freeway	0.435	0.408	5.6	0.79	0.473	-7.7	-1.1	0.423	2.5	0.4
lpop59	10.149	10.179	-2.7	-0.44	10.217	-6.2	-0.9	9.698	41.3	5.5***
spc59	0.085	0.098	-3.9	-3.93***	0.098	-3.8	-4.6***	0.108	-7.1	-3.8***
rtot59	59.617	56.212	6.7	1.43	56.885	5.4	0.8	129.04	-137.2	-5.4***
rpop59	-2.041	1.097	-13.2	-2.97***	2.818	-20.4	-4.3***	1.115	-13.2	-2.5**
dens59	90.048	86.179	0.7	0.36	114.62	-4.6	-1.8*	85.442	0.9	0.3
pov59	19.006	16.625	26.2	2.98***	14.696	47.5	6***	21.14	-23.5	-2.3**
pc1760	37.926	36.570	34.1	5.67***	37.204	18.1	2.8	37.353	14.4	1.8*
pc6560	9.796	11.193	-48.3	-9.06***	10.553	-26.2	-4.4***	9.179	21.3	3.6***
black60	6.171	6.332	-1.2	-0.21	9.214	-23.1	-3.5***	9.033	-21.7	-3.7***
city2560	32.319	33.484	-3.8	-0.75	34.261	-6.4	-1.1	32.489	-0.6	-0.1
city10060	67.6	67.311	0.4	0.12	64.063	5.4	1.3	59.85	11.8	2.6***
city25060	105.72	105.470	0.3	0.07	100.27	6.5	1.4	94.889	12.9	2.5**
city50060	185.85	172.240	8.8	1.97**	172.02	8.9	1.7*	210.19	-15.7	-2.3**
city100060	355.9	366.060	-4.5	-0.77	327.34	12.5	2.1**	385.37	-12.9	-1.7*
psvc59	0.064	0.067	-6.3	-0.94	0.067	-5.5	-0.8	0.056	19.2	2.7**
prtl59	0.088	0.097	-32.5	-5.49***	0.092	-16	-2.5**	0.081	24.9	3.7***
ptpu59	0.045	0.045	1.3	0.19	0.043	6.5	1	0.028	43.8	6.8***
pmfg59	0.217	0.215	1.6	0.2	0.226	-5.6	-0.7	0.188	19.7	2.4
pcon59	0.034	0.037	-10	-2.02**	0.036	-7.4	-1.4	0.035	-3.8	-0.7
pfar59	0.104	0.108	-3.4	-0.61	0.109	-4.4	-0.7	0.182	-66.1	-7.4***
ptrf59	0.121	0.117	10.5	1.37	0.109	28.3	3.5***	0.101	48.3	6.4***
pdir59	0.077	0.092	-38.1	-7.44***	0.089	-32.4	-6.5***	0.076	1.5	0.3
pres59	0.064	0.058	4.3	0.6	0.062	1.7	0.2	0.061	2.4	0.3
pmil59	0.007	0.007	0	-0.01	0.009	-5.5	-1.6	0.007	1.3	0.5
pfed59	0.022	0.020	5.1	1.1	0.021	2.7	0.5	0.032	-25.1	-3.6***
pstl59	0.07	0.065	14.6	2.68**	0.067	8.2	1.3	0.084	-42.4	-4***
pwhl59	0.021	0.023	-11.3	-1.74*	0.023	-13.8	-2.1**	0.016	23.2	3.5***

As noted before a lower pseudo  $R^2$  and likelihood ratio test statistic will point towards the better fitted model, and the results in Figure 71 point towards the nearest neighbors matching and the kernel matching as the best fitting models.

Figure 71: Tests of fitting between matching procedures for full period matching

Procedure	Pseudo- $R^2$	LR $\chi^2$	Average Bias	Variables Significantly Different
Mahalanobis Distance	0.393	430.31	-2.107	10
Nearest Neighbors without replacement	0.229	251.22	-1.332	11
Kernel Matching	0.184	201.54	-2.854	19

Furthermore from Figure 72 we can see the target measure compared before treatment<sup>15</sup> and their averages are not significantly different from zero for the matched counties using the nearest neighbors matching procedure. These results indicate that the nearest neighbor matching procedure is the better algorithm for matching.

Figure 72: Comparison of objective variables before treatment between treatment and control counties and significance level for full period matching. Rates of growth of per capita income between 1962-1959 and 1965-1962. \* = 10% \*\* = 5% and \*\*\* = 1%

Procedure	Variable	Treated	Control	Difference	T-stat
Mahalanobis distance	PCI 1962-59	0.181	0.183	-1.400	-0.220
	PCI 1965-62	0.114	0.107	8.000	1.780*
Nearest Neighbors	PCI 1962-59	0.181	0.182	-0.800	-0.120
	PCI 1965-62	0.114	0.119	-5.000	-1.030
Kernel Matching	PCI 1962-59	0.181	0.149	37.200	4.380***
	PCI 1965-62	0.114	0.117	-3.700	-0.610

<sup>15</sup> The analysis before treatment can only be applied to per capita income, because we do not have employment available for periods before 1969.

Figure 73 plots the various counties that were deemed to be a good match (i.e. the control counties) for the counties that were contained in the ARC investment areas.

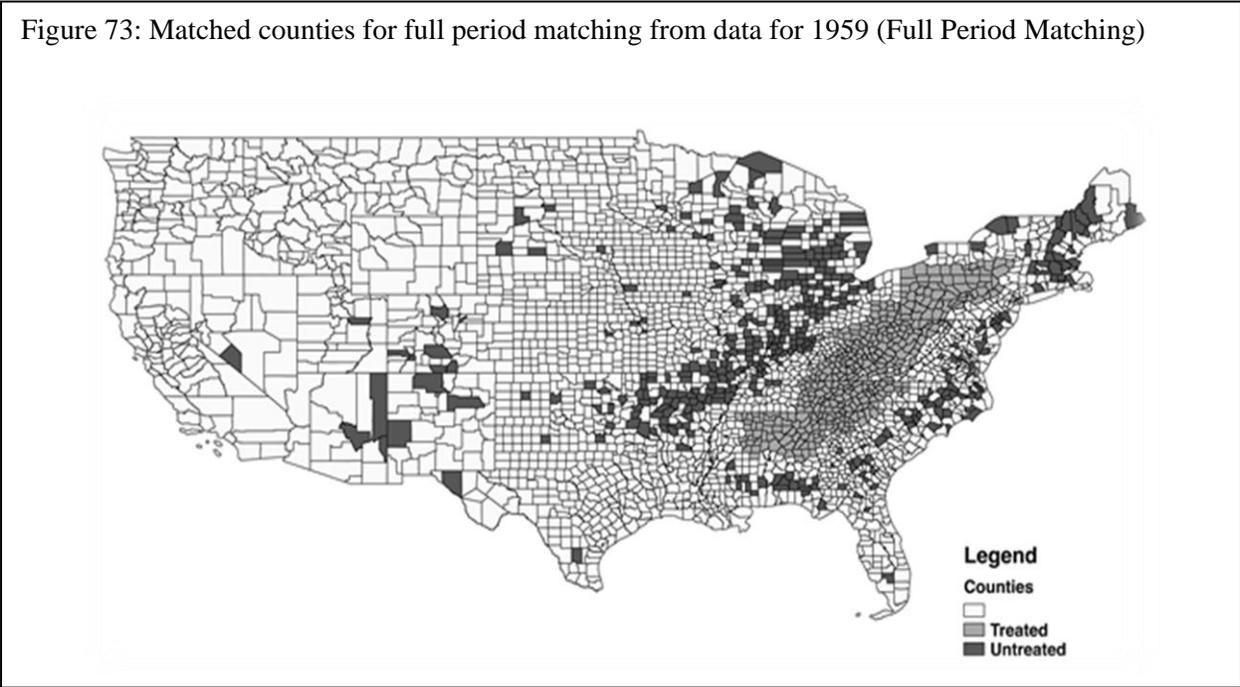


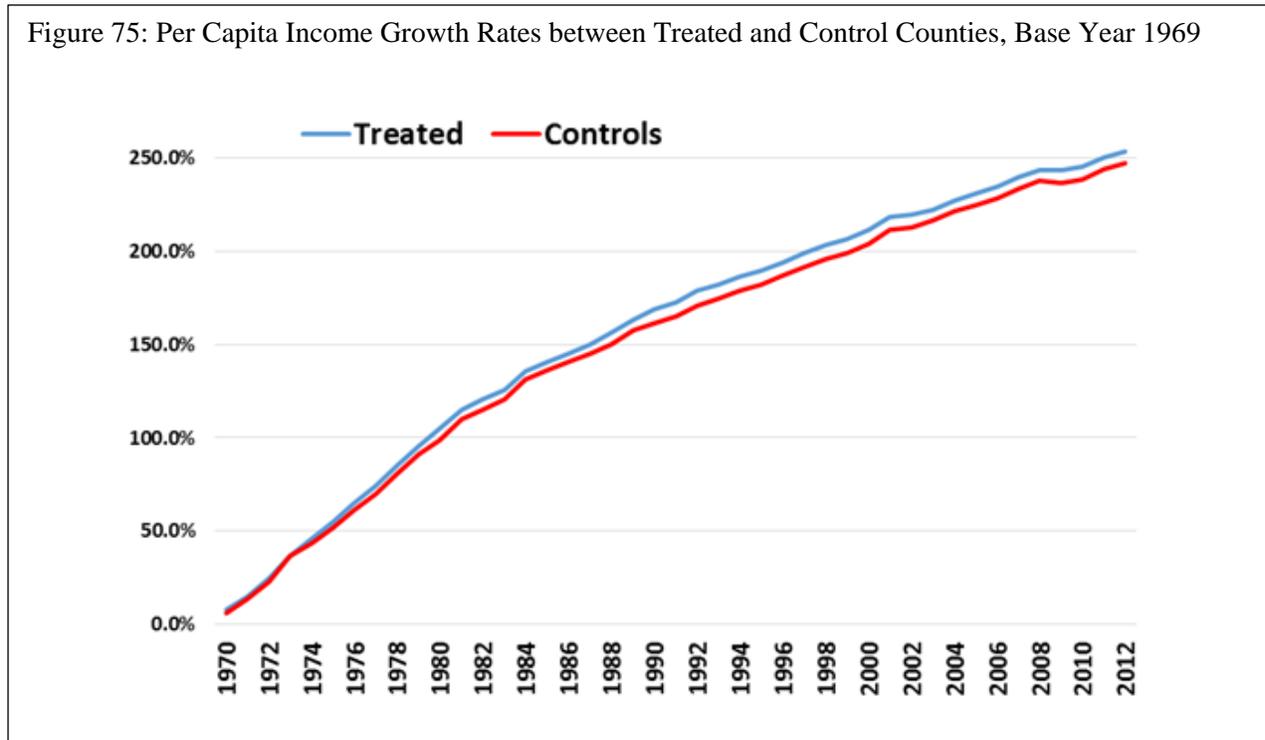
Figure 74 contains information regarding the results of the QEM analysis on per-capita income growth. The first column is the year, where the estimates correspond to each year reported (i.e. the growth rate from the original year to the year in question), followed by the growth rate in per-capita income for the treated counties, i.e. those that received ARC investment funds. The third column is the growth rate for the matched control counties, i.e. those that did not receive ARC investment funds, while the fourth column is the difference in the growth rate in per-capita income between the treated and control counties. The final column is the t-statistic which is a metric used to determine if the difference in the growth rate in per-capita income between the treated and control counties is statistically significant.

Figure 74: Per-Capita Income Growth Rate Results and significance levels for full period matching.

\* = 10% \*\* = 5% and \*\*\* = 1%

year	Per capita income Growth rate			
	Treated	Controls	Difference	T-stat
1970	7.9%	5.8%	2.0%	4.65***
1971	15.0%	13.4%	1.6%	3.36***
1972	24.7%	22.8%	1.9%	3.68***
1973	36.5%	36.4%	0.1%	0.09
1974	46.0%	43.8%	2.1%	3.22***
1975	54.6%	51.8%	2.9%	3.82***
1976	65.0%	61.4%	3.6%	4.93***
1977	74.1%	69.8%	4.4%	5.78***
1978	85.2%	80.6%	4.6%	5.78***
1979	95.8%	91.1%	4.7%	5.55***
1980	105.1%	99.0%	6.1%	7.21***
1981	114.8%	109.8%	5.0%	5.70***
1982	120.6%	115.0%	5.6%	6.35***
1983	125.4%	120.4%	5.0%	5.97***
1984	135.7%	131.3%	4.4%	5.29***
1985	140.9%	136.3%	4.5%	5.30***
1986	145.4%	140.6%	4.8%	5.58***
1987	150.1%	144.9%	5.2%	6.33***
1988	156.2%	150.4%	5.8%	6.71***
1989	163.4%	157.8%	5.6%	6.40***
1990	168.8%	161.6%	7.2%	8.09***
1991	172.7%	165.1%	7.7%	8.12***
1992	178.9%	170.9%	8.0%	8.35***
1993	182.1%	174.3%	7.8%	8.03***
1994	186.3%	179.1%	7.1%	7.24***
1995	189.6%	182.2%	7.3%	7.29***
1996	193.8%	186.9%	6.9%	6.73***
1997	198.7%	191.6%	7.1%	6.96***
1998	203.3%	195.9%	7.4%	7.25***
1999	206.5%	199.1%	7.4%	7.20***
2000	211.6%	204.2%	7.3%	7.07***
2001	218.1%	211.7%	6.4%	5.91***
2002	219.5%	212.7%	6.9%	6.42***
2003	222.1%	216.3%	5.9%	5.43***
2004	227.2%	221.4%	5.8%	5.15***
2005	230.7%	224.6%	6.2%	5.29***
2006	235.0%	228.6%	6.5%	5.47***
2007	239.4%	233.3%	6.2%	5.2***
2008	243.5%	237.8%	5.7%	4.65***
2009	243.3%	236.7%	6.7%	5.28***
2010	245.5%	238.7%	6.7%	5.36***
2011	250.1%	243.9%	6.2%	5.00***
2012	253.8%	247.5%	6.3%	5.00***
<b>Average</b>			<b>5.5%</b>	

These results are also illustrated in Figure 75 entitled “Per-Capita Income Growth Rates between Treated and Control Counties”.



Over most of the study period, counties that received ARC funding had higher per-capita income growth compared to the control counties that did not. Per-capita income growth rate in ARC counties grew an average of 5.5 percent over the entire study time period compared to the control counties. The differences in per-capita income growth between the treated and control counties are positive and statistically significant for nearly every year, meaning that it is unlikely that the growth in ARC counties are simply due to random chance. The only exception is in 1973, where there was no difference in per-capita income growth between the ARC counties and the comparison group. Historically speaking, 1973 was a year that was plagued by various economic evidence that these investments undertaken by the ARC led to higher growth in per-capita income over the time period 1970-2012.

Overall, these results paint a very positive picture for the counties that are located in Appalachia and provide evidence that these investments undertaken by the ARC led to higher growth in per-capita income over the time period 1970-2012.

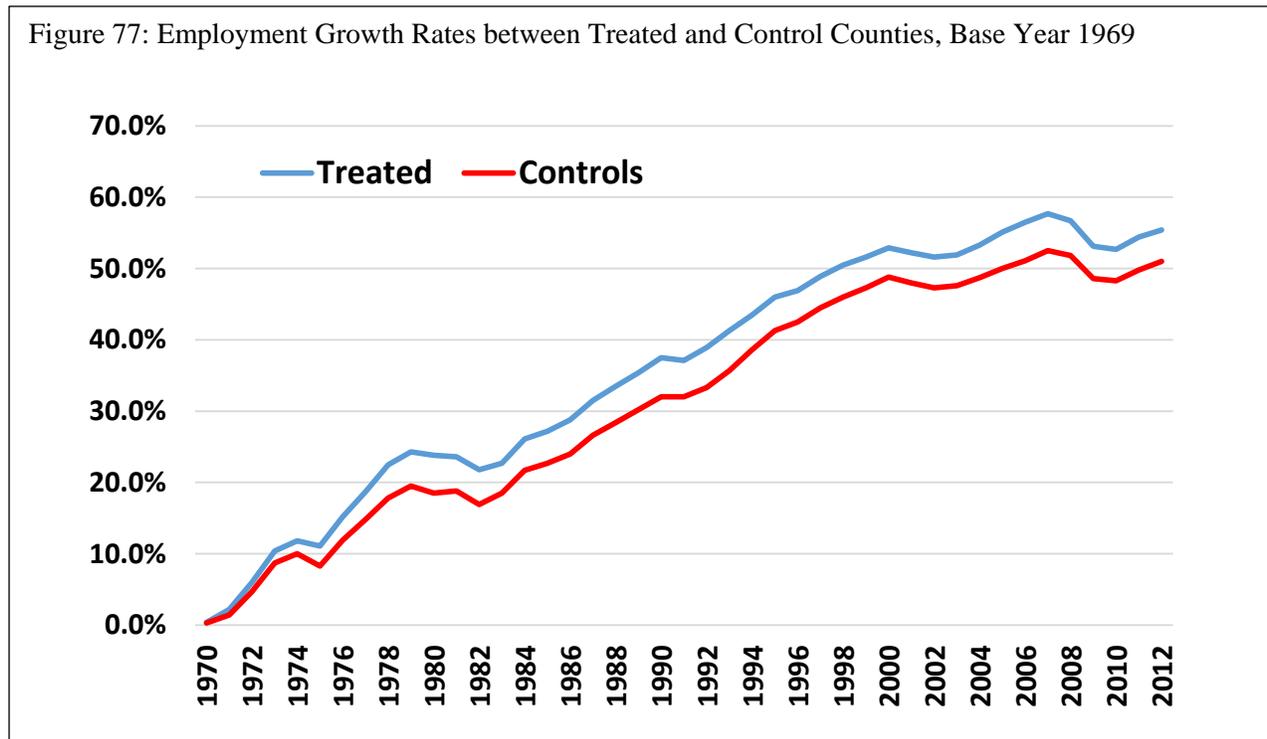
Employment growth is another important metric that can be used to measure the economic vitality of a region. Figure 76 contains information regarding the results of the QEM analysis regarding employment growth.

Figure 76: Employment Growth Rate Results and significance levels for full period matching.

\* = 10% \*\* = 5% and \*\*\* = 1%

year	Employment Growth Rate			
	Treated	Controls	Difference	T-stat
1970	0.4%	0.3%	0.1%	0.36
1971	2.2%	1.4%	0.5%	1.62
1972	6.0%	4.7%	1.3%	2.13**
1973	10.4%	8.7%	1.7%	2.36**
1974	11.8%	10.0%	1.8%	2.19**
1975	11.1%	8.3%	2.8%	3.03***
1976	15.2%	11.9%	3.3%	3.32***
1977	18.7%	14.8%	3.9%	3.58***
1978	22.5%	17.8%	4.6%	3.95***
1979	24.3%	19.5%	4.8%	3.88***
1980	23.8%	18.5%	5.3%	4.10***
1981	23.6%	18.8%	4.8%	3.50***
1982	21.8%	16.9%	4.9%	3.28***
1983	22.7%	18.5%	4.2%	2.67***
1984	26.1%	21.7%	4.3%	2.64***
1985	27.2%	22.7%	4.5%	2.62***
1986	28.8%	24.0%	4.8%	2.64***
1987	31.5%	26.6%	4.8%	2.54**
1988	33.5%	28.4%	5.1%	2.65***
1989	35.4%	30.2%	5.2%	2.61***
1990	37.5%	32.0%	5.5%	2.71***
1991	37.1%	32.0%	5.1%	2.45**
1992	38.9%	33.3%	5.6%	2.59***
1993	41.3%	35.7%	5.6%	2.53**
1994	43.5%	38.6%	4.9%	2.13**
1995	46.0%	41.3%	4.6%	1.96**
1996	46.9%	42.5%	4.4%	1.79*
1997	48.9%	44.5%	4.4%	1.75*
1998	50.5%	46.0%	4.5%	1.73*
1999	51.6%	47.3%	4.3%	1.61
2000	52.9%	48.8%	4.1%	1.48
2001	52.2%	48.0%	4.1%	1.45
2002	51.6%	47.3%	4.2%	1.46
2003	51.9%	47.6%	4.2%	1.43
2004	53.3%	48.7%	4.6%	1.52
2005	55.1%	50.0%	5.1%	1.62
2006	56.5%	51.1%	5.3%	1.68*
2007	57.7%	52.5%	5.3%	1.62
2008	56.7%	51.8%	4.9%	1.52
2009	53.1%	48.6%	4.5%	1.37
2010	52.7%	48.3%	4.4%	1.38
2011	54.4%	49.8%	4.6%	1.41
2012	55.4%	51.0%	4.4%	1.36
<b>Average</b>			<b>4.2%</b>	

Employment grew significantly faster in ARC counties compared to the control counties for most of the study period. The average difference in growth rates between the counties that obtained ARC investments and those matched counties that did not receive ARC investments was approximately 4.2 percent. This is shown in Figure 77, which shows that ARC counties had higher employment growth than the matched counties for nearly every year.



This gap narrowed after 1995, but the difference remained statistically significant at the 90 percent confidence threshold. The difference in employment growth was rather small and insignificant at first (1970 to about 1972), but the groups began to quickly diverge throughout most of the seventies and eighties. As mentioned earlier, the early seventies was an atypical period for the United States economy, and it is reasonable to expect that ARC investments would take some time to manifest themselves especially when it comes to employment growth.

Again, these findings strongly suggest that ARC investments had a positive influence on the employment prospects for residents of the region.

## Summary

In summary, using a well-established QEM technique, the research shows that employment growth and per-capita income growth over the period 1970-2012 were higher in Appalachian counties than in counties that did not receive ARC investments. On average, counties that received ARC investments experienced 4.2 percent higher employment growth and 5.5 percent higher per-capita income growth than the-counties that did not receive ARC funding. These results indicate the effectiveness of ARC investments for the Appalachian counties in the study.

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## Key Report Findings

Based on the analysis in this report, key findings emerge.

### **1. ARC represents a highly valued and active player in the Appalachian Region's economic development, supporting state and local partners in their efforts to transform their communities.**

Since 1965, ARC has made nearly 25,000 non-highway strategic investments in the Region. Working with federal, state, and local partners ARC has invested more than \$3.8 billion in these projects. These investments supported a variety of community and economic development initiatives, including basic infrastructure improvements, job creation initiatives, and leadership development. For every dollar in ARC funds, state and local partners were able to leverage an average of \$2.50 from other federal, state and local funds as well as \$6.40 in private sector investments.

In addition, more than \$9 billion has been obligated since 1965 for the Appalachian Development Highway System, which is now 89 percent complete or under construction. When finished, the 3,090-mile ADHS will connect almost every part of the Region to an interstate-quality highway and to the national Interstate Highway System.

### **2. ARC has had a significant and important impact on the Region's economic vitality.**

Over the past 50 years (with much higher appropriations in the earlier years of the program), ARC's \$3.8 billion in non-highway investments have resulted in nearly 312,000 direct, indirect, and induced jobs for the Region and \$10.5 billion (in constant 2013 dollars) in additional earnings. Between 2007 and 2013, ARC non-highway investments accounted for nearly 10,000 jobs and \$400 million in regional earnings. These impacts do not include the benefits accruing as a result of the investments that ARC has leveraged over the years.

Furthermore, our research demonstrates that counties receiving ARC investments grew at a slightly faster pace than similar counties that did not receive ARC investments. Using a rigorous quasi-experimental research method, our analysis suggests that ARC investments helped counties add employment at a 4.2 percent faster pace, and per-capita income at a 5.5 percent faster pace, than similar counties that did not receive ARC investments.

Moreover, leaders in the Region expressed consensus about the value of ARC's role as a catalyst in helping to make projects happen that might not otherwise have gone forward. In interviews with over 220 local, state, and federal stakeholders in every Appalachian state, ARC was praised for helping leaders respond to uniquely local problems and for its ability to leverage other

resources (by seeding new projects or providing the “last dollars” in) when projects did not fit neatly into other funding program models and might not have otherwise happened.<sup>16</sup>

### **3. ARC has made progress toward helping the Appalachian Region reach socioeconomic parity with the nation, but much work remains in moving some key indicators.**

ARC’s strategic plan has four major goals: (1) increasing job opportunities and per capita income in the Region; (2) strengthening the capacity of the people of Appalachia to compete in the global economy; (3) developing and improving the Region’s infrastructure; and (4) building the ADHS to reduce Appalachia’s isolation. On measures related to poverty, income disparity, unemployment, the industrial mix, and housing quality, the Region has improved significantly. For instance, as Figure 25 shows, there has been a dramatic reduction in the number of Appalachian counties where the share of the population living in poverty exceeds 150 percent of the national average. The number of high-poverty counties in the Region (those with poverty rates above 150 percent of the U.S. average) declined from 295 in 1960 to 107 for the period 2008–2012. The overall poverty rate for Appalachia is almost half that of 1960, dropping from over 30 percent to just under 17 percent.

### **4. ARC has not yet fully accomplished its mission of bringing the Region to parity with the rest of the nation on key socioeconomic indicators.**

The Region still lags in many key areas. The Region’s population growth is relatively stagnant, reflecting an economy that lags in terms of employment growth and educational attainment so that there are not enough high quality jobs to support its citizens.

Government transfer payments account for one-quarter of all personal income, a 41 percent higher rate than the rest of the nation. By comparison, the ratio was 17 percent after the 1981-82 recession, about 35 percent higher than the rest of the nation. Some, but certainly not all of this increase can be explained by the rise in citizens aged 65 and over now eligible for Social Security.

Furthermore, the Region’s citizens have relatively poorer health outcomes (in terms of mortality rates as well the prevalence of obesity and diabetes), reflecting changes in modern-day life that have reduced the quality of life for many residents. In addition, the Region remains relatively more isolated from the rest of the nation because the ADHS is not yet completed and, increasingly, because the Region lags the rest of the nation in access to affordable high-speed broadband service.

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<sup>16</sup> See *Appalachia Then and Now: Examining Changes to the Appalachian Region since 1965: State Meetings Report* for more details leading to these specific report findings.

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## Appalachia Moving Forward

The data from this research suggest that ARC has been a vital partner in the economic and community development progress achieved in the Appalachian Region. However, there is a continued need for investment to help Appalachia reach socioeconomic parity with the rest of the nation. Many questions remain about how best to address the challenges Appalachia faces today. How can leaders create a climate of entrepreneurship and opportunity so that local citizens can remain and contribute to Appalachia's future success? How can the Region compete and succeed in the global economy when it cannot always reach new markets? Few states or localities have the capacity to address these significant challenges without outside help. Addressing the Region's disparities will require continued local-state-federal partnerships and strategic investments that build opportunity for growth.

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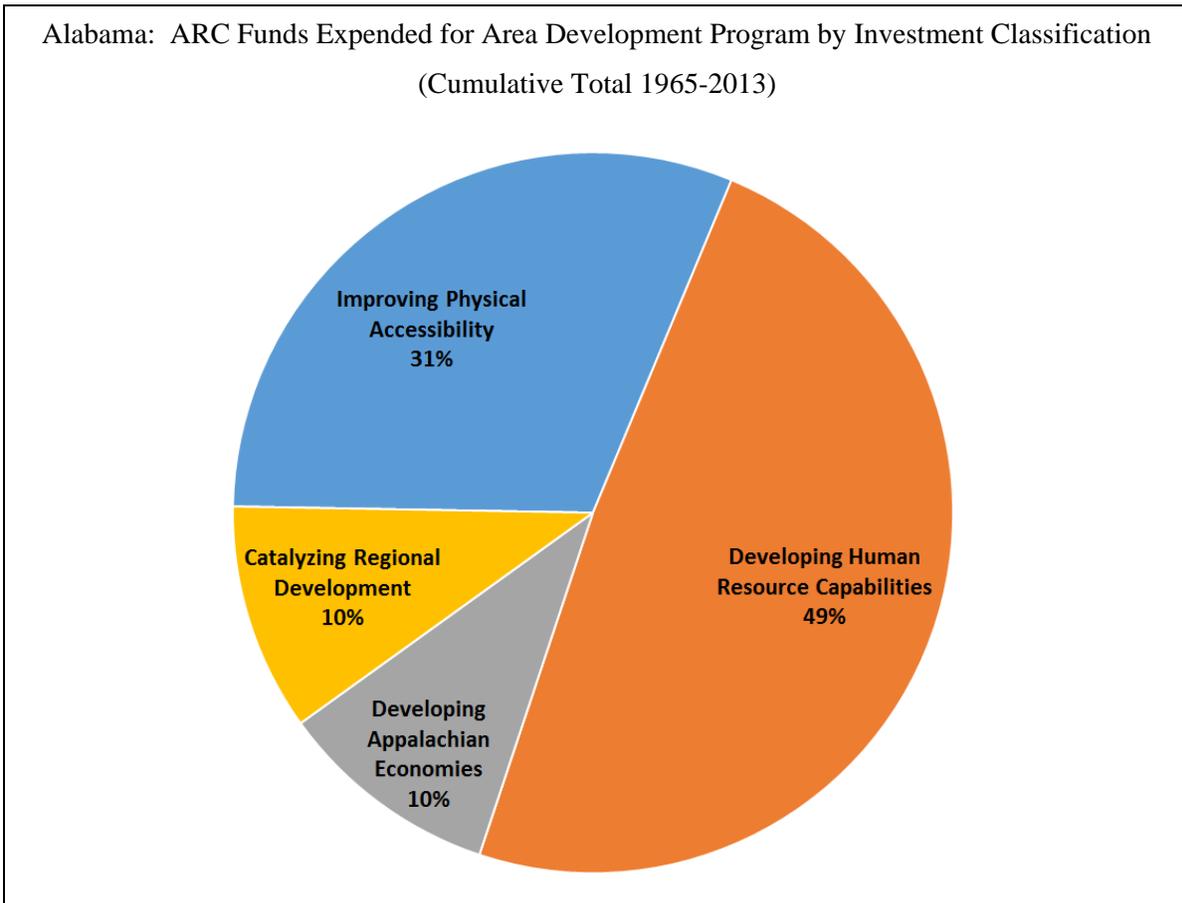
## Appendices

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## **Appendix A: Appalachian Region State Specific: Total Estimated Impacts**

### Alabama: Total Estimated Impacts

The production impacts for Alabama naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 531 jobs and \$16.5 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



Alabama: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	7,888	\$ 227,288	\$ 28.8	\$ 248.5	\$ 43.5
1972-1976	8,727	\$ 250,166	\$ 28.7	\$ 266.6	\$ 62.4
1977-1981	4,361	\$ 138,107	\$ 31.7	\$ 158.0	\$ 52.0
1982-1986	1,200	\$ 39,103	\$ 32.6	\$ 42.2	\$ 20.4
1987-1991	899	\$ 31,993	\$ 35.6	\$ 33.9	\$ 19.0
1992-1996	1,045	\$ 39,912	\$ 38.2	\$ 39.8	\$ 26.3
1997-2001	624	\$ 24,373	\$ 39.1	\$ 31.7	\$ 23.2
2002-2006	598	\$ 26,377	\$ 44.1	\$ 33.3	\$ 26.6
2007-2013	669	\$ 29,659	\$ 44.3	\$ 39.1	\$ 35.6
<b>Summary</b>	26,012	\$ 806,978	\$ 31.0	\$ 893.2	\$ 309.0

Detail of Employment Impacts

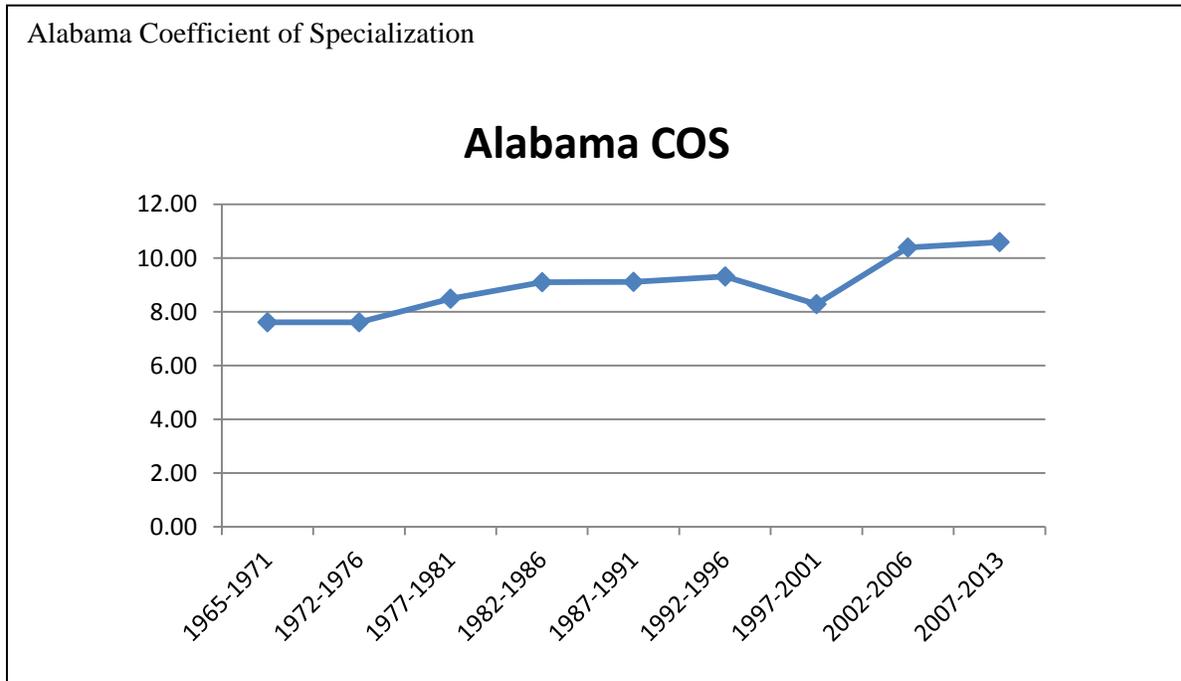
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	219	226	34	464	1,137	267	1,014	257	3,653	160	459	7,888
1972-1976	242	247	38	422	1,260	294	1,098	286	4,159	178	504	8,727
1977-1981	106	112	33	372	660	149	622	141	1,805	89	273	4,361
1982-1986	27	37	10	148	172	43	193	52	417	23	78	1,200
1987-1991	19	30	5	149	126	31	158	29	286	15	51	899
1992-1996	18	39	6	171	131	43	186	33	344	17	58	1,045
1997-2001	8	23	2	117	65	27	100	20	250	1	9	624
2002-2006	9	11	3	96	63	26	68	13	302	1	8	598
2007-2013	8	11	2	94	60	16	65	14	390	1	8	669
<b>All Years</b>	655	736	134	2,033	3,674	895	3,503	845	11,606	484	1,448	26,012

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$ 3.3	\$ 6.2	\$ 2.0	\$ 17.1	\$ 42.2	\$ 12.6	\$ 27.9	\$ 7.2	\$ 86.0	\$ 9.9	\$ 13.1	\$ 227.3
1972-1976	\$ 3.7	\$ 6.8	\$ 2.2	\$ 15.5	\$ 46.7	\$ 13.9	\$ 30.2	\$ 8.0	\$ 97.9	\$ 11.0	\$ 14.3	\$ 250.2
1977-1981	\$ 1.4	\$ 2.4	\$ 2.4	\$ 14.7	\$ 27.3	\$ 7.8	\$ 17.4	\$ 3.7	\$ 46.2	\$ 6.0	\$ 8.7	\$ 138.1
1982-1986	\$ 0.3	\$ 0.8	\$ 0.8	\$ 5.5	\$ 7.2	\$ 2.4	\$ 5.0	\$ 1.3	\$ 11.7	\$ 1.6	\$ 2.6	\$ 39.1
1987-1991	\$ 0.2	\$ 0.6	\$ 0.3	\$ 5.4	\$ 5.8	\$ 1.7	\$ 4.4	\$ 0.9	\$ 9.6	\$ 1.1	\$ 1.9	\$ 32.0
1992-1996	\$ 0.4	\$ 0.9	\$ 0.4	\$ 6.5	\$ 6.2	\$ 2.5	\$ 5.1	\$ 1.2	\$ 12.7	\$ 1.4	\$ 2.4	\$ 39.9
1997-2001	\$ 0.2	\$ 0.4	\$ 0.2	\$ 4.9	\$ 3.2	\$ 1.6	\$ 2.9	\$ 0.8	\$ 9.6	\$ 0.1	\$ 0.4	\$ 24.4
2002-2006	\$ 0.2	\$ 0.3	\$ 0.2	\$ 4.5	\$ 3.6	\$ 1.5	\$ 2.6	\$ 0.6	\$ 12.4	\$ 0.1	\$ 0.4	\$ 26.4
2007-2013	\$ 0.1	\$ 0.3	\$ 0.2	\$ 4.2	\$ 3.7	\$ 1.0	\$ 2.6	\$ 0.6	\$ 16.4	\$ 0.1	\$ 0.4	\$ 29.7
<b>All Years</b>	\$ 9.7	\$ 18.7	\$ 8.8	\$ 78.4	\$ 146.0	\$ 45.1	\$ 98.1	\$ 24.2	\$ 302.5	\$ 31.3	\$ 44.1	\$ 807.0

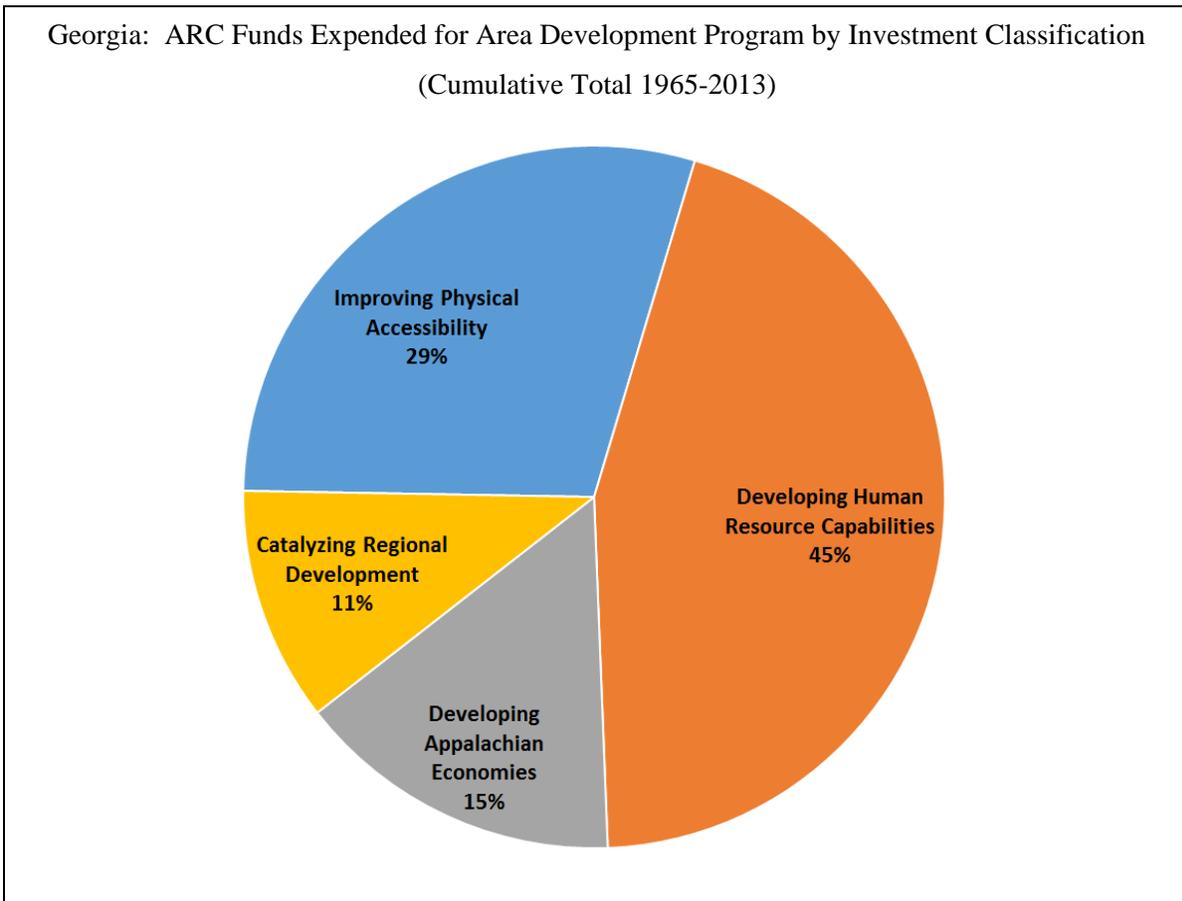
### Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of 0 to a maximum of 100. Alabama's COS values ranged from 7.61 in the first period to 10.60 in the latest period. This indicates the region is becoming more specialized.



