FINAL REPORT

An Assessment of Alternative Measures for Determining Economically Distressed Counties and Areas in the Appalachian Region

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TABLE OF CONTENTS

Contents   **Page**

PART I - BACKGROUND AND ISSUES IN CONSTRUCTING DISTRESS INDICATORS

PART II - EVALUATING DISTRESS INDICATORS AND MEASURES

PART III - EXPLORATORY ANALYSIS

PART IV- CONCLUSIONS AND RECOMMENDATIONS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

The Appalachian Regional Commission (ARC) has played a vital role since 1965 in advancing the well being of people, communities, and institutions in the region. Due to sustained investments undertaken by ARC and other public and private sector entities, substantial inroads have been made against the economic instability, poverty, weak human capital, poor transportation corridors, and limited physical infrastructure that characterized the region at the time of ARC's inception.

This report responds to a proactive effort by the ARC to explore new avenues for assessing well-being. Despite well-recognized advances, chronic socioeconomic distress persists in various pockets in the region while other areas face increasing instability stemming from population shifts and global economic changes. The ARC has sought to develop meaningful indicators to document distress, with the goal of improving the ability of the federal office of the ARC and its state partners to target resources effectively to counties facing a diversity of barriers to achieving economic progress.

The purpose of this report is to offer additional insights on the set of distress indicators and their respective measures that can prove comprehensive, practical, and valuable in guiding the future work of the ARC. Our report takes a fresh look at the current indicators employed by the ARC to classify counties as economically distressed. We outline the strengths and limitations associated with such indicators and evaluate a series of new indices and data sources that may promote greater accuracy in terms of monitoring the long-term socioeconomic complexion of counties in the region. These new indicators include "forward-looking" measures as well as indicators that tap a wider range of socioeconomic dimensions of distress, beyond the standard economic indices conventionally employed by the ARC.

Our *conclusion* is that the ARC should update its current distress indicators to better reflect twenty-first century socioeconomic conditions. Though improved in recent years, the currently-used distress index -- based on the poverty rate, unemployment rate, and per capita market income -- suffers from various shortcomings. Our analysis reveals that the poverty rate alone largely drives the variability in the current distress index. Therefore, the current index is not a valid and transparent measure that fully reflects all the dimensions of distress. Another problem is the use of the unemployment rate and per capita income. In particular, the unemployment rate does not capture contemporary labor market weaknesses to the degree that other indicators would. Finally, in sensitivity analysis, we find that the counties can shift in terms of their distress designation with only modest changes in how the distress index is calculated.

After a careful analysis of over 50 indicators, we **recommend** that the ARC reevaluate its distress indicators in the following ways. First, it should consider the following candidate indicators in this analysis: (1) population change; (2) educational attainment; (3) income and earnings; (4) housing market conditions; (5) entrepreneurship and self employment; (6) improved measures of labor market strength; and (7) the poverty rate. These indicators capture dimensions of both current and forward-looking distress. Second, the analysis of candidate indicators should be statistical in nature, relying on regression approaches to determine the factors that have more power in explaining shifts in distress over time. This analysis should

consider variable measurement issues and proper weights for each indicator. The outcome of the proposed approach would be a small list of three to five variables that would constitute a new indicator of distress. Finally, the ARC should consider monitoring a secondary grouping of indicators to provide a broader context for benchmarking. These **recommendations** are more fully described in Section 7 of the report.

PART I - BACKGROUND AND ISSUES IN CONSTRUCTING DISTRESS INDICATORS

1. Introduction

The purpose of this report is to assist in developing distress indicators and their respective measures that will be comprehensive, practical, and valuable in guiding the future work of the ARC. Our report takes a fresh look at the current indicators employed by the ARC to classify counties as economically distressed. We outline the strengths and limitations associated with such indicators and evaluate a series of new indices and data sources that may provide improved accuracy of the long-term socioeconomic viability of counties in the region. These new indicators include "forward-looking" measures as well as indicators that tap a wider range of socioeconomic dimensions of distress, beyond the standard economic indices conventionally employed by the ARC.

Our analysis is the product of a multi-disciplinary research team that carefully appraised the findings of past empirical studies, examined agency reports, conducted preliminary empirical analyses, and met with federal and state ARC representatives and staff to secure their input. The project team consists of economists and sociologists specializing in community/regional well-being and spatial analysis. Throughout the six month duration of the project, the team met in Washington D.C. and in Columbus, OH, conducted numerous conference call meetings, and worked individually to assemble the information presented here. The task of writing of the report was collectively shared by all members of the team.

This report is organized into three parts and seven sections.

Part I provides the research and policy-oriented background for the selection of distress indicators. Our primary intent is threefold. First, in Section 2, we present an overview of the history and background of the ARC's efforts to document distress. Agency reports and empirical research studying distress in the region are used to inform this overview. Second, we examine the comparability between ACR indicators and measures of distress with those of other federal agencies in Section 3. We find that many, if not most, agencies employ the same indicators used by the ARC -- poverty, unemployment, and income -- but some add other indicators more tailored to the respective needs of these agencies. Finally, Section 4 discusses conceptual, theoretical and methodological issues involved in developing indicators of distress. We document the types of decisions that need to be made and the problems that arise in selecting appropriate indicators and measures.

Part II turns to an appraisal of indicators that can be employed to document distress. The overall strength and limitations of these indicators for covering "distress" as a concept are discussed in Section 5.1. Data issues involved in the measurement of these indicators -- such as timeliness, geographic coverage, and cost of data sources -- are documented. Our initial focus is on what we label "backward-looking" indicators, measures that benchmark contemporary conditions such as poverty rates, income, and unemployment. Some of these variables have been widely used as distress measures; others are alternative measures involving new income sources and population attributes such as aging and immigration, measures that have received limited attention with

regard to their possible inclusion in socioeconomic distress indexes. In both cases, however, these indicators appear to perform better at tracking past or current conditions than in determining future well-being.

In Section 5.2, we delineate a number of indicators that potentially offer a window into the future fortunes of the region. These include indicators of population change, housing starts, entrepreneurial and knowledge economy trends, local government capacity, and the social capital/civic health of local communities. Section 5.3 examines new data sources that can be tapped to construct some of the indicators above for different geographies and time periods. These include data available at the sub-county level and recently developed data sources, such as the American Community Survey (ACS) which will soon be available for the nation's smallest counties (although with some time lags and as of yet unknown limitations). Taken as a whole, this section provides a list of indicators and their respective measures that we believe offer a more comprehensive and multi-faceted picture of distress relative to those presently in use.

Part III, contained in Section 6, provides an exploratory sensitivity analysis of distress indicators using empirical data. The purpose is to determine the consistency of the use of different variables in classifying counties as distressed. We begin by examining the performance of ARC's current distress indicators, namely, poverty, income, and unemployment. While all three have been perceived as key contributors to distress, our analysis reveals that the poverty rate alone largely drives the variability in the current distress index.

We then turn to a "what-if" analysis, changing the assumptions of the current distress index by adding two potential new variables, change in population and educational attainment. We find that while there is some stability in the classification of counties as distressed when either of the two variables is added, shifts in the designated distress classification of some counties also occur. Our conclusion is that categorizing distress is somewhat sensitive to the variables used in constructing the index.

Part IV, contained in Section 7, presents our conclusions and **recommendations**. We summarize the findings of our research review and exploratory empirical analysis. We document the range of scientifically sound indicators that are both contemporary and forward-looking measures of distress. These indicators should prove most useful to the ARC and other federal/state agencies) in its quest to develop a defensible system for determining levels of economic distress. Finally, we specify needed steps to refine the selection process of indicators and their accompanying measures, a process that can improve the benchmarking of both past progress and attainment of future goals.

2. History and Background of ARC

Created by an act of Congress in 1965, the Appalachian Regional Commission (ARC) is a regional economic development agency representing a unique partnership of federal, state, and local government. Local level participation in the Commission is assured through 72 local development districts with boards composed of elected officials, business people, and other local leaders. Similar to other agencies created to promote local planning and to address socioeconomic problems of lagging regions and communities in the U.S., ARC's primary role is to promote economic competitiveness and social development of the Appalachian Region.

In the Appalachian Regional Development Act, the legislation from which ARC derives its authority, Appalachia was originally defined to include 300 counties in 10 states. As a result of several amendments to the Act, the last of which was in 2002, the region now incorporates an area of 200,000 square miles and about 22.9 million people. It follows the spine of the Appalachian Mountain from Southern New York to Northern Mississippi and includes 410 counties comprising all of West Virginia and parts of 13 states referred to as Appalachian states: Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia. Governors of these 13 states, together with a federal co-chairman appointed by the President, make up the Commission. Figure 2.1 presents the Appalachian Region and its sub-regions.

To fulfill its mandate of reducing the socioeconomic gap between the Appalachian Region and the rest of the nation, the commission has put forth a wide range of activities and programs in the Region over the course of its history. In contrast to economic development agencies that are principally categorical grantmakers, ARC has implemented a multi-faceted approach which combines its special grant programs with advocacy, regional planning, and research activities. As a result, the commission has provided support for various projects since its inception, ranging from the Appalachian Development Highway System (ADHS); community water and sewer facilities for homes, businesses, and industries; health, education, and human resource development initiatives; to economic development programs and local capacity building and leadership development.

In the spirit of its congressional mandate, ARC originally mobilized its efforts to employ a growth center policy aiming at promoting economic development in Appalachia's urban areas with the assumption that development, once taken place in these localities, would spread to rural areas. Such policies, prominent among many world leaders and other development agencies such as EDA, were in line with the prevailing regional development theory in the 1960s and early 1970s. The growth center approach was harshly criticized for not supporting the areas in greatest need. The ARC shifted its focus in the mid-1980s towards the more remote rural areas, allocating its resources primarily to these more economically disadvantaged counties.

As a result of the Commission's multi-pronged efforts, great strides have been made in reducing the economic imbalances between the Region and the rest of the U.S. In fact, Widner (1990) forcefully argues that the ARC's endeavor to develop Appalachia (mostly through the Distressed Counties Program) has been the most comprehensive regional development effort ever undertaken in the country. However, a large number of communities in the region are still not

up to par with the rest of the country in terms of economic vitality and living conditions. Appalachia continues to battle economic anguish, concentrated areas of high poverty, high unemployment rates, educational disparities, high rates of diseases, and population out-migration (ARC, 2004).
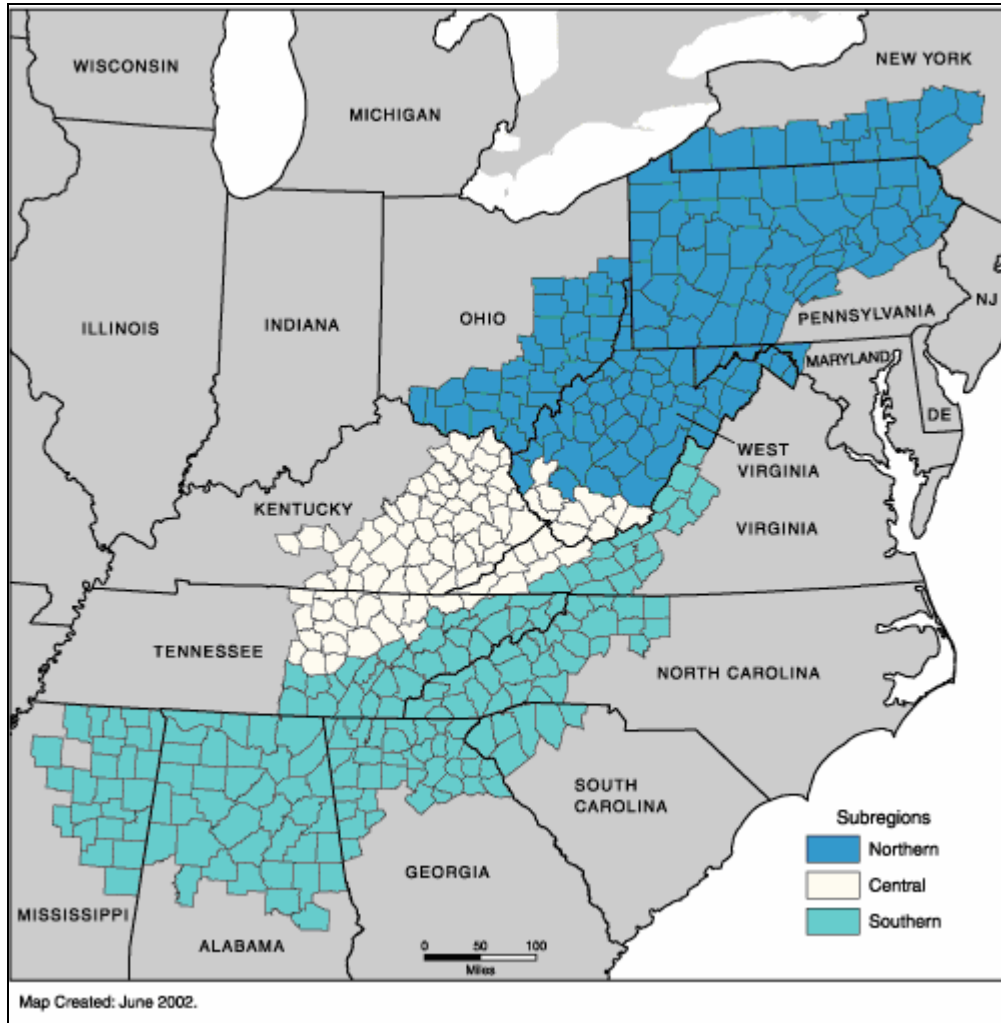
Source: ARC

Figure 2.1: Map of the Appalachian Region and Sub-regions

2.1. The ARC Distressed Counties Program and Distress Indicators

The ARC Distressed Counties Program is well documented in the academic literature (Glasmeier and Fuellhart, 1999; Wood and Bischak, 2000). The Distressed Counties Program (DCP) was proposed by ARC in a report to Congress in the early 1980s as a response to the threat of the Commission's imminent demise. Congress had requested that ARC outline a plan for completing its programs in a timely manner. Not only was ARC not dissolved, but the Distressed Counties Program was formally adopted as ARC's policy and took effect at the beginning of the fiscal year 1983. Implementing the program required that a reasonable share of the Commission's

4

funds be devoted to counties in the most dire economic need. From the inception of the DCP, 20 percent of Area Development funds were allocated to the distressed counties. In fiscal year 1997, Area Development allocation to distressed counties increased to 30 percent. But, this annual set-aside does not preclude these counties from benefiting from the rest of ARC's funded programs. The Distressed Counties Program has been the ARC's principal vehicle and predominant framework for providing adequate help to the most economically disadvantaged counties in the region.

Putting to work the Distressed Counties Program involves identifying distressed counties using economic indicators. ARC elected to employ variables that not only would vary little over very short time periods, but also would identify counties having the structurally weakest economies. In the 1980s, ARC began its distressed county designation using four distress indicators selected from a larger list of 12: a three-year average unemployment rate, poverty rate, per capita market income (which is income excluding transfer payments), and a three-year average infant mortality. These indicators were used to rank all ARC counties. To qualify as distressed, counties had to be in the lowest quartiles in at least three of the four categories. However, the ARC continues to struggle with how to define distress and how the definition should evolve with the changing economy. For example, between December 1999 and July 2006, there were 33 ARC meetings to discuss the distress indicators (Witte and Bischak, 2006).

To date, ARC has made several revisions to the original distress measures in order to improve their consistency and relevancy over time. The first adjustment to the distress indicators occurred in fiscal year 1988. Specifically, ARC discontinued the use of infant mortality since the region's mortality rate had improved to the point where it was consistent with the average rate for the nation. The ARC also indexed the remaining indicators to national averages. Rather than using a single county status designation, ARC defined two more categories, middle and competitive counties. Competitive counties were those with poverty rates at or below national averages, three-year unemployment rates at or below national averages, and per capita market income (PCMI) no less than 80 percent of the national average. In the same fiscal year, the Commission began tracking the counties located within its region using a five-category system: severely distressed, distressed, middle, strong, and very strong.

A second revision, which occurred in fiscal year 1995, resulted in a change in the distress designation. No longer did a county need to meet all three criteria to qualify as distressed. Counties with poverty rates of at least 200 percent of the national average needed to meet one of the two remaining criteria to be considered distressed. The two remaining criteria were 150 percent unemployment or two-thirds per capita market income.

A fourth designation, attainment counties, was introduced in FY1997 to categorize the counties performing at or above national averages in all three criteria. The four categories were then as follows: distressed, transitional or middle, competitive, and attainment. In that year, Area Development funds increased to 30 percent and attainment counties were disqualified from receiving such funds.

In fiscal year 1998, a fourth adjustment in the ARC distress measure was created. Congress charged ARC with the task of addressing the needs of severely and persistently distressed areas

of the Region and focusing attention on the areas of greatest need to provide a fairer opportunity for the people of the Region to achieve a quality of life on par with that generally enjoyed by citizens across the United States.

In fiscal year 2006, ARC introduced an "at risk" designation to include non-distressed counties which were nearly distressed. However, this designation (which was only for planning purposes) did not entitle counties to any additional funding. The at-risk category was viewed as useful in identifying the transitional counties with characteristics touching on the distress threshold. Criteria used to identify the at-risk category included a per capita market income that is two-thirds of the national average or less, a three-year average unemployment rate that is at least 125 percent of the national average, and a poverty rate that is at least 125 percent of the national average. ARC's county designations now were expanded to five: distressed, at risk, transitional or middle, competitive and attainment.

Finally in fiscal year 2007, ARC elected to transform its three traditional distress indicators into a national index. Under this new model, county designation and classification involves a three-step procedure. First, a county's averages on three economic indicators -- three-year average unemployment rate, per capita market income, and poverty rate -- are compared with national averages. Second, the resulting values are summed and averaged to create a composite index value for each county. Each county in the nation is then ranked based on its composite index value. The higher the index values, the higher the levels of distress. Thirdly, each Appalachian county is classified into one of the five economic status designations based on its position in the national ranking. Figure 2.2 shows the ARC's current economic status designation criteria.

ARC assigns the status "distressed" to counties ranking in the worst 10 percent of the nation's counties. Distressed counties are the most economically depressed. Counties ranking between the worst 10 percent and 25 percent of the nation's counties receive the "at-risk" status, meaning that counties are at risk of becoming economically depressed. Such counties ranking between the worst 25 percent and the best 25 percent of the nation's counties are assigned the "transitional" status. Counties ranking between the best 10 percent and 25 percent of the nation's counties fall in the "competitive" category. Those that rank in the best 10 percent of the nation's counties are classified as "attainment" counties, areas that are the most economically strong.
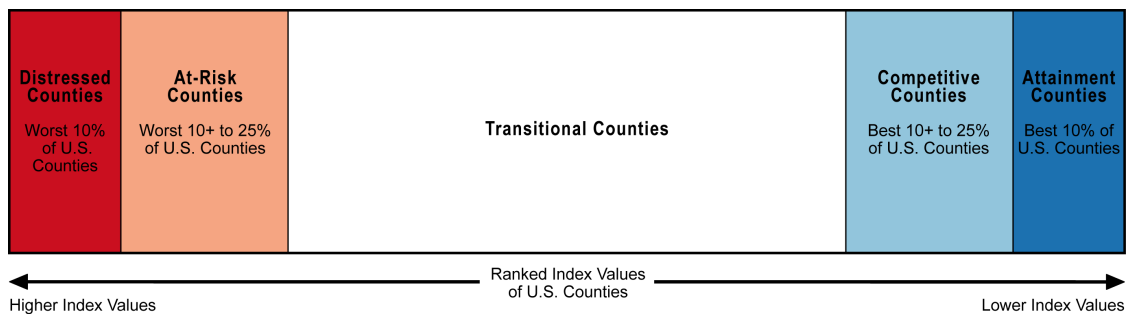
Source: County Economic Status Fiscal Year 2007, ARC

Figure 2.2: ARC County Economic Status Designation by National Index Value Rank

6

2.2. Past Research on Alternative Distress Indicators for Appalachia and Other Regions

ARC distress measures have been criticized as being imperfect. For example, conventional unemployment rates do not fully capture local market conditions, especially in rural regions. That is, unemployment rates fail to measure underemployment, labor force participation, or job creation differences. Furthermore, unemployment does not encompass involuntary part-time workers and discouraged job seekers who exit the job markets. To obtain a better understanding of the local labor markets and the need for job creation, ARC commissioned two studies assessing underemployment (e.g., involuntary part-time employment) and labor force participation which are broader measures of labor market surplus than unemployment.

A study by Bradley et al. (2001) focused on generating county-level measures of labor force participation and underemployment rates. Results from this study indicate that, more so than unemployment, both labor force participation and underemployment portray a higher degree of labor market surplus in Appalachia as compared to the U.S. Additionally, between 1993 and 1998, underemployment and labor force participation apparently grew more slowly in Appalachia than in the U.S. as a whole. This study also revealed that job growth was slower and wage growth slightly less than for the entire U.S. over this time period.

Following Bradley et al. (2001), Price and Wial (2005) analyzed underemployment by state and demographic group for each Appalachian state and the entire country for each year from 1996 to 2004. They concluded that tremendous progress had been realized by 2004 in bridging the underemployment gap between nonmetro and metropolitan Appalachia relative to nonmetro and metropolitan areas outside of Appalachia. Most Appalachian states experienced statistically significant declines in underemployment.

Another downside of the ARC distress measures is that data on poverty rates are decennial and as such become outdated over the course of a decade. Research conducted by Hammer (2000) and commissioned by ARC analyzed recent trends in poverty in the Appalachian region and examined the Census Bureau's Small Area Income and Poverty Estimates (SAIPE) effects on the ARC distress county designation. The SAIPE program was an attempt to remedy the deficiencies in economic distress measures such as the ten-year interval poverty rate and per capita income. The reason is that national levels and spatial distributions of income and poverty for small areas are not stable over time. The study focused on changes in total poverty in Appalachia between 1979 and the mid-1990s, with particular emphasis paid to the post-1990 period. Hammer discussed the geographic distribution of poverty, especially child poverty. He contended that while SAIPE would provide overall better estimates of distress than the poverty estimates derived from a decade-old census, a simple substitution of the SAIPE point estimates for census poverty estimates might unjustifiably deny some counties distressed-status recognition. The author concluded that the availability of new sources of income and poverty data such as the American Community Survey should significantly improve the accuracy of the SAIPE, making them an even more viable option for the determination of distressed-status by the Appalachian Regional Commission.

Another study by Wood and Bischak (2000) focused on progress and challenges in reducing economic distress in Appalachia from 1960 to 1990. They used data from several sources including the U.S. Census Bureau, the Bureau of Economic Analysis, and the Office of Economic Opportunity to identify time trends in the number of distressed counties in Appalachia, prior to the inception of ARC, as well as throughout much of the ARC's existence. The study also extended its scope to include all the remaining U.S. counties. To identify distressed counties, ARC's current distress criteria at the time of the study were applied to all U.S. counties for the decennial years 1960, 1970, 1980, and 1990. Illustrating the progress in the ARC region, their findings indicated that the number distressed counties had decreased by more than a half during the time period under scrutiny and only about one-quarter of the 1960 distressed counties in Appalachia remained distressed. Measures used to identify distressed counties included the following:

- A poverty rate that is 150 percent or more of the U.S. average
- PCMI that is no more than 2/3 of the U.S. average
- An unemployment rate that is 150 percent or more of the U.S. average
- A county also qualifies as being distressed if it has a poverty rate that is at least 200 percent of the national average and matches only one of the two remaining criteria (150 percent unemployment or two-thirds PCMI).

In addition to identifying counties moving out of or remaining in distress, Wood and Bischak pointed to several factors affecting the distress status of counties using two logistic regression models, a socioeconomic model and an economic structure model. The dependent variable in both models took on the value of "1" if a county moved out of distress and "0" if the county remained distressed between 1960 and 1990. Based on the socioeconomic model, factors contributing to a county moving out of distress between 1960 and 1990 included rates of employment in manufacturing, high educational attainment rates, high percentage of the population living in urban areas, a low percentage of minorities, and a county's location in the southern Appalachian sub-region. The results from their economic structure model point to factors such a county's ability to attract retirees, high levels of manufacturing, and close location to a metropolitan area as being key factors in determining whether a county moved out of the distress category.

Expanding and updating the work by Wood and Bischak (2000), Wood (2005) recently analyzed trends in national and regional economic distress from 1960 to 2000. Wood capitalized on the release of the 2000 census data to re-examine distress conditions in Appalachia. He found that distress was not random over time, but rather quite persistent. Counties that were distressed in 2000 were distressed for the most part in 1960. Wood's results were similar to those he obtained in the previous study with Bischak. Factors affecting the distressed county status include high minority populations, low educational attainment, low employment in manufacturing, high employment in mining, low employment in professional services, and location in a metropolitan area.

Given the weaknesses of the ARC's distress measure, Glasmeier and Fuellhart (1999) developed a surrogate additive index they labeled the *economic health index* (EHI). The EHI was composed of four individual indices: an unemployment rate index comparing county-level civilian

unemployment rate to the national civilian unemployment rate; a per-capita market income index comparing a county's income level, less transfer payments, to the national level; a labor force participation index; and a per-capita transfer payments to per-capita market income ratio index. The summation of the four individual indices yields the health economic index. The lower the health economic index scores, the better counties performed economically.

To predict economic distress, a linear regression model was used with the 1994 county-level index values as the dependent variable. Socioeconomic variables, such as percent of population with four-year college degrees, percentage of income from manufacturing, and percentage of income from residential adjustment were significantly and positively associated with county economic health. On the other hand, variables such as single mothers with children under 18, females in the labor force, and those over 65 years of age, were negatively associated with the EHI. Location variables, such as adjacency to a metro area, were significantly and positively related to a better EHI, while location in the central Appalachia region was significantly and negatively associated with county economic health. Glasmeier and Wood (2005) later used the EHI to determine the economic characteristics of the counties that had received funds from the U.S. Economic Development Administration from 1965 to 1997.

Feser and Sweeney (2003), in a study not commissioned by ARC, used data from the 1969 to 1999 period to examine the spatial extent and temporal persistence of U.S. economic distress based on three different indicators: unemployment, low income, and out-migration-induced population decline. They utilized commuter zone as their unit of analysis. The study was an attempt to assist the U.S. Economic Development Administration (EDA) in a review of criteria used to assess target development assistance and to evaluate the incidence and geography of out-migration and population decline as compared with two of the most common distress measures: low income and unemployment. The authors excluded poverty rate due to the unavailability of yearly poverty data. A mixture of absolute and relative distress measures was used. While unemployment was expressed as a rate, the ratio of income maintenance transfer payments (for family assistance, food stamps, and other income maintenance programs) to total personal income was used instead of per capita income.

To distinguish high-growth/high-out-migration places from places experiencing high out-migration/depopulation, Feser and Sweeney employed the following measure of out-migration/population loss (OPL):

$$OPL_{it} = \left(\frac{O_{it}}{P_{it}^*}\right)\left(\frac{P_{i,t+1} - P_{it}}{P_{it}}\right)$$

where t and i index regions and year respectively; O is the number of out-migrants as reported by the Statistics of Income Division of the IRS; $P*$ is estimated population from the IRS; and P is population from the Bureau of Economic Analysis. Unemployment and income data were from the BLS and the BEA's Regional Economic Information System respectively. Distress thresholds were 8.4 percent for unemployment rate (75th percentile), 75th percentile for ratio of income maintenance payments to personal income, and 25th percentile for OPL respectively.

Other studies have collected primary data to identify socio-economic problems characterizing distressed individuals, families, and communities. Fox and Chancey (1998), for example, analyzed the sources of economic distress, examining the relationship between six measures of economic stress and seven measures of individual and family well-being. Distress measures included income, perceived economic well-being, individual and spouse job instability, and individual and spouse job insecurity. Measures of individual and family well-being included psychological distress, self-affirmation, health, family accord, family conflict, and split-up. Results indicate that job and financial uncertainties negatively affected individual and family well-being for both men and women. For both employed men and all men, family conflict increased when a spouse experienced job instability and job insecurity.

The Florida Legislative Committee on Interregional Relations (LCIR) surveyed the county and municipal governments in the state regarding problems facing distressed communities and the extent to which federal and state revitalization programs used by local governments were successful in addressing the needs of these communities. Results from the survey revealed that the set of socioeconomic problems that characterized most distressed communities included (LCIR, 2003):

- Vacant and abandoned buildings
- Loss of jobs and corresponding high unemployment rates
- High dropout rates
- Inferior public infrastructure: streets in need of repair, crumbling sidewalks, lack of adequate street lighting, antiquated sewer/water systems, among others
- Low income households,
- Concerns for public safety and high crime.

Summary Evaluation: Past research has repeatedly identified key conditions related to whether a county is categorized as in distress or as having exited the distress category. These key conditions include poverty, labor market conditions, educational attainment, and net population loss.

3. Distressed Counties Programs of Other Federal Agencies

In addition to ARC, a wide range of federal and state agencies strive to counteract economic challenges in places of distress. Among these agencies are the Economic Development Administration (EDA), which under numerous program titles provides funding to projects in economically distressed places; the U.S. Department of Agriculture's (USDA) rural development programs that addresses housing electricity, water and sewage, empowerment zones, and enterprise communities; the Department of Housing and Urban Development (HUD), focusing specially on areas with persistent economic distress; and the Federal Emergency Management Agency (FEMA) which assists areas in need of disaster assistance. The Bureau of Indian Affairs; and the Tennessee Valley Authority (TVA) also plays key development roles as well.