## Georgia: Total Estimated Impacts

The production impacts for Georgia naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 386 jobs and \$10.7 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



Georgia: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	5,424	\$ 139,154	\$ 25.7	\$ 174.5	\$ 30.5
1972-1976	6,605	\$ 168,013	\$ 25.4	\$ 204.5	\$ 47.9
1977-1981	3,090	\$ 84,128	\$ 27.2	\$ 110.1	\$ 36.2
1982-1986	1,080	\$ 29,271	\$ 27.1	\$ 38.5	\$ 18.6
1987-1991	523	\$ 16,496	\$ 31.6	\$ 19.9	\$ 11.1
1992-1996	755	\$ 26,536	\$ 35.1	\$ 27.5	\$ 18.2
1997-2001	557	\$ 21,897	\$ 39.3	\$ 27.4	\$ 20.0
2002-2006	393	\$ 17,412	\$ 44.3	\$ 19.9	\$ 15.9
2007-2013	512	\$ 22,115	\$ 43.2	\$ 29.3	\$ 26.7
<b>Summary</b>	18,937	\$ 525,022	\$ 27.7	\$ 651.5	\$ 225.1

Detail of Employment Impacts

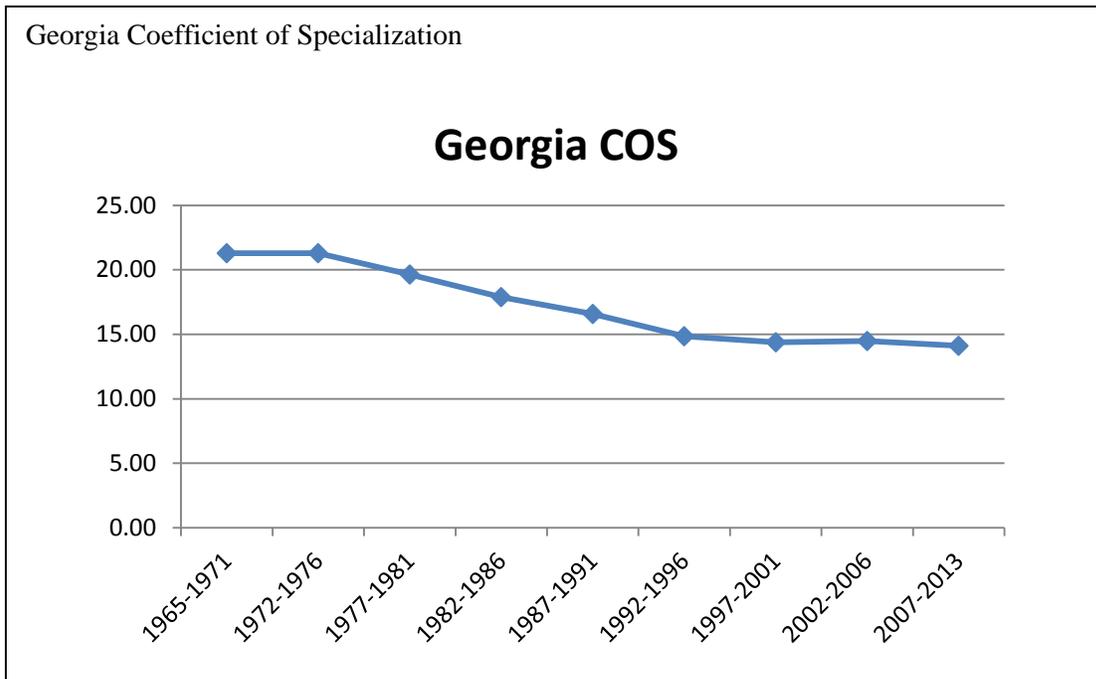
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	107	115	13	298	771	173	709	175	2,625	50	387	5,424
1972-1976	130	185	16	263	926	209	832	213	3,304	62	465	6,605
1977-1981	57	55	5	165	411	98	414	98	1,519	22	245	3,090
1982-1986	23	25	2	131	161	37	182	55	371	7	87	1,080
1987-1991	10	14	1	78	83	18	94	18	169	3	35	523
1992-1996	12	21	1	113	107	30	141	22	251	6	50	755
1997-2001	7	16	2	108	77	24	96	18	200	1	7	557
2002-2006	4	6	1	77	41	11	47	8	193	1	5	393
2007-2013	4	8	1	145	42	11	59	10	226	0	6	512
<b>All Years</b>	355	446	41	1,378	2,618	611	2,575	616	8,858	153	1,287	18,937

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$1.4	\$ 3.1	\$ 0.5	\$10.5	\$23.9	\$ 7.4	\$19.2	\$ 3.2	\$ 57.2	\$ 2.4	\$ 10.4	\$ 139.2
1972-1976	\$1.7	\$ 5.0	\$ 0.5	\$ 9.2	\$28.7	\$ 8.9	\$22.5	\$ 3.9	\$ 72.0	\$ 2.9	\$ 12.5	\$ 168.0
1977-1981	\$1.0	\$ 1.2	\$ 0.3	\$ 5.9	\$13.7	\$ 4.6	\$11.3	\$ 1.6	\$ 36.7	\$ 1.2	\$ 6.7	\$ 84.1
1982-1986	\$0.3	\$ 0.5	\$ 0.1	\$ 3.9	\$ 5.5	\$ 1.6	\$ 4.4	\$ 0.8	\$ 9.2	\$ 0.4	\$ 2.6	\$ 29.3
1987-1991	\$0.1	\$ 0.3	\$ 0.0	\$ 2.7	\$ 3.3	\$ 0.9	\$ 2.8	\$ 0.4	\$ 4.5	\$ 0.2	\$ 1.3	\$ 16.5
1992-1996	\$0.4	\$ 0.5	\$ 0.0	\$ 4.1	\$ 4.8	\$ 1.4	\$ 4.5	\$ 0.7	\$ 7.7	\$ 0.4	\$ 2.0	\$ 26.5
1997-2001	\$0.3	\$ 0.3	\$ 0.1	\$ 4.8	\$ 3.7	\$ 1.2	\$ 3.4	\$ 0.6	\$ 7.0	\$ 0.1	\$ 0.3	\$ 21.9
2002-2006	\$0.1	\$ 0.2	\$ 0.0	\$ 3.7	\$ 2.3	\$ 0.5	\$ 2.1	\$ 0.3	\$ 7.7	\$ 0.0	\$ 0.2	\$ 17.4
2007-2013	\$0.1	\$ 0.3	\$ 0.0	\$ 6.5	\$ 2.4	\$ 0.5	\$ 2.7	\$ 0.3	\$ 8.8	\$ 0.0	\$ 0.3	\$ 22.1
<b>All Years</b>	\$5.6	\$ 11.2	\$ 1.5	\$51.3	\$88.3	\$27.2	\$72.9	\$12.0	\$210.8	\$ 7.8	\$ 36.3	\$ 525.0

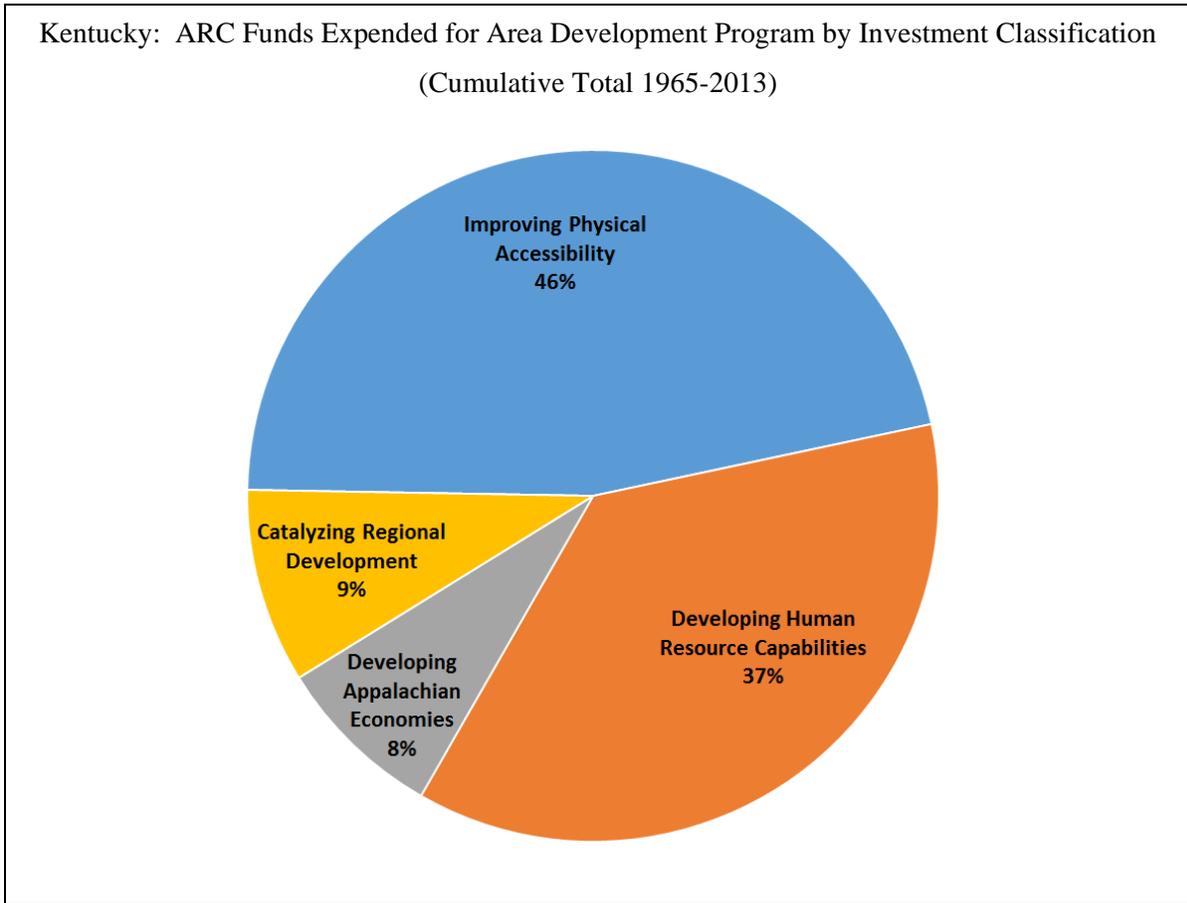
### Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. Georgia's COS values ranged from 21.29 in the first period to 14.10 in the latest period. This indicates the region is becoming more diversified.



## Kentucky: Total Estimated Impacts

The production impacts for Kentucky naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 613 jobs and \$17.2 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



Kentucky: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	8,838	\$ 227,833	\$ 25.8	\$ 271.8	\$ 47.6
1972-1976	8,293	\$ 216,991	\$ 26.2	\$ 254.3	\$ 59.5
1977-1981	4,268	\$ 127,015	\$ 29.8	\$ 162.6	\$ 53.5
1982-1986	1,676	\$ 50,961	\$ 30.4	\$ 61.3	\$ 29.6
1987-1991	1,400	\$ 43,611	\$ 31.2	\$ 50.8	\$ 28.5
1992-1996	1,628	\$ 49,796	\$ 30.6	\$ 57.6	\$ 38.1
1997-2001	1,344	\$ 41,545	\$ 30.9	\$ 66.1	\$ 48.4
2002-2006	1,108	\$ 38,498	\$ 34.8	\$ 58.4	\$ 46.6
2007-2013	1,477	\$ 46,039	\$ 31.2	\$ 83.6	\$ 76.2
<b>Summary</b>	30,032	\$ 842,289	\$ 28.0	\$ 1,066.6	\$ 427.9

Detail of Employment Impacts

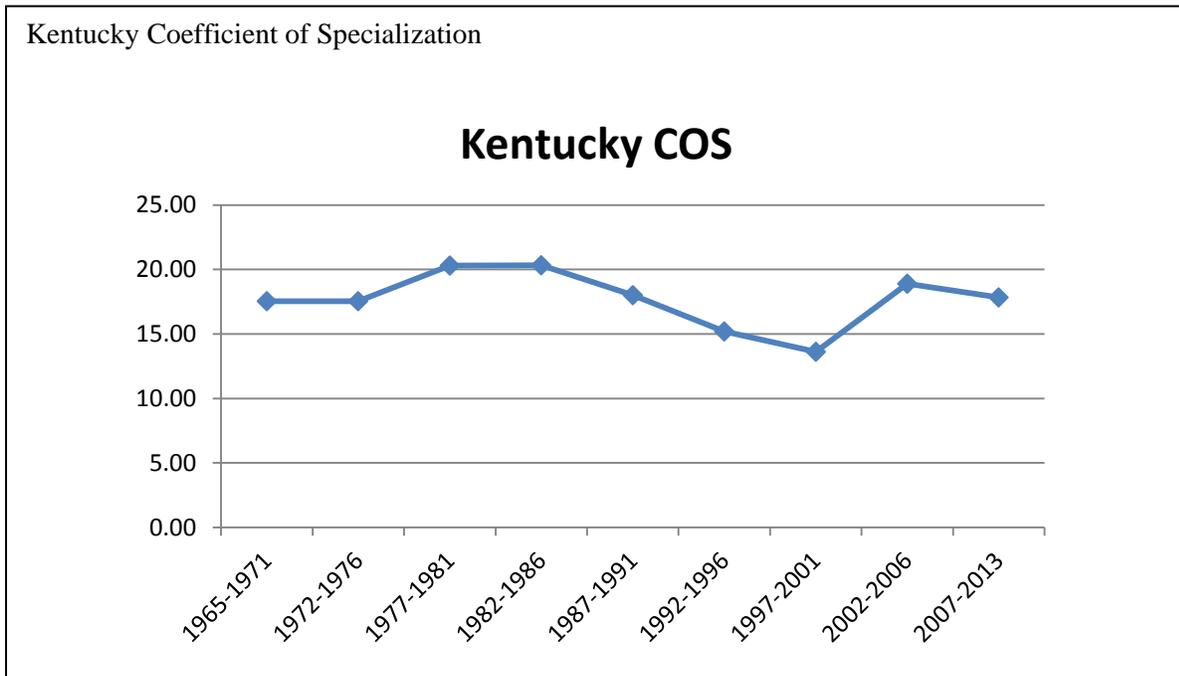
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	262	247	79	154	1,182	346	997	298	4,607	166	502	8,838
1972-1976	250	244	66	348	1,126	320	989	286	4,033	152	478	8,293
1977-1981	114	117	86	530	612	162	640	158	1,537	59	253	4,268
1982-1986	43	53	30	240	234	63	279	53	559	23	99	1,676
1987-1991	35	48	20	201	188	48	232	51	475	19	82	1,400
1992-1996	35	61	17	234	207	65	280	53	548	22	106	1,628
1997-2001	25	52	11	383	162	48	234	44	362	2	21	1,344
2002-2006	20	29	12	317	110	37	136	22	408	2	17	1,108
2007-2013	20	33	14	360	120	37	153	29	688	1	21	1,477
<b>All Years</b>	802	884	335	2,767	3,938	1,126	3,940	996	13,217	447	1,581	30,032

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$ 4.4	\$ 7.8	\$ 4.0	\$ 5.6	\$ 39.1	\$ 15.6	\$ 25.3	\$ 5.7	\$ 98.8	\$ 7.5	\$ 14.1	\$ 227.8
1972-1976	\$ 4.2	\$ 7.7	\$ 3.3	\$ 12.7	\$ 37.2	\$ 14.5	\$ 25.1	\$ 5.5	\$ 86.5	\$ 6.9	\$ 13.4	\$ 217.0
1977-1981	\$ 1.2	\$ 2.6	\$ 6.6	\$ 19.0	\$ 23.6	\$ 7.8	\$ 16.5	\$ 3.6	\$ 35.2	\$ 3.1	\$ 7.7	\$ 127.0
1982-1986	\$ 0.5	\$ 1.1	\$ 2.1	\$ 9.3	\$ 9.7	\$ 3.0	\$ 6.8	\$ 1.1	\$ 13.1	\$ 1.2	\$ 3.1	\$ 51.0
1987-1991	\$ 0.2	\$ 0.7	\$ 1.1	\$ 8.9	\$ 8.3	\$ 2.4	\$ 5.5	\$ 1.1	\$ 11.6	\$ 1.1	\$ 2.8	\$ 43.6
1992-1996	\$ 0.3	\$ 0.9	\$ 1.2	\$ 7.5	\$ 8.6	\$ 3.2	\$ 6.3	\$ 1.3	\$ 14.8	\$ 1.5	\$ 4.2	\$ 49.8
1997-2001	\$ 0.2	\$ 1.2	\$ 0.8	\$ 12.2	\$ 6.5	\$ 2.2	\$ 5.5	\$ 1.2	\$ 10.8	\$ 0.2	\$ 0.8	\$ 41.5
2002-2006	\$ 0.0	\$ 0.4	\$ 0.6	\$ 12.0	\$ 5.5	\$ 1.6	\$ 4.0	\$ 0.9	\$ 12.7	\$ 0.1	\$ 0.7	\$ 38.5
2007-2013	\$ 0.0	\$ 0.6	\$ 0.8	\$ 11.7	\$ 5.8	\$ 1.7	\$ 4.3	\$ 0.9	\$ 19.1	\$ 0.1	\$ 0.9	\$ 46.0
<b>All Years</b>	\$ 11.0	\$ 23.0	\$ 20.6	\$ 98.9	\$ 144.2	\$ 51.9	\$ 99.4	\$ 21.4	\$ 302.7	\$ 21.6	\$ 47.7	\$ 842.3

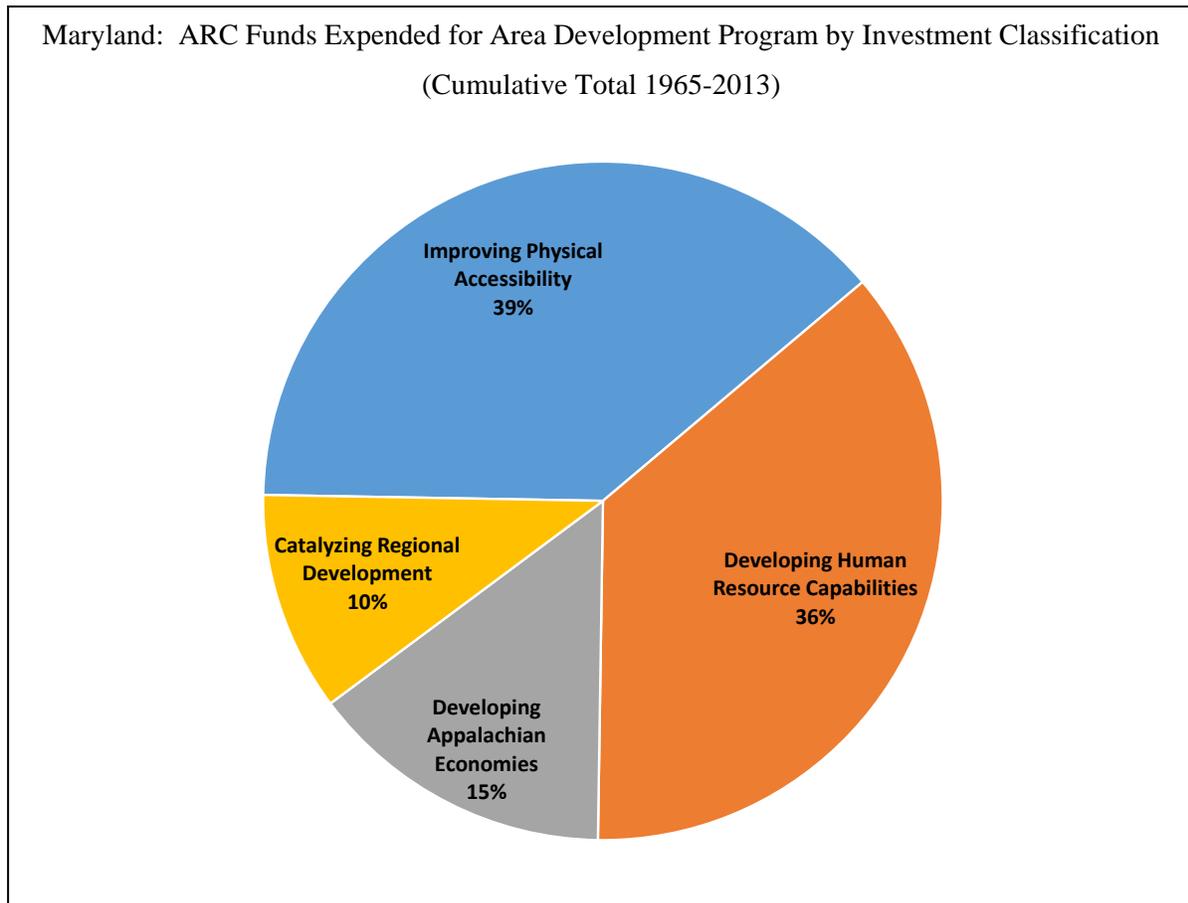
### Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. Kentucky's COS was 17.55 in 1965, increased over the subsequent 3 periods, then declined steadily for three periods, and finally rose to a value of 17.83 in the most recent period.



## Maryland: Total Estimated Impacts

The production impacts for Maryland naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 218 jobs and \$7.04 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



Maryland: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	2,697	\$ 82,382	\$ 30.5	\$ 85.3	\$ 14.9
1972-1976	3,702	\$ 115,754	\$ 31.3	\$ 119.5	\$ 28.0
1977-1981	2,149	\$ 70,655	\$ 32.9	\$ 75.3	\$ 24.8
1982-1986	456	\$ 15,314	\$ 33.6	\$ 16.2	\$ 7.8
1987-1991	295	\$ 10,270	\$ 34.8	\$ 11.7	\$ 6.6
1992-1996	531	\$ 18,265	\$ 34.4	\$ 18.3	\$ 12.1
1997-2001	289	\$ 10,181	\$ 35.3	\$ 15.0	\$ 11.0
2002-2006	266	\$ 10,863	\$ 40.8	\$ 14.0	\$ 11.2
2007-2013	275	\$ 11,391	\$ 41.4	\$ 16.4	\$ 14.9
<b>Summary</b>	10,660	\$ 345,074	\$ 32.4	\$ 371.8	\$ 131.3

Detail of Employment Impacts

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	47	76	9	169	385	119	371	89	1,239	39	155	2,697
1972-1976	68	107	13	305	565	171	535	121	1,546	52	218	3,702
1977-1981	36	53	13	167	286	89	313	76	946	33	138	2,149
1982-1986	11	14	5	67	77	21	85	24	115	6	30	456
1987-1991	7	10	2	42	42	12	53	22	83	5	18	295
1992-1996	11	20	3	65	69	26	97	16	186	7	31	531
1997-2001	4	11	2	53	33	14	49	15	104	1	4	289
2002-2006	4	7	1	61	25	12	33	6	116	0	3	266
2007-2013	4	6	1	65	23	9	32	6	125	0	3	275
<b>All Years</b>	191	303	48	995	1,506	473	1,567	374	4,459	143	600	10,660

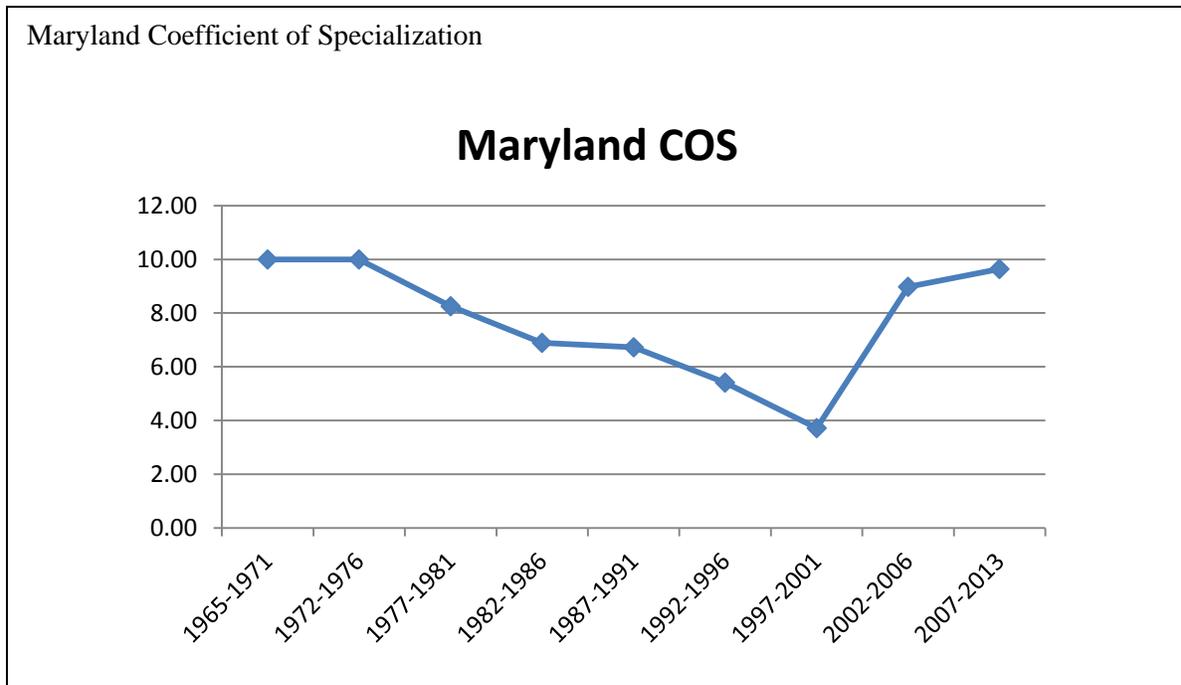
Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$ 1.2	\$ 1.9	\$ 0.4	\$ 7.1	\$ 18.2	\$ 6.2	\$ 10.1	\$ 1.8	\$ 28.5	\$ 2.2	\$ 4.9	\$ 82.4
1972-1976	\$ 1.7	\$ 2.6	\$ 0.6	\$ 12.8	\$ 26.7	\$ 8.9	\$ 14.6	\$ 2.4	\$ 35.6	\$ 2.9	\$ 6.9	\$ 115.8
1977-1981	\$ 0.5	\$ 1.1	\$ 1.4	\$ 6.6	\$ 15.1	\$ 5.1	\$ 8.1	\$ 1.7	\$ 24.1	\$ 2.2	\$ 4.9	\$ 70.7
1982-1986	\$ 0.1	\$ 0.3	\$ 0.4	\$ 2.5	\$ 4.1	\$ 1.1	\$ 2.1	\$ 0.5	\$ 2.9	\$ 0.4	\$ 1.1	\$ 15.3
1987-1991	\$ 0.1	\$ 0.2	\$ 0.1	\$ 1.7	\$ 2.3	\$ 0.7	\$ 1.3	\$ 0.4	\$ 2.2	\$ 0.3	\$ 0.8	\$ 10.3
1992-1996	\$ 0.2	\$ 0.1	\$ 0.3	\$ 2.5	\$ 3.5	\$ 1.2	\$ 2.4	\$ 0.4	\$ 5.7	\$ 0.5	\$ 1.5	\$ 18.3
1997-2001	\$ 0.0	\$ 0.2	\$ 0.1	\$ 2.2	\$ 1.8	\$ 0.7	\$ 1.2	\$ 0.5	\$ 3.3	\$ 0.0	\$ 0.2	\$ 10.2
2002-2006	\$ 0.0	\$ 0.3	\$ 0.1	\$ 2.8	\$ 1.4	\$ 0.6	\$ 1.0	\$ 0.2	\$ 4.1	\$ 0.0	\$ 0.2	\$ 10.9
2007-2003	\$ 0.1	\$ 0.2	\$ 0.1	\$ 3.0	\$ 1.5	\$ 0.5	\$ 1.0	\$ 0.2	\$ 4.7	\$ 0.0	\$ 0.2	\$ 11.4
<b>All Years</b>	\$ 3.9	\$ 6.9	\$ 3.3	\$ 41.2	\$ 74.6	\$ 25.0	\$ 41.8	\$ 8.2	\$ 111.2	\$ 8.5	\$ 20.6	\$ 345.1

### Coefficient of Specialization

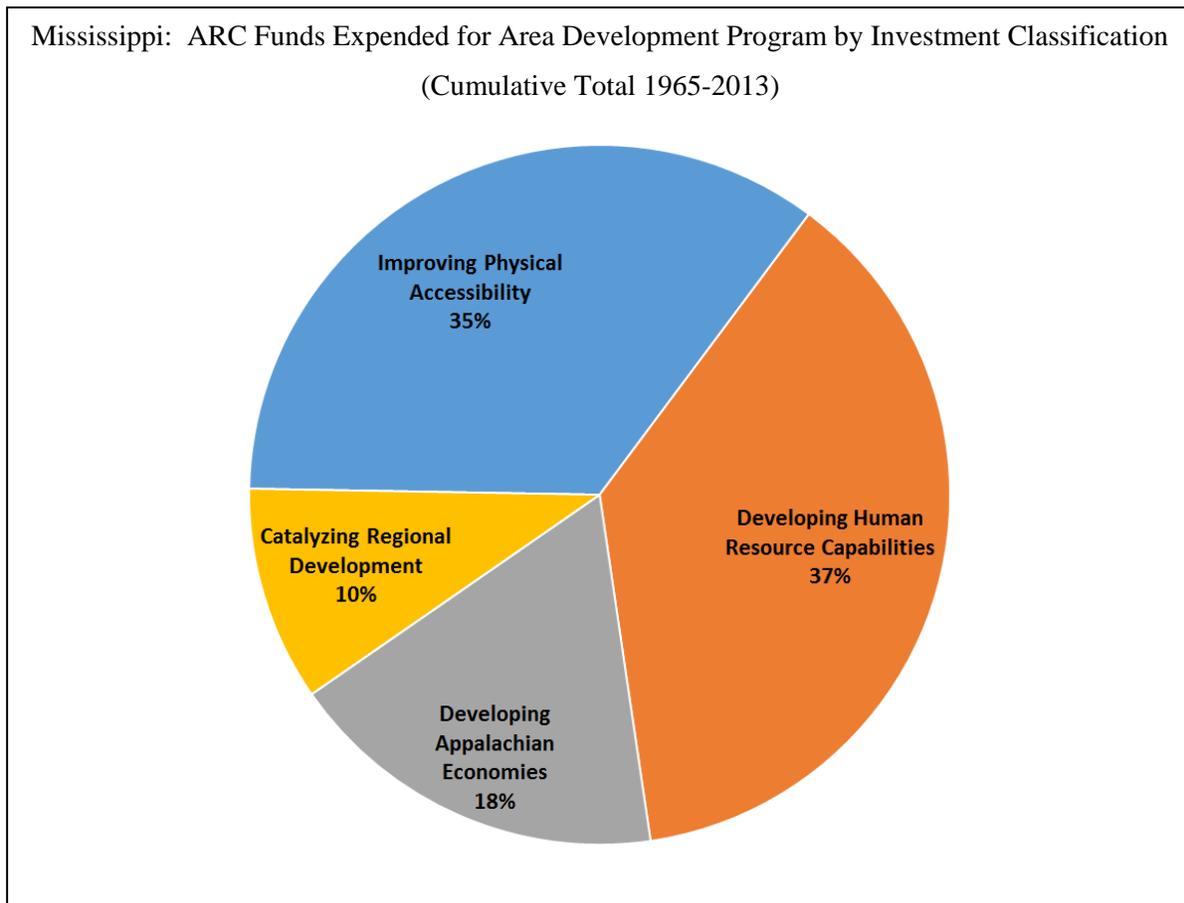
The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution.

Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. Maryland's COS was 9.99 in 1965, decreased over the subsequent 6 periods, then increased to a value of 9.64 in the most recent period.



## Mississippi: Total Estimated Impacts

The production impacts for Mississippi naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 308 jobs and \$7.8 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



Mississippi: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	2,209	\$ 50,001	\$ 22.6	\$ 73.3	\$ 12.8
1972-1976	5,325	\$ 116,500	\$ 21.9	\$ 163.7	\$ 38.3
1977-1981	3,150	\$ 78,626	\$ 25.0	\$ 112.8	\$ 37.1
1982-1986	1,051	\$ 26,791	\$ 25.5	\$ 35.1	\$ 17.0
1987-1991	611	\$ 16,875	\$ 27.6	\$ 22.8	\$ 12.8
1992-1996	641	\$ 19,366	\$ 30.2	\$ 23.8	\$ 15.7
1997-2001	636	\$ 20,656	\$ 32.5	\$ 31.1	\$ 22.8
2002-2006	624	\$ 22,112	\$ 35.4	\$ 32.4	\$ 25.9
2007-2013	834	\$ 29,784	\$ 35.7	\$ 47.8	\$ 43.6
<b>Summary</b>	15,081	\$ 380,712	\$ 25.2	\$ 542.9	\$ 226.0

Detail of Employment Impacts

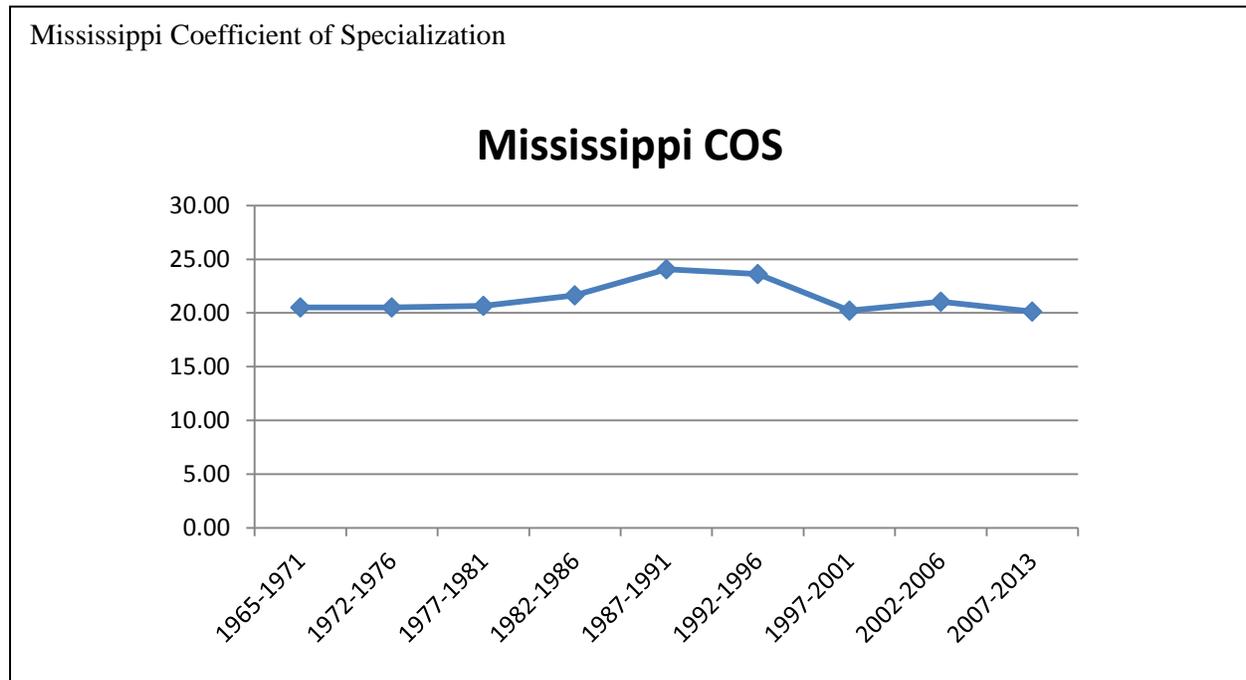
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	66	33	3	174	335	67	293	72	968	34	163	2,209
1972-1976	148	96	6	215	726	155	641	175	2,702	86	375	5,325
1977-1981	78	83	3	245	455	90	432	102	1,380	41	241	3,150
1982-1986	27	72	1	112	149	30	163	39	364	17	77	1,051
1987-1991	16	12	1	79	100	19	104	20	208	9	44	611
1992-1996	14	13	1	86	93	20	113	26	224	9	43	641
1997-2001	13	13	1	170	92	26	115	20	175	1	10	636
2002-2006	12	10	3	146	70	25	76	13	257	1	10	624
2007-2013	14	13	5	208	92	25	96	17	350	1	12	834
<b>All Years</b>	386	346	24	1,434	2,113	457	2,032	485	6,628	199	975	15,081

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$ 1.3	\$ 1.0	\$ 0.1	\$ 5.3	\$ 9.2	\$ 2.7	\$ 6.9	\$ 1.4	\$ 16.7	\$ 1.6	\$ 3.9	\$ 50.0
1972-1976	\$ 3.0	\$ 2.7	\$ 0.2	\$ 6.6	\$ 19.8	\$ 6.2	\$ 15.1	\$ 3.5	\$ 46.5	\$ 3.9	\$ 9.0	\$ 116.5
1977-1981	\$ 1.3	\$ 2.2	\$ 0.2	\$ 8.1	\$ 13.5	\$ 3.8	\$ 10.3	\$ 2.1	\$ 28.8	\$ 2.1	\$ 6.3	\$ 78.6
1982-1986	\$ 0.2	\$ 1.5	\$ 0.1	\$ 3.6	\$ 4.6	\$ 1.2	\$ 3.5	\$ 0.7	\$ 8.3	\$ 0.9	\$ 2.1	\$ 26.8
1987-1991	\$ 0.1	\$ 0.2	\$ 0.0	\$ 2.4	\$ 3.6	\$ 0.7	\$ 2.4	\$ 0.4	\$ 5.2	\$ 0.5	\$ 1.4	\$ 16.9
1992-1996	\$ 0.2	\$ 0.3	\$ 0.0	\$ 3.0	\$ 3.5	\$ 0.9	\$ 2.7	\$ 0.6	\$ 6.1	\$ 0.6	\$ 1.4	\$ 19.4
1997-2001	\$ 0.1	\$ 0.2	\$ 0.0	\$ 6.0	\$ 3.7	\$ 1.2	\$ 2.9	\$ 0.5	\$ 5.4	\$ 0.1	\$ 0.4	\$ 20.7
2002-2006	\$ 0.1	\$ 0.4	\$ 0.1	\$ 5.2	\$ 3.3	\$ 1.2	\$ 2.4	\$ 0.4	\$ 8.5	\$ 0.1	\$ 0.4	\$ 22.1
2007-2013	\$ 0.2	\$ 0.5	\$ 0.2	\$ 7.5	\$ 4.6	\$ 1.2	\$ 3.2	\$ 0.5	\$ 11.2	\$ 0.1	\$ 0.6	\$ 29.8
<b>All Years</b>	\$ 6.5	\$ 9.1	\$ 0.9	\$ 47.6	\$ 65.9	\$ 19.1	\$ 49.4	\$ 10.2	\$ 136.7	\$ 9.8	\$ 25.4	\$ 380.7

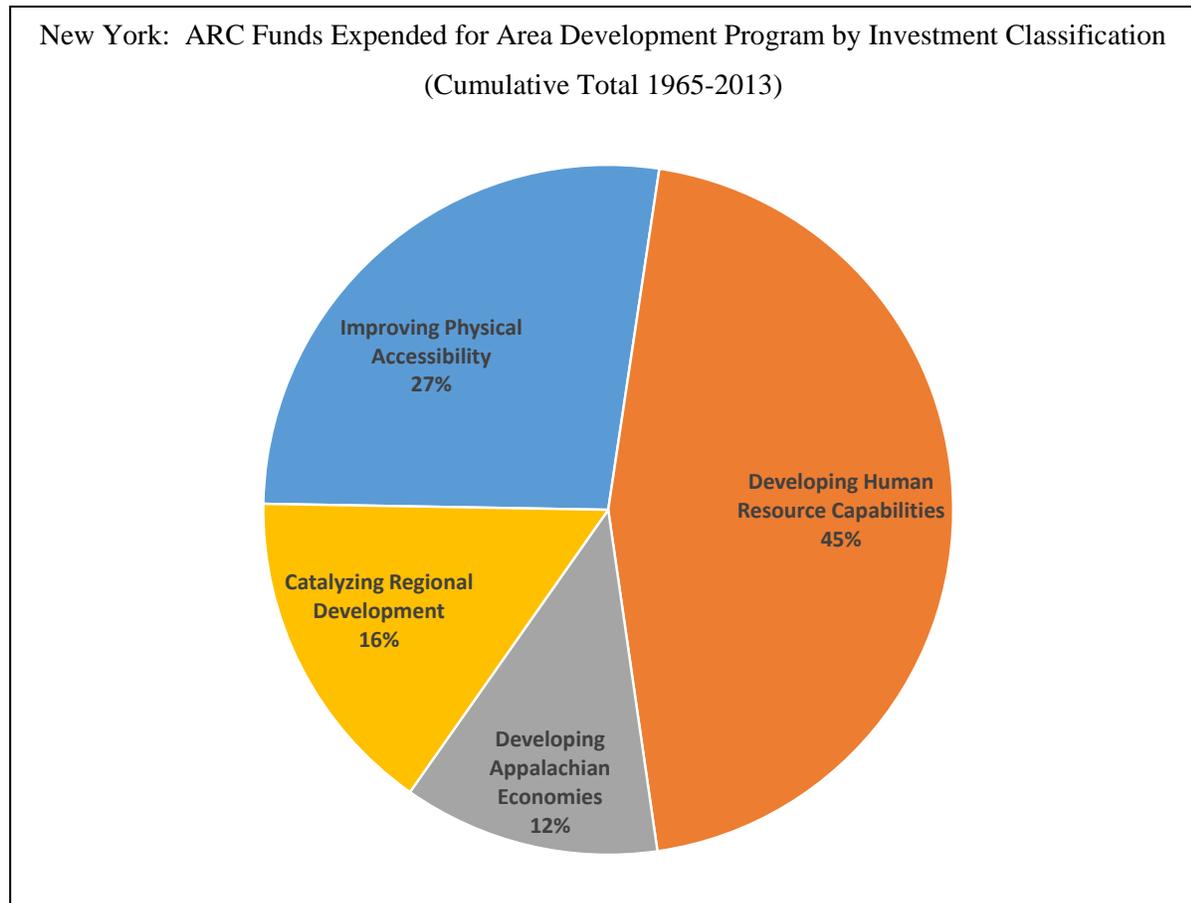
### Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. Mississippi's COS was 20.50 in 1965, increased over the subsequent 4 periods, then declined to a value of 20.13 in the most recent period.



## New York: Total Estimated Impacts

The production impacts for New York naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 332 jobs and \$10.7 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



New York: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	3,825	\$ 122,422	\$ 32.0	\$ 114.3	\$ 20.0
1972-1976	5,429	\$ 172,195	\$ 31.7	\$ 164.6	\$ 38.5
1977-1981	3,569	\$ 111,918	\$ 31.4	\$ 129.7	\$ 42.7
1982-1986	915	\$ 28,475	\$ 31.1	\$ 31.4	\$ 15.1
1987-1991	624	\$ 21,111	\$ 33.8	\$ 20.9	\$ 11.7
1992-1996	645	\$ 23,031	\$ 35.7	\$ 21.6	\$ 14.3
1997-2001	472	\$ 17,080	\$ 36.2	\$ 23.1	\$ 16.9
2002-2006	360	\$ 13,727	\$ 38.1	\$ 17.0	\$ 13.6
2007-2013	419	\$ 16,268	\$ 38.8	\$ 21.5	\$ 19.6
<b>Summary</b>	16,259	\$ 526,228	\$ 32.4	\$ 544.0	\$ 192.4

Detail of Employment Impacts

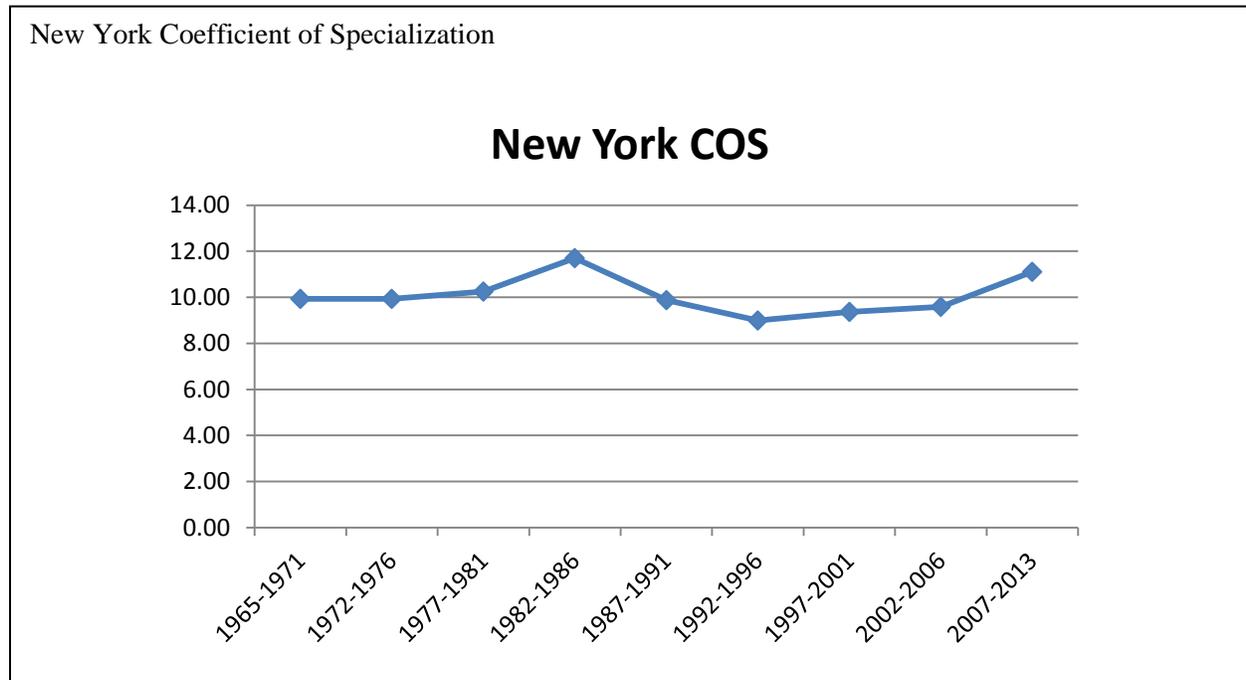
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	88	92	7	171	533	156	444	123	1,812	38	360	3,825
1972-1976	117	129	9	161	693	274	603	176	2,693	55	518	5,429
1977-1981	74	79	7	267	467	150	458	200	1,496	32	340	3,569
1982-1986	20	24	3	58	127	33	127	58	373	8	85	915
1987-1991	12	19	1	37	69	22	85	27	293	5	53	624
1992-1996	12	28	1	32	71	29	92	20	301	6	54	645
1997-2001	7	16	1	55	54	23	69	17	218	1	9	472
2002-2006	5	7	1	35	32	12	35	7	218	1	6	360
2007-2013	5	9	1	42	31	13	36	9	265	0	7	419
<b>All Years</b>	340	403	33	860	2,078	713	1,949	637	7,669	146	1,432	16,259

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$ 1.9	\$ 2.4	\$ 0.3	\$ 8.2	\$ 24.4	\$ 8.2	\$ 11.9	\$ 2.0	\$ 47.2	\$ 2.0	\$ 14.0	\$ 122.4
1972-1976	\$ 2.5	\$ 3.3	\$ 0.4	\$ 7.7	\$ 31.7	\$ 14.3	\$ 16.1	\$ 2.9	\$ 70.2	\$ 2.8	\$ 20.2	\$ 172.2
1977-1981	\$ 0.6	\$ 1.5	\$ 0.5	\$ 10.7	\$ 22.7	\$ 8.3	\$ 11.3	\$ 3.1	\$ 37.8	\$ 1.9	\$ 13.4	\$ 111.9
1982-1986	\$ 0.2	\$ 0.6	\$ 0.2	\$ 2.1	\$ 6.5	\$ 1.8	\$ 2.9	\$ 1.0	\$ 9.5	\$ 0.5	\$ 3.3	\$ 28.5
1987-1991	\$ 0.2	\$ 0.4	\$ 0.1	\$ 1.5	\$ 3.9	\$ 1.3	\$ 2.0	\$ 0.7	\$ 8.3	\$ 0.3	\$ 2.3	\$ 21.1
1992-1996	\$ 0.2	\$ 0.6	\$ 0.0	\$ 1.2	\$ 4.3	\$ 1.5	\$ 2.2	\$ 0.6	\$ 9.4	\$ 0.4	\$ 2.6	\$ 23.0
1997-2001	\$ 0.0	\$ 0.4	\$ 0.1	\$ 2.1	\$ 3.2	\$ 1.3	\$ 1.7	\$ 0.6	\$ 7.3	\$ 0.1	\$ 0.4	\$ 17.1
2002-2006	\$ 0.0	\$ 0.2	\$ 0.1	\$ 1.5	\$ 2.1	\$ 0.6	\$ 1.0	\$ 0.2	\$ 7.6	\$ 0.0	\$ 0.3	\$ 13.7
2007-2013	\$ 0.1	\$ 0.2	\$ 0.1	\$ 1.7	\$ 2.1	\$ 0.6	\$ 1.0	\$ 0.3	\$ 9.8	\$ 0.0	\$ 0.4	\$ 16.3
<b>All Years</b>	\$ 5.8	\$ 9.6	\$ 1.7	\$ 36.8	\$ 100.8	\$ 38.0	\$ 50.1	\$ 11.5	\$ 207.0	\$ 8.2	\$ 56.9	\$ 526.2

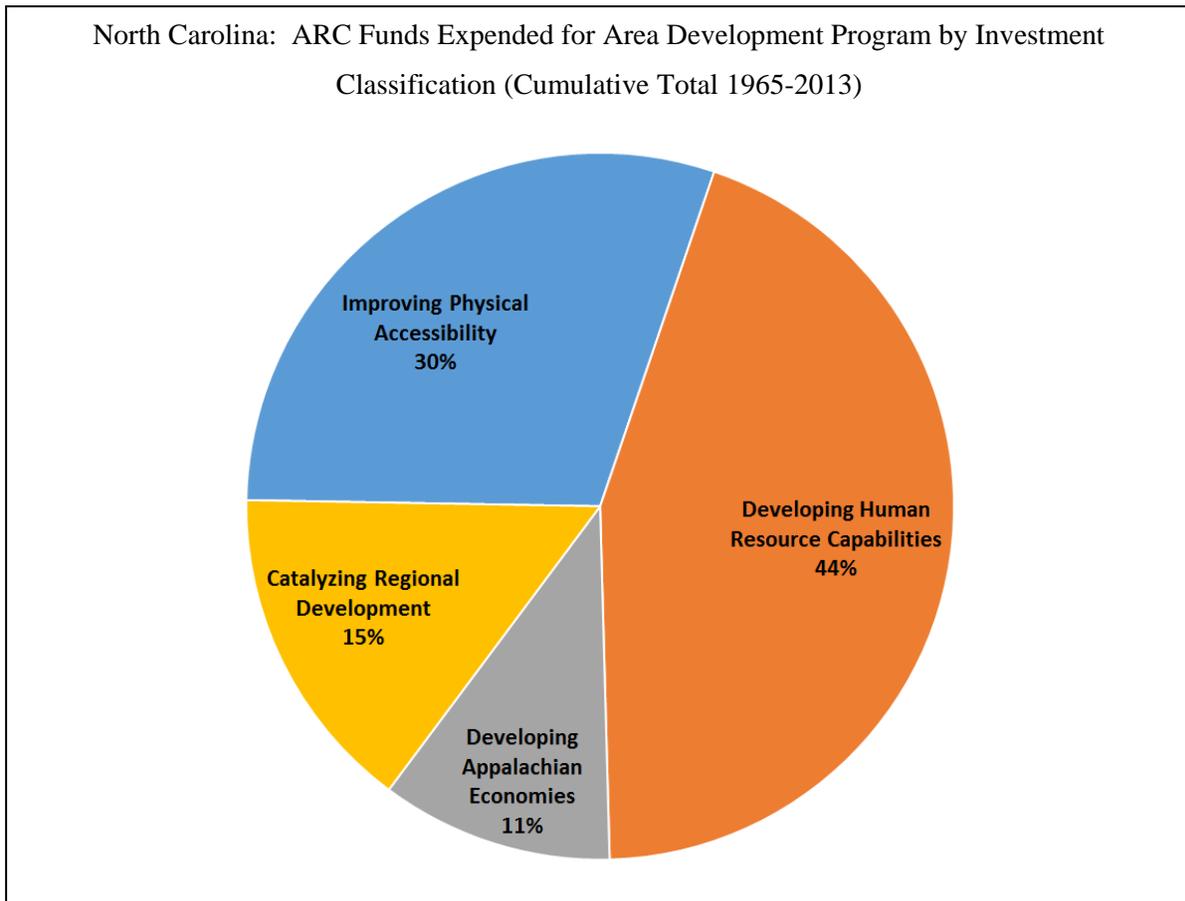
### Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. New York's COS values ranged from 9.93 in the first period to 11.11 in the latest period. This indicates the region is becoming more specialized.



## North Carolina: Total Estimated Impacts

The production impacts for North Carolina naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 425 jobs and \$11.7 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



North Carolina: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	5,885	\$ 152,806	\$ 26.0	\$ 184.2	\$ 32.2
1972-1976	7,356	\$ 189,937	\$ 25.8	\$ 225.1	\$ 52.7
1977-1981	3,457	\$ 96,832	\$ 28.0	\$ 123.8	\$ 40.7
1982-1986	1,067	\$ 28,778	\$ 27.0	\$ 35.8	\$ 17.3
1987-1991	674	\$ 21,175	\$ 31.4	\$ 24.3	\$ 13.7
1992-1996	799	\$ 26,127	\$ 32.7	\$ 28.4	\$ 18.8
1997-2001	555	\$ 19,211	\$ 34.6	\$ 26.4	\$ 19.3
2002-2006	490	\$ 18,967	\$ 38.7	\$ 23.5	\$ 18.7
2007-2013	524	\$ 19,696	\$ 37.6	\$ 29.0	\$ 26.5
<b>Summary</b>	20,806	\$ 573,529	\$ 27.6	\$ 700.5	\$ 239.8

Detail of Employment Impacts

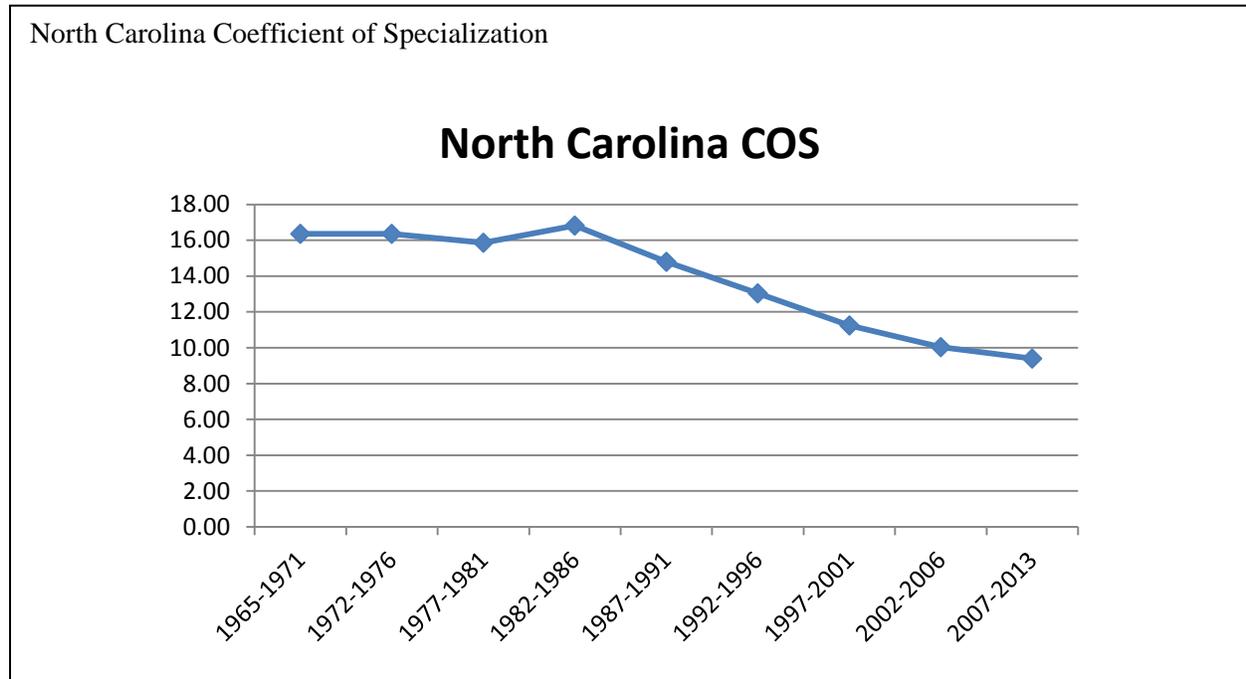
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	139	137	5	291	821	224	750	192	2,852	83	393	5,885
1972-1976	170	171	5	266	997	284	908	240	3,722	105	486	7,356
1977-1981	76	72	3	243	475	134	479	113	1,572	39	251	3,457
1982-1986	24	48	1	96	142	37	165	49	419	11	75	1,067
1987-1991	14	20	1	76	98	25	113	22	255	7	43	674
1992-1996	14	25	1	100	103	33	141	27	296	8	50	799
1997-2001	9	19	1	94	68	22	91	18	225	1	7	555
2002-2006	7	9	1	76	46	13	54	10	268	1	6	490
2007-2013	7	9	1	95	44	15	53	11	283	1	6	524
All Years	459	510	19	1,338	2,795	786	2,753	682	9,892	254	1,317	20,806

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$ 2.0	\$ 2.8	\$ 0.2	\$ 8.7	\$ 26.8	\$ 10.3	\$ 19.5	\$ 4.1	\$ 63.2	\$ 3.3	\$ 11.8	\$ 152.8
1972-1976	\$ 2.5	\$ 3.5	\$ 0.2	\$ 8.0	\$ 32.6	\$ 13.1	\$ 23.6	\$ 5.2	\$ 82.5	\$ 4.2	\$ 14.6	\$ 189.9
1977-1981	\$ 1.1	\$ 1.1	\$ 0.3	\$ 7.4	\$ 17.3	\$ 6.7	\$ 12.0	\$ 2.3	\$ 39.1	\$ 1.9	\$ 7.6	\$ 96.8
1982-1986	\$ 0.2	\$ 0.8	\$ 0.1	\$ 2.6	\$ 5.4	\$ 1.9	\$ 3.7	\$ 1.0	\$ 10.3	\$ 0.6	\$ 2.2	\$ 28.8
1987-1991	\$ 0.2	\$ 0.4	\$ 0.0	\$ 2.6	\$ 4.4	\$ 1.3	\$ 2.8	\$ 0.5	\$ 7.2	\$ 0.3	\$ 1.5	\$ 21.2
1992-1996	\$ 0.4	\$ 0.4	\$ 0.0	\$ 3.2	\$ 4.7	\$ 1.6	\$ 3.5	\$ 0.8	\$ 9.2	\$ 0.5	\$ 1.9	\$ 26.1
1997-2001	\$ 0.3	\$ 0.3	\$ 0.0	\$ 3.5	\$ 3.3	\$ 1.1	\$ 2.4	\$ 0.6	\$ 7.4	\$ 0.1	\$ 0.3	\$ 19.2
2002-2006	\$ 0.1	\$ 0.2	\$ 0.0	\$ 3.1	\$ 2.5	\$ 0.8	\$ 1.8	\$ 0.5	\$ 9.6	\$ 0.1	\$ 0.3	\$ 19.0
2007-2013	\$ 0.1	\$ 0.2	\$ 0.0	\$ 3.6	\$ 2.5	\$ 0.8	\$ 1.7	\$ 0.3	\$ 10.0	\$ 0.1	\$ 0.3	\$ 19.7
All Years	\$ 6.9	\$ 9.7	\$ 0.9	\$ 42.7	\$ 99.5	\$ 37.4	\$ 71.0	\$ 15.3	\$ 238.6	\$ 11.0	\$ 40.4	\$ 573.5

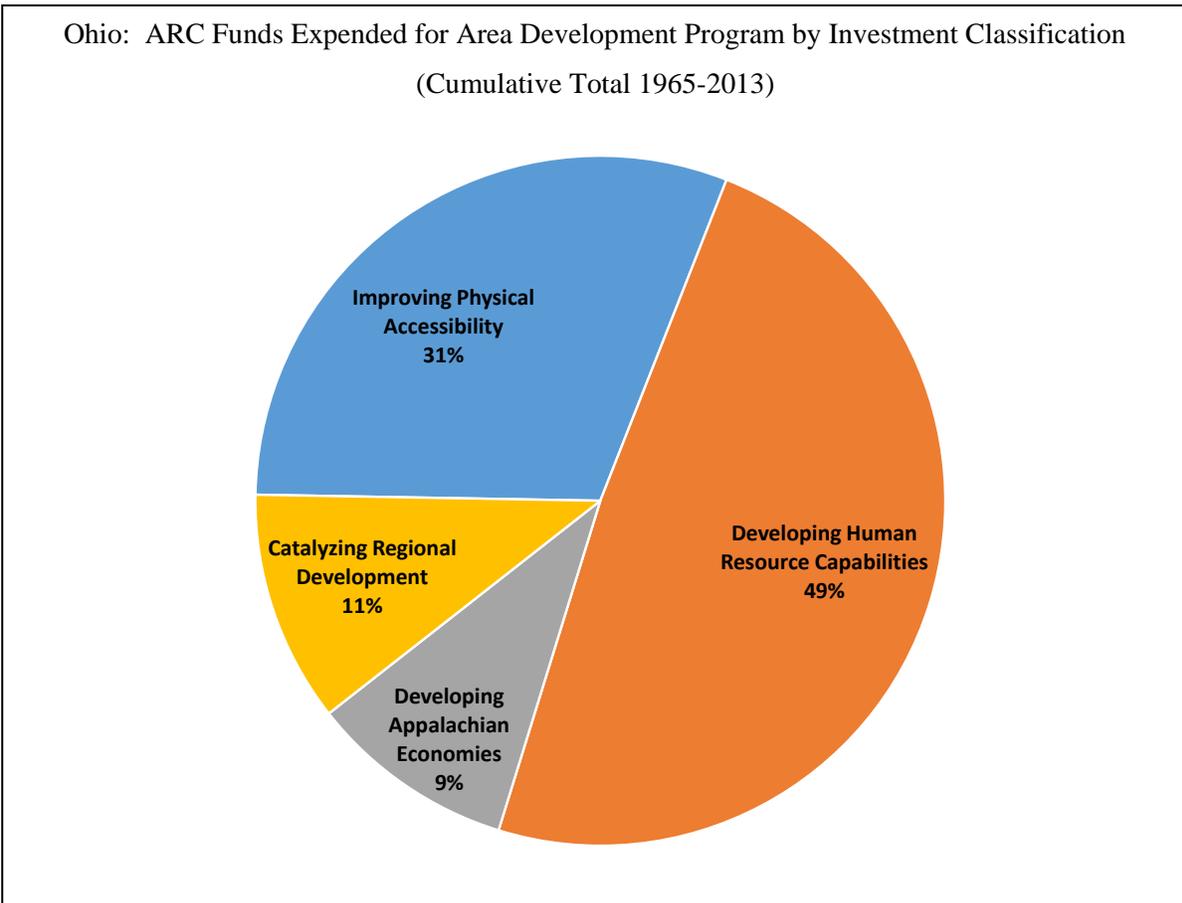
### Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. North Carolina's COS was 16.37 in 1965, remained steady over the subsequent 3 periods, then declined to a value of 9.40 in the most recent period.



## Ohio: Total Estimated Impacts

The production impacts for Ohio naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 445 jobs and \$14.1 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



Ohio: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	6,645	\$ 200,207	\$ 30.1	\$ 200.1	\$ 35.0
1972-1976	7,027	\$ 212,025	\$ 30.2	\$ 211.9	\$ 49.6
1977-1981	3,370	\$ 111,909	\$ 33.2	\$ 116.0	\$ 38.2
1982-1986	1,008	\$ 32,981	\$ 32.7	\$ 32.2	\$ 15.5
1987-1991	700	\$ 23,183	\$ 33.1	\$ 24.8	\$ 13.9
1992-1996	1,034	\$ 36,153	\$ 35.0	\$ 35.0	\$ 23.1
1997-2001	749	\$ 26,110	\$ 34.9	\$ 35.7	\$ 26.1
2002-2006	620	\$ 22,952	\$ 37.0	\$ 30.5	\$ 24.3
2007-2013	647	\$ 23,696	\$ 36.7	\$ 36.4	\$ 33.2
<b>Summary</b>	21,799	\$ 689,217	\$ 31.6	\$ 722.5	\$ 258.9

Detail of Employment Impacts

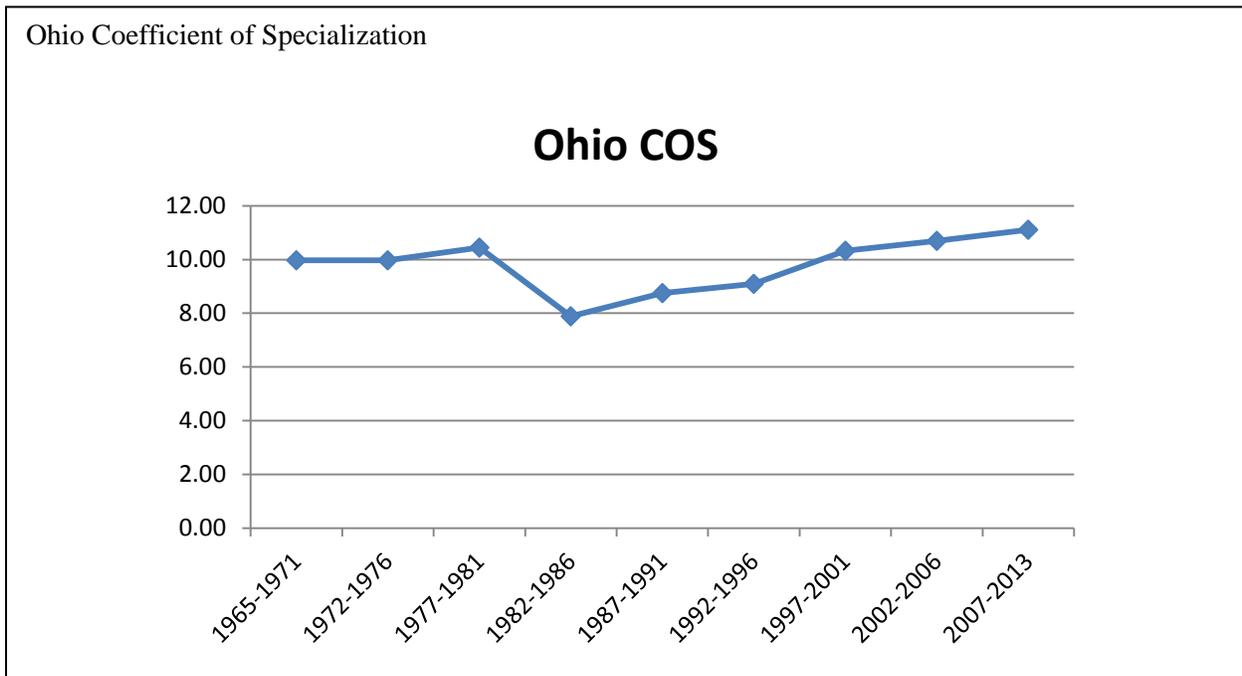
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	136	201	39	231	867	270	793	221	3,391	73	423	6,645
1972-1976	143	246	41	237	905	308	835	233	3,553	77	449	7,027
1977-1981	72	94	36	250	454	132	461	108	1,510	29	224	3,370
1982-1986	23	32	14	92	139	41	155	34	398	9	71	1,008
1987-1991	16	26	7	80	96	29	114	27	252	6	46	700
1992-1996	22	43	9	122	139	41	177	33	370	9	69	1,034
1997-2001	14	34	6	147	100	30	124	26	256	1	11	749
2002-2006	11	14	4	113	68	18	70	13	299	1	9	620
2007-2013	10	15	6	137	65	17	69	13	305	1	8	647
<b>All Years</b>	447	705	162	1,410	2,832	887	2,797	708	10,335	207	1,310	21,799

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$ 1.7	\$ 5.9	\$ 2.0	\$ 11.6	\$ 41.6	\$ 13.6	\$ 20.6	\$ 4.6	\$ 81.5	\$ 3.8	\$ 13.1	\$ 200.2
1972-1976	\$ 1.8	\$ 7.2	\$ 2.1	\$ 11.9	\$ 43.5	\$ 15.5	\$ 21.7	\$ 4.9	\$ 85.4	\$ 4.0	\$ 14.0	\$ 212.0
1977-1981	\$ 0.7	\$ 2.2	\$ 2.3	\$ 12.5	\$ 24.9	\$ 7.4	\$ 12.1	\$ 2.2	\$ 38.6	\$ 1.7	\$ 7.2	\$ 111.9
1982-1986	\$ 0.1	\$ 0.7	\$ 0.8	\$ 4.1	\$ 8.1	\$ 2.2	\$ 3.5	\$ 0.6	\$ 10.0	\$ 0.6	\$ 2.3	\$ 33.0
1987-1991	\$ 0.1	\$ 0.4	\$ 0.4	\$ 3.2	\$ 5.7	\$ 1.5	\$ 2.6	\$ 0.5	\$ 6.6	\$ 0.4	\$ 1.7	\$ 23.2
1992-1996	\$ 0.2	\$ 0.8	\$ 0.4	\$ 5.0	\$ 8.7	\$ 2.1	\$ 4.3	\$ 0.8	\$ 10.4	\$ 0.7	\$ 2.8	\$ 36.2
1997-2001	\$ 0.1	\$ 0.6	\$ 0.2	\$ 6.0	\$ 5.8	\$ 1.6	\$ 3.2	\$ 0.7	\$ 7.5	\$ 0.1	\$ 0.5	\$ 26.1
2002-2006	\$ 0.1	\$ 0.4	\$ 0.1	\$ 5.1	\$ 4.2	\$ 1.0	\$ 2.3	\$ 0.5	\$ 9.0	\$ 0.1	\$ 0.4	\$ 23.0
2007-2013	\$ 0.1	\$ 0.4	\$ 0.2	\$ 5.5	\$ 4.2	\$ 0.9	\$ 2.1	\$ 0.4	\$ 9.3	\$ 0.1	\$ 0.4	\$ 23.7
<b>All Years</b>	\$ 4.9	\$ 18.7	\$ 8.4	\$ 64.8	\$ 146.6	\$ 45.7	\$ 72.4	\$ 15.2	\$ 258.3	\$ 11.3	\$ 42.5	\$ 689.2

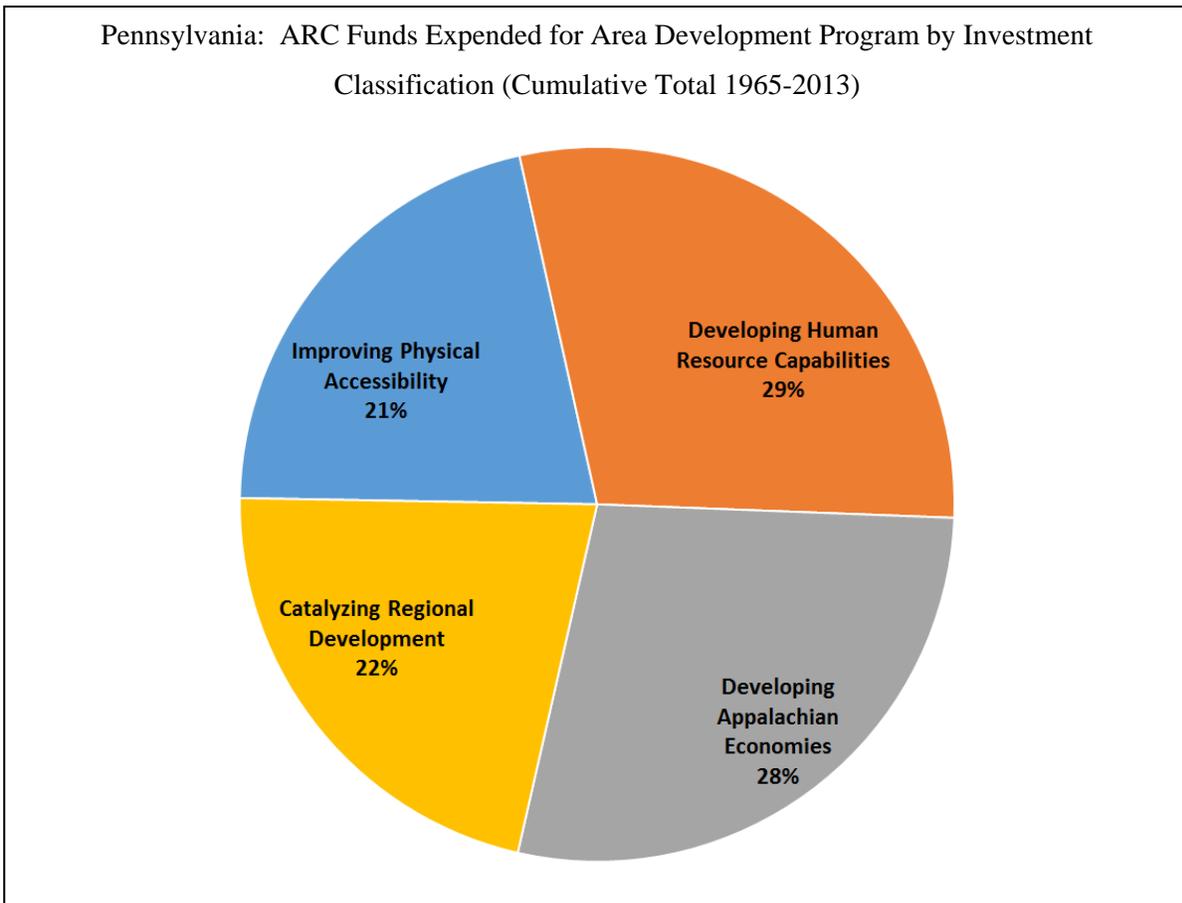
### Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. Ohio's COS was 9.98 in 1965, increased over the subsequent 2 periods, fell in period 4, then increased steadily to a value of 11.10 in the most recent period.



## Pennsylvania: Total Estimated Impacts

The production impacts for Pennsylvania naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 858 jobs and \$17.2 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



Pennsylvania: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	14,006	\$ 485,131	\$ 34.6	\$ 466.7	\$ 81.7
1972-1976	14,258	\$ 503,325	\$ 35.3	\$ 462.3	\$ 108.2
1977-1981	6,194	\$ 231,874	\$ 37.4	\$ 236.7	\$ 77.9
1982-1986	2,045	\$ 72,342	\$ 35.4	\$ 65.3	\$ 31.5
1987-1991	1,413	\$ 50,121	\$ 35.5	\$ 48.4	\$ 27.2
1992-1996	1,488	\$ 57,997	\$ 39.0	\$ 53.1	\$ 35.1
1997-2001	1,002	\$ 40,071	\$ 40.0	\$ 48.1	\$ 35.2
2002-2006	765	\$ 33,430	\$ 43.7	\$ 35.8	\$ 28.6
2007-2013	880	\$ 39,272	\$ 44.6	\$ 44.0	\$ 40.2
<b>Summary</b>	42,051	\$ 1,513,563	\$ 36.0	\$ 1,460.5	\$ 465.4

Detail of Employment Impacts

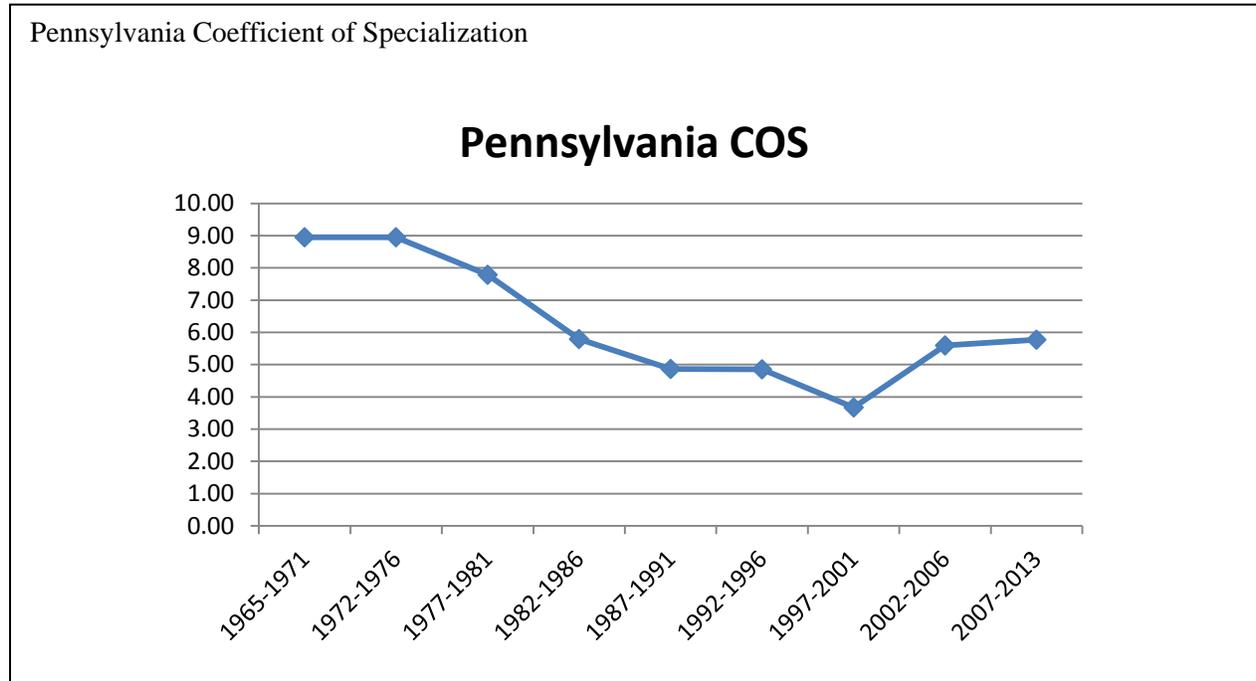
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	169	405	516	913	1,983	618	1,839	514	5,999	185	865	14,006
1972-1976	197	433	115	1,557	2,425	653	2,072	468	5,241	181	915	14,258
1977-1981	80	162	94	659	926	301	923	303	2,275	76	395	6,194
1982-1986	29	59	26	73	311	86	293	76	938	27	126	2,045
1987-1991	18	44	10	41	144	50	191	81	735	22	76	1,413
1992-1996	16	51	8	33	136	53	210	66	821	22	73	1,488
1997-2001	11	38	4	102	91	39	143	34	527	2	12	1,002
2002-2006	8	14	3	71	53	21	71	16	499	1	8	765
2007-2013	7	17	3	75	51	22	73	19	603	1	9	880
<b>All Years</b>	535	1,223	780	3,524	6,120	1,843	5,815	1,578	17,639	517	2,478	42,051

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$ 2.2	\$ 12.7	\$ 28.7	\$ 45.5	\$ 88.5	\$ 32.3	\$ 52.8	\$ 13.0	\$ 170.0	\$ 9.8	\$ 29.7	\$ 485.1
1972-1976	\$ 2.5	\$ 13.6	\$ 6.4	\$ 77.6	\$ 108.2	\$ 34.2	\$ 59.5	\$ 11.8	\$ 148.5	\$ 9.6	\$ 31.4	\$ 503.3
1977-1981	\$ 1.1	\$ 3.9	\$ 7.9	\$ 33.1	\$ 48.3	\$ 17.3	\$ 26.1	\$ 7.5	\$ 67.4	\$ 4.7	\$ 14.4	\$ 231.9
1982-1986	\$ 0.3	\$ 1.3	\$ 1.8	\$ 3.4	\$ 16.6	\$ 4.6	\$ 7.6	\$ 1.9	\$ 28.4	\$ 1.7	\$ 4.6	\$ 72.3
1987-1991	\$ 0.2	\$ 0.7	\$ 0.4	\$ 2.0	\$ 7.8	\$ 2.7	\$ 5.1	\$ 2.2	\$ 24.3	\$ 1.4	\$ 3.3	\$ 50.1
1992-1996	\$ 0.3	\$ 1.2	\$ 0.6	\$ 1.6	\$ 7.7	\$ 3.1	\$ 5.9	\$ 2.2	\$ 30.1	\$ 1.6	\$ 3.6	\$ 58.0
1997-2001	\$ 0.1	\$ 0.8	\$ 0.3	\$ 4.7	\$ 5.5	\$ 2.3	\$ 4.2	\$ 1.5	\$ 20.0	\$ 0.2	\$ 0.6	\$ 40.1
2002-2006	\$ 0.0	\$ 0.6	\$ 0.2	\$ 3.7	\$ 3.4	\$ 1.3	\$ 2.5	\$ 0.8	\$ 20.4	\$ 0.1	\$ 0.4	\$ 33.4
2007-2013	\$ 0.1	\$ 0.6	\$ 0.3	\$ 3.8	\$ 3.3	\$ 1.3	\$ 2.7	\$ 0.8	\$ 25.8	\$ 0.1	\$ 0.5	\$ 39.3
<b>All Years</b>	\$ 6.9	\$ 35.4	\$ 46.7	\$ 175.4	\$ 289.2	\$ 99.1	\$ 166.5	\$ 41.7	\$ 535.0	\$ 29.2	\$ 88.4	\$ 1,513.6

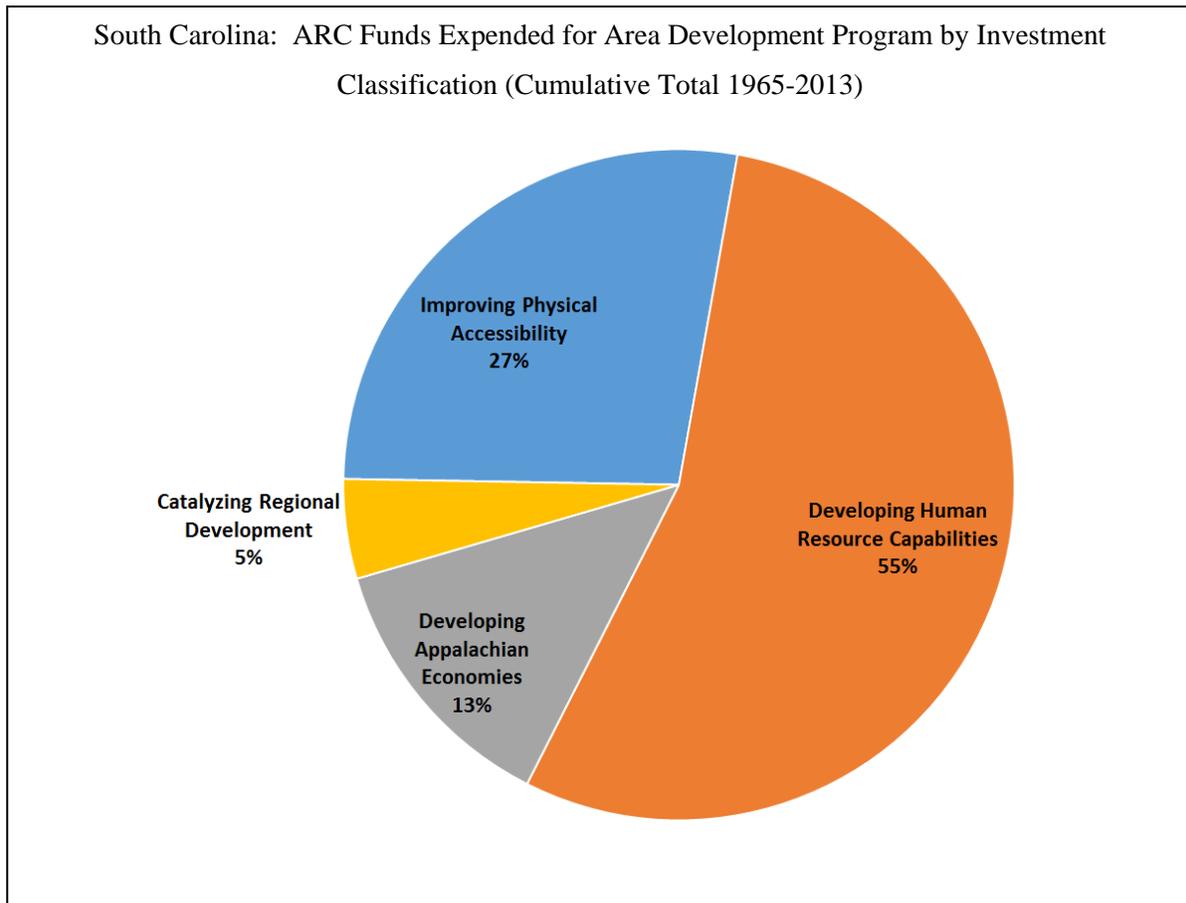
### Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. Pennsylvania's COS was 8.95 in 1965, decreased over the subsequent 6 periods, then increased to a value of 5.77 in the most recent period.