Newly created entities established by Congress to address economic distress issues include the Delta Regional Authority (DRA), the Denali Commission, and the Northern Great Plains Regional Authority. Members of Congress have also proposed bills to establish regional development commissions in the Southwest Border Region and the Southeast Crescent region.

Each of these established agencies has targeted specific areas with a variety of special programs if they meet the distress threshold that has been established by the relevant agency. However, the geographical distressed areas served by ARC overlap, at times, with those designated by these agencies. Because many of these agencies are modeled after ARC, it is not surprising that they rely on similar indicators for determining a county's distress status.

In terms of indicator usage across the established distressed programs, in a review of 16 federal and 18 state programs, Fullenbaum and McNeil (1995) noted that three distress indicators are the most commonly used: poverty, unemployment, and income. Most agencies employ at least one or all of the indicators used by ARC. Only rarely would an agency consider a single indicator at the county level. Six of the sixteen federal programs combine population change or out-migration with such measures as poverty rate and unemployment.

Some federal programs, rather than relying on a set of criteria, have recently adopted an open-ended approach to determining distress eligibility. The EDA rests upon two primary measures of distress to determine a community's eligibility to receive funding: per capita income and unemployment rate. To qualify as distressed, a community must have an average per capita income which is 80 percent or less of the national per capita income average and an unemployment rate, for the most recent 24-month period, at least one percentage point higher than the national average. Also qualifying as distressed are communities facing actual or threatened severe unemployment or economic adjustment problems resulting from short-term and long-term economic shocks, including the following (EDA, 2002):

- Closure or restructuring of industrial firms essential to area economies;
- Military base closures or realignments, defense contractor reductions-in-force, and Department of Energy defense-related funding reductions; federally declared natural or other major disasters or emergencies; extraordinary depletion of natural resources, such as fisheries, coal, and timber;
- Substantial out-migration or population loss;
- Underemployment;
- Destructive impacts of foreign trade.

Although DRA is patterned after ARC in terms of structure, it uses EDA's criteria to identify distressed counties (Reeder and Calhoun, 2002). The Department of Housing and Urban Development (HUD) has recently proposed a change in the Community Development Block Grant (CDBG)'s formula which favors towns with large college student populations by including the incomes of these full-time dependent students in the calculation of poverty rate (HUD, 2006). To allocate funds, the proposed formula would be based on five variables including:

- The number of households living in poverty excluding full-time students;
- The number of overcrowded housing units;
- The number of female headed households with minor children;
- The number of homes 50 years or older occupied by a low-income family;
- The per capita income of the community relative to the per capita income of its metropolitan area.

Most programs consider absolute measures to determine distress eligibility, meaning that counties must reach a threshold to be considered distressed. Agencies such as HUD, USDA, and TVA adopt a relative standard on given indicators. Counties qualify for funds based on their ranks on selected distress measures.

Geographic units utilized by federal programs can range from entire counties to small communities. While a county may not qualify as distressed, it may have distressed 'communities' ranging from cities, towns, Indian tribes, census tracts, to subdivisions. Recognizing such a possibility, ARC designates as distressed areas census tracts within "at-risk" and "transitional" counties with a median family income no greater than two-thirds of the national average and a poverty rate at least 1.5 times the national average (ARC, 2006). Similarly, communities in non-distressed counties can qualify for EDA's assistance if they meet the EDA's eligibility definition. Sub-county distress measures based on census tract data are also used by the SBA and USDA's empowerment zone and enterprise communities programs. Table 3.1 provides examples of distress indicators used across programs.

Programs	Distress Indicators					
	Poverty	**Income**	**Employment**	**Population**	**Housing**	**Social/Economic**
ARC	Poverty rate	Per capita market income	3-year Unemployment rate			
USDA1	High level of poverty rate greater than 30%					
USDA2		Median family income	Unemployment rate	Population change		
DRA		80% or less of national per capita income average	Unemployment rate at least one point higher than the national average	Substantial out-migration and population loss		
Ed Title1	Poverty rate					Number of children eligible for free school lunch
EDA		80% or less of national per capita income average	Unemployment rate at least one point higher than the national average	Substantial out-migration and population loss		- Destructive impact of foreign trade - Closure or restructuring of local industries
NGPA	- % of pop below 150% poverty level - % of pop below poverty level		Unemployment rate as of 2003	- %of pop ≤ 24 yrs - % of ≥ 65 yrs - Pop change		- % pop over 25 with bachelor's and higher - % of pop over 25 with high school and higher
HUD	Number of households living in poverty, excluding full-time college students	Per capita income of the community relative to the per capita income of its metropolitan area		Population size	-Overcrowded housing - Substandard housing - Cost of housing production - Housing built prior to 1940 - Housing with incomplete plumbing	Number of female headed households
SBA	Poverty rate 20% or more	- Median household income in non-metropolitan census tracts < 80% of the statewide median household income - 50% or more of households in metropolitan census tracts with income below 60 % the area median income				

Source: Bischak, 2002; Reeder and Calhoun, 2002; and HUD, 2006

Table 3.1: Distress Indicators Used across Distressed Counties Programs

4. Conceptual, Theoretical, and Empirical Issues

Academic and policy-oriented literature on the use and construction of socioeconomic indicators is vast. Indicators are summary tools used to delineate current status, problems, and trends. These tools enable policymakers and other decision-makers to assess important attributes of local and regional conditions, to evaluate specific programs, and determine the impacts of programs and policies (Miller, 1993). Academic researchers also use socioeconomic indicators to address a wide array of scholarly and policy-oriented questions. Socioeconomic indicators are innumerable in scope, but Sections 2 and 3 (Part I) explain that the most common measures of distress include poverty, unemployment, educational attainment, and income.

It should be kept in mind that a variety of measures constructed from data sources that can be used to operationalize any indicator. For example, poverty can be operationalized by using the official U.S. poverty rate, which is considered an indicator of "absolute deprivation" or by other measures, such as the proportion of a population whose income falls below 50% (or some other proportion) of the national median family income, which is a measure of "relative deprivation" (Schiller, 2008).

4.1. Conceptual and Theoretical Issues in Producing Robust Indicators: A Framework to Guide Selection

Drawing from the academic and policy-oriented literature on socioeconomic indicators, we offer brief points relevant to analyzing distress in the Appalachian region. Most broadly, the selection of appropriate indicators needs to be based on a sound conceptual and theoretical framework. Such a framework helps avoid *ad hoc* data collection and analysis and allows for the selection of indicators that best target distress. We briefly describe such a framework.

Defining the Meaning of "Distress": To select appropriate indicators, the general concept being assessed needs to be defined. Glasmeier et al. (2003) note that there is no universally accepted measure of distress among federal agencies. A clear definition is particularly needed because government agencies' use of "distress" tends to become blurred and imprecise as they respond to changing mandates. This in turn, affects the ability to meet big-picture goals. Distress, for example, can be conceptualized in terms of poverty alone, sufficiency or insufficiency along various other resource-related criteria (e.g., education, population increase, employment, income, health), and social exclusion or inclusion (e.g., isolation from nonpoor groups, social life, and services) (Garner and Short, 2002; Nelson et al., 1998; Schiller, 2008).

The ARC originally characterized "distress" as "underdevelopment," essentially focusing on economic development in the entire region (ARC, 1999). In 1983, with the introduction of the Distressed Counties Program, poverty and other insufficiency indicators assumed a more prominent role in defining distress. Our observation in reviewing materials from ARC is that current interest centers on distress as an indicator of persistent structural problems that reduce residents' well-being, with a focus on economic insufficiencies.

Using Government or Local Citizens' Definitions of Distress: A related point is the question whose definition of distress should prevail? Social indicators can be conceptualized through

"subjective indicators," that is, indicators that local citizens or community residents themselves evaluate, such as their perceptions of personal and local economic conditions. These types of indicators are associated with a "bottom-up" approach to community development because residents themselves decide the indicators that matter to them (Pike et al., 2008). Alternatively, distress can be defined through "objective indicators" such as official statistics collected in censuses. These types of indicators are usually associated with top-down approaches to community development, whereby external evaluators such as government agencies or other policymakers, decide the standards that are to prevail. Each of these ways of conceptualizing distress provides a different, equally important view of local conditions—but the views do not necessarily coincide (Garner and Short, 2002). That is, residents may not perceive distressed conditions even in communities where the poverty rate is high. As is customary in governmental agencies, ARC's measure of distress is based on objective indicators and our report centers on these indicators.

Using Theory to Define Distress: In order to ideally define distress, analysts need to draw from theory or "a systematic explanation for the observed facts" (Babbie, 1989). Theory provides guidelines for selecting the indicators that best represent distress, assessing the causes of distress, and designing policies that are intended to alleviate it. Social scientists have developed a number of theories addressing the determinants of poverty and related forms of distress. A succinct review is provided by Schiller (2008). He notes that theories depend upon the degree to which individual attributes (such as individual decisions and responsibility), structural attributes (such as the local economy), and government (such as a weak or strong social safety net) are emphasized as determinants of poverty and other distress. There are also different theories addressing the contrasting question of regional well-being or development—its determinants, definition, and policies that can promote it. Pike et al. (2008) provide a recent review of these theories. The conceptualization and measurement of distress (and its obverse, regional development) should fit with the underlying theory that specifies its attributes and causal determinants.

Specifying the Time Horizon: In conceptualizing distress, it is important to define the time horizon. Common distress indicators are often oriented at providing a backward view of distress; they are limited at identifying the risk of future distress. Thus, policies may be put in places that fail to address emerging problems if they rely on current distress indicators. For example, recent downturns in local housing markets could not be anticipated using conventional income-based measures. Glasmeier et al. (2003) note the ability to track both long-term and short-term distress conditions needs to be part of the mix.

Validating Indicators of Distress: Once distress is defined, indicators should reflect its intended meaning—they should have validity. By validity, social scientists mean indicators should have several important properties that allow them to capture the underlying concept(s) (Babbie, 1989:124). One of these qualities is face-validity -- essentially transparency; indicators should reflect common agreement and shared understanding (such as among researchers, practitioners, and policy-makers) that the indicator is indeed tapping distress. As we show below, analysts debate whether some indicators such as a high elderly population should be treated as markers of distress. A second quality is predictive validity, the degree to which the indicator is predictive of the situation in the future. For example, past poverty rates tend to be

very good predictors of those in the future, but past unemployment rates may not perform as well. A third quality is content validity-- the degree to which an indicator covers "the range of meanings included within the concept" (Babbie, 1989).

Poverty, for example, tends to have a great deal of content validity in that it covers innumerable forms of distress caused by lack of income in a modern society. The U.S. poverty threshold itself was formulated to implicitly capture major forms of distress, extrapolating from food to housing and other consumption expenses. Poverty is thus a good umbrella indicator that depicts other forms of distress. As a fourth quality, indicators should have construct validity, which refers to how an indicator relates to other indicators. If the indicator is supposed to tap distress, it should correlate with other like-indicators. Again, poverty is an excellent example of an indicator that correlates with common "distress" indicators -- such as unemployment, educational attainment, and adult and child health. At the same time, it should be kept in mind that indicators can be selected to tap different dimensions of distress, so the degree of correlation can vary among indicators.

4.2. Socioeconomic Indicators and Selection of Specific Variables for Distress Indexes

Once the precise conceptual indicators of distress are defined, measures or variables can be constructed. Variables have strengths and limitations along several lines that affect their usefulness for inclusion in distress indexes like the one currently employed by ARC.

First, measures raise the same issues of validity discussed above. Ideally, measures should be transparent and usefully predictive of present as well as future distress. Umbrella variables such as the "general poverty rate" allow indexes that can be constructed with greater parsimony. They minimize the number of variables that need to be included and the time, effort, and data steps required to create them. Such variables also simplify interpretation. On other hand, in an effort to create parsimonious indexes, important variables that provide new or independent information about distress may be left out. Thus, index construction needs to balance the trade-offs between inclusion and exclusion of pertinent variables. Typically, if variables are measuring the same indicator, they correlate with one another. However, if distress is defined as a multi-faceted concept—which we believe it should be—then variables measuring different indicators of this concept may not correlate highly.[1]

Second, since ARC employs "objective" or secondary-data indicators, selection of measures is dependent on available federal and other data sources, which vary in quality, geographic

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[1] A mix of indicators is important to identify distress among the ARC counties. Roback (1982) demonstrated why employing only a few, select indicators can be inadequate. She shows that locations profitable for firms have higher wages and higher land or property values, but locations attractive to households have lower wages due to greater labor supply and higher land prices. Her analysis shows that vibrant communities can have high or low wages – and high or low per capita incomes. Similarly, depending on whether a region's strengths are dominated by firm or household preferences, a vibrant region can have very low or high unemployment rates (Partridge and Rickman, 1997). It hinges on whether residents are willing to remain in a region if they are unemployed. This analysis illustrates why certain indicators such as average wages, income, and unemployment rates can be imperfect measures of distress when used in isolation. The rationale also underlies Partridge and Rickman's (2003) call for multiple measures to indicate whether a region is experiencing broad-based prosperity or distress.

coverage, cost, and timeliness (Feeney et al., 1995). One quality that social scientists expect measures to have is reliability—the idea that repeated measures applied to the same observations will yield the same, consistent results (Babbie, 1989). Some measures are more reliable than others due to their data source. For example, where data are reported in a different manner by state, such is the case with the Census of Governments, reliability is more problematic (e.g. measurement error is introduced due to different methods of data collection procedures in each state). Another issue is geographic coverage. While numerous potentially useful measures exist, many are not be available across counties, particularly small ones. Cost considerations are also important. The frequency of data collection affects the degree to which data are timely enough to assess distress conditions. To fully capture distress, measures should enable the assessment of both long and short-term distress.

Finally, once variables are selected, decisions need to be made about the manner by which counties are then classified as "distressed." One method of classification is to use an absolute cut-off point, or threshold under which counties fall, to designate the county as distressed. For example, a county could be classified as distressed when its unemployment rate exceeds a certain threshold unemployment rate. A contrasting method of classification is to use a relative cut-off point in which some proportion of counties (e.g., the top 10%) is designated as distressed. Measures using absolute cut-off points are problematic because they tend to assume an unchanging threshold when this threshold may vary in relevance over time. Moreover, for most variables, no widely agreed upon standard threshold points have been set by researchers. For these reasons, absolute thresholds may produce unsatisfactory or unreliable results whereby distress is not consistently captured. Related discussions of this issue are found in Feser and Sweeney (2003) and Schiller (2008). By contrast, "relative" measures of distress have the advantage of changing over time as national conditions and norms change. Indeed, it may be more defensible to argue that a county is "distressed" if it falls in the bottom 10% of U.S. counties than try to defend that, for example, a 25% poverty rate indicates distress but a 20% poverty rate does not.

Other problematic issues arise when the classification system is an index that combines different measures of distress. Variation in types of distress can become masked (Glasmeier et al., 2003). A county that fares markedly worse on one measure may be ranked as not distressed if other measures are favorable because summary indexes can wash-out the effects of any one individual measure. Classifying counties based on index scores into an "either/or" situation also adds arbitrariness. For example, the 78th county that just made the "distressed" category in FY 2008 is likely little worse off than the 79th county that was ranked at the top of the "at risk" category. Yet, they could be treated very differently in funding priorities. Our point is that distress is not likely to be captured with a threshold, but is more accurately reflected by a continuum (ARC, 1999).

One possible solution to the "either/or" question is to adopt an additive index with carefully selected weights for each indicator. A community is designated as being distressed if a particular threshold number is reached after taking into account a large number of distress measures. Yet, this still suggests that the ARC (or anyone else) can design the perfect weights and can identify

the perfect indicators of distress, which may be too complex to reasonably expect.[2] In FY 2007, the ARC adopted a more flexible meaning of distress (ARC, 2007). Rather than meeting some set threshold for each of the three distress indicators, the ARC now uses an additive measure across its three measures of distress. Specifically, if the *additive* sum of the three distress indicator measures fall in the lowest 10% of all U.S. counties, the county is deemed as falling into distress (ARC, 2007). While additive indexes still can mask distress among any one of their component variables, this is a more flexible and useful approach vis-à-vis past classification systems. Ranking distress relative to the universe of U.S. counties also gives the ARC a more transparent and defensible benchmark when describing "distress" to Congress and other stakeholders.

4.3. ARC Variables Measuring Distress

As noted in section 3 above, government agencies tend to use a common set of indicators for distress—e.g., unemployment rate, net population change/out migration, poverty rate, per-capita income, employment growth, etc. The ARC's historic reliance on the unemployment rate, per-capita market income (PCMI), and the poverty rate, places the Commission in the mainstream. Yet, there are shortcomings with any set of measures, including those used by the ARC. Moreover, structural changes in the economy since the early 1980s (when the ARC first initiated the distress indicators) suggest an ongoing need to appraise alternative measures to assess whether they are still meeting current priorities.

Our reading of the historic ARC usage of the term 'distress' is that it reflects persistent structural problems that reduce the well-being of most residents of a given county. In practice, its common distress indicators have been backward looking, examining "past distress." They are not necessarily indicative of future structural problems that may cause distress. This raises the question as to whether the ARC should be more strategic and consider future trends in determining distress? Is it that current ARC programs are more aimed at solving past problems and not proactive in mitigating emerging pockets of distress?

The ARC's usage of distress does not generally measure cyclical or short-term deprivation—e.g., a closing of a rural community's pulp mill is painful but does not necessarily portend to structural problems. This would stand in contrast to the Economic Development Administration (EDA) which places considerably more weight on short-term cyclical measures (Feser and Sweeney, 2003; Glasmeier and Wood, 2005). A justification for the ARC's targeting towards long-term distress is that its mission is to alleviate structural problems, leaving short-term problems to other agencies.

In the following section, we summarize a series of potential 'distress' indicators, assessing strengths and weaknesses, their geography of coverage, cost, frequency, and timeliness. We begin with primarily "backward" measures of distress that are indicative of past structural

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[2] Another issue with weighting the relative contribution of measures is that weights would probably need to vary over time. So for example, unemployment typically would be given a stronger weight in eras where distress was more dependent upon this indicator (i.e., such as was the case in the 1970s) but lesser weight today where unemployment has become more uniform across regions. It becomes difficult to benchmark indicators over time when different weighting systems are used for each time period.

problems. We then consider more "forward" looking measures that reflect emerging or continued evidence of distress. We give special attention to the current distress measures employed by the ARC, namely, PCMI, unemployment rate, and poverty rate.

PART II - EVALUATING DISTRESS INDICATORS AND MEASURES

5. Appraisal of Backward and Forward Looking Indicators of Distress

5.1. Backward-looking Indicators of Distress

5.1.1. Cost of Living Index

Distress indicators are often based on a nominal dollar value. Some examples include PCMI and the poverty rate threshold. Differences in local cost of living imply that a given (say) $20,000 poverty rate threshold is more binding in a high-cost location than a low-cost location. Thus, it seems logical that given its importance and interrelationships with other measures, we begin our discussion with the challenges in developing a local cost of living index.

There are many constraints in adjusting for local cost of living, including data availability and conceptual issues. With regard to data availability, the U.S. government does not produce a local cost of living index (COLI) that allows for comparisons in living costs. There has been discussion that the U.S. Bureau of Economic Analysis may, in the future, produce a COLI at the state level, but even within a given state, the differences in cost of living can be tremendous. Other measures of local cost of living include the U.S. Chamber of Commerce's ACCRA index, but this measure is only available for a subset of metropolitan areas, which would be inadequate for the needs of the ARC.

There are some "stop-gap" solutions for constructing local cost of living indices. First, the primary reason that cost of living varies across local areas is due to differences in housing costs (U.S. General Accounting Office, 1995). Across local areas, the costs of other goods and services vary much less than does housing. For example, it has been proposed that local poverty rate thresholds be adjusted for differences in cost of living using the U.S. Department of Housing and Urban Development Fair Market Rent (FMR) (see Joliffe, 2006b for details). The FMR is essentially the cost to rent a "standard housing unit" at the 40th percentile of the housing distribution.[3] The local COLI would be based on how much the local living costs are increased due to higher housing costs.[4]

The FMR COLI index has been criticized for its assumption that the cost of other goods and services do not vary across the nation. For example, prices of non-housing goods may

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[3]According to U.S. Housing and Urban Development (2007), "FMRs are gross rent estimates. They include the shelter rent plus the cost of all tenant-paid utilities, except telephones, cable or satellite television service, and internet service." According to HUD, FMRs are annually calculated for 530 metropolitan and urban areas and 2,045 nonmetropolitan counties and there is no data lag in their release. For more details of FMR, see http://www.huduser.org/datasets/fmr.html.

[4]The specific adjustment proposed for the poverty rate is based on the notion that a low-income household spends about 44% of its income on shelter and 56% on other goods and services. The key assumption is that non-housing goods and services costs do not significantly vary across locations (i.e., any non-housing cost differences tend to offset one another). Based on these assumptions, the cost of living index for a county c relative to the national average *U.S.* would equal: $COLI_c = 1 + .44(FMR_c/FMR_{US})$, where FMR is the fair market rent of the standard 40th percentile housing unit and the national average cost of living would equal 1. See Jolliffe (2006a, 2006b) for more details of how to adjust the poverty rate for local differences in cost of living.

significantly vary around the national average even if they are equal on average across the nation. Similarly, Nord and Leibtag (2005) and Partridge and Rickman (2006) argue that the FMR COLI "over adjusts" the cost of living because less-populated remote areas may have higher prices for some products, or some products may not even be available in such locations (e.g., there are no "big-box" stores in remote communities). Indeed, Kurre (2003) finds that there are rural-urban price differences across many categories of products—calling into question the basic assumption of the FMR COLI. Finally, the assumed 44%/56% housing-non housing expenditure share split may not accurately reflect consumption patterns for many locations.

There are also conceptual issues that call into the question the whole measurement of local cost of living. Economists have long recognized the pattern of compensating differentials (e.g., Roback, 1982). For example, locations with strong labor markets or "nice" amenities such as mountains, ocean views, or lakes will have relatively high housing costs and places that lack strong labor markets and other amenities will have low housing costs. Rather than indicating that a household needs less income to be as well off, low average housing costs often simply reflect the particular disadvantages of a location such as remoteness or poor environmental conditions (perhaps a toxic waste dump). The low housing costs compensate for these local disadvantages. Adjusting (say) PCMI upward to reflect a lower cost of living would overlook these other 'debilitating' factors that lead to lower housing costs.

Summary Evaluation: A county-level cost-of-living measure can be constructed on a timely basis, but there will remain conceptual problems in its interpretation as well as questions about its reliability. Possible gains in the use of this measure may be offset by concerns about the loss in precision.

5.1.2. Poverty Rate

The poverty rate is a key measure of community distress and is routinely used by ARC and other agencies. Though the ARC only nominally places a one-third weight on poverty rates, the current ARC distress indicator in fact closely mimics a poverty rate measure (Partridge, 2007). This follows because much of the variation in ARC counties is across their measured poverty rates (per capita income and the unemployment rate are not as variable). This outcome may be acceptable—but such a weighting scheme favoring the poverty rate is more accidental than explicit. Instead, the ARC may wish to have other factors play a stronger role in determining distress.

The official U.S. Census Bureau poverty rate is criticized for a variety of shortcomings. First, it is often denounced for *not* adjusting for local cost of living differences and it excludes informal or black market activity (Nord and Leibtag, 2005; Partridge and Rickman, 2006). Yet, as described in the local cost of living discussion in Section 5.1.1, it is not clear whether adjusting for "cost of living" differences would actually improve the poverty rate as a measure of community distress. Using poverty rates as a distress measure also introduces an arbitrary nature to the process. For example, households with incomes just above the poverty threshold would not be considered in "distress" even though they are clearly facing economic stress. Yet, a high local

poverty rate appears to be closely associated with the local area having a relatively high share of "low-income" households, including households just above the official poverty rate.[5]
The poverty rate also appears to be a very good measure of structural problems in a particular location. For example, local poverty rates are very persistent (Partridge and Rickman, 2006). Counties that had high (low) poverty rates 50 years ago tend to have high (low) poverty rates today. Thus, a high poverty rate is a good indicator of systemic structural problems that characterize underperforming locations both at present and over the long-term.

One of the biggest historical drawbacks of using the poverty rate is that it has been most reliably measured in the ten-year Census of Population at the county level. Thus, it is increasingly inaccurate as time elapses (Glasmeier et al., 2003), though relative poverty rates tend to change little over time (Partridge and Rickman, 2006). Intercensus annual estimates of poverty rates can currently be obtained from the U.S. Census Bureau's Small Area Income and Poverty Estimates (SAIPE) (Hammer, 2000).[6]

A potential advantage of SAIPE data is that it is available at county and school district levels. At the same time, a limitation associated with the SAIPE estimates is that they are available with about a three-year lag. Moreover, these estimates are survey-based and are not as accurate for less-populated counties (Wood, 2005). Measures of economic deprivation could be augmented by other indicators that are available on an annual basis such as the percentage of households that receive food stamps or the percentage of children who qualify for free or reduced-price meals (at the school district-level). Yet, this would require further statistical analysis to construct a proper method to bridge these alternative measures to a conventional poverty rate.

Beginning in 2010, the U.S. Census Bureau's American Community Survey (ACS) will produce poverty rates at the county, census tract, and block group levels on an annual basis (U.S. Census Bureau, 2006). With the ACS replacing the decennial census as a source of local economic and demographic data, this will overcome current concerns that poverty rates are increasingly outdated as time elapses from the past census. Another advantage of the ACS is that it will be released with about a one-year lag (which is far superior to longer release lags for the decennial census). Yet, for smaller rural counties and sub-counties, the ACS will use a five-year moving average, meaning that there still will be a delayed response for the ACS. Moreover, the ACS is sample based, which is subject to some error. For persistent measures such as poverty rates, this error is likely to be less severe than for other measures that are more variable over time (e.g., employment growth).

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[5]For example, Partridge et al. (1996) and Levernier et al. (1998) report that local measures of income inequality are highly correlated.

[6]The U.S. Census Bureau's SAIPE program was initiated to remedy the problem of the long ten-year interval in the census poverty rate. Annual county-level updated estimates for poverty and income are obtained using multiple regression analysis (with approximately a two-year delay). Predictors or independent variables used to create these estimates include the number of personal exemptions claimed on federal income tax returns by families with incomes at or below the poverty level, the number of people receiving food stamps, Census of Population, and Census Bureau population estimates. The Census Bureau (http://www.census.gov/hhes/www/saipe/techdoc/quantify.html) reports that the errors for the SAIPE program are larger than those in the ten-year Census. See Hammer (2000) for more details of the SAIPE program.

Summary Evaluation: The poverty rate is an essential distress indicator, though it has limitations in detecting future distress and it may not capture other dimensions of distress. ACS will likely prove to be an invaluable addition as a data source for the poverty rate, though it will reflect a five year moving average that will not be exactly current.

5.1.3. Unemployment Rate

The official unemployment rate reported by the Bureau of Labor Statistics has long been used by federal and state agencies as a core measure of economic distress (see the authors' comparison Table 3.1) or the underutilization of labor resources. This rate is defined as the number of unemployed workers divided by the civilian labor force in a community or region. Note that a non-employed individual must be *actively* seeking work to be officially considered unemployed.

As discussed in section 5.1.10 on population change and migration below, unemployment rates can fluctuate widely depending in part on the degree of attachment of workers and households to the local community. For example, unemployment rates in the Great Plains states are generally low not because the local economies are perpetually booming, but because people leave as soon as they lose their jobs given that they have little hope of finding new employment in the future (or they may not be attracted to remain in place with a harsh climate). The decision to leave is related, in part, to expectations about future wages; if expected wages and the odds of getting a job are high, then workers are willing to wait for some time, and be counted among the unemployed (e.g., Blanchflower and Oswald, 1995). Otherwise they will leave.

Further, as many authors have pointed out, unemployment rates do not include discouraged workers (those who have given up looking for work and are no longer counted as part of the labor force), underemployed workers (those who would like to work more hours or who are not in the types of jobs that take full advantage of all the skills that they have), and labor market churning of part-time and seasonal workers (Price and Wial, 2005; Bradley et al., 2001). Unemployment rates also reflect year-to-year cyclical behavior that may not reflect structural rigidities. In 2005, additional concerns arose over changes in the LAUS (Local Area Unemployment Statistics) methodology (Bishak communication to Brown, Chief of LAUS, BLS, Jan. 27, 2006) and how those changes affected the selection of distressed ARC counties. Nonetheless, the unemployment rate remains a widely used distress indicator and it is available annually with a two-year lag.

Furthermore, unpublished research on one southeastern Kentucky County found that the recorded unemployment rate rose dramatically after a major new manufacturing plant located there.[7] The reason was not only that more local workers decided to re-enter the workforce in that county, but also that a number of out-migrants, who had left previously because they had no local opportunities, decided to move back after the new plant opened. Thus, local unemployment rates and economic activity do not always move in opposite directions.

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[7] Eldon D. Smith, University of Kentucky, pers. comm., ca. 1990.