### South Carolina: Total Estimated Impacts

The production impacts for South Carolina naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 365 jobs and \$10.8 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



South Carolina: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	5,470	\$ 151,325	\$ 27.7	\$ 184.1	\$ 32.2
1972-1976	6,169	\$ 170,145	\$ 27.6	\$ 202.5	\$ 47.4
1977-1981	3,217	\$ 93,592	\$ 29.1	\$ 121.9	\$ 40.1
1982-1986	773	\$ 23,432	\$ 30.3	\$ 29.4	\$ 14.2
1987-1991	517	\$ 17,846	\$ 34.5	\$ 20.8	\$ 11.6
1992-1996	662	\$ 24,249	\$ 36.6	\$ 25.2	\$ 16.6
1997-2001	435	\$ 17,675	\$ 40.6	\$ 22.4	\$ 16.4
2002-2006	289	\$ 13,156	\$ 45.4	\$ 16.0	\$ 12.8
2007-2013	375	\$ 16,606	\$ 44.3	\$ 22.2	\$ 20.2
<b>Summary</b>	17,906	\$ 528,026	\$ 29.5	\$ 644.5	\$ 211.6

Detail of Employment Impacts

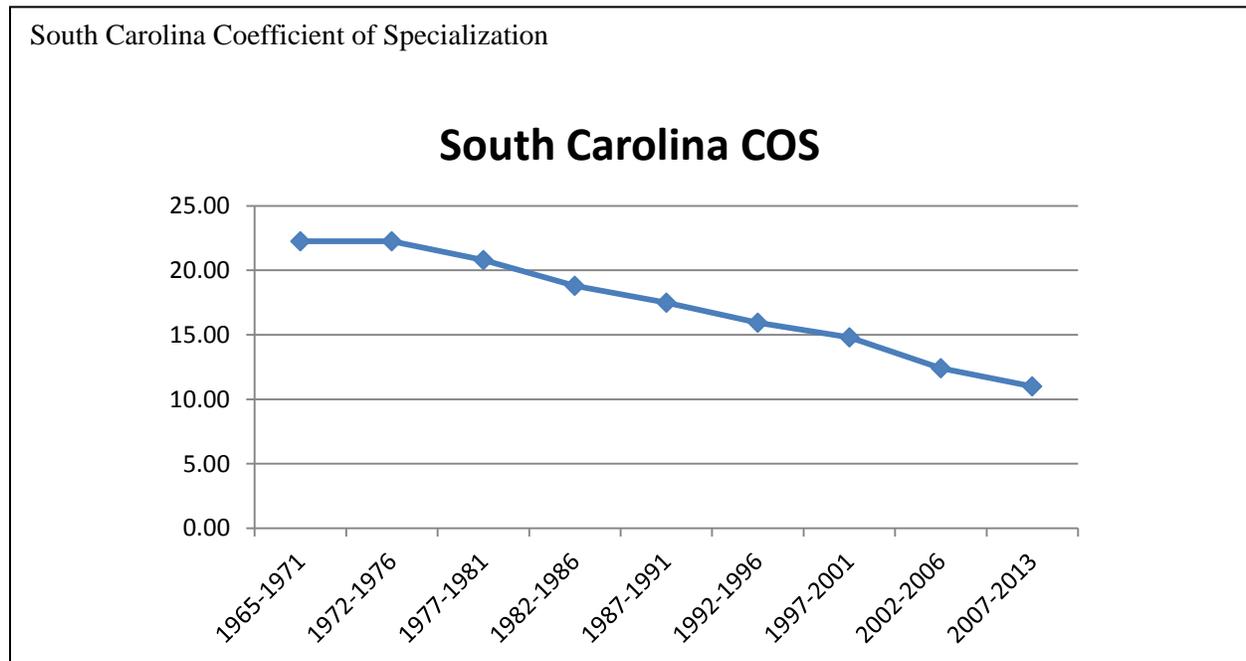
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	49	161	3	270	786	173	707	176	2,802	42	299	5,470
1972-1976	57	180	4	226	938	190	783	199	3,207	48	336	6,169
1977-1981	31	84	2	232	470	96	455	98	1,531	17	201	3,217
1982-1986	10	25	1	100	155	25	141	23	236	4	54	773
1987-1991	5	18	0	63	96	17	92	16	173	3	32	517
1992-1996	7	25	1	75	110	26	121	19	235	4	41	662
1997-2001	5	17	0	102	85	19	82	13	106	1	6	435
2002-2006	3	5	0	69	45	8	38	6	111	0	4	289
2007-2013	3	6	0	106	37	9	43	7	159	0	4	375
<b>All Years</b>	169	523	11	1,242	2,721	565	2,462	558	8,560	118	977	17,906

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$ 0.5	\$ 3.6	\$ 0.2	\$ 9.4	\$ 25.4	\$ 7.7	\$ 19.1	\$ 4.9	\$ 69.6	\$ 2.2	\$ 8.8	\$ 151.3
1972-1976	\$ 0.6	\$ 4.0	\$ 0.2	\$ 7.9	\$ 30.4	\$ 8.4	\$ 21.1	\$ 5.6	\$ 79.7	\$ 2.5	\$ 9.9	\$ 170.1
1977-1981	\$ 0.2	\$ 1.6	\$ 0.1	\$ 8.5	\$ 17.0	\$ 4.8	\$ 12.1	\$ 2.4	\$ 39.7	\$ 1.0	\$ 6.1	\$ 93.6
1982-1986	\$ 0.0	\$ 0.5	\$ 0.0	\$ 3.5	\$ 6.0	\$ 1.3	\$ 3.5	\$ 0.5	\$ 6.1	\$ 0.2	\$ 1.7	\$ 23.4
1987-1991	\$ 0.0	\$ 0.4	\$ 0.0	\$ 2.6	\$ 4.4	\$ 0.9	\$ 2.5	\$ 0.5	\$ 5.1	\$ 0.2	\$ 1.2	\$ 17.8
1992-1996	\$ 0.1	\$ 0.6	\$ 0.0	\$ 2.9	\$ 5.5	\$ 1.4	\$ 3.5	\$ 0.6	\$ 7.6	\$ 0.3	\$ 1.7	\$ 24.2
1997-2001	\$ 0.0	\$ 0.4	\$ 0.0	\$ 4.6	\$ 4.6	\$ 1.0	\$ 2.6	\$ 0.5	\$ 3.7	\$ 0.1	\$ 0.3	\$ 17.7
2002-2006	\$ 0.0	\$ 0.1	\$ 0.0	\$ 3.3	\$ 2.9	\$ 0.5	\$ 1.6	\$ 0.2	\$ 4.3	\$ 0.0	\$ 0.2	\$ 13.2
2007-2013	\$ 0.0	\$ 0.2	\$ 0.0	\$ 4.9	\$ 2.4	\$ 0.5	\$ 1.8	\$ 0.2	\$ 6.2	\$ 0.0	\$ 0.2	\$ 16.6
<b>All Years</b>	\$ 1.5	\$ 11.4	\$ 0.6	\$ 47.6	\$ 98.5	\$ 26.5	\$ 67.6	\$ 15.5	\$ 222.1	\$ 6.5	\$ 30.1	\$ 528.0

### Coefficient of Specialization

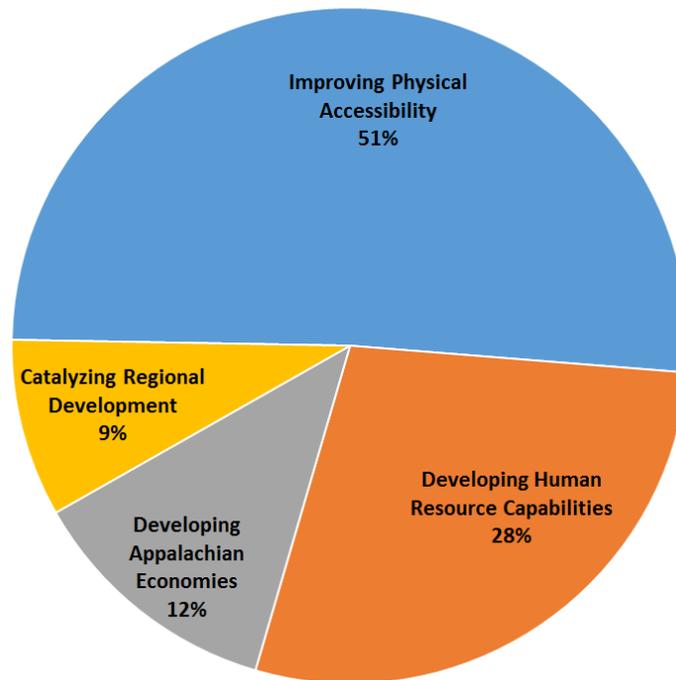
The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. South Carolina's COS values ranged from 22.26 in the first period to 11.00 in the latest period. This indicates the region is becoming more diversified.



## Tennessee: Total Estimated Impacts

The production impacts for Tennessee naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 512 jobs and \$16.0 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.

Tennessee: ARC Funds Expended for Area Development Program by Investment Classification  
(Cumulative Total 1965-2013)



Tennessee: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	6,156	\$ 178,754	\$ 29.0	\$ 195.9	\$ 34.3
1972-1976	8,090	\$ 233,840	\$ 28.9	\$ 254.4	\$ 59.5
1977-1981	4,846	\$ 154,359	\$ 31.9	\$ 181.7	\$ 59.8
1982-1986	1,541	\$ 49,862	\$ 32.4	\$ 54.0	\$ 26.1
1987-1991	1,065	\$ 37,426	\$ 35.1	\$ 39.7	\$ 22.3
1992-1996	1,120	\$ 40,526	\$ 36.2	\$ 40.4	\$ 26.7
1997-2001	830	\$ 31,637	\$ 38.1	\$ 40.3	\$ 29.4
2002-2006	575	\$ 23,185	\$ 40.3	\$ 29.2	\$ 23.3
2007-2013	853	\$ 34,557	\$ 40.5	\$ 49.4	\$ 45.1
<b>Summary</b>	25,077	\$ 784,146	\$ 31.3	\$ 885.0	\$ 326.5

Detail of Employment Impacts

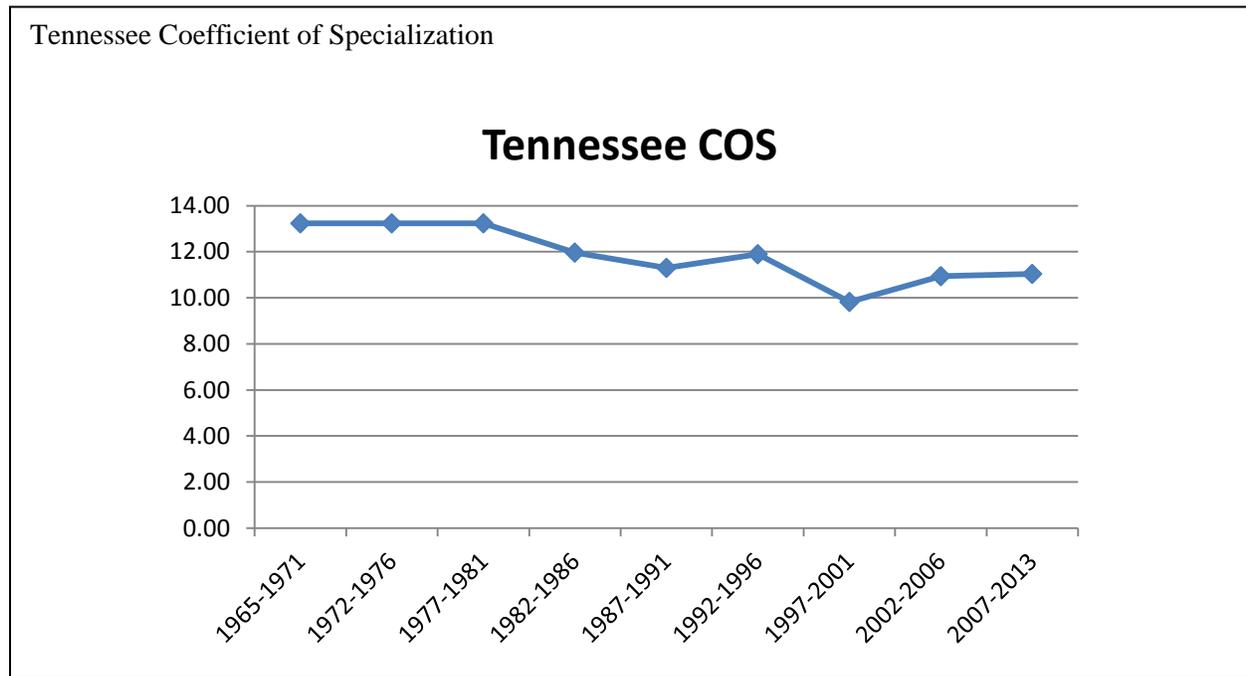
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	172	143	17	398	910	199	795	201	2,837	116	368	6,156
1972-1976	222	181	22	464	1,163	260	1,025	281	3,839	155	479	8,090
1977-1981	122	100	15	624	763	160	745	222	1,670	94	331	4,846
1982-1986	38	38	4	246	242	52	272	49	468	27	105	1,541
1987-1991	25	28	3	178	152	36	187	35	341	17	64	1,065
1992-1996	23	32	2	142	144	41	193	42	420	18	65	1,120
1997-2001	15	24	1	241	103	32	149	25	229	1	10	830
2002-2006	10	10	1	139	61	17	70	11	248	1	7	575
2007-2013	12	14	2	244	73	22	96	17	363	1	9	853
<b>All Years</b>	638	570	68	2,676	3,612	818	3,531	881	10,414	430	1,438	25,077

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$1.8	\$ 4.2	\$ 1.1	\$ 14.4	\$ 32.7	\$ 9.1	\$22.0	\$ 4.4	\$ 71.4	\$ 6.6	\$ 11.1	\$178.8
1972-1976	\$2.3	\$ 5.3	\$ 1.4	\$ 16.8	\$ 41.8	\$11.9	\$28.4	\$ 6.2	\$ 96.6	\$ 8.7	\$ 14.4	\$233.8
1977-1981	\$0.7	\$ 2.4	\$ 1.9	\$ 22.8	\$ 30.6	\$ 7.8	\$20.5	\$ 4.6	\$ 46.4	\$ 6.4	\$ 10.2	\$154.4
1982-1986	\$0.2	\$ 1.0	\$ 0.5	\$ 8.8	\$ 10.5	\$ 2.4	\$ 6.8	\$ 1.0	\$ 13.4	\$ 1.9	\$ 3.3	\$ 49.9
1987-1991	\$0.1	\$ 0.7	\$ 0.2	\$ 6.6	\$ 7.1	\$ 1.8	\$ 5.0	\$ 0.9	\$ 11.3	\$ 1.3	\$ 2.4	\$ 37.4
1992-1996	\$0.2	\$ 0.6	\$ 0.2	\$ 5.3	\$ 7.1	\$ 2.1	\$ 5.3	\$ 1.3	\$ 14.4	\$ 1.6	\$ 2.5	\$ 40.5
1997-2001	\$0.0	\$ 0.4	\$ 0.1	\$ 9.7	\$ 5.3	\$ 1.5	\$ 4.5	\$ 0.9	\$ 8.6	\$ 0.1	\$ 0.4	\$ 31.6
2002-2006	\$0.0	\$ 0.2	\$ 0.0	\$ 6.2	\$ 3.5	\$ 0.6	\$ 2.6	\$ 0.5	\$ 9.3	\$ 0.1	\$ 0.3	\$ 23.2
2007-2013	\$0.3	\$ 0.3	\$ 0.1	\$ 10.1	\$ 4.4	\$ 0.7	\$ 3.6	\$ 0.6	\$ 13.7	\$ 0.1	\$ 0.4	\$ 34.6
<b>All Years</b>	\$5.7	\$ 15.1	\$ 5.5	\$100.7	\$143.0	\$38.0	\$98.7	\$20.5	\$285.1	\$ 26.9	\$ 45.0	\$784.1

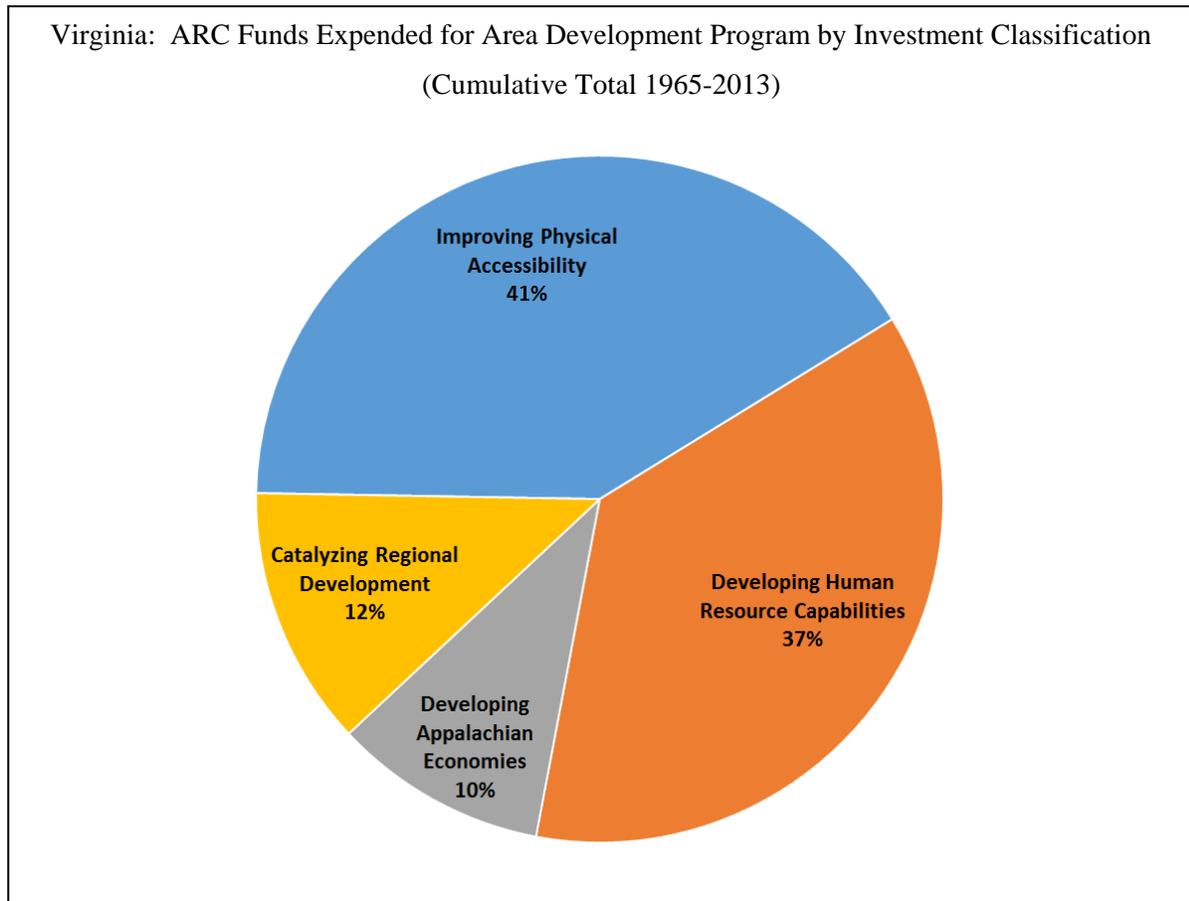
### Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. Tennessee's COS values ranged from 13.23 in the first period to 11.03 in the latest period. This indicates the region is becoming more diversified.



## Virginia: Total Estimated Impacts

The production impacts for Virginia naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 353 jobs and \$9.2 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



Virginia: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	5,338	\$ 127,950	\$ 24.0	\$ 158.6	\$ 27.8
1972-1976	5,541	\$ 134,899	\$ 24.3	\$ 167.2	\$ 39.1
1977-1981	2,906	\$ 84,837	\$ 29.2	\$ 103.9	\$ 34.2
1982-1986	709	\$ 19,455	\$ 27.5	\$ 24.3	\$ 11.7
1987-1991	559	\$ 15,862	\$ 28.4	\$ 22.0	\$ 12.3
1992-1996	789	\$ 23,150	\$ 29.4	\$ 27.5	\$ 18.2
1997-2001	541	\$ 16,602	\$ 30.7	\$ 25.4	\$ 18.5
2002-2006	465	\$ 14,333	\$ 30.8	\$ 23.0	\$ 18.3
2007-2013	455	\$ 14,386	\$ 31.6	\$ 24.4	\$ 22.3
<b>Summary</b>	17,303	\$ 451,475	\$ 26.1	\$ 576.3	\$ 202.5

Detail of Employment Impacts

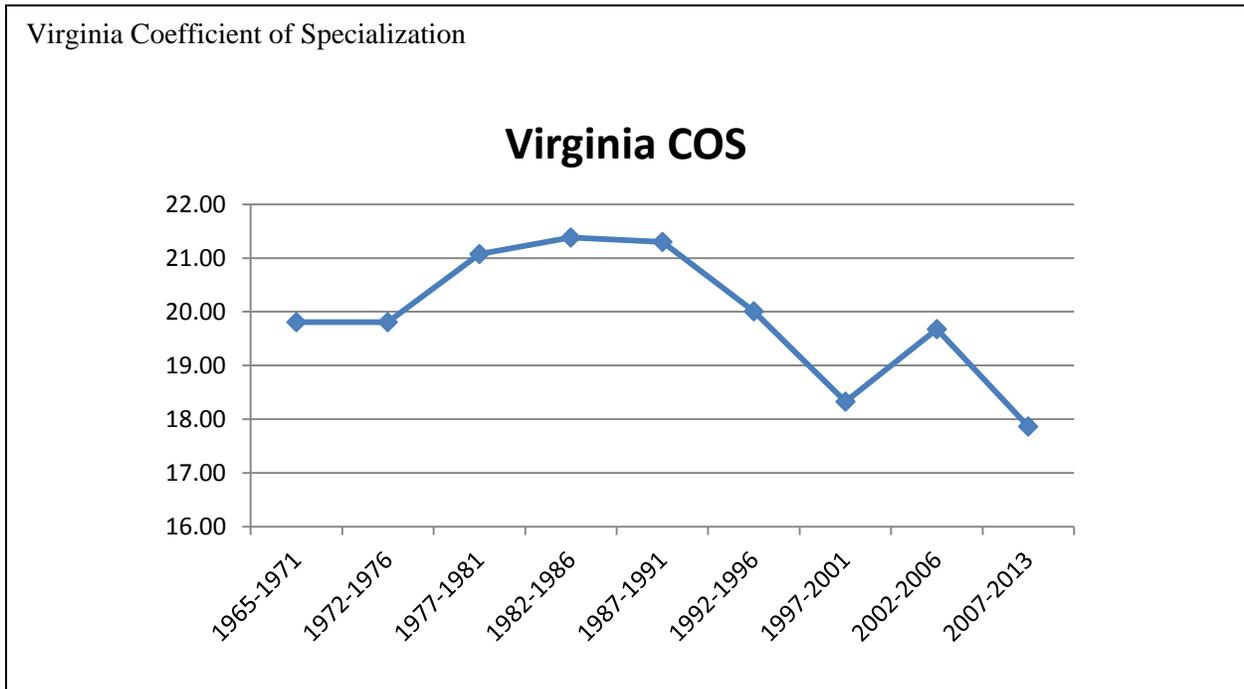
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	135	110	33	117	681	204	655	179	2,746	54	423	5,338
1972-1976	149	113	38	229	772	226	718	185	2,602	55	454	5,541
1977-1981	77	58	44	400	488	113	484	94	848	23	278	2,906
1982-1986	17	16	11	91	110	28	125	37	202	6	66	709
1987-1991	12	14	6	81	74	20	98	41	162	5	46	559
1992-1996	16	21	7	112	104	29	146	31	251	7	65	789
1997-2001	10	15	4	144	70	20	100	17	150	1	10	541
2002-2006	8	10	3	105	48	15	58	9	201	1	8	465
2007-2013	6	10	4	103	37	12	52	9	215	0	7	455
<b>All Years</b>	430	365	151	1,382	2,383	666	2,437	602	7,376	153	1,357	17,303

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$ 1.4	\$ 2.1	\$ 1.8	\$ 3.4	\$ 20.6	\$ 8.6	\$ 15.4	\$ 3.8	\$ 56.2	\$ 2.9	\$ 11.7	\$ 127.9
1972-1976	\$ 1.6	\$ 2.1	\$ 2.1	\$ 6.6	\$ 23.4	\$ 9.5	\$ 16.9	\$ 3.9	\$ 53.3	\$ 3.0	\$ 12.5	\$ 134.9
1977-1981	\$ 0.3	\$ 0.9	\$ 3.3	\$ 17.5	\$ 15.8	\$ 5.4	\$ 11.6	\$ 1.8	\$ 19.0	\$ 1.4	\$ 7.9	\$ 84.8
1982-1986	\$ 0.0	\$ 0.3	\$ 0.8	\$ 3.1	\$ 3.6	\$ 1.4	\$ 2.7	\$ 0.6	\$ 4.4	\$ 0.4	\$ 2.0	\$ 19.5
1987-1991	\$ 0.1	\$ 0.3	\$ 0.4	\$ 2.5	\$ 2.7	\$ 1.1	\$ 2.1	\$ 0.8	\$ 3.8	\$ 0.3	\$ 1.8	\$ 15.9
1992-1996	\$ 0.1	\$ 0.4	\$ 0.5	\$ 3.1	\$ 4.0	\$ 1.4	\$ 3.2	\$ 0.8	\$ 6.5	\$ 0.5	\$ 2.6	\$ 23.2
1997-2001	\$ 0.0	\$ 0.2	\$ 0.3	\$ 4.6	\$ 2.7	\$ 1.0	\$ 2.3	\$ 0.6	\$ 4.3	\$ 0.1	\$ 0.4	\$ 16.6
2002-2006	\$ 0.0	\$ 0.2	\$ 0.2	\$ 3.2	\$ 2.3	\$ 0.7	\$ 1.6	\$ 0.6	\$ 4.9	\$ 0.1	\$ 0.3	\$ 14.3
2007-2013	\$ 0.1	\$ 0.2	\$ 0.3	\$ 3.0	\$ 2.1	\$ 0.7	\$ 1.4	\$ 0.5	\$ 5.6	\$ 0.0	\$ 0.4	\$ 14.4
<b>All Years</b>	\$ 3.7	\$ 6.8	\$ 9.7	\$ 47.0	\$ 77.3	\$ 29.8	\$ 57.3	\$ 13.5	\$ 158.1	\$ 8.7	\$ 39.5	\$ 451.5

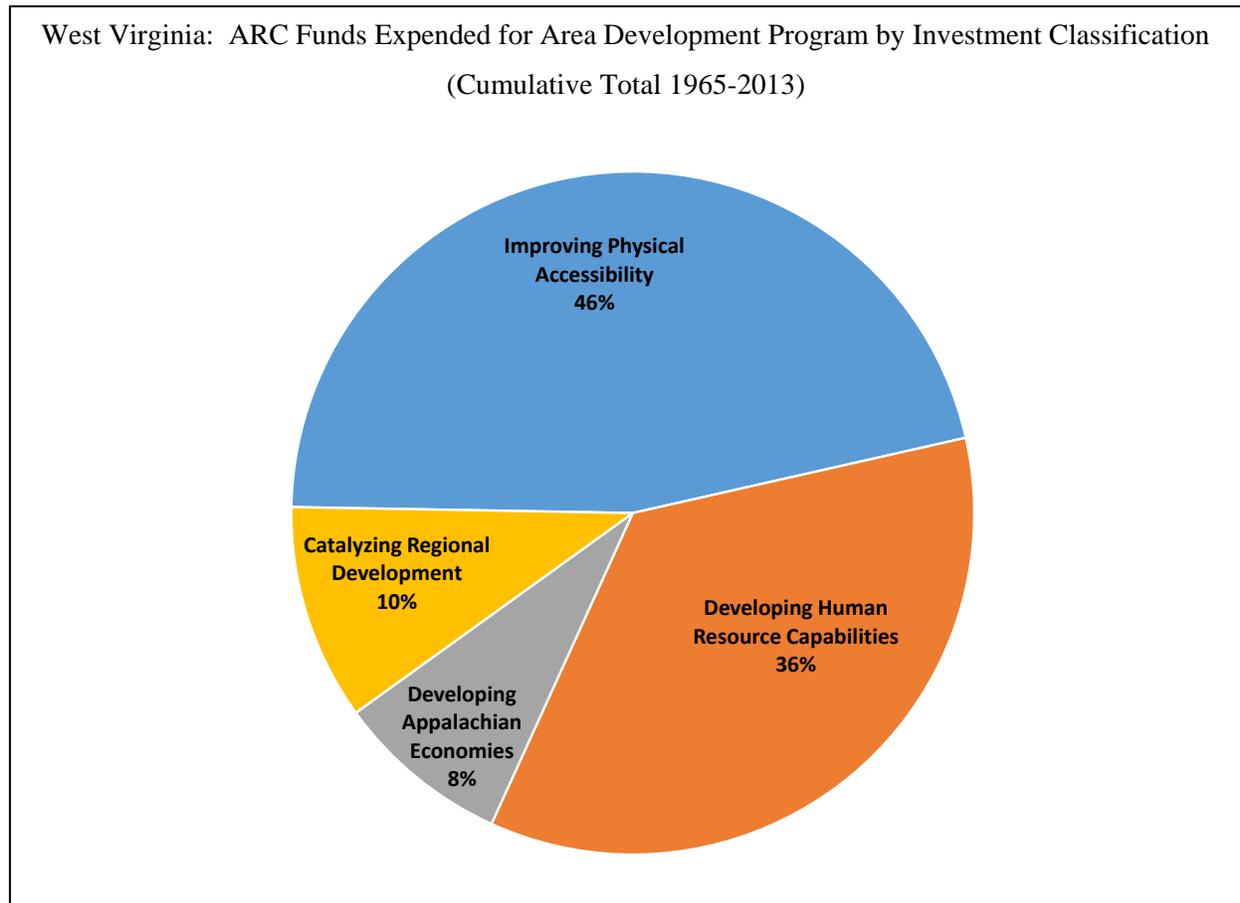
### Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. Virginia's COS was 19.81 in 1965, increased over the subsequent 3 periods, declined steadily for 3 periods, rose in period 8, then fell to a value of 17.86 in the most recent period.



## West Virginia: Total Estimated Impacts

The production impacts for West Virginia naturally follow the investment trend, which results in larger impacts in earlier years. On average annually, the ARC funds supported 500 jobs and \$15.7 million (in 2013 dollars) in earnings. The economic model examined only ARC investments so these estimate job and earnings impacts reflect only the results from the ARC portion of larger projects. Given that the average leverage ratio may be several times the ARC investment, the actual project impacts may be several times higher than these estimates.



West Virginia: Summary of All Impacts

Period	Employment Impacts	Earnings Impacts (2013\$K)	Earnings / Employee (2013\$K)	Investment (2013\$M)	Investment (Current\$M)
1965-1971	6,642	\$ 189,778	\$ 28.6	\$ 251.9	\$ 44.1
1972-1976	8,569	\$ 248,108	\$ 29.0	\$ 321.4	\$ 75.2
1977-1981	3,429	\$ 115,836	\$ 33.8	\$ 162.1	\$ 53.3
1982-1986	1,206	\$ 41,389	\$ 34.3	\$ 55.7	\$ 26.9
1987-1991	763	\$ 26,975	\$ 35.4	\$ 36.4	\$ 20.4
1992-1996	1,227	\$ 44,528	\$ 36.3	\$ 57.0	\$ 37.7
1997-2001	1,043	\$ 38,689	\$ 37.1	\$ 61.4	\$ 44.9
2002-2006	788	\$ 31,604	\$ 40.1	\$ 46.3	\$ 36.9
2007-2013	828	\$ 34,036	\$ 41.1	\$ 52.9	\$ 48.3
<b>Summary</b>	24,495	\$ 770,943	\$ 31.5	\$ 1,045.1	\$ 387.6

Detail of Employment Impacts

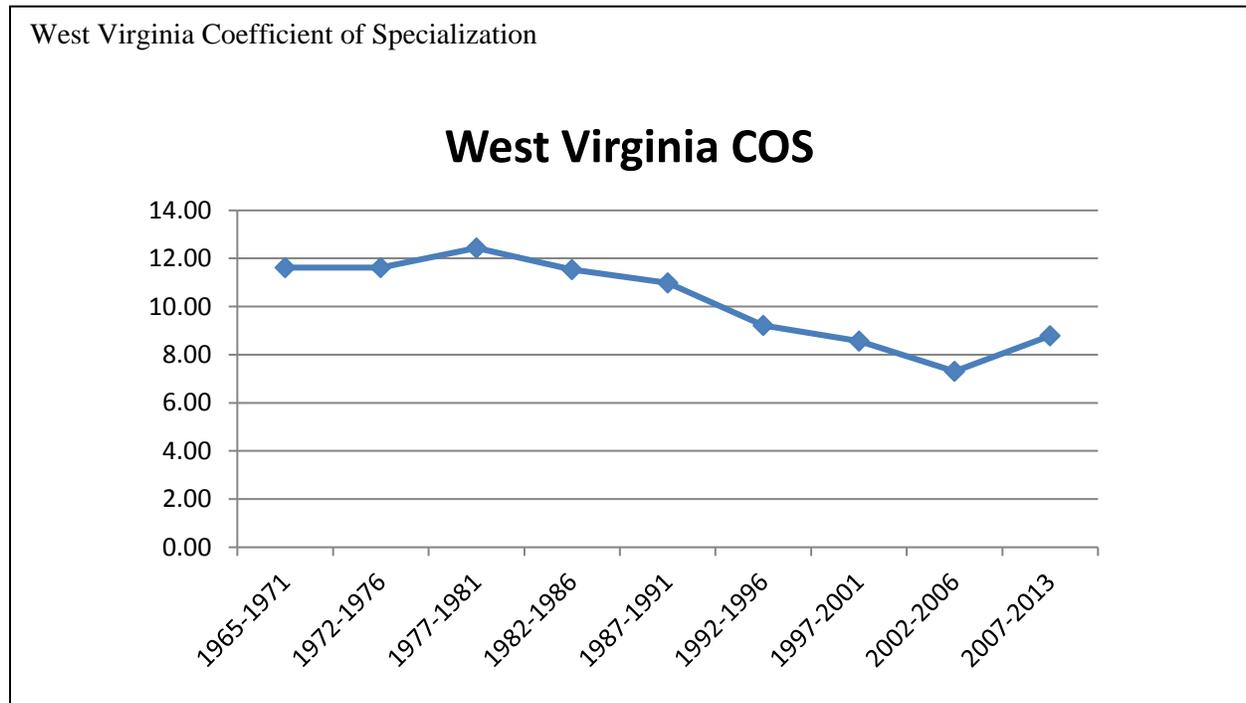
Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	134	93	39	239	673	212	704	190	3,883	124	350	6,642
1972-1976	179	122	53	390	921	277	931	267	4,810	159	459	8,569
1977-1981	58	84	51	407	399	108	434	114	1,519	55	200	3,429
1982-1986	22	33	16	197	130	40	177	44	457	18	71	1,206
1987-1991	14	14	8	154	79	24	126	30	260	11	44	763
1992-1996	20	24	10	250	113	40	205	55	425	19	67	1,227
1997-2001	14	20	7	294	97	36	169	37	354	2	14	1,043
2002-2006	10	10	5	184	57	16	80	15	400	1	9	788
2007-2013	7	11	5	261	41	15	82	15	380	1	9	828
<b>All Years</b>	459	411	195	2,376	2,510	768	2,908	767	12,488	390	1,223	24,495

Detail of Income Impacts (millions)

Period	Farm	AgForFish	Mining	Constr	Mfg	TPU	Trade	FIRE	Service	Fed Gov't	S&L Gov't	Total
1965-1971	\$ 0.7	\$ 2.2	\$ 2.2	\$ 11.5	\$ 30.0	\$ 10.7	\$ 19.1	\$ 4.7	\$ 92.6	\$ 6.2	\$ 9.8	\$ 189.8
1972-1976	\$ 0.9	\$ 2.9	\$ 3.0	\$ 18.8	\$ 41.1	\$ 14.0	\$ 25.3	\$ 6.6	\$ 114.7	\$ 8.0	\$ 12.8	\$ 248.1
1977-1981	\$ 1.0	\$ 1.7	\$ 3.5	\$ 19.4	\$ 20.6	\$ 6.1	\$ 12.0	\$ 2.7	\$ 39.2	\$ 3.2	\$ 6.3	\$ 115.8
1982-1986	\$ 0.3	\$ 0.7	\$ 1.2	\$ 8.0	\$ 7.3	\$ 2.3	\$ 4.6	\$ 1.0	\$ 12.6	\$ 1.1	\$ 2.4	\$ 41.4
1987-1991	\$ 0.0	\$ 0.3	\$ 0.5	\$ 6.1	\$ 4.5	\$ 1.5	\$ 3.2	\$ 0.7	\$ 7.8	\$ 0.7	\$ 1.6	\$ 27.0
1992-1996	\$ 0.1	\$ 0.5	\$ 0.8	\$ 10.0	\$ 6.5	\$ 2.3	\$ 5.1	\$ 1.5	\$ 13.5	\$ 1.4	\$ 2.7	\$ 44.5
1997-2001	\$ 0.0	\$ 0.4	\$ 0.6	\$ 12.4	\$ 5.4	\$ 2.0	\$ 4.3	\$ 1.1	\$ 11.7	\$ 0.1	\$ 0.6	\$ 38.7
2002-2006	\$ 0.2	\$ 0.4	\$ 0.3	\$ 8.7	\$ 3.7	\$ 2.2	\$ 1.2	\$ 0.9	\$ 13.4	\$ 0.1	\$ 0.5	\$ 31.6
2007-2013	\$ 0.2	\$ 0.3	\$ 0.4	\$ 12.8	\$ 2.6	\$ 2.1	\$ 1.2	\$ 0.9	\$ 12.9	\$ 0.1	\$ 0.5	\$ 34.0
<b>All Years</b>	\$ 3.3	\$ 9.4	\$ 12.6	\$ 107.8	\$ 121.9	\$ 43.0	\$ 76.1	\$ 20.2	\$ 318.4	\$ 20.9	\$ 37.2	\$ 770.9

### Coefficient of Specialization

The coefficient of specialization (COS) reflects the industry structure of a region. COS is a measure that compares a region's distribution of employment to the national distribution. Typically, higher regional self-sufficiency and higher multiplier effects are associated with lower COS values. More specialized regions are indicated by higher COS values and are considered by some to be more susceptible to economic downturns. COS values range from a low of zero to a maximum 100. West Virginia's COS values ranged from 11.62 in the first period to 8.78 in the latest period. This indicates the region is becoming more diversified.



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## Appendix B: QEM Sub-Period Analysis Findings

### Sub-period 1965-1974

The data for the sub-period from 1965 to 1974 comes from the economic structure for the year 1965, defined as the share of the income by sector and the rest of the variables are measured from the 1960 U.S. Census. The treatment group includes only those counties that received investments in the years 1966 to 1968. The control group excludes those counties within 60 miles to counties that are members of the ARC and this exclusion is repeated for all sub-periods hereafter. The rates of growth use 1965 per capita income as base year and 1969 employment as base year to measure the change in the periods.

The selection of which matching procedure is best is straightforward for this analysis because the procedure that had the lowest number of variables that differ between treated and control, the lowest pseudo  $R^2$ , and the smallest mean in the biases is the nearest neighbors matching procedure (see Tables 1 and 2). The results also show that there is a difference between per-capita income growth between treated and control counties, with treated counties having higher per-capita income.

The results from the fitted models highlight that per capita income in the treated counties (Table 6) and employment in the treated counties (Table 7) have a higher rate of growth and that the difference between the two groups of counties is positive and significant.

### Sub-period 1975-1984

The data for the sub-period from 1975 to 1984 comes from the economic structure for the year 1974, as explained in the last sub-period and the rest of the variables are calculated from the 1970 U.S. Census. The treatment group includes only those counties that received ARC investments in the years 1975 to 1978. The measured rates of growth for per-capita income and employment use 1974 as the base year in this sub-period analysis.

To decide which model performs better we analyze the results from Tables 10 and 11. The first table shows that the two best matching measures are the Mahalanobis distance metric and the nearest neighbors metric. The procedures with the lower pseudo  $R^2$  and likelihood ratio are nearest neighbors with kernel matching. Therefore, we use nearest neighbor matching for this sub-period.

The observed results in Table 15 show that the per capita income has a higher and significant growth rate for treated counties than for the control counties. However, the growth rate of employment is lower for treated counties than the control counties (see Table 16), and this result is only statistically significant for the years 1983 and 1984.

### **Sub-period 1985-1994**

The data for the sub-period from 1985 to 1994 comes from the economic structure for the year 1984 and other variables are measured from the 1980 U.S. Census. The treatment group includes as treated only those counties that received ARC investments in the years 1985 to 1988. The year 1984 is used as the base year in calculating the growth rate in per-capita income and employment for this sub-period.

We determine the best matching algorithm by following the previous procedure, i.e. we chose the method that has the fewest number of variables that are significantly different from zero, which are the Mahalanobis distance metric and the nearest neighbor matching algorithm (see Tables 19 and 20). The methods with the lowest pseudo  $R^2$  and likelihood ratio test statistics are the nearest neighbor with kernel matching, and we chose nearest neighbors as the method for this sub-period.

The observed results in Table 24 show that the per capita income has a higher and significant growth rate for treated counties than the control counties. However the growth rate of employment is lower and not significant for treated counties compared to the control counties (see Table 25).

### **Sub-period 1995-2002**

The data for the sub-period from 1995 to 2002 comes from the economic structure for the year 1994 and the rest of the variables are measured from the 1990 U.S. Census. The treatment group includes as treated only those counties that received investments in the years 1995 to 1997. The growth rates for per-capita income and employment use 1994 as the base year in the calculations for this sub-period.

Tables 28 and 29 contain the results for the Mahalanobis distance matrix and nearest neighbors matching algorithm. Again, the procedure with the lowest pseudo  $R^2$  and likelihood ratio test statistic is nearest neighbors with kernel matching, and we select the nearest neighbors matching methodology for this sub-period.

The results in Table 35 show that per capita income has a lower and for most years not statistically significant (it is only statistically significant for 2001) growth rate for treated counties relative to the control counties. However the growth rate of employment is negative and decreases for treated counties relative to control counties (see Table 36), but these results are not statistically significantly different from zero.

### Sub-period 2003-2012

The data for the sub-period from 2004 to 2012 comes from 2002 and the rest of the variables are measured from the 2000 U.S. Census. The treatment group includes as treated only those counties that received investments in 2003 because from the year 2003 onward all counties in the Appalachian Region received investments. The growth rate for per-capita income and employment use 2001 as the base year in this sub-period analysis.

Table 37 indicates that the models that have the fewest variables that are significantly different from zero is the kernel matching methods. Table 38 indicates that the procedure with the lowest pseudo  $R^2$  and likelihood ratio test statistics are associated with the kernel matching algorithm, and based on this we use kernel matching for this sub-period. It should also be noted that the pre-treatment analysis points to the kernel matching algorithm since there are no significant differences between treatment and control.

One noteworthy aspect of Table 44 is that the per capita income has a negative difference that is not significantly different from zero and from Table 45 employment has a positive and significant difference that shows that employment grows faster in the ARC counties.

Table 1: Comparison of averages variables used for estimating the matching procedure between treated and control and significance levels for sub-period 1966 to 1974.

\* = 10% \*\* = 5% and \*\*\* = 1%

Variable	Mean Treated	Mahalanobis distance			Nearest Neighbors			Kernel Matching		
		Mean Control	Bias	T-stat	Mean Control	Bias	T-stat	Mean Control	Bias	T-stat
freeway	0.53	0.57	-7.60	-0.87	0.51	3.00	0.35	0.38	30.20	3.50***
lpop59	10.40	10.43	-2.30	-0.28	10.38	2.00	0.27	9.35	96.10	8.65***
spc65	0.14	0.15	-12.00	-2.02**	0.15	-12.90	-2.13**	0.21	-87.40	10.36***
rtot59	58.62	58.88	-0.50	-0.05	57.32	2.60	0.45	140.85	-162.5	-4.50***
rpop59	-0.95	3.21	-17.60	-3.14***	3.12	-17.20	-3.32***	-6.44	23.20	2.97***
dens59	111.69	120.12	-1.60	-0.52	102.08	1.80	0.62	79.00	6.10	1.83*
pov59	17.90	15.21	32.90	3.13***	15.16	33.50	3.39***	19.22	-16.20	-1.45
pc1760	37.76	37.11	16.50	2.03***	36.51	31.60	4.41***	37.05	18.00	1.97**
pc6560	9.41	10.38	-34.20	-4.81***	11.07	-58.50	-8.91***	8.52	31.20	4.54***
black60	5.55	7.11	-12.60	-1.81*	5.95	-3.20	-0.52	9.11	-28.70	-4.09***
city2560	29.92	31.25	-4.30	-0.59	30.58	-2.20	-0.35	57.03	-88.50	-6.90***
city10060	65.05	63.08	3.00	0.58	61.90	4.80	1.08	85.28	-30.80	-4.40***
city25060	109.46	104.84	5.40	0.88	101.81	9.00	1.63	119.73	-12.10	-1.88*
city50060	188.11	177.28	7.00	1.07	182.70	3.50	0.59	326.92	-89.30	-9.02***
city100060	358.14	337.66	9.00	1.22	366.35	-3.60	-0.50	519.39	-71.00	-7.78***
psvc65	0.07	0.07	2.30	0.45	0.07	0.80	0.16	0.05	32.30	4.83***
prtl65	0.08	0.08	-17.10	-2.21**	0.08	-21.70	-3.26***	0.08	9.40	1.13
ptpu65	0.04	0.04	16.60	2.02**	0.04	10.70	1.25	0.02	64.00	8.03***
pmfg65	0.24	0.25	-5.60	-0.60	0.22	12.90	1.42	0.16	60.80	6.04***
pcon65	0.04	0.04	-10.00	-1.43	0.04	-3.80	-0.66	0.03	32.80	4.68***
pfar65	0.06	0.07	-13.40	-2.36**	0.08	-18.20	-3.41***	0.12	-56.70	-5.79***
ptrf65	0.12	0.11	27.50	2.86***	0.11	16.60	1.75	0.11	24.50	2.71***
pdir65	0.10	0.11	-34.50	-5.87***	0.12	-49.30	-8.34**	0.10	-5.80	-0.83
pres65	0.06	0.06	1.50	0.18	0.07	-3.50	-0.46	0.05	4.30	0.53
pmil65	0.00	0.01	-3.80	-1.07	0.00	-0.90	-0.40	0.01	-3.20	-0.75
pfed65	0.02	0.02	-0.60	-0.09	0.02	5.10	0.73	0.02	-2.50	-0.33
pstl65	0.08	0.08	11.60	1.39	0.07	16.10	2.14**	0.15	-170.4	-9.25***
pwhl65	0.02	0.02	-4.70	-0.56	0.02	-4.10	-0.52	0.01	45.00	5.57***

Table 2: Tests of fitting between matching procedures for sub-period 1966-1974.

	Pseudo R <sup>2</sup>	LR Chi <sup>2</sup>	Mean Bias	Variables Significantly Different
Mahalanobis Distance	0.45	327.08	-1.75	10
Nearest neighbors without replacement	0.25	181.57	-1.61	9
Kernel Matching	0.30	220.99	-12.40	20

Table 3: Comparison of objective variables before treatment between treatment and control counties and significance level. Rate of growth of matched counties rate of growth of per capita income for period 1962-1965. \* = 10% \*\* = 5% and \*\*\* = 1%

Matching procedure	Treated	Control	Difference	T-stat
Mahalanobis Distance	0.182	0.178	0.004	0.47
Nearest Neighbors without replacement	0.182	0.112	0.070	2.6*
Kernel Matching	0.182	0.171	0.011	1.79*

Table 4: Mahalanobis distance results for growth rate of per capita income for sub-period 1969 to 1974 with respect to the base year 1965. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1969	0.389	0.365	0.025	1.99**
1970	0.469	0.429	0.040	2.75***
1971	0.541	0.503	0.038	2.6***
1972	0.637	0.584	0.052	3.48***
1973	0.752	0.711	0.041	2.59***
1974	0.848	0.788	0.060	3.76***

Table 5: Mahalanobis distance results for growth rate of employment for sub-period 1969 to 1974 with respect to the base year 1969. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1970	0.007	0.005	0.002	0.32
1971	0.873	0.766	0.107	0.81
1972	0.067	0.051	0.015	1.75*
1973	0.112	0.088	0.023	2.25**
1974	0.125	0.101	0.024	2.1**

Table 6: PSM Nearest neighbors without replacement results for growth rate of per capita income for sub-period 1969 to 1974 with respect to the base year 1965.

\* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1969	0.389	0.382	0.008	0.86
1970	0.469	0.442	0.027	2.56**
1971	0.541	0.517	0.024	2.24**
1972	0.637	0.610	0.027	2.27**
1973	0.752	0.734	0.018	1.42
1974	0.848	0.811	0.037	2.83***

Table 7: PSM-Nearest Neighbors results for growth rate of employment for sub-period 1969 to 1974 with respect to the base year 1969. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1970	0.0069	0.0019	0.0050	1.36
1971	0.8729	0.7084	0.1645	1.58
1972	0.0665	0.0493	0.0171	2.41**
1973	0.1115	0.0886	0.0229	2.65***
1974	0.1247	0.1018	0.0228	2.43**

Table 8: PSM-Kernel matching results for growth rate of per capita income for sub-period 1969 to 1974 with respect to the base year 1965. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1969	0.3893	0.4750	-0.0857	-2.63***
1970	0.4689	0.5424	-0.0735	-2.06**
1971	0.5414	0.5980	-0.0567	-1.53
1972	0.6366	0.7630	-0.1264	-3.18***
1973	0.7520	0.8688	-0.1167	-2.41**
1974	0.8480	0.9542	-0.1062	-2.48**

Table 9: PSM-Kernel matching results for growth rate of employment for sub-period 1969 to 1974 with respect to the base year 1969. \* = 10% \*\* = 5% and \*\*\* = 1%

Year	Treated	Controls	Difference	T-stat
1970	0.007	0.025	-0.018	-1.65
1971	0.873	1.710	-0.837	-2.43**
1972	0.067	0.123	-0.057	-2.41**
1973	0.112	0.161	-0.050	-1.69*
1974	0.125	0.184	-0.059	-1.81*

Table 10: Comparison of averages variables used for estimating the matching procedure between treated and control and significance levels for sub-period 1975 to 1984.

\* = 10% \*\* = 5% and \*\*\* = 1%

Variable	Mean Treated	Mahalanobis distance			Nearest Neighbors			Kernel Matching		
		Mean Control	Bias	T-stat	Mean Control	Bias	T-stat	Mean Control	Bias	T-stat
freeway	0.456	0.464	-1.700	-0.220	0.536	-16.000	-2.15**	0.320	27.400	3.80***
lpop65	10.243	10.253	-0.900	-0.140	10.357	-10.300	-1.450	9.978	23.700	3.55***
spc74	0.355	0.356	-0.300	-0.060	0.391	-18.000	-2.80***	0.593	-117.700	-9.81***
rtot65	0.328	0.343	-12.500	-2.30**	0.344	-13.100	-2.21**	0.330	-2.000	-0.300
rpop65	4.641	4.654	-14.400	-2.80***	4.662	-22.700	-3.81***	4.660	-20.400	-2.77***
dens65	104.700	97.691	1.300	0.350	140.110	-6.300	-1.530	104.520	0.000	0.010
pov70	23.723	20.790	26.200	3.48***	20.874	25.400	3.29***	27.450	-33.200	-3.83***
rural70	73.886	68.096	22.100	3.28***	67.064	26.100	3.62***	79.262	-20.500	-2.98***
pc1770	34.151	34.156	-0.100	-0.020	34.619	-13.000	-1.77*	31.743	66.800	7.72***
pc6570	11.035	12.132	-33.200	-6.26***	11.226	-5.800	-0.910	9.810	37.200	5.28***
black70	6.226	6.944	-5.900	-0.940	9.395	-26.000	-3.62***	17.202	-90.200	-8.03***
city2560	31.959	33.019	-3.500	-0.680	32.975	-3.300	-0.570	33.934	-6.500	-1.090
city10060	66.276	65.667	0.900	0.240	63.049	4.900	1.140	66.161	0.200	0.040
city25060	105.700	98.481	8.600	1.85*	100.52	6.100	1.180	104.290	1.700	0.330
city50060	188.080	174.450	8.800	1.86*	184.94	2.000	0.350	163.140	16.000	3.18***
city100060	357.890	347.58	4.500	0.830	343.860	6.100	1.010	420.160	-27.200	-4.13***
psvc74	0.078	0.080	-3.200	-0.610	0.087	-14.500	-1.620	0.079	-2.200	-0.230
prtl74	0.075	0.078	-15.600	-2.56***	0.078	-13.100	-1.85*	0.069	24.300	3.19***
ptpu74	0.048	0.045	11.500	1.650	0.045	10.200	1.350	0.039	28.300	3.96***
pmfg74	0.223	0.215	5.600	0.720	0.215	5.400	0.650	0.287	-46.000	-4.72***
pcon74	0.046	0.045	2.800	0.400	0.048	-3.900	-0.520	0.044	6.900	0.900
pfar74	0.031	0.057	-27.400	-7.96***	0.041	-10.900	-3.47***	0.047	-16.600	-4.40***
ptrf74	0.158	0.149	18.800	2.58***	0.142	32.300	4.01***	0.142	33.500	3.92***
pdir74	0.106	0.122	-45.000	-8.53***	0.121	-40.900	-7.86***	0.116	-27.500	-5.41***
pres74	0.090	0.088	1.400	0.200	0.093	-1.600	-0.200	-0.005	61.000	5.68***
pmil74	0.005	0.004	1.700	1.220	0.006	-3.100	-1.250	0.006	-2.000	-0.740
pfed74	0.021	0.018	6.800	1.370	0.022	-2.100	-0.370	0.022	-1.400	-0.220
pstl74	0.088	0.081	15.700	2.44***	0.091	-5.500	-0.720	0.159	-162.100	-9.73***
pwhl74	0.021	0.022	-7.600	-1.160	0.023	-12.500	-1.76*	0.016	26.800	4.37***

Table 11: Tests of fitting between matching procedures for sub-period 1975-1984.

	Pseudo R <sup>2</sup>	LR Chi <sup>2</sup>	Mean Bias	Variables Significantly Different
Mahalanobis Distance	0.354	358.88	-1.193	10
Nearest Neighbors without replacement	0.244	247.44	-4.279	10
Kernel Matching	0.224	227.39	-7.645	20

Table 12: Comparison of objective variables before treatment between treatment and control counties and significance level. Rates of growth of per capita income and employment between 1971-1974. \* = 10% \*\* = 5% and \*\*\* = 1%

Method	Treated	Controls	Difference	T-stat
Mahalanobis Distance	0.308	0.292	0.015	1.97**
Nearest Neighbors without replacement	0.308	0.289	0.019	3.84***
Kernel Matching	0.308	0.305	0.003	0.1

Table 13: Mahalanobis distance matching results for growth rate of per capita income and significance levels for sub-period 1979 to 1984 with respect to the base year 1974.

\* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1979	0.499	0.467	0.032	4.28***
1980	0.594	0.550	0.045	5.17***
1981	0.693	0.660	0.033	3.98***
1982	0.751	0.717	0.034	3.8***
1983	0.799	0.768	0.031	3.24***
1984	0.897	0.879	0.017	1.93*

Table 14: Mahalanobis distance matching results for growth rate of employment for sub-period 1979 to 1984 with respect to the base year 1974. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1979	0.123	0.096	0.027	2.39**
1980	0.117	0.087	0.030	2.34**
1981	0.116	0.086	0.030	2.08**
1982	0.096	0.070	0.025	1.49
1983	0.104	0.089	0.015	0.82
1984	0.138	0.127	0.011	0.57

Table 15: PSM-Nearest Neighbors matching results for growth rate of per capita income for sub-period 1979 to 1984 with respect to the base year 1974. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1979	0.499	0.473	0.026	4.02***
1980	0.594	0.556	0.038	5.39***
1981	0.693	0.663	0.030	3.97***
1982	0.751	0.712	0.038	4.99***
1983	0.799	0.768	0.030	3.99***
1984	0.897	0.872	0.025	3.25***

Table 16: PSM- Nearest Neighbors matching results for growth rate of employment for sub-period 1979 to 1984 with respect to the base year 1974. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1979	0.123	0.125	-0.002	-0.24
1980	0.117	0.121	-0.004	-0.39
1981	0.116	0.127	-0.011	-1.05
1982	0.096	0.110	-0.015	-1.23
1983	0.104	0.132	-0.028	-2.13**
1984	0.138	0.170	-0.032	-2.31**

Table 17: PSM-Kernel matching results for growth rate of per capita income for sub-period 1979 to 1984 with respect to the base year 1974. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1979	0.499	0.414	0.085	2.15**
1980	0.594	0.537	0.057	1.19
1981	0.693	0.706	-0.013	-0.33
1982	0.751	0.737	0.014	0.36
1983	0.799	0.821	-0.023	-0.55
1984	0.897	0.881	0.016	0.41

Table 18: PSM-Kernel matching results for growth rate of employment for sub-period 1979 to 1984 with respect to the base year 1974. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1979	0.123	0.129	-0.007	-0.21
1980	0.117	0.210	-0.093	-2.63***
1981	0.116	0.254	-0.139	-3.53***
1982	0.096	0.245	-0.149	-3.46***
1983	0.104	0.274	-0.170	-3.85***
1984	0.138	0.317	-0.179	-3.79***

Table 19: Comparison of averages variables used for estimating the matching procedure between treated and control and significance levels for sub-period 1985-1994.

\* = 10% \*\* = 5% and \*\*\* = 1%

Variable	Mean Treated	Mahalanobis distance			Nearest Neighbors			Kernel Matching		
		Mean Control	Bias	T-stat	Mean Control	Bias	T-stat	Mean Control	Bias	T-stat
freeway	0.426	0.419	1.6	0.18	0.488	-12.5	-1.41	0.33	19.5	2.26**
lpop74	10.243	10.231	1.1	0.14	10.371	-11.2	-1.32	9.867	32.7	4.05***
spc84	0.788	0.798	-2.1	-0.34	0.838	-10.7	-1.58	0.839	-10.8	-1.13
rtot74	0.939	0.927	6.2	0.82	0.917	11.8	1.26	0.806	71.1	3.35***
rpop74	0.072	0.083	-7.6	-1.26	0.097	-17.8	-1.87*	-0.072	104.3	3.99***
dens74	112.73	100.62	2.2	0.44	133.86	-3.9	-0.8	102.77	1.8	0.35
pov70	25.758	22.673	26.6	2.91***	21.063	40.5	4.56***	25.707	0.4	0.05
rural80	28.989	27.558	10.3	1.32	28.469	3.7	0.4	32.061	-22.1	-2.37**
pct1780	29.66	29.29	11.5	1.67	29.237	13.2	1.67	29.078	18.1	2.21**
pc6580	12.213	13.305	-31.4	-5.06***	12.614	-11.5	-1.55	13.265	-30.2	-3.41***
black80	6.123	6.37	-2.1	-0.27	7.819	-14.1	-1.79*	7.976	-15.4	-1.99**
city2579	10.456	12.494	-8.8	-1.72*	9.893	2.4	0.49	15.496	-21.7	-4.1***
city10079	40.769	48.056	-16.6	-3.2	40.373	0.9	0.17	48.197	-16.9	-3.09***
city25079	66.874	73.277	-9.7	-2.04**	67.049	-0.3	-0.05	73.862	-10.6	-2.02**
city50079	105.37	106.46	-1.4	-0.23	103.23	2.7	0.4	105.73	-0.5	-0.07
city100079	309.94	285.54	16.5	1.9*	271.16	26.2	3.00***	306.63	2.2	0.27
psvc84	0.081	0.083	-3.5	-0.61	0.085	-6.3	-1.09	0.078	4.4	0.81
prtl84	0.065	0.066	-3.4	-0.45	0.065	-0.6	-0.08	0.059	26.9	3.33***
ptpu84	0.042	0.038	11.9	1.67	0.04	5.3	0.58	0.04	4.9	0.55
pmfg84	0.187	0.18	5.8	0.63	0.204	-13.8	-1.35	0.169	14.8	1.5
pcon84	0.03	0.031	-1.6	-0.60	0.034	-7.9	-2.04**	0.028	3.8	1.13
pfar84	0.017	0.026	-14.6	-4.06***	0.018	-1.2	-0.36	0.016	1.3	0.37
ptrf84	0.188	0.18	15.1	1.7*	0.174	27.1	2.86***	0.201	-26.3	-2.19**
pdir84	0.166	0.192	-49.1	-9.06***	0.181	-27.9	-4.98***	0.178	-24.1	-4.20***
pres84	0.085	0.089	-1.9	-0.26	0.088	-1.9	-0.24	0.082	2	0.23
pmil84	0.006	0.006	0	-0.02	0.005	1.5	0.66	0.011	-9.9	-2.59***
pfed84	0.02	0.018	4.5	0.57	0.017	5.6	0.77	0.028	-15.6	-1.91*
pstl84	0.082	0.078	10.5	1.5	0.082	-0.1	-0.01	0.092	-26.8	-1.67
pwhl84	0.019	0.022	-15.6	-2.07**	0.022	-15.6	-1.81*	0.016	15.7	2.1**

Table 20: Tests of fitting between matching procedures for sub-period 1985-1994.

	Pseudo R <sup>2</sup>	LR Chi <sup>2</sup>	Mean Bias	Variables Significantly Different
Mahalanobis Distance	0.356	254.79	-1.572	7
Nearest Neighbors without replacement	0.171	122.2	-0.566	5
Kernel Matching	0.124	88.89	3.207	15

Table 21: Comparison of objective variables before treatment between treatment and control counties and significance level. Rates of growth of per capita ncome and employment between 1981-1984. \* = 10% \*\* = 5% and \*\*\* = 1%

Procedure	Variable	Treated	Controls	Difference	T-stat
Mahalanobis Distance	PCI	0.213	0.209	0.004	0.57
	Employment	0.029	0.029	0.000	-0.05
Nearest Neighbors without replacement	PCI	0.213	0.212	0.001	0.24
	Employment	0.029	0.040	-0.011	-1.62
Kernel Matching	PCI	0.213	0.221	-0.008	-0.44
	Employment	0.029	0.041	-0.013	-0.88

Table 22: Mahalanobis distance matching results for growth rate of per capita income and significance levels for sub-period 1989 to 1994 with respect to the base year 1984.

\* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1989	0.276	0.269	0.007	0.91
1990	0.330	0.305	0.024	3.00***
1991	0.369	0.346	0.023	2.76***
1992	0.430	0.407	0.023	2.76***
1993	0.463	0.437	0.026	2.92***
1994	0.506	0.483	0.022	2.4**

Table 23: Mahalanobis distance matching results for growth rate of employment for sub-period 1989 to 1994 with respect to the base year 1984. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1989	0.094	0.084	0.010	0.91
1990	0.115	0.100	0.015	1.22
1991	0.110	0.102	0.008	0.63
1992	0.127	0.111	0.016	1.15
1993	0.153	0.138	0.015	1
1994	0.173	0.166	0.007	0.48

Table 24: PSM Nearest neighbors Without replacement matching results for growth rate of per capita income for sub-period 1989 to 1994 with respect to the base year 1984.

\* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1989	0.276	0.261	0.014	2.56***
1990	0.330	0.301	0.029	4.81***
1991	0.369	0.341	0.028	4.56***
1992	0.430	0.401	0.029	4.72***
1993	0.463	0.433	0.030	4.52***
1994	0.506	0.481	0.024	3.53***

Table 25: PSM Nearest neighbors Without replacement matching results for growth rate of employment for sub-period 1989 to 1994 with respect to the base year 1984.

\* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1989	0.094	0.095	-0.001	-0.06
1990	0.115	0.111	0.004	0.38
1991	0.110	0.113	-0.002	-0.21
1992	0.127	0.134	-0.007	-0.52
1993	0.153	0.162	-0.010	-0.7
1994	0.173	0.194	-0.020	-1.34

Table 26: PSM-Kernel matching results for growth rate of per capita income for sub-period 1989 to 1994 with respect to the base year 1984. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1989	0.276	0.258	0.017	1.02
1990	0.330	0.304	0.026	1.58
1991	0.369	0.354	0.015	0.87
1992	0.430	0.412	0.018	1.05
1993	0.463	0.440	0.023	1.21
1994	0.506	0.485	0.021	1.07

Table 27: PSM-Kernel matching results for growth rate of employment for sub-period 1989 to 1994 with respect to the base year 1984. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1989	0.094	0.102	-0.007	-0.33
1990	0.115	0.128	-0.013	-0.54
1991	0.110	0.122	-0.012	-0.46
1992	0.127	0.148	-0.021	-0.72
1993	0.153	0.173	-0.020	-0.67
1994	0.173	0.196	-0.022	-0.68

Table 28: Comparison of averages variables used for estimating the matching procedure between treated and control and significance levels for sub-period 1995-2002.

\* = 10% \*\* = 5% and \*\*\* = 1%

Variable	Treated	Mahalanobis distance			Nearest Neighbors			Kernel Matching		
		Control	Bias	T-stat	Control	Bias	T-stat	Control	Bias	T-stat
freeway	0.43	0.41	2.30	0.27	0.49	-12.50	-1.41	0.33	19.50	2.26**
lpop90	10.35	10.30	4.50	0.65	10.51	-13.10	-1.63	10.02	28.00	3.60***
spc90	1.22	1.24	-3.40	-0.61	1.30	-12.30	-1.84*	1.28	-9.30	-1.11
rtot90	0.66	0.66	3.70	0.49	0.67	-2.50	-0.33	0.69	-11.90	-1.51
rpop90	0.02	0.03	-5.90	-0.89	0.05	-21.50	-2.88***	0.05	-20.10	-2.70***
dens90	123.69	87.24	2.80	1.59	144.91	-4.10	-0.78	121.66	0.40	0.07
pov89	19.71	17.61	26.80	3.22***	16.83	36.70	4.33***	19.32	5.00	0.52
rural90	74.25	70.12	15.30	1.97**	64.06	38.00	4.41***	73.31	3.50	0.40
pc1700	26.82	28.14	-23.30	3.11***	28.35	-27.10	-3.35***	28.84	-35.70	-4.31***
pc6500	15.77	16.16	-9.90	-1.42	15.51	6.60	0.86	16.18	-10.20	-1.22
black90	6.12	5.57	4.50	0.61	7.43	-10.90	-1.41	7.56	-11.90	-1.56
city2596	9.18	9.91	-3.50	-0.70	8.46	3.40	0.68	14.30	-24.00	-4.34***
city10096	38.03	41.57	-9.10	-1.67	36.60	3.70	0.64	46.09	-20.70	-3.42***
city25096	63.77	64.70	-1.40	-0.31	63.12	1.00	0.20	71.65	-12.00	-2.44**
city50096	87.26	85.83	1.90	0.41	98.23	-15.00	-2.37**	100.49	-18.10	-3.20***
city100096	236.67	194.63	34.80	4.15***	205.34	25.90	2.99***	189.90	38.70	4.59
psvc94	0.10	0.10	6.10	1.21	0.11	-7.60	-0.99	0.10	-2.10	-0.19
prtl94	0.06	0.06	9.80	1.28	0.06	-2.60	-0.31	0.05	29.70	3.68***
ptpu94	0.04	0.04	3.00	0.40	0.04	-4.60	-0.54	0.04	6.50	0.81
pmfg94	0.17	0.16	12.10	1.45	0.18	-10.10	-1.06	0.15	19.30	2.00**
pcon94	0.03	0.03	3.90	0.73	0.04	-6.60	-1.19	0.03	3.80	0.67
pfar94	0.02	0.02	-7.80	-2.08**	0.02	-1.10	-0.32	0.01	4.70	1.22
ptrf94	0.23	0.21	22.50	2.48**	0.20	39.20	4.30***	0.23	-9.20	-0.80
pdir94	0.15	0.16	-28.00	4.78***	0.16	-18.60	-3.06***	0.16	-13.30	-2.11**
pres94	0.09	0.12	-14.60	-2.31**	0.10	-1.80	-0.26	0.10	-5.00	-0.67
pmil94	0.00	0.00	0.90	0.49	0.01	-1.60	-0.54	0.01	-10.70	-2.97***
pfed94	0.02	0.01	5.50	0.93	0.02	2.40	0.41	0.02	-11.60	-1.80
pstl94	0.09	0.09	3.70	0.57	0.09	-5.20	-0.62	0.10	-22.20	-1.77
pwhl94	0.02	0.02	1.00	0.12	0.02	-8.80	-1.01	0.02	25.30	3.13**

Table 29: Tests of fitting between matching procedures for sub-period 1995-2002.

	Pseudo R <sup>2</sup>	LR Chi <sup>2</sup>	Mean Bias	Variables Significantly Different
Mahalanobis Distance	0.225	253.61	2.01	8
Nearest neighbors without replacement	0.212	238.08	-1.06	8
Kernel Matching	0.123	138.03	-2.19	14

Table 30: Comparison of objective variables before treatment between treatment and control counties and significance level. Rates of growth of per capita income and employment between 1991-1994 \* = 10% \*\* = 5% and \*\*\* = 1%

Procedure	Variable	Treated	Controls	Difference	T-stat
Mahalanobis Distance	PCI	0.135	0.136	-0.001	-0.19
	Employment	0.063	0.066	-0.004	-0.75
Nearest Neighbors without replacement	PCI	0.135	0.132	0.003	0.96
	Employment	0.063	0.075	-0.013	-2.25**
Kernel Matching	PCI	0.135	0.129	0.006	0.45
	Employment	0.063	0.054	0.008	0.51

Table 31: Mahalanobis distance matching results for growth rate of per capita income and significance levels for sub-period 1998 to 2002 with respect to the base year 1994. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1998	0.170	0.176	-0.006	-1.58
1999	0.202	0.209	-0.007	-1.65
2000	0.252	0.262	-0.010	-1.99**
2001	0.318	0.339	-0.021	-3.81***
2002	0.333	0.349	-0.016	-2.82***

Table 32: Mahalanobis distance matching results for growth rate of employment for sub-period 1998 to 2002 with respect to the base year 1994. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1998	0.070	0.088	-0.019	-2.49**
1999	0.081	0.099	-0.019	-2.2**
2000	0.094	0.116	-0.022	-2.31**
2001	0.086	0.107	-0.021	-1.81**
2002	0.080	0.099	-0.019	-1.58

Table 33: PSM--Nearest Neighbors matching results for growth rate of per capita income for sub-period 1998 to 2002 with respect to the base year 1994. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1998	0.170	0.170	0.000	-0.07
1999	0.202	0.205	-0.003	-0.79
2000	0.252	0.258	-0.005	-1.39
2001	0.318	0.335	-0.017	-3.76***
2002	0.333	0.345	-0.012	-2.46**

Table 34: PSM-Nearest Neighbors matching results for growth rate of employment for sub-period 1998 to 2002 with respect to the base year 1994. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1998	0.070	0.086	-0.017	-2.78***
1999	0.081	0.099	-0.018	-2.68***
2000	0.094	0.113	-0.019	-2.54**
2001	0.086	0.107	-0.021	-2.37**
2002	0.080	0.102	-0.022	-2.26**

Table 35: PSM-Kernel matching results for growth rate of per capita income for sub-period 1998 to 2002 with respect to the base year 1994. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1998	0.170	0.173	-0.003	-0.25
1999	0.202	0.209	-0.007	-0.49
2000	0.252	0.266	-0.014	-0.84
2001	0.318	0.343	-0.025	-1.41
2002	0.333	0.353	-0.020	-1.04

Table 36: PSM-Kernel matching results for growth rate of employment for sub-period 1998 to 2002 with respect to the base year 1994. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
1998	0.070	0.077	-0.007	-0.41
1999	0.081	0.090	-0.009	-0.43
2000	0.094	0.102	-0.008	-0.36
2001	0.086	0.087	-0.001	-0.04
2002	0.080	0.084	-0.004	-0.15

Table 37: Comparison of averages variables used for estimating the matching procedure between treated and control and significance levels for sub-period 2003-2012.

\* = 10% \*\* = 5% and \*\*\* = 1%

Variable	Mean Treated	Mahalanobis distance			Nearest Neighbors			Kernel Matching			
		Mean Control	Bias	T-stat	Mean Control	Bias	T-stat	Mean Treated	Mean Control	Bias	T-stat
freeway	0.44	0.44	0.50	0.07	0.48	-6.90	-0.98	0.47	0.52	-9.50	-1.23
lpop90	10.33	10.32	0.80	0.15	10.40	-5.70	-0.94	10.41	10.27	11.40	1.62
spc00	1.85	1.94	-7.50	-1.50	2.04	-16.90	-3.39***	1.93	1.92	1.10	0.20
rtot90	0.66	0.65	4.20	0.70	0.67	-8.70	-1.40	0.66	0.67	-9.00	-1.34
rpop90	0.02	0.02	-3.80	-0.73	0.04	-14.40	-2.45***	0.02	0.03	-8.10	-1.26
dens90	114.17	91.32	1.80	1.45	117.52	-0.30	-0.19	124.78	108.45	1.30	0.51
pov99	16.40	14.33	32.50	5.02***	14.67	27.10	3.96***	15.56	15.88	-5.10	-0.74
rural00	70.52	66.17	15.40	2.43**	64.16	22.50	3.45***	67.63	68.84	-4.20	-0.59
pc1700	26.48	27.51	-18.70	-3.31***	27.44	-17.40	-3.04***	26.56	27.52	-17.30	-2.58***
pc6500	15.96	16.20	-6.30	-1.19	16.07	-2.80	-0.43	16.00	15.79	5.60	0.79
black00	6.18	5.71	3.70	0.61	8.76	-20.70	-2.95***	6.71	8.46	-13.90	-1.79*
city2501	8.59	9.71	-5.30	-1.30	7.92	3.20	0.80	8.04	9.33	-6.10	-1.30
city10001	36.23	40.55	-11.10	-2.72***	35.62	1.60	0.36	35.28	36.22	-2.40	-0.49
city25001	60.79	66.42	-8.80	-2.44**	61.23	-0.70	-0.19	61.22	63.05	-2.80	-0.65
city50001	87.90	90.14	-3.10	-0.78	83.49	6.00	1.47	86.88	82.87	5.50	1.15
city100001	221.58	187.52	29.30	4.55***	192.44	25.10	3.85***	205.55	214.66	-7.80	-1.12
psvc00	0.11	0.11	4.90	1.13	0.12	-11.90	-0.93	0.12	0.11	8.00	0.78
prtl00	0.06	0.05	6.20	1.01	0.06	-0.70	-0.10	0.06	0.05	13.30	1.79*
ptpu00	0.04	0.04	-1.80	-0.31	0.04	-5.70	-0.87	0.04	0.04	-0.30	-0.04
pmfg00	0.14	0.14	0.30	0.05	0.14	0.40	0.05	0.14	0.13	12.00	1.47
pcon00	0.03	0.03	-0.60	-0.10	0.04	-9.70	-1.31	0.03	0.03	4.90	0.56
pfar00	0.01	0.01	-7.00	-2.96**	0.01	1.10	0.21	0.01	0.01	4.20	0.57
ptrf00	0.23	0.20	32.50	4.64***	0.20	35.80	5.08***	0.22	0.21	3.10	0.42
pdir00	0.16	0.17	-23.40	-5.06***	0.17	-23.50	-4.07***	0.17	0.17	4.20	0.60
pres00	0.11	0.12	-9.10	-1.73*	0.10	5.10	0.63	0.10	0.12	-11.20	-1.48
pmil00	0.00	0.00	0.40	0.40	0.00	-0.10	-0.11	0.00	0.00	-1.70	-0.68
pfed00	0.01	0.01	1.10	0.27	0.02	-7.10	-0.70	0.02	0.02	0.90	0.11
pstl00	0.09	0.09	0.70	0.13	0.10	-10.80	-1.93	0.09	0.09	-1.60	-0.25
pwhl00	0.02	0.02	2.60	0.44	0.02	-13.60	-2.07	0.02	0.02	8.50	1.19

Table 38: Tests of fitting between matching procedures for sub-period 2003-2012.

	Pseudo R <sup>2</sup>	LR Chi <sup>2</sup>	Mean Bias	Variables Significantly Different
Mahalanobis Distance	0.229	260.23	1.05	9
Nearest neighbors without replacement	0.166	188.24	-1.71	10
Kernel Matching	0.033	31.19	-0.59	1

Table 39: Comparison of objective variables before treatment between treatment and control counties and significance level. Rates of growth of per capita income and employment between 2000-2003. \* = 10% \*\* = 5% and \*\*\* = 1%

Procedure	Variable	Treated	Controls	Difference	T-stat
Mahalanobis Distance	PCI	0.080	0.089	-0.008	-1.87*
	Employment	-0.014	-0.021	0.006	1.17
Nearest Neighbors without replacement	PCI	0.080	0.089	-0.009	-2.44*
	Employment	-0.014	-0.016	0.002	0.36
Kernel Matching	PCI	0.079	0.087	-0.008	-0.98
	Employment	-0.013	-0.017	0.005	0.64

Table 40: Mahalanobis distance matching results for growth rate of per capita income and significance levels for sub-period 2004 to 2012 with respect to the base year 2001.

\* = 10% \*\* = 5% and \*\*\* = 1%

Year	Treated	Controls	Difference	T-stat
2004	0.077	0.084	-0.007	-2.00**
2005	0.113	0.116	-0.002	-0.65
2006	0.156	0.161	-0.005	-1.12
2007	0.200	0.209	-0.009	-1.70*
2008	0.241	0.255	-0.015	-2.15**
2009	0.239	0.247	-0.008	-1.04
2010	0.261	0.268	-0.007	-0.89
2011	0.307	0.319	-0.011	-1.28
2012	0.344	0.354	-0.011	-1.19

Table 41: Mahalanobis distance matching results for growth rate of employment for sub-period 2004 to 2012 with respect to the base year 2001.

year	Treated	Controls	Difference	T-stat
2004	0.017	0.009	0.008	2.14**
2005	0.035	0.023	0.012	2.32**
2006	0.049	0.035	0.013	2.15**
2007	0.061	0.049	0.012	1.66
2008	0.051	0.040	0.012	1.39
2009	0.016	0.009	0.007	0.79
2010	0.012	0.001	0.011	1.2
2011	0.028	0.013	0.015	1.6
2012	0.039	0.023	0.015	1.54

Table 42: PSM Nearest Neighbors matching results for growth rate of per capita income for sub-period 2004 to 2012 with respect to the base year 2001.

year	Treated	Controls	Difference	T-stat
2004	0.077	0.089	-0.012	-4.95***
2005	0.113	0.121	-0.008	-2.91***
2006	0.156	0.165	-0.010	-3.03***
2007	0.200	0.215	-0.015	-4.13***
2008	0.241	0.261	-0.021	-4.67***
2009	0.239	0.252	-0.013	-2.57***
2010	0.261	0.273	-0.012	-2.15**
2011	0.307	0.325	-0.017	-2.84***
2012	0.344	0.360	-0.016	-2.62***

Table 43: PSM Nearest Neighbors matching results for growth rate of employment for sub-period 2004 to 2012 with respect to the base year 2001. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
2004	0.017	0.013	0.004	1.57
2005	0.035	0.027	0.008	2.03**
2006	0.049	0.039	0.010	2.05**
2007	0.061	0.053	0.009	1.56
2008	0.051	0.045	0.006	1.02
2009	0.016	0.015	0.001	0.1
2010	0.012	0.010	0.002	0.31
2011	0.028	0.023	0.005	0.76
2012	0.039	0.033	0.006	0.79

Table 44: PSM-Kernel matching results for growth rate of per capita income for sub-period 2004 to 2012 with respect to the base year 2001. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
2004	0.075	0.087	-0.012	-1.77*
2005	0.111	0.114	-0.004	-0.45
2006	0.155	0.155	0.000	0.00
2007	0.200	0.203	-0.004	-0.37
2008	0.240	0.252	-0.012	-0.92
2009	0.238	0.247	-0.010	-0.74
2010	0.259	0.270	-0.011	-0.78
2011	0.307	0.320	-0.013	-0.73
2012	0.344	0.357	-0.013	-0.69

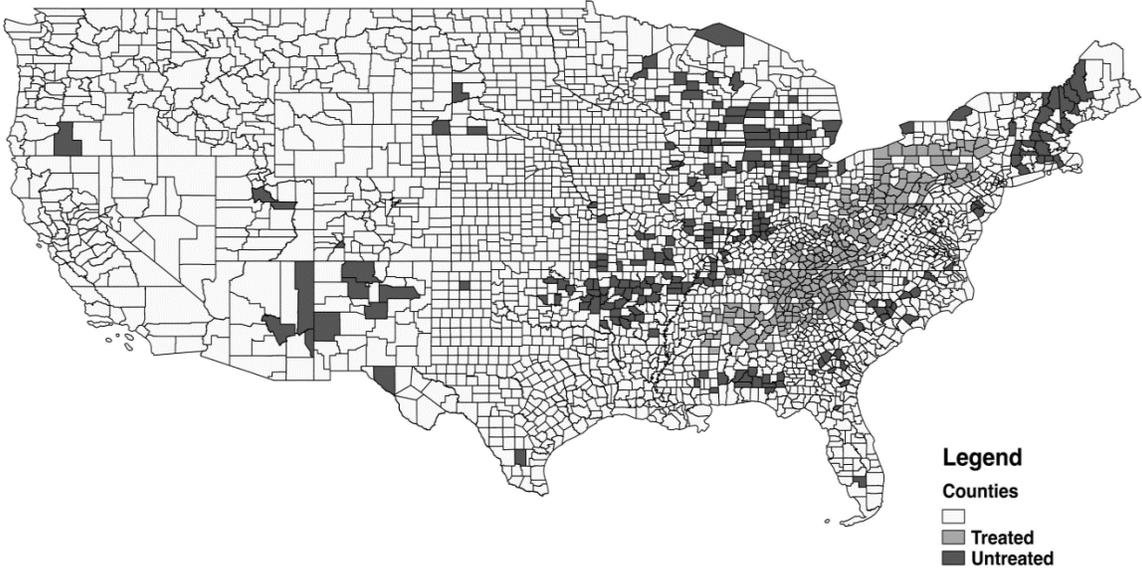
Table 45: PSM-Kernel matching results for growth rate of employment for sub-period 2004 to 2012 with respect to the base year 2001. \* = 10% \*\* = 5% and \*\*\* = 1%

year	Treated	Controls	Difference	T-stat
2004	0.017	0.004	0.012	2.47**
2005	0.034	0.009	0.025	3.57***
2006	0.048	0.019	0.029	3.23***
2007	0.063	0.033	0.030	2.81***
2008	0.054	0.030	0.024	2.02**
2009	0.020	0.002	0.018	1.44
2010	0.017	0.002	0.015	1.16
2011	0.034	0.019	0.015	0.98
2012	0.044	0.029	0.015	0.93

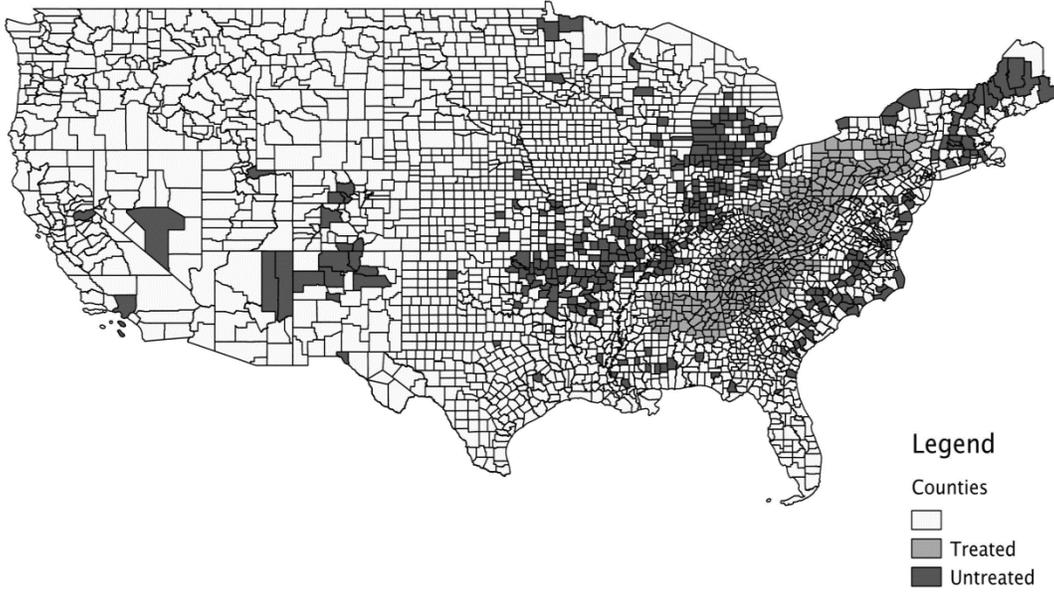
**Matching maps**

Maps 1 through 5 plot the various counties that were deemed to be a good match (i.e. the control counties) for the counties that were contained in the ARC investment areas. The maps show that the control counties selected by the match have broader geographic dispersion as the time frame moves forward.