In the ARC states of Ohio, Pennsylvania and New York, it is possible that unemployment rates have remained low despite on-going economic upheaval because residents have adjusted by leaving to find work elsewhere, especially in more recent years – e.g., see Grill's (2003) discussion regarding Appalachian New York. In fact, our maps showing population change for 2000-2005 suggest that this may be exactly what has happened in these communities. We know from supplemental information and human capital theory (Snyder et al., 2007) that it is often the youngest residents, the future workforce, who are the most likely to leave because they have the most to gain from relocating (Grassmueck et al., 2007).

> *Summary Evaluation*: The unemployment rate is easy to obtain and use, but it is also subject to considerable measurement error, and error of interpretation. We recommend that ARC explore the implications of dropping this variable as a measure of distress in favor of a population migration or change measure, coupled with a measure of job growth pending the results of the RFP on "Alternative Employment Measures of Economic Distress in the Appalachian Region," referenced in section VIII of the present RFP.

5.1.4. Employment Rate/Labor Force Participation: Measures of Labor Market Strength

The employment rate and labor force participation are place of residence (POR) measures of labor market strength. As we note above, the unemployment rate is increasingly viewed as an unreliable and incomplete measure of economic distress. It misses discouraged workers, long-term unemployed, marginally attached individuals who are not seeking work, and it undercounts underemployed workers (Bradley et al., 2001; Price and Wial, 2005; Wood, 2005).

For these reasons, Partridge and Rickman (2003) argue that the *employment rate* (employment rate/population that is sixteen and over), in conjunction with annual employment growth, is a better indicator of overall labor market strength (see also below). While this clearly improves upon the simple unemployment rate, accurately adjusting for the size of the local working age population from public statistics can be problematic. For example, some communities have more high school dropouts and more senior citizens who are forced to work because they did not save enough for retirement. In such cases, using only the strictly-defined civilian workforce could be problematic, but it is possible to make adjustments for these abnormalities by using Census data.

Glasmeier et al. (2003) proposed an Economic Health Index (EHI) that included a labor force to total population measure (LFPOP). The LFPOP corrects for two potential shortcomings in the traditional unemployment rate. First, it adjusts for counties that have a high dependency ratio with a large youth share of the population. Second, it adjusts for cases where there is a large share of the population that is not actively involved in the workforce—most notably discouraged workers who do not seek work due to the lack of employment opportunities.

In isolation, the LFPOP does not reflect the case where there is a large share of the labor force that is unemployed.[8] Thus, to combine the influence of a high unemployment rate and a low labor force participation rate due to discouraged workers, the total residential employment over total population (EMP-POP) would address both concerns with one measure (Partridge and Rickman, 2006). If the ARC continues to measure distress with a labor market indicator, using EMP-POP would directly capture unemployment and discouraged worker effects and is more informative than an unemployment rate measure.

Summary Evaluation: The place of residence (POR) employment is available on an annual basis with almost no delay as part of the Local Area Unemployment Statistics series at the Bureau of Labor Statistics. Thus, it would be available in as timely a manner as the unemployment rate and conceptually can be used to construct superior measures of labor market distress.

5.1.5. *Place of Work Employment Growth*

Place of work (POW) county employment captures employment by employers located in the county. POW employment would provide more of a measure of the economic health of the county's employers. Conversely, place of residence (POR) employment better reflects the employment conditions of the county's workforce. POR employment differs from POW employment primarily due to in- and out-commuting patterns. As is often the case in rural counties, there is significant out-commuting to urban locations, which would imply POR employment could greatly exceed POW employment (and visa versa in core urban counties).

POW employment growth offers different information on the economic conditions of local employers and it also provides information about local job availability for local residents—to avoid commuting. Moreover, local job growth is very highly correlated with local population growth in the medium to long-term. For this reason, Partridge and Rickman (2003) argue that POW job growth could be a relatively complete measure of local economic conditions. Another advantage of the POW employment data (described below) is that it includes both wage and salary employment and self employment. Because self employment is sometimes associated with more entrepreneurial activities, this reflects another advantage of considering POW employment data. Monitoring self employment then serves another ARC goal of trying to encourage entrepreneurship (ARC, 2007).

The largest possible shortcoming of POW job growth data is that it may not fully reflect conditions for employed residents (who may be out-commuting). Namely, ARC has primarily defined distress as it relates to the residents of a particular county—not the county's employers.

Summary Evaluation: Annual POW employment data are released by the U.S. Bureau of Economic Analysis with about an eighteen month delay. Thus, they are as timely as the per capita market income measure used in ARC's current distress indicator. Yet, POW employment data do not perfectly reflect place-of-residence (POR) prosperity, which should be weighed in any decision to adopt it.

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[8]The Glasmeier et al. (2003) index also included the relative county unemployment rate.

5.1.6. Income per Person, Ratio of Income Maintenance and Other Payments to Income

At first glance, income per capita would seem to be the single-best indicator of human welfare and well-being. Calculated as the total income earned in a place divided by the total population, it is a measure of the productivity of workers and the ability of owners of assets or entitlements to command resource flows. However, like the unemployment rate, this variable also has shortcomings as a measure of distress, or lack thereof, when it is applied to different geographic units. First of all, as discussed earlier, per capita income does not account for differences in the cost of living over space. For example, the prices of homes tend to be very high in cities or on the coasts of the U.S., as well as in high-amenity areas of the nation's interior. This reflects not just differences in the quality or size of the home, but also different costs of land (rents). Residents may also be willing to give up income in exchange for the ability to live in a high-amenity area. In this case, they may be just as well off as a higher-income household living in a low-amenity area (as mentioned above).[9]

Second, there may be variations in the size of the workforce earning the total income, and this can lead to misleading results. For example, Utah notoriously ranks near the bottom of all states in terms of per capita income (47th), but that does not mean that the average household or adult resident is poor. In fact, the state does much better in income per household rankings. The explanation for this finding is that average family size is quite large in Utah, with a relatively high number of children who are not of working age, so a given amount of total income is divided by more people.

Per capita income also does not reflect average wages, or earnings power, because it does not adjust for labor force participation. As an alternative, *growth* in per capita income does indicate whether a place is moving towards "attainment," all else being equal. Per capita income also does not measure income distribution, such as high levels of income inequality. Other than including the poverty rate, this drawback could be overcome by including measures of income inequality or median household income (these measures likely will be available annually from the American Community Survey (ACS) starting in 2010). One advantage of using income per capita as a measure of distress is that it is available annually, with about a two-year lag, from the U.S. Bureau of Economic Analysis, though median household income may become the preferred measure beginning in 2010 with the expansion of the ACS. Furthermore, it is easily understood as an indicator of distress, subject to the caveats discussed above.

Personal income is derived from three sources: labor, transfers and property (see Table 5.1). The ARC has long recognized that transfers should not be included as a part of income when assessing distress, and as such, it uses a "market-income" measure instead. This excludes "retirement and disability insurance benefit payments, medical payments, income maintenance benefits payments (e.g., food stamps), unemployment insurance benefit payments, veterans

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[9] Earnings in cities (places with high population density) are higher not only because worker productivity is higher, but also because employers have to pay workers more so that they will be compensated for disamenities related to urban congestion. This is a complication for present purposes, since the ARC region includes both metro and non-metro counties, and more generally, is "uneven" in how it includes or excludes cities within its states (Isserman and Rephann, 2005: 346).

benefit payments, and other such payments" (ARC, 2007). Similarly, the Conference Board uses personal income minus transfer payments when it assesses the health of the national economy (see discussion of economic indicators below). Yet, omitting transfer payments does mean that government-based retirement income is left out, which could overstate the amount of distress in locations with significant retirees.

Sources of Personal Income in the U.S.	2005
All numbers are per capita	
Personal income	$34,471
Net earnings[a]	23,956
Personal current transfer receipts[b]	5,149
Income maintenance	532
Unemployment insurance benefits	109
Retirement and other	4,507
Dividends, interest, and rent[c]	5,366
Source: U.S. BEA Regional Economic Information System, 2007	
a. Labor, *b*. transfer, *c*. property income.	

Table 5.1: Sources of Personal Income in the U.S., 2005

Because of the recognized shortcomings of per capita personal income as a measure of distress in any given county, we examine three alternative measures here. In particular, we consider income maintenance, retirement and dividends, interest and rent (DRI) payments separately as a share of total personal income. Our examination reveals the relative importance of each of these in the different ARC counties. These relative indicators (rates) could potentially offer a number of interesting insights into the vitality of local county economies that previously have not been considered directly. While we are able to present only national average for these variables here, we know from experience that these measures vary widely across the individual counties of the ARC region.

5.1.7. Income Maintenance Payments

The first indicator is income maintenance payments as a percent of total personal income in the county. This formulation is also used by Feser and Sweeney (2003), who argue that this approach: (*a*) not only gets around the problem of variations over space in relative costs of living differences, but (*b*) that it also generates a *rate*, which can more easily be used for benchmarking purposes.[10] They argue that the fact that the level of income per capita has been increasing for the most part over time makes it difficult to establish a "distress threshold that facilitates comparisons of the incidence of distress over both time and space" (p.43). This ratio is calculated as total income maintenance payments divided by total personal income.

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[10] Note that this is not a perfect correction, because income maintenance expenditures are not adjusted regional income maintenance expenditures are not adjusted for regional cost of living differences (just as federal income taxes paid by individuals do not depend on where they reside). Jolliffe (2004) reports a reversal of poverty rankings for metro and non-metro counties when HUD's FMR adjustments are used to correct for cost of living differences (see: http://www.npc.umich.edu/publications/workingpaper04/paper13/04-13.pdf). He finds that the FMR index is 20 percent lower in non-metro than in metro regions. Since the ARC region includes both metro and non-metro counties, the use of such adjustments would also impact county rankings.

Figure 5.1 shows that the ratio of income maintenance payments to total personal income nationally only moves between 1 and 1.6 percent, so it is quite small. However, transfer payments may be relatively more important in lower-income areas, such as in the Appalachian Region. While the ratio fell noticeably between 1995 and 2000 (the period which included the major welfare reform act of 1996, PRWORA and a major economic expansion), it has increased consistently again since 2001. As expected, this measure tends to coincide, in general, with the national business cycle.
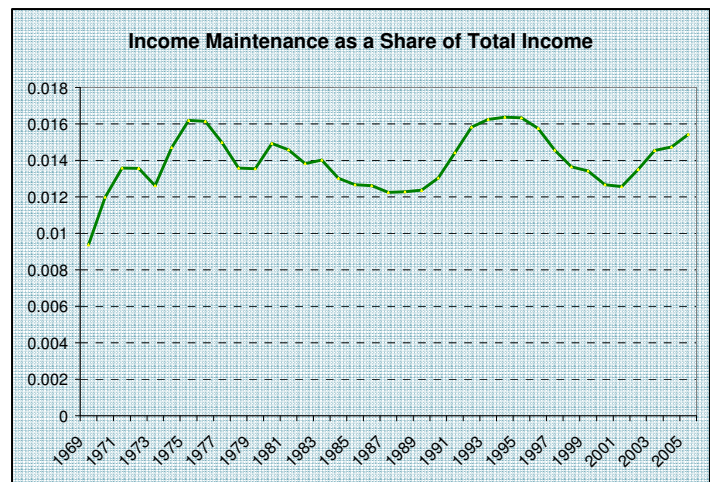
Figure 5.1: Income Maintenance vs. Share of income (data source: BEA, REIS)

The rationale for including this ratio as a measure of economic distress would be as follows. The larger the share of total income in a given community that is comprised of income maintenance payments, the less healthy – or distressed – is that community. Likewise, in a community that is becoming less distressed over time, this ratio will fall even if payments per capita are rising (so long as total income is rising at an even faster pace). *This ratio could be used as an alternative to the poverty rate*. As an important caveat, however, note that this ratio only appears superficially to be independent of the poverty rate. To the extent that eligibility for income maintenance transfers is poverty-based, the difference between the two series is more apparent than real. This measure also has the advantage of being more up-to-date, in theory, than the poverty rate previously based on the decennial Census to the extent that individuals have to reapply annually for transfer payments (though the expansion of the ACS will eliminate this advantage). Yet, a shortcoming is that transfer payments imperfectly reflect household poverty or local economic degradation.

5.1.8. Retirement Income

A second, novel indicator to consider is retirement income in a county as a share of total personal income. Not surprising, given the baby boomer bubble working its way through the labor force, this share has been rising steadily over the last 35 years (see Figure 5.2); it has almost doubled, from 6.8 percent of all income in 1969 to 13.1 percent in 2005. Whether or not this ratio by itself is an indicator of current or future distress can be debated. In declining communities, a strategy of driving local economic growth based on retirees will succeed only if the pipeline of retained (i.e., new) or return retiree migrants remains full. Otherwise, it is only a matter of time before this source of income *growth* dries up, and such a strategy will not be sustainable. Similarly, older retirees may be a drain on local health and human services.

Thus, in order to be reliable, this measure has to be viewed in conjunction with another – that of population change. If that population change is negative, then a relatively larger share of retirement income in total income would suggest that the community is in decline. Conversely, if the population is also growing, attracting well-to-do retirees, then the community is less likely

to be distressed. Before making a final recommendation about this indicator, and the others discussed here, some empirical sensitivity analyses would need to be carried out to assess the reliability of these numbers. However, like the other indicators considered here, this one is available annually with only a two-year lag from the Bureau of Economic Analysis.
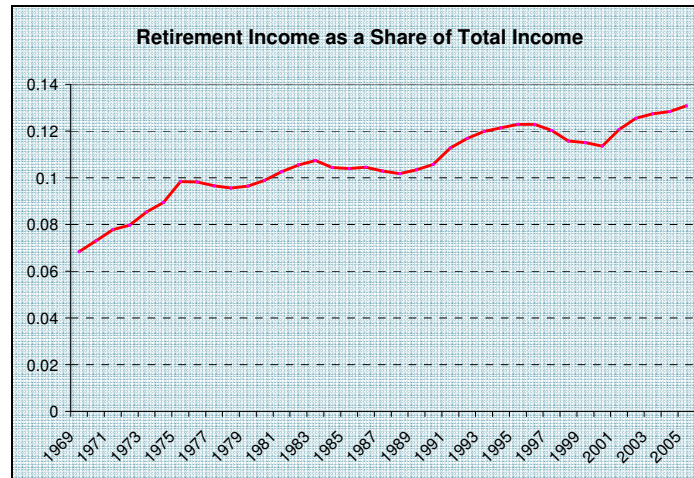
Figure 5.2: Trends in Retirement Income as a Share of Total Income
(Data source is BEA, REIS)

5.1.9. Income from Dividends, Interest, and Rent

Economists and others usually focus on income as a flow measure to assess the level of distress or well-being of a community. While labor income represents a return on individual's work effort, another important component of total personal income is derived from a stock rather than a flow variable -- the payment of dividends, interest and rent based on assets owned or wealth held. Pryor (2007) presents empirical evidence that these kinds of payments are accounting for the growing income inequality in American society. He argues that to the extent that "wealth begets more wealth," this trend will only increase in the future.

Figure 5.3 shows this source of income fluctuating between 14 and 20 percent of total personal income, with a downward trend occurring since about 2000. That is, total personal income has been rising more rapidly than income from dividends, interest and rents. We believe that examining this measure as a timely, supplemental indicator of economic well-being in a community would be useful in future analysis. Often this kind of income can provide a buffer against short-term fluctuations in local labor markets—e.g., if a manufacturing plant closes. As the figure shows, this income stream tends to be relatively independent of the national business cycle, unlike the income maintenance payments.

Other authors (e.g., Low, 2005) have also included the value of housing or an imputed rental value, as done by Pryor (2007), as well as the value of agricultural land, to measure local wealth in the form of fixed assets. A few of the counties in Central and Southern Appalachia score very high on the agricultural land value, but we hesitate to include this in the index. The reason is that the value of the land can only be extracted if it is sold. More generally, this discussion points to the fact that there are other important assets to consider in the region to assess the level of distress in a given county.
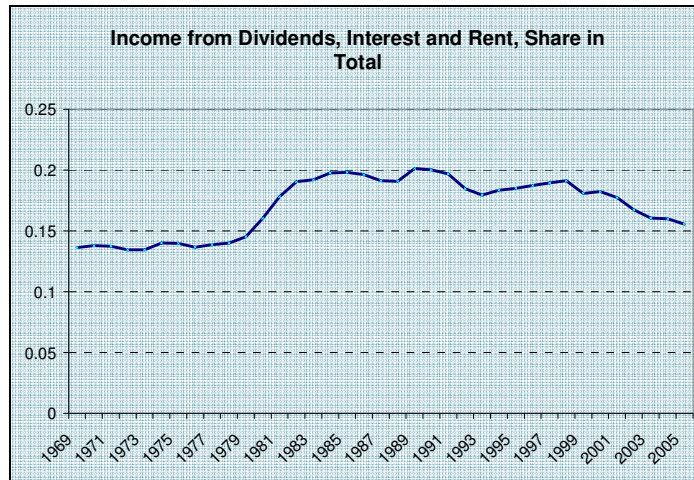
Figure 5.3: Trends in Income from Dividends, Interests, and Rent (Share in Total)
Data sources: BEA and REIS

Summary Evaluation: While intuitively appealing and easy to collect, per capita market income is completely dominated in the current ARC formula by the poverty rate. This variable says very little about the distribution of income within a county. One approach is to look at change in income over time. Theoretically, we would expect to observe some convergence – at least among the rural counties. The ARC should evaluate how income maintenance and dividend, rent and interest payments as a share of total income are related to distress. The relative importance of retirement income also should be explored, in conjunction with population change.

5.1.10. Out-migration/Net Migration/Change in Population

The notion that people "vote with their feet" in determining where to live is a widely-used measure of distress (Feser and Sweeney, 2003). Whether measured in terms of out-migration, net-migration, or change in population, it is apparent that people will on-balance leave areas that have some sort of combination of a weak economy or poor quality-of-life and move to areas that have strong economies and/or more favorable quality-of- life features. Thus, it reflects underlying economic conditions and quality of life as shown by the *actual* behavior of the residents – i.e., it is not an estimate produced by academics or public agencies. Because migration is both monetarily and psychologically costly, it also reflects the long-run expectations of the migrants as to where they will be most content to reside (Grassmueck et al., 2007).

There is conceptual debate regarding what population change actually measures. For example, population loss could indicate distress or alternatively, it could indicate a desired adjustment to distress (Feser and Sweeney, 2003; Partridge and Rickman, 2006). Regarding the latter point, if a location is suffering from hard economic times, then it is often helpful if some residents relocate to regions that are experiencing greater economic growth. By reducing labor market competition, such relocation mitigates the economic pain in the origin region while helping the workers who find employment elsewhere. Many economists would argue that such migration is helpful in

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promoting economic adjustment and should not be impeded by providing government aid to the declining region. They say such aid would slow the needed adjustment—prolonging the agony (Glaeser, 2005).

Other economists disagree and argue that population change is a direct indicator of distress. In particular, they note that a declining population may produce further distress. For example, it could lead to a vicious cycle of negative expectations that lead to a lack of private investment. Out-migration can be especially problematic for distressed communities if it is associated with a brain drain of the most talented or entrepreneurial individuals. Likewise, if fewer people are left to support a fixed public infrastructure, this would lead to higher taxes, which will further depress an area. Moreover, with concerns about sprawl and congestion in large growing American metropolitan areas, influxes of new residents from declining areas can lead to further increases in monetary costs for new infrastructure, as well as implicit costs. Finally, another advantage of using net-population change is that it also constitutes a *forward-looking* measure of a location's vibrancy because residents who are considering relocating are weighing future economic and quality-of-life prospects in their origin versus their potential destination.

In addition, the process of net migration or population change can also obscure some traditional measures of economic distress such as the unemployment rate (Grill, 2003; Partridge and Rickman, 1997, 2003, 2006). For example, Appalachian New York has experienced significant economic dislocation in recent decades. Rather than experiencing a sharp increase in the unemployment rate, this area has seen a steady out-migration of its residents. This pattern stands in stark contrast to the pattern in Central Appalachia where downsizing in natural resource based industries has led to sharp increases in local unemployment rates (because the unemployed tend to remain in their Central Appalachian homes). Therefore, using net migration would act as a complementary indicator to other labor market indicators.

It should be noted that net migration (or relative population change) has some limitations. Not all households can easily move. Likewise, in other settings, rapid population growth may make matters worse for the existing residents of the destination community. Partridge and Rickman (2005) found that some low-income regions experience considerable population growth. In such cases, Nord (1998) noted that low-income areas often attract new high-poverty residents who desire low-skilled occupations and "affordable" housing. Brown, Lobao, and Digiacinto (1999) also found clusters of low-income counties in the Ohio River Valley region of Appalachia that were attracting migration streams of new high poverty residents. This type of in-migration may create local "poverty traps" (see also Glaeser et al., 2000). After weighing these strengths and weaknesses, when net-population change represents increased distress (not just an adjustment to past distress), it is most sensible to use it as a distress indicator.

In the ARC region, the general pattern since about 1970 is that North Appalachia has faced significant net-out migration (especially New York and Pennsylvania) and South Appalachia has experienced significant net in-migration (Lichter et al., 2005; Pollard, 2005). The central region tends to fall in-between, though in far Southwest West Virginia and Southeast Kentucky, there is a clear distressed pocket that has experienced significant net-out migration (Pollard, 2005). This pattern would suggest that one advantage of using a net-population change measure is that it would better capture (potential) distress in North Appalachia (and parts of Central Appalachia),

while other measures such as the poverty rate would better reflect distress in other parts of the ARC region.

If a net-population change measure was adopted as a distress indicator, it should be calculated over a time period of sufficient length -- at least five years -- so that it adequately reflects distress and not short-term random variations or shocks. Likewise, when considered over a long enough timeframe, net population change is very closely linked to employment growth (Partridge and Rickman, 2003).

Regarding the proper population change measure, out-migration by itself would be inadequate due to the significant churning that naturally arises. For example, the typical Appalachian county generally has significant out-migration regardless of the net change in population (Lichter et al., 2005; Pollard, 2005). Indeed, rapidly growing regions like the northern suburbs of Atlanta have significant in-migration, but they also experience considerable out-migration (e.g., return migration).

Summary Evaluation: Population change or migration would capture elements currently lacking in the existing ARC indicators. The preferred population measure would be either the change in total population or net migration. Over longer periods, net migration and change in total population are very highly correlated because the natural increase in population is relatively uniform across the country. For example, Atlanta is growing so rapidly not because its population has a high birth rate, but because it has high net in-migration. Another advantage of considering either net population change or net migration is that they are available on an annual basis with only about a nine month delay from the U.S. Census Bureau.

An additional measure that may be helpful for planners in the ARC region is annual data on the origin of in-migrants to a given county or the destination of a county's out-migrants. Are they moving to nearby areas or are they leaving Appalachia in general? Such in- and out-migration data can be obtained from the IRS through its income tax database. It is available with about a two year lag and it is very inexpensive ($500 per year for the entire U.S.).[11] However, though income tax filers mostly represent the universe of migrants, it does miss undocumented workers and domestic non-tax filers, so it is not entirely complete.

5.1.11. *Demographic Characteristics and International Immigrants*

Demographic characteristics such as race, ethnicity, age, gender, and immigration status may serve as distress indicators insofar as they denote the presence of at-risk or disadvantaged populations. Native Americans, African Americans, and Hispanic populations historically have had higher poverty rates than non-Hispanic whites. Poverty is also higher among recent immigrants, children under 18, single-parent households (especially those headed by women), and the elderly (particularly elderly women) (Glasmeier, 2006; Schiller, 2008). These general national relationships tend to apply across geographic territory—for example, counties with a higher proportion of such disadvantaged groups usually fare worse on poverty and other

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[11]More details of the IRS county-to-county migration data can be found at
http://www.irs.gov/taxstats/indtaxstats/article/0,,id=96816,00.html.

economic distress indicators (Glasmeier, 2006; Glasmeier et al., 2003; Partridge and Rickman, 2006). A number of studies of Appalachian counties also find an association between the disadvantaged demographic groups above and greater distress using the ARC measures (Haaga, 2004; Wood, 2000; Wood, 2005).

County indicators of the presence of at-risk or disadvantaged populations can be constructed by simply using the proportion of the population in the socio-demographic groups above from the decennial censuses. Most studies assessing the determinants of poverty and other distress factors, including the ARC distress indicators, employ such proportional measures. But, they use them as determinant rather than outcome (i.e., distress) variables. A drawback of using sociodemographic variables is their timeliness. The U.S. Census Bureau's annual American Community Survey (ACS) will provide five year averages on such variables for all counties beginning in 2010 (U.S. Census Bureau, 2006). In addition, the census contains finer-grained data whereby the proportion of the population in poverty (and other income-level variables) by gender, race/ethnicity, age, and family status are available by county. Finally, other (nonproportional) measures have been developed that pertain to the well-being of different groups and we discuss these below.

Although numerous sociodemographic indicators can be measured, some are more pertinent than others for Appalachia. The recent ARC Strategic Plan (2004) notes that demographic shifts such as population aging and rapid increases of new populations with less proficient English language skills could affect future performance goals, so it is reasonable to scrutinize both age and immigration.

With regard to age, the number of children (under age 18) and older adults (ages 65 and older) are sometimes combined in a measure termed the "dependent population." This refers to the proportion of residents in age groups less likely to fully support themselves through participation in the labor market. Counties with higher dependent populations have greater economic distress nationally (Glasmeier et al., 2003; Wood, 2005), and to some degree, in the Appalachian region as well (Wood, 2005). However, this combined age measure is becoming less relevant to distress. There has been a long-term decline in the proportion of children, while the Appalachian elderly are growing as a proportion of the population due largely to net-outmigration of young adults (Haaga, 2004). The population over age 65 represents 14.3% of Appalachian residents compared to 12.4% of all U.S. residents (Haaga, 2004).

Most aging is done in place -- in-migration of retirees to Appalachia is relatively low and concentrated in a few counties. As a distress indicator, the aging population is limited. Poverty rates among the elderly are lower than those of children. Haaga (2004) also points out that older Americans are now more of a resource for communities. Many are able to work and those up to age 75 are not heavy consumers of public services. Thus, as described in Section 5.1.8, an aging population itself will continue to be a less relevant indicator of distress in the future.

International immigration at the county level is customarily measured using the data from the decennial censuses, which uses the term "foreign born population," defined as people who are not U.S. citizens at birth (MPI, 2003). This population includes naturalized citizens, legal immigrants, legal non-immigrants (e.g., refugees and persons on student or work visas), and

persons illegally residing in the United States.[12] Recent immigrants (those who arrived in the U.S. five years prior to the Census) also are documented.

Currently, immigration does not appear to be an indicator of distress as it pertains to most Appalachian counties. First, studies of ARC counties note that growth in the immigrant population has been much less in the region than the rest of the county, at least based on data from the 1990s (Lichter et al., 2005; Pollard, 2004). In 2000, the foreign born represented just 2.7% of the population, compared to 11.1% for the total U.S. population (Lichter et al., 2005). Pockets of higher immigrant populations, however, are found in northern Georgia, university settings, and parts of the Carolinas (Pollard, 2004). Second, there are data limitations. Measures of immigration at the county level are dependent on the decennial censuses, although they will soon be available through the ACS. Other data sources currently do not provide coverage of small geographic areas (MPI, 2003). These sources include the Current Population Survey conducted by the Census Bureau for the Bureau of Labor Statistics as well as the New Immigrant Survey.[13] Third, the degree to which new immigrants conceptually tap the concept of "distress" is debated. Some analysts argue that new immigrants, even undocumented immigrants, are beneficial to the economy while others argue the opposite. (See Martin and Midgley (2006) for a discussion of research findings on the topic).

Another set of demographic variables, race and ethnicity, have been identified as important in assessing distress by ACR reports and published research. Wood (2005) notes "counties and regions that have been persistently distressed invariably share one characteristic in common: a relatively high level of minorities." Ethnic concentration (density) and segregation have been studied by social scientists for many decades and are known correlates of economic distress (Glasmeier, 2006). In Appalachia, the non-Hispanic African American population remains the largest minority group, although the Hispanic population has grown rapidly (Pollard 2004). This contrasts with the U.S. as a whole where the Hispanic population now exceeds the African American population. Pollard (2004) notes that the minority population varies markedly in Appalachia, with southern Appalachia having a 19 percent minority population, compared to 7 percent of northern and 4 percent of central Appalachia in year 2000.

In addition to simple proportional measures, demographers and other social scientists have developed a variety of other measures that can be adapted to comparisons across the region. For

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[12]By way of comparison, the term native refers to people residing in the United States who are U.S. citizens, that is, people: born in one of the 50 states or the District of Columbia; born in the U.S. Insular Areas such as Puerto Rico or Guam; and born abroad of a U.S. citizen parent (MPI 2003).