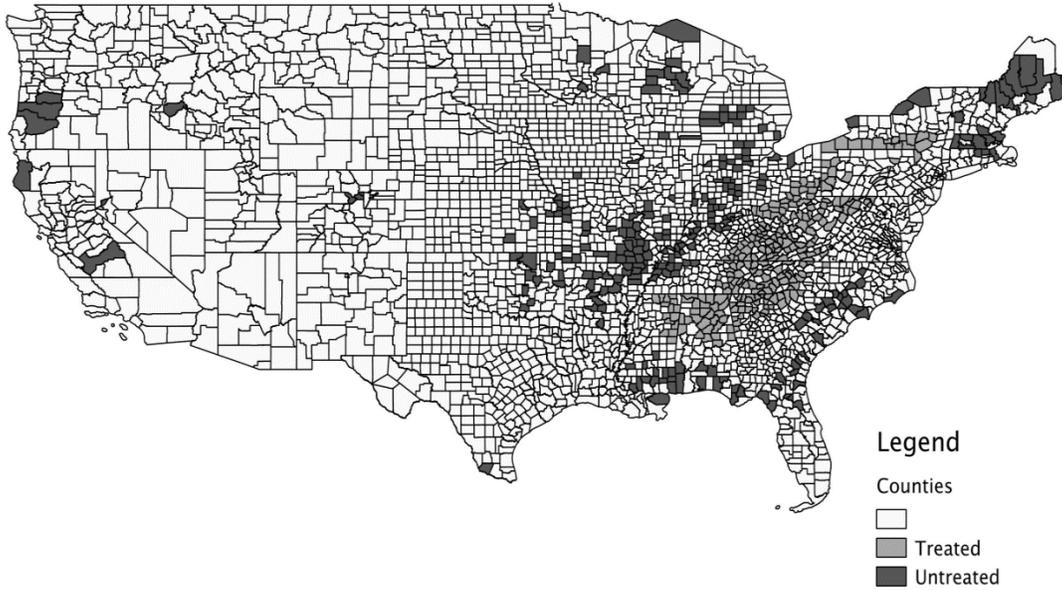
Map 1: matched counties for full period matching from data for 1965



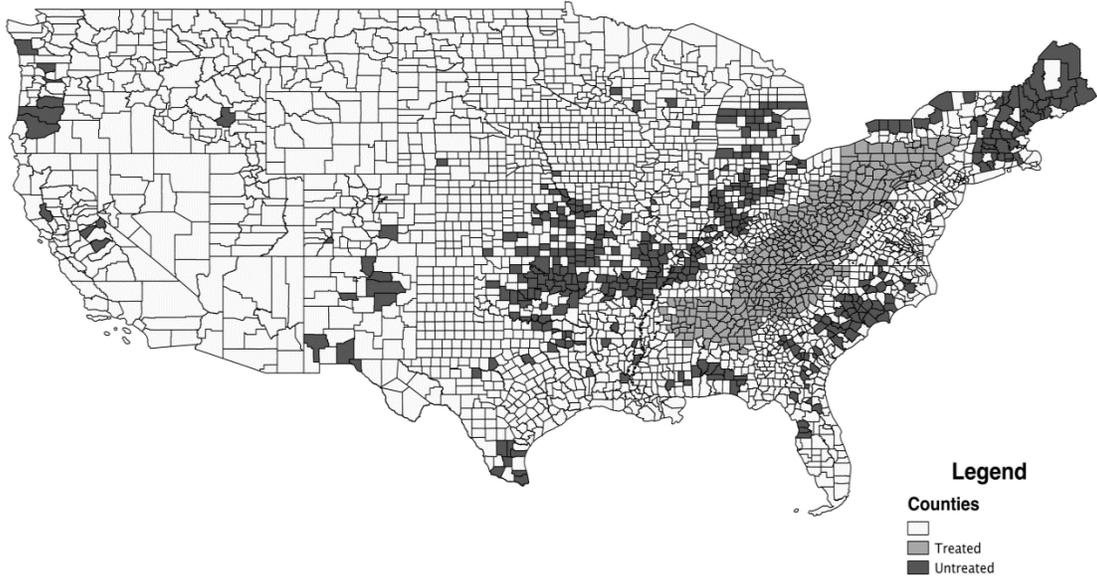
Map 2: matched counties for full period matching from data for 1975



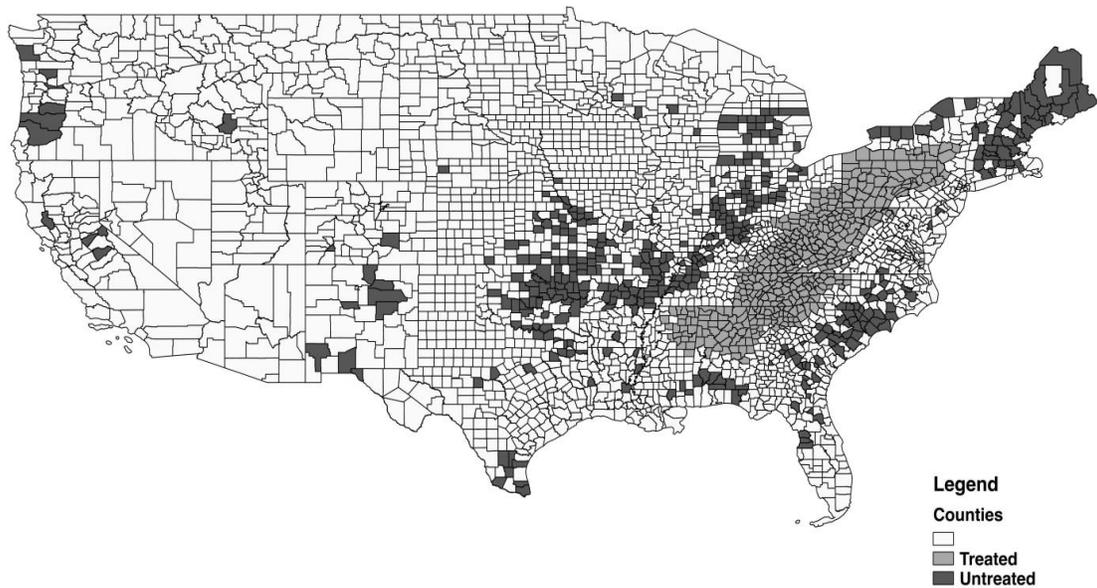
Map 3: matched counties for full period matching from data for 1985



Map 4: matched counties for full period matching from data for 1995



Map 5: matched counties for full period matching from data for 2002



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## Appendix C: QEM Regression Results

Table 1 shows the regression models to determine if higher rates of growth of per capita income and employment are correlated to ARC investments and total investment from ARC projects and other sources. The four columns represent different specifications that were utilized in the empirical analysis. In each specification, 16 different control variables that represent such things as the presence of a highway, population measures, and other demographic characteristics were used as were two variables related to ARC investments. The top number next to each variable name is the coefficient estimate with the bottom number in parentheses being the p-value.

The main variables of interest are the two different ARC investment variables. The first ARC investment variable consists of just funds from ARC alone, while the other variable is ARC funds plus funds from other sources such as local and state government spending on programs such as job training, education, and water treatment to name just a few examples. The sample of counties used in the regression results consist of only those counties that are contained in the ARC region and thus the sample size is 420 counties. The reason for this choice is twofold. First, we do not have data on investments for counties that are not part of the ARC region and second, the sample needs to be restricted to ARC counties to determine if the investments that are specifically targeted to ARC counties are effective.

The results indicate that counties that received ARC funds alone experienced a positive and statistically significant increase in both per-capita income growth and employment growth over the period 1965 to 2005. Counties that received a combination of ARC and other local government funds experienced a positive and statistically significant increase in employment over this same period. The only exception to this pattern is that counties that received a combination of ARC and other government funds experienced a positive increase in per-capita income growth over this time period, although this result was not statistically significant.

Table 1: Regression results for the rate of growth of the per capita income and the employment.  
The regression results include coefficients and the p-values in the parentheses

Variable	Per capita income	Per capita income	Employment	Employment
(Intercept)	2.984	3.164	-0.569	-0.483
	(0.000)	(0.000)	(0.340)	(0.413)
freeway	-0.015	-0.013	0.083	0.081
	(0.420)	(0.465)	(0.055)	(0.062)
city2560	0.002	0.002	0.004	0.004
	(0.000)	(0.000)	(0.005)	(0.007)
city10060	0.000	0.000	-0.001	-0.001
	(0.521)	(0.577)	(0.076)	(0.074)
city25060	0.001	0.001	-0.001	-0.001
	(0.000)	(0.000)	(0.039)	(0.053)
dens59	0.000	0.000	0.000	0.000
	(0.176)	(0.157)	(0.037)	(0.032)
rpop59	-0.003	-0.003	0.010	0.010
	(0.001)	(0.001)	(0.000)	(0.000)
black60	0.002	0.002	-0.005	-0.004
	(0.037)	(0.027)	(0.009)	(0.016)
pov59	0.001	0.001	-0.004	-0.004
	(0.162)	(0.118)	(0.039)	(0.048)
pfed65	0.514	0.486	1.874	1.879

	(0.050)	(0.065)	(0.003)	(0.003)
pmfg65	-0.109	-0.119	-0.373	-0.362
	(0.218)	(0.184)	(0.076)	(0.087)
pres65	-0.296	-0.296	1.432	1.446
	(0.197)	(0.199)	(0.009)	(0.008)
pwhl65	-0.685	-0.638	1.341	1.392
	(0.168)	(0.200)	(0.255)	(0.238)
perw65	-0.590	-0.575	0.148	0.163
	(0.012)	(0.015)	(0.791)	(0.771)
pmil65	0.627	0.737	-2.405	-2.233
	(0.484)	(0.412)	(0.259)	(0.293)
pfar65	0.708	0.685	0.617	0.616
	(0.000)	(0.000)	(0.042)	(0.043)
pstl65	1.533	1.517	1.810	1.823
	(0.000)	(0.000)	(0.005)	(0.005)
log(investment from ARC)	0.024		0.058	
	(0.038)		(0.031)	
log(Total Investment ARC projects)		0.010		0.047
		(0.304)		(0.046)
R <sup>2</sup>	0.569	0.566	0.369	0.368
N	420	420	420	420
F-stat	31.220	30.780	13.810	13.740



# Appalachia

THEN AND NOW

*Examining Changes to the Appalachian Region Since 1965*

## STATE MEETINGS REPORT

FEBRUARY 2015



Prepared by the Center for Regional Economic Competitiveness  
and West Virginia University for the Appalachian Regional Commission

*It is impossible to drink water, flush a toilet, or drive down a highway in Appalachia without seeing first-hand the result of an ARC investment.*

*- Common sentiment expressed at Stakeholder Meetings*

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## About the ARC Focus Groups

Stakeholder meetings were held in all 13 ARC states to afford key stakeholders the opportunity to provide insights about their region’s ARC-related activities (see Figure 1). Participants were asked to provide feedback on several issues including:

- The ARC-sponsored programs and other initiatives that made significant differences in their community,
- The community’s changing involvement with ARC over time,
- How ARC can strengthen their programs and initiatives, and
- Current and emerging issues that might motivate additional, future investments to alleviate economic distress in Appalachia.

Each facilitated session lasted roughly two hours and involved roughly 10 to 20 participants. Combined, over 220 people participated in these stakeholder meetings. This document contains reports describing the substance of these conversations and the participants who attended.

<b>Figure 1: ARC 50th Anniversary State Focus Groups</b>		
<b>State</b>	<b>Location</b>	<b>Date</b>
Tennessee	Alcoa, TN	May 16, 2014
North Carolina	Boone, NC	July 11, 2014
Development Districts Association of Appalachia	Marietta, OH	July 28, 2014
West Virginia	Charleston, WV	August 8, 2014
Virginia	Roanoke, VA	September 18, 2014
Mississippi	Tupelo, MS	October 15, 2014
Kentucky	Slade, KY	October 21, 2014
Georgia	Atlanta, GA	October 22, 2014
Maryland	Cumberland, MD	October 28, 2014
Ohio	Zanesville, OH	November 14, 2014
New York	Binghamton, NY	December 8, 2014
Pennsylvania	Lewisburg, PA	December 9, 2014
Alabama	Decatur, AL	December 15, 2014
South Carolina	Greenville, SC	December 17, 2014

Several common themes emerged from these meetings. Overall, participants noted that ARC investments have made a significant impact on the Region over the past half century. Several factors contributed to this impact including the federal-state-regional partnerships, the flexibility of ARC funding, and the ability for ARC investments to complement other projects. While much

has been accomplished over the past half century, challenges remain for the Appalachian Region as it faces new and emerging issues. Below are the common themes that arose during the course of the focus groups.

### **The ARC Model**

- Stakeholders were quick to mention ARC’s catalyzing role in spurring regional development. Regional stakeholders shared many examples of relatively small ARC investments that planted the seed for significantly more investment and growth. In many of these examples, later investments would not have occurred without the initial ARC investment. This was especially true for many investments in the Region’s most distressed communities, which have few accessible funding sources because of the difficulty they have in raising even a modest amount of local matching funds.
- ARC does more than fund projects—it also provides leadership, advocacy, planning, research, and timely seed investments to advance these efforts, and has done so with countless federal, state, non-profit, and private partners. This model has proven effective over the past 50 years and may become even more important for achieving the Region’s development goals in the future.
- Stakeholders noted that over the past 50 years, ARC’s federal-state-local partnership model has proven effective in helping Appalachian communities advance efforts with great local support and impact.
- ARC allows states and regions to set their own priorities and make their own decisions about how ARC funding is used. This model has allowed states to shift their focus in response to changing economic, political, or fiscal conditions. Diminished funds have led a number of states to refocus their ARC investments from relatively expensive physical infrastructure projects to business enterprise and tourism development, workforce training, and health promotion activities. Many stakeholders see this new generation of investments as having greater regional impact with the available funds.

## Flexibility of ARC Funding

- Local and regional stakeholders universally praise ARC's flexibility. Unlike other funding programs, ARC funding allows regions to think creatively about how best to address pressing regional challenges.
- Many stakeholders spoke of ARC's role in supporting the expansion of health-care and education facilities and the importance of those investments to the well-being of the Region's population. In many ways, these efforts helped address serious market failures that would have significantly diminished the health and welfare of the Region's residents.
- Several focus groups participants said that economic transformation in Appalachia is less about diversification, and more about forging entirely new economies. To help facilitate this process, ARC has made investments that support these transformations. This includes investing in the preparation of industrial sites, but also providing support for entrepreneurship, tourism destination development and promotion, export expansion, and business development programs, helping companies access programs that support technology acceleration or advanced manufacturing processes.

## State and Local Partnerships

- ARC's approach to development prioritizes partnerships with other federal, state, private, and nonprofit partners. Therefore ARC funding aligns with and complements state development initiatives, such as New York State's Regional Economic Development Councils and Kentucky's Shaping Our Appalachian Region (SOAR) initiative.
- Stakeholders from every state noted the importance of ARC support for the Region's 73 local development districts (LDDs). Several focus group participants cited the critical ability of LDDs to serve as an interagency connection between different service providers and local jurisdictions within the Region; and to connect local residents and businesses with resources at the state, regional, and federal levels, as well as with private resources. ARC funding also allows the LDDs to assist communities with project development, including assistance in grant writing for common funding sources. Without this support, stakeholders maintained, many of the most successful ARC projects would never have started.

## ARC Investments Complement One Another

- While the challenges facing Appalachia shift over time, ARC continues to lay the groundwork for future development by making investments that are designed to advance the Commission's strategic goals. Few investments embody this more than those that improve the Region's broadband infrastructure. Efforts to increase broadband access and speed have proven to be a vital foundation in addressing many other issues, including entrepreneurship development, tourism, telemedicine, distance learning, and even in-person education. Stakeholders throughout the Region noted that this was one of the most prominent issues that required ARC attention and investment.
- ARC investments in basic physical infrastructure, such as highways; water and wastewater; and, more recently, broadband, have allowed Appalachian communities to lay the basic foundation for additional development. Without this assistance, these communities would be at a significant disadvantage in taking advantage of future economic development opportunities.
- ARC has made investments to advance education and training programs to prepare the Region's workers for the jobs of tomorrow. These investments are not only for curricula and educational programs, but also for the construction of new facilities and the purchase of training equipment, with an emphasis on assisting the Region's most economically distressed or underserved communities.
- Place-making projects are another area where ARC investments not only create new economic activity, but also preserve Appalachian culture and improve the Region's overall quality of life. Focus group participants noted several ARC-supported projects that helped to preserve historic buildings or revitalize downtowns. Similarly, efforts to develop local food systems are beneficial in that they can serve as an attraction to visitors while creating new economic opportunities and healthier food options for residents. Focus group participants noted that these kinds of ARC-supported projects contribute to the Region's tourism infrastructure.
- ARC has invested in efforts to link individual projects, such as Virginia's Crooked Road, which connects heritage music venues and events; and the Great Allegheny Passage trail, which provides bike access from Pittsburgh to Cumberland, Maryland. These projects leverage many individual attractions to make the Region a more compelling destination for visitors since they can take advantage of many attractions rather than just one.

## Accomplishments and Challenges

- Many communities said they are continuously trying to do more with less. In order to do this, they must find ways to partner and leverage other public and private funding opportunities. For example, ARC launched multi-year Global Appalachia grants to foster member states' rural trade development efforts, building on the State Trade and Export Promotion Program of the U.S. Small Business Administration. Another example is ARC's participation in the Rural Jobs and Innovation Accelerator Challenge, in partnership with the U.S. Economic Development Administration and the U.S. Department of Agriculture.
- Communities can find projects that fit into other ARC or regional investments. Tourism and cultural projects provide a structure that allows regions to connect individual attractions into a bigger idea that makes the region itself a more attractive destination for visitors. By leveraging other investments, the sum of the parts becomes greater than the whole and is an effective way of doing more with less.
- Stakeholders recognize the importance of prioritizing ARC funding based on need. This does not mean, however, that the classification of counties by distress levels is free from challenges. For instance, persistent pockets of poverty can remain even in counties that overall are performing well relative to other counties. Additionally, while not a common occurrence, fluctuations in county economic status from year to year can also pose challenges for communities. Given that a change in status results in a change in matching funds requirements, this can introduce some long-term planning difficulties for some counties.
- Finally, stakeholders also suggested that ARC recognize that its impact has been well beyond what might be easily measured. As noted in several states and in similar ways, it is impossible to drink water, flush a toilet, or drive down a highway without seeing first-hand the result of an ARC investment. Given this significant impact on the Region, many stakeholders thought that ARC should more actively promote its accomplishments in ways similar to what other agencies do (e.g., signs that read "This road was paid for in part through ARC Funds").

**Figure 2: The Appalachian Region**



Source: Appalachian Regional Commission

## **Alabama ARC Focus Group Report**

On December 15<sup>th</sup>, 2014 key ARC stakeholders in the state of Alabama met to discuss the impact of ARC investments in their communities. The Alabama Department of Economic and Community Affairs (ADECA) helped to organize the meeting that was hosted by the North Central Alabama Regional Council of Governments in Decatur, Alabama. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs use in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

Overall there was enthusiastic support for ARC programs and investments. ARC remains vitally important to the communities it serves, and this is especially true for its most rural communities. Additionally, the consistency and predictability of ARC funding and services was cited as being critical to assisting rural and distressed communities. Participants also noted that among the reasons ARC investments have been impactful to the state are its ability to let investment priorities be “locally-driven” and the Commission staff really “cares” about Appalachia Alabama and the Region’s ability to improve the economy and quality of life for residents, communities, and businesses throughout the area.

### **Current role of ARC funding**

Participants noted that ARC funding plays a critical role in getting projects off the ground and as a tool for addressing core economic development challenges that provide the foundation for later development. Among the range of projects that ARC investments continue to help fund include water and sewer, education, healthcare, business access to capital via revolving loan funds, workforce training and community development. These investments make securing additional investment and activity easier for distressed communities with minimal access to resources.

Not all impactful investments require large outlays of funds, noted participants. A fruitful effort underway in the state includes ARC projects in Madison and Jefferson counties on integrating local food systems by partnering with local industries, schools, food banks and other community based organizations. This is a part of the Appalachian Regional Commission’s larger effort of “Growing the Appalachian Food Economy,” which is meant to foster economic diversification and revitalization by promoting local food systems and sustainable agriculture. In Alabama, participants discussed how this effort held enormous promise matching local growers with local buyers and that the project needed the boost provided through ARC to get it connected. An effort like this creates jobs and also helps with health, as the Region has a high incidence of obesity.

The collaboration model established by ARC for its investments is also bearing fruit in high-tech business development. For example, the Economic Development Partnership of Alabama Foundation, an ARC partner, collaborates with seven research universities in Alabama to promote high-growth and innovative start-up companies. Collectively they have established Alabama “Launchpad”, which provides startup capital and expert guidance to budding companies. Alabama ARC supports such efforts through its participation in Revolving Loan funds and Angel funds in Appalachian Alabama.

Additionally, ARC investments have complemented many important state initiatives to develop communities and grow the economy. For instance, ARC has been heavily involved with supporting the work of the Alabama State Energy Office, which is working on a State Energy Program to increase the use of renewable energy and promote energy efficiency in Alabama. State officials also noted how the Alabama ARC program is making an important contribution to the successful execution of the Alabama State Department of Education’s Plan 2020 to improve student growth and achievement, increase the graduation rate, close the achievement gap and increase the number of high school graduates that are college and/or career-ready and compete in the global economy. The state’s international trade and export development efforts in Appalachia Alabama are also being supported by ARC. The flexibility of ARC funding made these types of investments possible.

ARC funding also continues to play a crucial role for many rural and/or distressed counties because there remains tremendous pockets of need, which are often isolated. Several participants described ARC as being the champion in the rural development world. Helping to form this perspective were not just singular projects but the continuing commitment to fund the local planning councils, which are on the front lines to make things happen in Alabama. The funds provided to the Local Development Districts are important because rural areas often lack the staff capacity and resources to meet all their planning needs. The LDD funding provided by ARC allows for consistent and reliable planning and government service to these rural counties.

### **Impacts of past ARC investments**

At the time of its launch, ARC sought to bring the Appalachian Region to parity with the rest of the country. While the work is far from finished, the focus group participants thought that Alabama’s Appalachian communities had made meaningful progress toward fulfilling that goal. ARC investments allowed many rural residents access to clean water and sewer, and helped to put in place an infrastructure to support industry that created local employment opportunities. ARC has also played a leadership role in Alabama in bridging non-traditional economic development issues such as local food, healthcare, and alternative energy with traditional economic development activities.

Past ARC investments in Alabama have worked in building the foundation and capacity to provide needed services to residents. Among the most basic, water and sewer investments have

been an important part of ARC investments over the years, which participants agreed “have come a long way over the past 30-40 years due to ARC.” But ARC has done much more than this. For instance, ARC funds were used to purchase cargo cranes at the International Intermodal Center (IIC) at Huntsville International Airport and also helped to establish the Jetplex Industrial Park. Participants discussed how these investments helped open things up economically at the Huntsville International Airport to the benefit of the entire region. At this global logistics park, rail, air, and highway all come together which attracts major companies. The Jetplex Industrial Park, which opened in 1974, currently has more than 60 tenants, 24-hour U.S. Customs services, USDA inspectors, freight forwarders and a Foreign Trade Zone. The IIC, Jetplex and airport occupy more than 6,000 acres of the 10,000-acre master plan.

Perhaps the biggest economic development advancement for the Region in the past 50 years has been the growth of the state’s automotive industry. Participants noted ARC’s role in this as well, such as funding a water line from Tuscaloosa to the Mercedes-Benz plant. Alabama now has three major international auto manufacturers: Mercedes-Benz, Hyundai and Honda. Mercedes-Benz is located in Vance, which is in two ARC counties, Tuscaloosa and Bibb, while Honda Manufacturing of Alabama is in Lincoln, which is in the ARC county of Talladega. Other ARC counties in Alabama also benefit from these automotive manufacturers through the Tier 1, Tier 2 and Tier 3 supplier businesses serving them.

While never a large component of the total funding package, ARC funding—both in the past and present—has served as important seed funding to get larger projects started. Several participants offered examples demonstrating the importance of early ARC investments. For instance, ARC funded the purchase of diagnostic equipment for the area’s one stop center for justice. This center started as a unique concept, and is one of only two in Alabama – for those who are victims of abuse, instead of going to hospital or police, have all of their care and needs met in one location. Others have leveraged ARC investments to create revolving loan funds to offer area businesses access to needed capital. Several of these loan funds have turned small initial ARC investments into multi-million dollar capital funds for the ongoing benefit of the local economy. One example was given of funds going to a business filling a vital need for physician assistants in the Region and that business grew quickly to 15 jobs from 4, and they were able to pay back a three year loan in a year and a half.

ARC investments in highway infrastructure are also seen as crucial past investments as they provide important connections. This is particularly true for rural, mountainous counties where roads are limited in number, difficult to build, and expensive to maintain. This can make rural living even more expensive and difficult. ARC Highway funds are therefore seen as important to expanding and strengthening the Region’s highway infrastructure. Participants noted past road improvements as critical for the area but also looked forward to the final completion and opening of the Appalachian Development Highway System (ADHS) Corridors X and V which will offer an important contribution to continued economic growth in Appalachian Alabama. ADHS

Corridors X (future Interstate 22) and V will provide major new connections to Memphis, Tennessee in the west and Atlanta, Georgia to the east.

### **Moving forward**

Participants were all adamant about the continued importance of ARC funding to the state. As a result, they would like to see current investments continued, particularly as they relate to infrastructure-related investments such as water, sewer and highways. Although participants noted here that more requests are now for industrial access roads and maintenance; while water/sewer is usually for capacity increase or new projects, not maintenance. However with ARC funds, participants noted that in some places infrastructure projects are stalled due to trouble with meeting matching fund requirements.

In addition to these ongoing investments, the participants expressed general consensus about expanding investments in several other emerging areas. For instance, developing the Appalachian Region's human capital and health and wellness efforts was viewed as increasingly crucial. Expanded broadband access was mentioned by several participants as a particular area of investment that needs continuous attention from ARC. Broadband potentially supports many other priority areas including entrepreneurship, home-based businesses, and the overall ability to compete in the global economy.

Continuing to invest in education funding, including technology and workforce programs for schools was another important potential focus area for ARC investments. State officials noted how workforce development and training efforts will focus on high growth and high demand occupations, including green and renewable energy related occupations and industrial technology and maintenance specialties related to Alabama's specific industrial sectors, including auto manufacturing. Workforce development was seen by participants as helping with the problem of youth brain drain by keeping talented people in the Region rather than leaving to find jobs elsewhere.

The discussion often noted the need to generally improve the quality of life within the region in order to retain and assist current residents, as well as attract new residents, especially young workers. Connected to this, creating places where people want to live and spend time was seen as a vital condition for success in other strategies related to tourism and entrepreneurship and others. A participant noted how important it was to maintain a group of 20-50 year old residents in your community to develop future leaders and support services like volunteer fire departments. Other participants also noted the need to work on job access by getting workers out of impoverished communities and getting them to job opportunities in the surrounding communities. Many residents need viable transportation options – having no money for vehicles and poorly developed public transit systems. Also prevalent was the need to train the workforce to have soft skills (e.g., timeliness, drug- free).

Going forward, health care is a growing concern for the citizens of Appalachian Alabama. Challenges included low levels of dentists per capita; a lack of hospital-affiliated substance abuse treatment services; a lack of hospital-affiliated psychiatric services; and a lack of obstetric care, particularly in economically distressed counties. On the business development side, finding suitable land is a big issue for industrial expansion as landowners want to keep land. In other areas, it's topographic. However, throughout the conversation on future investments, participants noted how difficult it is to predict, and that a great benefit is the flexibility of ARC funding, as that flexibility (unlike many other funding sources) allowed them to effectively respond to their region's many critical development challenges and to future challenges as they arise. They also encouraged ARC to keep fostering a climate for creative ideas to take hold, especially if they can create change in the way things are done, and maintaining the wide range of projects that can be funded.

### **Meeting Attendees**

- Lucas Blankenship, Top of Alabama Regional Council of Governments
- Joey Hester, North Central Alabama Regional Council of Governments
- Brenda Jones, Alabama Department of Economic and Community Affairs
- Keith Jones, Northwest Alabama Council of Local Governments
- Jimmy Lester, Alabama Department of Economic and Community Affairs
- Michael Mills, North Central Alabama Regional Council of Governments
- Yvonne Murray, Regional Planning Commission of Greater Birmingham
- Jeffrey Pruitt, North Central Alabama Regional Council of Governments
- Nancy Robertson, Top of Alabama Regional Council of Governments
- Jeff Schwartz, Appalachian Regional Commission
- Marilyn Smith, Northwest Alabama Council of Local Governments
- Max Snyder, West Alabama Regional Commission

## **Georgia ARC Focus Group Report**

On October 22nd, 2014 key ARC stakeholders in the state of Georgia met to discuss the impact of ARC investments in their communities. The Georgia Department of Community Affairs helped to organize and host the meeting in Atlanta, Georgia. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs used in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

Overall, focus group participants expressed enthusiastic support for ARC programs and investments. Participants regularly noted the importance of the program's flexibility and how that flexibility allowed them to find creative solutions for projects with no obvious funding stream. They also noted the importance of the support provided by the state's Local Development Districts (LDDs), the State and ARC's Washington office, and how that expertise was vital to ensuring that projects not only got off the ground, but were also completed.

### **Current role of ARC funding**

Georgia has historically used its ARC funding to make investments to address key development challenges, often related to basic economic development infrastructure. Through the Appalachian Highway Development System, ARC has helped to fund the development of Corridor A (GA 400, US 19, GA 515, US 76) and A1 (GA 400, US 19) that have improved the connection between Atlanta and North Georgia.

Many participants cited examples of ARC-supported water, sewer and access road projects that were instrumental in creating sites for new businesses or ensuring that existing employers can remain competitive in their existing locations. In partnership with other funders, ARC investments in access road construction paved the way for an expansion of the King's Hawaiian Bakery in Hall County and subsequent expansion. Similarly, ARC investments in upgrades to the sewer system in Barrow County allowed the Atlantic Engineering Group to retain 60 jobs and create 50 new jobs in Braselton.

Participants all noted that ARC investments were unique because they provided important seed money for projects with no guaranteed return. Relative to many other funding sources, ARC funds allow communities to take some risks and be occasionally speculative with their economic development projects. Few projects are as illustrative of this as ARC's involvement with the Chateau Elan Winery. In 1982, ARC partnered with the Town of Braselton to expand the town's existing water and sewer system to accommodate what at the time was a two person winery. This initial seed money, as well as subsequent investments, laid the foundation for what has become a

3,500 acre world class resort, conference center and leisure destination. None of this was guaranteed in 1982, but these early somewhat speculative investments in Chateau Elan led to over 300 jobs and significant local, state and Federal tax revenues.

In addition to providing key seed money, ARC funding has also filled important holes in the current funding landscape. For instance, participants noted the growing need to preserve historic landmarks within their communities, and the importance of these vestiges in defining the community's cultural identity and contribution. Given the flexibility of ARC funding, communities can develop projects that can address some of these issues and ARC funds have been used for a number of tourism projects throughout Appalachian Georgia. The purchase of four-acres of land in Gainesville, Georgia for the development of Paradise Gardens in 2011 has been important for that area as it has allowed it to emerge as a leading folk artist site. Other tourism-related projects include restoring three barns in Blairsville, Georgia on the property formerly owned by Georgia poet, Byron Herbert Reece in 2005; the creation of a phone-guided tour and related signage of the Shields-Etheridge Farm in Jefferson, Georgia in 2010; and preserving two slave cabins in Snellville, Georgia in 2010. Developing these attractions strengthens the ability of these communities to grow their revenues from tourism.

A number of Georgia communities have used ARC funding as part of their efforts to revitalize their downtown. For instance, ARC investments helped to renovate Jackson County's historic courthouse which has been a key element in revitalizing Jefferson's downtown. ARC investments in the renovation of the Somerville theater has also had an impact on that community as that facility is now capable of hosting conferences and other events. These projects are important to their communities because they make them more attractive places to live and therefore serve the dual purpose of attracting new residents and retaining existing residents.

ARC investments have also made a difference beyond just economic and business development. ARC investments have also helped to strengthen the Region's education and health infrastructure. Construction of Lanier Technical College's Manufacturing Development Center (MDC) in Gainesville, Georgia was in part made possible by an ARC grant towards sewer construction. Similarly, ARC was one of the investors in the construction of Northeast Georgia Health System's Gainesville Campus. This project not only increased the Region's access to healthcare services, but it also created 450 jobs in the process. ARC funds, in conjunction with USDA Rural Development funds, were also utilized to improve sewer improvements for Cedartown's new hospital in Polk County.

ARC has also invested in non-infrastructure efforts such as programs that address the Region's substance abuse problems. Developing the Region's local food system is another way in which ARC funds have been leveraged to improve the Region's overall wellbeing. ARC helped to fund the Northwest Georgia Regional Commission's North Georgia Local Food Assessment Guide.

This guide allowed the Commission to identify and assemble the right partners to move their local foods efforts forward. It gave the Region a roadmap from which to begin, for instance, farm to school programs by working with Georgia Organics.

Pulling these kinds of projects together often requires a level of capacity greater than what many smaller communities (particularly those with fewer than 5,000 residents) are capable. Participants noted that ARC investments in the Region's Local Development Districts have been vital to ensuring that these small, rural communities received consistent service in areas such as grant writing, project development and basic community planning. ARC has also helped to expand the GIS capacity within the LDDs, which better enables them to undertake master planning throughout the Region. In addition to the support within the Region, participants were grateful for the assistance that they receive from ARC representatives both in Georgia and in Washington, DC. Assistance related, for instance, to the sharing of best practice or for preparing successful grants and applications is greatly appreciated.

### **Moving forward**

Diminished resources have led to a shift in focus. While infrastructure projects remain an important element in Georgia's ARC program, growing costs and fewer resources have led communities to look more to other funding sources like the Georgia Environmental Finance Agency to fund traditional water and sewer projects. Consequently, Georgia's communities are now looking at other types of projects for which to invest their ARC resources. These projects have been related to downtown revitalization, historic preservation, tourism, or local foods. What many of these projects have in common is that they do not have obvious funders for which to turn. As a result, the flexibility of ARC's funding allows local communities the opportunity to find locally-driven solutions to their challenges, rather than trying to shoehorn their efforts into a more rigid state or federal funding program.

Moving forward, participants expressed great interest in expanding and strengthening the Region's broadband capacity. This is not only needed to support economic and entrepreneurial development, but also to improve the Region's quality of life both in rural locations and revitalized downtowns. Aside from broadband, workforce training and retention are ongoing challenges, and participants were particularly concerned about youth leaving the Region if they cannot find the right opportunities.

Participants noted several ways in which Georgia might refine its ARC program. Participants expressed a desire for more flexible timing for applications, possibly two or more application dates as the need for assistance can occur at any time throughout the year. Several communities also noted that they had communities in their county that did not reflect the attainment status of their counties. These persistent pockets of poverty are therefore more difficult to serve using ARC funds. Finally, several participants noted that ARC needs more visibility for its efforts not

only for what ARC resources and programs can be used for, but also to draw attention to what they have already accomplished.

### **Meeting Attendees**

- J.R. Charles, Hambersham County Economic Development Department
- Gretchen Corbin, Georgia Department of Community Affairs
- Jennifer Dees, Town of Braselton
- Jim Dove, Northeast Georgia Regional Commission
- Beth Eavenson, Elbert County, Joint Development Authority of Northeast Georgia
- Jeff Ellis, City of Rockmart (Written Input)
- Bill Fann, Cedartown, GA (Written Input)
- Heather Feldman, Georgia Mountains Regional Commission
- Pat Graham, Barrow County Chairperson
- Jon Herschell, City of Cornelia
- Guy Herring, Barrow County Economic and Community Development
- Jim Henry, Northwest Georgia Regional Commission (Written Input)
- Jerry Hood, Town of Braselton
- David Howerin, Northwest Georgia Regional Commission (Written Input)
- Julie Meadows, Northwest Georgia Regional Commission (Written Input)
- Kostas Skordas, Appalachian Regional Commission
- Phil Smith, Georgia Department of Community Affairs
- Saralyn Stafford, Georgia Department of Community Affairs
- Bob Thomas, Elbert County Manager
- Burke Walker, Northeast Georgia Regional Commission
- Mayor John Weaver, City of Jasper (Written Input)
- Dan Wright, City of Ringgold (Written Input)

## **Kentucky ARC Focus Group Report**

On October 21st, 2014 key ARC stakeholders in the state of Kentucky met to discuss the impact of ARC investments in their communities. The Kentucky Department for Local Government (DLG) helped organize the meeting which was hosted by Natural Bridge State Resort Park in Slade, Kentucky. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs used in their region and community.
- Changes in ARC-sponsored programs and funding over time.
- Notable and important ARC investment, and
- Current and emerging issues that might motivate additional, future investments.

Overall, participants were in agreement that ARC has played a central role in addressing many of Eastern Kentucky's development challenges. The impacts of ARC investments are visible throughout Appalachian Kentucky, as they have helped strengthen the Region's connectivity, improve the health of its citizens, create economic opportunities, and bring its infrastructure closer to parity with the rest of the country. In spite of this progress, focus group participants noted that much work remained and that ARC remains relevant and vital in moving forward.

### **Impacts of past ARC investments**

Over the past half century, few places have been as impacted by ARC and ARC investments than Appalachian Kentucky. Focus group participants all recognized this legacy, and its transformative impact on the Region. To paraphrase one participant, you cannot drive down a highway, drink a glass of water or flush a toilet in Eastern Kentucky without seeing the impact of ARC investments. These investments in the Region's basic infrastructure have been striking. While investments in water and sewer systems are now typified by their influence on industrial development, in Eastern Kentucky these early ARC investments brought clean drinking water and indoor plumbing to people who previously lacked even these basic services. It was noted that in some communities, ARC investments helped facilitate basic garbage disposal as well.

ARC investments have also reduced the Region's overall isolation. A quick scan of an interstate map shows that the Region lacks any real interstate access, and this minimal access severely limits its economic development potential. Roads constructed in part with ARC funding like the Bert T. Combs Mountain Parkway (Corridor I) or the Country Music Parkway (US 23-Corridor B) near Pikeville have created real development opportunities for previously disconnected, isolated regions of Appalachia.

ARC investments have also improved the overall wellness of the Region's population by improving access to healthcare. The Region struggles with higher than average rates of diabetes, obesity and cancer. ARC investments are evident by the construction of health clinics and by funding programs that address core healthcare challenges. For instance, ARC has invested in

Morehead State's Center for Health Education and Research which has increased the number of nurses and radiographic technicians in the Region. In partnership with the University of Kentucky, Morehead State has also been actively involved in the Appalachian Rural Dental Education Partnership Program. Oral healthcare is an often overlooked issue, but can have an important influence on people's wellbeing. This program not only provides people access to oral health screening by dental students from the University of Kentucky, but it also supports awareness programs for parents and children about the importance of oral health. Several participants also noted that in addition to improving the overall wellbeing of the Region's population, healthcare also provided an important source of jobs and regional employment.

Overall regional wellbeing requires economic opportunities for its citizens. Participants noted that ARC had also been instrumental in the development of industrial sites that have laid the foundation for job opportunities in the Region in areas such as advanced manufacturing and distribution. For workers to take advantage of these job opportunities they must have the proper skills, and as a result participants did praise ARC investments that helped build a campus of Ashland Community and Technical College on the grounds of EastPark industrial site. This campus will provide easier access to training for companies and workers at EastPark.

Participants noted a number of workforce and training programs where ARC investments made a significant difference. For instance, they noted ARC's involvement in the expansion of the University of Pikeville or the creation of the University Center of the Mountains in Hazard. The latter of which provides residents access to programs available through eight different institutions of higher education. Participants also noted the importance of ARC investments in youth programs like Roger's Scholars or Morehead State's efforts to promote Science, Technology, Engineering and Math (STEM) education.

For all of these efforts, ARC funding has rarely been the sole source of funding. However, participants noted that ARC funding often served as important seed funding that got a project off the ground or allowed communities to leverage other funds. In other instances, it may have served as closing funds that ensured that a project was completed. They also noted how the flexibility of funding allowed them to address challenges in a way not possible through other funding sources. Participants appreciate this flexibility as it enables communities to create locally driven solutions to regional challenges.

In addition, financial support for Kentucky's Area Development Districts was also appreciated. This support allows the ADDs to provide consistent and reliable support to communities that generally lack any real capacity to write grants or develop projects. It also allows them to provide basic GIS or planning services to these communities who are often unable to afford them. At a broader level, focus group participants also praised ARC staff in Washington for providing them with additional expertise or being able to connect them to other experts

elsewhere in the Appalachian region or beyond. This expertise can help strengthen the design of different projects and improve the likelihood that they will be successful and impactful.

### **Moving forward**

While much progress has been made toward achieving ARC's mission over the past 50 years, the focus group participants were in general consensus that much work remains. By way of illustration, one participant noted that Kentucky now has three times as many distressed counties as West Virginia, yet in 1990 it was the same. Therefore there is a need to complete the job that was started, be it in the highway infrastructure or achieving greater parity in health outcomes. This will require continuing ongoing infrastructure investments, but also finding creative approaches to addressing other ongoing regional challenges like public or workforce transportation, meeting the care needs of an aging population, improving the Region's affordable housing stock, or battling health issues such as obesity or substance abuse.

The work remains, but participants were aware and realistic about the challenges that lie ahead. Most notably, the resources are not available in the way they once were. As a result, it is important for the Region to leverage as many different opportunities as possible. This will require regional stakeholders to forge new partnerships and effectively communicate in order to avoid duplication. This will involve effectively leveraging the opportunities provided through Community Development Block Grants (CDBG) investments or Kentucky's Promise Zone. It will also require finding ways to activate private investors or local foundations. Participants noted that the state's Shaping Our Appalachian Region (SOAR) effort provided an effective venue to not only develop these partnerships, but also to have a larger discussion about the future of the Region. Participants expressed gratitude for the Federal Co-Chair contributing an additional \$750,000 to support the SOAR initiative.

One of the clear benefits of the SOAR initiative has been a larger discussion about the Region's future. The Region's economy is undergoing significant transformation at the moment as the accelerating decline of the coal industry has removed one of its major economic drivers. While some participants noted that Appalachian Kentucky needed a more diversified economy, others responded by saying that the Region needed to create an entirely new economy. In either case, ARC can play an important role in this transformation through its support for entrepreneurial support efforts or tourism development initiatives. It can also promote economic growth through continued investments in industrial site development and workforce training. Moreover, future investments must continue to address issues of connectivity and isolation. As a result, expanding and strengthening the Region's broadband infrastructure will be vital for the future.

The Region must also continue to build capacity and develop regional leaders and continued support for the ADDs remains one important element of this effort. However, participants also noted for ARC to continue to play an important role in the Region's future there needs to be more new leaders from the Appalachian region stepping forward to advocate on the Region's

behalf. Congressman Hal Rogers has been a great advocate for the Region, but participants noted that more leaders will be required to promote these efforts over the next fifty years.

### **Meeting Attendees**

- Rocky Adkins, Majority Leader of Kentucky House of Representatives
- Wayne Andrews, Morehead State University (Phone interview)
- David Barber, Kentucky Speaker's Office
- Amy Barnes, Kentucky Department for Local Government
- Al Cross, Institution for Rural Journalism at University of Kentucky
- Ron Daley, Hazard Community and Technical College
- Scott Hamilton, Appalachian Regional Commission
- Peter Hillie, Mountain Association for Community Economic Development
- Jerry Johnson, University of Louisville
- Lonnie Lawson, The Center for Rural Development
- Lynn Latrell, Kentucky Department for Local Government
- Hilda Legg, Legg Strategies
- Paul Patton, Former Governor of Kentucky (Phone Interview)
- Vonda Poynter, Federation of Appalachian Housing Enterprises
- Roger Recktenwald, Kentucky Association of Counties
- Jerry Rickett, Kentucky Highlands Investment Corporation
- Sandra Runyon, Big Sandy Area Redevelopment District
- Peggy Satterly, Kentucky Department for Local Government
- Kostas Skordas, Appalachian Regional Commission
- Al Smith, Former Appalachian Regional Commission Federal Co-Chair
- Greg Stumbo, Speaker of the Kentucky House of Representatives
- Jim Ward, Letcher County Judge/Executive
- Tony Wilder, Kentucky Department for Local Government
- Gail Wright, Gateway Area Development District

## **Maryland ARC Focus Group Report**

On October 28<sup>th</sup>, 2014 key ARC stakeholders in the state of Maryland met to discuss the impact of ARC investments in their communities. Maryland Department of Planning's Al Feldstein helped to organize the meeting that was held at the Allegheny Arts Council in Cumberland, Maryland. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs used in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

Overall ARC investments are valued by members of the local community and are seen as an important resource for the community moving forward. Participants were especially appreciative of ARC's ability to catalyze regional collaboration and by the service and leadership provided by ARC federal and state representatives.

### **Current role of ARC funding**

Focus group members recognize the interrelatedness of ARC investments and appreciate ARC's wide-ranging mission. Focus group participants highlighted the flexibility of investments and ability to make small, focused investments. ARC funds also frequently provide the leverage necessary to complete key projects. Many local leaders note that ARC's requirement to leverage multiple resources has helped them accomplish their mission – and ARC's matching investments often facilitated this leverage.

The ARC mission of “expanding the capacity of the people” gives room for a wide range of investment opportunities. Furthermore, local leaders noted that the Maryland's ARC Program Manager played an important role in educating new partners (especially those not located within the Region) about the issues and challenges facing Maryland's Appalachian communities. Focus group participants also praised federal and state ARC staff. Furthermore, their institutional knowledge made the grant process work very smoothly.

ARC investments have also played an important role in the Region's development. It offers the flexibility of funding that allows local partners to develop creative solutions to local problems. The Region's economic development leaders play a particularly important role in Maryland in managing the process of determining whether an ARC investment makes sense for a project. These three organizations serve as the go-between for marketing the project and helping organizations with the application process. These organizations know that the ARC cannot fund every project that comes along, so the economic development organizations help to identify which investments are likely to have the largest impact. State and local leaders consider

themselves stewards of the ARC funds and take great pride in the fact that their investments are effective and efficient.

Another way that ARC makes an impact on the community is through the connections that it facilitates. ARC's model for leveraged investment has spurred stronger collaboration amongst federal, state, local and private sector partners who have been forced to work together in order to secure these investments. For example, the Region's approach to supporting entrepreneurship came about through ARC facilitated collaboration among area colleges. Local leaders noted that this was less about the financial resources and more about the leadership and connections that ARC resources helped to facilitate.

The Allegheny County Human Resources Development Commission provides another compelling example of how a local organization can benefit from ARC's leverage and networking capabilities. HRDC staff described how the agency was asked to organize a thirteen-day medical clinic, with over a thousand people receiving medical services. A five-figure ARC grant helped to leverage more than \$1 million in local investment. Numerous people at the focus group session participated in a collaborative eight month planning process.

### **Impacts of past ARC investments**

Initially, ARC investments in Maryland focused on housing and traditional infrastructure such as water, sewers, and access roads. More recently, ARC has shifted to a greater share of its Maryland investment to supporting the provision of high speed broadband designed to better connect the Region to the wider world, much in the same way that highway investments once did. Maryland's greatest legacy includes the construction of I-68, which has been instrumental in connecting the Regions east and west of the Appalachians through the Cumberland Gap as well as connecting communities across a once isolated region. For large infrastructure projects like this, small investments from ARC may not seem significant at first, but they can be a key factor in catalyzing a larger investment or accomplishing regional goals. For smaller projects, the investments in access roads and related infrastructure have helped to open up key sites to development along the Region's interstate corridor.

The Region's educational institutions have also seen substantial expansions due to ARC investment. For instance, Frostburg State University expanded its nursing program from four to over 300 students with some assistance from ARC. Local public schools expanded their broadband infrastructure with help from ARC grants. In addition, local community colleges and technical schools have used ARC to develop new training programs and purchase equipment.

Local leaders also cited a number of "legacy" investments made by ARC that have helped to redefine the Region. For instance, the bike trail from Pittsburgh to Washington and the related Trail Town Program have been a boon for local business. The trail brings in people from all over the world to spend money at local businesses. It also has helped to attract major events,

including local cancer walks and kidney rides. Those events have helped to raise awareness about the Region and bring the community together. One example cited of this impact involved a tourist on the trail was so impressed by the Town of Hancock that he bought and rehabbed a building there.

### **Moving forward**

While ARC has significantly impacted Maryland's Appalachian communities, the organizations delivering services to local residents see a variety of future investment opportunities. ARC has long helped smaller communities meet basic water, wastewater and storm water infrastructure needs. These issues remain important, but participants also believe that ARC funds could better be used to leverage more private investment. This will be important in the area of telecommunications where rapidly changing technology will require continued investment. An expanded broadband infrastructure will be required to support greater tele-medicine, or distance learning. In addition, the leaders noted the need for programs aimed at attracting and retaining quality healthcare professionals.

Many participants also described the importance of broadband and related infrastructure improvements to support post-secondary education in the Region. In fact, continued investment in education was a recurring theme during the meeting. There was an agreement that the Region's sparse and declining population affects the area's ability to make a case for greater public investments. Consequently, the state's school funding formula does not favor local schoolchildren because the area's declining population has led to budget cutting for schools and limiting opportunities for the educational system to invest as a way to remain competitive.

Related to this last point, local leaders believe that it is vital that the Region attract and retain young people, and suggested a number of ways to provide education, public transportation, arts and culture, and other amenities. Broadband infrastructure was mentioned by multiple parties as a particularly important tool for both homes and businesses. This would be beneficial for education, healthcare and other vital areas. In addition, participants recognize the hidden costs for area residents to live, especially for those who cannot afford a car, because the area's underfunded public transit system limits route options, leading to fewer riders and less funding.

Participants mentioned a number of areas in which ARC can improve or make the application process easier. Most of these concerns related to the application process, where ARC's basic agency requirement tied to federal procurement regulations can present challenges. At times, grantees have a difficult time finding a logical agency to serve as their basic agency.

Understaffed state agencies have a hard time helping due to paperwork and other issues tied to the combination of federal and state procurement rules. That being said, ARC received positive reviews for the new online application system, quick turnaround, flexibility, and customer service. With Al Feldstein's retirement, participants are greatly concerned about ensuring that the

state can hire a new program manager. They hoped that she or he will bring a strong local knowledge and will proactively work to develop a strong relationship with regional stakeholders.

### **Meeting Attendees**

- Bill Atkinson, Maryland Department of Planning
- Matt Diaz, Allegany County Economic and Community Development
- State Senator George Edwards, District 1, Garrett, Allegany, and Washington Counties
- Paul Edwards, Mayor of Garrett County
- Al Feldstein, ARC/ Maryland Department of Planning
- Nil Grove, Allegany County Public Schools
- Scott Hamilton, Appalachian Region Commission
- Shawn Hershberger, City of Cumberland Development Office
- Joe Hoffman, Frostburg State University
- Sonny Holding, Congressman John Delaney's Office
- Ann Jacobs, Senator Ben Cardin's Office
- Linda Janey, Maryland Department of Planning
- David Jones, Allegany College of Maryland
- Janice Keene, Evergreen Heritage Center Foundation
- Rick MacLennan, Garrett College
- Jay Oliver, City of Cumberland
- Vic Rezendes, Allegany Arts Council
- Cindy Sharon, Garrett County Economic Development
- Anne Shepard, Hagerstown Community College
- Kostas Skordas , Appalachian Region Commission
- Chris Sloan, Allegany Arts Council
- Elizabeth Stahlman, City of Frostburg
- Robin Summerfield, Senator Ben Cardin's Office
- Courtney Thomas, Allegany County HR Development Commission
- Guy Winterberg, Tri-County Council for Western Maryland

## **Mississippi ARC Focus Group Report**

On October 15<sup>th</sup>, 2014 key ARC stakeholders in the state of Mississippi met to discuss the impact of ARC investments in their communities. The Mississippi Development Authority helped to organize the meeting that was hosted by the Community Development Foundation in Tupelo, Mississippi. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs used in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

Overall ARC investments, particularly related to support for the Planning and Development Districts (PDDs), are seen as vitally important to the communities they serve, and this is especially true for the most rural communities. Additionally, the flexibility and consistency of ARC funding as making an important contribution to Appalachian Mississippi's rural and distressed communities.

### **Current role of ARC funding**

Mississippi has focused much of its past and current ARC funding on infrastructure development programs. Participants value the flexibility and broad parameters of ARC funding that allow local stakeholders to use their local knowledge to structure their efforts so that they best meet their unique challenges. ARC funding for the state's PDDs is particularly important to these efforts, as it allows the PDDs to provide services to communities in a consistent, reliable, and integrated fashion. Participants praised the responsiveness of their ARC representatives, especially during emergency situations. For example, ARC funding supported one PDD's GIS staff, which in turn allowed them to provide a detailed assessment of the areas affected by devastating tornadoes. One participant suggested that the ARC acronym should stand for "active, reliable, and caring."

Participants noted the value of being able to learn about ARC investments and strategies in other regions, and this knowledge allowed them to better craft their own strategies and metrics for success. They also stated that the ARC requirement to create community wide action plans helps them to prioritize and plan for future regional investments. Planning and technical assistance is particularly important for many small and rural communities that lack resources and capacity. ARC funding in Mississippi helped create the Appalachian Community Learning project—a self-help, results-based approach to community and economic development. This popular program has helped provide seed money for various community projects, including after school programs, farmers' markets and high school student career recruitment.

Small ARC investments can prove vital for moving larger projects forward, as they can provide gap financing, seed funding for pilot projects, or contributions to larger projects. ARC funding often provides the initial infrastructure or business assistance investment in an area, which can lead to securing larger private investments in the future. For instance, ARC invested in industrial pads as part of an industrial land development project in Panola County. These investments contributed to a company deciding to build in the Region soon afterwards because the county had a site readily available. As another example, ARC funding for water tank projects in Yalobusha County have recently led to three major company expansions in that area.

### **Impacts of past ARC investments**

Several participants offered examples demonstrating the importance of early ARC investments. During the early 1980's, the Mississippi Forestry Commission was able to use ARC funding to participate in the federal Forest Legacy Program. This ongoing ARC funding investment has returned millions of dollars to both the private and public sectors. Other notable early ARC investments contributed to the Red Hills/Mississippi Lignite Mining project in Choctaw County, which has been one of that region's major economic drivers. Similarly, ARC investments contributed to the National Hills Heritage Area, an important regional cultural resource.

The state has used ARC funding for a wide range of infrastructure projects related to transportation, water and sewage, civic/community centers, communications, natural resource conservation, and health care. Participants emphasized the major impact ARC investments, such as local access roads and water and sewage lines, have had in drawing businesses to the Region. In addition to these kinds of infrastructure projects, ARC has funded a large number of smaller industrial infrastructure projects contributing to industrial parks, incubators, and spec and industrial buildings that have collectively had an outsized impact on the Regional economy.

ARC funding for infrastructure improvements has been especially vital for rural and distressed counties that do not receive enough tax revenue for funding even minor infrastructure upgrades. Funding from the program has gone toward not only building infrastructure, but also consolidating and coordinating regional infrastructure systems, like different water systems. Funding has also been used for some major infrastructure projects, including the highway Interstate-22 in northern Mississippi. Many of the infrastructure investments such as sewer and water line and access road have led to many small investments, rather than large investments by major businesses. Participants noted that infrastructure investments through programs like Main Street Batesville in Batesville, MS can help municipalities quickly increase their tax revenue due to the influx of several new small businesses in an area newly served by infrastructure.

Participants noted the great value of ARC funding for technology infrastructure projects, including telecommunications infrastructure and Enhanced 911. The latter is especially important due to the Region's frequency of tornados. ARC also helped fund MEGAPOP (Mississippi Economic Growth Alliance and Point of Presence), a partnership between the

Mississippi Economic Growth Alliance and Telepak Networks to deliver advanced broadband telecommunications services. ARC funding also helped the Northeast Mississippi Planning and Development District partner with Blue Mountain Community College and Northeast Community College to further advance the Region's broadband capacity.

ARC funding has been particularly important for initiating workforce development programs. ARC provided gap funding so the state could match a grant from the Carl D. Perkins Vocational and Technical Education Act, which the state has used to create several workforce development programs and educational institutions. In 2006, Mississippi received an ARC construction grant related to Hurricane Katrina, which helped them serve about 1,900 people and leverage close to \$1 million in addition to ARC funding over three years. Noxubee and Clay Counties then started a construction skills program, which proved vital for retraining workers after a major plant closing in 2007 in West Point. The program has also been used for retraining ex-offenders from Noxubee County Correctional Facilities, which has been "life changing" for graduates. ARC investments also supported an industry partnership between Itawamba Community College and various industry representatives to establish a mobile welding lab and other training programs to help meet their manufacturing training needs.

Participants noted the major return on investment they have experienced from using ARC technology grants for small workforce training related projects, such as mobile science labs, software equipment purchases and community college training programs. ARC funding has also helped them create a mobile career aspiration lab to inform high school students about careers in manufacturing, and an interactive conference system to support their training activities.

### **Moving forward**

ARC investments have helped to spur investment and address many development challenges in Mississippi's Appalachian communities. In spite of this, there remain many enduring pockets of poverty through the Region and there are challenges yet to be addressed. A few participants stated that it was difficult to meet ARC funding job creation requirements for projects intended more for quality of life improvements. Participants also noted the need to maintain the flexibility of ARC funding, as that flexibility (unlike many other funding sources) allowed them to effectively respond to their region's many critical development challenges.

In addition to maintaining many of the current ARC investments, participants noted several other ongoing and emerging priority areas. Because much of the infrastructure in the Region was put in place during the 1960's and 70's, participants asked for support in funding physical infrastructure replacement projects. Participants also asked for increased funding for road, water and sewer infrastructure projects, especially highway building. Additionally, there was particular interest in expanding and strengthening the broadband infrastructure. All of these emerging areas point to the oft noted need to generally improve the Region's quality of life to retain existing residents and attract new ones. This is especially true for young workers that have left

the Region. In addition, participants noted the importance of bridging the gap in employment for workers who are between projects, so that the Region can retain highly skilled workers.

### **Meeting Attendees**

- Mike Armour, MDA/ARC Regional Office, Tupelo, MS
- Phylis Benson, Golden Triangle Planning and Development District, Starkville, MS
- Robert (Bob) E. Borton, Mayor – City of Macon, Macon, MS
- Spencer Brooks, Golden Triangle Planning and Development District, Starkville, MS
- John Byers, Three Rivers Planning and Development District, Pontotoc, MS
- George Crawford, Golden Triangle Planning and Development District, Starkville, MS
- Joseph P. Dodson, Golden Triangle Development LINK, Starkville, MS
- Steve Hardin, Mississippi Development Authority, Jackson, MS
- Larry Hart, Mayor – City of Water Valley, Tupelo, MS
- Kyle L. Jordan, Office of Congressman Harper, Starkville, MS
- Nancy Knight, Former ARC Director, Tupelo, MS
- Mindy Maxwell, Office of Senator Cochran, Columbus, MS
- Kawana McCary, East Central Planning and Development District, Kemper County
- Jamie McCoy, Northeast Mississippi Planning and Development District, Booneville, MS
- Sue Moreland, Appalachian Regional Commission
- Hank Moseley, Office of Congressman Harper, Starkville, MS
- Dr. Mabel Murphree, Office of Congressman Nunnelee, Former ARC Director, Tupelo, MS
- William (Boo) Oliver, Noxubee County – Board of Supervisor, Macon, MS
- Larry Otis, Former ARC Director, Starkville, MS
- Sandra Perkins, MDA/ARC Regional Office, Tupelo, MS
- Drew Robertson, Office of Senator Wicker, Tupelo, MS
- David P. Rumbarger, Community Development Foundation, Tupelo, MS
- Dr. Raj Shaunak, East Mississippi Community College, Starkville, MS
- Susan Shedd, Mississippi Development Authority, Jackson, MS
- Sonny Simmons, Panola Partnership, Batesville, MS
- James Williams, Itawamba Community College, Tupelo, MS

## **New York ARC Focus Group Report**

On December 8<sup>th</sup>, 2014 key ARC stakeholders in New York State met to discuss the impact of ARC investments in their communities. The New York Department of State helped to organize the meeting that was hosted by the Southern Tier East Regional Planning and Development Commission at the Doubletree by Hilton Hotel Binghamton. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs used in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

Overall, there was great enthusiasm for ARC investments, as it is one of the few programs that afforded them the ability to address their unique regional and local needs. Participants noted that ARC funding was vital for providing seed funding to move bigger projects or funding pilot projects that allowed communities to test innovative new ideas. Importantly ARC has also been instrumental in helping communities—in part through its support of the Region’s Local Development Districts (LDDs)—build their capacity to respond to both new and persistent challenges. They also appreciated the stability of the program over the past several decades and particularly how the federal-state-local collaboration allowed them the flexibility to address challenges that required creative responses.

### **Impacts of past ARC investments**

In many places throughout Appalachia, the impact of ARC funding can be found in the hard infrastructure projects pertaining to water, sewer and roads. While similar investments have been made in New York State, the state has never been one of the largest recipients of ARC funding. As a result, ARC investments in the state have often focused on a different set of issues but ARC’s impact on the Region remains evident. For instance, past ARC investments supported the creation of social welfare and child development programs that are still in operation today.

ARC has also been a leader in supporting new development ideas. For example, ARC funded many of the early planning grants related to broadband deployment and those plans allowed the Region to get a jump on installing what has become a vital piece of infrastructure. The range of ARC-supported projects underway in New York State demonstrates how this flexible funding source can be used to address a wide array of regional challenges. New York State uses its ARC funding for several purposes including seed funding, to pilot innovative projects, to help build community capacity, and to promote regionalism.

ARC investments have allowed New York State to seed programs that seek to address key regional challenges. Within the area of healthcare, for instance, ARC investments seeded social

service and child development programs that are still in operation today. It has been used to fund healthcare-related programs such as a mobile cancer screening unit that since 2009 has screened 12,000 people. ARC funds have also seeded the establishment of an accelerated nursing curriculum at Hartwick College that will allow graduates to complete their program earlier and more quickly to begin to meet the Region's need for nurses.

ARC investments have also allowed New York State to pursue innovative pilot projects in emerging areas of economic development. For instance, ARC investments have supported Finger Lakes ReUse's deconstruction program, which is a one-of-a-kind program in upstate New York. This program helps deconstruct homes and buildings, or refurbish computers, so that many of the materials are reused rather than creating additional waste for landfills. These deconstruction projects also provide workforce development opportunities for workers, as they gain practical experience in the construction and other technical trades.

New York State is also attempting to leverage its significant agricultural assets for economic development. ARC has assisted this effort through several pilot projects. For instance, ARC has helped to support the Groundswell Center for Local Food and Farming. Working with partners like the Cornell Cooperative Extension and the New York Department of State Office of New Americans, Groundswell is a 10 Acre Farm Incubator that provides support, resources, and training for new farmers. These services may range anywhere from basic farming techniques to English as a Second Language for farmers. In doing so, it hopes to contribute to a more sustainable food system.

ARC investments have also been used to create support for producers of craft food and beverages through funding creating the Hartwick Center for Craft Food and Beverage. In partnership with Hartwick College and Brewery Ommegang, ARC funding will contribute to staff support and equipment that will provide testing, business development and education for small breweries, wineries, distilleries, and other craft food producers. These activities have grown in upstate NY, and these services will make it easier for these enterprises to retain and grow their employment.

In addition to these pilot projects, ARC investments have been instrumental in promoting regional efforts. For instance, ARC funding in conjunction with a New York State Local Government efficiency grant helped underwrite a planning project that examined the water systems in northwest Chautauqua County and see how eight different local governments could work together to create a more efficient and integrated water system. ARC investments have also supported less traditional economic development efforts like the Career Opportunities in Rural Education (CORE) program in Otsego County. This program has helped to promote career awareness among students in multiple school districts and start a conversation between schools and businesses about what students need to succeed. ARC funding allowed the Milford School District to hire a coordinator that helps to facilitate and sustain the conversation and activities

that occur between the various regional partners. Programs like this have helped to give a new regional vision for school districts that do not always think regionally.

ARC investments have also been critical in building the capacity of communities throughout New York State's Appalachian counties. This is most evident through its support of the New York State's Regional Planning and Development Boards. This funding allows the RPDBs to better assist their communities by underwriting some of the costs involved in grant writing, project development or complying with state and Federal guidelines. Similarly, ARC funding offsets some of the costs they incur to provide planning and support services like the use of Geographic Information Systems (GIS). This GIS capacity has allowed the RPDBs to map water and sewer systems or the Region's broadband network. This information is a vital input to crafting more regional solutions to these challenges. ARC involvement has also allowed New York State communities to both access and share best practices not only throughout Appalachian New York (e.g., the planner's roundtables), but throughout the entire region as well. This planning support has also been vital for the Regions because it has allowed them to strengthen their proposals to their respective regional economic development councils, which in turn has made them more competitive for state economic development funding.

### **Moving forward**

Looking to the future, the participants were in general consensus that ARC investments in the Region were an important source of funding and should continue. As noted above, ARC investments help spur innovative approaches to solving regional development challenges. Participants did note that there were several areas where ARC might want to consider placing its attention in the future.

Issues pertaining to sustainability and addressing information related to climate change were noted as an area that requires creative thinking for addressing a multi-faceted problem. This not only means funding innovative programs like Finger Lakes ReUse, but also looking for other ways in which to reduce the environmental impact of economic development activities. In a somewhat related manner, participants also noted the need to find better local and regional approaches to storm water run-off and resiliency planning. Like many other parts of the ARC region, this region has been severely impacted by flooding and preparing for and responding to these events may be another area meriting greater ARC attention.

Another challenge facing rural regions is public transportation. New York State's rural areas make people car dependent. While mobility services are available in places for the aged and elderly, this is less the case for workers. As a result, workers lacking reliable personal transportation are at a real disadvantage in finding work opportunities. ARC funding might be used to better understand this issue and fund practical solutions.

For all the reasons mentioned above (seed funding, pilot project opportunities, capacity building, region building) participants remain enthusiastically supportive of ARC funding and the program's structure. Even though the funding is less than it has been in the past, it remains a vital tool for addressing the Region's challenges. The flexibility of ARC funding allows New York State's Appalachian communities to do more with less, and it is an important tool for leveraging additional funding opportunities. It not only helps fund innovative pilot projects, but its contributions to the Region's planning capacity makes the communities in New York State's Appalachian communities better able to respond when new opportunities present themselves.

### **Meeting Attendees**

- Maggie Arthurs, Hartwick College
- Diane Cohen, Finger Lakes ReUse
- Frank Evangelisti, Broome County Planning
- Carlana Ficano, Hartwick College
- Joanna Green, Groundswell Center
- Jen Gregory, Southern Tier East Regional Planning and Development Board
- Erik Miller, Southern Tier East Regional Planning and Development Board
- Dan Neff, Appalachian Regional Commission
- Mark Pattison, New York State Department of State
- Carolyn Price, Town of Windsor
- Liz Rickard, Milford Central School
- Jack Salo, Rural Health Network SCNY
- Kevin Stevens, Milford Central School
- Joanne Tobey, Bassett Healthcare Network
- Marcia Weber, Southern Tier Central Regional Planning and Development Board

## **North Carolina ARC Focus Group Report**

On July 11<sup>th</sup>, 2014 key ARC stakeholders in the state of North Carolina met to discuss the impact of ARC investments in their communities. The North Carolina Department of Commerce helped to organize the meeting that was hosted by the High Country Council of Governments in Boone, North Carolina. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs used in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investment.

Overall ARC investments, particularly related to support for the Local Development Districts (LDDs) and water and sewer projects and local food systems, are seen as vitally important to the communities they serve, and this is especially true for the most rural communities. Additionally, the flexibility and consistency of ARC funding and services were cited as being critical to meeting the needs of rural and distressed communities. The participants also noted the ARC programs will have more significant impacts in their communities in the future with a more explicit focus on the return of investment.

### **Current role of ARC funding**

Participants noted ARC funding has played a crucial role in North Carolina's Appalachian region. Support for the Local Development Districts (LDDs) was seen as one of the most important elements of ARC's efforts in North Carolina. Relative to many other states, North Carolina devotes more of their ARC funds to their LDDs. This funding allows the LDDs to provide planning services and assistance with grant writing and project development for many of their more rural communities. Several participants mentioned ARC investments in the community planning has increased local jurisdiction's capacity in project management and fund raising. In addition, ARC projects are seen the catalyst for communities to work together. Without this funding, the LDDs would be less able to provide consistent and reliable service to their smaller and more distressed communities. Due to this funding, it was noted that the LDDs in the western part of the state were in many instances, like writing CDBG grants, able to provide a greater level of service than their rural counterparts in eastern North Carolina.

Relative to many other forms of federal funding, North Carolina's ARC funding is relatively small. However, ARC funding can provide a critical gap funding for a number of regionally important projects. This funding ensures that projects get completed, or enables communities to leverage other forms of needed funding. These investments have shifted over time, and while North Carolina continues to use ARC funds for water, sewer and other large infrastructure projects these investments are increasingly being used to support efforts related to local food systems, education and workforce development, and entrepreneurial development among others.

ARC investments often provide important early funding which can have important ancillary benefits. One good example is the Home of the Perfect Christmas Tree in Mitchell County. ARC provided resources that helped to modernize a sewer line in Spruce Pine. This project laid the foundation for the establishment of the Home of the Perfect Christmas Tree, which provides a facility for local crafts people and small businesses to sell their handmade products. Since the project was started in 2003, 60 individual small businesses – many are owned by crafts people who lost their jobs in the furniture and manufacturing industries due to outsourcing in the past decades – have been created. Proceeds and a portion of the royalties from the product sales are used to fund scholarships at the local high school. ARC investments have also been used to support other entrepreneurial support efforts. For instance, ARC investments contributed to the Piedmont Angel Network that ARC has helped fund. The Piedmont Angel Network has invested in 23 companies since 2002 with a primary focus on the life sciences, technology, software, and advanced materials fields.

North Carolina has also used ARC funding to grow the local food systems in its Appalachian region. ARC's support has been particularly vital for small and independent farms to grow and expand. For instance, ARC, along with other North Carolina organizations such as North Carolina Golden LEAF Foundation and North Carolina Rural Economic Development Center, funded the Foothills Pilot Plant, a small scale slaughtering and processing facility serving independent growers of poultry and rabbits. Foothills Pilot Plant is the only USDA inspected small-animal slaughter facility in North Carolina.

North Carolina's ARC investments have also been utilized to retain some of the Region's larger businesses as well. For example, ARC funding supported renovating a major water pipe line in Wilkesboro, NC to meet increased demand in water from a large food company (Tyson Foods). With this ARC funding, the community was able to leverage more financial resources for this project. These investments were an important reason the community was able to retain over 200 jobs.

### **Impact of Past ARC Investments**

North Carolina's ARC investments have shifted over time. Past ARC investments were focused on a wide range of traditional economic development projects related to water and sewage, transportation, and community facilities. These investments were helpful in filling critical gaps, often to support the Region's manufacturing sector which has historically driven the Region's economy. Given the sharp declines in the textiles and furniture industries and the lack of large new manufacturing projects, the focus of North Carolina's ARC investments has somewhat shifted.

While ARC investments continue to go into infrastructure projects (e.g. water, sewer, access roads), these investments have become more diverse over time. North Carolina's ARC investments now are directed toward projects that address issues related to entrepreneurship,

local food systems, and community planning. This transition of ARC investments in North Carolina from traditional economic development projects to less tangible projects is largely due to declines in traditionally competitive industries such as furniture and manufacturing and more limited resources. As a result, there are fewer opportunities to develop these kinds of projects.

Participants provided examples of several past ARC projects that were critical to the development of their communities. For instance, combined with investments from other sources such as the U.S. Economic Development Administration and North Carolina Rural Center, ARC funding supported building the Granite Falls water tower in Caldwell County. This water tower was a critical element of much subsequent commercial and residential development. The Hot Springs Health Center in Madison County is another ARC supported effort that has had lasting impact. This health center was initially built in the early 1970s and since then has served as one of the primary medical and healthcare providers for Madison County and its surrounding counties.

### **Moving forward**

ARC investments have played a critical role in major economic development efforts in North Carolina's Appalachian region. All participants noted ARC's continued support was important to their communities. They also wished to see ARC funding and services remain flexible, consistent, and predictable going forward. This was especially important for the support for the LDDs. As participants noted, ARC's future investment in community planning is critical for LDDs to improve their staff capacity and build sustainable models for project management in longer term. In addition, many participants emphasized ARC should expand its investments to help LDDs implementing their plans and fulfill the entire planning process.

In addition to maintaining many of the current ARC investments, participants noted several other ongoing and emerging priority areas, most of which are related to improving the Region's quality of life and competitiveness. Almost all participants agree ARC expanding the reach of the Region's broadband infrastructure was an increasing priority moving forward. Last mile broadband is particularly challenging for many of the Region's more isolated areas. Broadband infrastructure was viewed as foundational for other initiatives related to local food systems, entrepreneurship, or the delivery of rural healthcare. Healthcare-related issues were another identified issue requiring greater attention. This effort will not only improve access to basic healthcare such as proximity to urgent care centers and general practitioners but also stimulate economic growth in distressed region.

There was also a consensus among the participants that ARC should increase its investments in local food systems, particularly in North Carolina's rural communities. For instance, the Foothills small animal pilot plant has proven successful and more help would be needed to allow it to serve more small animal producers. ARC investments might also be used to support the

Regional livestock market, or craft food and beverage producers in order to create more opportunities for local growers and producers.

The participants also noted the future ARC investment should place priority on supporting education and workforce development in distressed regions. Future ARC investments might help fund projects like the Spring Creek Literacy Project. This is an ongoing effort to help girls and young women from rural communities of Hot Springs, Laurel, and Spring Creek gain the skills they need for success in high school and beyond. As in other states, participants appreciated how ARC investments allow local communities to address this diversity of challenges and think it is important that these programs continue in a manner consistent with the past.

**Meeting Attendees:**

- Dee Blackwell, Western Piedmont Council of Governments
- Richard Canipe, High Country Council of Governments
- Kristy Carter, ARC Regional Planner, NC Department of Commerce
- Kelly Coffey, High Country Council of Governments
- Olivia Collier, ARC State Program Manager, NC Department of Commerce
- Matthew Dolge, Piedmont Triad Regional Council
- Mickey Duvall, High Country Council of Governments
- Jim Edwards, Isothermal Planning and Development Commission
- Sarah Graham, Southwestern Commission
- Sherry Long, Western Piedmont Council of Governments
- Ken Noland, High Country Council of Governments
- Ryan Sherby, Southwestern Commission
- Danna Stansbury, Land of Sky Regional Council
- Gary Steely, Piedmont Triad Regional Council
- Phil Trew, High Country Council of Governments

## Ohio ARC Focus Group Report

On November 14<sup>th</sup>, 2014 key ARC stakeholders in the state of Ohio met to discuss the impact of ARC investments in their communities. The Governor's Office of Appalachia helped to organize the meeting that was hosted by Zanesville Community College in Cambridge, Ohio. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs used in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

Overall ARC investments are valued by members of the local community and are seen as an important resource for the community moving forward. Meeting participants noted the importance of Local Development District funding to building community capacity throughout the Region. Additionally, it was noted that the ARC federal-state-local model allowed Ohio's Appalachian communities not only respond to traditional economic development challenges, but also to ongoing and emerging development challenges in areas such as healthcare and workforce development.

### Current role of ARC funding

As in many states, investments in the Local Development Districts were cited as one of the important uses of ARC funds. With diminishing budgets for local governments, these investments allow LDDs to provide consistent services for local governments that lack capacity. As a result, LDDs can assist local governments with activities such as grant writing and project development. This administrative funding also allows Ohio's Appalachian LDDs to provide other services like GIS, community planning, and data analysis for their communities. Providing and building this kind of community capacity ensures that small, rural communities have better access to resources, and can at least keep pace with other communities. Extending these kinds of basic services to underserved areas was a common theme repeated by the participants.

ARC funding also plays several important pieces of the funding puzzle. Communities have used ARC funding to fill funding gaps in projects to ensure that they are completed. More often, however, ARC funds are used to leverage additional funding and resources. One participant noted that ARC investments often gain up to 10:1 leverage. In an era of scarce resources, the ability to pull together a variety of funding sources is crucial to completing most projects.

A keyword for ARC impacts in Ohio is diversity. ARC funding has been used toward a variety of efforts ranging from workforce development to water and sewer expansion to growing broadband access. All of these efforts are intended to improve quality of life, economic development efforts, and job retention. This diversity of issues reflects the flexibility afforded by

the ARC federal-state-local partnership model that allows communities to create unique solutions to local problems. For instance, health and wellness issues related to substance abuse, obesity and other issues related to poverty present critical challenges to the Region's development. ARC funds allowed the Lawrence Economic Development Corporation to conduct a feasibility study for a medical wellness center in Lawrence County. Raising funds had been a challenge because the facility does not qualify as either a hospital or educational institution.

### **Impacts of past ARC investments**

Similar to many other ARC states, basic infrastructure investments typified early ARC investments. Water lines, sewage systems, and highway systems have been typical projects undertaken in the Region. These basic infrastructure investments can make a large impact on a community. For example, ARC helped fund a new wastewater treatment plant in a town that had lost an existing employer and needed assistance to maintain existing businesses. Basic infrastructure has been vital for key economic development and business retention projects – FedEx brought over 750 jobs to Lawrence County partially due to the development of an industrial park that was funded in part by ARC investments.

These kinds of infrastructure and construction projects were aided by the state's ability to serve as the basic agency for these efforts. When these projects had to rely on large Federal agencies to administer these grants, the process may have moved at too inefficient a pace. Companies were ready to create jobs in the area, but they were on a faster schedule than the local organizations' federal partners, and these delays might cause them to move forward with their efforts in the Region. As the state assumed this basic agency role, these projects were able to move at a somewhat quicker pace and ensure that projects were completed more efficient manner.

These investments in the Region's economic development infrastructure made a significant difference in its development trajectory. However, due to more limited resources it is increasingly difficult to provide these services and undertake these projects in communities that are more remote and have smaller populations. As a result, ARC investments in Ohio have shifted to fund a wider array of projects related to healthcare, workforce development/education, and business assistance. Healthcare projects may, for instance, involve increasing access to healthcare services by investing in telemedicine or equipping clinics.

Similarly, ARC investments have strengthened the Region's education and workforce infrastructure. For example, Zanesville Community College was once just a business and industry training center, but it has now been transformed into a more comprehensive campus. A critical link in the transformation was an ARC grant that helped build a state of the art science lab. This development paved the way for a fundraising campaign and building expansion. ARC funding also helped the college expand its welding program in support of the Region's manufacturing sector. Other efforts have been made to support entrepreneurial and business development opportunities. For instance, ARC funding has helped to leverage local private and

foundation money for export promotion programs for family-owned businesses and youth development programs. All of these programs are important for changing the culture of the Region from one often typified by dependency and instead create one based on self-sufficiency.

### **Potential future investments**

Moving forward, the ARC Ohio focus group attendees expressed an interest to expand workforce and entrepreneurial development efforts in their communities. The community college system was mentioned as a possible source for new leadership training opportunities and workforce development. Focus group participants were also uniformly interested in changing the culture of the Region by improving education, health outcomes, and self-sufficiency/entrepreneurship.

Workforce development was a recurring theme among participants, in both specific industries and general issues related to culture and basic education. Medical wellness will continue to be an issue in the area, and investments in drug prevention, nutrition, and more will help both quality of life and business retention and expansion, as this is a workforce development issue.

Participants were also concerned about youth retention and attraction. They believe that quality of life and amenities are vital to convincing young people with potential to stay in the area. The area's relative isolation is a recurring theme and traditional remedies for addressing this isolation (e.g., highways) needs to be mixed more with newer solutions (e.g., broadband).

Participants also sought to find ways to further growth the Region's local craft industries, such as those producing locally made furniture. Focus group participants believe that entrepreneurship and small firms are important, as they would change the character of the Region from relying on company relocation to the Region for employment to self-sufficiency. Participants also sought greater investment in business incubators and other investments in entrepreneurship that might help revitalize downtown areas, diversify the economy, and expand businesses. In addition, participants would like to see a greater focus on the logistics needs for cooperative multi-county businesses (e.g., supply chain networks for furniture makers). Entrepreneurship will be a focus moving forward, as participants recognize that small communities have a difficult time attracting large businesses.

Participants note that money continues to be tight, and that the needs that they are currently meeting will continue to be issues. Some participants would like to see more small capacity-building projects in communities, which was something ARC had funded in the past. A number of participants also mentioned the need for flexibility in their revolving loan fund requirements. One organization's fund has essentially turned into a grant program due to program limitations, and they would find it helpful, for example, to be able to change interest rates. In addition, some believe that equity is more of a need for businesses than loans, and they are interested creating more connections for equity investors.

## **Meeting Attendees**

- Bret Allphin, Buckeye Hills-Hocking Valley Regional Development District
- Cara Brook, Foundation for Appalachian Ohio
- Paul Brown, Zane State College
- Peggy Carlo, County Commissioner Ashtabula County
- Misty Casto, Buckeye Hills-Hocking Valley Regional Development District
- Greg DiDonato, Ohio Mid-Eastern Governments Association
- Bill Dingus, Lawrence Economic Development Corporation
- Ray Eyler, Holmes County
- Karen Fabiano, ODSA Community Services Division
- Senator Lou Gentile, Ohio Senate
- John Hemmings, Ohio Valley Regional Development Commission
- Ralph Kline, Lawrence County Community Action
- John Molinaro, Appalachian Partnership for Economic Growth
- Mary Oakley, Ohio Development Services Agency
- Joy Padgett, Governor's Office of Appalachia
- Ron Rees, Corporation for Ohio Appalachian Development
- Molly Theobald, Appalachian Regional Commission
- Viviane Vallance, Lawrence Economic Development Corporation
- Perry Varnadoe, Meigs County
- Jeannette Wierzbicki, Ohio Mid-Eastern Governments Association
- Jason Wilson, Governor's Office of Appalachia
- Mike Workman, Contraxx Furniture
- Kathy Zook, Eastgate Regional Council of Governments

## **Pennsylvania ARC Focus Group Report**

On July 9<sup>th</sup>, 2014 key ARC stakeholders in the state of Pennsylvania met to discuss the impact of ARC investments in their communities. The Pennsylvania Department of Community and Economic Development helped to organize the meeting that was hosted by SEDA-COG in Lewisburg, Pennsylvania. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs used in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

Overall, ARC investments, particularly related to support for the Local Development Districts (LDDs) and enterprise development programs, are seen as vitally important to the communities they serve, and this is especially true for the most rural communities. Additionally, the flexibility, consistency and predictability of ARC funding and services was cited as being critical to meeting the needs of rural and distressed communities.