[13]The CPS is a monthly survey of approximately 60,000 households designed to assess monthly economic conditions. It represents the civilian non-institutional population, rather than the full resident population as represented by the decennial censuses. MPI (2003) notes: unlike "the Census 2000 and ACS data, with their sizable sample populations, robust analyses of CPS data are generally restricted to the national level and to select geographic areas with sizeable populations." Other government surveys include the Survey of Income and Program Participation (SIPP), the National Health Interview Survey (NHIS), and the American Housing Survey (AHS) but their use for studying the foreign born is restricted by their relatively small sample sizes. The New Immigrant Survey (supported by NIH, INS, NSF, the Department of Education, and PEW Charitable Trusts) was piloted in 1996 with the first wave conducted in 2003 and second wave conducted in 2007. Its geographic coverage is limited to the top 85 Metropolitan Statistical Areas (MSAs) and the top 38 counties, with a random sample of 10 MSAs from among the rest of the MSAs and a random sample of 15 county pairs from among the rest of the counties (see NIS, 2006).

example, the Hoover index of concentration is a measure of the proportion of ethnic population in a county relative to its land area. It ranges from 0, where there is an extreme dispersal, to 100 indicating extreme concentration (Lichter and Johnson, 2006).

The most commonly used measure of segregation is the Index of Dissimilarity *Dt* which measures the degree to which two ethnic groups (e.g. whites/others) are evenly spread across geographic units, such as census tracts.[14] Segregation type indicators, although widely used, raise several issues. Measures vary as to their particular strengths and limitations for highlighting geographic patterns (Brown and Chung, 2006). These indicators were developed for cities using neighborhood or tract data. For segregation measures like the *Dt* to be useful in comparisons among counties in Appalachia, data below the county level, such as block level (Lichter et al., 2007) and block-group level data (Lichter et al., 2008) can be used, but this entails computational time. Multi-racial categories used first in the 2000 Census also add complexity for handling aggregate data (Lichter and Johnson, 2006).

Other indicators from reports and published research that could be considered are variables measuring women's employment and labor force participation (see 5.1.4). Wood and Bischak (2000) note, for metropolitan areas in the region in 1997, that female employment was over-represented in less skilled jobs, while male employment had a relatively higher percentage share of higher skilled employment when contrasted with other U.S. metropolitan areas. Women's status is often measured by the proportion of women in the labor force, which Brown et al. (2005) found was lower in the Ohio River Valley counties composing Appalachia. Measures based on proportional-based comparisons between men and women in employment sectors, labor force, and earnings can be constructed from decennial census data or the ACS after 2010. The Institute for Women's Policy Research (Caiazza et al., 2004) provides examples of labor force and other variables that be constructed for states and many of these measures are applicable to counties.

Summary Evaluation: The aging and immigrant populations do not appear to be highly relevant as distress indicators across most of Appalachia at present. Variables measuring race/ethnicity and gender could be given greater scrutiny as to their usefulness as markers of distress.

5.2. Forward Looking Measures of Distress

ARC distress indicators are backward looking in the sense they are measuring past structural problems. They do not necessarily reflect whether underlying conditions will change in the future and whether some currently non-distressed counties are at risk of falling into future distress. Thus, we will describe some other indicators of distress that we believe will better reflect *future* structural conditions in the county. To be sure, there will be some overlap. Many of

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[14]If the minority and white percentage are equal across all counties, then *Dt* is equal to 0, meaning racial segregation is low while a score of 100 means complete segregation. The *Dt* has as straightforward meaning. A score of 60 is high and indicates that 60% percent of either the white or the minority group must move to different geographic unit for the two groups to be equally distributed (Glasmeier, 2006).

these measures will reflect both past and current conditions, as well as signal future expectations for structural problems.

5.2.1. Net Migration/Population Change

The previous discussion in Section 5.1.10 regarding net migration/population change noted that expectations regarding migration are inherently forward looking (Topel, 1986). Future expectations about the local economy and the quality of life help drive migration decisions by both potential in- and out-migrants. As noted above, data availability represents a key advantage of using net-migration or relative population change. However, it was noted that a key problem with using net migration is that it may reflect the needed adjustment process to structural problems, in which it alleviates distress rather than indicates distress.

5.2.2. Building Permits and Housing Measures

Along with food and clothing, housing is a basic human need. Homes are not only the single largest expenditure item (33% of the total) and the most important asset for many Americans, but a home address is essential for accessing gainful employment and to assure worker productivity. The quality of housing and its affordability are important dimensions of county-level distress used by HUD. Improving housing quality has long been a key operational objective of the ARC, and when the Economic Research Service (ERS) recently compiled a housing distress measure, the ARC region did not figure prominently on the resulting map (see Figure 5.4 below). The ERS map relies on Census 2000 data and may be out of date given the upheaval that has occurred in housing markets since 2006.[15]
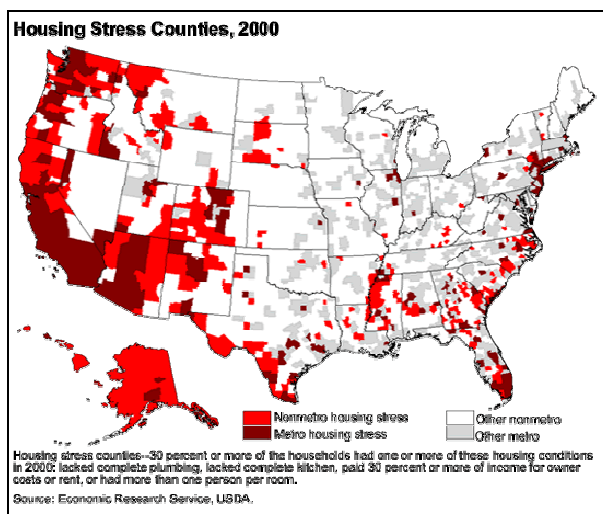
Figure 5.4: Housing Stress Counties, 2000

Housing affordability is another way of looking at housing as a potential problem area. This measure relies on Census data and usually is based on the ratio of the median home price to the

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[15] http://www.ers.usda.gov/briefing/rurality/typology/maps/Housing.htm

median household income in a community (a value greater than 3.0 indicates distress), or the share of homeowners and renters who spend more than 30 percent of their income on housing. Housing affordability is more of a problem especially on the coasts and in high-amenity scenic areas, as noted in Section 5.1. High home vacancy or foreclosure rates in a community also reflect an inability of homeowners to afford the homes in question.

Another more subtle indication of housing problems or shortages is the spatial mismatch phenomenon, where individuals cannot afford to live in the communities where they work. For example, Hilton Head, South Carolina is one such community, where service workers need to commute in from outlying areas. This is also a concern in a number of fringe counties in the ARC region (Mather, 2004). For policymaking purposes, however, it is sometimes difficult to ascertain how individuals voluntarily make the trade-off between nicer homes and longer commutes (e.g., residents of Pike County, PA have very long commutes into New York City, where many formerly lived, but in return, they can afford bigger homes with larger lots).

Here we focus on a different dimension of housing than the quality of and access to the existing stock. In part, we do this because the measures that have been used in the past are based on Census data and there is some uncertainty about the reliability and timeliness of their release for small counties once ACS is fully operational. Second, we know that a strong correlation exists between housing values with poverty rates. Thus, including these static indicators does not really provide any new and independent information about local economic distress beyond what is already derived in current distress indicators.

Thus, instead of looking at the traditional housing measures, we consider local county business permits as an independent forward-looking indicator of housing conditions. These permits can reveal predictions of future conditions in a county as assessed by the local real estate industry and other private investment decisions. *Economy.com* sells current county data at $200 per county or $2,000 for a regular subscription on building activity and housing affordability, updated quarterly. This data source is potentially relevant for this and other sections of our report, but their emphasis is on metropolitan areas and it is not clear how good their data are for non-metro areas. Further investigation would be needed to assess the reliability of Economy.com's nonmetropolitan housing indicators, but their use seems to be a reasonable possibility.

County Detailed Employment & Output Forecast

- Payroll employment, industrial output and wage forecasts for all U.S. counties.
- Includes both real and nominal output for 21 two-digit NAICS categories, 89 three-digit NAICS categories, and 284 four-digit NAICS categories.
- Complete coverage of government, military personnel and farm employment.
- History begins in 1970 and extends to 30 years of forecast for counties. History and forecasts are updated quarterly with adjustments monthly. Frequency is annual.

County Forecast

- Covers all U.S. counties.
- Approximately 100 variables, including one-digit employment, total and wage & salary income, population and households, labor force and unemployment rate, bankruptcies and retail sales, residential permit issuance, single-family and multifamily housing stock, existing sales, sales price, affordability index and mortgage originations.
- Annual forecast out 30 years. Updated monthly.

Source: http://www.economy.com/home/products/databases.asp?pid=30-00004-00&src=serviceOverview#30-00004-00

Table 5.2: *Economy.com* County-Level Employment and Forecast Availability

Housing construction is one of the ten variables that make up the index of leading economic indicators used to forecast national recessions and expansions. A key reason for using this variable is that as housing construction expands, so does the demand for consumer durables such as new refrigerators, cabinets, copper wiring, etc. In other words, new housing construction not only provides employment for construction workers, but it also has a multiplier effect in the economy at large. New housing construction in any one county is unlikely to have such a large multiplier effect, to the extent that manufacturing plants supplying the inputs may be located elsewhere. However, new home construction does indicate that the local private sector expects future growth in the community, and it creates important demand for the services of local bankers and real estate agents, among others, even as more and more of these transactions move to the web.

In a community that is in decline, or in distress, new building activity is likely to be subdued or non-existent from one year to the next, whether measured on a per capita or existing housing stock basis.[16] In vibrant communities, on the other hand, new building permits are likely to be issued on a regular basis, which would also be reflected in rising land values (e.g., Kilkenny and Johnson, 2007). These building permits data are available, at no cost, from the U.S. Census Bureau with only a one-year lag. This is an enormous advantage over other housing statistics, which are usually two years out of date before they are released. In addition, it is also possible to gauge the quality of the new housing stock as measured by the average value of the new homes that are being built, which are also reported in these statistics. Yet, one weakness with the U.S. Census Bureau's building permit data is that not all local governments regularly report their data as part of the county total (e.g., a rural township). One way to overcome this problem is to

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[16]In using this measure, one would need to control for factors such as age of the existing housing stock, cost of or availability of land, etc. For example, Allegheny County, PA is less likely to offer vacant green space for new housing construction at a relatively low price. One would also need to further investigate some abnormalities that occur in certain counties. For example, Columbia County, NY (just north of NY City) is seeing growth in the construction of new, high-end homes even as the county is depopulating and the local unemployment rate relative to the state's average is rising. To capture this kind of (suspected) "gentrification" on the edges of the ARC region, the distress indicator selected needs to have multiple variables.

monitor the change in permits, which would be more accurate if the reporting jurisdictions within each county remained constant over time.

Limitations of Building Permits Data. The portion of construction measurable from building permit records is inherently limited since such records obviously do not reflect construction activity outside of the area subject to local permit requirements. For the nation as a whole, however, less than 2 percent of all privately owned housing units built are in areas that do not require building permits.

The reported statistics are also influenced by the following factors. 1) Some building permit jurisdictions close their books a few days before the end of the month/year, so that the time reference for permits is not, in all cases, strictly the calendar month/year. 2) A study spanning four years showed that about 3 percent of the single-family houses built in permit-issuing places are built without a permit.

To the extent that most of these limiting factors apply rather consistently over an extended period, they may not seriously impair the usefulness of building permit statistics as prompt indicators of trends in residential construction activity.[17]
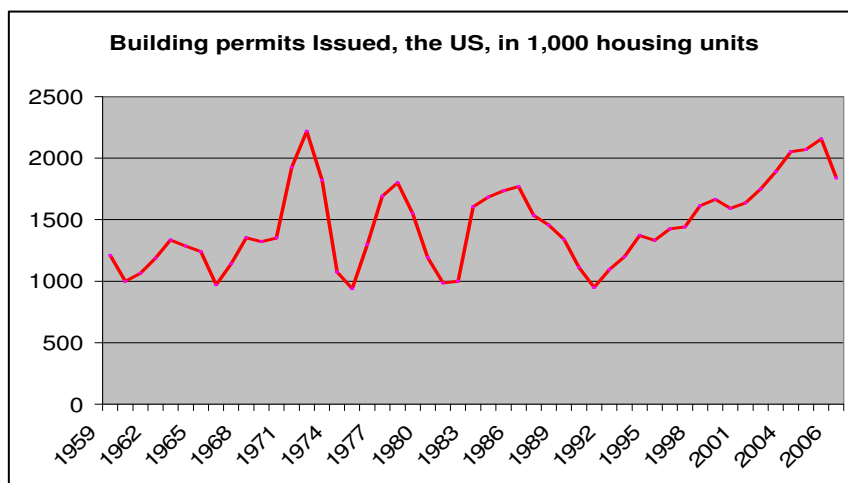
Figure 5.5: Trends in Building Permit Issued in the U.S. (1000 units)[18]

5.2.3. Housing Vacancy Rates

Housing vacancy can be a sign of building neglect and abandonment, which in turn, result from economic distress. It is important to determine if this is correlated with foreclosure data. The national vacancy rate has recently edged up sharply to above 2.5 percent for the first time, even as housing affordability has become a major issue in some regions. In other regions, it is likely that the vacancy rate is being partially driven by foreclosures or depopulation, which can lead to a downward spiral of economic decline if it portends a future decline in residential construction.

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[17] Questions should be directed to Manufacturing and Construction Division, U.S. Census Bureau, Washington, D.C. 20233-6900. Phone: (301) 763-5160. http://www.census.gov/const/C40/Sample/placeprt.pdf, p.4

[18] Source: http://www.census.gov/hhes/www/housing/hvs/historic/histtab2.html

In many communities, recent foreclosures are likely to be the result of excessive speculation associated with the housing bubble that was driven in part by subprime lending. It is not clear to what extent this has been an issue in the Appalachia. If this measure is used, it will be have to be based on the ACS.

5.2.4. Foreclosure Data

Another sign of economic distress in a community is likely to be that of widespread housing foreclosures. This can set off a spiral of socioeconomic decline that includes rising crime rates.[19] The RealtyTrac website (http://www.realtytrac.com/) makes foreclosure data available on a real-time basis, and this is one critical advantage of this data source.
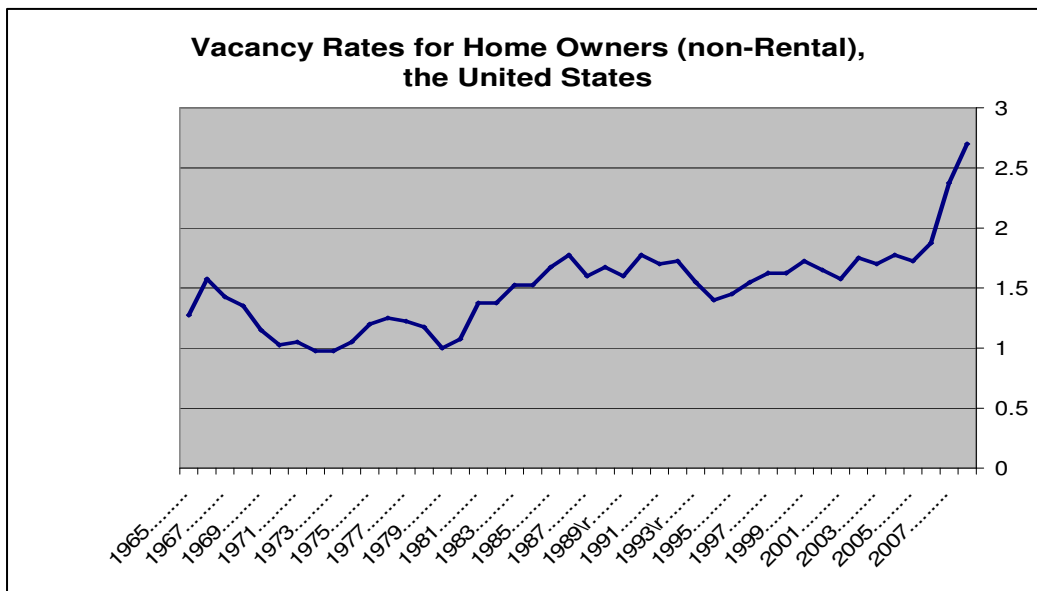
Figure 5.6: Trends in U.S. Vacancy Rates, 1965-2007
(Basic data are from U.S. Census Bureau)

According to the website, the numbers are updated *daily*. No other publicly collected and reported data sets even come close to matching this source in terms of timeliness. It is perhaps the single-best measure of what is happening in counties at this moment in time, rather than what happened two years ago. Yet, we caution that the recent attention on the number of home foreclosures will likely wane as past (discontinued) lending practices underlie much of the current 'crises'.

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[19] See the recent *New York Times* article "Foreclosures Force Suburbs to Fight Blight," March 23, 2007; also Immergluck and Smith, 2006. The latter study suggests that increases in foreclosure rates are associated with higher neighborhood crime rates.

Summary Evaluation: The housing sector is notoriously cyclical, often driven by speculation, but it may be too important as a measure of local economic well-being for ARC to ignore. The conventional measure of housing quality and affordability, however, may no longer be effective in distinguishing ARC from non-ARC counties. Building permits, and the rate at which they are or are not issued over time, are an important economic indicator about the future. But it is not clear if building activity itself is sufficiently large to have county-wide impacts. Housing also needs to be examined in the context of population change – are new homes just being built for wealthy in-migrants (in bedroom communities) who do not spend their money locally in any meaningful way, or does such construction reflect genuine expansion of local employment opportunities? One option, subject to caveats discussed above, is to use only a lack of new housing construction as an indicator of local stagnation, or distress. Local vacancy rates may be a better long-term indicator than foreclosure rates, but the former are available only with considerable lags, highlighting the trade-off between accuracy or relevance and timeliness of indicators.

5.2.5. Self-Employment and Entrepreneurship

One of the key facts of the "New Economy" is that individuals are increasingly working for themselves as opposed to others. Especially in rural regions, reported rates of self-employment have risen dramatically over the last 35 years (Goetz, 2008). Figure 5.7 shows an increase in the share of self-employed in rural areas from 18 to 27 percent, with similar changes occurring in urban areas. If these trends continue, then about one in three rural workers will be self-employed by 2015. Because self-employment is a forward-looking measure of future conditions, we view a county's ability to sustain self-employment (as an alternative to unemployment) as one indicator of future well-being.
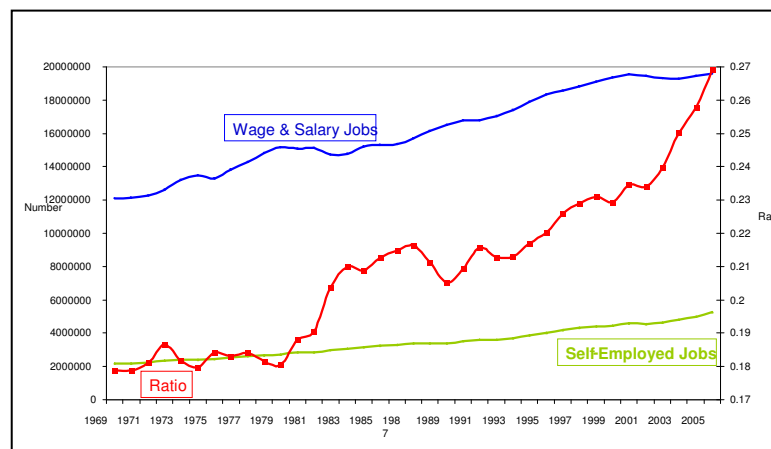
Figure 5.7: Trends in Rural Wage and Salary vs. Self-Employment Jobs and Ratio of Self –Employed to Wage and Salary Workers, 1969-2005 (Goetz, 2008; basic data are from BEA, REIS)

Bradley et al. (2001) dismiss self-employment or proprietorship formation as offering much promise for the region because they believe it to be "motivated by the absence of alternative means of economic subsistence" (p. 50). Even so, they acknowledge that in attainment counties, higher rates of such activity could reflect the opportunity to earn higher incomes or achieve

greater independence (the direction of causation here is not obvious). It is clear that self-employment reflects the lack of other economic opportunities in some communities, and we cannot dismiss this possibility.

Further, the returns to self-employment relative to wage-and-salary employment have been declining noticeably over time. It is not clear to what extent this relative decline is a result of the fact that productivity growth among the self-employed is not keeping up with that of wage-and-salary earners, whether it simply reflects under-reporting of earned income, or whether it represents a trend towards more casual forms of self employment.[20] Despite these challenges, we believe that as a new reality of working, the concepts of self-employment or entrepreneurship should be considered as a potential measure of economic distress by ARC. Emerging research (e.g., Shrestha et al., 2007) also suggests unequivocally that self-employment has important second-round effects in terms of stimulating wage-and-salary employment at the county-level. Furthermore, Rupasingha et al. (2007) found that self-employment was associated with statistically significant reductions in poverty rates at the county-level during the decade of the 1990s.

One clue about the extent to which self-employment growth in an Appalachian county is *radical* (response to opportunity) as opposed to *reactive* (response to necessity) may be found in the returns to self-employment. This aspect was not considered by Bradley et al. (2001), but these returns could be included in any assessment of entrepreneurship in a community. The ability to distinguish between reactive and radical self-employment is very important, and the ARC might consider further research in this area. By examining the so-called non-employer statistics, it may also be possible to assess changes by sector – e.g., manufacturing as opposed to basic or advanced producer services, although disclosure problems are likely to arise in less-populated counties.

As an alternative and independent verification of entrepreneurial energy in a county, *County Business Patterns* data could be examined for changes in establishments, especially those that are smaller, in different sectors that could be separated into more or less advanced. These data are available with two year lags from the Census Bureau, U.S. Department of Commerce.

> *Summary Evaluation:* Given the increasing importance of entrepreneurship and self-employment in terms of their numbers alone, we believe that more research is urgently needed to distinguish between self-employment as a necessity versus an opportunity within the ARC region. Such an indicator needs to be evaluated in the context of the FY2007 employment RFP issued by ARC.

5.2.6. Educational Attainment

The human capital model suggests that greater educational attainment would raise average wages (Borjas, 1996), and in turn, higher PCMI. Along with higher wages, greater average educational attainment is associated with lower unemployment and higher labor force participation. Thus, it

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[20] For example, the so-called Tax Gap of non-reported income was estimated to be around $365 bn in 2001, the most recent year for which estimates are available. This gap likely accounts for an important part of the relative decline in returns to self-employment since it is easier to under-report this type of income than wage-and-salary earnings.

is not surprising that if greater average education is associated with higher wages and labor force participation, it also is associated with lower poverty rates (Partridge and Rickman, 2006). For this reason, education attainment is clearly an underlying determinant of current levels of distress.

Moreover, educational attainment is a very good predictor of future economic growth over long periods of time (Partridge, 1997; Glaeser and Shapiro, 2003; Simon, Curtis, and Nardinelli, 2002). With decreasing emphasis on traditional natural-resource based and manufacturing sectors and a simultaneous increase in the importance of the New Economy, human capital and education's role will likely grow over time. In sum, if a locality has low levels of educational attainment, it will likely have higher current levels of poverty and unemployment and lower PCMI, as well as higher *future* levels of these measures. For these reasons, average educational attainment would in many cases directly account for the underlying causes of current and future local distress. Conversely, poverty, unemployment, and low market income are often *symptoms* of low educational attainment.

In terms of data availability, a key drawback of using educational attainment has been that it has been only available at the county level from the decennial census. Yet, as described in the poverty rate discussion in Section 5.1.2, it will be annually available at the county and census tract levels beginning with the 2010 ACS. Using educational attainment does have some drawbacks. Though, on average, it is a reasonable proxy for human capital, it does not necessarily reflect the quality of education. For example, a high school degree in Chattanooga may be of different quality than in Huntington, and so on. Likewise, any measure of educational attainment has an arbitrary nature. For instance, if a distress indicator used the percent of the adult population with a high school degree, one could always ask why not use the percent with at least an Associates Degree or a Bachelors' Degree. Of course, such problems are not unique to educational attainment.

Summary Evaluation: Educational attainment should be considered an important candidate for inclusion in a distress index due to its availability after 2010 and its backwards and forwards looking nature.

5.2.7. Natural Amenities and Natural Capital

One of the strongest predictors of local growth dating back to the 1930s is natural amenities, especially climate (Rappaport 2004, 2007). Natural amenities are important because they are complementary to a local tourist industry and help attract workers—especially more-mobile high skilled workers (Partridge et al., forthcoming). Natural amenities also are conducive to attracting retirees and supporting businesses. As a measure of natural amenities, the U.S. Department of Agriculture's Economic Research Service has produced an index of natural amenities based on climate, access to water, and landscape topography.

Nonetheless, Deller et al. (2001), Deller and Lledo (2007), and Ferguson et al. (2007) note that natural amenities may be insufficient to stimulate local growth without adequate man-made facilities. For example, human investment is needed to build a ski resort. This creates an added measure of complexity when incorporating man-made facilities with natural amenities.

Every several years, the USDA updates its National Resource Inventory. This inventory contains a large database of natural and manmade "amenities" at the county level. In attempting to combine this immense database into a usable form, Deller et al. (2001) and Deller and Lledo (2007) use the principal-component statistical approach to combine multiple measures into one unit of analysis. For example, they create a water recreation component by combining the number of boat launches, the number of lakes, the number of fishing sites, and so on into one variable. The problem with using a principal-component measure as an indicator of distress is that it has a "black-box" feel and the resulting lack of transparency may create controversy.

Summary Evaluation: It is currently not feasible to use natural amenities or natural capital as an indicator of distress. Nonetheless, it may be helpful if the ARC produced indicators of natural capital, but these would probably be most useful as supplementary measures for federal, state, and local planning.

5.2.8. Local Industry Composition

Communities with high shares of at-risk industries are more predisposed to experience future distress. Historically, Appalachian communities with economies most intensively engaged in natural resource activities such as manufacturing, timber, and mining have suffered due to labor-saving technological change. Likewise, since the mid 1990s, communities with significant shares of labor-intensive manufacturing have been at increasing risk due to global pressures (e.g., Bernard et al., 2005; Herzenberg, 2005). These patterns have been very persistent, dating back to the 1950s for natural resources and to the early 1970s for manufacturing-intensive communities.

A measure of predicted future economic distress could be easily constructed based on expected industry trends. The shift-share prediction is simply the predicted county growth rate if all of its industries grew at the expected national growth rate. This prediction accounts for whether the county has a composition of fast or slow-growing industries (Blanchard and Katz, 1992).[21] For example, it would predict slow growth for a county that has a high share of natural resource employment or manufacturing, with greater predicted growth for counties with emerging sectors. The shift-share measure performs quite well as a predictor of local economic growth, especially if the industry disaggregation is quite fine. Therefore, in using this measure, a given county can be viewed as a strong candidate for future distress if it fell below a certain threshold in terms of future predicted growth.

The predictions for national industry growth can be derived from U.S. Department of Labor data. Private vendors such as EMSI, IMPLAN or REMI can also be employed at a moderate cost to produce national estimates.[22] The advantage of using private vendors is that they can be used on short notice and be responsive to the Commission's schedule, though this does entail an expense.

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[21]The shift-share measure is simply the sum of the product of initial county-level industry composition multiplied by the *expected* national industry growth rate. Specifically, for county i in period 0, the expected county growth rate over the next t years would be: $INDMIX_i = \sum_j (Share_{cj0}) \times NATGWT_{j(0-t)}$, where j refers to industry, NATGWT refers to the predicted national growth for sector j between periods 0 and t and the summation is over all industries.

[22]For more details of EMSI's products, see http://www.economicmodeling.com/index.php. Their pricing suggests that their entire package for the entire nation can be purchased for $20,000, with an annual fee for new data.

Of the private vendors, EMSI is one firm that has been recommended to the authors as having innovative products. The novelties of EMSI include that its products are very easy to use on its web-based interface and they are flexible. For example, EMSI's GIS based tool means that its products can be used to construct reports within a user-defined distance of a point—and thus, it can produce reports for an entire region surrounding a county (e.g., within 100 miles). Regarding county-level forecasts and economic development data, both EMSI and IMPLAN can produce results at the 6-digit NAICS level where they employ algorithms to fill in suppressed data that are not disclosed by the government.

The ARC or private vendors could be called upon to produce individual county forecasts that are more complete than the simple shift-share forecast. However, such forecasts would be much more expensive to produce on an annual basis.

Another related measure that would be of interest for the ARC, states, local economic development areas, and counties is whether the region or county has emerging industry clusters that could be "growth engines." For example, a county with a particular high share of employment in a fast-growing set of related industries is blessed with an emerging cluster that could spur rapid economic growth. Various private vendors could help produce data on clusters. For example, using the EMSI tool, Purdue University has been working with the U.S. Economic Development Administration to provide county-level measures of clusters for economic development planning. Going forward, ARC and its partners could produce their own cluster analysis using EMSI, IMPLAN, REMI, or other vendors.

Summary Evaluation: The ARC should consider more sophisticated measures of industry composition and clusters for its state and local partners. However, it is not clear how to include these measures in a distress index that only utilizes three or four primary indicators. While measures of industry composition and clusters may not have the priority of these other indicators, they will be useful adjunct or secondary indicators for planning purposes.

5.2.9. The Knowledge/Creative-Based Workforce

For a number of years, adults living in rural areas could count on jobs in the agricultural, manufacturing, or extractive industries to secure gainful employment, regardless of their educational credentials. But as a result of technological advances, improved efficiencies in production, expansion of global competition, and greater government restrictions on mining activities, counties across Appalachia find themselves increasingly challenged in terms of maintaining and strengthening their local economic conditions.

The ability of communities to compete in a global marketplace increasingly rests on their success in capturing and expanding their knowledge-based workforce (Munnich and Schrock, 2003). Knowledge is defined as an intangible resource that enables individuals to use information, education, and past experiences to create ideas and innovations (Henderson and Abraham, 2005; Metcalfe and Ramlogan, 2005). According to Henderson and Abraham (2005), knowledge is the key driver of the U.S. economy. As such, understanding how the ARC region compares in terms of its success in expanding its knowledge-based economy is worth considering.

What remains a challenge is finding a metric that captures the knowledge sector of a local area. Recent studies have provided some straightforward approaches. For example, Henderson and Abraham (2004) view knowledge workers as those engaged in "management, business, financial, professional and related occupations," positions that require a high level of knowledge in order to complete complicated job-related tasks. In a similar vein, Florida's (2002) discussion of the "creative class" is closely aligned with the measurement proposed by Henderson and Abraham. The only exception is the inclusion of "high-end sales and sales management" workers in Florida's measure of the "creative class."

Occupations that constitute the knowledge/creative sector of a county's workforce are outlined below. They represent occupation categories now in use by the Census Bureau to describe the occupational complexion of counties in the U.S. counties.

- Management occupations (except farmers and farm managers)
- Business and financial operations occupations
- Computer and mathematical occupations
- Architecture and engineering occupations
- Life, physical, and social science occupations
- Legal occupations
- Education, training and library sciences
- Art, design, entertainment, sports, and media occupations
- Health care practitioners and technical occupations
- High-end sales (composed of the following two sales categories: (a) sales representatives, services, wholesale and manufacturing; (b) Other sales and related occupations, including supervisors).

Determining the proportion of the county's workforce collectively employed in these occupational classes can offer some inkling on how ARC counties are faring in terms of its engagement in the type of knowledge/creative activities that are seen as a key source of long-term economic growth. Of special concern is determining the extent to which economic distress is tied to the inability of counties to grow the knowledge/creative sectors of their economies.[23]

> *Summary Evaluation*: Monitoring changes in the workers in the ARC that are employed in occupations associated with the knowledge/creative-based economy would be useful in determining how well the region will perform in an important sector.

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[23]Research studies indicate the ability of local areas to capture and expand knowledge/creative-based jobs is dependent on a number of important factors. They include: (1) the availability of talented, well-educated and trained workers; (2) access to productivity-enhancing information and communication technologies; (3) public policies and local institutional systems that support innovation; (4) nearness to institutions of higher education that help facilitate the education and skill enhancement needs of knowledge workers, and serve as generators of new ideas and innovations; (5) physical proximity of the community to larger metropolitan areas; and (6) the availability of natural resource amenities (Barkley and Henry, 2004; Cortwright, 2002; Goetz and Rupasingha, 2003; Henderson and Abraham, 2004; Powell and Snellman, 2004; Romer, 1998). Having these important components in place could be a major challenge for nonmetro areas, according to Powell and Snellman (2004), given their historic dependence on physical inputs or natural resources, versus intellectual capacity, as the foundation of their economies.

5.2.10. Health Status of the Population

Basic personal health is both a cause of and determinant of economic well-being (or distress). In the past, the ARC used infant mortality as in indicator of economic distress but dropped the measure once the region had caught up with the rest of the nation. Likewise, in less-populated counties, annual changes in infant deaths led to significant fluctuations in the infant mortality *rate*. Another difficulty in mortality data interpretation is sorting out the place of death (say a hospital in an urban county) vs. the parents' county of residence.

County-level data for different causes of death are available from the CDC annually, and could be used as supplemental measures of economic distress within ARC counties. However, according to the CDC website (accessed 12/30/07), geographic information will no longer be supplied effective with the 2005 data.[24] While the CDC might provide such information to ARC upon request, including such a measure may not provide sufficient additional independent information to justify the costs to the extent that health status and income are relatively highly correlated. Even so, the mortality data can be used to demonstrate an important statistical feature of any indicator-type data, including some of the variables used by ARC to identify distressed counties. This is demonstrated using Figures 5.8 and 5.9.
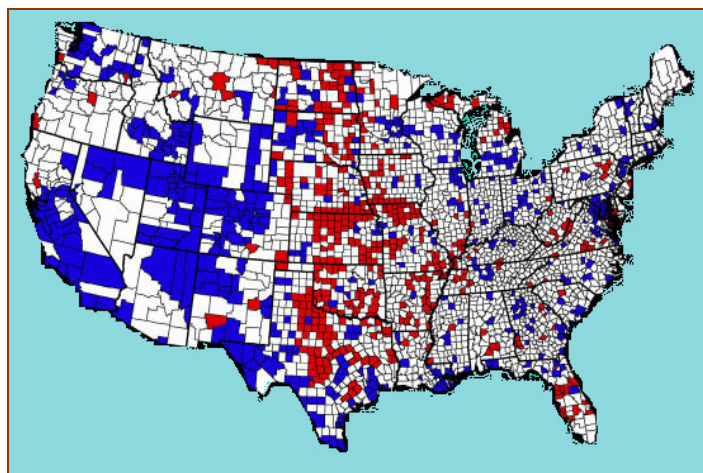
Figure 5.8: Unadjusted Mortality Rates, 1993–1997
Red = High Mortality White = Normal Mortality
Blue = Low Mortality

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[24] http://www.cdc.gov/nchs/products/elec_prods/subject/mortmcd.htm#description1
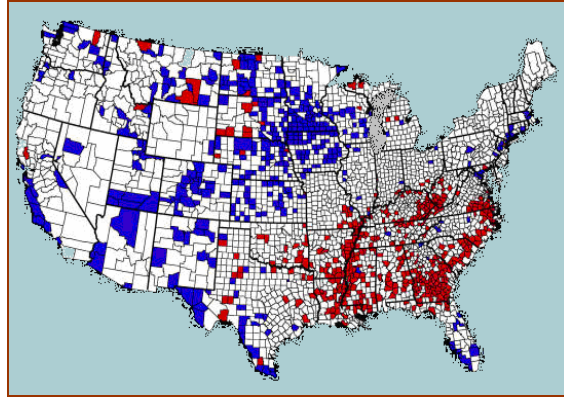
Source: James et al. (2004)

Figure 5.9: Age Adjusted Mortality Rates, 1993–1997
Red = High Mortality White = Normal Mortality
Blue = Low Mortality

Figure 5.9 maps the county-level mortality rates with and without adjustments for age. It is important to note the higher rates of mortality in the ARC counties once the data are adjusted for age of the population. The age-adjustment is an important correction in this case. More generally, the main point to note here is that ARC counties may show up as problem counties (distressed) only after we control for certain variables. This has to be considered in the selection of final variables to be included in the distress index.
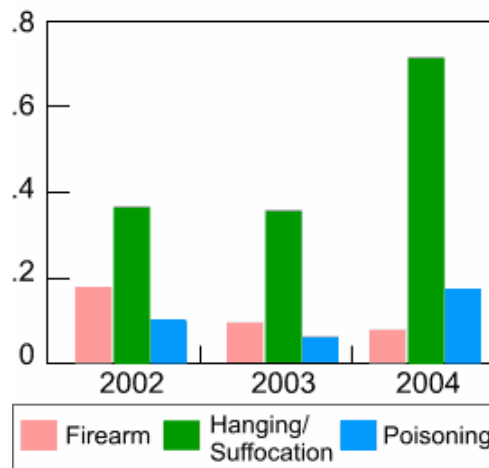
Source: CDC
Figure 5.10: Suicide Rates among Girls
Ages 10-14 in the U.S., 2002-2004

Suicide. Figure 5.10 shows suicide rates among young girls in the U.S. from 2002 to 2004. Suicide rates, especially among youth, can be an indicator of severe local economic distress, rather than reflecting only personal or family predisposition.[25] For example, suicide rates among farmers tend to rise during periods of farm financial crises, while the same tends to be true of young adults who have lost hope for a positive future. Figure 5.11 suggests that relatively high

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[25] The graphic is from http://www.cdc.gov/datastatistics/archive/youthsuicide.html

rates of suicide are a problem in parts of the Appalachian region; note that the problems seem even more pronounced in the West (often believed to be associated with higher gun ownership), but this is optically misleading because of the larger county sizes in the West. Also, suicide data do not capture unsuccessful attempts by individuals to end their own lives.

Data source: http://webappa.cdc.gov/cdc_mxt3/
Figure 5.11: Suicide Rates, 1989-1998

There is growing recognition in the literature that suicide is important – and increasingly common – in rural areas (e.g., Singh et al,. 2002), and that these areas are also ill-equipped to deal with the problem (Fiske et al., 2005). At the same time, researchers are finding that community- or neighborhood-level features, especially poverty and economic decline, are associated with higher suicide rates (Rehkopf et al., 2006). These regional characteristics, or the local ecology, may be just as important as individual-level characteristics (e.g., a family history of depression and suicide) in explaining suicide or other risky behaviors (Whitley et al., 1999; Hill et al., 2005, the latter based on United Kingdom data).

The CDC does not report suicide rates for individual counties when the numbers in question are so small as to preclude anonymity of those afflicted. However, experts who have worked at CDC with the data suggest it is possible to obtain actual numbers by using "rolling" 5-year windows in the web-enabled data extraction software. Even so, given the costs involved in collecting the data relative to the additional new information provided, we feel it is not feasible or desirable at this point to include suicide data in the index constructed to measure distress in ARC counties. This does not mean, however, that pronounced changes occurring in any one county over time should be ignored as a supplemental measure of distress.

Summary Evaluation: It is important to acknowledge the relationship between economic distress and human health measures, including mental health as reflected in suicide rates. Nevertheless, given the data limitations and recent changes at CDC in the geographic detail with which data are reported, it is not feasible at present to include these variables as indicators of economic distress. Suicide rates and related health data (deaths from cirrhosis of the liver, for example) could be tracked on an adhoc basis by ARC counties.

5.2.11. Local Government Capacity

Local government capacity is a general concept reflecting fiscal health and resources such as size, staffing, and expertise available to governments that increases ability to act on behalf of their citizens (Peterson, 1981; Reese and Rosenfeld, 2002). Limited government capacity can be considered an indicator of distress insofar as it constrains efforts to improve community conditions. Smaller, resource-poor governments usually provide fewer services for residents and local businesses (Kraybill and Lobao, 2005; Peterson, 1981; Reese and Rosenfeld, 2002). The ARC notes the importance of improving the capacity of local governments in its strategic plan for 2005-2010 (ARC, 2004).

Although "capacity" may be intuitively understood by policymakers, actual measures are problematic. First, social scientists employ numerous indicators of capacity encompassing size, staffing, and fiscal health. There is little consistent use of these indicators and respective measures across studies, so that benchmarking standards are not established.

Second, capacity indicators vary in relevance to assessing distress. Size of government variables (such as government employment per capita and general revenue) and staff attributes (such as the presence of different types of professionals) do not provide information about how governmental resources are allocated to match to population needs, nor do they denote the fiscal conditions of governments (Reese and Rosenfeld, 2002). Capacity, as measured by the fiscal health of governments, is more reflective of distress. These measures vary widely but most are constructed with the idea of assessing how fiscal conditions of local government are balanced with community attributes or needs. Conventional measures include ratio of own-source revenues to own-source expenditures, the ratio of own-source revenue to aggregate county income, property taxes per capita, and per capita tax revenues (Reese and Rosenfeld, 2002). Other measures of fiscal health include debt burden and bond ratings, but coverage of small governments is a problem with these measures (Hendrick, 2004).

Fiscal health measures also have limitations. Reese and Rosenfeld (2002) note most measures of fiscal health focus on ability to raise revenue. These measures have much do with external conditions outside government, particularly residential income and wealth and public willingness to pay for services. Fiscal measures also are not straightforward distress indicators because they often result from complex processes involving long-term community adaptations (Reese and Rosenfeld, 2002). For example, Johnson et al. (1995) found that counties with higher poverty had low fiscal burdens as measured by the ratio of own-source revenue to aggregate county income, in contrast to their expectations. They explain this finding by noting that high poverty counties adapt to an environment of weak revenue generation and place less tax burden on residents but provide fewer services. In such cases, it is difficult to argue that local government capacity is related to higher quality of life for citizens.

In addition to general issues above about local government capacity as an indictor of distress, there are issues specific to constructing measures for the ARC region. One is the unit of government to which data are referring. Measures could be constructed using county government as the reference point. However, this would neglect distress of municipalities and other local governments. To account for other local governments, measures could be constructed

whereby all local governments (including county government) are aggregated to provide a county-area government capacity measures (see Johnson et al., 1995 for an example). Second, functions and ability to tax and spend vary by state and even within states property tax rates and other conditions vary. To account for such variations, measures should be general enough to be applicable across states and proportionate, where the numerator and denominator use relevant base figures.

Third, data sources must be considered. The major data source on local governments is the Census of Governments and conventional variables on fiscal health described above are typically created from this source. However, the Census is conducted only every five years. Also, data quality is not uniform across all counties (Stephens and Wikstrom, 2002). For small counties, data are often less detailed and aggregated up to larger categories. Other measures can, in principal, be constructed using long- and short-term debt obligations from the Census and bond rating variables available for purchase from investment companies such as Moody's. But small counties are less likely to have any data on debts and bonds available for them.

Summary Evaluation: Local government capacity is not a transparent indicator of distress but could serve as an adjunct or secondary indicator to track needs of particular counties. We suggest use of conventional fiscal measures such as own-source revenues to expenditures noted above that can be derived from the Census of Governments. Although these measures have limitations, they are generally applicable across states and data are available for small counties. Fiscal measures should be evaluated for their association with external distress conditions (i.e. poverty, income, unemployment) to ensure that the former are capturing the local context appropriately. For a general assessment of government capacity, we suggest aggregating all local governments to create this measure for county areas.

5.2.12. Social Capital and Its Link to Economic Well-Being

There is an expanding body of research that suggests that social capital has an important impact on the economic health of an area. Rooted in the research of Putnam (1993, 2000) and others (such as Bourdieu, 1993 and Coleman, 1988), studies show that core elements of social capital—particularly the presence of a rich stock of social networks and sets of norms that govern the relationships among these networks—enhance the capacity of communities to act on issues of local importance (Schuller, 2001). Social capital is the "glue" that holds societies together and whose presence can spur the type of economic growth that brings benefits to the entire community (Grootaert, 1998; Putnam, 1993). In essence, it serves as a set of social resources that communities can tap when tackling local economic problems (Glaeser, 2001).

In areas suffering from economic distress, measuring the state of social capital present in these localities may be a path well worth exploring. Simply put, in communities where good things are happening across the spectrum – in education, in job creation, in health care, in community services – a broad-based corps of civic-minded people and organizations is often in place to undergird these important activities (Woolcock, 2001). As Putnam (1993) notes, "Working together is easier in a community blessed with a substantial stock of social capital." Thus, in the

context of forward-thinking strategies, taking stock of the social capital attributes of a county or place may offer some important insights regarding the future capacity of ARC counties (particularly those suffering for economic distress) to undertake collective action on their major socioeconomic challenges.

Social capital represents a multi-dimensional concept. It consists of "bonding" and "bridging" activities that occur within the local community setting, as well as "linkages" that tie community members to organizations and resources existing outside the community (what we commonly refer to as vertical ties). Bonding represents the strong interactions and intimate ties that people have with family, friends, neighbors, and close work associates. Bridging reflects the horizontal ties that individuals have with people and groups within the community with whom they have only limited interactions (Flora et al., 2008; Putnam, 2000). These constitute what Granovetter (1973) labels as "weak ties" that can be accessed in times of need. The third element, vertical linkages, offers an avenue for local people, organizations and communities to gain access to valuable resources and ideas from outside the community that can be used to support and guide local initiatives. According to Woolcock (2001), the presence of various combinations of bonding, bridging, and linking social capital shapes the range of social and economic outcomes that are possible in communities. As such, these interactions help build trust and create the social assets that can be tapped for future community endeavors (Putnam, 2002).

If social capital is to be viewed as a viable tool that the ARC might consider for discriminating among counties that are best or least positioned to "act" on local economic and social challenges, then it is critical that sound measures of social capital be identified. Measuring bonding, bridging, and vertical relations, or assessing levels of trust or existing norms in communities, cannot be easily achieved without engaging in costly and time consuming qualitative data collection activities (Haezewindt, 2003). We would propose the use of a series of quantitative measures that have been found to be important corollaries of civic-minded communities or that contribute to the development of trusting relationships. Most important, they represent variables that are readily available at the county level.

Table 5.3 outlines 10 key variables identified in the research literature as viable proxies for social capital. For sake of clarity, we classify these variables into four major themes – all of which are associated in some way with the strengthening (or weakening) of social capital in a local area. Variables listed under *community attachment* represent factors that help people feel "rooted" in their communities. Voting represents active *participation in the political process*. The *social/civic activeness* of a locality is captured by the density of local organizations existing in the area. Age and education are included in the "social and civic participation" category as well since both give shape to the civic activeness of local residents. Finally, we propose four variables to assess the level of social cohesion/integration present in the community.

Table 5.3: Ten Quantitative Measures of Social Capital

Variables	Contribution to Social Capital	Data Source
Community Attachment		
Home Ownership	▪ Increases membership in local organizations, voting participation, social trust	Decennial Census ACS after 2010
Length of Residence	▪ Improves the strength and breadth of social networks, increases chances of being civically involved and engaged in local organizations	Decennial Census ACS after 2010
Political Participation		
Voting Participation	▪ Increases awareness of political affairs ▪ Builds citizenship	County and City Data Book (2004)
Social and Civic Participation		
Associational/Nonprofit Organizations	▪ Builds horizontal ties across the community (i.e., expands connections and access to resources) ▪ Enhances communication and sharing of information ▪ Facilitates cooperation and collective action on local issues	County Business Patterns (2005) and National Center for Charitable Statistics (2007)
Years of schooling	▪ Higher educational levels increase trust and community involvement	Decennial Census ACS after 2010
Age	▪ Networks and relationships increase with age (until one surpasses age 60) ▪ Social trust increases with age ▪ Persons 30 and above are more likely to be involved in their communities	Decennial Census and U.S. Census Bureau's Population Estimates (2006) ACS after 2010
Social Integration		
Marital Status	▪ Married persons are more trusting, more likely to provide social support to neighbors ▪ Single persons are less likely to be civically active	Decennial Census ACS after 2010
Immigration/Ethnic Diversity	▪ Immigration reduces community cohesion on the short term	Decennial Census and U.S. Census Bureau's

	Ethnic diversity weakens social trust and results in lower political, social and civic participation	Population Estimates (2006) ACS after 2010
Income Inequality	• Inhibits the development of social trust • Lowers involvement in local organizations	Decennial Census and American Community Survey after 2010
Residential Mobility	• Disrupts the relationships/ties that individuals have with local people and organizations • Reduces membership in local organizations	Decennial Census ACS after 2010

Table 5.3: Ten Quantitative Measures of Social Capital—cont.

Summary Evaluation: Social capital-type measures should be given scrutiny for future use at least as secondary or adjunct indicators of distress. The items could be examined as a series of independent factors, or a smaller set of indices (if appropriate), to assess how well they correlate with economic conditions in the ARC counties. While not perfect measures of social capital, the items described in Table 5.3 could be worth exploring with regard to their links to future economic distress.

5.3. Regional and Sub-County Distress Measures

5.3.1. Multi-County Level Geographies

A common feature of economic (and social) distress is that it tends to cluster into groups of contiguous counties and neighborhoods (Glasmeier et al., 2003; Partridge and Rickman, 2005; Rupasingha et al., 2002; Miller and Weber, 2004). For example, poverty rates are highest at the cores of county-level clusters in Appalachia, the historic Cotton belt, and the Mississippi Delta, and then taper off gradually towards the edge of the clusters (Partridge and Rickman, 2007).

The ARC could develop more sophisticated statistical approaches to assess distress and for economic development planning. One approach is standard spatial econometric methods (Anselin, 1988) and more descriptive approaches such as Moran's I and geographically weighted (or distance-weighted) approaches (Fotheringham et al., 2002).[26] One advantage of these approaches is that they could formally account for the interdependence between neighboring counties. For example, economic distress manifested through a weak labor market in nearby counties may have spillover impacts on the county of interest. Another advantage is that they lend themselves quite well to GIS mapping and can be visually presented in a friendly way. Nonetheless, a clear shortcoming is that the current ARC staff is not sufficiently large to conduct this analysis on a widespread basis.

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[26]Geographically-weighted approaches would calculate the average of a particular indicator (such as the poverty rate) within a set distance of the county (e.g., within 100 miles). These statistics can then be mapped to illustrate the clustering in a visually appealing, transparent way.

Summary Evaluation: There are many potential uses of indicators that would tap clustering of distress among counties or sub-regions within the greater ARC region, but the construction of these indicators would have to be weighed against the need for additional resources.

5.3.2. Sub-County Indicators

It is conceptually easy to construct sub-county-level measures of distress—e.g., at the census tract level. Indeed, the ARC staff has produced distress measures at this level in the last few years. The practical problem is that it has been historically challenging to develop sub-county distress measures because most of these data have only been reported in the decennial Census. For this reason, as the decade moves forward, the ARC's census tract measures tend to be more out-dated than their county-level counterparts. Some current exceptions to these data constraints include inter-census estimates of population and place-of-work employment indicators linked to establishment zip code (which are subject to confidentiality restrictions and are sometimes hard to reconcile to census tracts). Yet, the ACS's expansion in 2010 will allow more annual sub-county analysis at the tract level or finer—though with the caveat that the ACS's accuracy will not be perfect.

Nevertheless, aside from issues of accuracy, before sub-county indicators of distress are widely used for funding allocations, there are the following conceptual and policy questions: (1) In the midst of an otherwise vibrant county, when does a cluster of "distressed" census tracks reach the critical mass such that they warrant further attention? (2) Do these proportions differ across "At Risk" counties and counties that are "Transitional?" (3) Some measures such as population change have very little meaning when discussing a neighborhood (census tract)—i.e., what does it mean if a census tract had out-migration when it is undergoing industrial or commercial development. (4) Does it make sense for ARC to be concerned with sub-county outcomes given its history as more of a *regional* economic development authority? Do sub-county issues fall more into the purview of other state and federal agencies such as EDA or Housing and Urban Development?

Summary Evaluation: We recommend that the ARC engage in more research and stakeholder discussion before utilizing sub-county distress indicators for planning and funding allocations. In the meantime, the current ARC approach of presenting sub-county measures of distress is wise for planning purposes.

5.4. New Federal Data Sources: Offering Expanded Assessment of Current Conditions

Throughout this report, we have recommended that the ARC consider new variables and data sources in measuring economic distress and in their planning. In particular, there are three federal surveys that we believe have the most potential for providing expanded assessments of current and future conditions.

The U.S. Census Bureau's annual *American Community Survey* (ACS) will increasingly be a source of data at the county and sub-county levels. In 2008, the ACS will report three-year

averages (2005 to 2007) for all counties with greater than 20,000 population. Beginning in 2010, it will report five-year averages for all counties and sub-counties (U.S. Census Bureau, 2006). The ACS is a rich source of data comparable to the decennial Census (which it will replace in terms of detailed local information). We are increasingly convinced that the ACS will provide relatively accurate measures that will be annually updated (with a very short lag into the following year). However, for smaller counties and for sub-counties, it will be based on five-year moving averages, meaning that it will not be perfectly up-to-date.[27] Yet, given that the ACS generally reports demographic data that more slowly change over time, a five-year moving average should be relatively accurate at the scale of a county (though it may not pick up dramatic changes at the census-tract level).

Summary Evaluation. As described earlier in the report, the ACS may prove to be an invaluable source for constructing future measures of distress.

Second, the *Longitudinal Employer-Household Dynamic (LEHD)* data set maintained by the U.S. Census Bureau has tremendous potential as a major source for both current and forward-looking indicators of distress.[28] Several forward-looking indicators can be obtained such as the overall number of new hires; number of new-hires into "stable" longer-lasting jobs; recent layoffs; and labor market turnover of hiring, quits, and layoffs. Even the average wages of all current employees and newly-hired employees are available. LEHD is currently publicly available at the county level with about a one-year lag. It also provides detailed assessments by gender on over 21 different industries and 8 different age groups.

One disadvantage is that only 11 of the ARC region's 13 states participate in the LEHD program (as of December 17, 2007, New York and Ohio data are not reported). Fortunately, though not as rich as the LEHD data, the U.S. Department of Labor's ES-202 data can potentially fill in some of the holes in non-participating ARC states, especially regarding wages and detailed employment conditions by industry. Yet, probably the key disadvantage of the LEHD data is that there are significant disclosure issues in less populated counties for particular industries, meaning that much of the detailed data is unavailable. There still would be some scope of filling in some of this data from private vendors such as EMSI or REMI.

Summary Evaluation: The ARC could utilize LEHD data as a timely indicator of counties that are experiencing significant upswings in hiring or in layoffs to provide an early signal/warning of fundamental change. Yet, given that the ARC's distress indicators have generally been structural or persistent measures of economic degradation, it is not clear how the ARC could incorporate LEHD data into a current distress index, although an ongoing pattern of layoffs could be a future indicator of structural distress. One drawback with using LEHD data is that there is not a long history of having such data at the county level, so it is not clear what shifts the data are tapping. There would need to be research as to how to use the data and more time devoted to learning about its long-term implications.

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[27]The ACS will use single-year estimates for locations with more than 65,000 people, three-year moving estimates for locations with more than 20,000 people, and five-year estimates for less-populated geographies (U.S. Census Bureau, 2006).

[28]For more details, see the LEHD website at: http://lehd.did.census.gov/led/index.html.

Third, when data on place-to-place migration flows were described above, we noted that the *IRS county-to-county migration data* could also be employed in constructing annual measures of migration. The IRS data could be utilized to assess the origin and destination of a particular county's migrants. For example, are out-migrants staying in the nearby region or are they leaving the region for other locations? Such data could be invaluable for policymakers trying to assess the underlying local dynamics and in their design of mitigating policies. In particular, it may help in designing regional or multi-county approaches for alleviating pockets of distress.

Summary Evaluation: The IRS migration data *may* prove to be a useful supporting tool for ARC's planning with local partners.

PART III - EXPLORATORY ANALYSIS

6. Assessing the Sensitivity of Current Indicators

Here we conduct an exploratory analysis to examine the sensitivity of different measures of distress. The purpose is to examine the degree of consistency in classifying counties based on changing assumptions about relevant variables that can be included in distress indexes.

Figure 6.1 shows the current distress indicator map for the ARC region, whereas Figure 6.2 reports the pattern for the U.S. as a whole. At the ARC level, distress is concentrated in Central Appalachia in Southwest West Virginia and Southeast Kentucky, as well as in Northeast Mississippi. Under the current formula, there are no distressed counties in New York and Georgia and there is only one distressed county in Pennsylvania. In the rest of the country, distress is most apparent in the Mississippi Delta, along with counties in the Rio Grande, in the Historic Cotton Belt, and in Native American reservations in the West.

Figure 6.3 reports poverty rates for the ARC region, while Figure 6.4 presents the same figures for the U.S. The clear pattern in both cases is that measures of distress closely correspond to the poverty rate. There are two clear causes of this pattern. One, the other indicators (unemployment and PCMI) are both correlated with poverty rates, as shown in Table 6.1. The other is that the poverty rate is more prone to vary across the nation, meaning it drives the variability in the distress indicator. Thus, the current ARC distress indicator is really a "high-poverty" indicator. Likewise, because poverty is so persistent, the current listing of ARC distressed counties would closely correspond to counties that had very high poverty rates in the late 1970s (Partridge, 2007). Conversely, the two candidate indicators for our analysis display a somewhat different pattern. Population change has lower correlations with the other variables, suggesting it provides independent information, but high school attainment is highly correlated with the existing indicators.

Figure 6.5 shows the relative three-year average (2002-2004) unemployment rate in the United States and the ARC region. As noted above, the unemployment rate does not vary greatly across the region, being slightly higher in Central Appalachia and slightly lower in North Alabama and North Georgia. Figure 6.6 reports the relative PCMI in 2003. The pattern is that relative PCMI is lowest in South and especially Central Appalachian counties, and is highest in the Northern counties.

As noted in Section 5, two indicators that appear to be especially worthy of being potential distress indicators are educational attainment and percent change in population change. For the ARC region, Figure 6.7 reports educational attainment as the percent of the adult population over 25 years of age that have achieved at least a high school degree. Likewise, Figure 6.8 illustrates the percent population change over the 2000-2005 period.

The figures repeat the consistent pattern of distress in Central Appalachia—in this case, being depicted by low educational attainment and significant population loss. Yet, there are differences between the two measures. Educational attainment is lower in Central and South Appalachia, but only modestly below the national average in North Appalachia. Population growth is much

weaker in North Appalachia, while actually quite robust in parts of South Appalachia—especially in North Georgia (Lichter et al., 2005). If educational attainment was used as a measure of distress, the range of distressed counties would likely tilt south, with the opposite being the case if population change was used as a distress indicator. Nonetheless, regardless of the choice of distress indicators, there will be most assuredly a cluster of distressed counties in Central Appalachia as well as in Northeast Mississippi, while North Georgia will appear to be relatively prosperous. Other changes would likely occur elsewhere.