### **Current role of ARC funding**

In the past, Pennsylvania's ARC funding focused on infrastructure projects, but over the past few decades has transitioned to more of a service delivery role, especially through the Local Development Districts (LDDs). Participants noted that moving from narrowly-focused infrastructure projects to more service delivery has allowed the program to have a broader impact throughout the Region. Consequently, Pennsylvania's current ARC funding supports several broad issues including funding for LDDs, Enterprise Development, supplementing and complementing larger projects with targeted investments, and providing seed funding for small, often pilot projects.

Most participants identified support for the LDDs as the most valuable role that ARC plays in the state's Appalachian region. ARC funding allows the LDDs to provide consistent and reliable service to the communities that they serve. LDDs can provide local communities with a range of planning services related to numerous disciplines (e.g., economic development, workforce development, transportation, tourism, environmental, etc.). ARC funding allows LDDs to do this in a consistent, reliable, and integrated fashion. This technical assistance is particularly important for many small and rural communities that lack resources and capacity. Several participants cited the critical ability of LDDs to serve as an interagency connection between different service providers and local jurisdictions within the Region. LDDs also connect local residents and businesses with resources at the state, regional and federal levels, as well as private resources.

Pennsylvania has also focused much of its ARC funding on enterprise development programs. Specifically these funds complement other funding sources in support of three primary areas—government procurement, export financing and business financing. The increased usage of ARC funding for enterprise development has led to small seed financing packages and assistance that help businesses expand their markets and internal capacity, which in turn advances the Region’s business retention and job creation efforts. Participants value the flexibility and broad parameters of ARC funding that allow the structure of projects to be formed by the local stakeholders that have a stronger understanding of the issues facing the Region.

Small amounts of ARC funding can also prove vital for moving larger projects forward. ARC funding for local access roads has been especially important. For instance, an access road project has supported the creation of a new Life Science industrial park in Mifflin County that will include a health center and create more than 100 jobs. Similarly, funding for an access road has furthered the development of the recently opened Anthracite Outdoor Adventure Area in Northumberland County. Built on abandoned coal mining land, this park provides opportunities for hiking, camping, horseback riding and other recreational activities. Additionally, ARC has supported a technology project at the park that tests new ways of using cell phone coverage to increase safety and security for visitors.

ARC funding has also been used to seed smaller, often pilot projects. Participants mentioned several examples of these smaller projects including the New Berlin Energy Independence Project. This 3-year project, funded by ARC and other partners (including PPL Electric Utilities, Bucknell University, and the Pennsylvania Department of Community and Economic Development among others) sought to achieve greater energy independence in the small rural community of New Berlin, PA (pop. 900). This project allowed the community numerous ways to conserve energy, and these measures have gone on to save New Berlin \$200,000 in energy costs annually. The project resulted in the publication “Energizing Small Communities” which serves as a guide for other communities. The ability to pursue this kind of project speaks to the overall flexibility of ARC funding.

### **Impacts of past ARC investments**

Pennsylvania’s current usage of ARC funding with its emphasis on supporting the LDDs and enterprise development funding differs from its usage during the 1970s and early 1980s. This is due in part to a relatively smaller amount of available funding. In the past, Pennsylvania used ARC funding for a wide range of infrastructure projects related to transportation, water and sewage, communication, recreation, business assistance, community facilities, and healthcare.

Several participants offered examples demonstrating the importance of early ARC investments. In Lackawanna County, ARC provided the first funding in 1978 for an access road to the Montage Mountain ski resort, which was completed and opened in 1984. Participants appreciated not only this initial project investment, but also ARC’s unwavering commitment throughout the

long public hearing process. Combined with four or five later investments, ARC eventually invested about \$3 million into the project. Opening up this land for development eventually led to more than \$500 million in private investment and four to five thousand jobs, as well as spin-off development in the area, such as golf courses, retail, housing, hotels, a stadium and service businesses.

In 1983, ARC provided a grant for a feasibility study on whether a public-private initiative could sustain rail in the Region, which led to the formation of the SEDA-COG Joint Rail Authority, an 8-county rail organization. The SEDA-COG Joint Rail Authority has invested over \$100 million in the Region for providing rail service, including refurbishment and capital upgrades, and extending new service to industrial parks. This investment has “created a whole different outlook in some of those towns” because of the current increase in the use of freight rail traffic over trucking. The World Bank recently used the SEDA-COG Joint Rail Authority as an example of successful regional rail model in a manual (prepared by Cambridge Systematic) for developing countries on models transportation initiatives.

In addition to these kinds of infrastructure projects, ARC has funded a large number of small infrastructure projects throughout the Region, such as Brownfield redevelopments and health centers, which have collectively had an outsized impact on the Regional economy. Participants noted that ARC’s early funding for rural healthcare facilities and career and technical education facilities have made a lasting impact and contributed to the overall health and capacity of the Region’s people.

### **Moving forward**

ARC investments have helped to spur investment and address many development challenges in Pennsylvania’s Appalachian communities. In spite of this, there remain enduring pockets of poverty through the Region and there are challenges yet to be addressed. To this end, there was a consensus among the participants that the most vital future ARC investments should place priority on maintaining the support for the LDDs. LDD support was seen as providing one of the greatest returns on ARC-related investments. Increasing investments in broadband access was seen as another critical investment area that fits well within ARC’s overall mission. Participants also noted the need to maintain the flexibility of ARC funding, as that flexibility (unlike many other funding sources) allowed them to effectively respond to their region’s many critical development challenges.

In addition to maintaining many of the current ARC investments, participants noted several other ongoing and emerging priority areas. Toward the top of this list was the need for increased support for expanding and strengthening the broadband infrastructure. Broadband infrastructure was viewed as foundational for other initiatives related to local food systems, entrepreneurship, or the delivery of rural healthcare. Healthcare-related issues were another identified issue requiring greater attention. This ranged from ensuring adequate access to basic healthcare such

as proximity to urgent care centers and general practitioners to reducing the incidence of obesity, diabetes and substance abuse among the Region's population.

Participants also noted the importance of supporting projects that address issues related to quality of life or quality of place. These types of projects may take on several forms. For instance, they may address water resources or sustainable development issues. They may incorporate projects like the Susquehanna Greenway Partnership and the multi-county Pennsylvania Wilds project that build on the Region's natural assets for recreation, tourism and other local business opportunities. All of these emerging areas point to the oft noted need to generally improve quality of life within the Region in order to retain and assist current residents, as well as attract new residents, especially young workers that have left the Region.

### **Meeting Attendees**

- Kevin D. Abrams, Northern Tier Regional Planning & Development Commission
- Kim D. Barnes, Northern Tier Regional Planning & Development Commission
- Jeffrey K. Box, Northeastern Pennsylvania Alliance
- Eric M. Bridges, North Central Pennsylvania Regional Planning & Development Commission
- Lisa Davis, Pennsylvania Office of Rural Health
- Neil Fowler, Pennsylvania Department of Community & Economic Development
- Jill Foys, Northwest Pennsylvania Regional Planning & Development Commission
- Ned Goucher, Northwest Pennsylvania Regional Planning & Development Commission
- Jim Hassinger, Southwestern Pennsylvania Commission
- Yvonne Lemel, Pennsylvania Department of Community & Economic Development
- Elizabeth Lockwood, SEDA-Council of Governments
- Teri MacBride, PPL Electric Utilities
- Julie Marshall, Appalachian Regional Commission
- Robert Postal, Mifflin County Industrial Development Corporation
- Tom Pellegrini, Northeastern Pennsylvania Alliance
- Deborah L. Prosser, Southern Alleghenies Planning & Development Commission
- Dennis E. Robinson, SEDA-Council of Governments
- Lorri Shaver, Pennsylvania Department of Community & Economic Development
- Lew Villotti, Southwestern Pennsylvania Commission
- Jerry S. Walls, SEDA-COG Joint Rail Authority Board

## **South Carolina ARC Focus Group Report**

On December 17<sup>th</sup>, 2014 key ARC stakeholders in the state of South Carolina met to discuss the impact of ARC investments in their communities. The South Carolina Department of Commerce helped to organize the meeting that was hosted by the South Carolina Appalachian Council of Governments (ACOG) in Greenville, South Carolina. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs used in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

Overall, ARC investments have been important in spurring economic development throughout the upstate South Carolina region. ARC has been an important source of funding for rural projects that do not always have a guaranteed return on investment. Participants were also especially grateful for the assistance that they receive from their local development district, the state department of commerce and ARC's Washington-based staff.

### **Current role of ARC funding**

South Carolina has focused much of its ARC funding on infrastructure development programs. Participants value the flexibility and broad parameters of ARC funding that allow the structure of projects to be formed by local stakeholders. They highly valued the open communication channel and technical assistance provided by ACOG, especially for learning about public and private grant opportunities, and assistance with grant writing.

ARC funding is often used as simultaneous match funding for grants from other federal agencies, such as the U.S. Economic Development Administration or the USDA Rural Development agency. Participants noted that the largest challenges for accessing ARC funding are lining up partners, getting match funding, and understanding the complex regulations that accompany applying for and administering federal grants. ACOG brings invaluable expertise for helping applicants navigate these challenges and forging partnerships between different economic development stakeholders in the Region. ACOG's provision of grant information has created a "true support system for smaller communities" in the Region.

Participants appreciated the helpfulness of ARC staff in Washington, as well as the ARC program manager with the South Carolina Department of Commerce. This assistance was especially appreciated during the application process, where participants noted their appreciation for the willingness to provide feedback on how to improve their applications and projects. This type of communication helps create an "open forum for South Carolina". By serving as the basic agency for construction projects that are partially funded by ARC, the state has also helped to

make the administration of these projects relatively easier and more efficient. Participants also noted the value of being able to learn about ARC investments and strategies in other regions, especially through peer-to-peer networking at ARC workshops. For instance, one participant mentioned that attending an ARC-sponsored workshop on local foods in West Virginia proved very helpful to their efforts locally. This kind of information sharing allows stakeholders to see what types of projects work in other regions and provides them with ideas for additional ways they can use ARC funding in South Carolina. However, some noted that they would like to see additional opportunities to share best practices between different regions.

### **Impacts of past ARC investments**

Since the start of the ARC program in South Carolina, the state has used ARC funding for a wide range of projects related to workforce training, economic and industrial development, food systems, education, healthcare, water and sewer systems, and transportation. ARC funding for infrastructure improvements has been especially vital for rural and distressed counties. One participant noted that ARC funding was integral to the upstate South Carolina region.

Several participants offered examples demonstrating the importance of early ARC investments. In addition to basic infrastructure, ARC provided funding support for many economic and workforce development projects in the Region. Greenville Technical College received construction and equipment funding for multiple workforce training related projects, including the Quick Jobs with a Future, allied health, dental worker, and truck driver training programs, as well as campus expansion projects. Tri-County Technical College has received funding from ARC for welding laboratories. Participants noted that the Quick Jobs with a Future proved especially beneficial for training dislocated workers during the recent downturn. One participant stated that without ARC funding for workforce training programs at the Region's technical colleges, large manufacturing plants like BMW would not have chosen to locate in the Region.

ARC funding for infrastructure in underserved communities has led to economic and industrial development in areas that otherwise would not have received that investment. Participants were particularly appreciative of being able to use ARC funds for these kinds of rural projects, as other federal grant programs generally do not invest in areas not already served by infrastructure. Moreover, few funding sources are able to be relatively speculative in nature, but ARC is one of them. Specific examples in the Region include road improvements to a publicly funded industrial park in Pickens County that have resulted in thousands of jobs. Other examples are water lines along Highway 5 and providing infrastructure that supported the creation of a regional outlet mall on Highway I-85.

Education grants from ARC and others helped ACOG develop various technology driven business development tools for regional businesses. These include business planning technical assistance and InfoMentum, a GIS-based data and mapping service that allows investors to generate maps and reports on demographic and market conditions, as well as access a database of

industrial sites and buildings for the ACOG region. ACOG is also developing a new technology-driven project to support entrepreneurship in the Region, and a website for taking counties through steps to become more business friendly, which is currently being piloted by three rural communities in the Region.

ARC funding in South Carolina has evolved from mainly meeting the basic needs of rural communities to funding more of a mix of projects, such as tourism and other quality of life improvements. Multiple recent ARC projects in the Region have focused on food systems planning, including a small animal facility program in Greenville, a planning technology project at Tri-County Technical College, and business plan development assistance for communities looking to become “farm-to-table” enterprises. ARC has also provided assistance with identifying gaps in their regional food system infrastructure.

### **Moving forward**

Participants also noted that continued ARC investments will play an important role in diversifying the Region’s economy. Its flexibility can fund projects related to quality of life and tourism that often do not have any obvious sources of funding. These projects are not only important for creating jobs and attracting visitors and residents to the Region, but they also help establish a new regional identity. ARC investments can be helpful in developing the Region’s local food system or promoting attractions related to the Region’s Revolutionary War history.

Several participants noted the success of the Greenville Health System Swamp Rabbit Trail, a Rails-to-Trails, multi-use trail system in Greenville County, South Carolina. Not only has this trail drawn tourists to the Region, but it has provided a framework that has allowed communities throughout the Region to connect their attractions and make the Region a more attractive destination. Other communities in the Region are following the Swamp Rabbit Trail model. For instance the “Blueways” (i.e., Water Trails) river recreation initiative in Spartanburg and Upstate Forever connects water attractions with tourism and environmental efforts.

Participants also noted that ARC investments might be useful for downtown redevelopment initiatives. Communities like Gaffney hoping to replicate the downtown revitalization success of Greenville through investing in streetscape improvements and taking part in the National Main Street Center redevelopment process. Like many ARC investments, these initiatives touch upon many development challenges. A collection of nice downtowns can make the Region a tourist destination. They also provide an attractive environment for new residents or entrepreneurs, and denser development can improve the public transportation infrastructure, which is relatively underdeveloped in the Region.

Participants are also looking for further economic and workforce development assistance through entrepreneurship training and after school education, especially for building the Region’s Information Technology (IT) workforce. ARC could also help expand the Region’s IT capacity

through broadband infrastructure development projects, as there remain many gaps in broadband coverage.

In order to market the Region globally, South Carolina is looking to attract more foreign direct investment and developing export plans through public-private partnerships like the Upstate South Carolina Alliance. Although participants were very interested in exploring opportunities for ARC investment needs, they also suggested increased ARC support for increasing collaboration between economic development partners on new regional initiatives. This was especially true for smaller, rural communities.

### **Meeting Attendees**

- Jill Francisco, South Carolina Department of Commerce
- Jane Hall, South Carolina Appalachian Council of Governments
- Tracy U. Martin, Town of Blacksburg
- Michael McInerney, South Carolina Department of Commerce
- Scott Park, Greenville County
- Dirk Reis, South Carolina Appalachian Council of Governments
- David Shellhorse, South Carolina Appalachian Council of Governments
- Kostas Skordas, Appalachian Regional Commission
- Brian Swords, Tri-county Technical College
- James R. Taylor, City of Gaffney
- Elizabeth Varga, Greenville Technical College
- Caroline Wilson, South Carolina Appalachian Council of Governments

## **Tennessee ARC Focus Group Report**

On May 16<sup>th</sup>, 2014 key ARC stakeholders in the state of Tennessee met to discuss the impact of ARC investments in their communities. The Tennessee Department of Community and Economic Development helped to organize the meeting that was hosted by the East Tennessee Development District in Alcoa, Tennessee. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs used in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

Overall there was enthusiastic support for ARC programs and investments. ARC is seen as vitally important to the communities it serves, and this is especially true for the most rural communities. Additionally, the consistency and predictability of ARC funding and services was cited as being critical to meeting the needs of rural and distressed communities. Participants also noted that they appreciated that the majority of ARC funding ends up “in the ground” in the form of, for instance, actual water and sewer lines, and not lost to substantial administrative costs.

### **Current role of ARC funding**

Participants noted that ARC funding remains a relatively small part of their region’s overall funding portfolio, but they all noted that it nevertheless plays a critical role in getting projects off the ground. For the participants, ARC funding was a tool for addressing core economic development challenges that require medium and long-term thinking. This funding often plays an important seed role—like installing water and sewer lines—that provide the foundation for later development. Without these initial investments, communities would find it more difficult to secure additional investment and activity.

ARC funding also continues to play a crucial role for many rural and/or distressed counties because there remains tremendous pockets of need, which are often isolated pockets of need. As one participant noted, “ARC means more for rural counties than you can imagine.” Meeting the match requirements for many potential funding sources can often prove challenging for the most distressed counties. ARC’s favorable match requirements therefore make it a crucial funding source for many smaller communities.

For instance, Pickett County is Tennessee’s least populous county with just over 5,000 residents. One participant noted that ARC was one of that county’s only hopes to fund infrastructure projects because they lack the resources to meet the match requirements needed to access other forms of infrastructure funding. Another participant noted that there would be no public water

system in rural Cocke County if not for ARC. Similarly, ARC funding has been important to Hancock County which has the lowest percentage of public water access in Tennessee.

Participants also view the relatively small amount of funding provided to the Local Development Districts as important for rural communities. Rural counties often lack the staff capacity and resources to meet all of their planning needs. The LDD funding provided by ARC allows the Local Development Districts to provide consistent and reliable planning and government services to their rural counties. In doing so, rural counties can access these services without having to potentially rely on more expensive consultants.

### **Impacts of past ARC investments**

At the time of its launch, ARC sought to bring the Appalachian Region to parity with the rest of the country. While the work is far from finished, the focus group participants thought that Tennessee's Appalachian communities had made meaningful progress toward fulfilling that goal. ARC investments allowed many rural Tennessee residents access to clean water and sewer, renovated schools in order to keep them open, and helped to put in place an infrastructure to support industry that created local employment opportunities.

While never a large component of the total funding package, this funding—both in the past and present—has served as important seed funding to get larger projects started. Several participants offered examples demonstrating the importance of early ARC investments. For instance, in 1986 ARC investments helped to fund the installation of a new sewer line that helped to prepare the current site for Pellissippi State Community College in Knox County. At the time, that \$500,000 investment looked small, but Pellissippi State now serves over 11,000 students and is a core component of the Region's higher education and workforce development systems. More recently, ARC investments were instrumental in getting the Kingsport Center for Higher Education facility off the ground. Kingsport has traditionally been underserved by higher education institutions, and this facility made it possible for Kingsport residents to access higher education from six different institutions in one location.

Several other residents noted that ARC investments in water and sewer lines allowed for the establishment of industrial corridors that have made economic development possible. This was certainly the case in Meigs County—a rural county without interstate access. ARC funding allowed for the creation—and over time expansion—of water and sewer lines to industrial sites. Without this infrastructure, the county would have limited opportunities to build its industrial base. Similar stories were shared by representatives from other rural locations like Polk County. The initial ARC investments made later investments possible.

ARC investments in highway infrastructure are also viewed as crucial as they provide important connections. This is particularly true for rural, mountainous counties where roads are limited in number, difficult to build, and expensive to maintain. In Polk County, several rock slides along

US 64 caused travelers to face an 80 mile detour. This can make rural living even more expensive and difficult. ARC Highway funds are therefore seen as important to expanding and strengthening the Region's highway infrastructure.

### **Moving forward**

Participants were all adamant about the importance of ARC funding. As a result, they would like to see current investments continued, particularly as they relate to infrastructure-related investments such as water, sewer and highways. In addition to these ongoing investments, the participants had general consensus about expanding investments in several other emerging areas. For instance, developing the ARC Region's human capital was viewed as increasingly important. These kinds of investments may take several forms. It may involve supporting efforts to provide workers with in-demand skills such as ARC's support for Motlow State's new Mechatronics program. These investments may also speak to general health and wellness efforts, such as increased support for substance abuse programs.

Investing in downtown redevelopment was another potential emerging focus area. Creating places where people want to live and spend time was seen as a vital condition for success in other strategies related to tourism, entrepreneurship and others. Increasing investments in broadband access was another critical investment area that fits well within ARC's overall mission. Broadband supports many other priority areas whether it related to local foods and agri-tourism or support for entrepreneurship and home-based businesses.

### **Meeting Attendees**

- Morris Baker, City of Kingsport
- Terry Bobrowski, East Tennessee Development District
- Brooxie Carlton, Tennessee Department of Community and Economic Development
- Hoyt Firestone, Polk County Executive
- Lorie Fisher, South Central Tennessee Development District
- Donald Hurst, Cocke County Partnership
- Garland Lankford, Meigs County Mayor
- Paula Lovett, Tennessee Department of Community and Economic Development
- Leigh McClure, Southeast Tennessee Development District
- Michelle Price, Upper Cumberland Development District
- Ken Rea, First Tennessee Development District

## Virginia ARC Focus Group Report

On September 18<sup>th</sup>, 2014 key ARC stakeholders in the state of Virginia met to discuss the impact of ARC investments in their communities. The Virginia Department of Housing and Community Development helped to organize the meeting that was hosted by the Roanoke Valley-Alleghany Regional Commission in Roanoke, Virginia. Participants were asked to give their input on several broad issues including:

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- ARC-sponsored programs used in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

Overall ARC investments are seen as vital to the Region's Appalachian communities, particularly those in the Virginia coal fields. ARC funds have been vital to laying the foundation for future development, leveraging key regional assets to spur new economic activities and ongoing health and workforce development challenges. In addition, investments in the Local Development Districts (LDDs) affords these communities access to the planning and support services they need to take advantage of opportunities as they arise. The flexibility, consistency and predictability of ARC funding and services was cited as being critical to meeting the needs of rural and distressed communities.

### Current role of ARC funding

Virginia uses its ARC funding to spur investments in building community capacity and in both traditional and non-traditional economic development activities. As in many states, the participants agreed that ARC's support of the local development districts was a vitally important element of the program. This funding—which for some of the more rural LDDs is an important source of non-local funding—allows LDDs to provide consistent planning services to rural communities throughout western and southwestern Virginia. These services might take the form of grant writing or more time consuming activities like project development. Without these services, many rural communities would be at an even greater disadvantage when it comes to leveraging additional funding.

ARC investments are rarely the sole source of funding. They can either serve as seed funding for an innovative project or it may represent the closing money needed to ensure that a project moves forward. The participants noted that ARC funding often can be used to attract other funders, such as the Economic Development Administration, Virginia Tobacco Commission, Foundations or private funds. ARC interest in a project can provide a signal to these other funders that the project is a 'real' project that is viable and has the ability to provide regional impact. For instance, in Danville, ARC funding helped bring foundation and private funds to the table for several projects.

The flexibility of ARC funding has allowed Virginia communities to undertake this wide range of projects that do not neatly fit into typical funding programs (e.g., USDA Rural Development, U.S. Economic Development Administration). This has been particularly true for efforts pertaining to cultural and heritage-related tourism. The Region's culture represents one of its great place-based assets. To better leverage these assets, ARC has invested in programs like the Crooked Road. The Crooked Road connects 19 counties, 4 cities and dozens of smaller communities in a regional effort to make southwest Virginia a destination for heritage music enthusiasts. ARC provided the 'glue' money that binds regional actors (including the 5 LDDs) around these efforts and it also helped to complement other funding sources like the Virginia Tourism Commission, The Virginia Department of Housing and Community Development, the National Endowment of the Arts, and several foundations, among others. In doing so, Virginia has used its ARC funding to create a structure around which other funders can invest, and communities can turn their individual attractions into a larger regional destination. The Crooked Road is therefore emblematic of how the larger federal-state-local ARC model can work in an era of scarce resources.

Infrastructure projects related to water and sewer and roads remain important, and the impacts of past ARC investments in these areas are wide-ranging. One participant noted that it is difficult to travel far within southwest Virginia and not see a project that had been supported by ARC. The ARC impact on the Region is everywhere, and this is particularly true in the western Virginia coalfields. Participants noted several highway projects that have created opportunities in western Virginia. For instance, when completed the Corridor Q project (US Route 460) will connect Pikeville, KY to Interstate 81 in Christiansburg, VA. The improvements on this route have already facilitated better access to the interstate for many rural communities. Similarly, creation of four lanes on U.S. Routes 23 and 58 (which intersect in Duffield, VA) has allowed these roads to become more significant arteries that can create greater development opportunities. Similar investments in water and sewer systems have also created development opportunities for Appalachian Virginia.

The administration of these large infrastructure projects can be costly and inefficient. Virginia has been a leader amongst Appalachian states by assuming the role of the basic agency for its construction projects. In doing so, the state manages the construction contracts rather than larger Federal agency like the Department of Housing and Urban Development or the Department of Transportation. This often makes the contract administration more efficient and projects are completed earlier thereby reducing the risk of costly delays. A number of other states are now following Virginia's lead in adopting the basic agency role.

### **Moving forward**

Meeting participants confirmed the federal-state-local model used by ARC has worked well for Virginia's Appalachian region. They found the feedback that they received from both ARC and

the Virginia Department of Housing and Community Development to be very beneficial in terms of developing projects and making sure they were structured in a way that would enable a successful outcome. Moreover, they mentioned that Virginia assessed projects not just on a year to year basis, but with a somewhat longer time horizon. A project may not fit with Virginia's current ARC funding program, but that project may be revisited in subsequent years.

Moving forward, Virginia will continue to use its ARC funding to support key infrastructure projects related to water and sewer or road access. However, the state is also making investments that will help lay the foundation for a new economy that is less dependent on traditional manufacturing and natural resource extraction. Doing so requires addressing a variety of current and emerging challenges facing Virginia's Appalachian region.

The diversity of these responses can be illustrated by several projects undertaken by the West Piedmont Planning District Commission's service area (Patrick and Henry counties, and the city of Martinsville). This region, which joined the ARC region in 2009, has used ARC funding to address a variety of development challenges. For instance, ARC investments contributed to the completion of the New College Institute which is a center for higher education that provides the Region's citizens easier access to college and university education. In partnership with the GENEDGE Alliance (Virginia's Manufacturing Extension Partnership affiliate), ARC investments have supported the delivery of E3 (Energy, Environment, Economy), a program that helps the Region's manufacturers adopt more sustainable and efficient manufacturing processes.

In the future, Virginia will continue to use ARC investments to support many other efforts to create a new economy. For instance, investments designed to expand the Region's broadband infrastructure have contributed to this goal in several ways. Expanded broadband access has allowed the Region to attract more retirees to the Region because it is one of several basic amenities required for those retirees who have many options for their retirement destination. It is also vital to the Region's entrepreneurial ecosystem as it creates more small business opportunities. This is best illustrated in Galax, VA where investments in efforts like the Crossroads Institute have helped the Region overcome the loss of 2,000 furniture jobs by assisting in the creation of 1,200 new small businesses.

ARC funding has also been used to support the provision of healthcare throughout the Region and this is another area where the expansion of the Region's telecommunications infrastructure can have wide ranging impact. For instance, Virginia was one of the first states to fund broadband when it funded the installation of fiber for the Haysi Clinic. This kind of connectivity is particularly important for delivering health services in rural areas. Virginia's ARC funds have also been used to fund the St. Mary's Health Wagon that brings basic health care services to rural, under-served, high poverty areas in southwest Virginia.

Meeting participants were overwhelmingly positive about ARC programs, but there were a couple of issues that they thought required some additional consideration. While not a widespread issue, several participants did note that the change in county economic status from year to year can cause some issues in project development and planning. For some smaller, distressed counties raising matching funds is an ongoing challenge, so a change in economic status that requires them to raise more can pose challenges. This is particularly true for counties looking to develop more long-term projects.

Moreover, the change in economic status may not reflect actual progress in the Region. For instance, a decrease in unemployment may mask underemployment and people falling out of the labor force altogether. In addition, participants noted that within Virginia's Appalachian counties—even the more prosperous counties like Botetourt County—there remain a number of persistent pockets of poverty. Given that funding is often prioritized by county economic status, using ARC funding to address these pockets of poverty remains incredibly difficult.

### **Meeting Attendees**

- Jim Baldwin, Cumberland Plateau Planning District Commission
- Patrick Burton, New River Valley Planning District Commission
- Leah Manning, West Piedmont Planning District Commission
- Duane Miller, LENOWISCO Planning District Commission
- William Shelton, Virginia Department of Housing and Community Development
- Wayne Strickland, Roanoke Valley-Alleghany Regional Commission
- Matt Weaver, Virginia Department of Housing and Community Development
- Ed Wells, Roanoke Valley-Alleghany Regional Commission

## **West Virginia ARC Focus Group Report**

On August 7<sup>th</sup>, 2014 key ARC stakeholders in the state of West Virginia met to discuss the impact of ARC investments in their communities. The West Virginia Development Office helped to organize the meeting that was hosted by the West Virginia Economic Development Authority in Charleston, West Virginia. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs use in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

Overall there was enthusiastic support for ARC programs and investments. ARC is seen as vitally important to the communities it serves, and this is especially true for the most rural communities. Additionally, the consistency and predictability of ARC funding and services was cited as being critical to meeting the needs of rural and distressed communities. Participants also noted that while ARC investments have been enormously impactful to the state, the most significant legacy of ARC was not necessarily financial related. “It changes the culture,” participants agreed. ARC helped create a culture of collaboration across agencies and levels of government, between the private, public and non-profit sectors, and in communities throughout West Virginia.

### **Current role of ARC funding**

Participants noted that ARC funding plays a critical role in getting projects off the ground and as a tool for addressing core economic development challenges that provide the foundation for later development. ARC investments continue to help fund a wide array of projects across West Virginia including water and sewer, education, healthcare, business access to capital via revolving loan funds, workforce training and community development. Without these investments, communities would be unable to get these projects started or completed.

Several participants noted the importance of small-scale investments. For instance, one program underway includes the state’s Flex-E-Grant program. This program provides small grants, up to \$10,000, that may be used to support local leadership, civic engagement and capacity building efforts. These grants foster civic entrepreneurship with leadership training for residents of West Virginia's ARC-designated distressed counties so they become more effective participants in the civic life and leadership of their communities. This approach contributes to the development of the community and the community members. Flex-E-Grant is a joint effort of the West Virginia Development Office (WVDO), the Appalachian Regional Commission (ARC) and the Claude W. Benedum Foundation. The collaboration of WVDO, ARC, and the Benedum Foundation is helping to address some of the state’s healthcare needs.

ARC funds contribute to this effort through investments that focus on improving access to oral healthcare. The number of days missing work because of bad oral health is actually a workforce issue, and West Virginia falls below the national standard for oral health. The Benedum Foundation representatives indicated that the ARC investment has been crucial to this effort to improve oral health across the state.

Additionally, ARC investments have supported many important state initiatives to develop communities and grow the economy. For instance, ARC has been heavily involved with the state's Main Street Program as one of the main funders since the creation of the program. ARC also helped fund a new and incumbent worker training program for existing manufacturers. This program provides cross training for manufacturing workers. West Virginia has an aging workforce and is looking to work on replacing retirees in manufacturing with younger workers. ARC hired the trainers to teach managers how to write job descriptions, standardize the production process, and also reimburse companies with costs related to new equipment training. The state's international trade office was also initially started and supported by ARC. The flexibility of ARC funding made these types of investments possible.

ARC funding also continues to play a crucial role for many rural and/or distressed counties because there remains tremendous pockets of need, that are often quite isolated. Helping to form this perspective were not just singular projects but the continuing commitment to fund the local planning councils, which are on the front lines to make things happen in West Virginia. The funds provided to the Local Development Districts are important because rural areas often lack the staff capacity and resources to meet all their planning needs. The LDD funding provided by ARC allows for consistent and reliable planning and government service to these rural counties.

### **Impacts of past ARC investments**

At the time of its launch, ARC sought to bring the Appalachian region to parity with the rest of the country. While the work is far from finished, the focus group participants thought that West Virginia's Appalachian communities had made meaningful progress toward fulfilling that goal. ARC investments allowed many rural residents access to clean water and sewer, and helped to put in place an infrastructure to support industry that created local employment opportunities. ARC has also played a leadership role in West Virginia in bridging non-traditional economic development issues such as local food, healthcare, and alternative energy with traditional economic development activities.

Past ARC investments in West Virginia have worked in building the foundation and capacity to provide needed services to residents. Among the most basic, water and sewer investments have been an important part of ARC investments over the years in West Virginia, necessitated in many instance by the impact of the state's mining industry on water quality. But ARC has done much more; for instance, Appalachian ambulance service was supported by ARC back in 1970s. ARC also invested significantly in building career centers in West Virginia, while many

community health clinics would not exist today if not for ARC funding. As one participant summarized, ARC has been involved with all the major impactful projects in West Virginia in the past few decades.

While never a large component of the total funding package, ARC funding—both in the past and present—has served as important seed funding to get larger projects started. Several participants offered examples demonstrating the importance of early ARC investments. For instance, ARC funded the planning for the Bakers Island community park project. The community got in total a half million dollar investment for that project to build a parking lot and other facilities for that park. This park is now the key community recreational facility and amenity. Leveraged ARC investments have also been used to create revolving loan funds to offer area businesses access to needed capital. Several of these loan funds have turned small initial ARC investments into multi-million dollar capital funds for the ongoing benefit of the local economy.

ARC investments in highway infrastructure are also seen as crucial past investments as they provide important connections. This is particularly true for rural, mountainous counties where roads are limited in number, difficult to build, and expensive to maintain. This can make rural living even more expensive and difficult. ARC Highway funds are therefore seen as important to expanding and strengthening the Region’s highway infrastructure.

### **Moving forward**

Participants would like to see current investments continued, particularly as they relate to infrastructure-related investments such as water, sewer and highways. In addition to these ongoing investments, the participants had general consensus about expanding investments in several other emerging areas. For instance, developing the ARC Region’s human capital and health and wellness efforts, was viewed as increasingly crucial. Expanded broadband access was mentioned by several participants as a particular area of investment that needs continuous attention from ARC. Broadband potentially supports many other priority areas whether it related to local foods and agri-tourism or support for entrepreneurship and home-based businesses.

Continuing to invest in downtown redevelopment was another important focus area for ARC investments. Creating places where people want to live and spend time was seen as a vital condition for success in other strategies related to tourism and entrepreneurship and others. Participants also encouraged ARC to continue to take leadership in helping the state move new initiatives forward such as small business incubators. ARC brought this topic to the table. It helped to find mentors and innovation ideas for small businesses. The use of Flex-E-grant funding to help develop the local food system was given as another example of ARC bringing new ideas to the table. The local food projects happened because of a handful of grants and leadership from ARC.

All of these emerging areas point to the oft noted need to generally improve quality of life within the Region in order to retain and assist current residents, as well as attract new residents, especially young workers that have left the Region. One participant mentioned the findings from a study on household wealth and financial security in Appalachia which ARC helped fund. In the coming years, an estimated \$45 trillion is transferring from the older generation to younger generation. How can we prepare to make sure the money stays and benefits West Virginia communities? Participants also noted the need to maintain the flexibility of ARC funding, as that flexibility (unlike many other funding sources) allowed them to effectively respond to their region's many critical development challenges. They also encouraged ARC to remain the "Voice of Rural" going forward.

### **Meeting Attendees**

- Sharon Adams, West Virginia Development Office
- James Bush, West Virginia Development Office
- Becky Ceperley, Greater Kanawha Valley Foundation
- David Cole, Region 1-Planning and Development Council
- Michele Craig, Region 2-Planning and Development Council
- Ralph Goolsby, RHGoolsby Consulting
- Jeff Herholdt, West Virginia Division of Energy
- Mary Hunt, Benedum Foundation
- Monica Miller, West Virginia Development Office
- WD Smith, Region 4-Planning and Development Council (retired)
- Kim Tieman, Benedum Foundation
- Geary Weir, Webster County Economic Development Authority

## **Development Districts Association of Appalachia (DDAA) ARC Focus Group Report**

On July 28<sup>th</sup>, 2014 the Board of the Development District Association of Appalachia (DDAA) met to discuss the impact of ARC investments in their communities. This meeting was held at the Lafayette Hotel in Marietta, Ohio. Participants were asked to give their input on several broad issues including:

- ARC-sponsored programs used in their region and community,
- Changes in ARC-sponsored programs and funding over time,
- Notable and important ARC investments, and
- Current and emerging issues that might motivate additional, future investments.

The discussion focused both on the impact of ARC investments in the participant's region, but also on its importance to their organizations. ARC funding allows Local Development Districts (LDDs) to provide a wider array of services, but also provide more reliable and consistent service to their more rural and disadvantaged communities. ARC investments have also been important in creating a community of stakeholders in their region and play a role in building consensus about regional economic and community development. The flexibility afforded by ARC funding allows local stakeholders the ability to implement programs that therefore align to regional and state priorities.

### **Current role of ARC funding**

Although a relatively small portion of overall ARC funding, support to the Region's Local Development Districts is a vital element of ARC's overall investment portfolio. The participants all spoke of ways in which ARC funding advances their organizations' economic and community development goals. LDD support allows these organizations to better serve local governments by providing important technical assistance such as grant writing, project development and grant administration. Without these services, many local governments would be unable to undertake these activities in an effective or affordable manner. Several participants from states that do not provide extensive resources to LDDs noted that the ARC funds were instrumental for them to provide a basic level of services given their current staffing levels.

The funding that ARC provides to LDDs also allows them to strengthen their internal capacity. Participants from numerous states noted that their organizations' ability to provide regional GIS (Geographic Information Systems) support was a direct consequence of their ARC funding. In addition, ARC-sponsored events provide opportunities for LDD staff to obtain the professional development and training necessary to do their jobs. This training may include guidance on how to develop competitive federal grant proposals or how to undertake data-driven economic development planning. ARC also provides LDD staff members the opportunity to learn more about emerging issues such as building local food systems or engaging local youth.

In addition to strengthening internal organization, the LDD directors also noted that ARC plays a vital role in building the capacity of the broader communities that they serve. This additional support allows LDDs to provide education and training to their region's local governments to improve their ability to address critical local issues. It also enables them to educate and prepare their local elected officials, so that they can make more informed decisions. These issues have been particularly important in rural localities, where local government and elected officials are stymied by loss of young people that has hurt the region's capacity to transition toward a new generation of leaders.

ARC funding also allows the LDDs to play an important role in promoting regional approaches to development challenges. Its ability to leverage other sources of public, private and philanthropic resources allows LDDs to assemble coalitions that can address broader regional challenges. One participant noted that these coalitions are built not just by bringing partners together for one project, but through hundreds of various ARC-sponsored projects over many decades. As a result, these ongoing investments have created a community of ARC stakeholders. This cumulative effect creates a platform for more easily achieving regional consensus on the nature and direction of regional economic and community development. ARC investments and projects can therefore provide important 'glue' money for promoting regional efforts. One participant noted that in his state there was a trend toward the 'deregionalizing' of economic development efforts in the areas outside of the ARC region, while in the ARC region it was just the opposite.

### **Impacts of past ARC investments**

Participants generally agreed that many of the issues that in the past drove their region and state's ARC investments remained just as important today. For instance, connectivity and road access are critical prerequisites for development, so completing the Appalachian Development Highway System (ADHS) remains an important priority. Similarly, it has been important for financing much of the regional economic development infrastructure such as water, wastewater, industrial parks and access roads.

However, ARC funding has been reduced significantly from what it was in ARC's early history and these relatively more limited resources change the nature of ARC-funded projects. While infrastructure projects remain important, ARC investments have shifted away from large physical infrastructure projects toward a more diversified array of development efforts. For instance, one participant noted that their state used ARC funds to invest in the region's health infrastructure. In the past, this meant large-scale investments in hospitals and health clinics. Investments in strengthening regional health systems continue, but with more limited funding those investments now go into activities related to telemedicine or programs that expand access to basic health services.

The changing nature of ARC investments was not just the result of diminished resources. In some instances, the changing economic environment and a diminished need for newer, greenfield industrial sites led to fewer investments in physical infrastructure and a greater focus placed on expanding planning and technical assistance, enterprise and business development, and workforce training. In other instances, the shifting focus reflects the priorities of the states' governors. One participant indicated that their state had used its ARC funding to support programs related to microenterprise development, but a change in the Governor's office shifted focus toward water and wastewater projects. The ability for ARC funds to reflect evolving state priorities is important to its overall success with state and regional partners.

These shifting priorities can also impact the composition of a region or state's ARC stakeholder group. As one participant explained, the shift away from physical infrastructure projects meant less involvement from local developers, but increased investments related to education and workforce development brought more educators into the coalition. Bringing these entirely new sets of stakeholders into the coalition ultimately broadens the wider ARC stakeholder community. This ever-changing stakeholder group is one of the lasting elements of ARC's legacy in the Region.

### **Moving forward**

Overall the participants noted that the consistency and reliability of ARC funding was important to their ability to serve their region's communities. It allows them to maintain this service and it affords them the ability to find creative ways to successfully address local development challenges.

There was a general consensus among participants that ARC should continue to emphasize ongoing efforts related to infrastructure development and poverty reduction. At the same time there remains a need to balance these efforts with emerging issues that are arising throughout the region. For instance, representatives from Pennsylvania and West Virginia were keenly interested in learning more about unconventional natural gas development (i.e., hydraulic fracturing). Since these types of energy projects are significantly reshaping regional economies in these states, there was interest in learning how to better pursue this development in a way that avoids some of the mistakes or unintended consequences experienced by other extractive industries.

Representatives from states such as New York and Alabama reinforced healthcare and workforce issues as growing in importance and were looking to utilize ARC investments to expand their efforts in those areas. Other participants were also interesting in placing greater emphasis on other non-infrastructure issues related to workforce development, tourism development, and growing local foods systems.

## Meeting Attendees

- Eric Bridges, North Central Pennsylvania Regional Planning and Development Commission
- Misty Casto, Buckeye Hills–Hocking Valley Regional Development District
- Michele Craig, Region 2–Planning and Development Council
- Jim Dove, Northeast Georgia Regional Commission
- John Hemmings, Ohio Valley Regional Development Commission
- Rudy Johnson, Golden Triangle Planning and Development District
- Keith Jones, Northwest Alabama Council of Local Governments
- Danny Lewis, Georgia Mountains Regional Commission
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