Therefore, we briefly examine the sensitivity of the distress measures to include population change and educational attainment. This analysis is **only** for illustrative purposes and does not necessarily represent the best measures of distress, which would require a complete statistical analysis and assessment of the proper weights. Specifically, we will consider two alternatives, one where we replace the unemployment rate with relative education and another where we replace the unemployment rate with the percent change in population over the 2000-2005 period.[29] Further analysis would need to assess other possibilities.

	Poverty rate	PCMI	Unemployment	Population change	High school completion rate
Poverty rate	1.00				
PCMI	-0.61*	1.00			
Unemployment	0.46*	-0.41*	1.00		
Population change	-0.26*	0.22*	-0.08*	1.00	
High school completion rate	-0.71*	0.60*	-0.46*	0.13*	1.00

* Significant at the one percent significance level, N=3108 U.S. counties.
   Table 6.1: Correlation Matrix of the Economic Indicators

Our methodology is the same as that currently used by the ARC to determine distressed counties. Namely, we calculate each variable _relative_ to the U.S. average, sum the scores, and rank them relative to the universe of over 3,100 U.S. counties. If an ARC county falls in the bottom 10% of the national ranking, it is deemed " distressed," if it falls in the bottom 10 to 25%, it is labeled "at risk," and so on (ARC, 2007). Of course, it is very unlikely that an optimal distress index would give these variables equal weight—if only because they would have different standard deviations and thus, have more or less impact at the extremes (i.e., a variable with higher standard deviation would be more prone to push a county down into the distressed category or above into the attainment category). Likewise, it is by no means clear that the ARC distress indicator list would exactly include three variables (e.g., Glasmeier et al., (2003) propose using more distress indicators). Moreover, it still needs to be determined which specific indicators should compose a distress indicator list.

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[29]We remove the unemployment rate because of our impression from key informants that it is no longer a good measure of distress. Further research would be needed to confirm this point.

Our alternative variable for educational attainment is the 2000 Census national adult share of the population with at least a high school degree divided by the corresponding county share [(U.S. national value/county value)*100]. This is for illustrative purposes, as further assessment should also consider the college graduate share. For population change, we use an analogous approach, though we cannot exactly use a parallel measure. The problem arises because we would have to divide by negative population change when counties lost population—which would not be desirable for an additive index. Instead, we create a distress measure of population change that is normalized to have the same standard deviation as the relative poverty rate (County Poverty rate/U.S. national poverty rate).[30]

We present the results for these two alternative indicators. First, Tables 6.2 and 6.3 show changes in economic status in the United States and Appalachian counties respectively, as result of removing unemployment rate from the ARC's national index for the fiscal year 2007 and replacing it with educational attainment and population change. For example, for the United States as a whole, 51 "at-risk" and 20 "transitional" counties now fall in the "distressed" category when including the population change index and 52 "at-risk" counties are now "distressed" when considering the educational attainment index. Fourteen and three counties shift from "distressed" to "transitional" with the population change and education attainment indices, respectively. Counties only shift from "distressed" to "at-risk" and "transitional" status.

In Appalachia, counties also switch from "at-risk" to distressed status. Six at-risk counties switch to distressed with the population change index and 15 with educational index. No counties switch from the transitional, competitive, and attainment categories to the distressed category in Appalachia. Counties mostly switch from distressed to at-risk when using our approach. Compared to the current ARC distress indicator, 19 counties either switch into or out of distress using population change and 22 counties change distress status when using educational attainment. Thus, about one-fourth to one third of the counties classified as distressed would differ from the current ARC distress classification.

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[30]First, we calculate a z-score, or how many standard deviations a county is either *below* the mean U.S. county population growth rate over the 2000-2005 period, or how many standard deviations a county is above the mean U.S. county growth rate. To correspond to the notion that the *bigger* the number, the greater the distress, we then calculate a "normalized" population standard deviation. By normalized, we mean for counties with *below* the national average county population growth, we assign the number of standard deviations a *positive* number, while for counties with above-average population growth, we give the corresponding standard deviation figure a *negative* number (i.e., the negative z-score). We then calculate the standard deviation of the relative poverty rate (County Poverty Rate/U.S. Poverty Rate), which equals 0.527. That is, the relative county poverty rate has a standard deviation of about 53 percentage points around the mean. Thus, the relative population number used in calculating our refined distress index is derived as:

Pop Index Measure = 100 - 52.7×(normalized population standard deviations from the national average). We use 52.7 since the relative poverty rate is multiplied by 100.

Normalizing the Pop Index Measure to have the same standard deviation as the relative poverty rate gives poverty and net population about equal weight in the distress index. To give an example in constructing this number, Gilmer County, West Virginia's 2000-2005 population growth was 1.18 standard deviations *below* the mean U.S. county average. The resulting Pop Index Measure for Gilmer County then equals 100 - (52.7)*(-1.18)=162.2. Of course, further analysis would need to assess whether the standard deviation of population index should be benchmarked to the poverty rate. See Feser and Sweeney (2003) for a similar discussion of the difficulties of normalizing population-change metrics.

Figures 6.9 and 6.10 portray the new distress status under our approach. For the United States, these two Figures need to be compared with Figure 6.2 to determine the change in economic status on a state-by-state basis. In Michigan for example, three counties appear distressed under the ARC's approach, but at-risk under our alternative using the educational attainment variable. Under the alternative with the population change variable, one of them remains distressed and two become at-risk.

Tables 6.4 and 6.5 present predictions of county economic status in the Appalachian states by both the ARC's index and our two alternatives. In Ohio, for example, the ARC approach produces three distressed counties while our alternatives produce zero and one distressed county, respectively. In such states as Alabama and Mississippi, the number of distressed counties remains the same regardless of approaches. Nonetheless, the specific counties that fall into distress can differ between the two approaches. Likewise, no indictors predict a distressed county in Georgia, Maryland, New York, North Carolina, and South Carolina. While our alternative index with the educational attainment variable predicts more distressed counties in Kentucky, Tennessee, and Virginia; the opposite is observed when using our index with the population change variable. In total, across all five distress designation categories, 91 ARC counties would change their current status if the population growth alternative was used and 61 counties would change their designation if the education alternative was used.

Table 6.6 reports the results for the Appalachian sub-regions. Neither approach predicts a single attainment county in Central Appalachia. Counties are either distressed, at-risk of becoming distressed, or transitional, though one county falls into the competitive category under our added-population approach. While more than 65% of the Central Appalachia counties are classified as distressed under our alternative with the educational attainment variable, about 50% of them are so labeled under the two other indicators. In Northern Appalachia, both approaches put about two-thirds of the counties in the transitional category. Whereas the ARC's approach predicts attainment counties only in the Southern Appalachia, our approach predicts such counties in Northern and Southern Appalachia. It is worth noting that more attainment counties are predicted in Southern Appalachia by our added-population approach, since population growth is stronger in parts of this sub-region as shown in Figure 6.8.

The results above indicate that, in predicting distressed counties, in some cases our approach is consistent with that of ARC, while in other cases, the two approaches disagree. Although we are not endorsing our sensitivity measures (they are only for illustrative purposes), they do clearly show that small subtle changes can produce different counties categorized as in distress, illustrating some sensitivity to the analysis.

For the United States a whole, Figures 6.11 and 6.12 consist of a pair of maps comparing our approach with that of ARC in terms of predicting distressed and non-distressed counties. Red indicates cases where both methods produce the same prediction for a distressed county (scenario 1); blue represents cases where the ARC approach produces a distressed county prediction, but our alternative does not (scenario 2); green represents cases where our method produces a distressed county prediction, but the ARC approach does not (scenario 3); while white represents cases where both methods suggest the county is not distressed (scenario 4).

ARC 's Distress status	Alternative Distressed		Alternative At-risk		Alternative Transitional		Alternative Competitive		Attainment	
	Population	Education	Population	Education	Population	Education	Population	Education	Population	Education
Distressed	-	-	57	49	14	3	0	0	0	0
At-risk	51	52	-	-	149	93	6	0	0	0
Transitional	20	0	144	96	-	-	167	118	56	6
Competitive	0	0	5	0	188	124	-	-	80	59
Attainment	0	0	0	0	36	0	99	65	-	-

The Row indicates current ARC classification and the column is the classification for the alternative indicator.
Education indicates an alternative indicator index where unemployment is replaced with the education index
Population indicates an alternative indicator index where unemployment is replaced with the population index
Table 6.2: Change of County Economic Status in the United States

ARC's Distress status	Alternative Distressed		Alternative At-risk		Alternative Transitional		Alternative Competitive		Attainment	
	Population	Education	Population	Education	Population	Education	Population	Education	Population	Education
Distressed	-	-	13	7	1	0	0	0	0	0
At-risk	6	15	-	-	25	9	0	0	0	0
Transitional	0	0	10	15	-	-	18	4	5	0
Competitive	0	0	0	0	4	8	-	-	8	1
Attainment	0	0	0	0	0	0	1	2	-	-

The Row indicates current ARC classification and the column is the classification for the alternative indicator.
Education indicates an alternative indicator index where unemployment is replaced with the education index
Population indicates an alternative indicator index where unemployment is replaced with the population index
Table 6.3: Change of County Economic Status in Appalachia

The results for Appalachia suggest that for seven out of 13 states, the ARC's approach agrees with our alternative distress indicator approach in indicating a distressed county (see Tables 6.4 and 6.5). Figure 6.11 shows that our added-education indicator tends to predict more distress in Kentucky, Tennessee, and Virginia and less distress in Ohio and Pennsylvania. Figure 6.12 shows that the added-population approach tends to add more cases in Virginia, while there are fewer distressed counties in Kentucky, Ohio, Tennessee, and West Virginia.

To provide further refinement, we create an additional category for **descriptive** purposes only— "weakly" and "strongly" transitional counties, which is respectively distinguished by a county being below or above the national average. Thus, the "weakly transitional" counties include those ranking between the *worst* 25 and 50% of the U.S. counties and the "strongly transitional" counties are those ranking between the *best* 25 and 50% of the U.S. counties. Figures A-1, A-2, and A-3 in appendix present the refined economic status for both ARC and our approaches.

Summary Evaluation: Even when using *ad hoc* alternative distress indicators that are only modestly different from those used in the current ARC distress index, both the number and types of counties that fall into distress can be somewhat different. It is likely that using other indicators would produce very different results. Moreover, the current ARC distress index implicitly places more weight on the poverty rate due to poverty's high variability. Changing the variable weights to z-scores would likely further shift the distress index. The point is that for a variety of reasons, measures of distress are somewhat sensitive to the underlying assumptions.

States	Distressed		At-risk		Transitional		Competitive		Attainment		Total
	ARC	Education	ARC	Education	ARC	Education	ARC	Education	ARC	Education	
Alabama	3	3	9	11	23	21	1	1	1	1	37
Georgia	0	0	0	3	26	28	6	3	5	3	37
Kentucky	34	41	11	4	6	6	0	0	0	0	51
Maryland	0	0	0	0	2	2	1	1	0	0	3
Mississippi	9	9	11	11	4	4	0	0	0	0	24
New York	0	0	0	0	14	14	0	0	0	0	14
North Carolina	0	0	7	5	18	20	4	4	0	0	29
Ohio	3	0	10	9	15	19	1	0	0	1	29
Pennsylvania	1	0	1	1	45	42	5	9	0	0	52
South Carolina	0	0	1	0	4	5	1	1	0	0	6
Tennessee	7	11	12	12	27	26	4	1	0	0	50
Virginia	1	3	4	4	15	13	1	1	1	1	22
West Virginia	16	15	16	20	21	18	2	2	0	0	55
Total	74	82	82	80	220	218	26	23	7	6	409*

ARC indicates the ARC's current index composed of three indicators: poverty, income, and unemployment

Education indicates an alternative indicator index where unemployment is replaced with the education index

*There is one missing value for the education attainment variable in Virginia.

**The composition of specific counties differs across the different distress indicator approaches.

Table 6.4: Economic Status Prediction in Appalachian States with the Added-education Approach

States	Distressed		At-risk		Transitional		Competitive		Attainment		Total
	ARC	Population	ARC	Population	ARC	Population	ARC	Population	ARC	Population	
Alabama	3	3	9	9	23	20	1	4	1	1	37
Georgia	0	0	0	0	26	14	6	11	5	12	37
Kentucky	34	32	11	10	6	8	0	1	0	0	51
Maryland	0	0	0	0	2	2	1	1	0	0	3
Mississippi	9	9	11	10	4	5	0	0	0	0	24
New York	0	0	0	0	14	14	0	0	0	0	14
North Carolina	0	0	7	2	18	21	4	5	0	1	29
Ohio	3	1	10	8	15	19	1	0	0	1	29
Pennsylvania	1	0	1	2	45	45	5	3	0	2	52
South Carolina	0	0	1	0	4	5	1	1	0	0	6
Tennessee	7	4	12	9	27	33	4	4	0	0	50
Virginia	1	3	4	5	16	14	1	1	1	0	23
West Virginia	16	14	16	19	21	18	2	2	0	2	55
Total	74	66	82	74	220	218	26	33	7	19	410

ARC indicates the ARC's distress indicator index composed of poverty, income, and unemployment

Population indicates an alternative indicator index where unemployment is replaced with the population index.

*The composition of specific counties differs across the different distress indicator approaches.

Table 6.5: Economic Status Prediction in Appalachian States with the Added-population Approach

Distress status	Indicators[a]	Central	Northern	Southern	Total
Distressed	ARC	45	14	15	74
	Population	43	9	14	66
	Education	57	9	16	82
At-risk	ARC	22	26	34	82
	Population	23	26	25	74
	Education	16	27	37	80
Transitional	ARC	20	95	106	221
	Population	20	98	100	218
	Education	14	95	109	218
Competitive	ARC	0	9	17	26
	Population	1	6	26	33
	Education	0	12	11	23
Attainment	ARC	0	0	7	7
	Population	0	5	14	19
	Education	0	1	5	6
Total		**87**	**144**	**179**	**410**

[a]*ARC* indicates the ARC's current index composed of poverty, income, and unemployment
Education indicates our alternative index where unemployment is replaced with the education index
Population indicates our alternative index where unemployment is replaced with the population index
*The composition of specific counties differs across the different distress indicator approaches.
Table 6.6: Change in Economic Status of the Appalachian Sub-regions

County Economic Status in Appalachia, Fiscal Year 2007
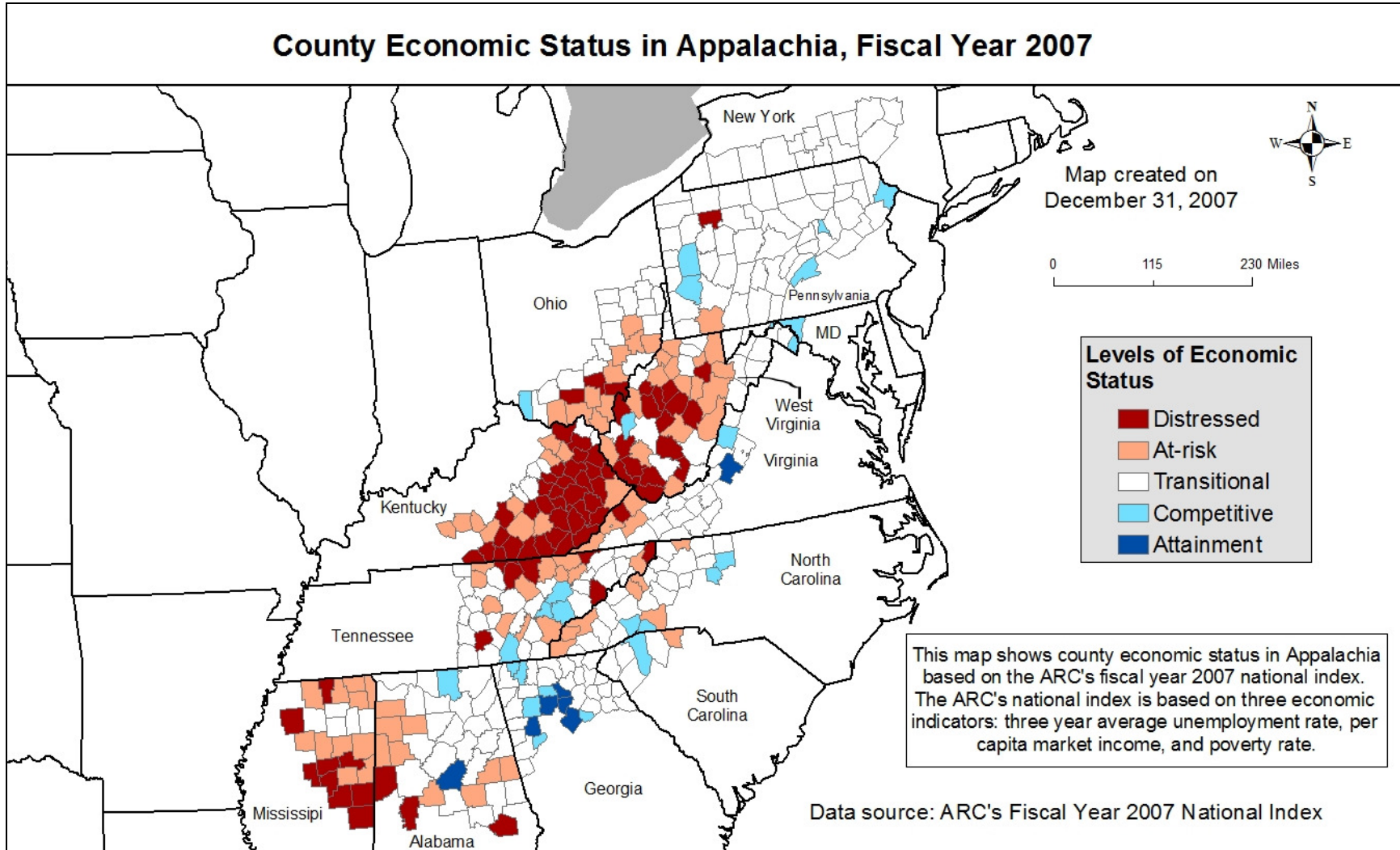
Figure 6.1: Distress Indicator Map for the ARC Region

County Economic Status in the United States and Appalachia, Fiscal Year 2007

This map shows county economic status in the United States and Appalachia based on the ARC's fiscal year 2007 national index. The ARC's national index is based on three economic indicators: three year average unemployment rate, per capita market income, and poverty rate.

Levels of Economic Status

- Distressed
- At-risk
- Transitional
- Competitive
- Attainment
- Appalachian Region

0   160   320 Miles

0   200 400 Miles

0   70 140 Miles
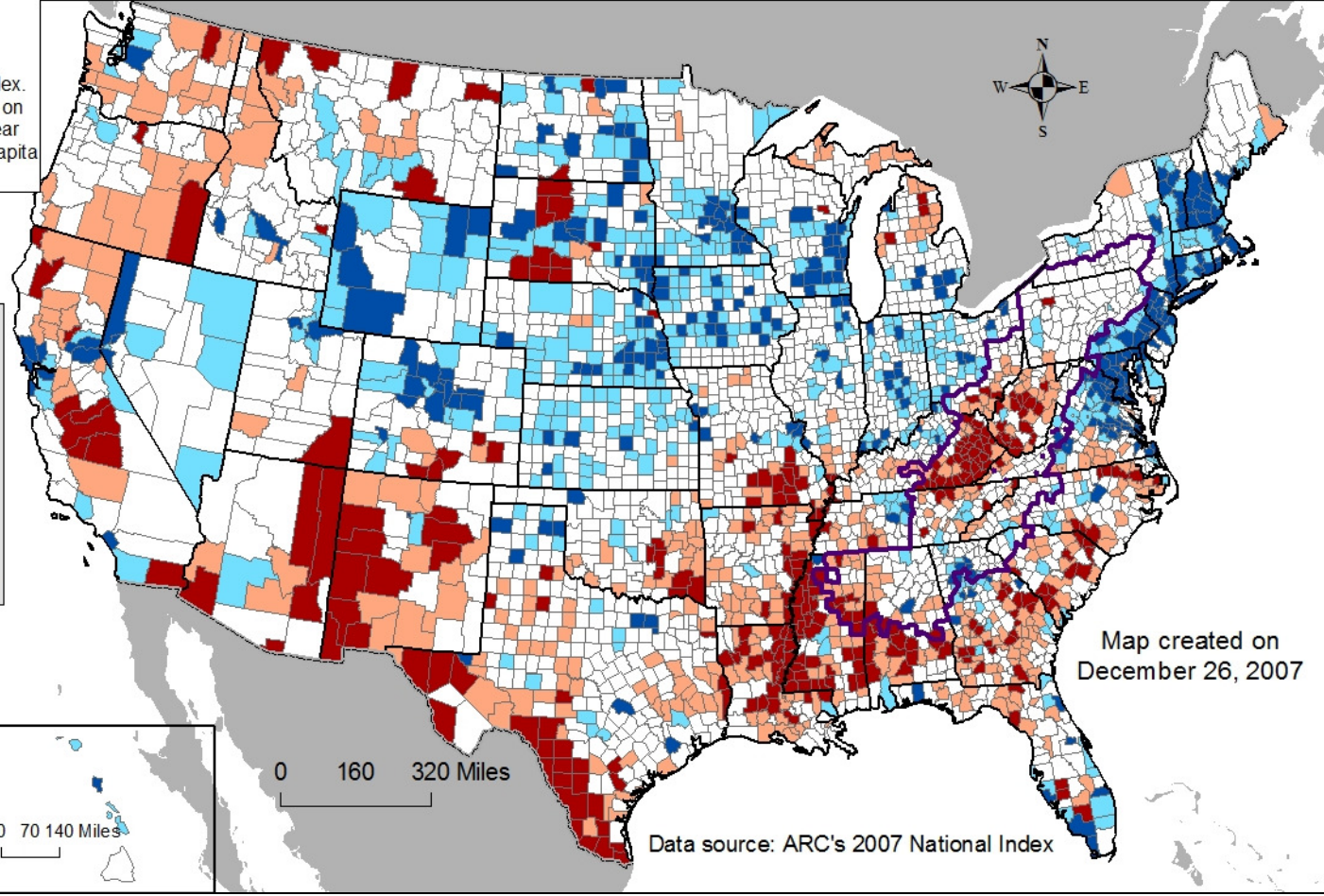
Map created on December 26, 2007

Data source: ARC's 2007 National Index

Figure 6.2: Distress Indicator Map for the U.S. as a Whole
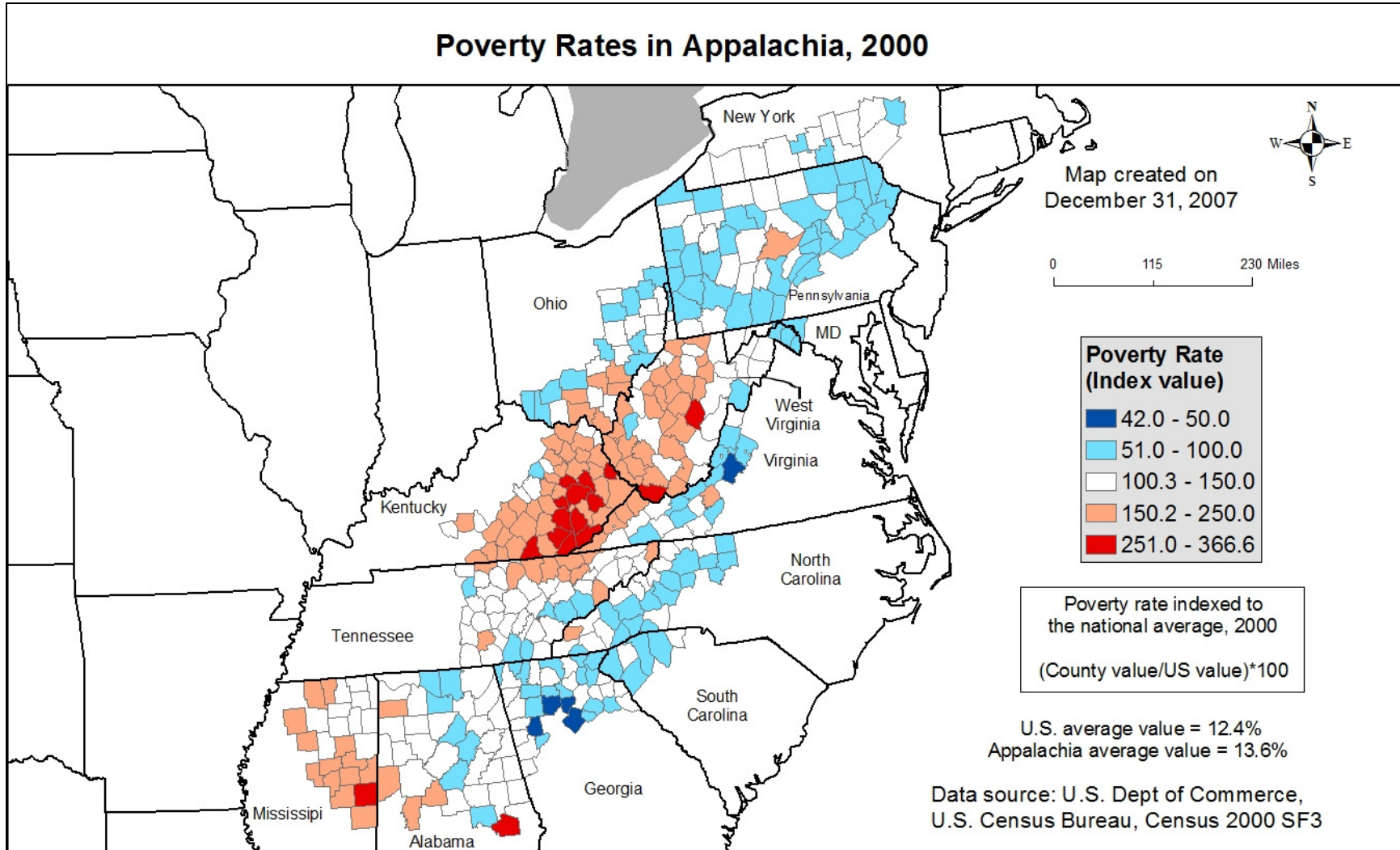
Figure 6.3: Poverty Rate Map in the Appalachian Region

Figure 6.4: Map of Poverty Rates in the United States

Figure 6.5: Map of Unemployment Rates in the United States and Appalachia

Per Capita Market Income in the United States and Appalachia, 2003

Per capita market income indexed to the national average, 2003

Inverse of (county value/US value)*100

Per capita market income
- 229 - 419
- 177 - 228
- 143 - 176
- 111 - 142
- 36 - 110
- Appalachian Region

Map created on December 26, 2007

0   160   320 Miles

0 190 380 Miles

0 70 140 Miles

Data source: U.S. Dept of Commerce, Bureau of Economic Analysis, 2004 Regional Economic Information System
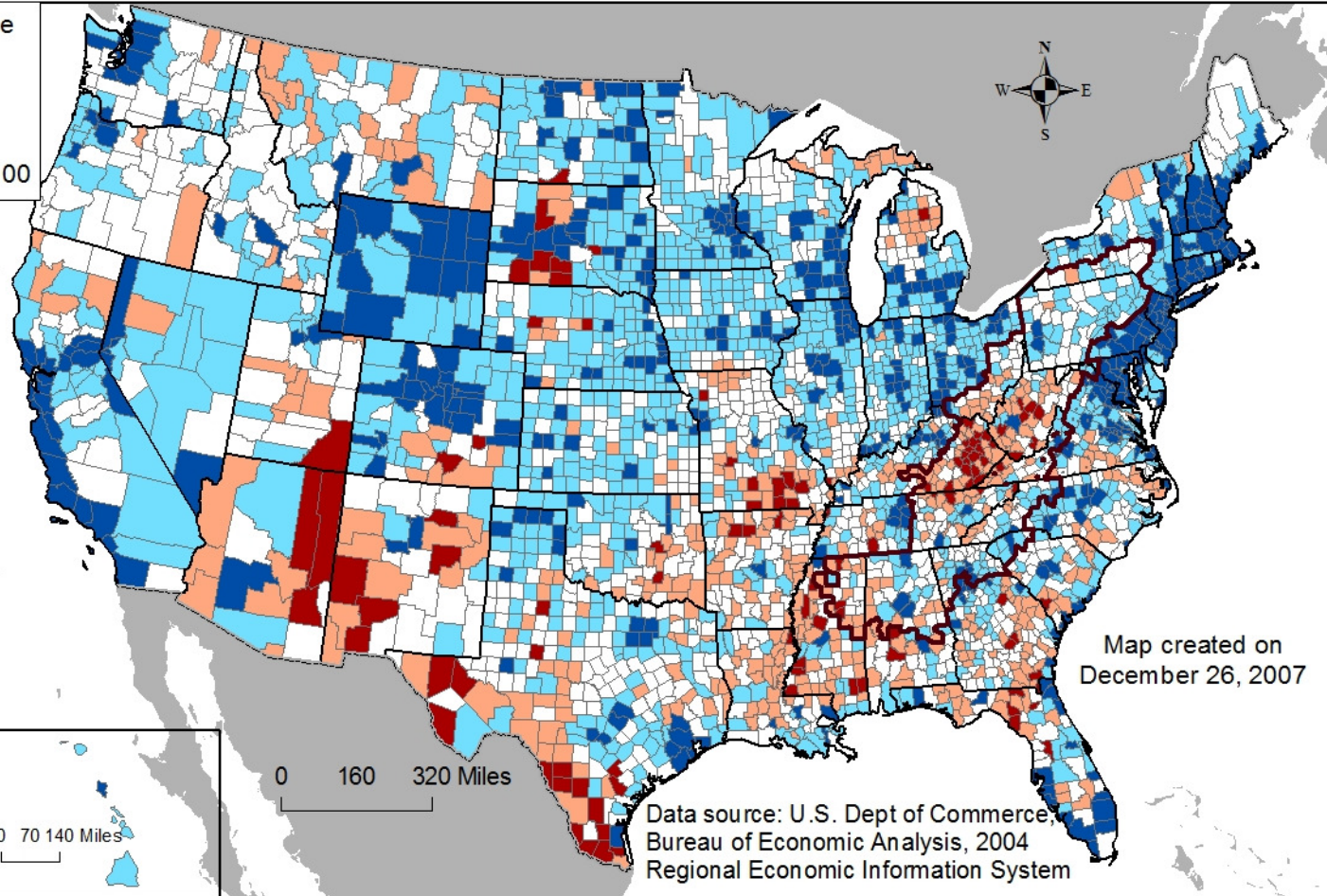
Figure 6.6: Per Capita Market Income in the United States and Appalachia, 2003

**Educational Attainment in Appalachia, 2000
(High School Completion Rates)**

Map created on
December 27, 2007

0   115   230 Miles

High School Completion Rates (%)

■ 49.2 - 59.6
■ 59.7 - 66.2
■ 66.3 - 72.3
■ 72.4 - 78.4
■ 78.5 - 91.4

U.S. average = 80.4%
Appalachia average = 76.8%

This map shows the percentage
of adult population 25 years and
over that have achieved at least
a high school degree.

Data source: U.S. Census Bureau,
2000 Census SF3

New York

Pennsylvania

Ohio

MD

West
Virginia

Virginia

Kentucky

North
Carolina

Tennessee

South
Carolina

Georgia

Mississipi

Alabama

Figure 6.7: Map of Educational Attainment in Appalachia (High School Completion Rates)

73

Total Population Change in Appalachia, 2000-2005

New York

Map created on
December 28, 2007

Ohio

Pennsylvania

0   115   230 Miles

MD

West
Virginia

Percent change

Virginia

-22.6 - -1.9

-1.8 - 5.4

Kentucky

5.6 - 15.0

16.0 - 31.0

33.0 - 67.0

North
Carolina

U.S. average = 9.9%
Appalachia average = 6.4%

Tennessee

South
Carolina

This map shows the total population
change from 2000 to 2005 in
Appalachia.

Data source: U.S. Dept of Commerce, U.S. Census Bureau,
Population Division, 2005 Population Estimates

Mississipi

Georgia

Alabama

Figure 6.8: Map of Total Population Change in Appalachia, 2000-2005

**Prediction of County Economic Status in the United States and Appalachia
(With the relative educational attainment index)**

This map shows changes in economic status of the United States and the Appalachian counties when replacing the ARC's national index with an alternative national index where the ARC's unemployment indicator is replaced with a relative educational attainment index.

Levels of Economic Status

- Distressed
- At-risk
- Transitional
- Competitive
- Attainment
- Appalachian Region

Map created on December 26, 2007

0   160   320 Miles

0   200   400 Miles

0   70   140 Miles

Data source: U.S. Dept of Commerce, Bureau of Economic Analysis, 2004
U.S. Census Bureau, 2000 Census, SF3
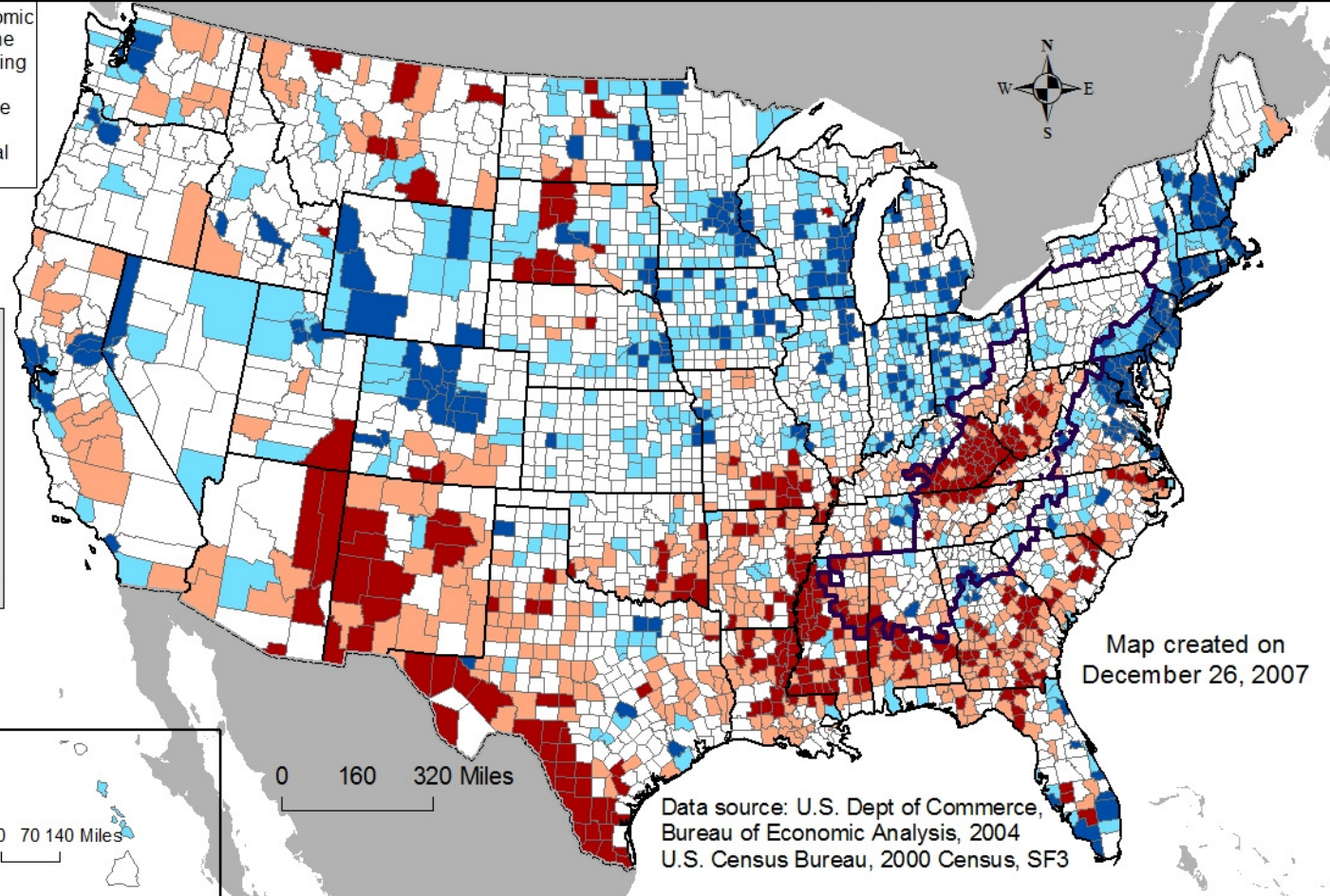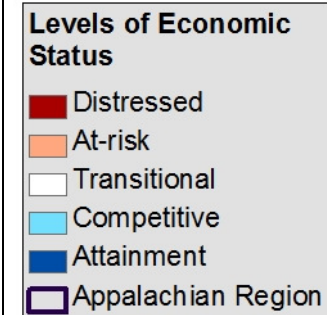
Figure 6.9: Map of Distress Indicator with the Educational Attainment Index

Prediction of County Economic Status in the United States and Appalachia
(With the net population change index)

This map shows changes in economic status of the United States and the Appalachian counties when replacing the ARC's national index with an alternative national index where the ARC's unemployment indicator is replaced with a net population change index.

Levels of Economic Status
- Distressed
- At-risk
- Transitional
- Competitive
- Attainment
- Appalachian Region

Map created on December 26, 2007

0   160   320 Miles

0 200 400 Miles

0 70 140 Miles
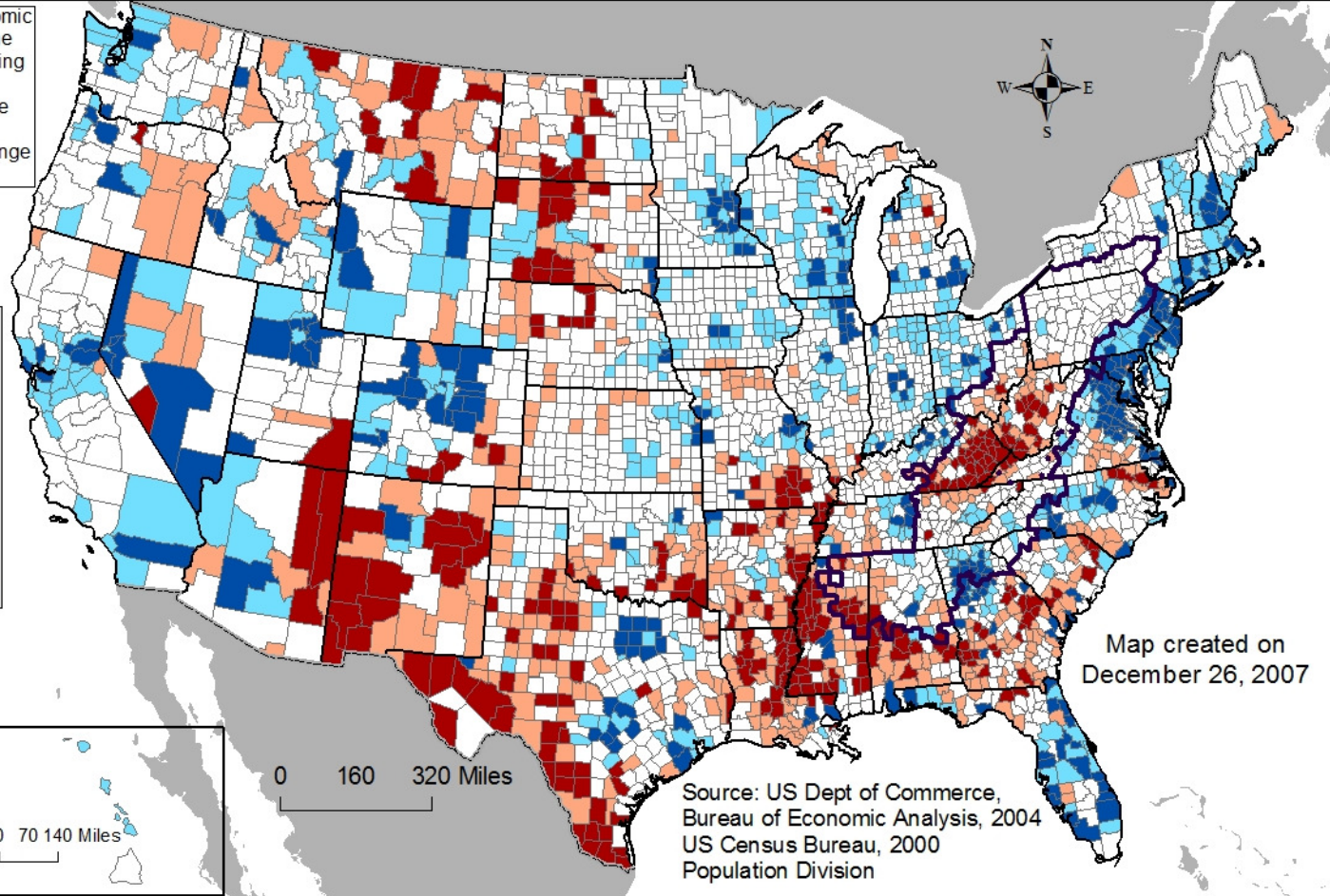
Source: US Dept of Commerce, Bureau of Economic Analysis, 2004
US Census Bureau, 2000 Population Division

Figure 6.10: Map of Distress Indicator with the Population Change Index

Distressed and Non-distressed Status Prediction:
A Comparison between the ARC's Index and Our Index with Educational Attainment

Scenario 1 = cases where both methods produce a distressed county.

Scenario 2 = cases where ARC method produces a distressed county but our method does not.

Scenario 3 = cases where our method produces a distressed county, but ARC method does not.

Scenario 4= cases where both methods suggest the county is not distressed.

Scenarios
- Scenario 1
- Scenario 2
- Scenario 3
- Scenario 4
- Appalachian Region

Map created on December 27, 2007

0   160   320 Miles

0   195 390 Miles

0   70 140 Miles

Figure 6.11: Map Comparing the ARC's Index with Our Index with Educational Attainment

**Distressed and Non-distressed Status Prediction:
A Comparison between the ARC's Index and Our Index with Population Change**

Scenario 1 = cases where both methods produce a distressed county.

Scenario 2 = cases where ARC method produces a distressed county but our method does not.

Scenario 3 = cases where our method produces a distressed county, but ARC method does not.

Scenario 4= cases where both methods suggest the county is not distressed.

Scenarios

- ■ Scenario 1
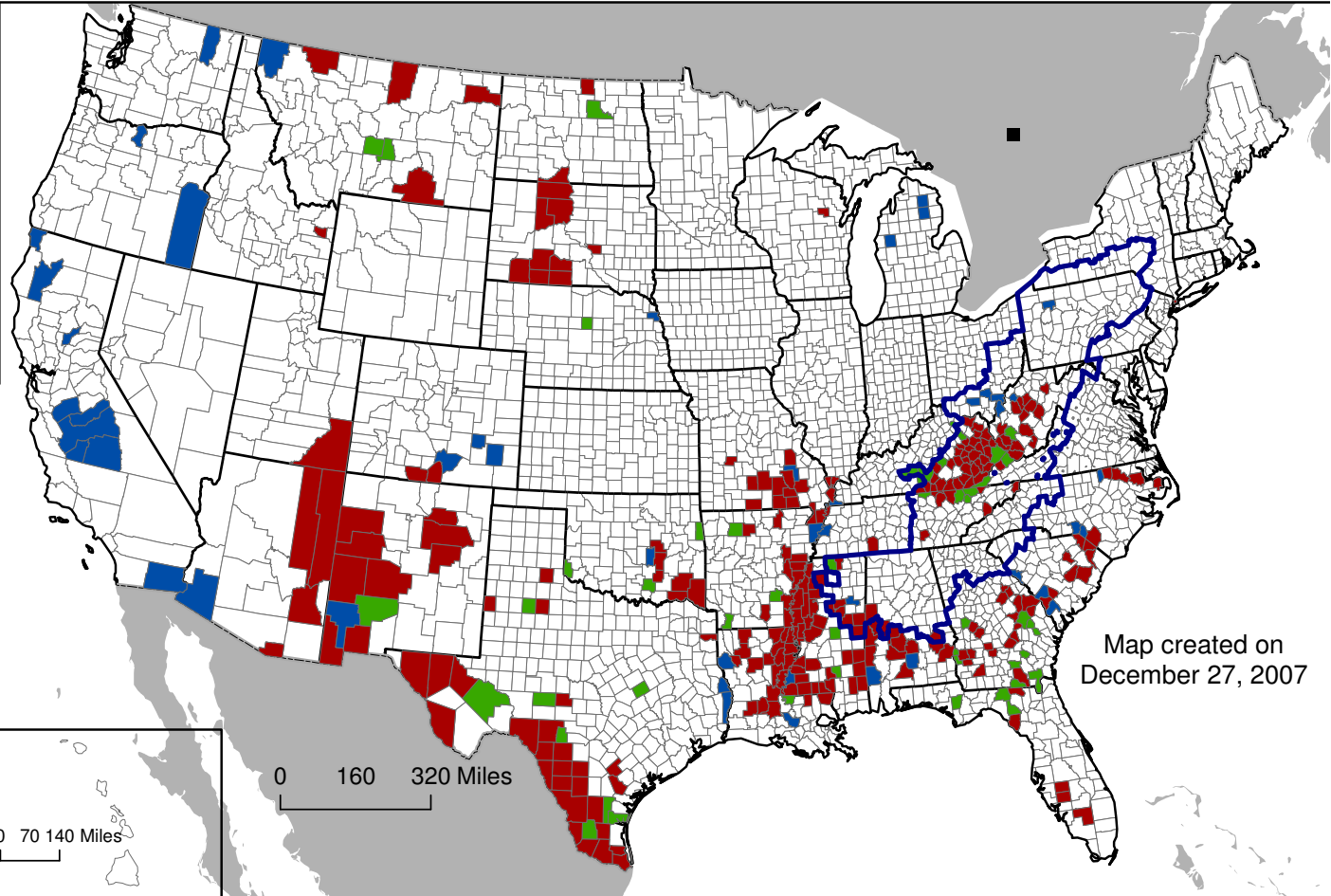- ■ Scenario 2
- ■ Scenario 3
- □ Scenario 4
- ▭ Appalachian Region

Map created on December 26, 2007

0   160   320 Miles

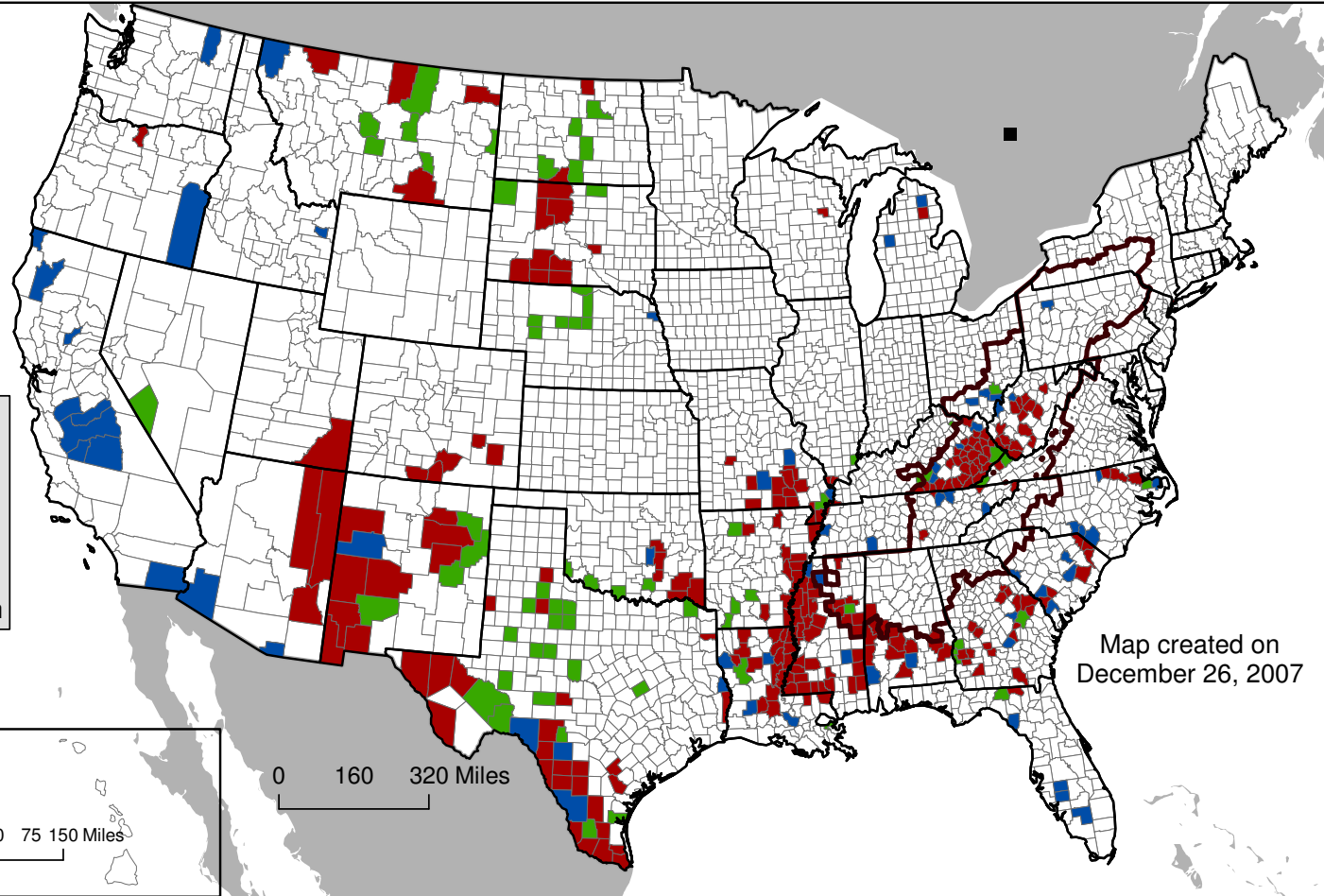0   200 400 Miles

0   75 150 Miles

Figure 6.12: Map Comparing the ARC's Index with Our Index with the Population Change

PART IV - CONCLUSIONS AND RECOMMENDATIONS

7. General Principles and Recommendations for Developing Distress Indicators

7.1. An Updated Economic Distress Index for the Appalachian Regional Commission

As set forth in the RFP, the new distress index should satisfy the following general criteria:

- It should be credible, transparent and likely to be acceptable to ARC, Congress and OMB.
- The component indicators selected for the index should be as up-to-date or delivered with as little time lag as possible.
- The index should be accurate in terms of capturing economic distress in the ARC counties, without identifying false positives (a county that is not really distressed but is identified as such by the index) or false negatives (a county that is in reality distressed but does not show up as such on the index).

Evaluation of the Index	County is in fact:	
Index shows county is:	Distressed	Not Distressed
Distressed	**Correct**	**False positive**
Not Distressed	False negative	**Correct**

Table 7.1: Possible Outcomes from a Distress Index Evaluation

Given the fact that economic distress is a multi-dimensional phenomenon, the proper construction of an index requires multiple indicator measures or variables as "inputs." Thus, each variable needs to have an explicit weight associated with it (whether that weight is 1.0, $1/n$ where n is the number of indicators, or some other number). Not choosing a weight for an indicator (by default) is exactly the same as choosing one, and thus, results in explicit value judgments as to the importance of each factor. In other words, a weight of 1 is just as arbitrary as a weight of 2, 33 or 0.33. For example, as we noted above, the current passive ARC distress index, is, in the end, a *de facto* measure of the poverty rate. And, as we showed in our modest sensitivity analysis using educational attainment and population change, changing variables and/or weights leads to different rankings and to the identification of different counties being labeled as distressed.

Our point is that more empirical work is needed to develop a credible distress index, using actual county-level data going back through time, combined with some ground-truthing with knowledgeable local observers. Thus, a new index can be calibrated against the one current one. Future ARC efforts to adopt a new index should consider adding an additional option that involves "listening" to local experts across the region in order to gauge the range for which indicator variables should be weighted in a distress index—i.e., to ensure that the indicators reflect the reality on ground. For example, should a proper index place considerably more weight on variation in poverty rates (as is currently the case by default rather than by design) relative to other indicator variables? Likewise, as we have noted

repeatedly, the proper indicators would also need to be determined to gauge distress in the 21st Century.

7.1.1. General Principles for Further Analysis

A well-constructed distress index should track how the ARC counties are performing relative to non-ARC counties, and how they are performing relative to one another. Though the current ARC index may be lacking in some dimensions, it does reasonably well in terms of being benchmarked to the U.S. average. However, the following principles should be applied with regard to the possible revision of the index:

1. The ARC should consider reducing the dominating influence that the poverty rate currently has on the overall distress index. This would be accomplished by generating z-scores that standard-normalize each indicator variable by subtracting its mean and dividing by its standard deviation. Of course, each variable would need to be appropriately weighted and empirical verification would be necessary. Such a standard normalization would even the playing field for the variables comprising the index in the sense that each variable is given a more equal relative weight, regardless of how much it varies statistically. This is also relevant for regression analyses discussed in point 7 below. In revising the distress index, future research should assess how much of a difference standard normalizing each indicator variable would make.

2. An explicit weighting of each variable—perhaps equal to one—will create greater transparency regarding how each variable affects a given county's distress ranking. For example, using z-scores, a variable could be transparently given a weight of 2 by multiplying the variable's z-score by 2. Conversely, under the current ARC distress measure, it is not transparent how much more weight the poverty rate receives as compared to the other two indicators. Yet, as Partridge (2007) notes, the current ARC distress index corresponds quite closely to a poverty mapping from the late 1970s.

3. The current ARC indicators—poverty, unemployment and PCMI—may not describe the current or future situation in a county because they reflect the cumulative effects of previous economic forces. Instead, they describe the situation as it existed two (or more) years earlier. We strongly recommend that the ARC consider adopting better indicators that help predict future distress for directing government expenditures (Appendix A.2 presents materials on lagging, coincident and leading indicators.)

4. In the past, ARC has had to measure distress using indicators that were at least two or even more years out of date. This should be less of a problem in the future with the American Community Survey.

5. As a supplementary measure, ARC could consider using a leading economic indicator – in the form of building permits issued or other relevant variables (see Appendix A.2). Building permit numbers are released with only a relatively short delay of 12 months or less, and they help describe local economic conditions (subject to caveats discussed elsewhere). The Conference Board uses building permits as a leading measure of U.S. national economic activity.[31]

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[31]The Conference Board's methodology for constructing their indexes of economic activity can be found at:

6. The ARC should weigh whether economic conditions in nearby counties are components of a given county's level of distress. If neighboring counties are distressed, then economic spillovers across county-lines may increase the distress burden of the county in question. This phenomenon could be assessed using geographical weighting procedures described in Section 5.3.1.

7. To validate potential distress indicators, we strongly recommend using econometric modeling to determine how well the contemporaneous measures of distress presage future economic conditions. For example, using models developed from regression analysis, one can simulate over time how well a particular variable predicts structural economic (distress) conditions in a future period. A general approach for accomplishing this as a validity check could be to regress outcomes over the period 2000-2007 on initial conditions in 2000.

8. Another 'reform' that the ARC should consider is a finer delineation of distress to better address the absolute threshold issue of either being "in" or "out" of distress or the related issue of greater severity of distress. The advantage of a finer delineation is that it would target more funding to the most severely distressed cases, while at the same time, including counties that fall just below the "distressed threshold." Clearly, the group of "most at risk" counties faces structural issues much like their distressed cousins and including them for funding would partially mitigate the concerns of counties that fall just below the "distressed" threshold.

7.1.2. Related Questions for Further Analysis

1. High poverty rates have persisted for decades in certain ARC counties. Other counties in the region have had low rates since ARC was first formed. Are there other key correlates (additional information) that account for these differences? A conceptual framework would provide guidelines for selecting the indicators that best represent distress, assessing the causes of distress, and designing policies that are intended to alleviate it.

2. Counties in the northern reaches of the ARC have low poverty and unemployment rates, as well as high educational attainments compared to other ARC counties. Thus, these counties tend not to show up as distressed. To what extent then, are there sub-regional variations in distress? If a range of different indicators were evaluated, would the northern ARC counties still tend to have lower distress rankings?

3. Even though individuals who are left behind in the northernmost counties may not live in poverty or experience high rates of officially-recorded unemployment. However, they do suffer from the (unmeasured) externalities or spillovers associated with the departure of long-time residents (Kilkenny and Johnson, 2007). To what extent should these spillovers be considered in the funding formula?

4. Increasing urbanization in the southern areas of the ARC has resulted in general reductions in distress. Many remote areas of southern and central Appalachia have not experienced this relative prosperity. Issues of race and class still plague many communities. What additional social issues and problems continue to influence patterns of distress in Appalachia?

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http://www.e-forecasting.com/US_Leading_Economic_Indicator.htm.

7.2. Recommendations for Selecting Variables and Developing a Distress Index

7.2.1. Review of Current Indicators

Section 4, 5 and 6 discussed various shortcomings of the current ARC distress index consisting of poverty rates, unemployment rates, per-capita market income (PCMI). The key concern is that the current index is a *de facto* poverty rate measure. Moreover, because the poverty rate is so persistent, the current list of distressed counties is almost synonymous with lagged poverty rates from decades ago. Our point is not that poverty is a weak measure of distress, but rather that it may be receiving too much weight in the process of determining the distress status of counties.

Another shortcoming with the current indicators is that the poverty rate varies significantly across the ARC region, as well as the country. By contrast, PCMI and the unemployment rates vary less across the region and country. Because the poverty rate is more variable, it drives whether a county appears to be distressed or falls into the attainment category. This could be corrected by weighting each variable differently in the construction of the overall distress index. A final problem is that the unemployment rate and PCMI are increasingly flawed measures of distress due to socioeconomic shifts. For example, differences in unemployment rates no longer clear reflections of economic conditions due to migration patterns—i.e., at the local level, job growth and changes in unemployment are very low.

For these reasons, we encourage the ARC to reexamine its current distress index to better reflect socioeconomic shifts since the 1980s. Likewise, indicators could better capture future distress in order to guide funding to areas that are designed to mitigate future problems rather than providing band-aids for past characteristics of distress. Finally, future efforts need to rigorously examine the weights that should be placed on each variable so that the distress indicator fully reflects the intended structural weaknesses.

7.2.2. Next Steps

In a quest to assess persistent distress, a rigorous appraisal of the underlying structural factors that predict future *distress would be in order. Such a conceptual framework would inform the ensuing statistical investigation.*

From this conceptual framework, we envision a new distress index that consists of three to five major components (each of which may have a number of sub-components), that are to be standard-normalized to facilitate a transparent weighting process. Weights would be determined based on consultation with key informants and on the basis of the outcomes (that is, how well they predict or correlate with actual conditions of local distress).

The ARC would be presented with several different distress indexes. Key information that would be considered would include the counties that changed status—i.e., enter the distress category or exit the distress category. Our basic sensitivity analysis in Section 6 provides a good example of how such an analysis could present such findings. We envision the ARC being presented with maps and tables showing the results of an extensive sensitivity analysis.

We believe that the following variables deserve further close examination:

After evaluating over 50 indicator variables, we believe the following form the core indicators of future analysis for a distress indicator. They are transparent, valid, reliable, easy for stakeholders to understand, and available at a relatively low cost. We also offer a set of secondary indicators that would be of value for stakeholders for tracking progress. A data dictionary for the key core and secondary variables we recommend for consideration is provided in Table 7.2.

1. Population Change: Population change -- including its key component such as out-migration -- forms an important mechanism for dealing with economic decline. As such, it should be considered for use in any future distress index. Population loss is a real measure of economic deterioration, and counties should not be penalized in the distressed counties formula for tackling their economic problems through out-migration. Over longer periods, population change also closely proxies for employment change, capturing a key economic component as well. Further assessment of the composition of population change would be warranted. For instance, is distress more related to migration of young workers, or is distress linked more to changes in the numbers of retirees?

   Adjustment assistance to counties experiencing significant population loss can be motivated with two arguments: (1) Those staying behind have to deal with real negative consequences of a smaller population base; and (2) Assistance could stem or even reverse the outmigration (See section 5.1 for further discussion).

2. Educational Attainment: Education is the prime measure of human capital, is an underlying determinant of an individual's *current* and *future* earnings capacity, and is highly correlated with other factors such as poverty. It is also associated with an individual's ability to adjust to economic change and succeed in the knowledge economy. For these reasons it is connected to current distress and is a forward-looking measure of future distress. Indeed, adding high school educational attainment was more important than adding population change in terms of affecting county exit/entry into/from distress, as shown by the sensitivity analysis in Section 6. A full set of measures should be considered, including the proportion with an associate degree, four-year college degrees, and net changes in educational attainment as a way of determining whether there is an ongoing problem with brain drain.

3. Income: Per capita market income is another possible measure of economic well-being or distress, and it should be considered as a potential candidate in a new index (see section 5.2 for further discussion). Yet, as noted above, lower per-capita income can reflect amenities, lower cost of living, and other factors that are not related to distress. For these reasons, other measures of income and earnings should be weighed as well, including recent trends in changes in income.

4. Housing or Housing Change: Some measure of building permits, coupled with changes in property values, would reflect the forward-looking economic outlook of each individual county. Property values denote local on-the-ground assessments of the future direction of the community by private entrepreneurs (the market). Changes in new home construction are also good forecasts of changes in future population.

5. <u>Entrepreneurship and Self-Employment:</u> A forward-looking measure of the local community's ability to compete is having a strong entrepreneurial capacity. Though "entrepreneurial capacity" cannot be directly measured from any federal data source, a good proxy is self employment as owners of small businesses. Because small business formation is motivated by a host of favorable and unfavorable reasons, the ARC should consider investing resources to sort out "reactive" from "radical" entrepreneurship in the region. As section 5.2.5 described, one clue regarding the extent to which self-employment growth in an Appalachian county is *radical* (response to opportunity) as opposed to *reactive* (response to necessity) may be found in the returns to self-employment. This distinction could be an important measure of a county's ability to adjust to new employment realities.

6. <u>Labor Market Strength:</u> Several measures of labor market conditions should be considered in a refined distress index. As noted above, the unemployment rate fails to adequately capture labor market conditions. As described in Section 5.1.4, the *employment rate* (employment rate/population that is sixteen years old and over), in conjunction with annual employment growth, are better indicators of overall labor market strength. The employment rate directly captures labor force participation, unemployment and discouraged worker effects. It also proves more informative than the conventional unemployment rate measure.

7. <u>Poverty Rate:</u> The poverty rate should remain one of the core variables that indicate distress. Yet, future assessment should consider the proper weight to place on the poverty rate. Moreover, this investigation should consider the overlap of poverty with the other indicators included in the complete distress index.

8. <u>Other Alternative Measures:</u> Our final recommendation is for the ARC to report a more complete listing of indicators for the region beyond those narrowly interpreted as distress. These would include a large number of the alternative indicators discussed in various sections of this report, such as the more innovative measures of social capacity. Though many of these measures are not suited to be among the four or five core selected indicators of distress, they would offer the ARC counties and interested parties a more comprehensive/holistic gauge of their progress towards meeting regional goals aside from "distress." By providing a more complete list of measures, individual counties can customize their benchmarks to monitor progress. Such measures could be reported at a relatively low cost on the ARC web-site for access by interested users.

Some candidates for inclusion in a secondary list of indicators include:
- Social capital proxies such as voter participation rates, home ownership, and residential stability to help assess various forms of social development and capacity-building;
- Local government capacity to provide services; because of limitations in Census of Government data, a full delineation of fiscal capacity will require data collection from taxation and revenue departments at the state level, which may be more costly;
- Foreclosures and vacancy rates for local housing;
- Amenities and quality of life indicators;
- Demographic change including changes in immigrants;
- An index of leading economic indicators for each county;
- Knowledge-economy occupational changes;
- Share of local employment in industries that are vulnerable to international competition.

Indicators	Overall assessment, strengths, and weaknesses	Geography	Cost	Source	Frequency	Timeliness
Current						
Poverty rate	Good measure of structural problems of a location, but households just above poverty not included	County, Census tract	No cost	U.S. Census Bureau, ACS[1]	Decennial but will become annual with ACS	9 month lag
Unemployment rate	Easy to obtain, use, and interpret; but may not reflect labor market conditions	County, Census tract	No cost	U.S. Census Bureau, Bureau of Labor Statistics, and ACS	Annual	Two-year lag
Employment rate	Better than unemployment rate, but cannot adjust for the size of the local working age population	County and census tract	No cost	Local Area Unemployment Statistics, Bureau of Labor Statistics, and ACS	Annual	Almost no delay
Employment growth	Can give clues about local economic conditions, but does not reflect place of residence prosperity	County	No cost	U.S. Bureau of Economic Analysis (BEA)	Annual	Eighteen-month delay
Per capita income	A good measure of well-being, but does not account for differences in the cost of living over space, does not reflect average wages, and does not measure income inequality	County and Census tract	No cost	Regional Economic Information System, U.S. Dept of Commerce, and BEA	Annual	Two-year lag
Population or net migration rate	Reflects many elements missing in the existing ARC indicators.	County, Census tract	No cost	U.S. Census Bureau, IRS	Annual	9-month lag

[1]: See Section 5 for more details. American Community Survey (ACS) will be available in 2010.

Table 7.2: Data Dictionary

Indicators	Overall assessment, strengths, and weaknesses	Geography	Cost	Source	Frequency	Timeliness
Housing conditions	Can predict future conditions in a county, but quality of data for nonmetro areas could be of concern	County	No cost	ACS, U.S. Census Bureau	Updated Quarterly	
Population change/In- and out-migration	Useful to track down origin and destination of migrants, but not entirely complete	County	$500 per year for the entire U.S.	IRS income tax database, ACS	Annual	Two-year lag
Forward-looking						
Building permits	Do not reflect construction activity outside areas subject to local permit requirements, not all local governments regularly report their data	County	No cost	U.S. Census Bureau	Monthly, Annual	Minimal lag
Foreclosure (F) and vacancy rates (VC)	Important measure of local economic well-being, but need to be examined in the context of population change	County	No cost	F: RealtyTrac.com, VC: ACS	F: Daily, VC: annually with ACS	F: No lag VC: many lags
Self-employment/ entrepreneurship	A good indicator for future well-being, but research is needed to separate radical from reactive self-employment	County	No cost	U.S. Census Bureau, Dept. of Commerce, BEA, ACS	Annual	Two-year lag
Educational attainment	Very good predictor of future economic growth, but does not reflect quality of education and has an arbitrary nature	County and census tract	No cost	ACS	Annual	Two-year lag
Natural amenities/ natural capital	Good indicator of natural capital base, but not a good indicator of distress.	County	No cost	Economic Research Service (USDA)	Every several years	NA

Table 7.2: Data Dictionary, Cont.

Indicators	Overall assessment, strengths, and weaknesses	Geography	Cost	Source	Frequency	Timeliness
	Social Capabilities					
Local government capacity	Reflects fiscal health and resources, data available for small counties, but data quality not uniform across all counties	County	No cost	Census of Governments	Every five years	
Social capital	See Table 5.3 for a list social capital variables and their sources. These variables can be obtained at zero or a nominal fee.					

Table 7.2: Data Dictionary, Cont.

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Appendices

Appendix A.1 Maps of Distress Indicators with the Refined Categories

County Economic Status in the United States and Appalachia
(Distress status categories refined)

This map shows a refinement of the ARC's distress status categories which splits the transitional counties into "Weakly" and "Strongly" transitional. It is based on the ARC's 2007 national index which is composed of three indicators: unemployment, poverty, and per capita market income

Levels of Economic Status

- Distressed
- At-risk
- Weakly transitional
- Strongly transitional
- Competitive
- Attainment
- Appalachian Region

Map created on December 28, 2007

0   160   320 Miles

0 200 400 Miles

0 70 140 Miles

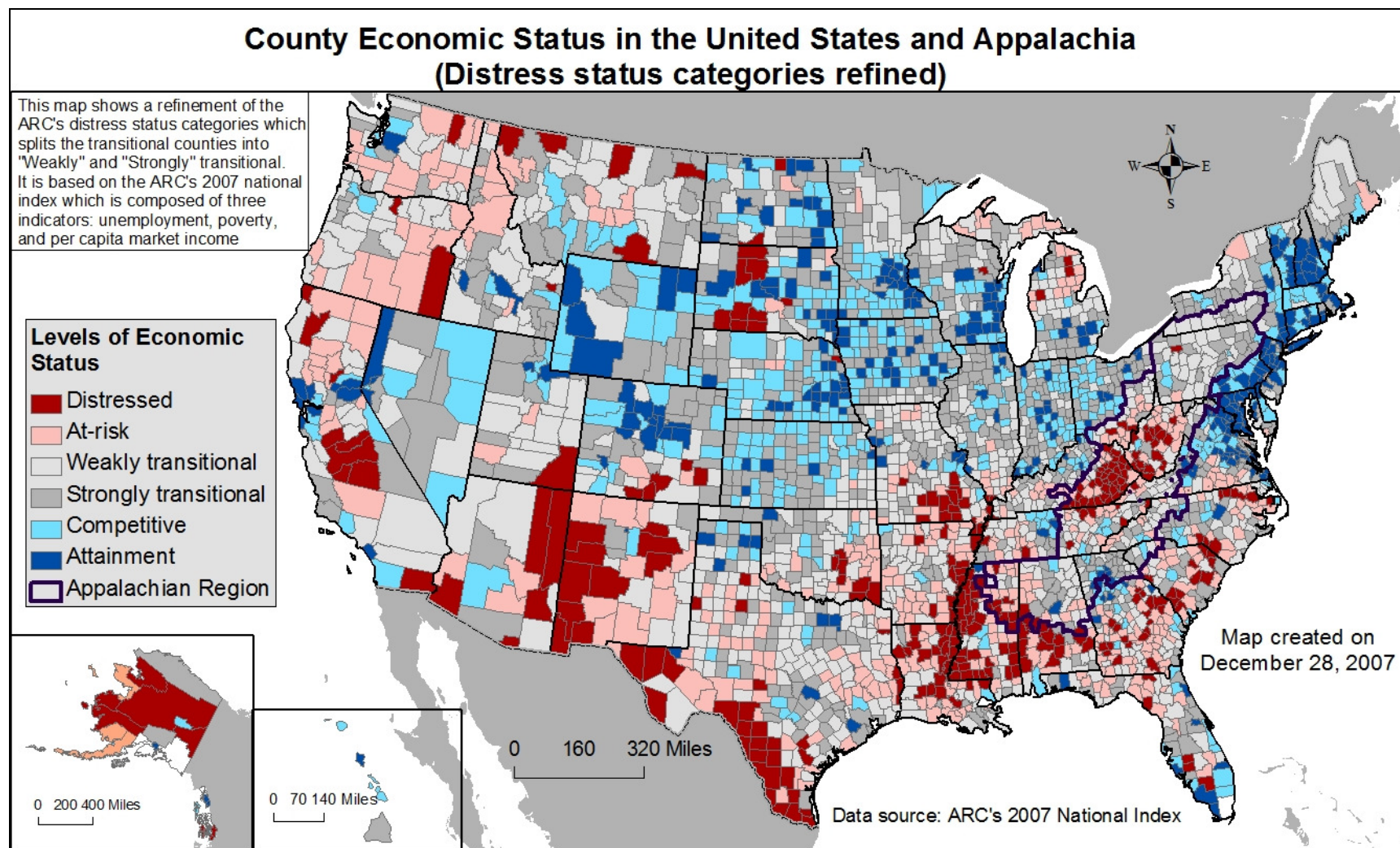Data source: ARC's 2007 National Index

Figure A.1: Map of ARC's Distress Indicator with the Refined Economic Status

Prediction of Refined County Economic Status in the United States and Appalachia (With the relative educational attainment index)

This map shows a refinement of the ARC's distress status categories which splits the transitional counties into "Weakly" and "Strongly" transitional. It is based on our alternative national index which includes the relative educational attainment index.

Levels of Economic Status

- Distressed
- At-risk
- Weakly transitional
- Strongly transitional
- Competitive
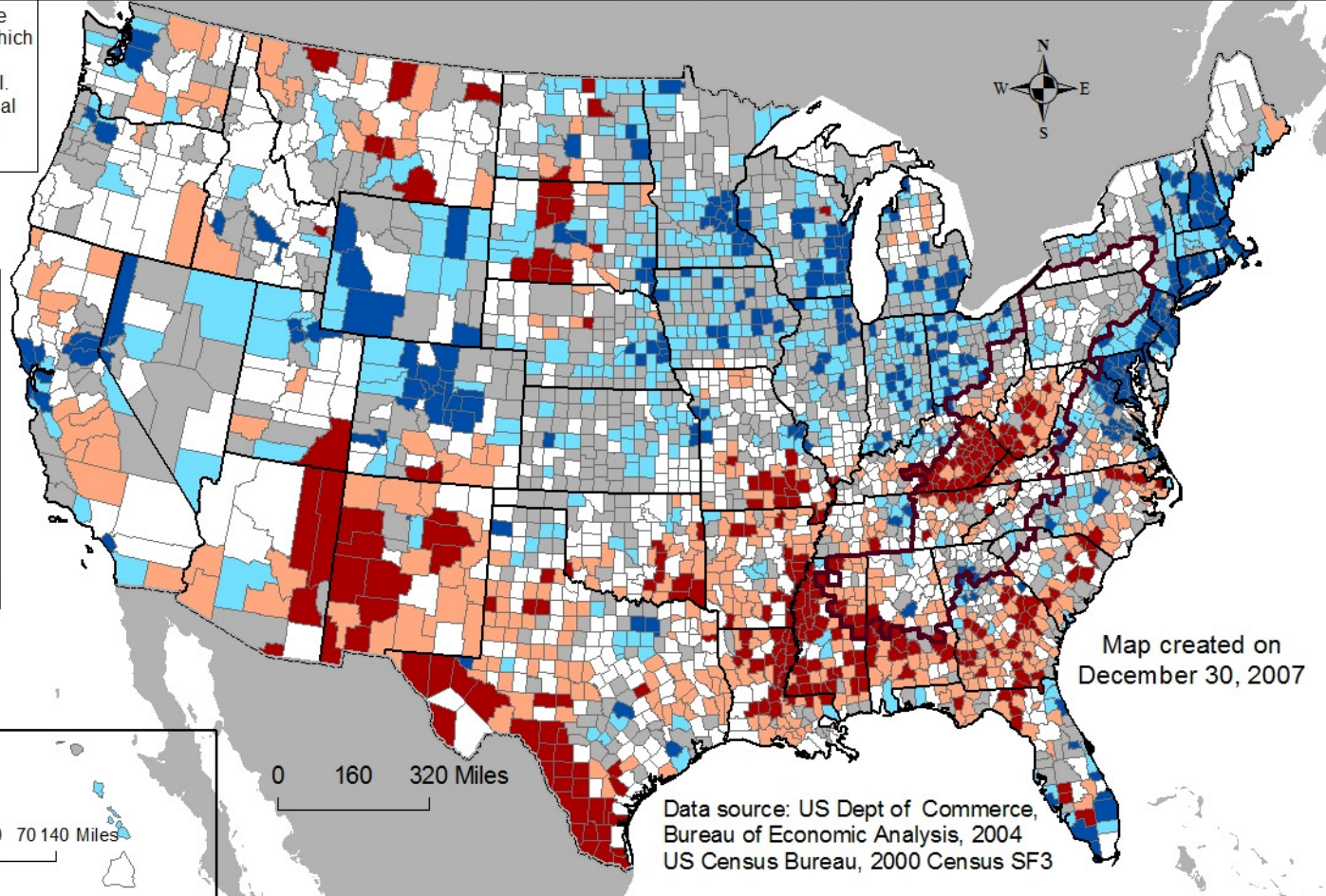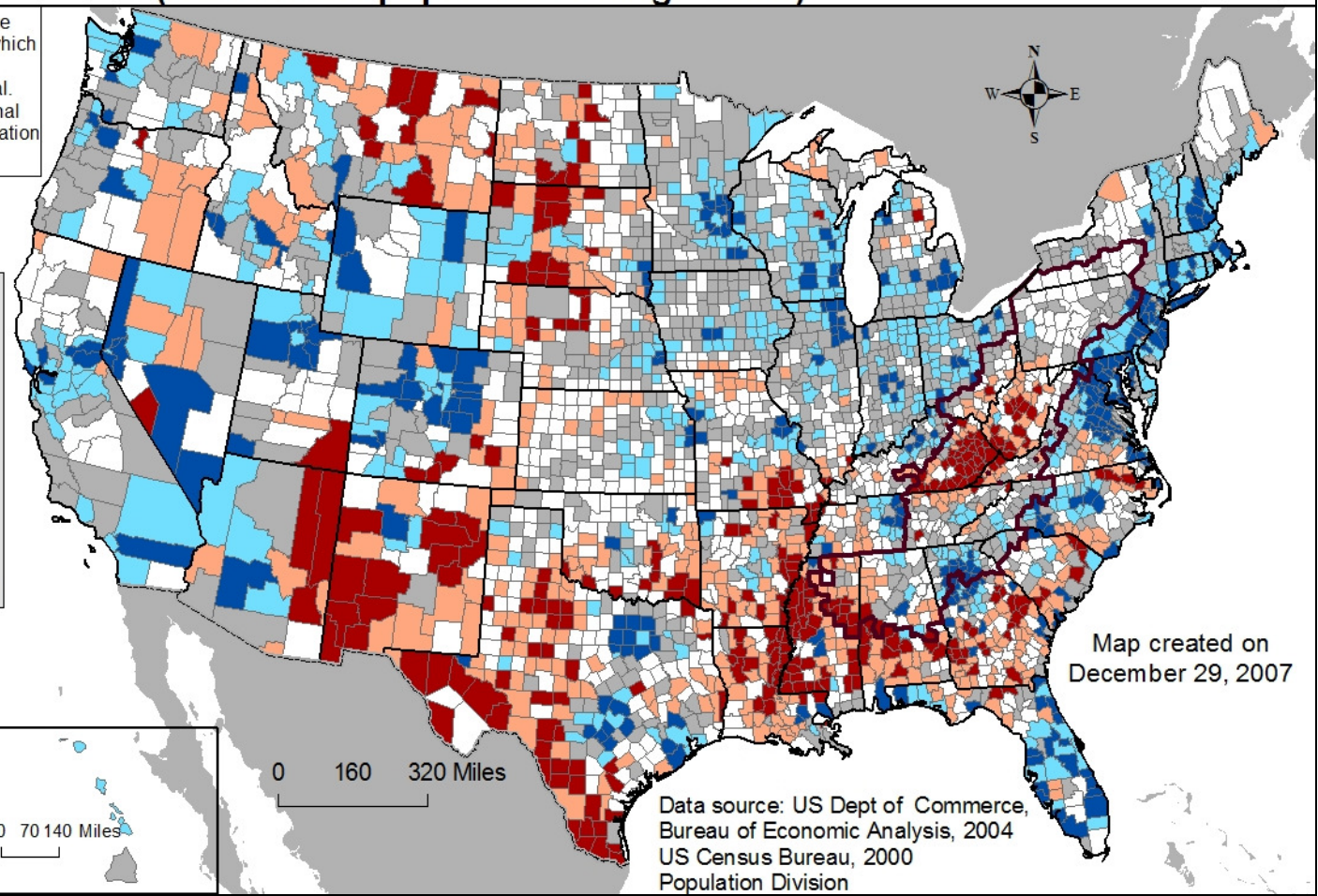- Attainment
- Appalachian Region

Map created on December 30, 2007

0   160   320 Miles

Data source: US Dept of Commerce, Bureau of Economic Analysis, 2004
US Census Bureau, 2000 Census SF3

0 200 400 Miles   0 70 140 Miles

Figure A.2: Map of Prediction of Refined Economic Status Using Our Index with Educational Attainment

101

**Prediction of Refined County Economic Status in the United States and Appalachia
(With the net population change index)**

This map shows a refinement of the ARC's distress status categories which splits the transitional counties into "Weakly" and "Strongly" transitional. It is based on our alternative national index which includes the net population change index.

Levels of Economic Status

- Distressed
- At-risk
- Weakly transitional
- Strongly transitional
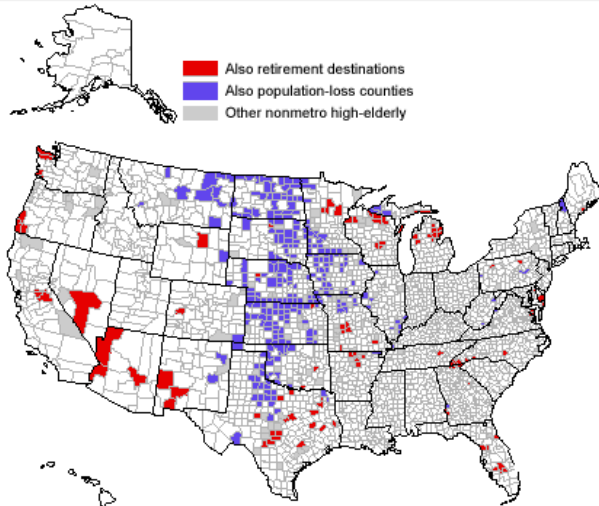- Competitive
- Attainment
- Appalachian Region

Map created on December 29, 2007

0   160   320 Miles

0   200 400 Miles

0   70 140 Miles

Data source: US Dept of Commerce, Bureau of Economic Analysis, 2004
US Census Bureau, 2000
Population Division

Figure A.3: Map of Prediction of Refined Economic Status Using Our Index with Population Change

Nonmetro counties with above-average (18 percent or higher) population 65 and older, 2000

Also retirement destinations
Also population-loss counties
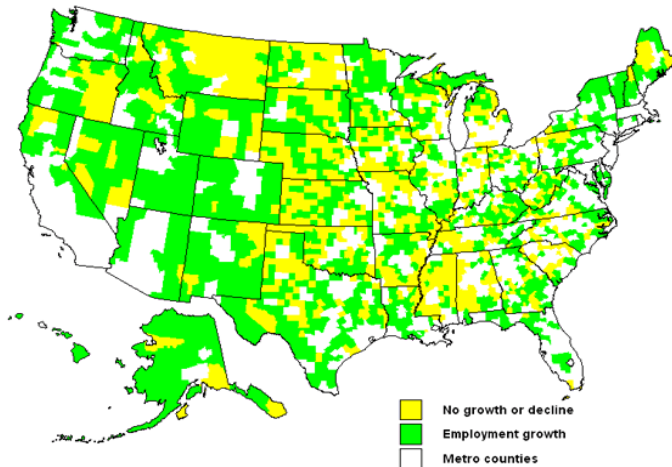Other nonmetro high-elderly

Figure A.4: Nonmetro Counties with Above-average (18 percent or higher) Population 65 and above, 2000

Source: USDA, ERS using data from the U.S. Census Bureau and ERS County Typologies.

Nonmetro employment change, 2000-2006

Figure A.5: Nonmetro Employment Change, 2000-2006

No growth or decline
Employment growth
Metro counties

Source: Calculated by ERS using data from the Bureau of Labor Statistics.

Average commute times in nonmetro counties, 2000
Longest commutes are in mountainous areas and in counties near metro areas

Figure A.6: Average Commute Times in Nonmetro Counties, 2000

Commute times

Metro
25 minutes or more
20.1 - 24.9 minutes
20 minutes or less
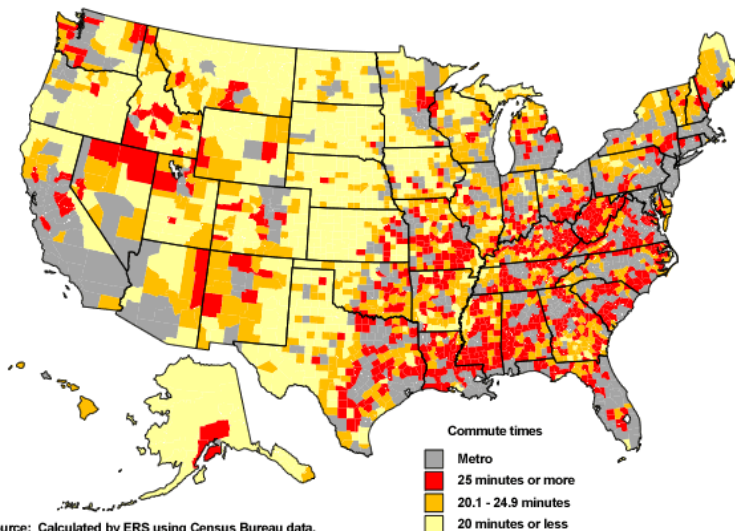
Source: Calculated by ERS using Census Bureau data.

103

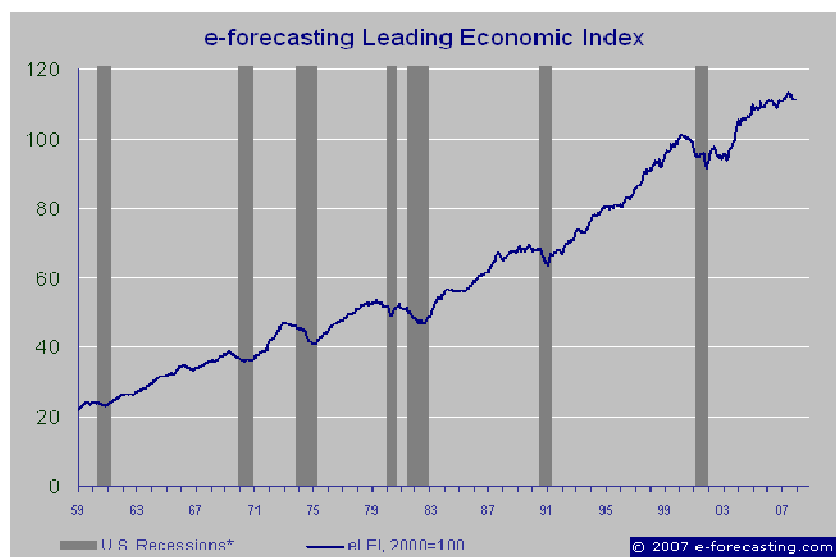## Appendix A.3 Materials on Leading, Coincident, and Lagging Indicators

Figure A.7: E-forecasting Leading Economic Index

The following describes leading, coincident, and lagging economic indicators used to construct the national index of leading, lagging, and coincident economic indicators.

Ten Components of the U.S. National Leading Economic Indicator: Vendor performance, average weekly manufacturing hours, manufacturers' new orders for nondefense capital goods, stock prices, average weekly initial claims for unemployment insurance (inverted), index of consumer expectations, real money supply, building permits, interest rate spread, and manufacturers' new orders for consumer goods and materials

Four Components of the Coincident Economic Indicator: Personal income less transfer payments, industrial production, employees on nonagricultural payrolls, and manufacturing and trade sales.

Seven Components of the Lagging Economic Indicator: Change in CPI for services, commercial and industrial loans outstanding, change in labor cost per unit of output, ratio of consumer installment credit to personal income, average prime rate charged by banks, average duration of unemployment (inverted) and the ratio of manufacturing and trade inventories to sales.
Source: Conference Board

http://www.e-forecasting.com/U.S._Leading_Economic_Indicator.htm